Total No. of Questions : 10]

SEAT No. :

P3411

[Total No. of Pages : 2

[6005]-501

First Year M.E. (Civil) (Construction & Management)

APPLICATIONS OF STATISTICAL METHODS IN CONSTRUCTION

(2017 Pattern) (Semester - I) (501021)

Time :3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8 and Q.9 or Q.10.***
2) ***Neat Diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary and clearly state.***
5) ***Use of cell phone is prohibited in the examination hall.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) Explain in details Rules of Probability & The Baye's theorem. **[10]**

OR

Q2) What are the 5 basic methods of statistical analysis? **[10]**

Q3) Determine the mean and variance of the random variable X having the following probability distribution. **[10]**

$X = x$	1	2	3	4	5	6	7	8	9	10
$P(x)$	0.15	0.10	0.10	0.01	0.08	0.01	0.05	0.02	0.28	0.20

OR

Q4) Determine the mean and variance of a discrete random variable, given its distribution as follows: **[10]**

$X = x$	1	2	3	4	5	6
$F_x(x)$	$\frac{1}{6}$	$\frac{2}{6}$	$\frac{3}{6}$	$\frac{4}{6}$	$\frac{5}{6}$	1

P.T.O.

Q5) If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 1000 individuals more than two will have bad reaction. A manufacturer who produces medicine bottles finds that 0.1% of the bottles are defective. The bottles are packed in boxes containing 500 bottles. Find the probability that in 100 such boxes how many are expected to contain (a) no defective (b) at least two defective bottles. **[10]**

OR

Q6) What is the expectation or mean of a discrete random variable? **[10]**

Q7) Explain Griffi's waiting line Method, Concept of Downtime Cost of Equipment **[10]**

OR

Q8) a) What is simulation explain with suitable example and what is significance of random numbers? **[5]**

b) Explain with example: **[5]**

i) Nunally model

ii) Failure cost Profile

Q9) Explain in detailed **[10]**

a) Sensitivity analysis

b) Role of mathematical model in construction management.

OR

Q10)a) Describe in brief ABC Analysis? **[5]**

b) Describe in brief EOQ in Civil Engineering? **[5]**

Total No. of Questions : 8]

SEAT No. :

P3412

[Total No. of Pages : 2

[6005]-502

First Year M.E. (Civil-Construction & Management)

MANAGEMENT AND PROJECT PLANNING IN CONSTRUCTION

(2017 Credit Pattern) (Semester-I) (501022)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary and clearly state.***
5) ***Use of cell phone is prohibeted in the examination hall.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) a) Discuss the SWOT analysis of construction industry in general. **[4]**

b) Justify the sentence "Mayo is the father of Human relations movement" by discussing his contributions. **[5]**

OR

Q2) a) Explain the work breakdown structure implemented in industrial shade construction. .**[4]**

b) What do you mean by Autocratic management styles? Discuss the advantages and drawbacks of the same. **[5]**

Q3) a) Write the steps adopted in resource levelling. **[4]**

b) Explain the photography technique for work measurement on a construction site. **[5]**

OR

Q4) a) Draw a multiple activity chart for construction of brick wall. **[5]**

b) What are the activities to be carried out for site mobilization? **[4]**

Q5) a) How to promote safety culture on site? State the types of trainings required.**[8]**

b) Write safety procedure for launching of girder of a flyover on site. **[8]**

OR

P.T.O.

Q6) a) Explain in brief : Workmen compensation act. **[8]**

b) What are the direct and indirect costs in an accident? **[8]**

Q7) a) What is meant by Job Evaluation? Explain any one technique under it. **[8]**

b) Write a detailed note on Artificial Neural Network. **[8]**

OR

Q8) a) What is the meaning of "Merit Rating"? Give its importance and drawbacks. **[8]**

b) Write detailed note on various Software used for artificial intelligence techniques. **[8]**

Total No. of Questions : 10]

SEAT No. :

P-3413

[Total No. of Pages : 2

[6005]-503

F.Y. M.E. (Civil) (Construction & Management)

CONSTRUCTION TECHNOLOGY

(2017 Pattern) (Semester - I) (501023)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or 4Q, Q.5 or Q.6, Q.7 or Q.8 and Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary and clearly state.***
5) ***Use of cell phone is prohibited in the examination hall.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) a) Define is vibro - compaction method of soil compaction and Explain any one in detail. **[5]**

b) State objectives of the dewatering system. Explain Electroosmosis dewatering method. **[5]**

OR

Q2) a) Explain Electro Osmosis dewatering process in detail with its applicability. **[5]**

b) Enlist the grouting materials used. Focus on cement grouting in detail. **[5]**

Q3) a) Explain is Boom Placer? State its necessity and draw well sketch which is showing angles of its. **[5]**

b) Explain the sequential operations involved in construction of sheet pile cofferdam for construction of bridge pier. **[5]**

OR

Q4) a) Explain in detail Jet grouting and Chemical grouting. **[5]**

b) "Rapid Hardening Cement is suitable for under water concreting", support this statement with conditions of underwater and characteristics of RHC. **[5]**

P.T.O.

Q5) a) Discuss the operations involved in construction of diaphragm wall. **[5]**

b) Explain Cofferdam wall by ICOS method in detail. **[5]**

OR

Q6) a) Explain construction of double wall cofferdam. **[5]**

b) Explain Which factors are considered in geotechnical investigation of caisson construction? State importance of each factor. **[5]**

Q7) a) Explain the sequential operations involved in construction of hammered concerete piles. **[5]**

b) Explain in detail micro- Piles. **[5]**

OR

Q8) a) Explain concrete wall movable cofferdam and Sheet pile cofferdams. **[5]**

b) Explain with neat diagrams the various shapes of well foundations. **[5]**

Q9) a) Explain in detail caissons and write its advantages and disadvantages. **[5]**

b) Discuss methods of construction for well foundations. **[5]**

OR

Q10)a) Explain with neat sketch earth and rock fill cofferdam with its advantages and disadvantages. **[5]**

b) Explain with neat diagrams the soldier construction method. **[5]**

Total No. of Questions : 8]

SEAT No. :

P-3414

[Total No. Of Pages : 2

[6005]-504
M.E. (Civil) (Construction & Management)
Total Quality Management in Construction
(2017 Pattern) (501024) (Semester - I)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates :

1) ***Attempt Q. 1 or Q. 2, Q. 3 or Q. 4, Q.5 or Q. 6 and Q. 7 or Q. 8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary and clearly state.***
5) ***Use of cell phone is prohibited in the examination hall,***
6) ***Use of electronic pocket calculator is allowed.***

Q1) a) Elaborate contribution of Deming in TQM Implementation. **[4]**

b) Write note on — Benchmarking in TQM. **[5]**

OR

Q2) a) Highlight the use of Quality Manual for construction Industry. **[4]**

b) Enlist seven Quality Control Tools used in TQM? Explain- Pareto diagram. **[5]**

Q3) a) Write note on - Training needs assessment in TQM implementation. **[4]**

b) Explain the use of 360° feedback for quality in any construction work. **[5]**

OR

Q4) a) Explain the different managerial competencies necessary for achieving Quality. **[5]**

b) Elaborate the role of inspection reports used in TQM implementation. **[4]**

P.T.O

Q5) a) Describe the role of Management support and commitment necessary for achieving implementation for quality system standards. **[8]**

b) Explain the Certification process for ISO 9001. **[8]**

OR

Q6) a) Difference between ISO 9001 and ISO 9004. **[8]**

b) Elaborate the Eight Principles of ISO 9001. **[8]**

Q7) a) Application of Six Sigma tool to :RCC Work in building. Justify it. **[8]**

b) Write note on - Quality Functions Deployment (QFD). **[8]**

OR

Q8) a) Explain the different barriers encountered in implementation of TQM. **[8]**

b) Explain Eight types of construction defects. **[8]**

Total No. of Questions : 10]

SEAT No. :

P-3415

[Total No. of Pages : 2

[6005]-505

M.E. (Civil) (Semester - II)

CONSTRUCTION & MANAGEMENT

Construction Contracts Administration and Management

(2017 Pattern) (501027)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8 and Q.9 or Q10.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary and clearly state.***
5) ***Use of cell phone is prohibited in the examination hall.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) a) With reference to the MOS & PT contract conditions explain the following : **[5]**

i) Various advances and their recovery.

ii) Dispute resolution mechanism.

b) What is breach of contract and explain its effect. **[5]**

OR

Q2) a) Explain in details standard forms of contracts & what is the importance of comparative statement after opening the Tenders? Give format for the same. **[5]**

b) Explain importance Workmen's Compensation Act on construction projects with clauses. **[5]**

Q3) a) Discuss the advantages of DRB over dispute resolution mechanism. **[5]**

b) Circumstances under which the contractor shall be entitled to terminate the contract. **[5]**

OR

Q4) a) State the circumstances under which the lowest tender is rejected? **[5]**

b) Write in detail roles of project management consultants. **[5]**

P.T.O.

Q5) a) What is Construction Claims, Types of construction claims and explain settlement of claims. **[5]**

b) Write a brief meaning/Provision for following under FIDIC conditions RED BOOK. **[5]**

i) Provisional sum work & Day work schedule

ii) Force Mejeure

OR

Q6) a) What are the different types of FIDIC books commonly used in projects and its uses? **[5]**

b) What is Extra items and causes of claims in construction industry. **[5]**

Q7) a) Describe the clauses of escalation of cost: What is an arbitral proceeding. Explain with example. **[5]**

i) Escalation formula for material cost

ii) Escalation formula for Labour cost

b) Explain in detail - Defect Liability Period. **[5]**

OR

Q8) a) Write a short note on-Conciliation related to contract. **[5]**

b) What is the importance of role of various stakeholders in prevention of disputes? **[5]**

Q9) a) Procedure of appeal against the awards. **[5]**

b) What are the various duties, power;of arbitrators? **[5]**

OR

Q10)a) What is Conciliation and its provisions in the Act, also explain conduct of conciliation and arbitral proceedings? **[5]**

b) What is difference between Arbitration and Conciliation? **[5]**

Total No. of Questions : 8]

SEAT No. : ____

P-4225

[Total No. of Pages : 3

[6005]-506A

M.E. (Civil - Construction and Management)

PROJECT ECONOMICS AND FINANCIAL MANAGEMENT

(2017 Pattern) (Semester - II) (501028)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer Q.1 or 2, Q.3 or 4, Q.5 or 6 and Q.7 or 8***
2) ***Assume suitable data if necessary and clearly state.***
3) ***Figures to the right indicates full marks.***
4) ***Use of electronic pocket calculator is allowed.***

Q1) a) Write your comment about present Indian economy. **[4]**

b) Write a short note on requirements of working capital. **[5]**

OR

Q2) a) Explain Cost implication to Real Estate Developer firm and its maintenance. **[5]**

b) As a project manager handling bridge project explain how you will control the 'Cost' during the design and Construction phase. **[4]**

Q3) a) Explain the following terms **[4]**

i) Stock

ii) Borrowings

iii) Debentures

iv) Loan Capital

b) Throw a light on 'Role of financing institutes in Construction sector'.**[5]**

OR

P.T.O.

Q4) a) Discuss the Direct Tax Court System. **[5]**

b) Explain Public policies on ICRA grading of exchange. **[4]**

Q5) a) Trading and Profit and Loss Account of Fantasy Ltd. for the year 31-3-2019 is given below : **[12]**

Particular	Rs.	Particular	Rs.
To Opening Stock	76,250	By Sales	5,00,000
" Purchases	3,15,250	" Closing stock	98,500
" Carriage and Freight	2,000		
" Wages	5,000		
" Gross Profit b/d	2,00,000		
	5,98,500		5,98,500
To Administration expenses	1,01,000	By Gross Profit b/d	2,00,000
" Selling & Dist. expenses	12,000	" Non-operating Incomes :	
" Non-operating expenses	2,000	" Interest on Securities	1,500
" Financial Expenses	7,000	" Dividend on shares	3,750
Net Profit c/d	84,000	" Profit on sale of shares	750
	2,06,000		2,06,000

i) Gross Profit Ration

ii) Expenses Ratio

iii) Operating Ratio

iv) Stock Turnover Ratio

b) What is mean by Escrow Account for PPP Project? **[4]**

OR

Q6) a) Explain in detail about accounting process by taking any suitable example of a housing project. **[8]**

b) Prepare the flow diagram for the methods of recording and reporting of ERP department between project office and head office with a procedure.**[8]**

Q7) What is mean by PPP? Explain in detail its impact, its advantages and disadvantages with suitable example. **[16]**

OR

Q8) Draft a detailed report of Government Funded infrastructure project with respect to Project Appraisal. **[16]**

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Total No. of Questions : 8]

SEAT No. :

P3417

[Total No. of Pages : 3

[6005]-507

First Year M.E. (Civil - Construction & Management)

OPERATIONS RESEARCH

(2017 Pattern) (Semester - II) (501029)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.*
2) *Neat diagram must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary and clearly state.*
5) *Use of cell phone is prohibited in the examination hall.*
6) *Use of electronic pocket calculator is allowed.*

Q1) a) What are the applications of Optimization Techniques in Civil Engineering. **[4]**

b) Maximize $Z = 20\,x_1 + 25\,x_2$ **[5]**

Subject to $12\,x_1 + 16\,x_2 \leq 100$

$16\,x_1 + 8\,x_2 \leq 80$

$x_1, x_2 \geq 0$

OR

Q2) a) Check whether the given functions are convex, concave or neither. **[4]**

i) $F(x) = 20 - x^2$

ii) $F(x) = x^4 - 5x^2 + 6x$

b) What is meant by Sensitivity Analysis? Discuss various changes in the parameters of a Linear Programming method that can be studied under this. **[5]**

Q3) a) Determine optimum solution by using Least cost method and North-West corner method for following transportation problem. **[6]**

Destination

		1	2	3	4	5	Supply
	A	2	3	4	1	4	4
Origin	B	11	7	7	3	8	8
	C	10	1	2	9	12	9
	Demand	3	3	4	5	6	

b) Describe the method of optimization using Golden section method. Use suitable example. **[3]**

OR

P.T.O.

Q4) a) A company has three media A, B and C for advertising its product. The data collected over past years indicate following sales with frequency of advertisement. **[5]**

Frequency/ month	Estimated sales per month (in lakh of Rs.)		
	A	B	C
0	3	4	5
1	4	4	6
2	6	6.8	8
3	7.2	7.5	8.4
4	8	8.8	9.5
5	10	10.4	10.9

If there is no restriction on the budget, find the frequency of advertisements in each of the media to maximize the sales.

b) Assign the five jobs to the five machines so as to minimize the total expected cost. **[4]**

	1	2	3	4	5
A	5	11	10	12	4
B	2	4	6	3	5
C	3	12	5	14	6
D	6	14	4	11	7
E	7	9	8	12	5

Q5) a) Describe the steps to solve the unconstrained optimization problems. **[8]**

b) Solve the following NLP with Lagrangian Multiplier technique. **[8]**

Maximize $Z = 6\, x_1\, x_2$

Subject to

$2x_1 + x_2 = 10$

$x_1, x_2 \geq 0$

OR

Q6) a) Write the steps to solve NLP using Newtons method. **[8]**

b) Minimize $f(x) = x^4 - 15x^3 + 72x^2 - 1135x$ in a range of 0 to 10 using Golden section method up to 2 iterations. **[8]**

Q7) a) What is simulation? Describe the simulation process. What are the reasons for using simulation? **[8]**

b) Find the value of game as given below: **[8]**

		B		
	1	2	–1	2
	3	1	2	3
A	–1	3	2	1
	–2	2	0	–3

OR

Q8) a) Find the sequence and total elapsed time to complete the following jobs in the order BA. **[8]**

Jobs (Processing times in minutes)

Machines	1	2	3	4	5	6	7	8	9
A	5	6	10	3	7	2	8	4	7
B	9	8	7	4	5	7	3	6	10

b) A firm is considering replacement an excavator, whose cost price is Rs. 10,200 and the scrap value is Rs. 2,000. The running (maintenance and operating) costs are found from experience to be as follows. **[8]**

Year	1	2	3	4	5	6	7	8
Running Cost	1000	1300	1700	2200	3000	4000	5300	7000

When should the machine to be replaced?

✡ ✡ ✡

Total No. of Questions : 10]

SEAT No. :

P-719

[Total No. of Pages : 2

[6005]-508

M.E. (Civil) (Semester - III)

CONSTRUCTION & MANAGEMENT

Environment and Energy for Sustainable Construction

(2017 Pattern) (601033)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8 and Q.9 or Q10.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary and clearly state.***
5) ***Use of cell phone is prohibited in the examination hall.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) a) Write a note on Ethics & Ecology of sustainable development. **[5]**

b) Explain the Concept of Environment. What are the different Environmental Impact Factors to be considered when construct the Highways? **[5]**

OR

Q2) a) Write a note on 3 E's of sustainable development. **[5]**

b) Define the different steps involve in performing the socio economic assessment in details. **[5]**

Q3) a) Explain the Energy Conservation Act 2001. **[5]**

b) Explain the Role of Financial Institutions and corporate banks for Energy Efficient Projects. **[5]**

OR

Q4) a) Explain Carbon credits system and its importance for developing country. **[5]**

b) Explain in details on PCF? **[5]**

P.T.O.

Q5) a) Explain of role of Government to promote energy conservation of projects. **[5]**

b) Explain the types of energy performance Contracts. **[5]**

OR

Q6) a) Explain the Role of UNFCCC. **[5]**

b) Explain CDM? Explain the Methodology & Procedures for CDM in detail. **[5]**

Q7) a) Explain the ESCOs and their role in development of energy efficient projects. **[5]**

b) Explain you understand by thermal phenomena and active HVAC system used in energy efficient structures? **[5]**

OR

Q8) a) Explain points should be considered to carry energy audit of a building? **[5]**

b) Explain what is meant by passive heating with neat sketch. **[5]**

Q9) a) Explain what is energy management and its importance. **[5]**

b) Explain how to improve power factor. **[5]**

OR

Q10)a) Explain do you understand by differed payment financing? **[5]**

b) Explain on improvement of boiler efficiency. **[5]**

Total No. of Questions : 8]

SEAT No. :

P720

[Total No. of Pages : 2

[6005]-509

S.Y.M.E. (Civil) (Construction & Management)

RESEARCH METHODOLOGY

(2017 Pattern) (Semester - III) (601034)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***All Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Discuss the general objective of research funding agency. **[5]**

b) Write short note on objective of literature survey and different sources of literature. **[5]**

OR

Q2) a) Write a short note on criteria of good research. **[5]**

b) What is the necessity of defining a research problem? Give three examples to illustrate your answer. **[5]**

Q3) a) Explain the criteria of goodness of a measurement scale. **[5]**

b) Explain the differences between collection of data through questionnaire and schedules. **[5]**

OR

Q4) a) Discuss in brief various sampling techniques. **[5]**

b) Why the data collected for research should be checked for reliability suitability and adequacy. Explain. **[5]**

Q5) a) Write a note on the usage of ANOVA in linear regression analysis. Why do we use t-test in linear regression analysis? **[8]**

b) Explain the centroid method of factor analysis and merits demerits of factor analysis. **[7]**

OR

P.T.O.

Q6) a) Explain the significance of research report and explain the various steps involved in writing such report. **[7]**

b) Differentiate descriptive statistics and inferential statistics. **[8]**

Q7) a) Explain the significance of research report and explain the various steps involved in writing such report. **[8]**

b) Explain the various important points while preparing the research report. **[7]**

OR

Q8) Write a research proposal for suitable research problem (preferably from civil engineering field) with reference to following terms. Title, Introduction, Origin of problem, Expected Outcome, literature review, significance of study, objectives and methodology year wise plan. **[15]**

Total No. of Questions : 8]

SEAT No. :

P3418

[Total No. of Pages : 2

[6005]-511

F.Y. M.E. (Civil - Environmental Engineering)
ENVIRONMENTAL LEGISLATION AND MANAGEMENT SYSTEMS
(2017 Pattern) (Semester - I) (501061)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.*
2) *Figures to the right indicate full marks.*
3) *Draw diagrams wherever necessary.*
4) *Assume necessary data.*
5) *Use of scientific calculators is allowed.*

Q1) a) Write penalties for violation of consent conditions in Air Act 1981. **[4]**

b) Explain legal sampling procedure for water and wastewater. **[5]**

OR

Q2) a) Explain polluter pays principle with the example. **[4]**

b) Explain principle and elements of EMP. **[5]**

Q3) a) Write details of latest EIA notification. **[4]**

b) Explain role of judiciary in environmental protection. **[5]**

OR

Q4) a) Write objectives of Environmental Protection Act 1986. **[4]**

b) Explain public interest litigation with example. **[5]**

Q5) a) Explain application of Bio-Medical Waste (M & H) Rules, 2016 for hospital of having bed capacity 1000. **[8]**

b) Explain application of hazardous waste (Management and Handling) Rules, 1989 with respect to any chemical industry. **[8]**

OR

Q6) a) Write important powers and functions of the MPC board under both the water and air acts. **[8]**

b) Explain role of SPCB in implementation of various notifications issued by Central Govt. under Environment (Protection) Act, 1986. **[8]**

P.T.O.

Q7) a) Explain role of NGO in Nature Conservation with any example. **[8]**

b) Explain procedure of public hearing for obtaining Environmental Clearance. **[8]**

OR

Q8) a) Explain the responsibilities of pollution control board in hazardous waste management. **[8]**

b) Explain the responsibilities of generators in hazardous waste management. **[8]**

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Total No. of Questions : 8]

SEAT No. :

P3419

[Total No. of Pages : 2

[6005]-512

F.Y.M.E. (Civil - Environmental Engg.)

ENVIRONMENTAL CHEMISTRY AND MICROBIOLOGY

(2017 Pattern) (Semester - I) (501062)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary and clearly state the same.***
5) ***Use of an electronic pocket calculator is allowed.***

Q1) a) Differentiate between nuclear fusion and nuclear fission. **[4]**

b) Explain nuclear chemistry related to the measurement of pollution parameters. **[5]**

OR

Q2) Write a detailed note on: **[4+5]**

a) Acid Rain.

b) Ozone depletion.

Q3) a) Explain in detail: removal of hydrocarbons by bioremediation technique.**[5]**

b) Explain in detail: pollution and climate change. **[4]**

OR

Q4) a) Explain in brief about classification of surfactants. **[5]**

b) Describe the functions of various detergents. **[4]**

Q5) a) Discuss the techniques for Isolation of microorganisms. **[8]**

b) Explain the difference between Prokaryotic and Eukaryotic cells. **[8]**

OR

P.T.O.

Q6) a) Explain Aeration Tank as Unit Process from a conventional wastewater treatment plant wrt the role of microbes in it. **[8]**

b) Explain in detail: Anaerobic and Aerobic processes of wastewater treatment wrt microbiology involved. **[8]**

Q7) a) Explain in detail: the different stages of wastewater treatment wrt microbial role involved in it. **[8]**

b) Explain in detail: Algae Bacteria Symbiosis in an Oxidation Pond. **[8]**

OR

Q8) a) Discuss the applications of Environmental Microbiology. **[8]**

b) Write short note on (wrt microbiology involved): **[8]**

i) Rotating Biological Contactors.

ii) Trickling Filters.

✡ ✡ ✡

Total No. of Questions : 12]

SEAT No. : ____

P-3420

[Total No. of Pages : 3

[6005]-513

F.Y. M.E. (Civil) (Environmental Engineering)

PHYSICO CHEMICAL PROCESS FOR WATER AND WASTEWATER TREATMENT

(2017 Pattern) (Semester - I) (501063)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Solve Q1 OR Q2, Q3 OR Q4, Q5 OR Q6, Q7 OR Q8, Q9 OR Q10, Q11 OR Q12.***
2) ***Figures to the right indicate full marks.***
3) ***Your answers will be valued as a whole.***
4) ***Assume suitable data, if necessary.***

Q1) Write short note on : **[5]**

a) Continuous process (Flow process)

b) Semi-batch process

OR

Q2) It is required to prepare 1270 kg of a solution composed of 13 wt.% ethanol and 87 wt.% water. Two solutions are available, the first contains 5 wt.% ethanol. and the second contains 25 wt.% ethanol. How much of each solution are mixed to prepare the desired solution? **[5]**

Q3) Give short note on : **[5]**

a) Repulsive and Attractive Potentials

b) Destabilization of Colloids

OR

Q4) Explain in details about Electrical relations at surfaces of colloids. **[5]**

P.T.O.

Q5) A layer of crushed anthracite with a sphericity of 0.70 and a density of 1.50 is to rest on a layer of sand with a sphericity of 0.80 and a density of 2.65. Find the maximum ratio of the diameter of the coarsest anthracite to the finest sand that will ensure both equal expansion and equal settling of the two materials at the common boundary. Assume that the density of the water is 1.00. **[5]**

OR

Q6) What is the purpose of disinfection? Discuss the properties of disinfectants.**[5]**

Q7) Draw and discuss the flow diagram of Activated Sludge Process. **[5]**

OR

Q8) Estimate the capacity of the components of a small trickling-fllter plant treating 3.5 MLD of domestic wastewater from 8,200 people, assuming the following: **[5]**

a) Sewage flow production - 370 Lpcd

b) Two primary settling tanks with a depth of 13.1 m

c) Two sludge digestion tanks with a storage requirement of 0.057 m^3 per capita

d) Four sludge drying beds with an area requirement of 0.093 m^2 per capita

e) One trickling filter with a loading of 0.0028 $ML/m^2/d$

Q9) a) Draw and discuss the schematic diagram of typical UASB. **[7]**

b) What are the design considerations for good performance of the UASB?**[7]**

OR

Q10)a) Assuming suitable design criteria and following characteristics of domestic wastewater, design a UASB reactor system to treat an average 5.0 MLD flow of wastewater. Assume up flow velocity of 0.5m per hour. Given data **[8]**

i) Influent BOD = 318 mg/l

ii) Influent COD = 840 mg/l

iii) Influent TSS = 400 mg/l

iv) Influent VSS = 300mg/l

v) Desired effluent BOD = 105mg/l or less

b) Determine the specific gravity of total solids of a 10% sludge which has 25% solids as fixed minerals with specific gravity 2.5 and 75% solids as volatile matter with specific gravity 1 .0. Assume suitable data if required.**[6]**

Q11)a) Discuss the types of adsorption and factors influencing to it. **[8]**

b) Give note on : **[8]**

i) Granular Activated carbon

ii) Exchange Isotherm

OR

Q12)a) How the performance of RO process can be measured? Discuss in details. **[8]**

b) Discuss the followings : **[8]**

i) Adsorption kinetics

ii) Adsorption isotherms

Total No. of Questions : 12]

SEAT No. :

P-3421

[Total No. Of Pages : 2

[6005]-514

M.E. (Civil) (Environmental Engineering)

ENVIRONMENTAL SANITATION

(2017 Pattern) (Semester-I) (501064)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates :

1) ***Figures to the right indicate full marks.***
2) ***Your answers will be valued as a whole.***
3) ***Assume suitable data, if necessary.***

Q1) What is the relation between Micro-organisms and communicable diseases? **[5]**

OR

Q2) Discuss how diseases communicated by discharges of intestines? **[5]**

Q3) Discuss the followings- **[5]**

a) Control of Insects

b) Control of Rodent

OR

Q4) What are the different fly control methods? Discuss any one in detail.**[5]**

Q5) What is industrial Sanitation? Discuss the factors to be considered during sanitation study. **[5]**

OR

Q6) Discuss the industrial poisons in detail. **[5]**

P.T.O

Q7) What is rural sanitation? How population habits and environmental conditions it? **[5]**

OR

Q8) Enlist the rural sanitation improvement schemes. Discuss any one in details. **[5]**

Q9) a) Discuss the difference between one-pipe system and two pipe system. **[7]**

b) What are the different factors affecting the design of water supply in buildings. **[7]**

OR

Q10) a) Discuss about break pressure tank system and hydro-pneumatic system. **[7]**

b) Discuss the steps involved in design of water pipes. **[7]**

Q11) a) How Gully Traps and Intercepting Traps are useful? Discuss with suitable sketch. **[8]**

b) Give note on followings **[8]**

i) Flushing Cistern

ii) Wash Basin

iii) Lavatory Basin

iv) Sink

OR

Q12) a) Discuss the principles governing the design of building drainage.**[8]**

b) Discuss how drainage design of high rise buildings differ than other drainage system. **[8]**

Total No. of Questions : 12]

SEAT No. :

P-3422

[Total No. of Pages : 2

[6005]-515

M.E. (Civil) (Environmental Engineering)

INDUSTRIAL WASTE WATER MANAGEMENT

(2017 Pattern) (Semester - II) (501067)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Figures to the right indicate full marks.***
3) ***Your answers will be valued as a whole.***
4) ***Assume suitable data, if necessary.***
5) ***Use of electronic pocket calculator and steam table is allowed.***

Q1) What is Toxicity and Bioassay test? **[5]**

OR

Q2) Differentiate between the followings : **[5]**

a) Equalization and Neutralization

b) Flotation and Precipitation

Q3) Differentiate between Nitrification and De-nitrification process. **[5]**

OR

Q4) Discuss the advantages and disadvantages of Wet Air Oxidation. **[5]**

Q5) Discuss the treatment & disposal method of effluent from dairy industry in detail. **[5]**

OR

Q6) Discuss the treatment & disposal method of effluent from food processing industry. **[5]**

P.T.O.

Q7) Enlist the Characteristics and composition of effluent from Mineral Processing Industry. **[5]**

OR

Q8) Differentiate the manufacturing process of Pharma industry and the Petroleum industry. **[5]**

Q9) a) Discuss problems encountered in management of CETP in detail. **[7]**

b) Discuss with suitable example Zero effluent discharge system. **[7]**

OR

Q10) a) What are the general design considerations and principles involve in of CETP? **[7]**

b) Why it is important to reuse the waste water? How industries play their role in reuse? **[7]**

Q11) a) What is polymer coagulation? How it is differ from other coagulants? **[8]**

b) Enumerate the major design components required for wastewater treatment plant for Petroleum industry. Comment on its suitability. **[8]**

OR

Q12) a) Give the effluent standards for Dye stuff and dye manufacturing industries. **[8]**

b) Discuss Freundlich adsorption isotherm and Langmuir adsorption isotherm in detail. **[8]**

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Total No. of Questions : 8]

SEAT No. :

P-3423

[Total No. of Pages : 2

[6005]-516

M.E. (Civil) (Environmental Engineering)

AIR POLLUTION AND CONTROL

(2017 Pattern) (Semester - II) (501068)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6 and Q7 or Q8.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat figures wherever necessary.***

Q1) a) What are the types of air quality models? **[4]**

b) What are the assumptions in Gaussian modelling for the estimation of pollutant concentrations? **[5]**

OR

Q2) a) Explain plume behaviour with the help of neat sketches. **[4]**

b) What is inversion? Explain in brief radiation and subsidence inversion. **[5]**

Q3) a) Explain in brief about the control of pollution by process modification and change of raw materials. **[4]**

b) What are the requirements of electrostatic precipitation process? Also enlist the operational issues related to ESP. **[5]**

OR

Q4) a) Explain cyclone and fabric filter with parameters of working principle, schematic sketch, advantages and applications. **[4]**

b) What is the difference between physical and chemical adsorption for gaseous contaminant control system? **[5]**

Q5) a) Explain in brief National Air Quality Monitoring Programme. **[8]**

b) What are the tabular columns mentioned in national ambient air quality standards (NAAQS)? What are the current NAAQS for ozone, lead, carbon monoxide and benzene? **[8]**

P.T.O.

OR

Q6) a) Explain with neat sketch the determination of ambient PM_{10} and $PM_{2.5}$ using particulate dust sampler. **[8]**

b) What is the purpose of stack sampling? Explain in detail essential parts of sampling train. **[8]**

Q7) a) What are the various control strategies adopted for automobile pollution? **[8]**

b) What are the various sources of odour? How the measurement of odour can be carried out? **[8]**

OR

Q8) a) What are the sources of the odours produced in chemical, tanneries, fertilizer and food industries? **[8]**

b) What are the causes of indoor air pollution? Explain the method of mechanical ventilation system used for control of indoor air pollution.**[8]**

Total No. of Questions : 10]

SEAT No. :

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[6005]-517

F.Y. M.E. (Civil - Environmental Engineering)

SOLID WASTE AND HAZARDOUS WASTE MANAGEMENT

(2017 Pattern) (Semester - II) (501069)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Each question carries equal marks.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Write detailed note on Proximate and Ultimate analysis of MSW. **[5]**

b) Discuss in detail, Hauled container collection system. **[5]**

OR

Q2) Explain in detail, the direct load and discharge load transfer station. **[10]**

Q3) Explain in detail, the types of composting. **[10]**

OR

Q4) Explain in detail the different methods of landfilling. **[10]**

Q5) What are the different techniques involved in resource recovery? Explain in detail. **[10]**

OR

Q6) Explain in detail, the various methods for disposal of Nuclear and Radioactive waste. **[10]**

Q7) Explain in detail, Electronics waste management. **[10]**

OR

Q8) Write a detailed note on TCLP test. **[10]**

Q9) Explain in detail, the Stabilization and solidification of Hazardous waste management. **[10]**

OR

Q10) Explain in detail, the characteristics of Hazardous waste management. **[10]**

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Total No. of Questions : 8]

SEAT No. :

P-721

[Total No. of Pages : 2

[6005]-518

M.E. (Civil) (Environmental Engineering) (Semester - III)

ENVIRONMENTAL IMPACT ASSESSMENT

(2017 Pattern) (601073)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Assume necessary data.***
5) ***Use of scientific calculators is allowed.***

Q1) a) What is a need of Environmental Impact Assessment (EIA)? Also write about Indian Policies Requiring EIA. **[4]**

b) Write environmental indices and indicators for describing affected environment. **[5]**

OR

Q2) a) Explain environmental impact assessment methodology for any industry. **[4]**

b) Explain methodology for preparing environmental impact assessment report. **[5]**

Q3) a) Write general existing noise levels for any processing industry and standards for the same industry. **[4]**

b) Write water quality standards HDL and MPL. **[5]**

OR

Q4) a) Write methods for prediction of noise levels. **[4]**

b) Write basic information of water quality (Surface water and ground water) and explain its significance with respect to EIA. **[5]**

P.T.O.

Q5) a) Write public participation in environmental decision making in any large construction project. **[8]**

b) Write rules and regulations for cultural resources for archaeological and historical structures. **[8]**

OR

Q6) a) Explain verbal communication in EIA studies with any example. **[8]**

b) Write prediction and assessment of impact and mitigation for any project. **[8]**

Q7) a) Write procedure for conducting environmental impact assessment report for any large project. **[8]**

b) Write Environmental management plan for sugar industry. **[8]**

OR

Q8) a) Write procedure for obtaining Environmental clearance for construction projects. **[8]**

b) Write the environmental rules 1999 (sitting of industries) as per the notification of Ministry of Environment and Forests. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

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[6005]-519

S.Y.M.E. (Civil-Environmental Engineering)
RESEARCH METHODOLOGY
(2017 Pattern) (Semester-III) (601074)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Slove Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagram should be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) Explain need of literature survey and state it's objectives. **[5]**

b) What are various sources of research problems? **[5]**

OR

Q2) a) Define research and explain it's significance. **[5]**

b) Design a standard format of research proposal with suitable example. **[5]**

Q3) a) Write a note on **[5]**

i) Qualitative research

ii) Quantitative research

b) Explain ANOVA with suitable example **[5]**

OR

Q4) a) Explain steps in approaches in data analysis. **[5]**

b) Explain the meaning of validity and reliability. **[5]**

Q5) a) Enlist various types of measurement and explain most widely used type. **[7]**

b) Elaborate in brief the concept of hypothesis testing. **[8]**

OR

P.T.O.

Q6) a) Define Discriminate analysis and it's importance characteristics. **[8]**

b) Define hypothesis, state two types of hypothesis. Explain one in detail. **[7]**

Q7) a) Elaborate the concept of multidimensional measurement and factor analysis. **[8]**

b) Discuss the importance characteristics of cluster analysis. **[7]**

OR

Q8) a) Explain the various steps involved in process of patent from drafting to commercialization. **[8]**

b) State the need of effective documentation and give important of report writing. **[7]**

Total No. of Questions : 12]

SEAT No. :

P3425

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[6005]-521

First Year M.E. (Civil Geotechnical Engineering)

ADVANCE SOIL MECHANICS

(2017 Pattern) (Semeter - I) (501121)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use of non-programmable calculator is allowed.***

Q1) Write a short note on Mohr's circle construction. **[4]**

OR

Q2) Describe the influence of anisotropy in soil bodies. **[4]**

Q3) Differentiate between general shear failure, local shear failure and punching shear failure. **[4]**

OR

Q4) Explain the concept of limiting equilibrium and factor of safety for slope stability analysis. Also explain the general procedure for locating the critical failure plane. **[4]**

Q5) With a suitable sketch, explain in detail the Rebhann's graphical method for estimation of active earth pressure on retaining wall. **[4]**

OR

Q6) What are various the types of braced cuts? Explain them with suitable diagrams. **[4]**

Q7) State the 3-D consolidation equation and mention the assumptions made for 3-D consolidation. **[4]**

OR

Q8) Describe the concept of sand drain with neat sketch. **[4]**

P.T.O.

Q9) a) State and explain the dynamic procedure for hammer foundations. **[6]**

b) What is the effect of footing shape on vibration response? **[6]**

c) Explain the terms: **[4]**

i) Damping.

ii) Degree of freedom

OR

Q10)a) Explain modes of vibrations in foundations of reciprocating machines.**[6]**

b) State and explain the dynamic response of embedded block foundation. **[6]**

c) Write a note on forced vibration in machine foundations. **[4]**

Q11)a) Explain two dimensional Amplitude method for the design of foundations of rotary machines. **[6]**

b) Write a short note on: **[6]**
Construction details of machine foundations.

c) Why vibration Isolation is required? Describe the methods to control vibrations why it is difficult to control low frequency vibrations. **[6]**

OR

Q12)a) Explain the "Insulation against outside vibrations method" in vibration isolation with neat sketches. **[6]**

b) Describe the following methods of vibration isolation: construction of open or slurry filled trenches, sheet pile and concrete walls. **[6]**

c) Enlist the design criterias for foundation of rotary machine. **[6]**

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Total No. of Questions : 8]

SEAT No. :

P3426

[Total No. of Pages : 2

[6005]-522

First Year M.E. (Civil)(Geotechnical Engineering)
GROUND IMPROVEMENT TECHNIQUES
(2017 Pattern) (Semester-I) (501122)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary and clearly state.***
5) ***Use of cell phone is prohibeted in the examination hall.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) a) Write short notes on atomic bonds in clay minerals. **[4]**

b) Explain principle of chemical stabilization and the chemicals used. **[5]**

OR

Q2) a) Explain electrical effects in clay minerals. **[5]**

b) Discuss change in soil properties after stabilisation. **[4]**

Q3) a) Explain the mechanism of cement stabilization and its application. **[4]**

b) Describe construction methods for thermally stabilized soils. **[5]**

OR

Q4) a) Discuss the effectiveness of lime treatment. **[5]**

b) How are compaction piles and stone-gravel columns effective in soil stabilization? **[4]**

Q5) a) Explain total and differential soil settlement. **[8]**

b) What are the design considerations of lime column foundation? **[8]**

OR

P.T.O.

Q6) a) Describe the sand drains with their design criteria. **[8]**

b) Explain principle of lime column foundation and determination of its bearing capacity. **[8]**

Q7) a) How is quality control achieved and testing of grouting carried out as per IS code? **[8]**

b) State the grouting techniques and explain any two. **[8]**

OR

Q8) a) How is the soil grouting program designed? **[8]**

b) Discuss the suitability criteria for different types of grouts. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

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[6005]-523

F.Y. M.E. (Civil) (Geotechnical Engineering)

ROCK MECHANICS

(2017 Pattern) (Semester - I) (501123)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates :

1) ***Attempt any 5 questions from the 8 questions.***
2) ***Figures to the right indicate full marks.***
3) ***Use of logarithmic tables, slide rule, Mollier charts, electronics pocket calculator and steam tables is allowed.***
4) ***Assume suitable data if necessary.***
5) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) State the different index properties of rock mechanics and explain any one. **[5]**

b) Explain importance of rock mechanics for tunnel construction. **[5]**

Q2) a) Describe rock anchoring technique. **[4]**

b) Write a note rock blasting. **[6]**

Q3) a) What are the methods for measuring absolute state of stress in rocks? **[6]**

b) Write a note on Over Coning. **[4]**

Q4) a) Explain the Mohr Coulomb failure criteria for rocks. **[4]**

b) What is creep in rock? Explain the influence of time on rock deformation. **[6]**

P.T.O.

Q5) a) State and explain the factors affecting the rupture behavior of rock. **[5]**

b) Write a note on rock failure in compression. **[5]**

Q6) a) Write a note on analysis of general slip surface. **[5]**

b) Explain approximate methods for two dimensional limit equilibrium analysis. **[5]**

Q7) a) Write a note on allowable bearing pressures for rock foundations. **[5]**

b) Describe foundation anchoring. **[5]**

Q8) a) Write a note plastic behavior around tunnels. **[5]**

b) Write a note on review of design methods of tunnels. **[5]**

Total No. of Questions : 8]

SEAT No. :

P-3428

[Total No. of Pages : 2

[6005]-524

M.E. (Civil) (Geotechnical Engg.)

GEO-ENVIRONMENTAL ENGINEERING

(2017 Pattern) (Semester - I) (501125)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates :

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary and clearly state.***
5) ***Use of cell phone is prohibited in the examination hall.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) a) State the chemical and biological characteristics of solid waste. **[4]**

b) Enlist different sources of solid waste. Explain any two. **[5]**

OR

Q2) a) Define solid waste and State the classification. **[4]**

b) Explain the defects of pollutants on soil properties. **[5]**

Q3) a) Explain principle of composting of solid waste. **[5]**

b) State any four advantages and disadvantages of landfill method. **[4]**

OR

Q4) a) State the factors affecting selection of site for land filling of solid waste. **[4]**

b) Discuss on detection, control and remedies of sub-surface containment. **[5]**

P.T.O.

Q5) a) Explain uses of waste in geotechnical engineering. **[8]**

b) Discuss in detail landfill reclamation process. **[8]**

OR

Q6) a) Explain in detail the reclaimed waste. **[8]**

b) Describe in detail, "Reclamation of old solid waste dumps". **[8]**

Q7) a) Discuss advantages and disadvantages of landfill? **[8]**

b) Describe in detail types and application of clay liners. **[8]**

OR

Q8) a) Explain in detail which waste materials are used for landfill liner. **[8]**

b) Discuss the application of Geosynthetic in waste disposal design. **[8]**

Total No. of Questions : 8]

SEAT No. :

P-3429

[Total No. of Pages : 2

[6005]-525

M.E. (Civil-Geotechnical)

ADVANCED FOUNDATION ENGINEERING

(2017 Pattern) (Semester - II) (501127)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume Suitable data, if necessary.***
4) ***Use of electronic pocket calculator is allowed in the examination.***
5) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Discuss different types of samplers. **[4]**

b) Calculate the ultimate bearing capacity per unit area of a strip footing 1m wide and 1m deep when unit weight of soil 18 kN/m^3, cohesion is 20 kN/m^2, $\phi = 20°$, Nc = 17.5, Nq = 7.5, Ny = 5. **[5]**

OR

Q2) a) Derive Meyorhoff bearing capacity equation with notations and sketch. **[4]**

b) Explain in detail any one geophysical method. **[5]**

Q3) a) Write a note on bearing capacity of rafts on sandy soil. **[4]**

b) Find the depth of embedment for the sheet pile which support 6m cohesion less backfill with unit weight 17 kN/m^3 and $\phi = 30°$. **[5]**

OR

Q4) a) Explain different types of anchors. **[4]**

b) Determine the net ultimate bearing capacity of a mat foundation measuring 15m × l0m on a saturated clay with Cu = 95 kN/m^2, $\phi = 0$, Df = 2m. **[5]**

P.T.O.

Q5) a) Discuss short and long piles with neat sketch. **[8]**

b) A group of 9 piles arranged in square pattern with diameter and length of each pile as 25 cm and 10 m respectively, is used as a foundation in soft clay deposit. Tacking UCS of clay as 12 kN/ m^2 and pile spacing as 100cm c/c. Find load capacity of group. Assume bearing capacity factor Nc = 9, Adhesion factor = 0.75, FOS = 2.5. **[8]**

OR

Q6) a) Write a note on deflection of vertical pile. **[8]**

b) A group of 16 piles of 600mm diameter is arranged in a square pattern with c/c spacing of 1.2m. The piles are 10m long and embedded in soft clay with cohesion of 30kN/m^2. Bearing resistance may be neglected for the piles. Adhesion factor is 0.6. Determine the ultimate load carrying capacity of pile group. **[8]**

Q7) a) Discuss IRC method for the analysis of well foundation. **[8]**

b) Write down detail procedure of sinking of well foundation. **[8]**

OR

Q8) a) Explain in detail sinking stresses in well foundation. **[8]**

b) Write a note on design of cellular cofferdam. **[8]**

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Total No. of Questions : 8]

SEAT No. :

P-3430

[Total No. of Pages : 2

[6005]-526

F.Y. M.E. (Civil-Geotechnical Engineering)

CONSTRUCTION METHODS IN GEOTECHNICAL ENGINEERING

(2017 Pattern) (Semester - II) (501128)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figure to the right indicates full marks.***
4) ***Assume suitable data, if necessary and clearly state.***
5) ***Use of cell phone is prohibited in the examination hall.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) a) Write note on Construction of precast and cast-in-situ piles **[4]**

b) Describe Rectangular cofferdams. **[5]**

OR

Q2) a) Write down in detail pile raft foundation and its application. **[4]**

b) Explain Bracing systems. **[5]**

Q3) a) Explain Tremic method for construction of seal of cofferdam. **[4]**

b) Describe the procedure of construction of pneumatic caisson with sketch. **[5]**

OR

Q4) a) Explain the procedure of seal construction of grout intrusion method. **[5]**

b) How is the fabrication and launching of a caisson carried out? **[4]**

Q5) a) Enlist various drilling equipment and explain any one in detail. **[8]**

b) Write down the selection criteria of explosives for rock excavations. **[8]**

OR

P.T.O.

Q6) a) Explain in detail evaluation and planning required for rock excavation. **[8]**

b) Write notes on over brake control and pre-splitting. **[8]**

Q7) a) Explain how is tunneling in moderately firm rocks and ground carried out? **[8]**

b) Differentiate between the classical and mining methods. **[8]**

OR

Q8) a) Discuss multistage classical method of tunnelling. **[8]**

b) What is sinking caisson method? Write down its merits and demerits. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3431

[Total No. of Pages : 2

[6005]-527

F.Y.M.E. (Civil - Geotechnical)

STABILITY OF SLOPES AND EARTH DAMS

(2017 Credit Pattern) (Semester - II) (501129)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary and clearly state.***
5) ***Use of cell phone is prohibited in the examination hall.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) a) A 5 m deep canal has side slopes of 1:1. The properties of soil are c_u=20 kN/m^2, $\varnothing$ = 10º, e = 0.8 and G = 2.8. If Taylor's stability number is 0.108, determine the factor of safety with respect to cohesion when the canal runs full. Also find the same in case of sudden drawdown, if Taylor's stability number for this condition is 0.137 **[4]**

b) Explain Bishop's method for slope stability analysis. **[5]**

OR

Q2) a) State and explain the suitability of long term and short term criteria for slope stability analysis. **[5]**

b) Discuss the use of Swedish slip circle method and its significance. **[4]**

Q3) An earth dam foundation consists of clay having very low shear strength. It is proposed to construct a dam of 10m height. Suggest a method of foundation treatment and design considerations so as to avoid a base failure. **[9]**

OR

Q4) a) Discuss the various conditions for failure of earthen dams with sketches. **[5]**

b) Explain the design considerations for upstream and downstream slopes of an earthen dam. **[4]**

Q5) a) Draw 4 flownets for different foundation conditions of earthen dam. **[8]**

b) What is the significance of filter in an earth dam? Discuss the design criteria of filters. **[8]**

OR

P.T.O.

Q6) a) How is the quantity of seepage and seepage force analysed in case of layered soil? **[8]**

b) Draw and explain the construction of phreatic line for a homogeneous earthen dam section with rocktoe and horizontal drain at the downstream slope. **[8]**

Q7) a) How is the earthquake consideration taken care of in the design of earthen dam? **[8]**

b) Explain measures required to ensure the stability of foundation for earthen dam. **[8]**

OR

Q8) a) How will the steady seepage condition and sudden drawdown condition affect the stability of earthen dam? **[8]**

b) State and explain how the different forces acting on the earthen dam taken into consideration for design. **[8]**

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Total No. of Questions : 8]

SEAT No. : [ ]

P-723

[Total No. of Pages : 2

[6005]-528

M.E. (Civil - Geotechnical Engg.)

Geotechnical Earthquake Engineering

(2017 Pattern) (Semester - III) (601133)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) Discuss 'Elastic Rebound Theory'. **[6]**

b) Discuss 'Effect of local site conditions' on ground motion. **[7]**

Q2) a) Compare 'Continental Drift' & 'Plate Tectonics'. **[6]**

b) Explain Measurement of Dynamic Soil Properties. **[7]**

Q3) a) Discuss 'Development of design parameters' for ground motion. **[6]**

b) Discuss 'Effects of liquefaction'. **[6]**

Q4) a) Explain 'Seismic Reflection Test'. **[6]**

b) Discuss causes & effects of liquefaction. **[6]**

Q5) a) Explain 'Jai-Krishna' Approach. **[6]**

b) Discuss different EQ induced landslides. **[6]**

Q6) a) Explain 'Goodman & Seed Approach'. **[6]**

b) Explain 'Seismic slope stability Analysis. **[6]**

P.T.O.

Q7) a) Discuss the method for mitigation of EQ effects. **[6]**

b) Explain 'Seismic Design of Retaining wall'. **[7]**

Q8) a) Discuss 'EQ induced settlement'. **[6]**

b) Explain different soil reinforcing techniques. **[7]**

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Total No. of Questions : 8]

SEAT No. :

P724

[Total No. of Pages : 2

[6005]-529

S.Y.M.E. (Civil) (Geotechnical Engineering)
RESEARCH METHODOLOGY
(2017 Pattern) (Semester-III) (601134)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary and clearly state.***

Q1) a) Explain the research problem in a flowchart. **[5]**

b) Explain the need of literature survey. **[4]**

OR

Q2) a) Identify the ethical issues related to interpretation and reporting a research problem. **[5]**

b) Describe the strategies in literature survey. **[4]**

Q3) a) What are the different methods of data collection? Explain any one in detail. **[5]**

b) What do you understand by non-parametric tests? **[4]**

OR

Q4) a) What is meaning and significance of attitude measurement and scaling. **[5]**

b) Distinguish between quantitative and qualitative data analysis. **[4]**

Q5) a) What is correlation and regression analysis? What are their methods? State its significance and their values. **[8]**

b) What is the role of multi-dimensional measurement in data analysis? **[8]**

OR

P.T.O.

Q6) a) Explain "descriptive statistics: measures of Central Tendency, measures of dispersion, measures of skewness, measures of relationship". **[8]**

b) Enlist and explain different clustering methods. **[8]**

Q7) a) Explain in detail mechanics of writing research report with suitable example. **[8]**

b) Discuss the important points to be considered during presenting a research idea. Also write a note on patenting a research idea. **[8]**

OR

Q8) a) Write a research proposal for a suitable research problem (related to Geotechnical Engg.) to a funding agency with reference to the following terms- "Title, Introduction, origin of the problem, expected outcome, literature review, significance of study in context of current status, objectives, methodology year wise plan. **[8]**

b) Write short notes on the following : **[8]**

i) Bibliography and its importance in context of research report

ii) Rewriting and polishing of report

Total No. of Questions : 8]

SEAT No. :

P3432

[Total No. of Pages : 2

[6005]-532

First Year M.E. (Civil-Hydraulics)

IRRIGATION & DRAINAGE ENGINEERING

(2017 Pattern) (Semester-I) (501042)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary and clearly state.***

Q1) a) Classify Surface and Subsurface irrigation methods. **[6]**

b) Explain the following: **[6]**

i) Factors affecting irrigation scheduling?

ii) Quality of irrigation water.

OR

Q2) a) Considering the water - soil plant relationships explain the terms evaporation, transpiration, consumptive use. **[6]**

b) Write short notes on : **[6]**

i) Estimation of consumptive use

ii) Soil moisture and crop water relationship

Q3) a) Explain the component parts and design concept of sprinkler irrigation system. **[8]**

b) Explain benefits and limitations of drip irrigation systems. **[6]**

OR

Q4) a) Explain lift irrigation system considering the following points. **[8]**

i) Elements of lift irrigation scheme

ii) Design consideration involved in intake well, rising main, and distribution system.

b) Why the pressurised irrigation system is preferred over the flow irrigation system to farms? Explain drip irrigation system considering the following points. **[6]**

i) elements of the system

ii) design concept

P.T.O.

Q5) a) Explain the causes of soil erosion and also illustrate the various soil conservation techniques, what factors would you consider to apply specific techniques for specific cause? **[6]**

b) Classify the salts affecting the soils and their characteristics. **[6]**

OR

Q6) a) Explain following: **[6]**

i) Reclamation of saline and alkaline soils

ii) Leaching and salinity control of soil

b) How soil conservation is achieved by following methods. **[6]**

i) Afforestation

ii) Checking Overgrazing

Q7) a) Describe water logging of agricultural lands. **[6]**

b) Explain the following: **[6]**

i) Transient designs of surface drainage systems

ii) Drainage by wells

OR

Q8) a) Describe water logging of agricultural lands and its reclamation. **[6]**

b) WMD recommendations. **[6]**

Total No. of Questions : 8]

SEAT No. :

P-3433

[Total No. of Pages : 3

[6005]-535

F.Y. M.E. (Civil-Hydraulics)

OPEN CHANNEL HYDRAULICS

(2017 Pattern) (Semester - II) (501047)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data, if necessary.***
5) ***Use of electronic pocket calculator is allowed in the examination.***

Q1) a) A rectangular channel is 3.0 m wide and carries a discharge of 15 m^3/s at a depth of 2.0 m. At a certain section of the channel, it is proposed to reduce the width to 2.0 m and to alter the bed elevation by $\Delta \bullet Z$ to obtain critical flow at the contracted section without altering upstream depth. What should be the value of ΔZ? **[5]**

b) Water from a low dam is released through a sluice gate on a horizontal rectangular channel. The depth of water upstream of the sluice gate is 16.0 m above the channel bed and the gate opening is 1.5 m. The sluice gate can be assumed to be sharp edged. If a free hydraulic jump is formed just downstream of the gate, find the sequent depths and the percentage of the initial energy lost in the jump. **[4]**

OR

Q2) a) Explain : **[4]**

i) specific energy diagram,

ii) specific force diagram.

b) At the bottom of a spillway the velocity and depth of flow are 12.0 m/s and 1.5 m respectively. If the tail water depth is 5.5 m find the location of the jump with respect to the toe of the spillway. What should be the length of the apron to contain this jump? Assume the apron to be horizontal and Manning's n = 0.015. **[5]**

P.T.O.

Q3) a) Explain characteristics of S1, S2 and S3 profiles. **[5]**

b) A side channel spillway channel is 100 m long and is rectangular in cross section with B = 5.0 m, n = 0.02, β = 1.30 and So = 0.15. if the lateral inflow rate is 1.75 m^3s/m, find the critical depth and its location. **[4]**

OR

Q4) a) Show that in a wide rectangular critical slope channel the gradually varied flow profiles calculated by using Chezy formula with C = constant are horizontal lines. **[5]**

b) A rectangular channel is 2.0 m wide and carries a flow of 3 m^3/s at a depth of 0.9 m. At a certain location in this channel a uniformly discharging side weir is proposed to divert 0.3 m^3/s of flow laterally. The weir crest is horizontal and is placed at a height of 0.65 m above the bed at the commencement of the side weir. Calculate the length of the side weir and other dimensions of the channel geometry to achieve the objective. **[4]**

Q5) a) A wide tidal river has a low water velocity of 1.5 m/s and a depth of 2.5 m. A tide in the sea causes a bore which travels upstream. **[8]**

i) If the height of the bore is 0.9 m, estimate the speed of the bore and the velocity of flow after its passage.

ii) If the bore is observed to cover a distance of 2.5 km in 10 minutes determine its height.

b) Show that in a positive surge moving down a rectangular channel with absolute velocity V_w, the depths before the passage of the surge y_1 and after the passage of the surge y_2 are related as $\frac{y_2}{y_1} = \frac{1}{2}\left[-1+\sqrt{1+8F_a^2}\right]$ Where $F_a^2 = \frac{(V_w - V_1)^2}{gy_1}$ and V_1 = absolute velocity in the channel before the passage of the surge. **[8]**

OR

Q6) a) A positive surge is often known as a moving hydraulic jump. Obtain an expression in terms of depths y_1 and y_2 for the energy loss in a moving hydraulic jump in a horizontal rectangular channel. **[8]**

b) A rectangular channel carries a discharge of 1.5 m^3/s/m width at a depth of 0.75 m. If the sudden operation of a sluice at an upstream section causes the discharge to increase by 33 per cent, estimate the height and absolute velocity of the positive surge in the channel. **[8]**

Q7) a) Distinguish between : **[7]**

i) hydraulic and hydrologic method of flood routing,

ii) hydrologic storage routing and hydrologic channel routing,

iii) prism storage and wedge storage.

b) A small reservoir has the following storage elevation relationship. **[9]**

Elevation(m)	55	58	60	61	62	63
Storage (10^3 m^3)	250	650	1000	1250	1500	1800

A spillway provided with its crest at elevation 60.00 m has the discharge relationship $Q = 15H^{3/2}$, where H = head of water over the spillway crest. When the reservoir elevation is at 58.00 m a flood as given below enters the reservoir. Route the flood and determine the maximum reservoir elevation, peak outflow and attenuation of the flood peak.

Time (hr)	0	6	12	15	18	24	30	36	42
Inflow (m^3/s)	5	20	40	60	50	32	22	15	10

OR

Q8) a) Describe a numerical method of hydrologic reservoir routing. **[7]**

b) A small reservoir has a spillway crest at elevation 200.00 m. Above this elevation, the storage and outflow from the reservoir can be expressed as : **[9]**

Storage : $S = 36000 + 18000\ y\ (m^3)$

Outflow : $Q = 10\ y\ (m^3/s)$

Where y = height of the reservoir level above the spillway crest in m. Rout an inflow flood hydrograph which can be approximated by a triangle as

I = 0 at t = 0 h

I = 30 m^3/s at t = 6 h (peak flow)

I = 0 at t = 26 h (end of inflow).

Assume the reservoir elevation as 200.00 m at t = 0 h. Use a time step of 2 h.

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Total No. of Questions : 8]

SEAT No. : ____

P-3434

[Total No. of Pages : 2

[6005]-536

M.E. (Civil) (Hydraulic)

SEDIMENT TRANSPORT & RIVER MECHANICS

(2017 Pattern) (Semester - II) (501048)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Solve any Five questions from Eight questions.***
2) ***All questions carry equal marks.***
3) ***Figures to the right indicate full marks.***
4) ***Use of scientific calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Discuss in brief Origin and formation of sediments. **[5]**

b) What are the fundamental properties of individual sedimentary particles. **[5]**

Q2) a) Explain resistance analysis related to Regimes of flow. **[5]**

b) What are the various approaches of establishment of incipient motion? **[5]**

Q3) a) Explain the different empirical, dimensional and semi-theoretical bed load equations. **[7]**

b) What are the different Modes of sediment transport. **[3]**

Q4) a) Design an irrigation channel in alluvial soil according to Lacey's method for following data **[5]**

i) Full supply discharge : 75 m^3/sec

ii) Lacey's silt factor - 0.9

iii) Channel side slope 0.5H: 1V

b) Explain the Tractive force approach method of channel design. **[5]**

P.T.O.

Q5) a) Explain **[5]**

i) Initial Regime

ii) Final Regime

b) What is river gauging? Explain the methods of river gauging in detail. **[5]**

Q6) a) Write a short note on : **[5]**

i) Bed load measurement

ii) Suspended load measurement

b) Explain "Continuity Equation for sediment". **[5]**

Q7) a) Discuss "River bank protection". **[5]**

b) What are the objective of river training and bank protection. **[5]**

Q8) a) How the Alluvial river models development will help in river training works? **[5]**

b) Discuss sediment transport through pipes. **[5]**

Total No. of Questions : 8]

SEAT No. :

P-725

[Total No. of Pages : 3

[6005]-538

M.E. Civil (Hydraulic Engineering)

Optimization Techniques

(2017 Pattern) (Semester - III) (601051)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt Q 1 or Q 2, Q 3 or Q 4, Q 5 or Q 6 and Q 7 or Q 8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figure to the right indicates full marks.***
4) ***Assume suitable data, if necessary and clearly state.***
5) ***Use of cell phone is prohibited in the examination hall.***
6) ***Use of Non programmable electronic pocket calculator is allowed.***

Q1) Use the Two Phase Simplex method to, **[14]**

Maximize $Z = 5x_1 - 4x_2 + 3x_3$.

Subject to $2x_1 + x_2 - 6x_3 = 20$,

$6x_1 + 5x_2 + 10x_3 \leq 76$,

$8x_1 - 3x_2 + 6x_3 \leq 50$,

$x_1, x_2, x_3 \geq 0$.

OR

Q2) A Surveying Equipment Dealer wishes to put four repairman to four different jobs. The repairman has somewhat different skills and they exhibit different levels of efficiency from one job to another. The dealer has estimated the number of man hours that would be required for each job-man combination. This is given in the matrix form in the table (**Table 2**) below. Find the optimal assignment. **[14]**

Table 2 : Effective man-hours needed

	Job			
Men	A	B	C	D
1	5	3	2	8
2	7	9	2	6
3	6	4	5	7
4	5	7	7	8

P.T.O.

Q3) a) Solve the following N.L.P.P. by Using Lagrangian multipliers method. **[10]**

Minimize $x_1^2 + x_2^2 + x_3^2$,

Subject to $4x_1 + x_2^2 + 2x_3 = 14$,

$x_1, x_2, x_3 \geq 0$.

b) Explain in brief with sketch: Local and Global Optimum. **[2]**

OR

Q4) a) Explain in detail the procedure of Dichotomous search method. **[6]**

b) Discuss in detail the procedure of "Newton's method" with reference to Non Linear Programming Problem. **[6]**

Q5) A Tile manufacturing company is interested in selecting the advertising media for its product and the frequency of advertising in each media. The data collected over the past two years regarding the frequency of advertising in three media of newspaper, radio and television and the related sales of the product give the following results : **[12]**

Table 5 : Expected Sales in Thousands of Rupees

Frequency/Week	Television	Radio	Newspaper
1	220	150	100
2	275	250	175
3	325	300	225
4	350	320	250

The cost of advertising in newspaper is Rs. 500/appearance, while in radio and television is Rs. 1,000 and Rs. 2,000 respectively. The budget provides Rs. 4,500 per week for the advertisement. The problem is of determining the optimal combination of advertising media and advertising frequency. Use Dynamic Programming.

OR

Q6) Solve the following L.P.P. by the method of Dynamic Programming : **[12]**

Maximize $Z = 2x_1 + 5x_2$.

Subject to $2x_1 + x_2 \leq 430$,

$2x_2 \leq 460$,

$x_1, x_2 \geq 0$.

Q7) The information regarding to be scheduling through one machine is given below. **[12]**

Job	A	B	C	D	E	F	G
Processing Time (Days)	4	12	2	11	10	3	6
Due Date (Days)	20	30	15	16	18	5	9

a) What is the first come, first served (FCFS) schedule?

b) What is the shorted processing time (SPT) schedule?

c) What is the slack time remaining (STR) schedule?

d) What is the earliest due date (EDD) schedule?

e) What are the mean flow times for each of the schedules above?

OR

Q8) Solve the game given in the following table (Table 8) by graphical method. **[12]**

Table 8

		B			
		Y_1	Y_2	Y_3	Y_4
A	X_1	19	6	7	5
	X_2	7	3	14	6
	X_3	12	8	18	4
	X_4	8	7	13	−1

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Total No. of Questions : 8]

SEAT No. : ____

P726

[Total No. of Pages : 2

[6005]-539

S.Y.M.E. (Civil) (Hydraulics Engineering)
RESEARCH METHODOLOGY
(2017 Pattern) (Semester-III) (601052)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Slove Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) Explain various types of research. **[5]**

b) What are the sources of literature in research? Explain. **[4]**

OR

Q2) a) Explain the process of research. **[5]**

b) What is the need of literature survey? Explain. **[4]**

Q3) a) Write a note on data collection for research. **[5]**

b) What do you mean by testing of hypothesis? **[4]**

OR

Q4) a) What are the methods of data collection? Explain. **[5]**

b) Explain variance technique. **[4]**

Q5) a) Explain with an example correlation and regression analysis. **[8]**

b) What do you mean by discriminant analysis? Explain. **[8]**

OR

P.T.O.

Q6) a) Explain multidimensional measurement and factor analysis. **[8]**

b) What do you mean by cluster analysis? Explain. **[8]**

Q7) a) Explain the need of effective documentation and report writing. **[8]**

b) Write a note on plagiarism and presentation styles. **[8]**

OR

Q8) a) Explain the points to be considered in writing, presenting and publishing a of research paper. **[8]**

b) Write a note on elements of effective presentation and impact of presentation. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3435

[Total No. of Pages : 2

[6005]-541

First Year M.E. (Civil/Structural Engg.)

THEORY OF ELASTICITY AND PLASTICITY

(2017 Pattern) (Semester - I) (501001)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Derive an expression for maximum shearing strain for a state of strain at a point on an element. **[5]**

b) Write short notes on Airy's Stress Function. **[4]**

OR

Q2) a) Show that the stress tensor is symmetrical for small cube of size dx, dy and dz along X, Y and Z direction respectively. **[5]**

b) What is the physical meaning of compatibility equations also derive the three compatibility equation of 2D problem in Cartesian coordinates. **[4]**

Q3) a) Explain with examples the axisymmetric problems. Hence write down the corresponding basic equations of equilibrium, compatibility and strain displacement relations. **[5]**

b) State and explain Saint Venant's principle. **[4]**

OR

Q4) a) Derive an expression for maximum shearing stress in case of thick cylinders. **[5]**

b) Derive expression for moment and maximum stress due to torsion of a hollow shaft. **[4]**

Q5) a) Write as short notes on Bauschinger effect of stress strain. **[8]**

b) State the uniqueness theorem for small plastic-elastic deformations. **[8]**

OR

Q6) a) Explain in brief Tresca's failure criteria with suitable example. **[8]**

b) State the membrane analogy for torsion of thin walled structures. **[8]**

P.T.O.

Q7) a) Derive the expression of expansion of a thick walled tube considering elastic condition and initial yielding. **[8]**

b) State the behavior of ideally plastic thick walled cylinders under internal pressure alone with plane strain condition. **[8]**

OR

Q8) a) State and discuss the Prandtl-Reuss theory for plane strain. **[8]**

b) Derive the expression for solid cylindrical bar under torsion as per Nadia's Sand Heap analogy. **[8]**

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Total No. of Questions: 8]

SEAT No. : ____

P3436

[Total No. of Pages : 3

[6005]-542
F.Y.M.E. (Civil-Structural)
STRUCTURAL DYNAMICS
(2017 Pattern) (Semester-I) (501002)

Time : 3 Hours] ***[Max. Marks :50***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2; Q.3 or Q.4; Q.5 or Q.6; and Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***If necessary, assume suitable data and indicate clearly***
4) ***Use of electronic pocket calculator is allowed.***

Q1) Calculate the natural frequency for the frame shown in Fig. 1. Assume the beam to be infinitely rigid. **[9]**

Consider E = 206×10^9 N/m^2, I = 62.5×10^{-6} m^4, L= 3.65 m and m = 140 kg.

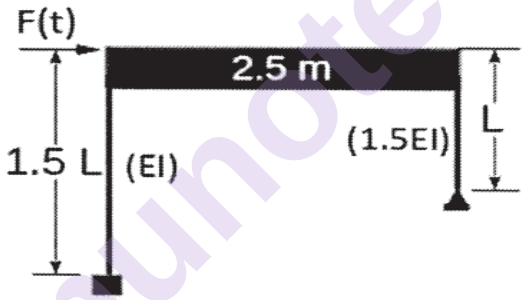


Fig. 1

OR

Q2) The natural frequency of a spring-mass system is 2 Hz. When an additional mass of 1 kg is added to the original mass m, the natural frequency is reduced to 1 Hz. Find the spring constant k and the mass m. **[9]**

Q3) An undamped single degree of system is subjected to a harmonic force having an amplitude F_0= 80 N and a frequency of 10 cps. Determine the displacement amplitude of the steady state response if the mass is 8 kg and spring constant is 2.5 N/m. **[9]**

OR

P.T.O.

Q4) A single degree of freedom system is subjected to a step functions as shown in Fig. 2. Determine the response of the system. **[9]**

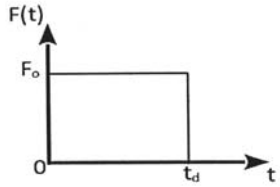


Fig. 2

Q5) a) Calculate the natural frequencies and plot the mode shapes for the system shown in Fig.3. **[12]**

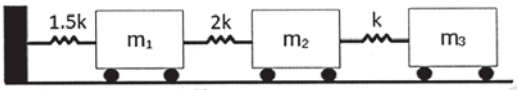


Fig. 3

b) What are mode shapes? Explain how they are calculated. **[4]**

OR

Q6) a) The building shown in Fig. 4 consists of frames spaced 3 m center to center. The design load on the floor may be taken as 4.5 kN/m^2. The column are of size (350×400) mm. Determine the natural frequency and plot the mode shapes. Take E = 22 GPa. **[12]**

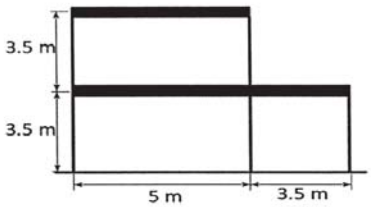


Fig. 4

b) What are Eigen values and Eigen vectors? **[4]**

Q7) a) Derive the expression for transverse vibration of a simply supported beam. **[8]**

b) Derive the expression for transverse vibration of a beam fixed at one end and simply supported at the other end. **[8]**

OR

Q8) a) Write a note on Rayleigh-Ritz method. **[8]**

b) Write a note on continuous systems. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

P-3437

[Total No. of Pages : 2

[6005]-543

F.Y. M.E. (Civil Structure Engineering)

ADVANCED DESIGN OF STEEL STRUCTURES

(2017 Pattern) (Semester - I) (501003)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***
5) ***IS: 800-2007, IS: 800-1984, IS: 801, IS: 802, IS:811, SP-34 and Nonprogrammable calculator.***

Q1) a) Explain different types of hoarding structures with sketches. **[3]**

b) Design a castellated beam in grade Fe410 steel to carry an imposed load of 3kN/m and dead load of 5kN/m over a simply supported span of 18m. **[6]**

OR

Q2) a) What are the force considered in the design of microwave tower and transmission tower? **[3]**

b) A tabular column hinged at both ends has the outside diameter of the tube 129.1mm and is of heavy gauge (i.e@31 kg/m). The length of the column is 4.5m. Determine the safe load the column can carry if the column is of IS 1161 grade ST 32 steel. **[6]**

Q3) a) Give brief sketch of different structures used to support the electric power transmission lines? **[3]**

b) A light gauge steel rectangular box section 200mm×100mm×2.0mm is used for a column. The effective length of column is 3.6m. Determine the safe load carrying capacity of the section. Take basic design stress σ_b as 125 N/mm^2. **[6]**

OR

P.T.O.

Q4) a) Define Stiffened, Multiple Stiffened, and Un-Stiffened light-gauge sections. **[3]**

b) Explain structural configuration (Tower geometry) and material. Briefly explain the design steps for transmission tower. **[6]**

Q5) a) How is stability analysis carried out for a steel chimney? **[8]**

b) What is the function of base plate provided for the steel chimney? How is it analyzed and designed. **[8]**

OR

Q6) a) A steel chimney of 72 m heighi and the diameter of cylindrical shell is 3m. The moment at the base of chimney is 8830kNm and the weight of chimney shell is 756kN. It has a 100mm thick lining brick lining. Design base Plate and Anchor bolt. **[8]**

b) State and explain different design forces for the chimney. **[8]**

Q7) A self supporting steel stack is 84mts high and its top diameter is 3m is to be designed for Pune. Design the plates of stack, base plate of stack and anchor bolt. **[16]**

OR

Q8) a) State and explain design criterion for foundation of steel chimney. **[8]**

b) Explain how the height and other dimensions of a steel chimney are determined. **[8]**

Total No. of Questions : 8]

SEAT No. :

P-3438

[Total No. of Pages : 3

[6005]-544

M.E. (Civil) (Structures)

NUMERICAL METHODS IN STRUCTURAL ENGINEERING

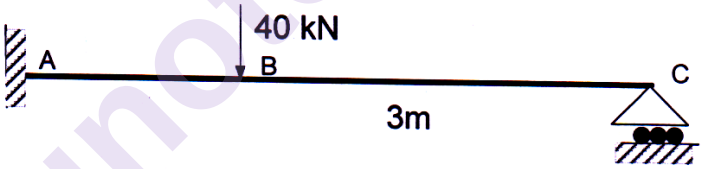
(2017 Pattern) (Semester - I) (501004)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***If necessary, assume suitable data and indicate clearly.***
4) ***Use of electronic pocket calculator is allowed.***

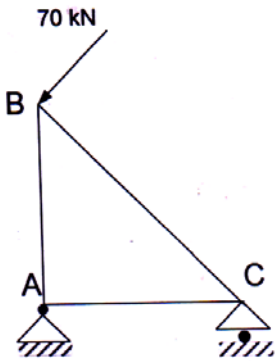
Q1) a) A beam AC is loaded and supported as shown in figure. Using member stiffness approach of matrix method of analysis, determine the rotations at B and C. The 40 kN load is acting at B which is at a distance of 1 m from A. **[5]**



b) Write short note on Gauss elimination method, Gauss - Jordan method. Point out the difference and advantages of each method over the other.**[4]**

OR

Q2) a) For the given truss, derive the global stiffness matrix using direct stiffness matrix load of 70 kN is acting at an angle of 90 degrees with BC member. AB = 4m, AC = 3m, Take E = 200 GPa, A = 0.03 m^2. **[5]**



P.T.O.

b) Using partial pivoting technique in Gauss Elimination method, find the solution of the system of equation with the augmented matrix **[4]**

$$[A|B]=\begin{bmatrix}1 & 1 & 1 & 4\\ 2 & 1 & 3 & 7\\ 3 & 1 & 6 & 2\end{bmatrix}$$

Q3) a) Explain the one point and two Gauss Quadrature rule of Integration. Integrate $f(x) = 3x^3 - 3x^2 - 6$ from -3 to 4 using Gauss Quadrature formula. **[5]**

b) Solve the pair of simultaneous equations **[4]**

$dy_1/dx = y_2$; $y_1(0) = 0$

$dy_2/dx = y_{1*}y_2 + x^2 + 1$; $y_2(0) = 0$

and find $y_1(0.2)$, $y_2(0.2)$ using numerical method of your choice.

OR

Q4) a) Solve the following initial value problem using fourth order Runge Kutta method. **[5]**

Interval is (1, 2) take $h = 0.2$ and find $x(1.2)$.

Initial conditions are $x(1) = 1$ and $\frac{dx}{dt} = 0,\ x = 1$

$$2x\frac{d^2x}{dt^2} + \left(\frac{dx}{dt}\right)^2 + 1 = 0$$

b) Write a short note Gauss Quadrature method for numerical integration. Explain with illustration. **[4]**

Q5) a) A fixed beam of length L supports a uniformly distributed load of intensity 'w' kN/m over half right span. Calculate the maximum moment and deflection in the beam using central difference. **[8]**

Assume EI as constant. Divide the beam in four equal parts.

b) A simply supported uniform plate of length 4 m and with 2 m supports uniformly distributed load 3 kN/m^2 over the entire plate. Using finite difference method, estimate the deflection at the nodal points of the grid, using grid interval of h = 1m. **[8]**

OR

Q6) a) Using finite difference method, estimate the buckling load of pin ended column of length L and uniform cross section. Consider four subinterval and compare the approximate value obtained with the exact value given by Euler's critical load theory. **[8]**

b) Explain stepwise the finite difference technique to obtain the maximum deflection of simply supported square plate of size '*a*' subjected to a distributed load of intensity '*po*'. Divide the plate into 4 × 4 grid. **[8]**

Q7) a) Fit and model ($y=a*x/(b+x)$) to the data given below : **[8]**

X	2	4	6	8
Y	1.5	2.1	2.5	2.7

b) Write a short note on curve fitting techniques. **[8]**

OR

Q8) a) Fit a curve using least square method and find the functional value at x = 5.6. **[8]**

X	1	3	5	9	9
Y	5.39943	6.59468	8.05501	9.83841	12.01666

b) What do you understand by Spline interpolation? What are cubic splines? State the conditions for a spline to be cubic. **[8]**

Total No. of Questions : 8]

SEAT No. :

P-3439

[Total No. of Pages : 2

[6005]-546

M.E. (Civil-Structures)

FINITE ELEMENT METHOD

(2017 Pattern) (SEMESTER - II) (501007)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Q.1 or 2, Q.3 or 4, Q.5 or 6, Q.7 or 8***
2) ***Neat diagrams must be drawn wherever necessary***
3) ***Figures to the right indicates full marks***
4) ***Use of electronic pocket calculator is allowed***
5) ***Assume suitable data if necessary.***

Q1) a) Solve the following differential Equation using the Galerkin Method. **[6]**

$$\frac{d^2y}{dx^2} + 50 = 0 \text{ for } 0 \le x \le 10$$

Boundary conditions are $y(0) = y(10) = 0$. Assume trial function $y = ax\,(10 - x)$

b) Define node in finite element analysis. What are the types of nodes. **[4]**

OR

Q2) a) Write short note on significance of strong and weak formulation in finite element analysis. **[5]**

b) State and explain the variational principles of virtual work and minimum potential energy used for the derivation of stiffness matrix of finite element.**[5]**

Q3) a) What are the criteria for convergence requirement of displacement function with suitable example. **[5]**

b) A three nodded constant strain triangular element is used in plane elasticity problem. Coordinates at nodes are (1, 2), (5, 6), (4, 6). Hence, derive shape functions for the given CST element. **[8]**

OR

P.T.O.

Q4) a) Using the Lagrange interpolation function, derive shape functions of nine nodded rectangular element in natural coordinate system **[8]**

b) Explain with suitable example **[5]**

i) Isoparametric elements,

ii) Sub-parametric elements and

iii) Super-parametric elements

Q5) a) Explain Mindlin's plate element & explain step by step procedure of deriving the stiffness matrix of plate using Mindlin' s plate element. **[8]**

b) Explain need of refined shear deformation theories for the finite element analysis of plate and shell type structures. **[5]**

OR

Q6) Obtain Jacobian matrix for the quadrilateral element using isoparametric formulation. The coordinates of quadrilateral elements are (2, 1), (8, 3), (7, 7) and (3, 5). **[13]**

Q7) Derive stiffness matrix for the rectangular ACM plate bending element with 12 DOF. **[14]**

OR

Q8) a) Write difference between plate element and shell element. Write strain-displacement relations for doubly-curved shallow shell. **[8]**

b) Write short note on axi-symmetric finite elements. Explain with suitable example. **[6]**

x x x

Total No. of Questions : 8]

SEAT No. :

P-3440

[Total No. of Pages : 2

[6005]-547

M.E. (Civil-Structures)

THEORY OF PLATES AND SHELLS

(2017 Pattern) (Semester - II) (Credit) (501008)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 orQ.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable data, if necessary and clearly state.***
5) ***Use of cell phone is prohibited in the examination hall.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) a) Derive Relationship between Bending Moments and Curvature in Pure Bending of Plates. **[6]**

b) Explain the difference between thin and thick plates. **[3]**

OR

Q2) a) Explain in brief boundary condition for rectangular plate. **[5]**

b) Describe in brief shear deformation theory and write the displacement function of Reissener - Mindlin theory. **[4]**

Q3) a) Derive differential Equations of Bending of Plates in Polar Coordinates. **[4]**

b) State and explain classification of shells on geometry with suitable sketches. **[5]**

OR

Q4) a) Derive Differential Equation for Symmetrical Bending of Laterally Loaded Circular Plates. **[5]**

b) Derive equation for of Deformation of a Cylindrical Shell. **[4]**

P.T.O.

Q5) a) Derive expression for Cylindrical Shells with Supported Edges. **[8]**

b) Differentiate membrane and bending theory for circular cylindrical shell. **[8]**

OR

Q6) a) Derive differential equation for pressure vessel. **[8]**

b) State and Explain Bending theory of Cylindrical Shells. **[8]**

Q7) a) State and explain Lundgren's beam theory with its application to analysis of shells. **[8]**

b) Explain in details beam analysis for cylindrical shells. **[8]**

OR

Q8) a) Explain in brief beam method of analysis for cylindrical shells and applications to cylindrical roof shells. **[8]**

b) Explain Stress Analysis of Cylindrical Roof Shells. **[8]**

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Total No. of Questions : 8]

SEAT No. :

P3441

[Total No. of Pages : 2

[6005]-548

F.Y.M.E. (Civil) (Structural Engineering)
ADVANCED DESIGN OF CONCRETE STRUCTURES
(2017 Pattern) (Semester-II) (501009)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Q.1 or Q2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use IS 456, IS 1343, IS 1893, IS 3370 and Non-programmable calculators.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain Assumptions in Yield line Theory. **[4]**

b) Design a grid slab for a floor of community hall 11.5m×13.5m having a square grid of 1.5m. Use M25 and Fe 500 steel. **[5]**

OR

Q2) a) Draw yield line pattern for: A rectangular slab with fixed support on three sides with shorter side free. **[4]**

b) Design a grid slab for a floor of Auditorium hall 14m×16m having square grid of 2m. Use M25 and Fe 415. **[5]**

Q3) a) Enlist the advantages and disadvantages of flat slab. **[4]**

b) An open square tank 6m×6m×3.5m deep and supported 7m above the ground level on beams and columns. Design the beam and column of a tank. Use M20 and Fe 500 steel. **[5]**

OR

Q4) a) Explain in detail wind load analysis of column for a water tank supported on four identical columns with their lower end fixed to the base and braced at intermediate levels. **[4]**

b) Design an interior panel of flat slab for flexure take live load of 4.5 kN/m^2 and floor finish load of 0.9kN/m^2. The panels are 6m×6m in dimensions. Use M20 and Fe 500. **[5]**

P.T.O.

Q5) a) Design a circular bunker to store 50 tons of coal for the following. Density of coal=16 kN/m^3, angle of repose is 29º. Use M25 and Fe 500 steel. Draw the details of reinforcement in side wall and hopper. **[8]**

b) A concrete silo of diameter 10m, with height of cylindrical portion of 30m and contains wheat weighing 8.5kN/m^3. The coefficient of friction between grain and grain is 0.43, the coefficient of friction between grain and concrete is 0.41 and angle of repose is 25º. Determine the lateral pressure at 5m interval on the walls of silo. **[8]**

OR

Q6) a) Design a square bunker to store 500kN furnace slag. Unit weight of slag is 8500 N/m^2. Angle of repose is 22º. Use M25 and Fe 500. Draw reinforcement details for side walls and hopper bottom. **[8]**

b) A concrete silo of diameter 8m, with height of cylindrical portion of 25m and contains and contains cement weighing 15.2kN/m^3. The coefficient of friction between grain and grain is 0.31, the coefficient of friction between grain and concrete is 0.5 and angle of repose is 17.5º. Determine the lateral pressure at 5m interval on the walls of silo. **[8]**

Q7) a) A group of 24 piles are arranged in 4 rows and 6 in each row. The piles are 250mm in diameter and spaced 1m center to center. Each pile can carry 150kN load if it can act independently. Determine the carrying capacity of the pile group. **[8]**

b) Design a formwork for a slab of 4m×4m having thickness of 150mm. It is proposed to deposit concrete in one stage. **[8]**

OR

Q8) a) In a group of 16 piles of diameter 450mm and center to center spacing of pile being1.5m. The piles are arranged in square area. Each pile is 10m long and taking m = 0.7 and c=50kN/m^2. Ascertain whether the failure will occur with the piles acting individually or as a group. Also specify the failure load. **[8]**

b) Design a raft foundation for the following center to center distance of column in both directions is 2.5m. Taking column size as 350mm×350mm, working load on each column is 650kN. The depth of strata is 1.8m. Use M25 and Fe 500, SBC 110kN/m^2. Draw reinforcement details **[8]**

Total No. of Questions : 8]

SEAT No. :

P-727

[Total No. of Pages : 2

[6005]-549

M.E. Civil (Structural Engineering)

RESEARCH METHODOLOGY

(2017 Pattern) (Semester - III) (601013)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Write a research report in a flowchart. **[4]**

b) How to define a research problem? Give one example to illustrate your answer. **[5]**

OR

Q2) a) Enlist various types of research and discuss fundamental research in detail. **[4]**

b) Explain the precautions to be taken while writing a research report. **[5]**

Q3) a) Explain in detail the secondary sources of data and explain its limitations. **[4]**

b) Write a note on advantages and limitations of sources of literature survey. **[5]**

OR

Q4) a) Explain the importance of good literature review. **[4]**

b) Explain the characteristics of a good sample design. **[5]**

Q5) a) Enlist different hypothesis testing methods. Explain any two methods. **[8]**

b) Explain in detail "Multi-collinearity and Regression". **[8]**

P.T.O.

OR

Q6) a) Explain "Descriptive Statistics: Measures of Central Tendency, Measures of Dispersions, Measures of Skewness and Measures of Relationships". **[8]**

b) Write a note on "Two group Discriminant Analysis" and "Multiple Discriminant Analysis". **[8]**

Q7) a) Explain in detail Mechanics of writing Research report with suitable example. **[8]**

b) Write a research proposal for a suitable research problem (For any problem related to Civil Engineering can be considered) to a funding agency with reference to the following terms: Title, Introduction, origin of the problem, expected outcome, literature review. Significance of the study in context of: current status, objectives, methodology, year-wise plan. **[8]**

OR

Q8) a) Discuss about the importance of research report writing and write a note on the steps involved in presenting a research paper. **[8]**

b) Write a research proposal for a suitable research problem (For any problem related to Structural Engineering can be considered.) to a funding agency with reference to the following terms: Title, Introduction, origin of the problem, expected outcome, literature review. Significance of the study in context of: current status, objectives, methodology, year-wise plan. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

P728

[Total No. of Pages : 3

[6005]-550

S.Y.M.E. (Civil-Structures Engineering)

ANALYSIS AND DESIGN OF EARTH QUAKE RESISTANT STRUCTURES

(2017Pattern) (Semester-III) (601014)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Slove Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary and clearly state.***
5) ***Use of cell phone is prohibited in the examination hall.***
6) ***Use of electronic pocket calculator is allowed.***
7) ***IS 1893 is allowed.***

Q1) a) Why are aftershocks recorded? **[5]**

b) Write a short note on P-Δeffect **[4]**

OR

Q2) a) Describe with neat figure **[5]**

i) Seismic waves

ii) Epicenter

iii) Hypocenter or focus

b) What is the “magnitude” of an Earthquake? **[4]**

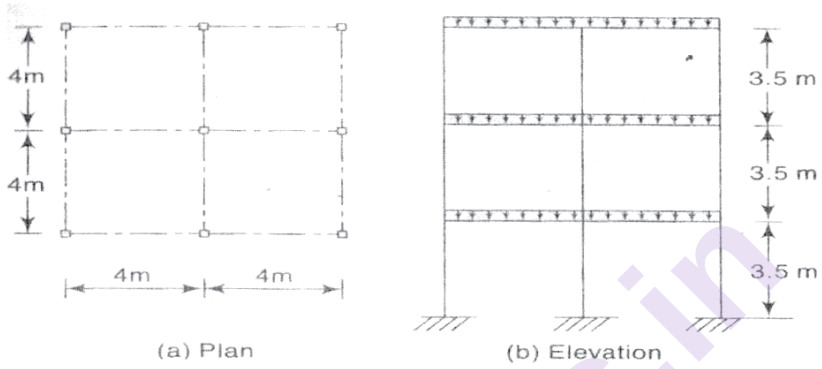
Q3) a) Explain what twist does to building members. **[5]**

b) Explain effects of irregularity and architectural planning for earthquake resistant design. **[4]**

OR

P.T.O.

Q4) The plan and elevation of three story RCC school building is shown in Fig. The building is located in seismic zone V. The type of soil is encountered is medium stiff and it is proposed to design the building with special moment resisting frame. The intensity of dead load is 10 km/m^2 and the floors are to cater to IL of 3kN/m^2. Determine the design seismic loads on the structure by static analysis. **[9]**



Q5) Give reasons for following with regard RC member subjected to seismic forces. **[16]**

a) Depth of beam should not more than one-fourth of clear span

b) Tension steel ratio on any face of beam should not less than $0.24\sqrt{\frac{f_{ck}}{f_y}}$

c) Width of column should not be too small

d) Special confining reinforcement for full height column is provided when stiffness of column changes significantly along the height.

OR

Q6) a) Explain Methods of seismic retrofitting. **[7]**

b) Write a short notes on **[9]**

i) Shaking table test

ii) Pseudo-dynamic test

iii) Quasi static test

Q7) a) State IS 3370 code provisions for water tanks. Write design procedure for water tank. **[8]**

b) Explain why buildings with shear walls preferred in seismic regions. Discuss the concept of flanged shear wall. **[8]**

OR

Q8) a) Calculate time period of water tank whose mass is 201869 kg and stiffness is 2.22×10^8N/m. **[8]**

b) Ductile detailing consideration as per 13920:1993 for lap splices in beam, beam web reinforcement, column and joint detailing, travers reinforcement in columns. **[8]**

Total No. of Questions : 8]

SEAT No. :

P-3442

[Total No. of Pages : 2

[6005]-555

F.Y. M.E. (Civil)

WATER RESOURCES AND ENVIRONMENTAL ENGINEERING

Hydrology

(2017 Pattern) (Semester - II) (501087)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer all questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Write a note on IUH. **[5]**

b) Explain Stanford Watershed Model. **[4]**

OR

Q2) a) Draw a flow chart for mathematical methods in hydrology and explain stochastic hydrology applications. **[6]**

b) Explain normal distribution (statistical). **[3]**

Q3) a) What is design flood? How it is finalized while designing hydraulic structure. **[4]**

b) Explain Pearson Type-II method. **[5]**

OR

Q4) a) Write note on method of images for ground water management. **[5]**

b) Explain the Goodrich method of flood routing. **[4]**

P.T.O.

Q5) a) Explain step by step design of tube well & also explain types and construction methods for tube wells. **[8]**

b) What are causes of ground water pollution? State effects of ground water pollution. What are the methods to treat polluted ground water? **[8]**

OR

Q6) a) What affects the quality of ground water in India? **[8]**

b) Explain porous media models. **[8]**

Q7) a) Explain any one widely used method of ground water recharge. **[8]**

b) State various methods to conserve ground water and explain any two and also explain how it helps in management of water resources. **[8]**

OR

Q8) a) Explain sand tank model and transparent model for ground water modeling with neat sketches. **[8]**

b) Explain electric analog model for ground water modeling with neat sketches. **[8]**

□□□

Total No. of Questions : 8]

SEAT No. : ____

P729

[Total No. of Pages : 2

[6005]-559

S.Y.M.E. (Civil-Water Resource and Environmental Engineering)
RESEARCH METHODOLOGY
(2017 Pattern) (Semester-III) (601094)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Your answer will be valuaed as a whole.***
4) ***Assume suitable data, if neccessary.***

Q1) a) Discuss the various strategies of literature survey for Explanatory Research. **[5]**

b) Discuss the criteria's to be considered while formulation of research hypotheses. **[4]**

OR

Q2) a) Enlist various sources for literature review and discuss the strategy to be employed for applied research. **[5]**

b) Discuss the methods which can be utilized in selecting a research problem. **[4]**

Q3) a) Discuss the conditions in which type I and Type II errors will be committed. **[5]**

b) What are the merits and demerits of collection of data through questionnaires? **[4]**

OR

Q4) a) Discuss the conditions in which z-test and chi-square test is used for Hypothesis testing. **[5]**

b) Explain conditions in which one tailed and two tailed tests for hypothesis testing are used. **[4]**

P.T.O.

Q5) a) Discuss in detail descriptive statistics and inferential statistics. **[8]**

b) Explain principal component analysis. Give a suitable example explaining its need. **[8]**

OR

Q6) a) Discuss the important characteristics of ANOVA. **[8]**

b) Explain the centroid method of factor analysis. **[8]**

Q7) a) What are characteristics of good abstract for a journal paper. Discuss as to why abstract is necessary. **[8]**

b) Discuss the importance of publishing a research work in a journal. Enlist the steps involved in publish a research paper in journal. **[8]**

OR

Q8) a) Discuss the need of effective documentation in research. **[8]**

b) Explain the importance of a good presentation. **[8]**

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Total No. of Questions: 7]

SEAT No. :

P3443

[Total No. of Pages : 2

[6005]-562

First Year M.E. (Mechanical) (Design Engineering)

MATERIAL SCIENCE AND MECHANICAL BEHAVIOR OF MATERIALS

(2017 Pattern) (Semester-I) (502202)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any Five questions.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of programmable calculator is not allowed.***
5) ***Assume suitable data wherever necessary.***

Q1) a) Write a short note on composites materials and explain its orthotropic properties. **[6]**

b) Explain any four properties of Nano materials and it's industrial application. **[4]**

Q2) a) Is it possible to determine the principal strains by Mohr's circle? True or false, Justify the answer in short. **[4]**

b) For isotropic material and a complex stress state, explain yield criteria and yield curve. **[6]**

Q3) a) Calculate the temperature rise in a tension test of low-carbon steel after a tensile elongation of 22%. Assume that 95% of the energy goes to heat and remains in the specimen. For steel, the heat capacity is 447 J/kg K and the density is 7.88 Mg/m^3. Also assume that Figure 1 represents the stress-strain curve of the material. **[7]**

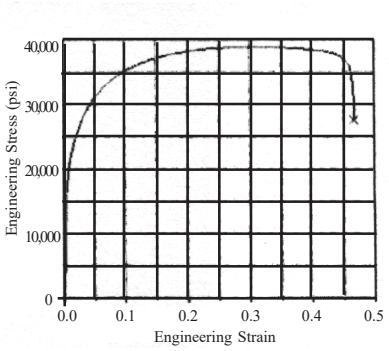

Fig. 1 Typical engineering stress-strain curve for a ductile material

b) Explain with neat sketch Bridgeman correction for metals. **[3]**

P.T.O.

Q4) a) A tensile bar is machined so that the diameter at one location is 1% smaller than that for the rest of the bar. The bar is tested at high temperature, so strain-hardening is negligible, but the strain-rate exponent is 0.25. When the strain in the reduced region is 0.20, what is the strain in the larger region? **[6]**

b) Explain Power-law approximation with neat sketch. **[4]**

Q5) a) Explain the concept of Strain Hardening and condition of loading and unloading with neat sketch? **[4]**

b) The strain-rate dependence of a zinc alloy is m=0.07. What is the ratio of the flow stress at $\varepsilon = 0.10$ for a strain rate of 10^3/s to that at $\varepsilon = 0.10$ for a strain rate of 10^{-3}/s? Calculate the same for a low carbon steel with m = 0.01. **[6]**

Q6) a) Explain the concept of Superplasticity? **[4]**

b) Explain the concept of Rubber elasticity and phenomenon of crazing for theromoplastics material? **[6]**

Q7) What is viscoelasticity? Explain Maxwell-Voigt Model for rheological properties of viscoelastic material and compare the effect of Strain relaxation and Stress relaxation on both with neat sketch? **[10]**

Total No. of Questions : 7]

SEAT No. :

P-3444

[Total No. of Pages : 3

[6005]-563

M.E. (Mechanical) (Design Engineering)

ADVANCED STRESS ANALYSIS

(2017 Pattern) (Semester - I) (502203)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions out of 7.***
2) ***All the questions should be solved in one answer book and attach extra supplements if required.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data if necessary, but state the assumptions clearly.***

Q1) a) Show that the stress function, $\phi = D.x.y^3 + B.x.y$, provides stress distribution for a cantilever of depth 2h, and of unit thickness when it is loaded by a concentrated force P at its free end. **[6]**

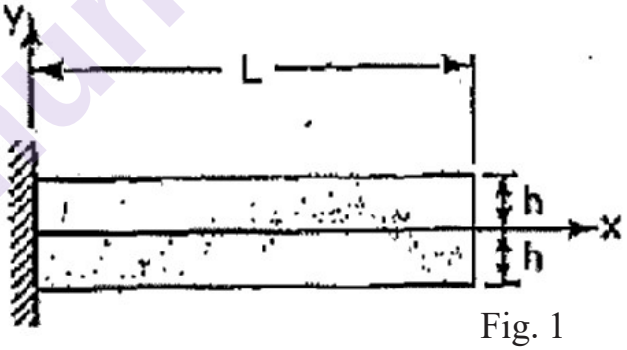

Fig. 1

b) Explain 'Plain strain' with suitable examples. **[4]**

Q2) a) The strain distribution in a thin plate has the form **[5]**

$$\begin{bmatrix} 3yx^2 & (2xy+2x^3) \\ (2xy+2x^3) & 4xy^2+10^{-2} \end{bmatrix}$$

Show whether this strain field is a valid solution to the elasticity problem. Body forces are neglected.

P.T.O.

b) For Beam carrying moving point loads, Obtain condition for maximum bending moment relating position of load, resultant of point loads and beam length. **[5]**

Q3) Derive an expression and locate the shear center for the beam cross-section shown in fig.2

The wall of the cross-section has a constant thickness t = 2 mm **[10]**

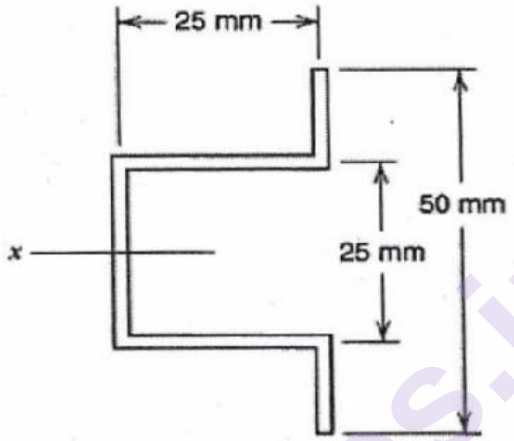

fig.2

Q4) a) Obtain the warping function for an elliptical cross-section bar subjected to pure torsion , if shear stress are given as **[5]**

$$\tau_{xz} = \frac{-2Ty}{\pi ab^3} \text{ and } \tau_{yz} = \frac{-2Tx}{\pi ba^3}$$

and '2a' and '2b' are the semi-major and semi-minor axis of elliptical cross- section.

b) For an square cross-section bar shown in fig 3 is subjected to pure torsion, Obtain the Prandtl stress function, if the side of square is '2a' and the square is bounded by lines as $a - x = 0$; $x + a = 0$; $a - y = 0$, $y + a = 0$ **[5]**

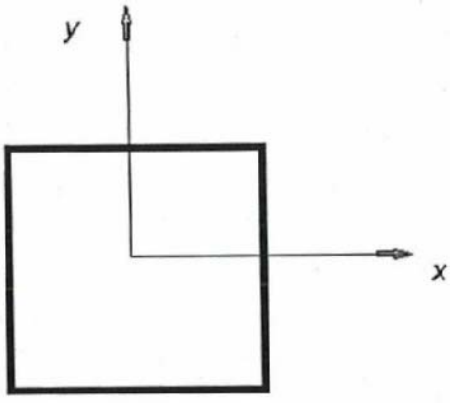

Fig.3

Q5) A hard steel ball (E = 200 GPa, V = 0.29) of diameter 50 mm is pressed against a thick aluminum plate (E = 72 GPa, V = 0.33 and yield stress = 450 MPa). Determine the magnitude of load P required to initiate yield in the aluminum plate according to the maximum octahedral shear stress criterion of failure, maximum shear stress, maximum octahedral shear stress and distance from the plane of contact to the maximum shear stress. **[10]**

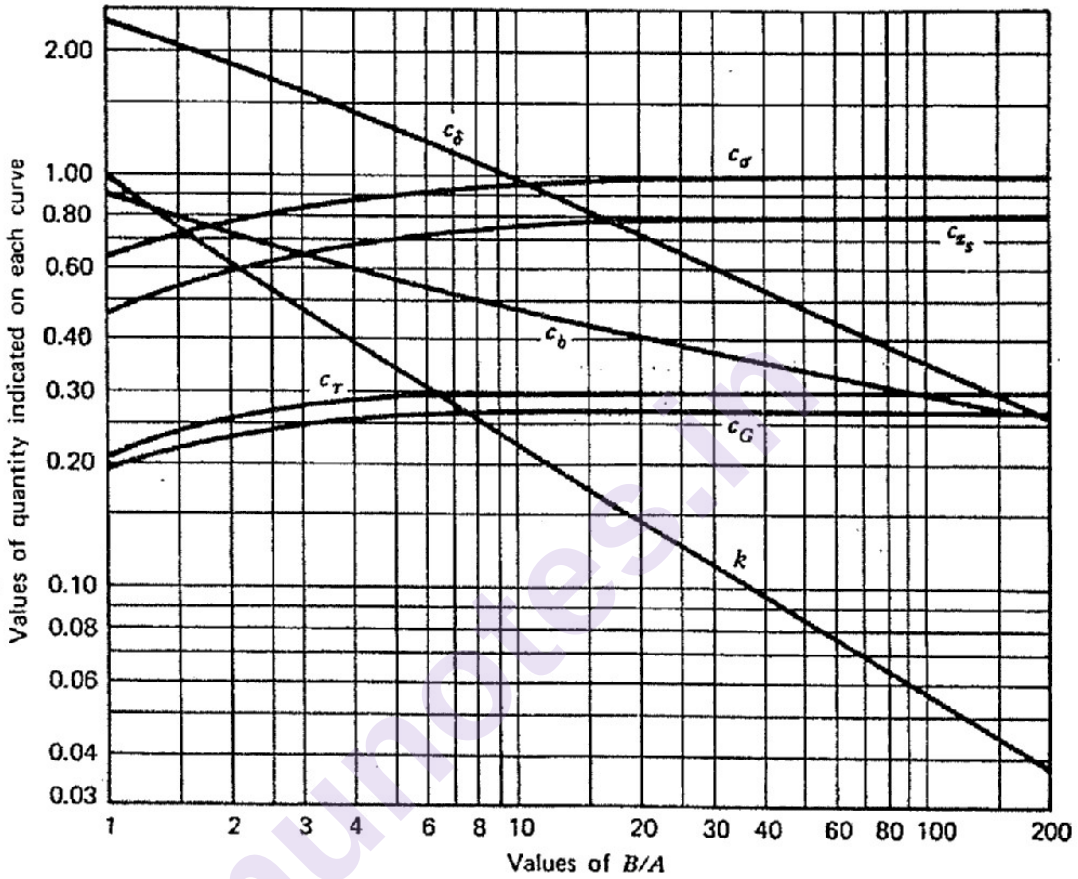

Fig 4: Stress and Deflection coefficient of two bodies in contact of a point

Q6) a) A strain rosette gauge is mounted at a critical location on a free surface of steel structural member. For a particular state of loading of the structure the strain gauge readings are -
ε_A = 200 μm/m (at 0° angle), ε_B = 900 μm/m (at 60° angIe),
ε_C = 1000 μm/m (at 120° angle),
Determine the maximum principal strain and its orientation.
Let E = 200GPa and υ = 0.285. **[6]**

b) Explain Prandtl's membrane analogy, with a suitable example. **[4]**

Q7) a) Explain Strain gauge rosette. **[5]**

b) Describe construction and working of Circular Polariscope. **[5]**

Total No. of Questions : 8]

SEAT No. :

P-3445

[Total No. of Pages : 2

[6005]-564

M.E. (Mechanical(All branches))

RESEARCH METHODOLOGY

(2017 Pattern) (Semester - I) (502104)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve any five questions from the following.***
2) ***Assume suitable data if necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of scientific calculator is allowed.***
5) ***Use of standard statistical tables having normal distibution, F-test and Chi-square test are permitted.***

Q1) a) Explain different types of research. **[5]**

b) Define a good research problem. What are various criteria of good research problem? **[5]**

Q2) a) Explain various sources of research problem. **[5]**

b) How it is verified that the assumptions hold true for a given apparatus setup? Explain in detail. **[5]**

Q3) a) Explain various steps in setting up a computer model to predict performance of experimental system. **[5]**

b) How to collect data and represent it in different forms? Which is best suited for engineering research. **[5]**

P.T.O.

Q4) a) Define following characteristics related to instruments (any 5) : **[5]**

i) Range

ii) Accuracy

iii) Precision

iv) Readability

v) Sensitivity

vi) Repeatability

vii) Reproducibility

b) Explain the Meaning of variable and selection of variables. **[5]**

Q5) a) Explain the different sections / formats in a project proposal. **[5]**

b) List down and discuss in short various statistical methods used in research. **[5]**

Q6) a) Discuss the errors in Selecting Research Problem. Also elaborate the benefit of conducting Pilot Study of Research Problem. **[5]**

b) How citation indexing of selected journals is estimated? Explain with one example. **[5]**

Q7) a) Discuss open access and subscription journals. What do you understand by Article Processing Charges? **[5]**

b) Explain structure of research report. **[5]**

Q8) a) Discuss popular and commonly used indexing of Journals used for selecting suitable journal for submitting your research paper. Explain important terms related to research Impact factor, Citation. h-Index. i10 index, and plagiarism. **[5]**

b) Explain various methods of research finding dissemination. **[5]**

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Total No. of Questions : 7]

SEAT No. :

P-3446

[Total No. of Pages : 2

[6005]-565

M.E. (Mechanical-Design Engineering)

ANALYSIS AND SYNTHESIS OF MECHANISMS

(2017 Pattern) (Semester - II) (502207)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of a calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Determine the Degree of Freedom of the mechanism shown in Figure 1. **[5]**

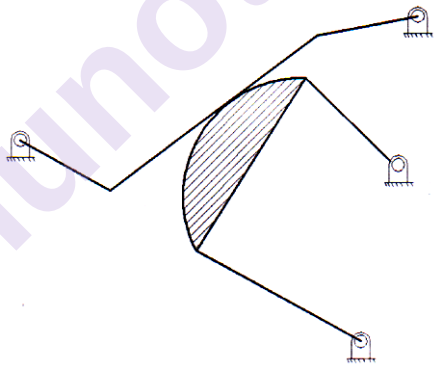

Figure - 1

b) Write a short note on the Mechanical advantage and Deviation angle of a four-bar mechanism. **[5]**

Q2) a) Explain the following terms with suitable examples **[5]**

i) Low degree of complexity

ii) High degree of complexity

b) Discuss the Goodman's Indirect method to determine the acceleration of a complex mechanism. **[5]**

P.T.O.

Q3) a) Derive the Eular-Savery equation to determine the location of the conjugate point of any point on the moving link. **[6]**

b) Discuss the significance of the Inflection circle and Inflection Pole in the design of a mechanism. **[4]**

Q4) a) Explain the following terms : **[4]**

i) Function Generation

ii) Rigid Body Guidance

b) Write a note on 'Centre Point and Circle Point curves'. **[6]**

Q5) A four-bar is to be designed, by using three precision points, to generate the function $y = x^{1.5}$, for the range $1 \leq x \leq 4$. Assuming 30° starting position and 120° finishing position for the input link and 90° starting position and 180° finishing position for the output link, determine the values of x, y, θ and φ corresponding to the three precision points. **[10]**

Q6) Discuss with suitable sketch Denavit-Hartenberg (D-H) parameters for the analysis of any spatial mechanism. **[10]**

Q7) a) Describe the mechanism with a high degree of complexity. **[5]**

b) State and prove Robert - Chebyshev Theorem. **[5]**

Total No. of Questions : 7]

SEAT No. :

P-3447

[Total No. of Pages : 2

[6005]-566

F.Y. M.E. (Mechanical-Design Engineering)

ADVANCED MECHANICAL VIBRATIONS

(2017 Pattern) (Semester - II) (502208)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve any five questions.***
2) ***Draw Neat diagrams wherever necessary.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume suitable data wherever necessary.***
5) ***Figures to the right indicate full marks.***

Q1) Derive the frequency equation of longitudinal vibrations for a free-free beam with zero initial displacement. **[10]**

Q2) The differential equations governing the motion of a 2 DOF system are as given below. Determine the system's natural frequencies. **[10]**

$$\begin{bmatrix} m & 0 \\ 0 & m \end{bmatrix} \begin{bmatrix} \ddot{x}_1 \\ \ddot{x}_2 \end{bmatrix} + \begin{bmatrix} 2k & -k \\ -k & 3k \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

Q3) What is the required tension in a transmission line of length 15 m and linear density of 5 kg/m such that the transmission line's lowest natural frequency for transverse vibrations is 100 rad/sec? Assume the line is simply supported. **[10]**

Q4) a) Explain how frequency domain analysis is useful in predicting machine failure. **[5]**

b) Explain narrow band analysis. **[5]**

P.T.O.

Q5) a) Explain balancing of masses in single plane by vibration measurement technique. **[5]**

b) Explain condition monitoring techniques in detail. **[5]**

Q6) Find the autocorrelation function of a random process whose power spectral density is given by $S(\omega) = S_0$ = constant between the frequencies ω_1 and ω_2. **[10]**

Q7) Write short notes on any three : **[10]**

a) Fault Diagnosis

b) Holzer method

c) Analysis of narrow band system

d) Experimental modal analysis

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Total No. of Questions : 8]

SEAT No. :

P3448

[Total No. of Pages : 2

[6005]-567

F.Y. M.E. (Mechanical - Design Engg.)

FINITE ELEMENT METHOD

(2017 Pattern) (Semester - II) (502209)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve any FIVE questions.***
2) ***Figures to the right indicate full marks.***

Q1) a) Clearly point out the situations in which FEM is preferred over other methods. **[5]**

b) Briefly describe the standard steps involved in the finite element method. **[5]**

Q2) a) Define stiffness matrix and explains special features. **[5]**

b) Explain the terms **[5]**

i) Constant strain triangle (CST)

ii) Linear strain triangle (LST) and

iii) Quadratic strain triangles(QST).

Q3) a) State and explain the convergence requirements of polynomial shape functions. **[5]**

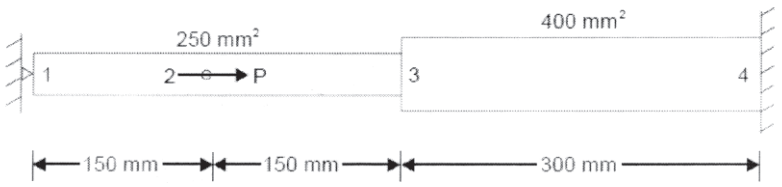
b) Determine the shape function for a two noded bar element using Local coordinate system with range - 1 to 1. **[5]**

Q4) a) state and explain the principle of virtual work. **[5]**

b) Write short note on Galerkin's method. **[5]**

Q5) a) Two noded 1D element has node 1and 2 located at the distance of 200 and 360 mm respectively from Y - axis. The displacements of node 1and 2 are 0.03 and -0.05 mm respectively. At point P, located at 240 mm from Y - axis on element, determine, linear shap functions and determine the nodal displacement, element stresses and support reactions of the axially loaded bar as shown in Fig. 1. Take E = 200 GPa and P= 30 kN **[6]**

P.T.O.

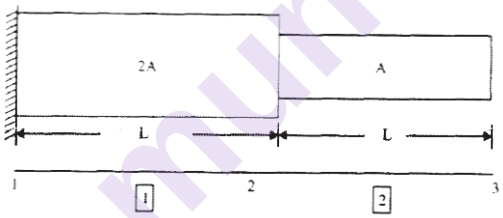


b) Discuss the advantages and disadvantages of FEM over **[4]**
   i) Classical method
   ii) Finite difference method.

Q6) a) Explain the term 'Shear locking' in plate element. How this problem is overcome? **[5]**

b) Explain the different types of non - linearities encountered in structural analysis. **[5]**

Q7) a) Find the natural frequencies of longitudinal vibrations of the constrained stepped shaft of areas A and 2A and of equal lengths(L), as shown below.(A3 BOOK_Finite Element Analysis G Lakshmi Narasaiah) **[6]**



b) Discuss the conforming and non conforming rectangular plate bending analysis. **[4]**

Q8) a) Write a short note on **[5]**
   i) Mesh quality checks,
   ii) h & p refinements

b) Explain Pre - processor, Processor, Post - processor. **[5]**

♦ ♦ ♦

Total No. of Questions : 7]

SEAT No. :

P-730

[Total No. of Pages : 2

[6005]-568

S.Y. M.E. Mechanical (Design Engineering)

OPTIMIZATION TECHNIQUES

(2017 Pattern) (Semester - III) (602213)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Any five question.***
2) ***Answers in One answer Books.***
3) ***Neat diagram must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data, if necessary***

Q1) a) Discuss various parameters related to optimization problem. **[5]**

b) Discuss in brief how the optimization problems are classified. **[5]**

Q2) Solve the following LPP **[10]**

using Simplex method

Maximize $F = x_1 + 2x_2 + x_3$

Subject to

$2x_1 + x_2 - x_3 \leq 2$

$-2x_1 + x_2 - 5x_3 \geq -6$

$4x_1 + x_2 + x_3 \leq 6$

$xi \geq 0, i = 1, 2, 3$

Q3) Use optimization concept to find out the maximum and minimum values of the function $f(x, y) = x^3 + y^3 + 2x^2 + 4y^2 + 6$. **[10]**

Q4) Write a short note on (Any 2) : **[10]**

i) Genetic Algorithm

ii) Neural-Network

iii) Simulated Annealing

iv) Fuzzy Optimization

P.T.O.

Q5) Find the value of x in the interval [0, 3] using Golden Section Method up to six iterations. **[10]**

$F(x) = 0.65 - [0.75/(1 + x^2)] - 0.65 \text{ x } \tan -1 \text{ (l/x)}$

Q6) Explain following :

a) ESO for stress level optimization **[5]**

b) ESO for stiffness optimization **[5]**

Q7) a) Explain how topology optimization can be used as a design tool with an example. **[5]**

b) Write a short note on Bidirectional Evolutionary Optimization Method. **[5]**

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Total No. of Questions : 10]

SEAT No. :

P731

[Total No. of Pages : 3

[6005]-569

S.Y.M.E. (Mechanical) (Design Engineering)
MECHANICAL MEASUREMENTS AND CONTROLS
(2017 Pattern) (Semester-III) (602214)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of electronic scientific pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain Laser Doppler Vibrometer in details. **[5]**

b) Explain with neat sketch resistance Thermometer. **[5]**

OR

Q2) a) Explain how FFT analyzer can be used for vibration measurement. **[5]**

b) Write a note on working of LVDT with neat sketch. **[5]**

Q3) a) What is low pass filter? Explain the working of it for Noise measurement. **[5]**

b) What do you mean by Analog and Digital Signals with examples? **[5]**

OR

Q4) a) Draw Bode's plot for control system whose transfer function is **[5]**

$$G(s)H(S) = \frac{80}{s(1+0.02s)(1+0.05s)}$$

b) Using Routh Horwitz criterion, find the stability of closed loop system given below **[5]**

$$\frac{C(s)}{R(s)} = \frac{(5s+1)}{s^3+3s^2+3s+1}$$

P.T.O.

Q5) a) Reduce the block diagram shown in Fig. Q5 a **[5]**

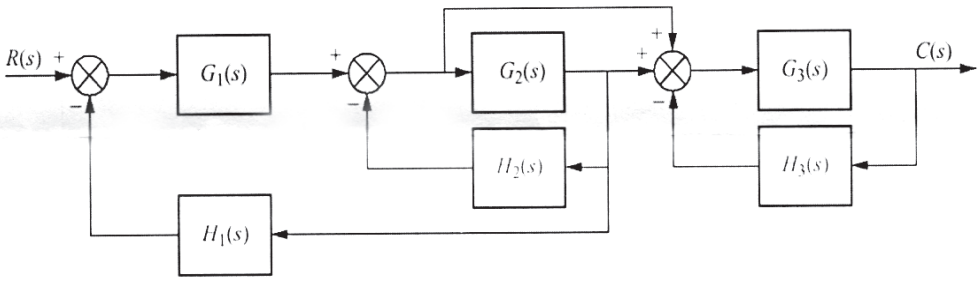


Fig. Q5a

b) State and explain Routh Hurwitz criterion to determine poles & Zeroes of system. **[5]**

OR

Q6) a) Explain the importance of transient response specification w.r.t. performance of control system. **[5]**

b) Write a note on importance of controllability in control system.. **[5]**

Q7) a) Explain two steps of Routh Hurwitz criterion in detail. **[4]**

b) For the system shown in fig. Below, assume m=1 kg, k=stiffness=2N/m and d=damping= 0.5 Ns/m. Also F=force input in N and y=displacement output in M. **[6]**

for this system

i) Determine the transfer function y(s)/F(s)

ii) Identify the location of poles and zeros.

iii) Comment on the stability of system.

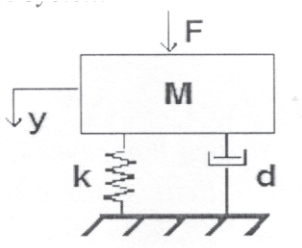


Fig. Q7b

OR

Q8) a) Find the stability of feedback control system $2s^4+s^3+3s^2+5s+10=0$ **[5]**

b) Write a note on proportional + integral + derivative controller. **[5]**

Q9) a) Explain poles and zeroes of control system. Explain Lyapunov's criterion for stability of system. **[5]**

b) Explain frequency domain analysis using bode plot. **[5]**

OR

Q10)a) Explain with examples. **[6]**

i) Stable system.

ii) Unstable system

iii) Critically or marginally stable system

b) Explain phase margin and gain margin. **[4]**

Total No. of Questions : 8]

SEAT No. :

P3449

[Total No. of Pages : 3

[6005]-571

First Year M.E. (Mechanical) (Heat Power/Energy Engg.)
ADVANCED MATHEMATICS AND NUMERICAL METHODS
(2017 Pattern) (Semester - I) (502501)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any Five questions.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marsk.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Find by Newton - Raphson's method, the real root of the equation $3x = \cos x + 1$ correct to four decimal places. **[5]**

b) In some experimental observations the following data is obtained. It is expected that y follows the relation $y = ax^2 + b/x$ with x. Fit the curve by least square method. **[5]**

x :	1	2	3	4
y :	–1.51	0.99	3.88	7.66

Q2) a) Solve the following set of equations by using LU decomposition method. **[5]**

$$3x_1 + 2x_2 + x_3 = 10$$
$$2x_1 + 3x_2 + 2x_3 = 14$$
$$x_1 + 2x_2 + 3x_3 = 14$$

b) For the following data calculate the value of $f(x)$ at $x = 9$ by using Newton's divided difference method. **[5]**

x :	5	7	11	13	17
y :	150	392	1452	2366	5202

Q3) a) Find the Hermite interpolating polynomial for the following data: **[5]**

x	$f(x)$	$f'(x)$
0.5	4	–16
1	1	–2

b) Use Romberg's method to Compute $\int_0^1 \frac{dx}{1+x^2}$ correct to '4' decimal places. **[5]**

P.T.O.

Q4) a) Evaluate $\int_{0.2}^{1.5} e^{-x^2} dx$ using 3 - point Gaussian quadrature formula. **[5]**

b) Find the largest eigen value and the corresponding eigen vector of the matrix using power method. Take $[1, 0, 0]^T$ as initial eigen vector. **[5]**

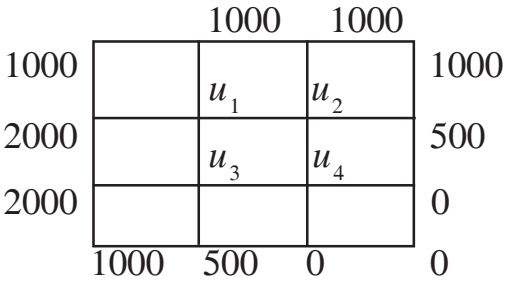
$$\begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}. \quad \textbf{[5]}$$

Q5) a) Using Given's method reduce the following matrix A to the tridiagonal form where $A = \begin{bmatrix} 2 & 1 & 3 \\ 1 & 4 & 2 \\ 3 & 2 & 3 \end{bmatrix}$. **[5]**

b) Use Runge-Kutta fourth order method to find y (0.2) with $h = 0.1$ for the initial value problem represented by mechanical system : $\frac{dy}{dx} = \sqrt{x+y}$, y (0) = 1. **[5]**

Q6) a) Using Adams Bashforth predictor-corrector method find y at x = 0.4, given that $\frac{dy}{dx} = x^2 - y$, given that $y(0) = 1$, $y(0.1) = 0.905125$, $y(0.2) = 0.8212352$, y (0.3) = 0.7491509. **[5]**

b) Solve the partial differential equation represented by mechanical system as $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ using Jacobi's method to find u_1, u_2, u_3, u_4 (carry out five iterations). Given that. **[5]**



Q7) a) Use Crank - Nicolson method to solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial t^2}$ subject to conditions $u(x, 0) = \sin \pi x$ where $0 \leq x \leq 1$. $u(0, t) = u(1, t) = 0$. Assume $\Delta x = ¼$ and $\Delta t = 1/16$. Find all values of u for $t = 0$ to $t = 1/16$ and for $x = 0$ to $x = 1$. **[5]**

b) Solve the following simultaneous equations by Gauss-Seidel Method (4 iterations). **[5]**

$-x + y + 4z = 3$

$5x - y + z = 10$

$2x + 8y - z = 11$

Q8) a) Solve the following differential equation using modified Euler's method $\frac{dy}{dx} = x^2 + y$ given $y(0) = 1$ to get $y(0.04)$ using step size of 0.02. Assume permissible error = 1×10^{-5}. **[5]**

b) The transverse displacement u of a point at a distance x from one end at any time t of a vibrating string satisfies the equation $\frac{\partial^2 u}{\partial t^2} = 4\frac{\partial^2 u}{\partial x^2}$ for the following boundary conditions; $u(0, t) = u(4, t) = 0$, $0 \leq t \leq 0.5$ and initial conditions $u = x(4 - x)$ at $t = 0$ & $t = 0.5$ for $0 \leq x \leq 4$. $\frac{\partial u}{\partial x} = 0$ at $t = 0$ for $0 \leq x \leq 4$ find all values of u for $0 \leq t \leq 2.5$ and $0 \leq x \leq 4$. Assume $\Delta x = 1$ and $\Delta t = 0.5$. **[5]**

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Total No. of Questions: 7]

SEAT No. : ____

P3450

[Total No. of Pages : 2

[6005]-572

F.Y.M.E. (Mechanical) (Heat Power Engineering)

ADVANCED THERMODYNAMICS AND COMBUSTION TECHNOLOGY

(2017 Pattern) (Semester-I) (502102)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Solve any five questions.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicates full marks.***
4) ***Use of steam tables, Molliercharts scientific calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Define the compressibility factor and describe the generalized compressibility chart. **[6]**

b) A 3.27m^3 tank contains 100kg of Nitrogen at 175k. Determine the pressure in the tank using **[4]**

i) the ideal gas equation

ii) the vander waals equation Take for Nitrogen R= 0.2968 KPa. m^3| kgK, M=28.013 kg|kmol T_{cr} = 126.2K, P_{cr} = 3.39 MPa

Q2) a) Draw P-V-T surfaces of the substance **[4]**

i) that contracts on freezing

ii) that expands on freezing

b) One kg of water at 0°C is brought into contact with a heat reservoir at 90°C when the water has reached 90°C Find **[6]**

i) Entropy change of water

ii) Entropy change of the heat reservoir

iii) Entropy change of the universe

Q3) a) What do you understand by the term dead state? Define availability. **[4]**

b) A house that is losing heat at a rate of 80000kJ/h when the outside temperature drops to 15°C is to be heated by electric resistance heaters If the house is to be maintained at 22°C at all times, determine the reversible work input for this process and the irreversibility **[6]**

P.T.O.

Q4) a) Find the value of co-efficient of volume expansion β and isothermal compressibility k for a vander waal's gas obeying **[5]**

$$\left(p+\frac{q}{v^2}\right)(v-b)=\mathrm{RT}$$

b) What is Joule-Thomson coefficient? Describe the inversion line and the maximum inversion temperature. **[5]**

Q5) a) Derive the following relations **[6]**

i) $\left(\frac{\partial \mathrm{T}}{\partial \mathrm{P}}\right)_s=\frac{\mathrm{T_V}\beta}{\mathrm{C_p}}$

ii) $\left(\frac{\partial \mathrm{T}}{\partial \mathrm{V}}\right)_s=\frac{-\mathrm{T}\beta}{\mathrm{C}_v\mathrm{K}}$

Where β = coefficient of cubical expansion and

K = Isothermal compressibility

b) State and explain Amagat's law **[4]**

Q6) a) What do you understand by the term enthalpy of formation and enthalpy of combustion. **[4]**

b) Determine the enthalpy of liquid octane (C_8H_{18}) at 25°C and 1 atm, Assume the water in the products is in the liquid form **[6]**

Take the enthalpy of formation at 25°C and 1 atm

is – 393520 kJ/kmol for CO_2

–285830 kJ/kmol for H_2O (e) and

– 249950 kJ/kmol for C_8H_{18} (e)

Q7) Write a short notes on (any two) **[2×5=10]**

a) Energy conversion efficiency of Biological system

b) Thermodynamics of aging and death

c) Fugacity and Activity

Total No. of Questions : 7]

SEAT No. :

P-3451

[Total No. of Pages : 2

[6005]-573

F.Y. M.E. (Mechanical) (Heat Power Engineering)

ADVANCED FLUID MECHANICS

(2017 Pattern) (502103) (Semester - I)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks..***
4) ***Use of scientific calculator is allowed***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain the Langragian and Eulerian descriptions. **[6]**

b) A steady, incompressible, two-dimensional velocity field is given by the following components in the xy-plane :

$u = 0.20 + 1.3x + 0.85y$, $v = -0.50 + 0.95x - 1.3y$

Calculate the acceleration field (find expressions for acceleration components a_x and a_y) and calculate the acceleration at the point $(x, y) = (1, 2)$. **[4]**

Q2) Derive generalized expression of Navier-stokes equations. **[10]**

Q3) a) During a high Reynolds number experiment, the total drag force acting on a spherical body of diameter D = 12 cm subjected to airflow at 1 atm and 5°C is measured to be 5.2 N. The pressure drag acting on the body is calculated by integrating the pressure distribution (measured by the use of pressure sensors throughout the surface) to be 4.9 N. Determine the friction drag coefficient of the sphere.

The density and kinematic viscosity of air at 1 atm and 5°C are $\rho = 1.269$ kg/m^3 and $v = 1.382 \times 10^{-5}$ m^2/s. The drag coefficient of sphere in turbulent flow is $C_D = 0.2$. **[5]**

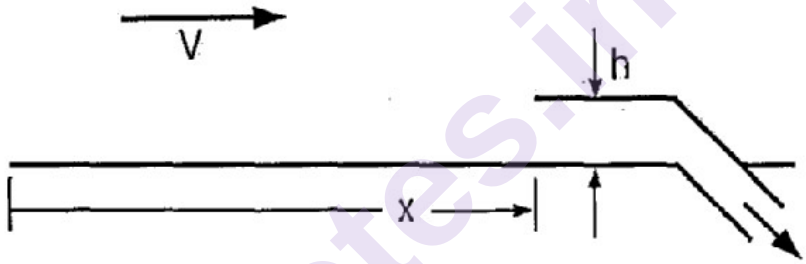
b) Explain the concept of lift and drag for an airfoil. **[5]**

P.T.O.

Q4) a) Explain Rayleigh flow and derive expression for Rayleigh line. **[5]**

b) Carbon dioxide enters an adiabatic nozzle at 1200 K with a velocity of 50 m/s and leaves at 400 K. Assuming constant specific heats at room temperature, determine the Mach number (i) at the inlet and (ii) at the exit of the nozzle. The gas constant of carbon dioxide is R = 0.1889 kJ/kg.K. Its constant pressure specific heat and specific heat ratio at room temperature are cp = 0.8439 kJ/kg.K and k = 1.288. **[5]**

Q5) a) In order to avoid boundary layer interference, engineers design a "boundary layer scoop" to skim off the boundary layer in a large wind tunnel (As shown in fig.). The scoop is constructed of thin sheet metal. The air is at 20°C, and flows at V= 65.0 m/s. How high (dimension h) should the scoop be at downstream distance x =1.45 m? **[5]**



b) Obtain momentum-integral equation for boundary layer. **[5]**

Q6) a) Write short note on following with suitable diagram. **[6]**

i) Wake

ii) Large eddy simulation

b) Determine the thickness of boundary layer at the trailing edge of smooth plate of length 4 m and of width 1.5 m, when the plate is moving with a velocity of 4 m/s in stationary air. Take kinematic viscosity of air as 1.5×10^{-5} m^2/s. **[4]**

Q7) a) Write short note on : **[6]**

i) Governing equations

ii) Boundary conditions

iii) Shear stress models

b) Illustrate Creeping flow past a cylinder. **[4]**

Total No. of Questions : 7]

SEAT No. :

P-3452

[Total No. of Pages : 3

[6005]-575

F.Y. M.E. (Mechanical Heat Power)

ADVANCED HEAT TRANSFER

(2017 Pattern) (Semester - II) (502107)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt Any Five Questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right of each question indicate full marks.***
4) ***Assume suitable data wherever necessary and mention the same clearly.***
5) ***Use of steam tables, Mollier chart and calculator is allowed.***

Q1) a) What do you mean by initial and boundary conditions. Explain in brief : **[5]**

i) Heat flux boundary condition

ii) Convection boundary condition

b) A steel pipe with 50 mm OD is covered with a 6.4 mm asbestos insulation (k = 0.166 W/m^{0}c) followed by 25 mm layer of fiber glass insulation (k = 0.0485 W/m^{0}c). The pipe wall temperature is 393 K and outside insulation temperature is 311 K. Calculate interface temperature between asbestos and fiber glass. **[5]**

Q2) a) Consider the base plate of a 1200-W iron that has a thickness of L = 0.5 cm, base area of A = 300 cm^2 and thermal conductivity of k = 15 W/m. °C. The inner surface of the base plate is subjected to uniform heatflux generated by the resistance heaters inside, and the outer surface loses heat to the surroundings at T = 20°C by convection. Taking the convection heat transfer coefficient to be h = 80 W/m^2. °C and neglecting heat loss by radiation, obtain an expression for the variation of temperature in the base plate and evaluate the temperatures at the inner and the outer surfaces. **[5]**

b) What do you mean by Thermal Contact Resistance? What are methods to reduce the same? **[5]**

P.T.O.

Q3) Write Short Notes on following : **[10]**

a) Local and average Heat Transfer Coefficient

b) Hydraulic diameter

c) Thermal entrance region and length

Q4) a) Explain physical significance of following dimensionless numbers **[5]**

i) Richardson Number

ii) Stanton Number

iii) Peclet Number

b) Experimental results for the local heat transfer heat transfer coefficient h_x for flow over a flat plate with an extremely rough surface were found to fit the relation $h_x(x) = x^{0.1}$ where x (m) is the distance from the leading edge of the plate. Develop an expression for the ratio of the average heat transfer coefficient for a plate of length x to the local heat transfer coefficient h_x at x. **[5]**

Q5) a) Explain following terms of mixed convection with neat sketch **[5]**

i) Assisting flow

ii) Opposing flow

iii) Transverse flow

b) A plate type 200 mm × 300 mm heater is immersed in water bath at 40 °C. The larger side of heater is maintained vertical. The heater rating is 3.5 kW. Determine the steady state temperature attended by the heater using following thermo physical properties. Consider heat transfer from one side of the plate **[5]**

k = 0.667 W/m °C, $v = 0.415 \times 10^{-6}$ m^2/s, ρ = 977.8 Kg/m^3 C_p = 4187 KJ/kg °C, $\beta = 4.15 \times 10^{-4}$ per degree Kelvin

For heat transfer by convection use following correlation

$Nu = 0.13\ (Ra)^{(0.33)}$

Q6) a) Write note on : **[5]**

i) Nucleate boiling

ii) Drop and film condensation

b) Explain with neat sketch different regimes of pool boiling curve. **[5]**

Q7) Explain the following in brief : **[10]**

a) Lambert's cosine law

b) Intensity of radiation

c) Solid Angle

d) Irradiation

e) Radiosity

□□□

Total No. of Questions : 7]

SEAT No. :

P-3453

[Total No. of Pages : 2

[6005]-576

M.E. (Mechanical-Heat Power Engg.)

AIR CONDITIONING TECHNOLOGY

(2017 Pattern) (Semester - II) (502108)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any 5 questions out of 7.***
2) ***Draw neat labeled diagrams wherever necessary.***
3) ***Assume suitable data if necessary and mention it clearly.***
4) ***Use of steam table, p-h chart, Psychrometric chart and scientific calculator is allowed.***
5) ***Figures to the right side indicate full marks.***

Q1) a) Explain the significance of Dry bulb temperature, Relative humidity, ADP and Air washer. **[4]**

b) What is Air refrigeration system? Explain with neat sketch of Vapor Compression Cycle. **[6]**

Q2) a) Explain the local and central Air Conditioning system. **[4]**

b) Moist air enters an insulated duct at the rate of 10 kga/s at 20°C, 50 relative humidity and standard atmospheric pressure. It is heated by a heater of 25.0 kW capacity and steam at the rate of 0.1 kg/s is injected at 100°C. Find the outlet state, and the sensible and latent heat transfer rates. **[6]**

Q3) An air conditioning system is to take in outdoor air at 10°C and 30% relative humidity at a steady rate of $45 m^3$/min and to condition it to 25°C and 60% relative humidity. The outdoor air is first heated to 22°C in the heating section and then humidified by the injection of hot steam in the humidifying section. Assuming the entire process takes place at a pressure of 1 bar. Determine, without using the pyschrometric chart : **[10]**

a) The rate of heat supply in the heating section; and

b) The mass flow rate of steam required in the humidifying section.

P.T.O.

Q4) A laboratory having an unusually large latent heat gain is required to be air conditioned. The design conditions and loads are as follows : **[10]**

Summer design conditions: 40°C DBT, 27°C WBT

Inside design conditions: 25°C DBT, 50% RH

Room sensible heat: 34.9 kW

Room latent heat: 18.6 kW

The ventilation air requirement is 85 cmm. Determine the following:

a) Ventilation load.

b) Room and effective sensible heat factors.

c) Apparatus dew point and amount of reheat for economical design.

d) Supply air quantity.

e) Condition of air entering and leaving coil and supply air temperature.

f) Grand total heat.

Assume a suitable bypass factor.

Q5) a) Describe the procedure for the Duct design. **[4]**

b) With the help of example, explain equal friction method of Duct design. **[6]**

Q6) a) Write down the difference between water cooled VRV and air cooled VRV. **[4]**

b) Short note on : **[6]**

i) Desiccant Dehumidification

ii) Types of ventilation system.

Q7) a) Explain the significance of chiller ceiling and chiller beams. **[4]**

b) Explain the open loop and close loop control system for air conditioning system. **[6]**

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Total No. of Questions : 8]

SEAT No. :

P3454

[Total No. of Pages : 2

[6005]-577

First Year M.E. (Mechanical) (Heat Power Engineering)
MEASUREMENTS AND CONTROLS
(2017 Pattern) (Semester-II) (502109)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain the necessity of calibration. Describe the calibration procedure for a pressure transducer. **[5]**

b) Differentiate between null and deflection type instruments. Comment also on "Null method is often preferred over deflection method". **[5]**

Q2) a) Explain the uncertainty in measurement system. **[5]**

b) Explain the construction and working of total radiation pyrometer to measure temperature. **[5]**

Q3) a) Find the Spearman's coefficient of correlation between marks assigned to 10 students by two judges as given below: **[6]**

Students	1	2	3	4	5	6	7	8	9	10
Marks by Judge-1	52	53	42	60	45	41	37	38	25	27
Marks by Judge-2	65	68	43	38	77	48	35	30	25	50

b) Explain regression analysis. **[4]**

P.T.O.

Q4) a) In a partially destroyed record the following data are available: **[5]**

Variance of X = 25

Regression equation X upon Y, 5X–Y = 22

Regression equation Y upon X, 64X– 45Y = 24

Find the mean value of X & Y and Coefficient of correlation between X & Y.

b) Explain the properties of regression and correlation coefficient. **[5]**

Q5) a) Which parameters are measured during vibration measurements? Explain piezoelectric accelerometer with neat sketch. **[5]**

b) Explain how you measure the velocity of hot gases. What are the advantages, limitations of the devices? **[5]**

Q6) a) Compare electronic controller with other type of controller. **[5]**

b) Explain the construction and working of Foil type heat flux gauge. **[5]**

Q7) a) Explain with neat sketch the constructional feature and basic working principle of McLeod gauge. **[5]**

b) Explain any one instrument used for noise measurement. **[5]**

Q8) a) Design a control system for temperature control in a metal-melting furnace. **[5]**

b) Write a short note on force measurement. **[5]**

Total No. of Questions : 7]

SEAT No. : ____

P732

[Total No. of Pages : 2

[6005]-578

S.Y. M.E. (Mechanical) (Heat Power Enng.)
COMPUTATIONAL FLUID DYNAMICS
(2017 Pattern) (Semester-III) (602113)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer any five quetions .***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Derive conversation from of the governing eqution based on principal of Newton's 2nd law of motion. Write viscos from in the tensor from. **[7]**

b) Explain the mathemeatical nature of parabolic equation and their physical boundary conditions. **[3]**

Q2) a) Describe the physical meaning of Substantial and Local Derivative. **[5]**

b) Derive an expression for mass conservation equation In conservation form. Explain its signification in fluid mechanicas. **[5]**

Q3) a) Write a short note on Dirichlet, Neumann and Robbin boundary conditions. **[6]**

b) Explain the difference between explicit and imlicit methods. **[4]**

Q4) a) Explain first order upwind and second order upwind schemes. **[4]**

b) Explain Solution of two dimensional steady heat conduction equation using explicity approach. **[6]**

Q5) a) Derive the Navier-Stoke's equation for incompressible flow. **[4]**

b) Explain the significance of 1-D transient convection-diffusion system. **[6]**

P.T.O.

Q6) a) Importance of Pressure correction method in SIMPLE algorithm. **[4]**

b) Explain use of SIMPLE algorithm for solution of 2-D Navier Stokes equations. **[6]**

Q7) a) Explain the **[6]**

i) k-ε turbulence model and

ii) k-ω turbulence model

b) Explain Reynolds average Navier stoke (RANS) In details. **[4]**

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Total No. of Questions : 7]

SEAT No. :

P733

[Total No. of Pages : 2

[6005]-579

S.Y.M.E. (Mechanical) (Heat Power Engineering)
DESIGN OF HEAT TRANSFER EQUIPMENTS
(2017 Pattern) (Semester - III) (602114)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) *Answer any five questions.*
2) *Neat diagram must be drawn whenever necessary.*
3) *Figures to the rightside indicate full marks.*
4) *Use of steam tables, heat transfer data book, calculator is allowed.*
5) *Assume suitable data, if necessary.*

Q1) a) How heat exchangers are classified? **[4]**

b) A double pipe parallel flow heat exchanger is to heat water (Cp = 4180 J/KgºC) from 25ºC to 60ºC at a rate of 0.2 Kg/s. The heating is to be accomplished by geothermal water (Cp = 4310 J/KgºC) available at 140ºC at a mass flow rate of 0.3 Kg/s. The inner tube is thin-walled and has a diameter of 0.8 cm. If the overall heat transfer coefficient of the heat exchanger is 550 $W/m^2ºC$. Determine the length of the heat exchanger required to achieve the desired heating. **[6]**

Q2) a) What is chain rule methodology? How it is applied in heat exchanger design? **[4]**

b) Consider a shell and tube heat exchanger constructed from a 0.0254 m OD tube to cool 6.93 Kg/S of a 95% ethyl alcohol solution (Cp = 3810 J/KgK) from 66ºC to 42ºC using water available at 10ºC (Cp = 4187 J/KgK) at a flow rate of 6.30 Kg/S. In the heat exchanger 72 tubes will be used. Assume that the overall coefficient of heat transfer based on the outer tube area is 568 W/m^2K. Calculate the surface area and the length of the heat exchanger for each of the following arrangements

i) Parallel flow shell and tube heat exchanger.

ii) Counter flow shell and tube heat exchanger. **[6]**

Q3) a) Write note on Wilson plot technique. **[5]**

b) Explain the principle of flow reversibility. **[5]**

P.T.O.

Q4) a) Discuss the effect of baffles on the flow pattern in the shell and tube heat exchanger. **[5]**

b) State the major assumptions made for pressure drop analysis of heat exchanger. **[5]**

Q5) a) How cooling towers are classified? **[5]**

b) Explain the various factors affecting the performance of cooling towers. **[5]**

Q6) a) Discuss the various parameters that are considered while designing furnace. **[5]**

b) Explain the concept of heat pipe with neat sketch. **[5]**

Q7) Write notes on (any two) : **[2 × 5 =10]**

a) Heat transfer augmentation techniques.

b) Fouling factor.

c) Bell Delaware method.

Total No. of Questions : 8]

SEAT No. :

P3455

[Total No. of Pages : 3

[6005]-581

First Year M.E. (Mechanical) (Design & CADM&E) (Automotive Engineering)

ADVANCED MATHEMATICS

(2017 Pattern) (Semester - I) (507201)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of pocket non programmable electronic calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Apply Gram-Schmidt method to the given vectors to get an ortho-normal baris. **[5]**

(2,2,2) , (1,0,-1) and (0,3,1).

b) If W = ϕ + i ψ represents a 'Complex potential' for an electrostatic field which is analytic, if the potential function ϕ in given by $\phi = 3x^2y - y^3$. Find its complex conjugate ψ, which is its stream functions. **[5]**

Q2) a) Evaluate $\oint_z \frac{z^2+\cos^2 z}{\left(z-\pi/4\right)^2} dz$, where C is $|z| = 1$. **[5]**

b) Solve the laplace transform of periodic **[5]**

function *f*(t) with period $\frac{2\pi}{w}$ where

f(t) = sin wt, $0 < t < \pi/w$

$= 0$, $\pi/w < t < 2\pi/w$

P.T.O.

Q3) a) Using Laplace transform, find the solution of the initial value problem **[5]**

$$y''+4y'+4y=6e^{-t}, y(0)=0, y'(0)=1$$

b) Find the power series solution of **[5]**

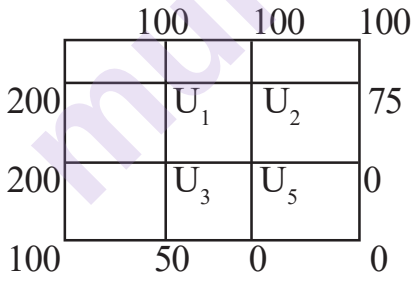
$$\left(x^2-1\right)y''+3xy'+xy=0$$

Q4) a) Calculate by power method, the largest Eigen value and vector of the matrix **[5]**

$$A=\begin{bmatrix}1 & 2 & 0\\ -2 & 1 & 2\\ 1 & 3 & 1\end{bmatrix} \text{ with } x_0=\begin{bmatrix}1\\1\\1\end{bmatrix}$$

b) Given the values of u (x,y) on the boundary of the square in the figure, evaluate the function u (x,y) satisfy Laplace equation **[5]**

$$\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}=0.$$



Q5) a) Use Bendre. Schmidt to solve heat equation $16\frac{\partial u}{\partial t}=\frac{\partial^2 u}{\partial x^2}$ with boundary conditions u (0,t) = u (1,t) = 0, t > 0 and u (x,0) = x (1 - x), 0 < x < 1 taking h = $1/4$, k = $1/2$ upto t = 2. **[5]**

b) Using Rayleigh Rits method, solve the boundary value problem **[5]**

$$y''-y+4xe^x=0, y(0)=y(1)=0$$

Q6) a) Find the function for which functional

$\int_0^{\pi/2}\left[y^2+(y')^2-2y\sin x\right]dx, y(0)=0, y\left(\pi/2\right)=0$, can be extremized. **[5]**

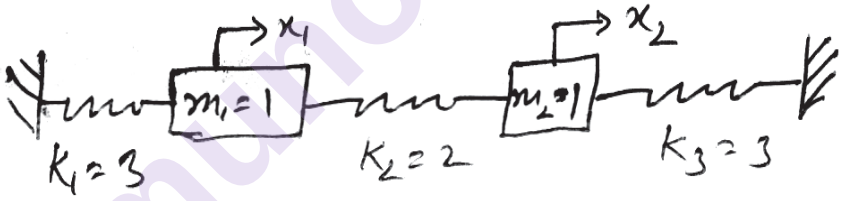
b) Find the following by a partical given by $y=\alpha+\beta x$ of least square line that best fit for the data of points of the partical follows (2, 1) , (5, 2), (7, 3,) , (8, 3). **[5]**

Q7) a) Find the image $|z-2i|=2$ under the mapping $w=\frac{1}{z}$ **[5]**

b) Find the Fourier transform of **[5]**

$$f(x)=\begin{cases}1 & for\ |x|<a\\ 0 & for\ |x|>a\end{cases}$$

Q8) a) For the system shown in two figure, assuming there is no friction. Find natural frequencies of the system and corresponding normal mode of the vibration using matrix method. **[5]**



b) Solve the differential $Eq^n\ 16\frac{\partial^2 u}{\partial x^2}=\frac{\partial^2 u}{\partial t^2}$ by taking $h=1\ upto\ t=5/4$. **[5]**

Given that

i) u (0,t) = u (5, t) = 0

ii) u (x, 0) = x^2 (5–x), 0 < x < 5

iii) u_t (x, 0) = 0

Total No. of Questions : 7]

SEAT No. :

P-3456

[Total No. of Pages : 2

[6005]-583

F.Y. M.E. (Mechanical-Automotive Engineering)

AUTOMOTIVE SAFETY AND REGULATIONS

(2017 Pattern) (Semester - I) (502303)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide rules and electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) What is crash worthiness structure? Explain with suitable example. **[5]**

b) What is FMVSS? Describe various steps involved in crash testing of vehicle. **[5]**

Q2) a) Explain various design requirements for crash test dummies. **[5]**

b) Explain various features for ATDs used in crash test. **[5]**

Q3) a) Describe with neat sketch head restraint geometry. **[5]**

b) What are the functions of car bumper? Explain various requirements of crash worthiness of it. **[5]**

Q4) a) Explain asymmetrical beam used in headlamp. What is merits and demerits of plastic lens head lamps? **[5]**

b) Explain briefly construction and working principle of headlamp used in automobile. **[5]**

P.T.O.

Q5) a) Explain briefly what procedure to be followed for obtaining permanent licence for LMV by regulatory authority RTO. **[5]**

b) Sketch any three road signs specifying dimensions and color code as per CMVR rule. **[5]**

Q6) a) List and explain instruments used in crash testing of vehicle. **[5]**

b) Describe head lamp low beam measuring screen test point grid. **[5]**

Q7) Write short notes on the following (Any two) : **[10]**

a) Under run protection device

b) Testing tracks for vehicles.

c) Wheeplash injuery.

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Total No. of Questions : 7]

SEAT No. :

P-3457

[Total No. of Pages : 2

[6005]-585

F.Y. M.E. (Mechanical) (Automotive Engineering)

NOISE VIBRATION & HARSHNESS

(2017 Pattern) (Semester - II) (502308)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions out of 7.***
2) ***All the questions should be solved in one answer book and attach extra supplements if required.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary, but state the assumptions clearly.***

Q1) a) What is the difference between FFT and CPB analysers? **[5]**

b) Explain the different techniques used to noise control? **[5]**

Q2) a) Explain the Pass by Noise measurement method for Vehicle. **[5]**

b) Show that as the distance from a point source doubles, the sound intensity level decreases by 6 dB. **[5]**

Q3) The sound pressure level measured at 10 m from an automobile horn is 110 dB. Determine the sound pressure level at distance of i) 20 m ii) 80 m. Assume that the inverse square law holds good between intensity and distance. **[10]**

Q4) a) Why signal conditioning is required and explains in detail Digital Signal Processing? **[5]**

b) Explain effect of noise on human beings and what are noise specifications for generator sets, fire crackers and household articles. **[5]**

P.T.O.

Q5) a) Explain the working of sound intensity probe P-P. **[5]**

b) Explain in detail different sound fields and state its significance. **[5]**

Q6) The lower and upper frequencies an octave band are 11, 312 and 22, 614 Hz. Determine : **[10]**

a) The central frequency of the 1/1 octave band

b) The intermediate frequency of the 1/2 octave band, and

c) The intermediate frequencies of the 1/3 octave band

Q7) a) Explain the working of Reactive type Muffler. **[5]**

b) Describe Acoustic holography technique. **[5]**

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Total No. of Questions : 7]

SEAT No. :

P3458

[Total No. of Pages : 2

[6005]-586

F.Y.M.E. (Mechanical-Automotive Engineering)
AUTOMOTIVE CHASSIS DESIGN
(2017 Pattern) (Semester-II) (502309)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain with neat sketch front independent suspension system. **[5]**

b) Describe the purpose and operation of air suspension used in suspension system. **[5]**

Q2) a) What are various types of rubber springs used in suspension? Explain advantages and disadvantages of rubber springs. **[5]**

b) Describe clearly difference between independent suspension and conventional suspension system. **[5]**

Q3) a) Describe with neat sketch principle and working of Davis steering mechanism used in automobile. **[5]**

b) Explain the construction and working of a recalculating ball type steering gear box. **[5]**

Q4) a) What do you understand by Electronic Stability Programme (ESP) for motor Cars? What are the advantages of it? Explain. **[5]**

b) Explain the different factors which affect on tyre life. **[5]**

Q5) a) How tyres are rated and specified? Explain with suitable example. **[5]**

b) Describe with neat sketch construction and working of a disc bake. **[5]**

P.T.O.

Q6) a) Explain with neat sketch layout of Air-brake system. What are advantages over hydraulic brake system? Explain. **[5]**

b) Write short note on Scammell articulated trailer. **[5]**

Q7) Write short note on the following (Any two). **[10]**

a) Reversible and Irreversible steering.

b) Self energizing disc brakes.

c) Retreading and manufacturing of tyres.

Total No. of Questions : 5]

SEAT No. : ____

P734

[Total No. of Pages : 2

[6005]-587

S.Y. M.E. (Mechanical) (Automotive Engineering)

VEHICLE DYNAMICS

(2017 Pattern) (Semester-III) (602313)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Attempt all questions.***
2) ***Figures to the right indicate full marks.***
3) ***All questions carry equal marks.***
4) ***Assume Suitable data if necessary.***

Q1) Attempt any TWO.

a) Describe the construction details of Radial tire and Bias ply tire **[5]**

b) Explain variation of tractive effort with longitudinal slip **[5]**

c) Draw the tire axis system as recommended by the SAE an Explain various angles and forces associated with the tire. **[5]**

Q2) Attempt any TWO.

a) Derive the equation for maximum tractive effort that the tire ground can support in terms of coefficent of road resistance. **[5]**

b) Discuss the effect of wheel lock up during braking on the directional stability and control of a road vehicle. **[5]**

c) Write short notes power requirement of a full size passenger car as a function of speed. **[5]**

Q3) Attempt any TWO.

a) Explain steering force and moments in suspension kinematics. **[5]**

b) A passenger car weighs 20 kN and has a wheelbase of 2.8 m. The center of gravity is 1.27 m behind the front axle. If a pair of radial-ply tires. each of which has a cornering stiffness of 46 kN/rad are installed in the front, and a pair of bias-ply tires, each of which has a cornering stiffness of 33 kN/rad are installed in the rear. The average steerin gear ratio is 22. Determine whether the vehicle is understeer or oversteer. **[5]**

c) Describe anti-dive and squat geometry. **[5]**

P.T.O.

Q4) Attempt any TWO.

a) Explain various tests that can be used to evaluate handling charcteristics of vehicles. **[5]**

b) Explain the steady-state handling characteristics of a two-axle vehicle. **[5]**

c) Sketch and explain the handling behavior of car with and without vehicle stability control system. **[5]**

Q5) Attempt any TWO.

a) Write short note on the model of ISO road profile. **[5]**

b) Explain the concept of acctive and semi active suspension with neat sketch. **[5]**

c) Explain the effect of wheelbase in road and suspension modelling **[5]**

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Total No. of Questions : 7]

SEAT No. :

P 735

[Total No. of Pages : 2

[6005]- 588

S.Y./M.E. (Mechanical Automotive Engineering)

AUTOTRONICS

(2017 Pattern) (Semester - III) (602314)

Time :3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat Diagram must be drawn wherever necessary.***
3) ***Figures to right indicate full marks.***

Q1) a) Explain with neat sketch different types of resistors used in Automotive circuits. **[5]**

b) What is Clamping Diode? Explain the use of it in Vehicle Air conditioning. **[5]**

Q2) a) What is Reference Voltage Sensor? Explain the Throttle position sensor in computer controlled Engine. **[5]**

b) Explain how the misfire detection is done in Electronic Ignintion System. **[5]**

Q3) a) Explain with aid of sketch Digital EGR Valve in context with Emission control Systems. **[5]**

b) Explain the need of 42-V system. **[5]**

Q4) a) Explain how the six Stage diagnostic process is used by giving simple example. **[5]**

b) Explain the testing of temperature sensor in vehicle. **[5]**

Q5) a) Explain different components of automotive - Air-conditioning system. **[5]**

b) Classify Communication Networks in vehicular communication system. **[5]**

P.T.O.

Q6) a) Explain the mechanism to reduce roll moment. **[5]**

b) Explain Side slip Angle, Yaw and Roll Feedback in context with rollover control function. **[5]**

Q7) Write short Note (Any Two)

a) Air Bag System Sensor. **[5]**

b) Tire pressure Sensor. **[5]**

c) Gas Analyser. **[5]**

d) Diagnostic Trouble Code. **[5]**

Total No. of Questions : 7]

SEAT No. :

P3459

[Total No. of Pages : 2

[6005]-589

First Year M.E. (Mechanical) (CAD Manufacture & Engineering)

ADVANCED MACHINE DESIGN

(2017 Pattern) (Semester-I) (502402)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve any five questions.***
2) ***Assume suitable data, if necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***

Q1) a) Derive the compatibility equations in Polar co-ordinate system. **[5]**

b) Derive the relation between Young's modulus, Bulk modulus and modulus of rigidity in detail. **[5]**

Q2) a) Investigate what problem of plane stress is represented by the function

$$\phi = \frac{3F}{4h}\left(xy - \frac{2R\, y^3}{3h^2} \right) + \frac{P}{2} y^2$$ **[5]**

Where 'h' is half depth of beam, and 'F' as the concentrated load.

b) Explain with examples the plain stress and strain problems. **[5]**

Q3) a) Explain Mohr's theory of failure in detail. **[5]**

b) Explain the following theories of failures with graphical representation and applications. **[5]**

i) Octahedral shearing stress theory.

ii) Maximum shear stress theory.

Q4) a) State and explain theory of virtual work. **[5]**

b) Explain Raleigh-Ritz method with its important characteristics. **[5]**

P.T.O.

Q5) a) Describe the influence of super imposed static stress in fatigue. **[5]**

b) The work cycle of a mechanical component subjected to completely reversed bending stresses consists of the following three elements: **[5]**

i) $\pm$ 350 Nlmm^2 for 85% of time.

ii) $\pm$ 400 Nlmm^2 for 12% of time.

iii) $\pm$ 500 Nlmm^2 for 3% of time.

The material for the component is 50C4 (Sut=660 Nlmm^2) and the corrected endurance limit of the component is 280 Nlmm^2 Determine the life of the component.

Q6) a) Explain the concept of energy balance during crack growth. **[5]**

b) Describe transverse shear effect in composite laminates. **[5]**

Q7) a) Explain the Rheological and Kelvin models. **[5]**

b) Consider a graphite epoxy laminate whose elastic constant along the perpendicular direction to fibres are as follows. **[5]**

E_{xx} =181 Gpa, E_{yy} = 10.3 Gpa, G_{xy} = 7.17 Gpa,

V_{yx} = 0.28, V_{xy} = 0.01594.

Obtain the compliance coefficient aprox to x' y' axes which are at,

i) + 30º counter clockwise to XY axes and.

ii) + 90º to XY axes.

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Total No. of Questions : 8]

SEAT No. :

P-3460

[Total No. of Pages : 2

[6005]-590

M.E. (Mechanical) (CADME)

COMPUTER AIDED DESIGN

(2017 Pattern) (Semester - I) (502403)

Time : 2 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Use of non-programmable calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain in brief the functional areas of CAD system. **[5]**

b) Enlist the points which helps in efficient utilization of CAD software's for modeling. **[5]**

Q2) a) Compare between the parametric and non-parametric representation of synthetic curves. **[5]**

b) Explain NURBS. **[5]**

Q3) Explain the Parametric representation of surface of revolution with neat sketch and explain its need and applications. **[10]**

Q4) a) Derive the condition to obtain the isometric projection by rotating the object about 'y' and 'x' axis. **[5]**

b) Write notes on COONs synthetic surface representation. **[5]**

Q5) Explain the parametric representation of Hermite Cubic surface with neat sketch and state its advantages and limitations. **[10]**

Q6) Classify the solid modeling techniques and compare between B_rep and CSG modeling techniques **[10]**

P.T.O.

Q7) a) Explain the Manual explode view techniques used in CAD. **[5]**

b) Discuss the concept of Design by features modeling techniques. **[5]**

Q8) a) Explain the Implementation issues ACIS and DXF. **[5]**

b) Differentiate between Assembly Modeling and Behavioral Modeling. **[5]**

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Total No. of Questions : 7]

SEAT No. : ____

P-3461

[Total No. of Pages : 1

[6005]-591

M.E. (CADM & E)

MECHANICAL

Computer Integrated Manufacturing (CIM)

(2017 Pattern) (502407) (Semester - II)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer any five questions from the following.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use of Calculator is allowed.***

Q1) Explain the role of CAD/CAM in CIM? **[10]**

Q2) What is Flexible Manufacturing system? Explain with example? **[10]**

Q3) Explain the role Integrative manufacturing planning and control? **[10]**

Q4) Explain the role of Kanban, JIT, and 5S in Lean Manufacturing. **[10]**

Q5) Write short note on MRP-I and Explain the Principle of PDM & PLM. **[10]**

Q6) Explain the concept of lean production? What are the benefits of lean Manufacturing? **[10]**

Q7) Discuss in detail capacity planning & Materials Requirements Planning in the context of Computer Integrated Manufacturing. **[10]**

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Total No. of Questions : 7]

SEAT No. :

P-3462

[Total No. of Pages : 1

[6005]-592

M.E. (Mechanical Engineering) (CADME)

INDUSTRIAL PRODUCT DESIGN & PRODUCT LIFE CYCLE MANAGEMENT

(2017 Pattern) (Semester - II) (502408)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions from following.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) What is the role of design creativity and innovations of product design? Explain the advantages & disadvantages of 'S' curve technology. **[10]**

Q2) What do you mean by generating concepts? Explain 6-3-5 Method? **[10]**

Q3) Explain bench marking and establishment of engineering specifications? **[10]**

Q4) What is the impact of DFM on development cost and product quality? **[10]**

Q5) Discuss the factors affecting implementation of PDM systems. **[10]**

Q6) Explain engineering workflow and PDM acquisition. **[10]**

Q7) What is PLM? Explain the concept of cloud PLM. **[10]**

Total No. of Questions : 8]

SEAT No. :

P3463

[Total No. of Pages : 2

[6005]-593

First Year M.E. (Mechanical) (CADME)
AUTOMATED MANUFACTURING SYSTEM MODELLING
(2017 Pattern)(Semester-II)(502409)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Use of non-programmable calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Enlist strategies for Automation. **[5]**

b) Explain the basic elements of an Automated System. **[5]**

Q2) a) Explain Advanced Automation Functions. **[5]**

b) Explain the significance of Flow lines & Transfer mechanisms in automation. **[5]**

Q3) a) A 20 -station transfer line is divident into two stages of 10 stations each. The ideal cycle time of each stage is T=1.2 min. All of the stations in the line have the same probability of stopping, p=0.005. We assume that the downtime is constant when a breakdown occurs, Td = 8.0 min. Compute the line efficiency for the following buffer capacities at b=0. **[5]**

b) Explain the need for analysis of transfer lines. **[5]**

Q4) a) Discuss how Boolean algebra is used in pneumatic/hydraulic circuits. **[5]**

b) Explain schmitt triggering devices used in pneumatic and hydraulic circuits. **[5]**

Q5) Explain the Role of AI in manufacturing and automation.Explain the steps used for building Mathematical Model of a manaufacturing Plant. **[10]**

P.T.O.

Q6) a) Enlist the inspection principles and explain in brief. **[5]**

b) Explain in brief non-contact non-optical Inspection techniques. **[5]**

Q7) a) Explain the concept Internet of things (IOT) in manufacturing system. **[5]**

b) Write short notes on notations and examples used in system modeling. **[5]**

Q8) Explain discrete-time Markov chain with an example. **[10]**

Total No. of Questions : 7]

SEAT No. : [ ]

P736

[Total No. of Pages : 1

[6005]-594

S.Y. M.E. (Mechanical)

(Computer Aided Design, Manufacturing & Engineering)

SIMULATION AND MODELING

(2017 Pattern) (Semester-III) (602413)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Attempt any Five questions from the following.***
2) ***Figures to the right side indicate full marks.***
3) ***Use of Non-Programmable calculator allowed.***
4) ***Assume suitable data if necessary.***

Q1) Classify the distribution system. Explain Exponential distribution system. With suitable example. **[10]**

Q2) Explain the steps involve in a simulation. **[10]**

Q3) Explain Poisson Distribution. **[10]**

Q4) Explain Kolmogorov Smirnov test and the Chi Square test for simulation in detail. **[10]**

Q5) Explain different performance measures in manufacturing system modeling. **[10]**

Q6) What is simulation Languages and how it works? **[10]**

Q7) What is necessity of verification & validation of model. **[10]**

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Total No. of Questions : 7]

SEAT No. :

P737

[Total No. of Pages : 2

[6005]-595

S.Y. (Mechanical - Design Engineering)
(Computer Aided design, manufacture & Engineering)
OPTIMIZATION TECHNIQUES
(2017 Credit Pattern) (Semester - III) (602414)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Use of logorithmic tables slide rule, molier charts, electronic pocket calculator and stream table is allowed.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data, if necessary.***

Q1) Maximize $F = X_1 + 2X_2 + X_3$ **[10]**

subject to $2X_1 + X_2 - X_3 \leq 2$

$-2X_1 + X_2 - 5X_3 \geq -6$

$4X_1 + X_2 + X_3 \leq 6$

$Xi \geq 0, i = 1, 2, 3$

Q2) a) A beam of uniform rectangular cross-section is to be cut from a log having a circular cross-section of diameter 2a. The beam has to be used as a cantilever beam (length is fixed) to carry a concentrated load at the free end. Find the dimension of the beam that correspond to the maximum tensile (bending) stress carrying capacity using multivariable optimization with equality constraints variation. Assume the necessary condition. **[6]**

b) What is the meaning of optimization? What are the different mathematical techniques for dealing optimization problems? **[4]**

Q3) Write a short note on (any three) : **[10]**

a) Simulated Annealing.

b) Fuzzy optimization.

c) Genetic Algorithms.

d) Neural - Network based method.

P.T.O.

Q4) Minimize the function $f(x) = 0.65 - [0.75(1 + X_2)] - 0.65 \times \tan^{-1}(1/X)$ using the golden section method with n = 6. Also calculate final to the initial interval uncertainty. **[10]**

Q5) a) Write a short note on bi-directional evolutionary structural optimization based on von mises stress. **[5]**

b) Explain ESO for stiffness and stress level optimization. **[5]**

Q6) a) What do you mean by combining Topology and shape design optimization? Explain with examples. **[5]**

b) Explain how topology optimization can be used as design tool with an example. **[5]**

Q7) a) What are the different method involved in problem formation formulation and parameterization of design? Explain one method in details. **[5]**

b) Write a short note of stress constraints on the following terms : **[5]**

i) Stress criterion for the SIMP Model.

ii) Solution Aspects (Constraints relaxation).

Total No. of Questions : 7]

SEAT No. : ____

P3464

[Total No. of Pages : 2

[6005]-601

First Year M.E. (Mechanical) (Energy Engineering)

ADVANCED THERMODYNAMICS

(2017 Pattern) (Semester - I)(502502)

Time :3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Draw neat diagrams wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***use of steam tables, eletronic calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) State and explain the law of corresponding states. **[5]**

b) State and explain Dalton's law of partial pressure. **[5]**

Q2) a) Draw and explain a P-T (pressure - temperature) diagram for a pure substance. **[4]**

b) Find the specific volume, enthalpy and internal energy of wet steam at 18 bar, dryness fraction 0.85. **[6]**

Q3) a) What do you understand by the entropy principle? **[4]**

b) One kg of water at 273K is brought into contact with a heat reservoir at 373K. When the water has reached 373K. Find the entropy change of the water of the heat reservoir and of the universe. **[6]**

Q4) a) Define the second law efficiency? How is it different from the first law efficiency? **[4]**

b) The inner and outer surfaces of a 0.5cm thick, 2m×2m window glass in winter are 10ºC and 3ºC respectively. If the rate of heat loss through the window is 3.2kJ/s, determine the amount of heat loss, in KJ through the glass over a period of 5h. Also determine the exergy destruction associated with this process Take T_o = 5ºC. **[6]**

P.T.O.

Q5) a) Derive clapeyron equation. **[4]**

b) Derive first and second Tds equation. **[6]**

Q6) a) What is adiabatic flame temperature? **[4]**

b) Exlain the term Enthalpy of formation and Enthalpy of combustion. **[6]**

Q7) Write notes on (any two) **[2×5=10]**

a) Nernst heat theorem

b) Fugacity and Activity

c) Availability

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Total No. of Questions : 8]

SEAT No. :

P-3465

[Total No. of Pages : 2

[6005]-602

M.E. (Mechanical - Energy Engineering)

NON-CONVENTIONAL ENERGY SOURCES

(2017 Pattern) (Semester - I) (502503)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of non programmable calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Explain different types of energy sources in brief. **[5]**

b) What are the prospects of Renewable energy sources in India? **[5]**

Q2) a) Explain the principle and main elements of solar photovoltaic power generation. **[5]**

b) Write a note on : **[5]**

i) Solar pumping

ii) Solar cell arrays

Q3) a) Describe a central solar thermal power station. **[5]**

b) What are the main considerations in site selection, for wind genertors? **[5]**

Q4) a) Describe in detail different components of microhydel power plants. **[5]**

b) Explain biomass conversion. **[5]**

P.T.O.

Q5) a) What are the advantages and disadvantages of Geothermal energy? **[5]**

b) Describe working of OTEC power plant. **[5]**

Q6) a) Write a short note on wave energy conversion machines? **[5]**

b) Explain with sketches the various methods of tidal power generations. **[5]**

Q7) a) Describe in detail Fuel cell energy storage system. **[4]**

b) How are Gasifiers classified? What is Pyrolysis? **[3]**

c) What are the main applications of Biogas? **[3]**

Q8) Write a short note on : **[10]**

a) Microhydel-PV system

b) Wind PV system

c) Diesel PV system

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Total No. of Questions : 7]

SEAT No. : ____

P-3466

[Total No. of Pages : 5

[6005]-603
M.E. (Mechanical - Energy Engineering)
ADVANCED HEAT TRANSFER
(2017 Pattern) (Semester - II) (502507)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates :

1) ***Attempt any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right of each question indicate full marks.***
4) ***Assume suitable data wherever necessary and mention the same clearly.***
5) ***Use of steam tables, Mollier chart and calculator is allowed.***

Q1) a) Consider 50 mm diameter spherical hot object initially at uniform temperature of 225 °C suddenly exposed to an ambient of 25 °C with heat transfer coefficient of 500 W/m^2 -°C. Take density of object 7850 kg/m^3, thermal conductivity = 60 W/m-°C and specific heat 460 J/kg-k. Determine **[5]**

i) Center temperature 2 min after start of cooling process.

ii) Temperature at a depth 1 cm after start of cooling process.

iii) Energy removed from the sphere during this time.

b) What do you mean by Newtonian Heating and cooling? What is I.T.G? How is developed in object? **[5]**

Q2) a) Consider the base plate of a 1200-W iron that has a thickness of L = 0.5 cm, base area of A = 300 cm^2 and thermal conductivity of k = 15 W/m °C. The inner surface of the base plate is subjected to uniform heatflux generated by the resistance heaters inside, and the outer surface losesheat to the surroundings at T = 20°C by convection. Taking the convection heat transfer coefficient to be h = 80 W/m^2 °C and neglecting heat loss by radiation, obtain an expression for the variation of temperature in the base plate and evaluate the temperatures at the inner and the outer surfaces. **[5]**

b) What do you mean by Thermal Contact Resistance? What are methods to reduce the same? **[5]**

P.T.O.

Q3) a) Experimental results for the local heat transfer heat transfer coefficient h_x for flow over a flat plate with an extremely rough surface were found to fit the relation $h_x(x) = x^{-0.1}$ where x(m) is the distance from the leading edge of the plate. Develop an expression for the ratio of the average heat transfer coefficient for a plate of length x to the local heat transfer coefficient h_x at x. **[5]**

b) Consider laminar flow of a fluid over a flat plate maintained at a constant temperature. Now the free-stream velocity of the fluid is doubled. Determine the change in the drag force on the plate and rate of heat transfer between the fluid and the plate. Assume the flow to remain laminar. **[5]**

Q4) a) Explain physical significance of following dimensionless numbers **[5]**

i) Peclet Number

ii) Stanton Number

iii) Rayleigh Number

b) Water enters a tube with fully developed velocity and uniform temperature of 20°C. The inside diameter of the tube is 4 cm and its length is 9 m. It is desired to heat the water to 60°C by maintaining the surface at 90°C uniform temperature. Determine the mass flow rate to satisfy the above condition. Take k = 0.64W/m °C, $\nu = 0.62 \times 10^{-6}$ m^2/s, ρ = 995 Kg/m^3, C_p = 4187 KJ/kg °C, $\beta = 4.25 \times 10^{-4}$ per degree Kelvin

Use following correlations

$Nu = 0.023\ Re_d^{0.8} Pr^{0.4}$ **[5]**

Q5) a) Explain following terms of mixed convection with neat sketch **[5]**

i) Assisting flow,

ii) Opposing flow,

iii) Transverse flow,

b) A plate type 200 mm × 300 mm heater is immersed in water bath at 40°C. The larger side of heater is maintained vertical. The heater rating is 3.5 kW. Determine the steady state temperature attended by the heater using following thermo physical properties. Consider heat transfer from one side of the plate k = 0.667 W/m °C, $\nu = 0.415 \times 10^{-6}$ m^2/s, ρ = 977.8 Kg/m^3 C_p = 4187 KJ/kg °C, $\beta = 4.15 \times 10^{-4}$ per degree Kelvin

For heat transfer by convection use following correlation

$Nu = 0.13\ (Ra)^{(0.33)}$ **[5]**

Q6) a) Explain with neat sketch different flow regimes encountered in flow boiling in a tube under forced convection. **[5]**

b) The steam at 165°C condenses in the shell side of a heat exchanger over the tubes through which water flows. Water enters the 4-cm-diameter, 14-m-long tubes at 20°C at a rate of 0.8 kg/s. Determine the exit temperature of water and the rate of condensation of steam. Take fluid properties at 85°C and latent heat of steam as 2066.5 kJ/kg

Use following correlations

$Nu = 4.6$	for laminar flow, Constant heat flux
$Nu = 3.66$	for laminar flow, Constant wall temperature
$Nu = 0.023\ Re_d^{(0.8)} Pr^{(0.4)}$	for turbulent flow, Constant heat flux or wall temp

[5]

Q7) a) What is the radiation effect? How does it influence the temperature measurements? **[5]**

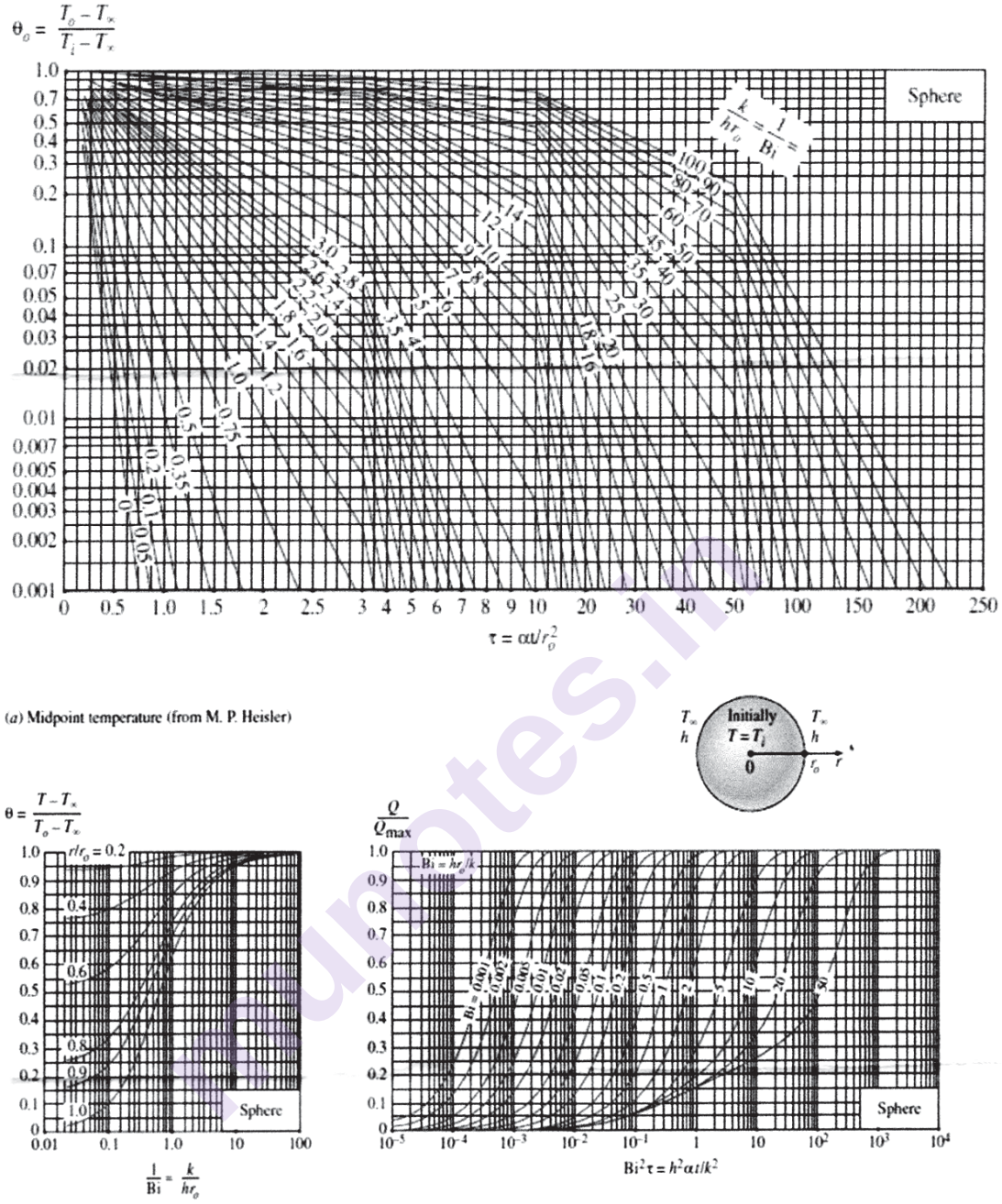
b) What is a gray body? How does it differ from a blackbody? What is a diffuse gray surface? **[5]**

Figure1: Physical Properties of Air (1 atm)

t °C	ρ kg/m³	c_p kJ/kgK	$k \times 10^2$ W/mK	$\alpha \times 10^4$ m²/hr	$\mu \times 10^2$ kg/hr-m	$\nu \times 10^6$ m²/s	Pr –
10	1.247	1.005	2.511	7.22	6.346	14.16	0.705
20	1.205	1.005	2.592	7.71	6.533	15.06	0.703
30	1.165	1.005	2.673	8.23	6.717	16.00	0.701
40	1.128	1.005	2.755	8.75	6.904	16.96	0.699
50	1.093	1.005	2.824	9.29	7.067	17.95	0.698
60	1.060	1.005	2.894	9.79	7.221	18.97	0.696
70	1.029	1.009	3.045	10.28	7.523	21.09	0.692
80	1.000	1.009	3.045	10.87	7.523	21.09	0.692
90	0.972	1.009	3.127	11.48	7.701	22.10	0.690
100	0.946	1.009	3.208	12.11	7.880	23.13	0.688
120	0.898	1.009	3.336	13.26	8.170	25.45	0.686
140	0.854	1.013	3.487	14.52	8.479	27.80	0.684
160	0.815	1.017	3.638	15.80	8.786	30.08	0.682
180	0.779	1.022	3.778	17.10	9.070	32.49	0.681
200	0.746	1.026	3.929	18.49	9.380	34.85	0680

Figure 2: Physical Properties of Water (Liquid state)

t °C	ρ kg/m³	c_p kJ/kgK	$k \times 10^2$ W/mK	$\alpha \times 10^4$ m²/hr	$\mu \times 10^2$ kg/hr-m	$\nu \times 10^6$ m²/s	Pr –
0	999.9	4.212	55.093	4.71	644.093	1.789	13.67
10	999.7	4.191	57.418	4.94	469.818	1.306	9.54
20	998.2	4.183	59.859	5.16	361.892	1.006	7.02
30	995.7	4.174	61.718	5.35	288.668	0.805	5.42
40	992.2	4.174	63.345	5.51	235.602	0.659	4.31
50	988.1	4.178	64.740	5.65	197.771	0.556	3.54
60	983.2	4.178	65.902	5.78	169.305	0.478	2.98
70	977.8	4.187	66.716	5.87	146.370	0.415	2.55
80	971.8	4.195	67.413	5.96	127.924	0.365	2.21
90	965.3	4.208	67.995	6.03	113.507	0.326	1.95
100	958.4	4.220	68.227	6.09	101.910	0.295	1.75



Transient temperature and heat transfer charts for a sphere of radius r_o initially at a uniform temperature T_i subjected to convection from all sides to an environment at temperature T_∞ with a convection coefficient of h.

Figure 3 Hesler Grober Chart for Sphere

Total No. of Questions : 8]

SEAT No. :

P-3467

[Total No. of Pages : 2

[6005]-604

M.E. (Mechanical-Energy Engineering)

ENERGY CONVERSION AND ENVIRONMENT

(2017 Pattern) (Semester - II) (502508)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Describe conversion of chemical energy of the fuel into thermal energy. **[5]**

b) Explain classification of different energy sources and its conversion. **[5]**

Q2) The following particulars refer to a stage of a Parson's steam turbine comprising one ring of fixed blades and one ring of moving blades; Mean diameter of blade ring = 75cm, R.P.M. = 3000, Steam velocity at exit of the blades 160 m/s, Blade outlet angle = 20°, Steam flow through blades = 7kg/s. **[10]**

Draw the velocity diagram and find the following

a) Blade inlet angle

b) Tangential force on the ring of moving blades

c) Power developed in a stage.

Q3) a) Enumerate lean burn engines. **[4]**

b) Explain any combined cycle with heat recovery boiler with sketch. **[6]**

P.T.O.

Q4) a) Explain the environmental aspects of a nuclear power generation with remedial actions. **[6]**

b) Enumerate formulation of standards against the radioactive protection. **[4]**

Q5) a) Explain capacity of the compressor and various efficiencies of the compressor. **[5]**

b) Explain efficient compressor operation with examples. **[5]**

Q6) a) Describe advantages of adopting Diesel power plants. **[4]**

b) Explain Energy Saving Opportunities in Cooling Towers. **[6]**

Q7) a) Explain in detail the environmental impacts of industrial operations. **[5]**

b) Explain global energy policy framework. **[5]**

Q8) a) Explain design procedure for Francis turbine. **[5]**

b) Explain working principle of Pelton turbine. **[5]**

Total No. of Questions : 7]

SEAT No. :

P738

[Total No. of Pages : 2

[6005]-607

S.Y.M.E. (Mechanical) (Energy Engineering)

ENERGY SYSTEMS MODELING AND OPTIMIZATION

(2017 Pattern) (Semester - III) (602514)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of the scientific calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) What is a system? Explain the concept of system and system environment with an example? **[5]**

b) Explain in brief discrete and continuous system? **[5]**

Q2) a) Explain in detail different types of similarities. **[5]**

b) Explain the technique of simulation and its advantages and limitations. **[5]**

Q3) a) A firm produces three products. These products are processed on three different machines. The time required manufacturing one unit of each of the three products and the daily capacity of the three machines are given in the table below.

Machine	Time per unit (Minutes)			Machine Capacity
	Product1	Product2	Product3	(minutes/day)
M_1	2	3	2	440
M_2	4	--	3	470
M_3	2	5	--	430

It is required to determine the daily number of units to be manufactured for each product. The profit per unit for product 1, 2 and 3 is Rs. 4, 3 and 6 respectively. It is assumed that the entire amount produced is consumed in the market. Formulate the mathematical (Linear Programming) model that will maximize the daily profit. **[6]**

b) Maximize $f(x) = 20x - 3x^2 - x^4$ by using 1- Dimensional search procedure. **[4]**

P.T.O.

Q4) Attempt any two. **[10]**

a) Use false position method to find the root of the function.
$f(x) = x^2 - x - 2 = 0$ in the range $1 < x < 3$.

b) Consider the following problem:

Minimize $f(x_1, x_2) = (x_1 - 1)^2 + x_2^2$
Subject to

$$g_1(x_1, x_2) = x_1^3 - 2x_2 \leq 0$$
$$g_2(x_1, x_2) = x_1^3 + 2x_2 \leq 0$$

Determine whether the constraint qualification and the Kuhn-Tucker conditions are satisfied at the optimum point.

c) Maximize: $z = 2x_1 + x_2$. By using Graphical Method.
Subject to: $x_1 + 2x_2 \leq 10$
$x_1 + x_2 \leq 6$
$x_1 - x_2 \leq 2$
$x_1 - 2x_2 \leq 1$
$x_1, x_2 \geq 0$

Q5) a) Explain in details search techniques Univariate method. **[5]**

b) The objective function for an optimization problem is taken as the total income, which involves an income of five units on item A and seven units on item B. The former requires 2.5 hours of cutting and 1.5 hours of polishing, whereas item B requires 4 hours of cutting and 1 hour of polishing. If the total labor hours available for cutting are 4000 and for polishing 2000, formulate the optimization problem and solve it by the simplex algorithm to obtain the optimum. **[5]**

Q6) Minimize $f = -3x_1 - 4x_2$ **[10]**
Subject to
$3x_1 - x_2 + x_3 = 12$
$3x_1 + 11x_2 + x_4 = 66$
$x_i \geq 0$, i = 1 to 4
all xi are integers.

Q7) Explain with an example, the simulation procedure for analyzing a system. **[10]**

Total No. of Questions : 8]

SEAT No. : [ ]

P3468

[Total No. of Pages : 2

[6005]-611

F.Y. M.E. (Mechanical- Mechatronics)

SYSTEM MODELLING, IDENTIFICATION AND SIMULATION

(2017 Pattern) (Semester-I) (502801)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Explain the concept of similarity transformation in the context of MDOF systems. **[5]**

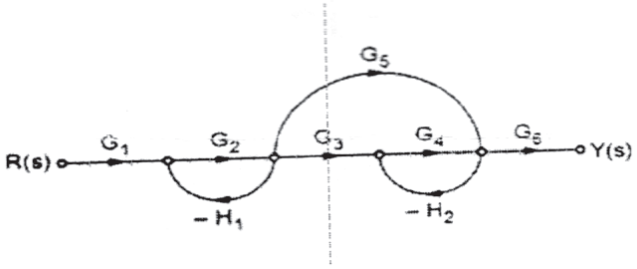
b) Describe the process of modeling of distributed parameter systems using the example of a cantilever beam. **[5]**

Q2) a) Explain the concept of power variables in Bond Graph modeling. **[5]**

b) Discuss the use of bond graph standard elements in Bond Graph modeling. **[5]**

Q3) a) Write the generic state space model of a MDOF system in Diagonal form and discuss the advantages of the said form. **[5]**

b) Find transfer function from following signal flow graph **[5]**

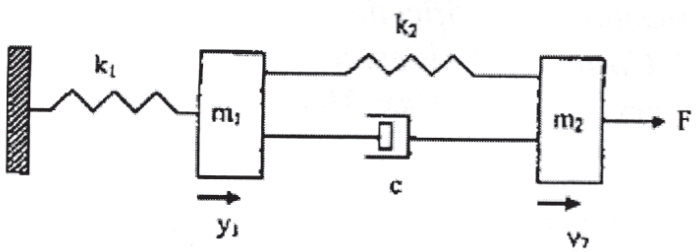


P.T.O.

Q4) a) For the following transfer function, draw the equivalent signal flow diagram. **[5]**

$$\frac{C(s)}{R(s)} = \frac{12}{(s+1)(s+2)(s+3)}$$

b) Figure shows a mechanical system with two masses and two springs. Drive an expression for the mathematical model of the system. **[5]**



Q5) a) In comparison to the Kalman Filter approach, discuss the advantages offered by the Extended Kalman filter approach. **[5]**

b) Draw the flow chart and explain the identification of ARX model using Least Square method. **[5]**

Q6) a) Draw the flow chart and explain the process of identification of a frequency domain model. **[5]**

b) Draw a suitable block diagram explain the process of "Model Identification". **[5]**

Q7) a) Convert the below state space model into a transfer function. **[5]**

$$\dot{x} = \begin{bmatrix} -4 & -1.5 \\ 4 & 0 \end{bmatrix} x + \begin{bmatrix} 2 \\ 0 \end{bmatrix} u(t)$$

$$y = \begin{bmatrix} 1.5 & 0.625 \end{bmatrix} x$$

b) List the criterion for selection of fuzzy membership functions. **[5]**

Q8) a) Differentiate between supervised and un-supervised learning. **[5]**

b) Draw the flow chart and explain the working of Predictor-Corrector type Extended Kalman Filter. **[5]**

Total No. of Questions :8]

SEAT No. :

P3469

[Total No. of Pages :3

[6005] - 612

First Year M.E.(Mechanical-Mechatronics)

CONTROL SYSTEMS - I

(2017 Pattern) (Semester - I) (502802)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Explain second- order system observer design using Ackermann's formula. **[5]**

b) Discuss in detail, the disadvantages associated with pole placement based comtrol. **[5]**

Q2) a) Explain Effect of Feedback on Overall Gain. **[4]**

b) Explain Quadratic Poles and Zeros with example. **[6]**

Q3) a) Explain design via State Space in detail. **[5]**

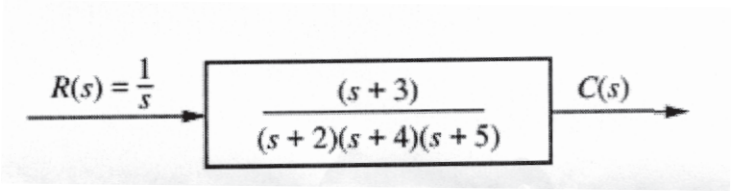
b) Write the cost function for LQR type control and discuss the effect of ratio QR in the cost function. **[5]**

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -0.4 & -5 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \end{bmatrix} u$$

$$y = \begin{bmatrix} 0 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + [0] u$$

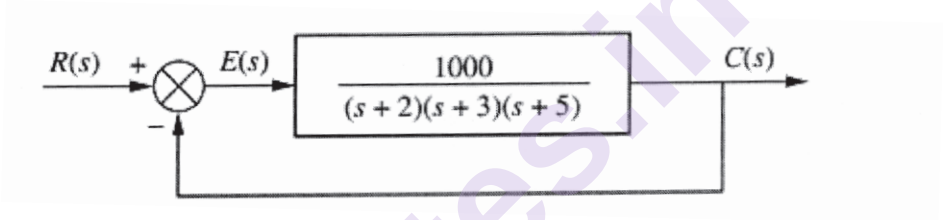
P.T.O.

Q4) a) Evaluating Response Using Poles **[5]**



b) Discuss the effect of condition number on controllability and observability of a system. **[5]**

Q5) a) Make the Routh table for the system shown in Figure **[6]**

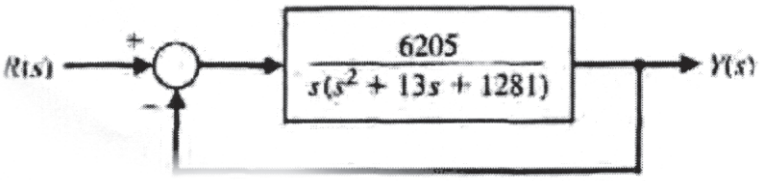


b) What is the State - Space Representation? **[4]**

Q6) A closed - loop control system is shown in Figure **[10]**

a) Determine the transfer function T(s)=Y(s)/R(s).
b) Determine the poles and zeros of T(s).

c) Use a unit step input, R(s) = 1/s, and obtain the partial fraction expansion for Y(s) and the value of the residues.



Q7) a) Draw a block diagram for a control system made up of the plant, the observer and the compensator. **[5]**

b) Explain applications for feedback control systems. **[5]**

Q8) a) Using a suitable block diagram, discuss the design of a reduced order observer. **[5]**

b) Determine the number of right - half - plane poles in the closed - loop transfer function. **[5]**

$$T(s) = \frac{10}{s^5 + 7s^4 + 6s^3 + 42s^2 + 8s + 56}$$

♦ ♦ ♦

Total No. of Questions : 7]

SEAT No. :

P-3470

[Total No. of Pages : 2

[6005]-613

M.E. (Mechanical - Mechatronics)

SENSORS, TRANSDUCERS AND INTERFACING TECHNIQUES

(2017 Pattern) (Semester - I) (502803)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt any five questions.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat figures, diagrams wherever necessary.***
4) ***Use of non-programmable scientific calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Define error. What are the causes of experimental errors? Explain different types of errors & how to reduce or minimize these errors. **[5]**

b) Explain the probability & the Gaussian or Normal error distribution. **[5]**

Q2) a) Enlist important specifications of : **[5]**

i) Analog oscilloscope

ii) Digital storage oscilloscope

b) Explain the working of hall effect transducer using neat diagram. State its applications. **[5]**

Q3) a) With neat diagrams explain the working of Diaphragm & Bellow gauge. **[5]**

b) What is the approximate range of mean free paths for air over the range of pressures for which the Knudsen gage is applicable? **[5]**

P.T.O.

Q4) a) Explain the working of Rotameter with neat schematic. **[5]**

b) With the help of neat diagram explain the working of hot wire anemometer. **[5]**

Q5) a) What is RTD and thermistor? Explain how thermistor is used to measure temperature. **[5]**

b) Using neat diagram explain the series & parallel connection of thermocouples. **[5]**

Q6) a) Define strain & stress. State the different techniques of strain measurements & explain any one with neat diagram. **[5]**

b) What is the need of temperature compensation in strain measurement? **[5]**

Q7) a) What is the need of signal conditioner in case of data acquisition system? State the different signal conditioners used for DAS. **[5]**

b) Enlist the important specifications of analog-to-digital converter. Draw a neat diagram of flash type ADC & explain its working. **[5]**

□□□

Total No. of Questions : 8]

SEAT No. :

P-3471

[Total No. of Pages : 3

[6005]-614

M.E. (Mechanical - Mechatronics)

PLC PROGRAMMING

(2017 Pattern) (Semester - II) (502807)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) A temperature control system consists of four thermostats controlling three heating units. The thermostat contacts are set to close at 50°, 60°, 70° and 80°F. Receptively. The PLC ladder logic program is to be designed so that at a temperature below 50°F. Three heaters are to be ON. Between 50° to 60°F, two heaters are to be ON. For 60° to 70°F. One heater is to be ON. Above 80°F, there is a safety shutoff for all three heaters in case one stays on because of a malfunction. A master switch is to be used to turn the system ON and OFF. Prepare a typical PLC program for this control process. **[10]**

Q2) a) List out advantages that PLCs offer over the conventional relay control system. **[4]**

b) Describe the main function of each of the following main component parts of a PLC. **[6]**

i) Processor module (CPU)

ii) I/O modules

iii) Programming device

Q3) a) What type of output devices can be controlled by an output module that uses relays for the switching device? **[4]**

b) State three other functions, in addition to simple logic processing, that PLC processors are capable of performing. **[6]**

P.T.O.

Q4) a) Convert each of the following binary numbers to decimal numbers: **[4]**

i) 10

ii) 100

iii) 111

iv) 1011

b) Draw the logic symbol. construct a truth table, and state the Boolean equation for each of the following: **[6]**

i) Two-input AND gate

ii) Three-input OR gate

iii) NOT function

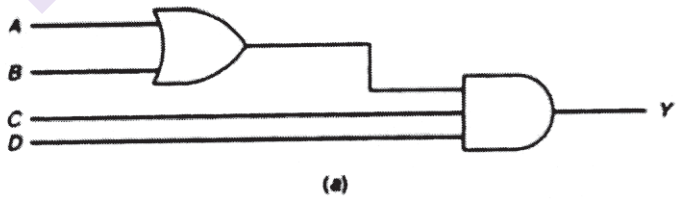
Q5) a) Develop a logic gate circuit for each of the following Boolean expressions using AND, OR and NOT gates: **[6]**

i) $Y = ABC + D$

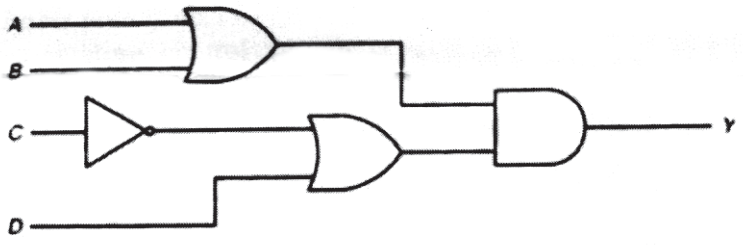
ii) $Y = AB + CD$

iii) $Y = (A + B)(\overline{C} + D)$

b) Write the Boolean equation for each of the logic gate circuits **[4]**



(a)



(b)

Q6) Write the ladder logic program needed to implement each of the following :**[10]**

(assume inputs A, B and C are all normally open toggle switches) :

a) When input A is dosed, turn ON and hold ON outputs X and Y until A opens.

b) When input A is dosed and either input B or C is open, turn ON output Y. Otherwise, it should be OFF.

c) When input A is dosed or open, turn ON output Y.

d) When input A is dosed, turn ON output X and turn OFF output Y

Q7) a) State advantages of using programmed PLC timers. **[5]**

b) Explain what each of the following quantities associated with a PLC timer instruction represents : **[5]**

i) Preset time

ii) Accumulated time

Q8) a) What are the two methods commonly used to represent a timer within a PLC's ladder logic program? **[6]**

b) State the method used to reset the accumulated time of each of the following: **[4]**

i) TON timer

ii) TOF timer

▽▽▽▽

Total No. of Questions : 7]

SEAT No. :

P-3472

[Total No. of Pages : 3

[6005]-615

M.E. (Mechanical - Mechatronics)

CONTROL SYSTEMS - II

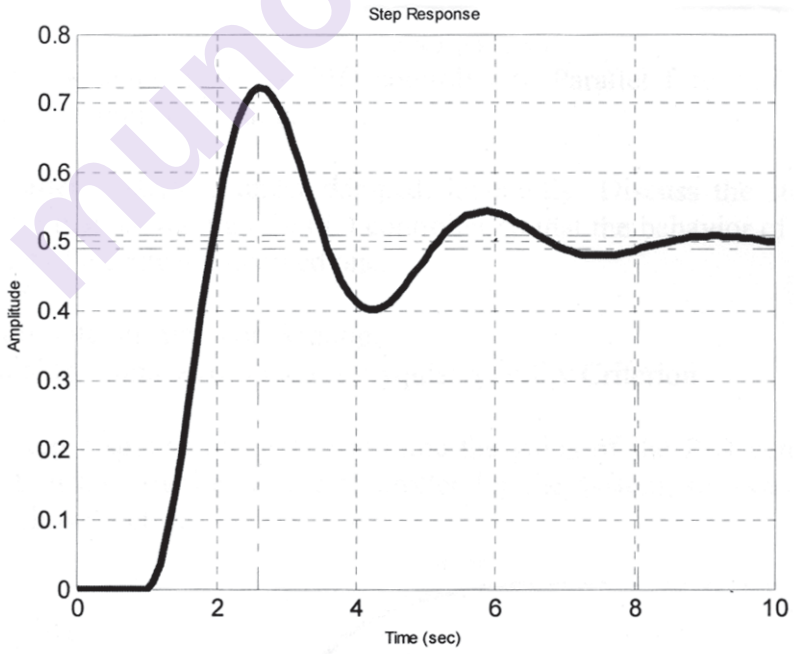
(2017 Pattern) (Semester - II) (502808)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

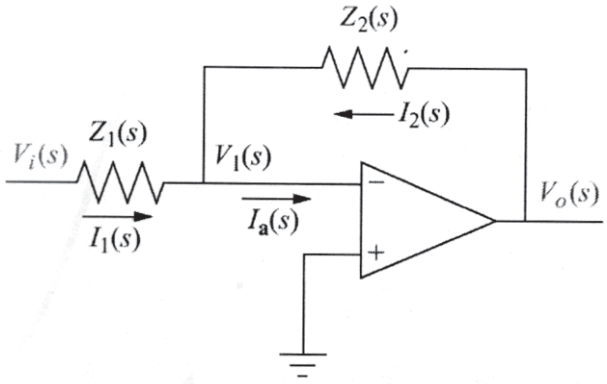
Q1) a) The step response of a model is shown below. Using suitable technique identify the model. **[8]**



b) List two points of Differentiation between Static and Dynamic Model.**[2]**

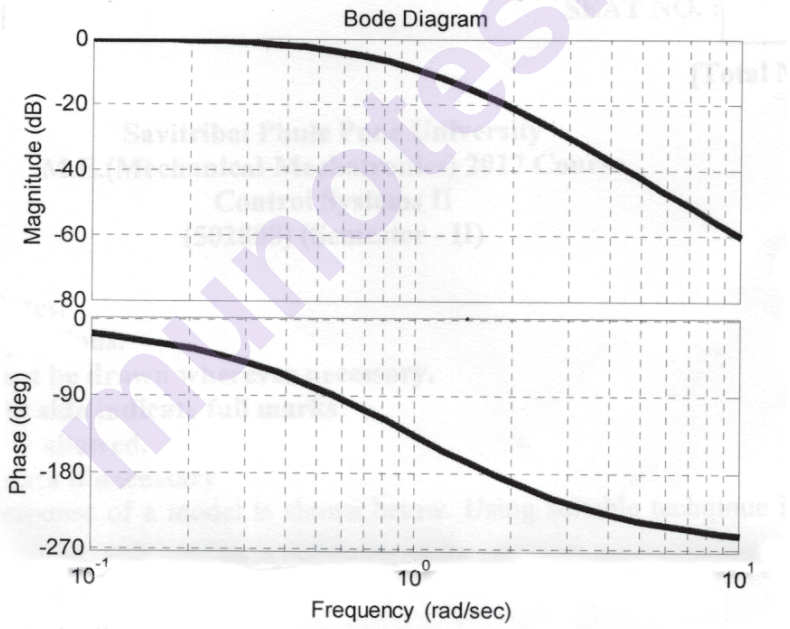
P.T.O.

Q2) a) Derive the equation of motion for the circuit shown in figure below. **[6]**



b) List the procedure for sketching the Bode Plot. **[4]**

Q3) a) Determine the approximate value of Gain and the Phase Margin from below plot. **[6]**



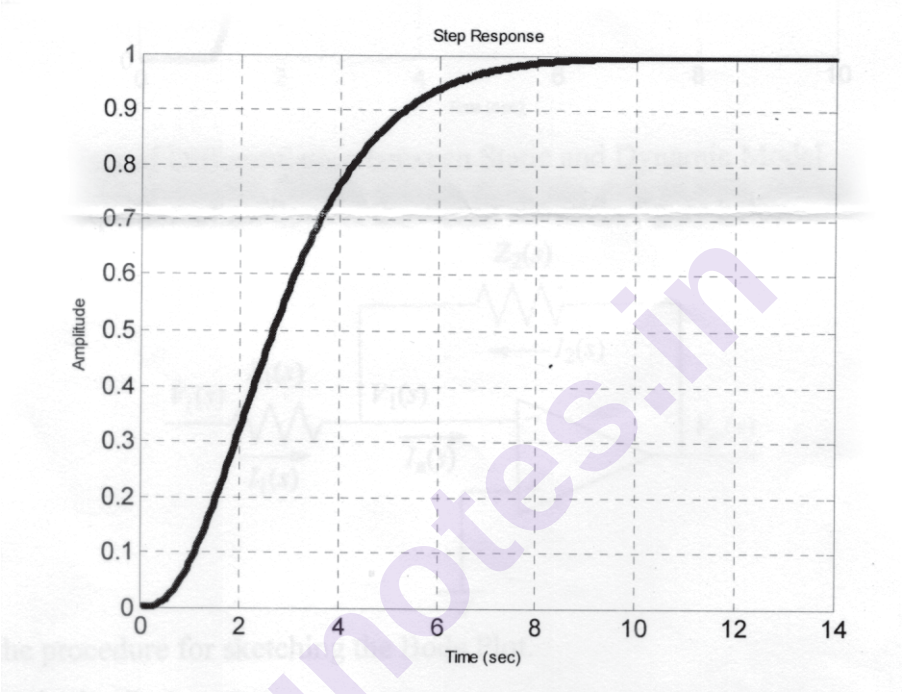
b) Draw the block diagram of the PID controller in Parallel form and derive the equation for the control signal, u. **[4]**

Q4) A second order system is under damped, inherently. Discuss the step by step procedure for manual tuning of a PID controller so that the behavior of the system becomes that of a critically damped one. **[10]**

Q5) a) Write a short note on Actuator Windup. **[5]**

b) Using a suitable example, discuss the Nyquist Stability Criterion. **[5]**

Q6) Using ZN step response method, determine the gains of the PID controller and derive the transfer function of the controller for the system, for which the step response is shown below. **[10]**



Q7) a) Discuss, in detail, the relationship between Sensitivity and Gain Margin. **[5]**

b) Using a suitable example explain the ITAE controller. **[5]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

P3473

[Total No. of Pages : 2

[6005]-616

M.E. (Mechanical-Mechatronics)
INDUSTRIAL DRIVES & ACTUATORS
(2017 Pattern) (Semester-II) (502809)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain briefly the concept of Electric Drive with block diagram and state its advantages. **[5]**

b) What do you mean Active and Passive torque? Explain it brifly. **[5]**

Q2) Explain different speed control methods of DC series and DC shunt motor. **[10]**

Q3) a) Write a short note on reduced voltage starting of Induction motor. **[5]**

b) Explain basic principle of operation of three phase induction motor and draw its equivalent circuit. **[5]**

Q4) Explain constant torque constant power speed control characteristics of synchronous motor drive. **[10]**

Q5) Enlist the advantages, limitations and applications of Hydraulic Systems and Electric Systems. **[10]**

Q6) a) Discuss the hazards if pressure in hydraulic system grows above limit. **[5]**

b) Explain hydraulic power steering as a hydraulic servo system. **[5]**

P.T.O.

Q7) a) Discuss types of flow control valves with symbol and working. **[5]**

b) Explain classification of pneumatic cylinders w.r.t. construction with industrial application of each type. **[5]**

Q8) Answer any two: **[10]**

a) Comparison between Air motor and electric motor.

b) Compare Gear Pump and Vane Pump.

c) Derive torque angle relationship for synchronous motor drive.

d) Describe DC servo motor types.

Total No. of Questions : 8]

SEAT No. :

P739

[Total No. of Pages : 2

[6005]-617

S.Y. M.E. (Mechanical) (Mechatronics)

MICROCONTROLLER APPLICATIONS IN EMBEDDED SYSTEMS

(2017 Pattern) (Semester-III) (602813)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, whenever necessary.***

Q1) a) Draw and explain block diagrm of PIC 18F microcontroller. **[4]**

b) List and Explain the instructions used for Arithmetic operation and logical operation of PIC 18F microcontroller. **[4]**

c) Discuss flags in STATUS register of PIC 18F microceontroller in detail. **[2]**

Q2) a) With neat diagram explain support devices of PIC 18 F microcontroller. **[4]**

b) Explain the result after the execution of the following instructions. Identify the content of W. register and status of flags. **[4]**

MOVLW 5AH

ADDLW 9FH

c) What is subroutine? Explain PIC 18 CALL and RETURN Instructions. **[2]**

Q3) a) With neat circuit diagram of LCD Interfacing tp PIC Microcontroller. **[4]**

b) Explain in detail interfacing of push-Button keys. **[4]**

c) Explain stack of PIC 18F microcontroller. **[2]**

Q4) a) What is Interrupt? Explain different types of interrupts. **[4]**

b) Draw and explain with block diagram Timer of PIC 18F microcontroller. **[4]**

c) Enlist applications of Hardware counters and Timers? **[2]**

P.T.O.

Q5) a) With block diagram explain successive approximation A/D conversion. **[4]**

b) What is function of Capture. Compare and PWM module? **[4]**

c) What is the need of A/D and D/A converters. **[2]**

Q6) a) Explain data transfer in Inter-Integrated circuit protocol. **[4]**

b) Explain Data transfer in Serial Peripheral intrface protocol. **[4]**

c) What is Rs 232 standard in serial communication? **[2]**

Q7) a) Explain basic concepts in serial communication. **[4]**

b) Enlist features of embedded systems. **[4]**

c) Explain any two features of Embedded System. **[2]**

Q8) a) Explain hardware Aspect of the Time and Temperature Monitoring System (TTMS). **[5]**

b) Explain Software Aspect of the Time and Temperature Monitoring System (TTMS). **[5]**

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Total No. of Questions : 8]

SEAT No. : ____

P740

[Total No. of Pages : 2

[6005]-618

S.Y.M.E. (Mechanical -Mechatronics)

FLEXIBLE MANUFACTURING SYSTEMS

(2017 Pattern) (Semester - III) (602814)

Time : 3Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) List the major components of an FMS. Explain them in brief. **[10]**

Q2) a) What is single station automated cells. **[4]**

b) Write short note on cellular manufacturing. **[6]**

Q3) a) What is automated production line? What is benefits of it? **[4]**

b) What is difference between Fixed Routing and Variable Routing in Manufacturing system. **[6]**

Q4) a) Explain the working of NC machine tool with the help of the diagram. **[4]**

b) Write a note on: Automated guided vehicles associated with FMS. **[6]**

Q5) a) Distinguish NC and CNC Machine. **[4]**

b) Explain the constuction details of column type of CMM? Mention the advantages and disadvantages. **[6]**

Q6) a) What are the components on which success of Concurrent Engineering depend? **[4]**

b) Discuss Taguchi approach for design of experiments. **[6]**

P.T.O.

Q7) a) Write brief notes on inventory control system. **[4]**

b) Explain how DFM helps in reducing the manufacturing cost of a product? **[6]**

Q8) a) Mobile charger supplier drawn randomly constant sample size of 500 chargers every day for quality control test. Defects in each charger are recorded during testing & tabulated as follows. **[6]**

Lot No.	Sample Size	Number of defects in Sample [c]
1	500	12
2	500	14
3	500	16
4	500	18
5	500	16
6	500	14
7	500	12
8	500	12
9	500	32
10	500	16
11	500	18
12	500	16
13	500	14
14	500	12
15	500	16
16	500	18
17	500	12
18	500	19
19	500	18
20	500	21

Draw the appropriate control chart and comment on the state of control.

b) Explain the function of shop floor control. **[4]**

Total No. of Questions : 8]

SEAT No. :

P3474

[Total No. of Pages : 3

[6005]-621

F.Y.M.E. (Chemical Engineering)

MATHEMATICAL AND STATISTICAL METHODS

(2017 Pattern) (Semester - I) (Theory) (509101)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer five out of 8 questions.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Assume necessary data.***
4) ***Figures to the right indicate full marks.***
5) ***All questions carry equal marks.***

Q1) a) Solve the differential equation using power series. **[6]**

$y' - y = 0$

$y'' + 9y = 0$

b) Solve the following Legendre's equation using power series **[4]**

$(1-x^2)\, y'' - 2\, xy' + n\,(n+1)\, y = 0$

Q2) Solve the following heat equation using Fourier series. **[10]**

$$\frac{du}{dy} = c^2 \nabla^2 u .$$

Q3) a) Find the Laurent series expansion of $(z-1)/z^2$ for $|z-1| > 1$. **[5]**

b) Find Talor's expansion of $f(z) = 1/(z+1)^2$ about the point of $z = -i$. **[3]**

c) If w = 1g z, find dw/dz and determine where w is non-analytical. **[2]**

Q4) a) The annual salaries of a group of employees are given in the following table: **[5]**

Salaries in Rs.	45	50	55	60	65	70	75	80
Number of persons	3	5	8	7	9	7	4	7

Calculate the standard deviation of the salaries.

P.T.O.

b) Two brands of tyres are tested with the following results: **[5]**

Life in km	No of tyres brand	
	X	Y
20-25	1	0
25-30	22	24
30-35	64	76
35-40	10	0
40-45	3	0

i) Which brand of tyres have average life.

ii) Compare the variability and state which brand of tyres would you use on your fleet of trucks?

Q5) a) A random variable X has the following probability distribution. **[5]**

i) Find K

ii) Evaluate P (X < 2)

iii) Find the cdf of X and

iv) Evaluate the of X

X	–2	–1	0	1	2	3	4
P(X)	0.1	K	0.2	2K	0.3	3K	0.3

b) Compute the coefficient of correlation between X and Y using the following data. **[5]**

X	1	3	5	7	8	10
Y	8	12	15	17	18	20

Q6) a) The joint probability mass function of (X, Y) is given by p (x,y) = k (2x+3y), x = 0, 1, 2, y = 1, 2, 3. Find all the marginal and conditional probability distributions. Also find the probability distribution of (X+Y). The joint probabilities are given below: **[7]**

X	Y		
	1	2	3
0	3k	6k	9k
1	5k	8k	11k
2	7k	10k	13k

b) Write note on rank correlation coefficient. **[3]**

Q7) a) In a random samples of size 16 has 53 are mean. The sum of deviation taken from mean is 135 with LOS of 1%. Can this sample regarded as taken from the population having 56 as mean? Also obtain 95% and 99% confidence limits of the mean of the population (given for v = 15, $t_{0.05} = 2.13$, $t_{0.01} = 2.95$). **[5]**

b) Test the normality of the following distribution by using chi-square test of goodness of fit. Take $\chi^2_{0.05}$ (v = 2) = 5.99 **[5]**

x	125	135	145	155	165	175	185	195	205
f	1	1	14	22	25	19	13	3	2

Q8) The following data resulted from an experiment to compare three burners B1, B2 and B3. A Latin square design was used as the tests were made on 3 engines and were spread over days. **[10]**

	Engine1	Engine2	Engine3
Day1	B_1-16	B_2-17	B_3-20
Day2	B_2-16	B_3-21	B_1-15
Day3	B_3-15	B_1-12	B_2-13

Test the hypothesis that there is no difference between the burners. Take $F_{5\%}$ (v_1=2, v_2=2) = 19

A122	B121	C123	B122
B124	C123	A122	D125
A120	B119	D120	C121
C122	D123	B121	A121

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Total No. of Questions : 8] **SEAT No. :**

P3475 **[Total No. of Pages : 2**

[6005]-622
First Year M.E. (Chemical Enginneering)
PROCESS OPTIMIZATION
(2017 Pattern) (509102)(Semester - I)

Time :3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Draw neat diagrams wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Discuss Optimization. Explain Nature and Scope of Optimizaton. **[5]**

b) Write short note on convex and concave function. **[5]**

Q2) Explain in detail Classification of Optimization Problems. **[10]**

Q3) Minimize $f = (x-1)^4$ via (a) Newton's method and (b) the Quasi - Newton (Secant) method, starting at(1) x= –1, (2)x = – 0.5, amd (3)x = 0.0. **[10]**

Q4) Write short notes on :

a) Secant method. **[5]**

b) Evolutionary optimization method. **[5]**

Q5) Use Fibonacci method to maximize $Z = 24X - 2X^3$ in the range 0 to 10 to an accuracy of 1% carry out 4 iteration. **[10]**

Q6) a) Explain the differences between Genetic Algoritham and traditional methods. **[5]**

b) What is fitness function in Genetic Algorithm? **[5]**

P.T.O.

Q7) a) Write short note on quadratic programming. **[5]**

b) Explain reduced gradient method. **[5]**

Q8) a) Explain the differences between Genetic Algoritham and traditional methods. **[5]**

b) Steps in simulated annealing algorithm. **[5]**

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Total No. of Questions : 7]

SEAT No. :

P-3476

[Total No. of Pages : 2

[6005]-623

M.E. (Chemical Engineering)

ADVANCED SEPARATION PROCESSES

(2017 Pattern) (509103) (Semester - I)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of an electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***
6) ***Use of cell phone or Mobile phone is prohibited in the examination hall.***

Q1) a) Explain in brief equipment used in cross flow filtration. **[5]**

b) Write a short note on : advances in conventional separation processes. **[5]**

Q2) Describe in brief design aspects of reverse osmosis and microfiltration membrane processes. **[10]**

Q3) a) Explain in brief working of a membrane in dialysis of kidney. **[5]**

b) Write a short note on : Ceramic Membranes. **[5]**

Q4) Which are different types and choice of adsorbents and adsorption isotherms? Describe in brief construction and working of column used for adsorption technique. **[10]**

Q5) Discuss in detail : Plate and Frame membrane system with a neat diagram. Also discuss advantages of membrane separation techniques. **[10]**

P.T.O.

Q6) a) Which are different ion chromatographic techniques? Explain in brief electro-dialysis. **[8]**

b) What do you mean by Iyophilisation? **[2]**

Q7) a) Explain in brief construction and working of equipment used to carry out Reactive distillation with a neat diagram. **[6]**

b) Write a short note on : Foam separation technique. **[4]**

□□□

Total No. of Questions : 8]

SEAT No. :

P-3477

[Total No. of Pages : 2

[6005]-624

M.E. (Chemical)

RESEARCH METHODOLOGY

(2017 Pattern) (Semester - I) (509104)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) What is Research? Explain its significance in modern times. **[5]**

b) How do you define a research problem? Give one example to illustrate your answer. **[5]**

Q2) a) What do you mean by regression? Explain Simple Regression. **[5]**

b) The heights in inches of 30 students are as follows : **[5]**

66, 68, 65, 70, 67, 64, 68, 64, 66, 64, 70, 72, 71, 69, 69, 64, 67, 63, 70, 71, 63, 68, 67, 65, 69, 65, 67, 66, 69, 67

Prepare a frequency distribution table showing relative frequency, cumulative frequency and percent frequencies.

Q3) a) Explain the need of regression analysis. Explain with a suitable example simple regression. **[5]**

b) Write a note on the usage of ANOVA in linear regression analysis. Why do we use t-test in linear regression analysis? **[5]**

Q4) a) Explain the application of Tables and graphs of frequency data of one variable with suitable example. **[6]**

b) Define frequency distribution and percent frequency distribution. **[4]**

P.T.O.

Q5) a) Discuss the various parameters useful in writing a research proposal. **[5]**

b) Explain why a good literature survey is important to narrow the research problem and the technique that might be used. **[5]**

Q6) a) Write a note on patenting a research idea. **[5]**

b) Explain the sources which can and/or should be used for selecting a research problem. **[5]**

Q7) a) Discuss the steps involved in publishing a research idea in a journal. **[5]**

b) Write a note on Bibliography. **[5]**

Q8) Explain the role of computer in research. Discuss the software and their applications in data analysis and preparing a research report. **[10]**

□□□

Total No. of Questions : 8]

SEAT No. :

P-3478

[Total No. of Pages : 2

[6005]-625

M.E. (Chemical Engg.)

ADVANCED TRANSPORT PHENOMENA

(2017 Pattern) (Semester - II) (509107)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Assume suitable data, if necessary.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of electronic pocket calculator is allowed.***

Q1) A spherical tank of radius R and its drain-pipe of length L and diameter D are completely filled with a heavy oil. At time t = 0 the valve at the bottom of the drainpipe is opened. Derive the time equation for complete draining of the tank. There is an air vent at the very top of the spherical tank. Ignore the amount of oil that clings to the inner surface of the tank, and assume that the flow in the drainpipe is laminar. **[10]**

Q2) Derive the following velocity profile relation of a fluid flowing inside a circular pipe, starting with the continuity equation and the r, θ and z-equations of motion. Assume no radial and tangential flow components. **[10]**

$$v_z = \frac{(\mathcal{P}_0 - \mathcal{P}_L)R^2}{4\mu L}\left[1 - \left(\frac{r}{R}\right)^2\right]$$

Q3) Derive the final equation of energy change for Non-isothermal systems starting from the basic conservation of energy equations with suitable assumptions.**[10]**

Q4) Develop the dimensionless wall heat flux relation for the temperature distribution for turbulent flow in tubes equipped with an electric heating coil which provide a constant wall flux q_0. **[10]**

P.T.O.

Q5) Discuss the time-smoothing of the equations of continuity and motion for component 'A' disappearing by an n^{th} order chemical reaction in rectangular coordinates. **[10]**

Q6) A liquid 'B' is flowing very slowly around a spherical bubble of gas 'A' of radius 'R' (creeping flow). Develop the relation for the determination of the rate of mass transfer of 'A' into the surrounding fluid 'N_{A0}', if the solubility of gas 'A' in liquid 'B' is C_{A0}. State the assumptions. **[10]**

Q7) A fluid stream emerges from a chemical plant with a constant mass flow rate w and discharges into a river (see Fig.). It contains a waste material A at mass fraction W_A, which is unstable and decomposes at a rate proportional to its concentration according to the expression, $r_A = -k_1 \rho A$ that is, by a first-order reaction. To reduce pollution it is decided to allow the effluent stream to pass through a holding tank of volume V, before discharging into the river. The tank is equipped with an efficient stirrer that keeps the fluid in the tank at very nearly uniform composition. At time t = 0 the fluid begins to flow into the empty tank. No liquid flows out until the tank has been filled up to the volume V. Develop an expression for the concentration of the fluid in the tank as a function of time, both during the tank-filling process and after the tank has been completely filled. **[10]**

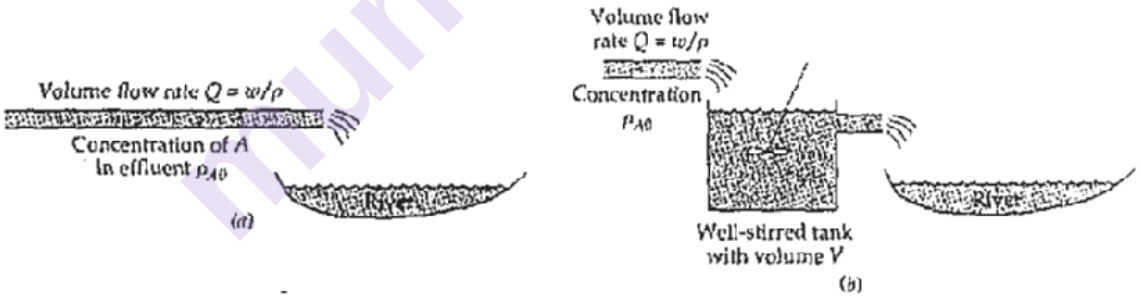

Fig. Effluent Discharge, (a) Effluent discharged to river, (b) Effluent decomposed in CSTR and then discharged to river.

Q8) a) State the analogies among heat and mass transfer at low mass-transfer rates in terms of the basic relations. **[5]**

b) Discuss the Chilton & Colburn 'J' factor analogy in brief. **[5]**

Total No. of Questions : 8]

SEAT No. : ____

P3479

[Total No. of Pages : 2

[6005]-626
F.Y. M.E. (Chemical)
ADVANCED PROCESS CONTROL
(2017 Pattern) (Semester - II) (509108)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain Linearization of Non-linear models. Linearize the model of a liquid level in tank system. **[5]**

b) Discuss the concept of Degree of Freedom Analysis and determine the degree of freedom of the blending system wherein two streams containing two components 'A' and 'B' in different compositions are mixed continuously. **[5]**

Q2) Determine the best variable pairing by RGA analysis for the Wood and Berry distillation column transfer function model. **[10]**

$$G(s)=\begin{bmatrix} \dfrac{12.8e^{-s}}{16.7s+1} & \dfrac{-18.9e^{-3s}}{21.0s+1} \\ \dfrac{6.6e^{-7s}}{10.9s+1} & \dfrac{-19.4e^{-3s}}{14.4s+1} \end{bmatrix}$$

Q3) State with appropriate relations the Digital approximation of classical PID controllers in the position form and the velocity form **[10]**

Q4) Design a controller for the following first-order system using the Direct Synthesis controller design approach: **[10]**

$$g(s)=\frac{0.66}{6.7s+1}$$

P.T.O.

Q5) Discuss the important issues in Plant wide Control of a chemical process. **[10]**

Q6) a) Discuss the PID controller tuning methods in detail. **[5]**

b) Explain in detail the Override control of a boiler system with neat figure. **[5]**

Q7) Discuss in detail the fundamentals of Model Predictive Control (MPC) with the predictive graph. **[10]**

Q8) Discuss the importance of Singular Value Analysis and the Condition Number of a system. **[10]**

Total No. of Questions : 8]

SEAT No. :

P3480

[Total No. of Pages : 2

[6005]-627

F.Y. M.E. (Chemical Engineering)
ADVANCED REACTION ENGINEERING
(2017 Pattern) (Semester-II) (509109)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) Derive a model for spherical particle of unchanged size when chemical reaction is controlling resistance. **[10]**

Q2) A feed consisting 35% of 50 μm radius particles, 35% of 100 μm radius particles, 30% of 200 μm radius particles is to be reacted in a fluidized bed reactor (at steady state) from a vertical 2 m long, 20 cm ID pipe. The time required for complete conversion is 5, 10 and 20 min for the three sizes of feed, find conversion of solids for a feed rate of 1 kg solids/min if bed contains 10 kg solids. **[10]**

Q3) a) From a pulse input into a vessel we obtain the following output signal. **[6]**

Time, min.	1	3	5	7	9	11	13	15
Concentration, (mol/lit.)	0	0	10	10	10	10	0	0

We want to represent the flow through the vessel with the tanks - in - series model. Determine the no. of tanks to be used.

b) What is meant by effectiveness factor and its evaluation? **[4]**

Q4) a) Write the steps for modelling diffusion with reaction. **[5]**

b) What is the significance of 'Thiele Modulus' catalytic reaction engineering? **[5]**

P.T.O.

Q5) a) Explain the heat effects during the reactions in porous catalyst. **[6]**

b) Explain Rideal Eiley Model. **[4]**

Q6) a) Calculate the mass flux of reactant A to a single catalyst pellet 1 cm in diameter suspended in a large body of liquid. The reactant is present in dilute concentrations and the reaction is considered to take place instantaneously at the external pellet surface (i-e C_{AS} =0). The bulk concentration of reactant is 1.0 M, and the free system liquid velocity is 0.1 m/s. The kinematic viscosity is 0.5 centistoke and the liquid diffusivity of A is 10^{-10} m^2/s. **[7]**

Use Frossling correlation:

$Sh = Kc\ dp/\ D_{AB} = 2+0.6\ Re^{½}.\ Sc^{1/3}$

b) What is Weitz-prater criterion for internal diffusion? **[3]**

Q7) a) Explain Langmuir-Hinshelwood model in details. **[6]**

b) Write a note on catalytic reactions. **[4]**

Q8) a) Explain in details about the fluidised bed reactor. **[6]**

b) Describe rate controlling steps in catalytic reactions. **[4]**

Total No. of Questions : 8]

SEAT No. : ____

P741

[Total No. of Pages : 1

[6005]-628
S.Y. M.E. (Chemical)
PROCESS MODELING & SIMULATION
(2017 Pattern) (Semester-III) (509113)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is permitted.***

Q1) Define model and also give its applications in chemical engineering. **[10]**

Q2) What is Unsteady State Models? Explain it with suitable example. **[10]**

Q3) Explain Factorial Design of Experiment. **[10]**

Q4) Develop a model for simple distillation unit. **[10]**

Q5) Write assumption for a model of Absorber & develop a model. **[10]**

Q6) Give the simulation scheme for MFR. Explain it with a case study. **[10]**

Q7) A patient just had surgery and is required to have at least 81 units of drug D1 and 120 units of drug D2 each day. Assume that an over dosage of either drug is harmless. Each gram of substance M contains 10 units of D1 and 8 units of drug D2 and each gram of substance N contains 2 units of D1 and 4 units of D2. Now suppose that both M and N contain an undesirable drug D3, 3 units per gram in M an 1 unit per gram in N. Find how many grams of substances M and N should be taken in order to meet the requirements and minimize the intake of D3 at the same time. **[10]**

Q8) Explain classification of partial differential equations. **[10]**

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Total No. of Questions : 8]

SEAT No. :

P-742

[Total No. of Pages : 2

[6005]-629

S.Y.M.E. (Chemical Engineering)

ADVANCED THERMODYNAMICS

(2017 Pattern) (Semester - III) (509114)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Assume suitable data, if necessary.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of electronic pocket calculator is allowed.***

Q1) a) State the importance of the UCST and LCST points on a Liquid-Liquid Equilibrium (LLE) diagram in brief: **[4]**

b) The following activity coefficient relation is applicable for a binary LLE system: **[6]**

$$\frac{G^E}{RT} = A\,x_1 x_2 \qquad \ln\gamma_1 = A_2^2 = A(1-x_1)^2 \qquad \ln\gamma_2 = A\,x_1^2$$

Determine the respective activity coefficients for the system if A = 2.2 for a composition of x_1 = 0.3.

Q2) Describe the common three types of binary Liquid-Liquid Equilibrium (LLE) solubility diagrams in detail. **[10]**

Q3) A mixture of CO, H_2O and H_2 in the mole 1:1:2 is fed to a reactor which is maintained at 10 bar and 1000 K, in which the following reaction takes place: $CO + H_2O \rightarrow CO_2 + H_2$

Assuming that the gaseous components in the mixture are ideal gases and the equilibrium constant for the reaction at the given temperature is K = 1.5, calculate the degree of conversion. **[10]**

P.T.O.

Q4) Acetic acid is esterified in the liquid phase with ethanol at 100ºC and atmospheric pressure to produce ethyl acetate and water according to the reaction:

$CH_3COOH + C_2H_5OH \rightarrow CH_3COOC_2H_5 + H_2O$

If initially there is one mole each of acetic acid and ethanol, estimate the mole fraction of ethyl acetate in the reacting mixture at equilibrium.

Data given: $\Delta H^o_R = -3640$ J, $\Delta G^o_R = -4650$ J, assume ideal solution behavior of the species. **[10]**

Q5) Write short note on Canonical Ensembles proposed in Statistical Thermodynamics. **[10]**

Q6) Explain the significance of Liouville Equation in detail. **[10]**

Q7) Explain the process of density-gradient centrifugation for separation of DNA samples. **[10]**

Q8) Explain the Onsager reciprocal relations law formulated for non-equilibrium thermodynamics. **[10]**

Total No. of Questions : 8]

SEAT No. :

P3481

[Total No. of Pages : 1

[6005]-631

First Year M.E. (Environmental Engineering) (Chemical)
APPLIED STATISTICS FOR ENVIRONMENTAL ENGINEERING
(2017 Pattern) (Semester - I) (509131)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any 05 questions from each section.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) Explain residual error in regression model with suitable illustration. **[10]**

Q2) Growth of bacteria (N) in a culture after 1 hour is given below. **[10]**

t	0	1	2	3	4	5	6
N	32	47	65	92	132	190	275

Fit a curve of the form N = ab' and estimate N when t = 7 using least square method.

Q3) Explain in detail correlation and Autocorrelations with examples and its plots. **[10]**

Q4) a) What are the types of errors associated in testing hypothesis. **[5]**

b) What is the degree of confidence and confidence limits. **[5]**

Q5) a) State and explain the assumptions in analysis of variance. **[5]**

b) What is the analysis of variance in two way classification model? **[5]**

Q6) a) What is transportation model. **[5]**

b) Distinguish between statistic and porometers. **[5]**

Q7) Explain purposive sampling random sampling stratified sampling and systematic sampling. **[10]**

Q8) Explain graphical sensitivity analysis in the light of simplex method. **[10]**

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Total No. of Questions : 8]

SEAT No. :

P3482

[Total No. of Pages : 2

[6005]-632

F.Y. M.E. (Chemical) (Environmental Engg.)

ENVIRONMENTAL MANAGEMENT

(2017 Pattern) (Semester - I) (509132)

Time :3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain various environmental management tools in detail. **[5]**

b) Discuss the various advantages of Environmental Accounts and Auditing. **[5]**

Q2) a) Discuss Green funding and taxes. **[5]**

b) Explain EIA evaluation in India. **[5]**

Q3) a) What is 74^{th} amendment of the constitutions. **[5]**

b) What are the impact of Legal and constitutional sub - systems of environment on Business? **[5]**

Q4) a) Write down the difference between Regulation, Law and Notification Bills. **[5]**

b) What are the different environmental acts? **[5]**

Q5) a) Explain fundamental rights and duties of Indian citizens. **[5]**

b) Write short note on general procedure for Risk assessment. **[5]**

Q6) a) Discuss the various steps in rule notification. **[5]**

b) Give the difference between regulations and laws. **[5]**

P.T.O.

Q7) a) Explain the role of Central Pollution Control Board for sustainable growth. **[5]**

b) Write short note on Kyto protocol. **[5]**

Q8) a) Explain the role of Ministry of forest for conservation of environment. **[5]**

b) Discuss general features of annual report of Ministry of Environment for current year. **[5]**

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Total No. of Questions : 8]

SEAT No. :

P-3483

[Total No. of Pages : 1

[6005]-633

F.Y. M.E. (Chemical Environmental Engineering)

ENVIRONMENTAL CHEMISTRY

(2017 Pattern) (Semester - I) (509133)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any 5 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, and electronic pocket calculator and steam table is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) What is the role of Chemical kinetics in Environmental Engineering? Explain it in detail. **[10]**

Q2) What is COD? Explain its environmental significance and determination Technique. **[10]**

Q3) Explain the formation of photochemical smog? In which region of India it is been observed and why? **[10]**

Q4) How to do the Reclamation of oily soil? **[10]**

Q5) What are the promising areas of Environmental Sciences & Engineering? **[10]**

Q6) What is CO_2 capture mechanism? **[10]**

Q7) What are different effects of Air pollutants on materials? **[10]**

Q8) What is Anion exchange capacity? How to determine it? **[10]**

Total No. of Questions : 8] **SEAT No. :**

P-3484 **[Total No. of Pages : 1**

[6005]-634

M.E. (Chemical) (Environmental Engg.)

RESEARCH METHODOLOGY

(2017 Pattern) (Semester - I) (509134)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Attempt any 5 question.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) Draw the neat diagram and describe the Research Process flow. **[10]**

Q2) What are the general Problems Encountered by Researchers in India? **[10]**

Q3) Describe in detail about the techniques involved in defining a research problem.**[10]**

Q4) What are the features of a good design? Explain suitable case study. **[10]**

Q5) Discuss the generally accepted principles of tabulation for data analysys.**[10]**

Q6) Discuss the SIMPLE REGRESSION analysis in research. **[10]**

Q7) How to prepare the research proposal? Discuss about the funding agencies and estimation of budget and activity chart for the proposed project. **[10]**

Q8) Describe the precautions that the researcher should take while interpreting his findings. **[10]**

Total No. of Questions : 8]

SEAT No. :

P3485

[Total No. of Pages : 2

[6005]-635

First Year M.E. (Chemical) (Environmental Engineering)

WASTEWATER TREATMENT & DESIGN

(2017 Pattern) (Semester - II) (509137)

Time :3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam table allowed.***
5) ***Assume suitable data, if necessary.***

Q1) Explain mass transport processes. **[10]**

Q2) A treated wastewater with a flow rate of 1000 L/min is to be treated with PAC to reduce the concentration of residual organics measured as TOC from 5 to 1 mg/L. The Freundlich adsorption isotherm parameters were developed. Assuming the following data apply, determine the PAC requirements to treat the wastewater flow. If the PAC costs Rs. 0.50/kg, estimate the annual cost for treatment, assuming the PAC will not be regenerated. **[10]**

Compound - mixed organics.

Initial Concentration CO = 5mg/L

Final ConcentrationCg = 1 mg/L

GAC density = 450 g/L

Freundlich capacity factor, kf = 150 (mg/g) (L/mg) 1/n

Freundlich intensity parameter, 1/n = 0.5

Q3) a) Explain PSA in the process of adsorption. **[5]**

b) Explain the design of GAC contractors. **[5]**

Q4) a) Discuss general features of conventional rapid granular medium depth filters. **[5]**

b) What is backwash hydraulics. **[5]**

P.T.O.

Q5) a) How activated carbons are prepared and explain carbon regeneration and reactivation. **[5]**

b) Explain the concept of uptake capacity. **[5]**

Q6) a) Explain the applications of ion exchange for hardness and TDS removal. **[5]**

b) Discuss disinfection with ozone. **[5]**

Q7) Determine the capacity of achlorinator for a treatment plant with an average wastewater flow of 1000 m3/d. The peak daily. factor for the treatment plant is 3.0 and the maximum required chlorine dosage is to be 20 mg/L. **[10]**

Q8) a) Discuss the general design consideration for anaerobic treatment process. **[5]**

b) Explain design of clarifiers. **[5]**

Total No. of Questions : 8]

SEAT No. :

P3486

[Total No. of Pages : 1

[6005]-636
First Year M.E. (Environmental Engineering)
(Chemical Engineering)
SOLID WASTE MANAGEMENT
(2017 Pattern) (Semester - II) (509138)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) Illustrate the functional elements of the solid waste management. **[10]**

Q2) Explain the transportation of the solid waste in detail. **[10]**

Q3) Analyze the economics of solid waste generation rate. **[10]**

Q4) Explain the typical material recovery facility for a commercial solid waste. **[10]**

Q5) Explain the vermicomposting and its impact on the environment. **[10]**

Q6) Explain the energy recovery system from the biomethanation. **[10]**

Q7) Explain the various landfilling methods in detail. **[10]**

Q8) Explain the elements of functional management plan for solid waste system. **[10]**

Total No. of Questions : 8]

SEAT No. :

P-4228

[Total No. of Pages : 1

[6005]-637

M.E. (Chemical) (Environmental Engineering)

INDUSTRIAL WASTE TREATMENT

(2017 Pattern) (Semester - II) (509139)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Assume suitable data, if necessary.***
3) ***Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam table is permitted.***

Q1) Write down Classification and characterization of Industrial wastewater. **[10]**

Q2) Write short notes Trickling Filters. **[10]**

Q3) Explain Secondary treatments for industrial Wastewater. **[10]**

Q4) What are clean up and cleaner technologies? Explain with proper examples.**[10]**

Q5) Explain the treatment techniques for the removal of Inorganic chemicals from industrial wastewater with neat flow diagram. **[10]**

Q6) Draw the flow sheet for treatment of dairy waste and focus on its cost benefit analysis with all details. **[10]**

Q7) Define COD. Explain the procedure to determine COD. What are the limitations of COD test? **[10]**

Q8) Write notes on : Flow chart for Oxidation Pond. **[10]**

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Total No. of Questions : 8]

SEAT No. : ____

P743

[Total No. of Pages : 1

[6005]-638

S.Y. M.E. (Chemical) (Environmental Engineering)
REMOTE SENSING AND GIS APPLICATIONS IN ENVIRONMENTAL ENGINEERING
(2017 Pattern) (Semester-III) (509143)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain Active and Passive Remote Sensing system. **[5]**

b) Explain the advantages and limitations of remote sensing. **[5]**

Q2) Write short note on "Various satellites in orbit and their sensors" in detail. **[10]**

Q3) a) Explain the different pre-processing techniques in image processing. **[5]**

b) With a neat diagram explain the spectral reflectance curves. **[5]**

Q4) Differentiate between analog and digital system of remote sensing. **[10]**

Q5) Write short notes on. **[10]**

a) Image classification

b) Indian remote sensing satellites.

Q6) Explain in brief interpretation of radar imagery. **[10]**

Q7) Briefly explain the hardware and software components of GIS. **[10]**

Q8) Explain Watershed management by using remote sensing & GIS. **[10]**

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Total No. of Questions : 8]

SEAT No. :

P744

[Total No. of Pages : 2

[6005]-639

S.Y.M.E. (Chemical Engineering Environmental)

INDUSTRIAL POLLUTION PREVENTION & CLEANER PRODUCTION

(2017 Pattern) (Semester - III) (509144)

Time : 3Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Write note on industrial ecology for Pollution Prevention and Cleaner Production. **[5]**

b) Discuss about Environmental Policies and Regulations to encourage Pollution Prevention and Cleaner Production. **[5]**

Q2) a) Discuss the various Sustainability Strategies for pollution control and cleaner Production. **[5]**

b) Explain the cleaner technology and cleaner production concept. **[5]**

Q3) a) Discuss the historical evolution of pollution prevention and control. **[5]**

b) Explain the role of government and industry in pollution prevention and cleaner Production. **[5]**

Q4) a) Discuss the role of Process and Equipment Optimization in pollution prevention and control. **[5]**

b) Explain the applications of Internet Information pollution prevention and cleaner.

i) Production.

ii) Raw material substitution. **[5]**

P.T.O.

Q5) Explain the pollution prevention and control by following ways. **[10]**

a) Reuse
b) Recover
c) Recycle
d) Raw material substitution

Q6) Discuss the technical and Environmental Feasibility analysis of pollution prevention and cleaner production program. **[10]**

Q7) a) Explain the role of Cost Analysis for pollution prevention and control. **[5]**

b) Write a note on Environmental Audit. **[5]**

Q8) Write short notes on.

a) International Environmental Standards- ISO 14001. **[5]**
b) Elements of life cycle costing. **[5]**

Total No. of Questions : 12] **SEAT No. :**

P-3487 **[Total No. of Pages : 2**

[6005]-641

M.E. (Computer Engineering)

EMBEDDED AND REAL-TIME OPERATING SYSTEM

(2017 Pattern) (Semester - I) (510104)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Define Embedded System. Explain different characteristics of Embedded System. **[5]**

b) Explain the software tools used for embedded system development. **[3]**

OR

Q2) a) With a diagram explain classification of embedded systems. **[5]**

b) What is the use of watchdog timer in embedded system. **[3]**

Q3) a) What is SOC? Explain its components. **[5]**

b) What are the common structural units in most of the processors? **[4]**

OR

Q4) a) Brief write about the ARM processor & its features. **[4]**

b) What factors have to be considered while selecting processor for an application? **[5]**

P.T.O.

Q5) Explain types of I/O communication with example. **[9]**

OR

Q6) Explain ISA and PCI buses in detail along with applications. **[9]**

Q7) Explain EDF algorithm with example. **[8]**

OR

Q8) Explain Least Slack Time (LST) algorithm with example. **[8]**

Q9) a) List and explain how functional parameters affect scheduling. **[4]**

b) What are the advantage of disabling interrupts during the running of a critical Section. **[4]**

OR

Q10) Explain the steps in priority inheritance algorithm with example. **[8]**

Q11) With neat diagram Explain Software development process for embedded system. **[8]**

OR

Q12) Explain the embedded software development tools. **[8]**

Total No. of Questions :6]

SEAT No. :

P3488

[Total No. of Pages : 1

[6005]-642

First Year M.E. (Computer Engineering)

BIO - INSPIRED OPTIMIZATION ALGORITHMS

(2017 Pattern)(Semester - I) (510102)

Time :3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve any 5 from Q.No.1 to Q.No.6***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain Philosophy of natural computing. **[5]**

b) Explain simulated annealing algorithm. **[5]**

Q2) a) Explain Evolutionary algorithm and its evolutionary strategies. **[5]**

b) Explain Genetic Algorithm and its steps in detail. **[5]**

Q3) a) Explain Ant Colony Optimisation technique. **[5]**

b) Explain Particle Swarm Optimisation technique. **[5]**

Q4) a) Explain Artifical Neural Network in detail. **[5]**

b) Describe how distance is calculated in Firefly Algorithm. **[5]**

Q5) a) Explain the computational scope of artificial immune systems. **[5]**

b) Explain Cognitive Computing and Emotional Intelligence. **[5]**

Q6) a) Discuss the architecture of Framstick. **[5]**

b) What is Artificial life? Explain its scope. **[5]**

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Total No. of Questions : 8] **SEAT No. :**

P-3489 **[Total No. of Pages : 2**

[6005]-643

F.Y. M.E. (Computer Engineering)

SOFTWARE DEVELOPMENT AND VERSION CONTROL

(2017 Pattern) (Semester - I) (510103)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) Explain the design strategies used in software development. **[9]**

OR

Q2) Give the steps in component based software design. **[9]**

Q3) Explain different approaches of hierarchical architecture. **[9]**

OR

Q4) Explain the service oriented architecture with its advantages. **[9]**

Q5) a) Explain the architecture in a project life cycle context. **[8]**

b) Give the architecture reconstruction process. **[8]**

OR

Q6) a) Explain the source code management concepts. **[8]**

b) Give the goals, principles and importance of environment configuration control. **[8]**

P.T.O.

Q7) a) Explain the distributed version control with an example. **[8]**

b) Give the importance and functions of version control system. **[8]**

OR

Q8) a) Write short note on, **[8]**

i) CVS

ii) SVN

b) Explain branching and merging in version control tool. **[8]**

▽▽▽▽

Total No. of Questions : 6]

SEAT No. :

P3490

[Total No. of Pages : 2

[6005]-644

First Year M.E. (Computer Engineering)
RESEARCH METHODOLOGY
(2017 Pattern) (Semester - I) (510101)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat diagrams where necessary.***

Q1) a) Describe 'Research Outcomes', 'Research Objectives', 'Research Motivation' and 'Research Postulates'? State the techniques involved in defining a research problem? **[9]**

OR

b) What is the significance of the code of ethics in research? Which are the 'ethical aspects' affecting and influencing engineering research? **[9]**

Q2) a) What is Literature Survey? How to enumerate research gap, research objectives from literature survey? **[8]**

OR

b) Elaborate the significance of the following types of research publications. **[8]**

i) Journal papers
ii) Patents
iii) Wikipedia and websites
iv) Trade Magazine

Q3) a) What is the hypothesis and the Null hypothesis? Differentiate between One-dimensional Statistics and Two-dimensional Statistics? **[8]**

OR

b) State the use of the following tools. **[8]**

i) ANOVA
ii) SOFA
iii) t-test
iv) CAT (Qualitative analysis tool)

P.T.O.

Q4) a) State the importance of optimization in engineering research? With the help of an example, explain the Monte Carlo Optimization Method? **[8]**

OR

b) State the simplex optimization steps? What are constraints and cost function? State the similarity and differences in simplex and gradient methods of optimization? **[8]**

Q5) a) What are the guidelines for conducting surveys? What is role of a statistical analysis in surveys? What are guidelines for survey reporting? **[8]**

OR

b) What is significance of the research proposal? What is an outline of a research proposal? What is the criteria for evaluating the research proposal? **[8]**

Q6) a) What is research thesis? What are generic contents of the organization of thesis? Why the 'appendix' part in the thesis is important? **[9]**

OR

b) State significance of the following with context of IPR. **[9]**

i) Copyright
ii) InPASS (Indian Patent Advanced Search System)
iii) Google Patents
iv) Journal Papers

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Total No. of Questions : 9]

SEAT No. :

P3491

[Total No. of Pages : 3

[6005]-645
M.E. (Computer Engineering)
OPERATION RESEARCH
(2017 Pattern) (Semester - II) (510108)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Assume suitable data if necessary.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***

Q1) A firm produces three products. These products are processed on three different machines. The time required to manufacture one unit of each of the three products and the daily capacity of the three machines are given in the table below :

Machine	Timeper unit (Mintes)			Machine Capacity (minutes/day)
	Product 1	Product 2	Product 3	
M1	2	3	3	440
M2	4	-	3	470
M3	2	5	-	430

It is required to determine the daily number of units to be manufactured for each product. The profit per unit for product 1, 2 and 3 is Rs. 4, Rs.3 and Rs. 6 respectively. It is assumed that all the amounts produced are consumed in the market. Formulate the Linear Programming model that will maximize the daily profit. **[5]**

Q2) Draw a network dagram of the following schedule of activities. **[5]**

Activities	1-2	1-3	1-4	2-6	3-7	3-5	4-5	5-9	6-8	7-8	8-9
Duration (in days)	2	2	1	4	5	8	3	5	1	4	3

P.T.O.

Q3) Explain Critical Path method of Project Planning and Network Analysis. **[5]**

Q4) For the following project activities and duration find the critical path and maximum time completion of the project. **[10]**

Activity	A	B	C	D	E	F	G	H	I	J	K	L
Preceded by		A	A	B	B	C	C	F	D	G,H	E	I
Duration (Week)	10	9	7	6	12	6	8	8	4	11	5	7

Q5) A firm makes two products P1 & P2 and has production capacity of 18 tonnes per day. P1 & P2 required the same production capacity. The firm must supply at least 4t of P1 and 6 t of P2 per day. Each tonne of P1 & P2 requires 60 hours of machine work each. Maximum machine hours available are 720. Profit per tonne for P1 is Rs. 160 & P2 is Rs. 240.Find optimal solution by graphical method. **[5]**

Q6) Using North west corner rule (NWC), Compute the initial basic feasible solution for the Trasportation problem **[5]**

Routes	Chilling centers				Route Capacity
	P	Q	R	S	
A	16	18	21	12	150
B	17	19	14	13	160
C	32	11	15	10	90
Chilling Center Capacity	140	120	90	50	400

Q7) A plant manager has four subordinates, and four tasks to be performed. The subordinates differ in efficiency and the tasks differ in their intrinsic difficulty. This estimate of the times each man would take to perform each task is given in the effectiveness matrix below.

	I	II	III	IV
A	8	26	17	11
B	13	28	4	26
C	38	19	18	15
D	19	26	24	10

How should the tasks be allocated, one to a man, so as to minimize the total man hours? **[5]**

Q8) Describe decision making under **[5]**

a) Certainty

b) Uncertainty and Risk

Q9) Describe the **[5]**

a) Two persons - Zero Sum Game

b) MaxiMin - MiniMax Priciple

Total No. of Questions : 12]

SEAT No. : ____

P3492

[Total No. of Pages : 2

[6005]-646
First Year M.E. (Computer Engineering)
SYSTEM SIMULATION AND MODELING
(2017 Pattern) (Semester - II) (510109)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Neat diagrams must be drawn whenever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) How the simulation models are Classified. Give their characteristic. **[4]**

b) What are the different ways to study the system? Explain with a diagram. **[4]**

OR

Q2) a) Define Simulation and when the Simulation is appropriate tool? **[3]**

b) What are basic components of System? **[5]**

Q3) a) Explain general ARMA model with the help of suitable block diagram. **[4]**

b) Describe the random walk and derive its Mean. **[4]**

OR

Q4) a) Explain Superposition Principle with example. **[4]**

b) Give the properties of white noise. **[4]**

Q5) a) Explain Synchronous and asynchronous Finite State Machine. **[4]**

b) Explain Constraint Propagation. **[4]**

OR

P.T.O.

Q6) a) What is Petri Nets? Discuss on Standard Petri Net nomenclature. **[5]**

b) What are different varieties of exogenous signals? **[3]**

Q7) a) Describe M/M/1 queuing model in brief. **[4]**

b) Differentiate between event and time driven systems. **[4]**

OR

Q8) With an illustrative Example explain the simulation of queuing System. **[8]**

Q9) a) Explain statistical analysis for steady state parameters. **[4]**

b) Explain types of simulation with respect to output analysis. **[5]**

OR

Q10)a) Briefly explain measures of performance for simulation system. **[5]**

b) Why the replication/deletion approach for estimation of mean is preferred over other methods justify the answer. **[4]**

Q11)a) What are the potential benefits from using simulation in manufacturing analysis? **[5]**

b) Explain any one simulation software used for manufacturing applications. **[4]**

OR

Q12)Write short notes **[9]**

a) Point estimation and Interval estimation

b) Simulation tools.

Total No. of Questions :6]

SEAT No. :

P3493

[Total No. of Pages : 1

[6005]-647
First Year M.E. (Computer Engineering)
MACHINE LEARNING
(2017 Pattern)(Semester - II) (510110)

Time :3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer all the questions.***
2) ***Figures to the right indicate full marks.***

Q1) a) Enlist and explain types of machine learning in short. **[4]**

b) Differentiate parametric and non - parametric machine learning. **[4]**

Q2) a) Explain PAC learning in detail. **[5]**

b) Discuss VC dimension with suitable examples. **[5]**

Q3) a) Explain support vector machine in detail. **[4]**

b) Write and explain algorithm for K- NN. **[4]**

Q4) a) What is decision tree ? Explain IDS in detail. **[4]**

b) What is ensemble method? Explain any one ensemble method in short. **[4]**

Q5) a) Discuss discriminative learning with maximum likelihood in short. **[4]**

b) What is Bayesian network? Explain in detail. **[4]**

Q6) Write a short note on : **[8]**

a) Credit card fraud detection.

b) Under ground Internet economy.

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. : ____

P745

[Total No. of Pages : 2

[6005]-648

S.Y. M.E. (Computer Engineering)

FAULT TOLERANT SYSTEMS

(2017 Pattern) (Semester-III) (610101)

Time : 2½ Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Describe and explain in detail software redundancy? How the static and dynamic techniques applied in software redundancy. **[6]**

b) Establish the relationship between fault, error and failure. Justify your answer with suitable example. **[6]**

OR

Q2) a) Explain in detail abstract representation using reliability modeling. **[6]**

b) What are the measures that can be used to assess the reliability of a multi-stage interconnection network (MIN)? **[6]**

Q3) a) Explain the e-cube routing algorithm in detail? **[6]**

b) Explain what is the possible classification for adaptive routing algorithms in Hypercube & Mesh Networks. **[6]**

OR

Q4) a) Define BSN Connectivity? Explain BSN reliability in detail. **[6]**

b) Draw and explain in detail the General architecture of the HTN. **[6]**

Q5) a) Define an n-dimensional Hypercube, and explain how Hamming difference between two addreses is calculated. Draw 4-cube architecture. **[6]**

b) Explain how the number of hops between nodes can be reduced in Daisy-Chain Architectures? **[6]**

OR

P.T.O.

Q6) a) Draw a suitable diagram to describe the main components of fault simulator. **[6]**

b) Draw and explain One-Fault Tolerance Switch Architecture. **[6]**

Q7) a) Discuss in detail Check Point Techniques in mobile network. **[7]**

b) Discuss in detail Fault Tolerance in Loop Network. **[7]**

OR

Q8) a) Discuss in detail [BSN] Block Shift Network **[7]**

b) Discuss in detail Itrative-Based Heuristic Routing Algorithm. **[7]**

Total No. of Questions : 12]

SEAT No. :

P746

[Total No. of Pages : 2

[6005]- 649
S.Y.M.E. (Computer Engineering)
INFORMATION RETRIEVAL
(2017 Pattern) (Semester - III) (610102)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4,Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or .Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of Scientific Calculator is permitted.***

Q1) a) Explain information retrieval with the help of block diagram. **[5]**

b) Explain the forms of spelling correction. **[4]**

OR

Q2) Explain K-gram index. Construct k-gram indexes for query re*ve (wild card query). **[9]**

Q3) Compute variable byte code and gamma codes for the the posting list (777, 17743, 294068, 312511336) **[9]**

OR

Q4) Explain Heaps' law and Zipfs law with suitable example. **[9]**

Q5) Consider the following training example. **[8]**

Example	DocID	Query	ST	SB	Judgement
1	34	Linux	1	1	R
2	32	Penguine	0	1	R
3	35	System	0	1	R
4	36	Mining	0	0	N
5	87	Training	1	1	R
6	54	Database	0	1	R
7	7	Linux	1	0	N

Computer weighted zone score for each (query, document) example.

OR

P.T.O.

Q6) Explain the following terms. **[8]**

a) Field
b) IDF
c) Zone
d) Term-document matrix

Q7) Draw inverted index that would be built for the following document collection **[8]**

Doc l new house sales top forecasts
Doc 2 home sales rises in July
Doc 3 increase in home sales in July
Doc 4 July new home sales rise
Apply the following query

a) Home and sales
b) (July or sales) and (new or homes)

OR

Q8) Explain Vector Space Model for XML information retrieval. **[8]**

Q9) Suppose we have collection that consists of the four documents given in the below. **[8]**

Doc Id	Document Text
1	Click go the shears boys click click click
2	Click click
3	Metal here
4	Metal shears click here

Build a query likelihood language model (unigram model) for this document collection for the query 'click shears' and rank the documents.

OR

Q10)Explain the types of languages models with suitable example. **[8]**

Q11)What is Naive Bayes algorithm, When we can use this algorithm in text analysis? **[8]**

OR

Q12)a) What is mean by Content based Information Retrieval? What are its advantages? **[4]**

b) What is mean by Latent Semantic Indexing? Explain with example. **[4]**

Total No. of Questions : 12]

SEAT No. :

P-3494

[Total No. of Pages : 2

[6005]-651

M.E. (Computer Networks)

RESEARCH METHODOLOGY

(2017 Pattern) (Semester - I) (510201)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12***
2) ***Assume suitable data wherever necessary.***
3) ***Figure to right indicates will get full marks.***

Q1) Distinguish between Research methods and Research methodology? Explain Research Questions and Engineering Ethics? **[10]**

OR

Q2) Explain types of research and work flow? **[10]**

Q3) Explain plagiarism, h-index, Impact Factor, I-index in research publication.**[8]**

OR

Q4) What are types of publications? Explain measures of research impact and literature review? **[8]**

Q5) Explain the Null hypothesis testing in detail? **[8]**

OR

Q6) Write short notes on GNU PSPP and SOFA tool? **[8]**

P.T.O.

Q7) Explain multi-parameter optimization technique with suitable example? **[8]**

OR

Q8) Explain merits and demerits of Monte Carlo optimization technique? **[8]**

Q9) Why undertake a survey? Explain general survey guidelines? **[8]**

OR

Q10)Write short notes on Qualitative Analysis Tools- AQUAD, CAT? **[8]**

Q11)Explain with suitable example IEEE/ACM Paper templates? **[8]**

OR

Q12)Explain steps involved in research presentation? **[8]**

x x x

Total No. of Questions : 7] **SEAT No. :**

P-3495 **[Total No. of Pages : 1**

[6005]-652

M.E. (Computer Engineering)

COMPUTER NETWORKS

Network Security

(2017 Pattern) (510202) (Semester - I)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Q.No. 7 is compulsory, solve any five from Q.No. 1 to Q.No. 6.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) What is data security and network security? What are ten steps to data and network security? **[8]**

Q2) How to detect & Prevent Black Hole Attack in Mobile Ad Hoc Networks?**[8]**

Q3) Which command is used to scan single IP, scan host IP, scan a range of IP's scan a subset in network sniffing? **[8]**

Q4) How network sniffing can be used for monitoring wireless Networks? What are its advantages & disadvantages. **[8]**

Q5) What is Intrusion Detection Systems? What is Host-based IDS? Give an example. **[8]**

Q6) What is man-in-the-middle (MITM) attack? Which are the different related types of attacks, explain in detail. **[8]**

Q7) What is Web application vulnerability? Web application vulnerabilities are some of the most common & laws leading to modern data breaches - Discuss. State and explain any one web application vulnerability in Detail. **[10]**

Total No. of Questions : 8]

SEAT No. :

P-3496

[Total No. of Pages : 2

[6005]-653

M.E. (Computer Networks)

WIRELESS SENSOR NETWORKS

(2017 Pattern) (Semester - I) (510203)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) Describe Distribution versus gathering of data - In-network processing. **[6]**

b) Draw the Architecture of a wireless sensor node and explain sensing subsystem in detail. **[6]**

OR

Q2) a) Explain repeated interaction using Directed diffusion - Two-phase pull. **[6]**

b) With suitable diagram explain the IMote Node Architecture. **[6]**

Q3) a) Describe Contention-Free MAC Protocol : Traffic-Adaptive Medium Access. **[6]**

b) Explain Single-hop localization: **[6]**

i) Active Badge

ii) Active office

OR

Q4) a) Describe Contention-Based MAC Protocol Power Aware Multi-Access with Signaling. **[6]**

b) Explain Multihop range estimation using Euclidean distance estimation in the absence of direct connectivity example, also comment on “DV-Hop” and “DV-Distance” methods. **[6]**

P.T.O.

Q5) a) Explain the Coverage of random deployments: Boolean sensing model. **[7]**

b) Explain Single packet delivery using a single path, is it efficient to use only end-to-end acknowledgements? **[6]**

OR

Q6) a) Describe the Reliability requirements in sensor networks. **[6]**

b) Explain Mechanisms for congestion detection and congestion handling in WSN. **[7]**

Q7) a) Explain Fundamentals of Network Security. **[6]**

b) Discuss various Challenges of providing Security in Wireless Sensor Networks. **[7]**

OR

Q8) Write Short Notes on (Any Two) : **[13]**

a) Symmetric and Public Key Cryptography

b) IEEE 802.15.4 and ZigBee Security

c) Defenses Against DoS Attack

▽▽▽▽

Total No. of Questions : 12]

SEAT No. : ____

P3497

[Total No. of Pages : 2

[6005]-656
F.Y.M.E. (Computer Networks)
NETWORK DESIGN AND ANALYSIS
(2017 Pattern) (Semester - II) (510209)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4. Q.5 or Q.6. Q.7 or Q.8. Q.9 or Q.10. Q.11 or Q.12.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat diagram wherever necessary.***
4) ***Use of scientific calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) How you can measure the performance of the network? Give Performance Metrics. **[8]**

OR

Q2) Explain general principles of network design with example? **[8]**

Q3) State and Explain different IP routing Methods. **[8]**

OR

Q4) Give details about the Physical addressing and Switching concepts. **[8]**

Q5) State and Explain different Delay Models in Data Networks. **[9]**

OR

Q6) Derive following performance parameters for M/M/1/N queue. **[9]**

a) Average number of packets in the system (LS)

b) Average waiting time (wq)

P.T.O.

Q7) Write short note fundamental graph algorithms. **[8]**

OR

Q8) State and Explain different types of link prediction algorithms with suitable example. **[8]**

Q9) Explain resource reservation and traffic engineering in networking. **[9]**

OR

Q10) Give different applications of Methods of ensuring quality of service and QoS. **[9]**

Q11) Enlist different types of network Testing and Explain about testing tool - wire shark. **[8]**

OR

Q12) State and Explain about different types cards and device networks with their applications. **[8]**

Total No. of Questions : 12] **SEAT No. :**

P3498 **[Total No. of Pages : 2**

[6005]-657
F.Y. M.E. (Computer Networks)
DATA ALGORITHMS
(2017 Pattern) (Semester -II)(510210)

Time :3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer the question of 1 or 2, 3 or 4, 5 or 6, 7 or 8, 9 or 10, 11 or 12***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) Explain Secondary sort in Hadoop and how it works? **[8]**

OR

Q2) What is POJO moving average? Write solution using queue. **[8]**

Q3) What is left outer join operations in database? What is significance of left outer join in real world situation? Give suitable SQL for the same? With the help of SQL explain what is mean by Left in left outer join. **[8]**

OR

Q4) Left OuterJoin(T_1, T_2, K) = {(k, t_1, t_2) where k$\in$ T_1. K and k$\in$ T_2.K}
$\cup$ {(k, t_1, null) where k $\in$ T_1.K and k$\notin$ T_2.K}
Above is the given a mathematical definition in term of set theory for left outer join.
What K, T1 and T2 signifies, take suitable example and explain. **[8]**

Q5) What is moving average? And how do we calculate it? Give the suitable example. **[9]**

OR

Q6) "One can sort the input data and then easily select the K largest records from the sorted file. This is often the most efficient method for very large K." to implement this sort give the construct of Map and Reduce functions. **[9]**

Q7) What is market basket analysis? What are the association rules? What is the role of association rules in market basket analysis? In the following example calculate support, confidence and lift **[8]**

P.T.O.

* Assume there are 100 customers
* 10 of them bought milk, 8 bought butter and 6 bought both of them

OR

Q8) What is the purpose of market basket analysis? Give suitable example of application and explain market basket analysis using spark **[8]**

Q9) Explain in brief five method template for implementing scatter search. **[9]**

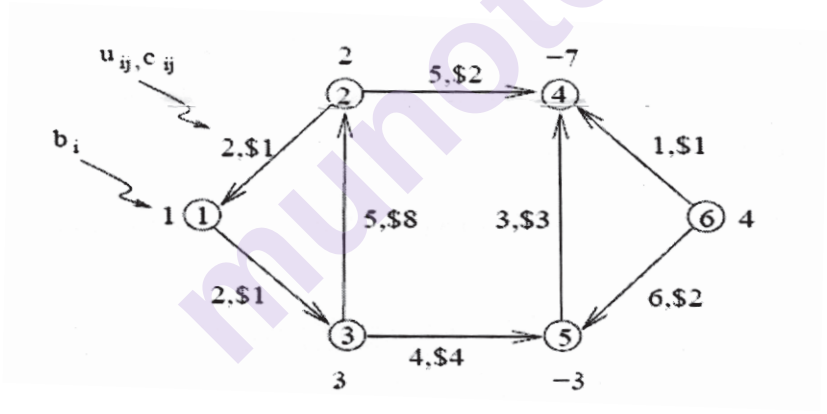
OR

Q10)What is the scatter search algorithm? What are its characteristics? And Give the algorithmic procedure. **[9]**

Q11) Explain Bellman's equation and acyclic graph? What is significance of bellman's equation in shortest path finding? **[8]**

OR

Q12) Apply The Min Cost Flow Linear Program using network simplex method for the following graph to find the network linear program. **[8]**



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Total No. of Questions : 12]

SEAT No. : ____

P747

[Total No. of Pages : 2

[6005]-658

S.Y. M.E. (Computer Networks)

FAULT - TOLERANT SYSTEMS

(2017 Pattern) (Semester-III) (610201)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer six questions.***
2) ***Neat diagrm must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***

Q1) Explain Hardware Redundancy in detail with example? **[9]**

OR

Q2) Explain various Empirical Models in detail with examples? **[9]**

Q3) Explain in detail Serial Fault Simulation Algorithm? **[9]**

OR

Q4) Explain in detail about Sequential Fault Diagnosis Methods? **[9]**

Q5) Explain Routing in Faulty Mesh Networks with diagrams? **[8]**

OR

Q6) Explain in detail Node Labeling Technique? **[8]**

Q7) Differentiate HINs versus HCNs? **[8]**

OR

Q8) Explain detail about degree and diameters in Hierarchical cubic networks? **[8]**

P.T.O.

Q9) Explain in detail Classification of Fault-Tolerant Switching Architectures? **[8]**

OR

Q10) What is token ring network and bypass switch network? Explain how reliability calculates in both networks? **[8]**

Q11) Explain Message Logging Based Checkpoints in detail? **[8]**

OR

Q12) Explain the Minimal Snapshot Collection Algorithm with diagram. **[8]**

❖ ❖ ❖

Total No. of Questions : 8]

SEAT No. :

P748

[Total No. of Pages : 2

[6005]-659
S.Y.M.E. (Computer Networks)
MOBILE AD HOC NETWORKS
(2017 Pattern) (Semester - III) (610202)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain various applications of ADHOC wireless networks. **[6]**

b) Compare table driven and on-demand routing protocols in ADHOC wireless networks. **[6]**

OR

Q2) a) Differentiate Mobile IP with traditional internet IP protocol. What do you mean by Tunnelling in Mobile IP? **[6]**

b) Explain contention based MAC protocols with collision avoidance time allocation protocol. **[6]**

Q3) a) Explain the operation of source-initiated and receiver-initiated multicast routing protocols in ADHOC wireless networks. **[6]**

b) Discuss distributed point coordination function and point coordination function in IEEE802.11e protocol. **[6]**

OR

Q4) a) Explain various transport layer and application layer attacks in ADHOC wireless networks. **[6]**

b) Explain predictive location-based QoS routing protocol. **[6]**

Q5) a) What are the issues and challenges in designing a wireless sensor network? **[7]**

b) Explain Low Energy Adaptive Clustering Hierarchy (LEACH) network architecture. **[6]**

OR

P.T.O.

Q6) a) Explain the MCN Architecture for Next-Generation Hybrid wireless networks. **[6]**

b) Explain Power-Efficient data gathering method for sensor information systems. **[7]**

Q7) a) What are the important features that make the UWB systems applicable for high-speed mobile communications? **[6]**

b) Give two advantages and disadvantages in using laser diodes as light sources for optical wireless networks. **[7]**

OR

Q8) Wirte Short Notes on (Any Two) **[13]**

a) Comparison of UWB with other Technologies.
b) Software Radio-Based Multimode Systems.
c) Meghadoot Architecture.

Total No. of Questions : 12] **SEAT No. :**

P-3499 **[Total No. of Pages : 4**

[6005]-661

M.E. (Computer Engineering & Artificial Intelligence & Data Science)

MATHEMATICAL FOUNDATION FOR DATA SCIENCE

(2020 Pattern) (Semester - I) (510301)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

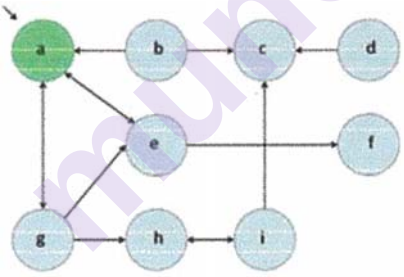
1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Determine which of the following sets are countable or uncountable and justify. **[3]**

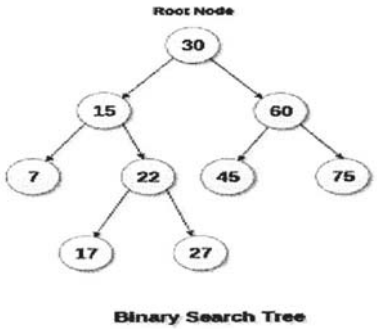
$A = \{x \in Q | -100 \leq x \leq 100\}$

$B = (0,0.1]$

b) Represent given graph using adjacency matrix. **[3]**



c) Write Inorder traversal of given Binary Search Tree. **[3]**



Binary Search Tree

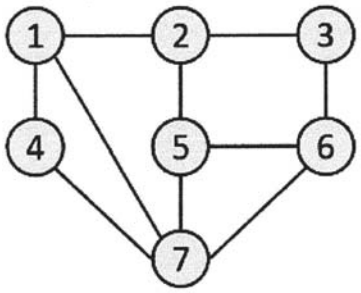
OR

P.T.O.

Q2) a) The following numbers are inserted into an empty binary search tree in the given order : 10, 1, 3, 5, 15, 12, 16, 4, 14. Construct tree step by step. **[3]**

b) In a group of 60 people, 27 like cold drinks and 42 like hot drinks and each person likes at least one of the two drinks. How many like both coffee and tea? **[3]**

c) Write Breadth First Search Traversal of given graph considering 2 as starting vertex. **[3]**



Q3) a) For given attribute marks values: **[4]**

10, 90, 30, 20, 50, 30, 60, 40, 70, 40, 30, 60, 80, 20.

Compute mean, median, mode. Also compute five number summary.

b) There are 35 students in art class and 57 students in dance class. Find the number of students who are either in art class or in dance class. When two classes meet at different hours and 12 students are enrolled in both activities. **[4]**

OR

Q4) a) Explain any two Central tendency and dispersion measures of numerical data with example. **[4]**

b) A machinist produces 22 items during a shift. Three of the 22 items are defective and the rest are not defective. In how many different orders can the 22 items be arranged if all the defective items are considered identical and all the non-defective items are identical of a different class? **[4]**

Q5) a) For given attribute marks values: **[5]**

50, 40, 30, 30, 40, 50, 50, 30, 40, 50, 60, 60, 50, 50

Compute standard deviation, Range, Inter Quartile Range (IQR), five number summary plot it using boxplot.

b) Explain concept and application of Skewness & Kurtosis. **[4]**

OR

Q6) a) What is correlation coefficient of age and glucose values given below **[4]**

(Age-1.5, 2, 1.6, 1.2, 1.1)

(Glucose -1.7, 1.9, 1.8, 1.5, 1)

b) Explain correlation analysis of Nominal attribute using Chi-square. **[5]**

Q7) a) Find covariance for following data set x = {2, 5, 6, 8, 9}, y {4, 3, 7, 5, 6} **[3]**

b) Consider following dataset, predict the class label using naive Bayesian classification for tuple (Yes, No, Male, Yes, B). **[5]**

Owns home	Married	Gender	Employed	Credit rating	Risk class
Yes	Yes	Male	Yes	A	B
No	No	Female	Yes	A	A
Yes	Yes	Female	Yes	B	C
Yes	No	Male	No	B	B
No	Yes	Female	Yes	B	C
No	No	Female	Yes	B	A
No	No	Male	No	B	B
Yes	No	Female	Yes	A	A
No	Yes	Female	Yes	A	C
Yes	Yes	Female	Yes	A	C

OR

Q8) a) Use these methods to normalize the following group of data : **[4]**

200, 300,400, 600, 1000

i) z-score normalization

ii) z-score normalization using the mean absolute deviation instead of standard deviation

b) Explain any one Probabilistic models with hidden variables using example.**[4]**

Q9) a) Solve the following system of equations using LU Decomposition method:

$X_1 + X_2 + X_3 = l$, $4X_1 + 3X_2 - X_3 = 6$, $3X_1 + 5X_2 + 3X_3 = 4$ **[4]**

b) List the applications of chain rule and discuss any one in detail. **[4]**

OR

Q10)a) Find the eigenvalues and associated eigenvectors of the matrix. **[4]**

$$\begin{bmatrix} -1 & 2 \\ 0 & -1 \end{bmatrix}$$

b) Explain one application of Jacobian Matrix. **[4]**

Q11)a) Discuss advantages and disadvantages of Multivariate Regression. **[4]**

b) Find linear regression equation for the following two sets of data : **[4]**

x	2	4	6	8
y	3	7	5	10

OR

Q12)Suppose we have the following dataset with one response variable y and two predictor variables Xl and X2. Fit a multiple linear regression model to this dataset. **[8]**

X_1	60	62	67	70	71	72	75	78
X_2	22	25	24	20	15	14	14	11
Y	140	155	159	179	192	200	212	215

Total No. of Questions : 12]

SEAT No. :

P-3500

[Total No. of Pages : 2

[6005]-662

F.Y. M.E. (Computer/A.I & D.S)

BASICS OF DATA SCIENCE

(2017 Pattern) (Semester - I) (510302)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates :

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data, if necessary.***

Q1) a) What is Data Science? Elaborate importance of data science. **[5]**

b) Explain : **[4]**

i) Structured vs. Unstructured Data

ii) Quantitative vs. Categorical Data

OR

Q2) a) Explain in detail the Data science process. **[5]**

b) Explain the Role of Data Scientist in Machine Learning. **[4]**

Q3) How does Exploratory Data Analysis help in analyzing the data? **[8]**

OR

Q4) What is Pearson's Correlation? Find the Pearson's correlation coefficient for the following data : **[8]**

No.	X	Y
1	43	99
2	21	65
3	25	79
4	42	75
5	57	87
6	59	81

P.T.O.

Q5) a) What is Linear Regression? Find a linear regression equation for the following sets of data : **[5]**

x	2	4	6	8
y	6	14	10	20

b) Explain K-nearest Neighbors(k-NN) algorithm with an example. **[4]**

OR

Q6) a) Explain K-means clustering algorithm with an example. **[5]**

b) Differentiate between Naive Bayes and k-NN algorithm. **[4]**

Q7) a) Explain types of data visualization. **[4]**

b) What is data visualization and why it is important? **[4]**

OR

Q8) a) Explain various methods of encoding. **[4]**

b) Explain following bivariate data visualization techniques. **[4]**

i) Line plot

ii) Bar plot

Q9) What is Collaborative Filtering? Explain how to compute the missing value of the utility matrix. **[8]**

OR

Q10) What is a Content-based Recommendation System? Explain the advantages and disadvantages of content-based recommendation system. **[8]**

Q11) Explain Social Network Graph. Also explain the varieties of Social Networks. **[8]**

OR

Q12) What are various methods to achieve the Clustering of Social-Network Graphs? **[8]**

Total No. of Questions : 12]

SEAT No. :

P3501

[Total No. of Pages : 2

[6005]-663

F.Y. M.E. (Computer Engineering) (Master of Data Science)

BIG DATA ANALYTICS

(2017 Pattern) (Semester -I) (510303)

Time :3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer question Q1or Q2, Q3 or Q4, Q5or Q6, Q7 orQ8, Q9 or Q10, Q11 or Q12***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use of scientific calculator is permitted.***

Q1) What is Data analysis process? what are different types of Data Analytics? Explain the Importance of Data Analytics in Research? **[9]**

OR

Q2) What are different Tools used for Big data Analytics? What are the Business Drivers for Big Data Analytics? **[9]**

Q3) What are different Technologies used for Handling Big data? Differentiate between Distributed and Parallel Computing. **[8]**

OR

Q4) Explain in brief the hadoop components HDFC and YARN. **[8]**

Q5) What is Hadoop ecosystem ? Explain the role of each component in Hadoop ecosystem. **[8]**

OR

Q6) Explain Features of Apache Pig for Big Data Analysis? Differentiate between Pig and Map Reduce. **[8]**

Q7) What is Apache Spark?Explain any 2 Apache Spark Machine Learning Algorithms detail. **[8]**

OR

Q8) What is Apache Spark RDD?What are the limitations of RDD in Apache Spark and how to overcome those limitations? **[8]**

Q9) What is PySpark? What are industrial benefits of PySpark? **[9]**

OR

P.T.O.

Q10) What is Scala?What are important features of Scala?Explain in brief benefits of using Scala. **[9]**

Q11) What are important features of Data Visualization? Explain the Tools used in data visualization with appropriate examples. **[8]**

OR

Q12) Explain the benefits of good data visualization? What are the different Data Visualization Techniques used in data science? **[8]**

♦ ♦ ♦

Total No. of Questions : 6]

SEAT No. :

P-3927

[Total No. of Pages : 2

[6005]-664

M.E. (Computer /Artificial Intelligence and Data Science)

RESEARCH METHODOLOGY

(2017 Pattern) (Semester - I) (510101)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat diagrams where necessary.***

Q1) a) Describe research process steps in detail? What are the techniques involved in defining a research problem and research objectives? **[9]**

OR

b) What is the code of ethics in engineering research? State the IEEE and ACM Code of ethics in engineering research? **[9]**

Q2) a) What is Literature Survey? How to enumerate research gap, research objectives from literature survey? **[8]**

OR

b) What is the significance of following in research methodology **[8]**

i) Journal papers as a type of research publication
ii) Bibliometrics in literature survey
iii) Impact Factor
iv) Paraphrasing

Q3) a) What is the hypothesis and the Null hypothesis? How statistical analysis helps in testing of hypothesis? **[8]**

OR

b) State the use of the following tools **[8]**

i) NOST-Dataplot
ii) t-test
iii) ANOVA
iv) CAT

P.T.O.

Q4) a) State the importance of optimization in engineering research? With the help of an example, explain what gradient optimization is? **[8]**

OR

b) State the simplex optimization steps? What are constraints and cost function? State the similarity and differences in simplex and gradient methods of optimization? **[8]**

Q5) a) What are the guidelines for conducting surveys? How are respondents identified? What are human factors associated with surveys conducted for research? **[8]**

OR

b) What do you understand by the research proposal? What is an outline of a research proposal? What is the criteria for evaluating the research proposal? **[8]**

Q6) a) What are the contents of Theis in general? What is significance of References in Thesis? What are characteristics of a good thesis and What are cautions in Thesis writing? **[9]**

OR

b) State significance of the following with context of IPR **[9]**

i) Copyright

ii) InPASS (Indian Patent Advanced Search System)

iii) Google Patents

iv) Journal Papers

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P3502

[Total No. of Pages : 2

[6005]-665

F.Y. M.E. (Computer Engineering) (Artificial Intelligence and Data Science) (Data Science)

DATA WAREHOUSING AND MINING

(2017 Pattern) (Semester - II) (510308)

Time :3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use of Scientific Calculator is permitted.***

Q1) Why is it important to store multiple types of data in the data warehouse? Give examples of unstructured data likely to be found in the data warehouse of a health management organization (HMO). **[9]**

OR

Q2) Describe in brief Web - enabled data warehouse? Explain the various functional features of the same in detail. **[9]**

Q3) Explain the Data Acquisition Technical architecture of the data warehouse in detail with suitable diagram. **[9]**

OR

Q4) List the three major areas in the data warehouse? Describe the architectural components anyone of the three major areas with suitable diagram. **[9]**

Q5) List and explain in brief four metadata types used in each of the three major areas of the Data Warehouse. **[8]**

OR

Q6) Suppose that a data warehouse for Big University consists of the four dimensions student, course, semester, and instructor, and two measures count and avg grade. At the lowest conceptual level (e.g., for a given student, course, semester, and instructor combination), the avg grade measure stores the actual course grade of the student. At higher conceptual levels, avg grade stores the average grade for the given combination. Design a Snowflake schema diagram for the above Data Warehouse. **[8]**

P.T.O.

Q7) Explain the information Delivery framework in detail. Also Explain the role of all users in the framework **[8]**

OR

Q8) Explain a data warehouse bus architecture? How does it fit in a Web - enabled data warehouse? **[8]**

Q9) What are multidimensional databases? List OLAP operations and explain the Rollup and Drill down with example. **[8]**

OR

Q10) A database has 5 transactions. Let min sup = 60% and min conf = 80%. Find all frequent itemsets using Apriori Algorithm. **[8]**

TID	Items bought
T100	{M, O, N, K, E, Y}
T200	{D, O, N, K, E, Y}
T300	{M, A, K, E}
T400	{M, U, C, K, Y}
T500	{C, O, O, K, I, E}

Q11) What are the considerations for deploying the data warehouse in stages? Under what circumstances is staged deployment recommended? Describe in detail. **[8]**

OR

Q12) Explain the data warehousing monitoring activity and its usefulness with suitable diagram. **[8]**

♦ ♦ ♦

Total No. of Questions : 12]

SEAT No. :

P3503

[Total No. of Pages : 2

[6005]-666

F.Y.M.E. (Computer Engineering/Artificial Intelligence and Data Science)

MACHINE LEARNING

(2017 Pattern) (Semester - II) (510309)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4. Q.5 or Q.6. Q.7 or Q.8. Q.9 or Q.10. Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figure to the righ indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Define and explain parametric machine learning algorithms. Give two examples of it. **[5]**

b) Differentiate between supervised and unsupervised machine learning.**[4]**

OR

Q2) a) Define Multi-class classification. Explain following methods of multi-class classification in detail with example. **[5]**

i) One vs One

ii) One vs All

b) What is reinforcement learning? Explain it with example. **[4]**

Q3) What is Linear discriminant analysis? What is the main goal of Linear discriminant analysis. Explain how Linear discriminant analysis works step by step. **[8]**

OR

Q4) What is dimensionality reduction? Describe how principal component analysis is used for dimensionality reduction in detail with example. **[8]**

P.T.O.

Q5) a) Define and explain Multivariate Linear regression with example. **[5]**

b) Explain how Support Vector Machine works. **[4]**

OR

Q6) What is Artificial Neural Network? Discuss different activation function of ANN. **[9]**

Q7) Using k-means algorithm, cluster following data into two clusters. Show each step of clustering. {2, 4, 10, 12, 3, 20, 30, 11, 25} **[8]**

OR

Q8) Write and explain association rule mining algorithm with example. **[8]**

Q9) What is Hidden Markov model? Explain with an example. **[8]**

OR

Q10) Explain Expectation Maximization method. **[8]**

Q11) Write short note on: **[8]**

i) Fraud Detection

ii) Detection of malicious websites in adversarial classification

OR

Q12) Write short note on: **[8]**

i) Diagnosis of human disease

ii) Profiling the online storefronts of counterfeit merchandise

Total No. of Questions : 12]

SEAT No. :

P-3504

[Total No. of Pages : 2

[6005]-667

M.E. (Computer Engineering) (Data Science)

SOFT COMPUTING

(2017 Pattern) (Semester - II) (510310)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain the types of hybrid systems. **[5]**

b) Compare hard computing and soft computing methods. **[4]**

OR

Q2) a) Explain the operations on fuzzy sets. **[5]**

b) What are the operations on Fuzzy relations? **[4]**

Q3) a) How is membership value assignment carried out? Explain any four methods. **[5]**

b) Explain the Fuzzy control system. **[4]**

OR

Q4) a) Explain the Fuzzy inference system. **[5]**

b) What are the different methods of defuzzification process? **[4]**

Q5) Explain the traditional optimization and search techniques. **[8]**

OR

Q6) What are different mutation methods in genetic algorithm. **[8]**

P.T.O.

Q7) Explain the perception training network with flow chart. **[8]**

OR

Q8) Explain different activation functions. **[8]**

Q9) Explain discrete Hopfield network. **[8]**

OR

Q10) Explain the architecture of heteroassociative memory network. **[8]**

Q11) Explain the characteristics of genetic neuro hybrid systems. **[8]**

OR

Q12) Explain the neuro fuzzy hybrid system. **[8]**

Total No. of Questions : 12]

SEAT No. : ____

P749

[Total No. of Pages : 2

[6005]-668

S.Y. M.E. (Computer) (Data Science)

DEEP LEARNING

(2017 Pattern) (Semester-III) (610301)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer Q.1 or 2, Q.3 or 4, Q.5 or 6, Q.7 or 8, Q.9 or 10, Q.11 or 12,***
2) ***Neat diagrm must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary and clearly state.***
5) ***Use of cell phone is prohibite in the examination hall.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) What is backpropagation? Explain the algorithm in detail. State the advantages and disadvantages. **[9]**

OR

Q2) Differentiate between shallow and deep neural networks. **[9]**

Q3) What is principal Component Analysis (PCA)? Elaborate the steps in PCA. Enlist the applications of PCA. **[9]**

OR

Q4) What is gradient decent. Explain following three variants of gradient descent : Batch, stochastic and Mini batch. **[9]**

Q5) What is Bias Variance trade-off? Explain with suitable examples. **[8]**

OR

Q6) What is the need Ensemble methods? Discuss in brief about Ensemble Methods. **[8]**

Q7) What are the Pooling Types in CNN? What are their characteristics? Elaborate the significance of ReLU. **[8]**

OR

Q8) How to apply guided backpropagation to enhance the interpretability of CNN. Justify with suitable example. **[8]**

P.T.O.

Q9) When should we switch from other generative models to GANs? What is GAN? Discuss in brief. **[8]**

OR

Q10) How to apply autoencoders for dimensionality reduction? Discuss the types of Autoencoders. **[8]**

Q11) In what situations would you prefer to use LSTMs over simple Neural Nets? Explain the architecture of an LSTM network. **[8]**

OR

Q12) How does the attention mechanism solve the encoder-decoder bottleneck problem? Elaborate on the working of attention mechanism for images. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P-750

[Total No. of Pages : 2

[6005]-669

S.Y. M.E. (Comp. Engg./Data Science)

DATA MODELING AND VISUALIZATION

(2017 Pattern) (Semester - III) (610302)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) What are the different stages in data visualization? Explain with a diagram. **[8]**

OR

Q2) How Fitt's law is helpful in visualization? Justify your answer with example. **[8]**

Q3) What are the different types of data visualization, explain with examples. **[8]**

OR

Q4) How streamlines are useful in flow visualization? Give examples. **[8]**

Q5) Which maps can be used in visualizing the hierarchy? Explain. **[8]**

OR

Q6) Write short notes on : **[8]**

a) Node link diagram.

b) Shaded Maps.

P.T.O.

Q7) Explain the method of subspace clustering in high dimensional data. **[9]**

OR

Q8) Explain PROCLUS, a top-down subspace approach. **[9]**

Q9) a) Explain the textual segmentation. **[4]**

b) Explain the Gestalt laws of symmetry for pattern comparison with example. **[5]**

OR

Q10) How textures are used for univariate and multivariate map displays explain. **[9]**

Q11) Explain the various components of Tableau Desktop/Public Dashboard. **[8]**

OR

Q12) How tableau can be used for data Analytics? **[8]**

Total No. of Questions : 8] **SEAT No. :**

P3505 **[Total No. of Pages : 2**

[6005]-673

F.Y. M.E. (Computer Engg.) (Artificial Intelligence and Data Science)

ARTIFICIAL INTELLIGENCE

(2017 Pattern) (Semester - I) (510501)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side, indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) Explain learning agent architecture and describe their components. **[9]**

OR

Q2) What is Reinforcement Learning ? Differentiate Passive and active reinforcement learning. **[9]**

Q3) What are the limitations of Minmax search algorithm? Explain the method for overcoming the limitations of Min max search procedure **[9]**

OR

Q4) Explain various forms of Learning. **[9]**

Q5) a) Explain Goal Stack Planning with an example of block world problem. **[8]**

b) Differentiate between the propositional logic and FOL. Write the rules to convert the first order logic to ConjunctiveNormal Form **[8]**

OR

Q6) a) Write short note on **[8]**

i) AI Applications in Healthcare

ii) AI Applications in banking and finance

b) Explain Sentiment Analysis with its application. State and explain the different steps involved in Sentiment Analysis **[8]**

P.T.O.

Q7) a) Write an architecture and function of model based reflex agent. **[8]**

b) Define rational agent. Explain a generic agent diagram. Describe four things on which Rationality depends. **[8]**

OR

Q8) a) Define search Problem. Solve 8 queen problems as a State space search problem. **[8]**

b) Explain iterative deepening depth first search algorithm and its function. **[8]**

♦ ♦ ♦

Total No. of Questions : 12]

SEAT No. :

P-4229

[Total No. of Pages : 2

[6005]-677

M.E. (Artificial Intelligence and Data Science)

VIRTUAL REALITY AUGMENTED REALITY

(2017 Pattern) (Semester - II) (510504)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8, Q9 or Q10, Q11 or Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) Explain difference between geometry of virtual world and Illumination. **[9]**

OR

Q2) How axis angle representation work? Explain with example. **[9]**

Q3) What is visual perception? How it's represented. **[9]**

OR

Q4) How combine source of information? With suitable example. **[9]**

Q5) Explain how simultaneous localization and mapping done. **[9]**

OR

Q6) How multiple camera infrared tracking work? Explain in details. **[9]**

Q7) Compare the marker based and markerless tracking. **[9]**

OR

Q8) How hybrid tracking works? Explain in details. **[9]**

P.T.O.

Q9) Why unity UI is important? With suitable example. **[9]**

OR

Q10)What technical skill that are important to virtual reality. **[9]**

Q11)Describe augmented reality application with ARCore. **[5]**

OR

Q12)Explain features of ARCore integration with unity. **[5]**

Total No. of Questions : 8]

SEAT No. : ____

P751

[Total No. of Pages : 2

[6005]-678

S.Y. M.E. (Artificial Intelligence and Data Science)
SOFT COMPUTING AND DEEP LEARNING
(2020 Pattern) (Semester-III) (610501)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Draw the diagram and explain Sequential and Embedded hybrid System with its necessity. **[4]**

b) Compare Soft computing approach with hard computing approach. **[4]**

c) Discuss one applications of G.A. and Neural Network. **[2]**

Q2) a) Draw block diagram for Fuzzy Inference system and explain working of each Block. **[4]**

b) Explain working of Simple Genetic algorithms. **[4]**

c) What is fuzzification? Why it is required? **[2]**

Q3) a) What are applications Shallow Neural Network? Explain its working with diagram. **[4]**

b) Explain Neural network architectures: feedforward Neural Networks. **[4]**

c) What is perceptron? Explain its working. **[2]**

Q4) a) Discuss the vanishing gradient problem and ways to mitigate the same. **[4]**

b) Design a system for weather forecasting applying Neural Network **[4]**

c) Explain in short heuristics for faster training in deep learning **[2]**

P.T.O.

Q5) a) Design a system applying CNN for identifying Cat Vs. Dog. **[4]**

b) What are features of GoogleNet, Discuss in detail. **[4]**

c) Explain pooling in CNN. **[2]**

Q6) a) Design hybrid system for customer segmentation applying any suitable sequential model. **[4]**

b) What is need of LSTM? Draw and explain working of LSTM. **[4]**

c) Explain working principal of RNN. **[2]**

Q7) a) Design a system for disease detection, applying Backpropogation algorithm. **[5]**

b) Explain various crossover techniques used in GA with diagrams. **[5]**

Q8) a) Explain how you will apply Fuzzy inference system for Air Conditioner. **[5]**

b) Design a solution to solve Travelling salesman Problem using Genetic Algorithm. Explain with example how you will implement this using suitable encoding, Crossover, and Mutation techniques along with selection of Objective function. **[5]**

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Total No. of Questions : 12]

SEAT No. :

P-752

[Total No. of Pages : 2

[6005]-679

M.E. (Artificial Intelligence and Data Science)

SCALABLE DATA SCIENCE

(2017 Pattern) (Semester - III) (610502)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) Explain Approximate near neighbors search with kd-trees. LSH Families and MinHash for Jaccard. **[9]**

OR

Q2) Write a short note on : **[9]**

a) Count-Min Sketch.

b) Hash functions.

c) Misra-Gries sketch.

Q3) Explains Data Frames? Creating Data Frames from- RDDs, JSON and databases using JDBC? **[9]**

OR

Q4) Explain Parallel data processing and different strategies used for Apache Spark? **[9]**

P.T.O.

Q5) Describe in detail Apache Spark RDD and How parallelism in applying basic statistical calculations in Apache Spark RDD? **[9]**

OR

Q6) Explain statistical calculations with suitable examples. **[9]**

a) Standard deviation

b) Skewness

c) Kurtosis

Q7) Explain Logistic Regression with Apache SparkML. **[9]**

OR

Q8) Explain Linear Regression with Apache SparkML. **[9]**

Q9) Explain the concept of Graph? Explain Graph Properties, Graph Operators illustrate with suitable examples. **[9]**

OR

Q10) Explain use of GraphX API with suitable example. **[9]**

Q11) Explain SQL operations and set Operations with suitable examples. **[5]**

OR

Q12) Explain advantages and disadvantages of SparkR. **[5]**

Total No. of Questions : 12]

SEAT No. :

P-3506

[Total No. of Pages : 2

[6005]-681

F.Y. M.E. (Computer Engg)

MATHEMATICAL FOUNDATIONS FOR CYBER SECURITY

(Cyber Security 2020)

(2017 Pattern) (Semester - I) (510401)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8 and Q.9 or Q10 and Q.11 or Q12.***

2) ***Figures to the right indicate full marks.***

Q1) a) Discuss the concept of divisibility with suitable example. **[4]**

b) Write Euclidean algorithm for GCD. **[4]**

OR

Q2) a) Perform the following operations. inputs come from Zn **[4]**

i) Add 7 to 14 in Z_{15}

ii) Subtract 11 from 7 in Z_{13}

iii) Multiply 11 to 7 in Z_{20}

iv) Add 17 to 15 in Z_{16}

b) Find Multiplicative inverse of 8 in Z_{10}. **[4]**

Q3) a) For the group G =<Z_4, +> **[4]**

i) Prove that it is an Abelian group.

ii) Show the result of 3+2 and 3–2.

b) Find all Subgroups of the following groups. **[4]**

i) G<Z_{16} +>

ii) G<Z_{23} +>

OR

Q4) a) Prove that (x) and (x+1) are irreducible polynomial of degree 1. **[4]**

b) In the field of GF(7), find the result of **[4]**

i) 5+3

ii) 5–4

iii) 5*4

iv) 5/4

P.T.O.

Q5) a) Distinguish between a prime and Composite Integers. **[4]**

b) Explain the Naive method and its application. **[5]**

OR

Q6) a) Define Euler's theorem and define its applications. **[4]**

b) Define Fermat's little theorem and its applications. **[5]**

Q7) a) Define Chinese remainder theorem and its applications. **[4]**

b) Write an algorithm for finding primitive roots for any set Zp*. **[4]**

OR

Q8) a) Write an algorithm for QR and QNR for any Zp*. **[4]**

b) Define discrete logarithm and its application in solving logarithmic equations. **[4]**

Q9) a) Discuss the Monte Carlo algorithm for probability. **[4]**

b) Write a short note on Stochastic Process Markov Chain. **[4]**

OR

Q10)a) What is pseudorandom number generator? Discuss in detail. **[4]**

b) Discuss Baye's theorem and its application in probability theory. **[4]**

Q11)a) Show that for a linear code C, its minimum distance equals the minimum Hamming weight of a nonzero codewords of C, i.e., **[4]**

$$\Delta(C) = \min_{c \in C,\ C \neq 0} wt(c)$$

b) What are linear codes? Discuss Equivalence of codes. **[5]**

OR

Q12)a) Discuss Parity Check matrices **[4]**

b) Write a short note on Hamming Codes. **[5]**

Total No. of Questions : 7]

SEAT No. :

P-3507

[Total No. of Pages : 2

[6005]-682

M.E. (Cyber Security)

MODERN CRYPTOGRAPHY

(2020 Pattern) (Semester - I) (510402)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Q. No. 7 is compulsory, solved any five from Q. NO. 1 to Q. No. 6.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) Explain the basic Principles of Modern Cryptography? Describe "Vernam's Cipher" with the help of example. **[8]**

Q2) Write short note on : **[8]**

a) Pseudorandom Functions

b) CPA-Secure Encryption schemes from Pseudorandom.

Q3) What is Elliptic curve cryptography, Explain with example? Explain key Serialization & Asymmetric utilities? **[8]**

Q4) Describe with diagram "Models of Digital Signature" in detail. List down the importance of Digital Signature? **[8]**

Q5) Write short note on : **[8]**

a) Technology Operations and configuration in Cyber Security.

b) Counter Measures Challenges in Cyber Security & Betnets.

P.T.O.

Q6) Describe in detail “Security frameworks” & “Policy Objectives” in cyber security? **[8]**

Q7) Explain cyber security Management and how it will helpful in preparation of cyber security planning guide, also explain the Cyber Plan Action Items? **[10]**

Total No. of Questions : 8]

SEAT No. :

P3508

[Total No. of Pages : 2

[6005]-683

F.Y. M.E. (Computer Engineering)

CYBER SECURITY

Secure Software Design, Coding Practices & Ethics

(2020 Pattern) (Semester - I) (510403)

Time :3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right side indicates full marks.***
3) ***Neat diagrams must be drawn wherever necessary***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the principles of software engineering ethics. **[5]**

b) Explain the objective of software security. **[4]**

OR

Q2) a) Why is security a software issue? **[5]**

b) Explain the principles of software assurance. **[4]**

Q3) a) Discuss the most common requirements Elicitation Techniques. **[5]**

b) What elicitation techniques can be used with SQUARE ? **[4]**

OR

Q4) a) What are the common approaches followed for developing high - level and detailed requirements using SQUARE? **[5]**

b) Explain architecture risk management, with example. **[4]**

Q5) a) Explain OWASP Software assurance maturity model. **[8]**

b) What is the secure software development life cycle (SDLC)? **[8]**

OR

Q6) a) What are secure coding principles? **[8]**

b) Explain security breach. What are the three main causes of security breaches? **[8]**

P.T.O.

Q7) a) What is penetration testing software? What are the 5 stages of penetration testing? **[8]**

b) Explain the any four main methodologies of threat modelling? **[8]**

OR

Q8) a) Describe the common methods for managing vulnerabilities. How do you manage vulnerability management? **[8]**

b) Explain risk - based testing strategy with different approaches in cyber security? **[8]**

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Total No. of Questions : 8]

SEAT No. :

P-3509

[Total No. of Pages : 2

[6005]-691

F.Y. M.E. (Electrical) (Semester - I)

OPTIMIZATION TECHNIQUES IN CONTROL SYSTEM

(2017 Pattern) (503101)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Qu 1 or 2, Qu 3 or 4, Qu 5 or 6, Qu 7 or 8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of algorithmic tables slide rule, Mollier charts, and electronic pocket calculator and steam table is allowed.***
5) ***Assume suitable data if necessary.***

Q1) Calculate the Maxima & Minima if any of the function $F(x)= 4x^3–9x^2+20x–6$ **[9]**

OR

Q2) Use analytical method to investigate for extremum points. **[9]**

$F(x)= X_1^3+X_2^3+X_3^3+2X_1^2+6X_2^2+9X_3^2$

Q3) Explain the method of obtaining extremum point of multivariable optimization with equality constraints. **[9]**

OR

Q4) Find the maximum of F = X(1.5 – X) in the interval 0 - 1 within 10% of the exact value by Dichotomous search method **[9]**

Q5) Explain the Multistage decision process in dynamic programming. **[16]**

OR

Q6) Explain final value and initial value problems dynamic programming in continuous time systems. **[16]**

P.T.O.

Q7) a) Explain what do you understand by zero-one programming. **[8]**

b) Explain integet linear programming. **[8]**

OR

Q8) Minimize $F = -3X_1 - 4X_2$ Subject to $3X_1 - X_2 + X_3 = 10$

$3X_1 + 11X_2 + 2X_4 = 64$

$Xi \geq 0$, i=l to 4 and xi is integer **[16]**

Total No. of Questions : 6]

SEAT No. :

P-3510

[Total No. of Pages : 2

[6005]-692

M.E. (Electrical) (Control Systems)

AUTOMATION IN MANUFACTURING

(2017 Pattern) (Semester - I) (503102)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates :

1) ***Answer Questions from Q1 or Q2, Q3 or Q4 and Q5 or Q6.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Classify the various cams used in mechanical engineering applications. **[5]**

b) Explain the significance of pre-loading in ball screws. **[5]**

c) Write a brief note on Indexing mechanism and explain any one type with example. **[4]**

d) What is cyber Physical System and explain its features. **[4]**

OR

Q2) a) Explain what Reset Windup Problem is. **[4]**

b) Explain classification of Hydraulic Pumps. **[5]**

c) Explain Indexing Mechanism in detail. **[5]**

d) Explain architecture of Cyber Physical system. **[4]**

Q3) a) In digital manufacturing which are the objects those need to be described by a model. **[8]**

b) Explain the architecture of Digital Manufacturing. **[8]**

OR

P.T.O.

Q4) a) Explain Modeling Theory of Digital Manufacturing Science. **[8]**

b) Explain Operation Reference Mode of Digital Manufacturing **[8]**

Q5) a) Explain working of Industry 4.0. Explain in detail. **[8]**

b) Explain characteristics of Industry 4.0. **[8]**

OR

Q6) a) List out the drivers of Industry 4.0. Explain in detail. **[8]**

b) Explain the benefits of Industry 4.0. **[8]**

✷ ✷ ✷

Total No. of Questions : 6] **SEAT No. :**

P3511 **[Total No. of Pages : 2**

[6005]-693
F.Y. M.E. (Electrical) (Control Systems)
NON- LINEAR CONTROL SYSTEM
(2017 Pattern) (Semester - I)(503103)

Time :3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of algorithmic tables slide rule, Mollier charts, and electronic pocket calculator and steam table is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Compare the methods of analysis of non - linear systems. **[6]**

b) Draw the phase plane trajectory for the following equation using Isocline method

$\ddot{x} + 4\dot{x} + 5x = 0,$ given $\dot{x} = 1.5, x = 0$ **[6]**

c) Explain with suitable example **[6]**

i) Positive and Negative Definiteness

ii) Positive and Negative Semi - Definiteness

OR

Q2) a) The systems equations are given below **[6]**

$\dot{x}_1 = 2x_2$

$\dot{x}_2 = -2x_1 - x_1^2 x_2$

Select $v = x_1^2 + x_2^2$ as Liapunov Function and determine stability.

b) Explain following terms **[6]**

i) Phase plane

ii) Phase Plane Trajectory

iii) Isoclines

c) Explain Popov criterion for absolute stability **[6]**

P.T.O.

Q3) a) Explain the terms **[6]**

i) Sliding Phase

ii) Reaching Phase

iii) Chattering as used in sliding control

b) Write a short note on Input - Output Linearization **[5]**

c) Write a short note on Chattering as used in Sliding Control. **[5]**

OR

Q4) Explain the following (any two) **[16]**

i) Concept of Variable Structure Control

ii) Properties of Sliding Mode Control

iii) Effect of disturbance on Sliding Mode Control

Q5) Explain any two of the following **[16]**

i) Explain any non- linear system design using sliding mode technique.

ii) Effect of disturbance on Sliding Mode Control.

iii) Matched & Unmatched uncertainty in case of Sliding Mode Control

OR

Q6) Explain clearly for input - output Linearization and state input for the system given as below **[16]**

$$\dot{x}_1 = x_1^2 + x_2 + u$$

$$\dot{x}_2 = -2u$$

♦ ♦ ♦

Total No. of Questions : 3]

SEAT No. :

P3512

[Total No. of Pages : 2

[6005]-694

F.Y.M.E. (Electrical) (Control System)

RESEARCH METHODOLOGY AND LINEAR ALGEBRA

(2017 Pattern) (Semester - I) (503104)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Use of Logarithmic Tables, Slide rule,mollier charts, Electronic pocket calculator and steam tables is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) Solve any three.

a) Describe different types of Research. **[6]**

b) What are different steps involved in report writing of project. **[6]**

c) Write short note on 1) Copy right 2) IPR. **[6]**

d) Explain in details properties of field and vectors. **[6]**

e) Let $A = \begin{bmatrix} 2 & -2 & 1 & 2 \\ -3 & 6 & 0 & -1 \\ 1 & -7 & 10 & 2 \end{bmatrix}$ Reduce A to echelon using pivoting method. **[6]**

Q2) Solve any two

a) Reduce the system equations for solution of the system with r equations and n unknown. **[8]**

b) Find augumented matrix M and coefficient matrix A for following given system. **[8]**

$x + 3y - z = 2$

$x - 2y + 3z = 4$

$2x + 4y - 3z = 5$

P.T.O.

c) Write short - note with illustration on. **[8]**

i) Homogenous equation

ii) Non homogenous equation

d) Gaussian elimination method for solving linear equations. **[8]**

Q3) Solve any two

a) Write short note on Diagonal form and jordan form of matrix representation . **[8]**

b) For a given matrix **[8]**

$A = \begin{bmatrix} 1 & 3 \\ 2 & 1 \end{bmatrix}$ find eigen values, eigen vectors, Diagonal matrix and characteristic equation.

c) For a given system find eigen values, eigen vectors. **[8]**

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 1 & 4 \\ 2 & 1 & 0 \end{bmatrix}$$

d) Write software program for finding eigen values and eigen vectors it system matrix A is given. **[8]**

Total No. of Questions : 6] **SEAT No. :**

P3513 **[Total No. of Pages : 2**

[6005]-695

F. Y. M.E. (Electrical Engineering) (Control System)

MULTIVARIABLE AND OPTIMAL CONTROL SYSTEM

(2017 Pattern) (Semester -II) (503107)

Time :3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer Q.1or Q.2, Q.3 or Q.4, Q.5 or Q.6.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of algorithmic tables slides rule, Mollier charts, and electronic pocket calcuator and stem table allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain representation and advantages of multivariable control system into **[5]**

i) Transfer matrix form

ii) State space form

b) Explain the concepts of controllability and observability of multivariable control system. **[4]**

c) What is the observer? Explain the neat block diagram of state estimation problem using observer. **[5]**

d) Discuss the formulation of an optimal control problem using quadratic performance criterion. **[4]**

OR

Q2) a) Outline the procedure for obtaining the optimal control law for time invariant state regulator problem. **[5]**

b) Explain in decoupling or non - interactive control for multivariable control system design. **[4]**

c) Briefly note model matching control. **[4]**

d) explain with block diagram pole allocation using Linear state variable feedback in multivariable control system. **[5]**

P.T.O.

Q3) a) State the Pontryagin's minimum principle. **[8]**

b) Discuss step by step procedure of solving optimal control problem using Pontryagin's minimum principle. **[8]**

OR

Q4) a) State merits and demerits of optimal control. **[8]**

b) Explain Hamilton. Jacobi method for solving optimal control law. **[8]**

Q5) a) Discuss in detail the Bang - bang control strategy. **[8]**

b) Explain the optimal control law with example. **[8]**

OR

Q6) a) Explain the minimum time optimal control problem. **[8]**

b) Define and explain singular control solution. **[8]**

♦ ♦ ♦

Total No. of Questions : 6]

SEAT No. :

P3514

[Total No. of Pages : 2

[6005]-696

First Year M.E. (Electrical) (Control Systems)

CONTROL OF POWER ELECTRONICS CIRCUITS

(2017 Pattern) (Semester - II) (503108) (Credit)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Figures to the right indicate full marks.***
2) ***Answer Q.1 or Q.2, Q.3 or Q.4. Q.5 or Q.6.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of algorithmic tables slide rule, Mollier charts, and electronic pocket Calculator and steam table is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain the roles & objectives of power electronic converters. **[6]**

b) Write brief a note on Sampled data type model, averaged models, large-signal and small-signal models, behavioural models. **[12]**

OR

Q2) a) Explain in brief Control families of Power Electronic Converters. **[12]**

b) Explain relations between modelling and control of power electronic converters. **[6]**

Q3) a) Draw the circuit diagram of Buck-Boost Converter & explain circuit topologies of it. **[12]**

b) Write a note on switched type model. **[4]**

OR

Q4) a) Explain pole placement based on observer design for linear feedback control. **[8]**

b) Discuss the example of Grid connected single phase DC-AC converter. **[8]**

P.T.O.

Q5) a) Explain variable structure control of power electronic converters. **[8]**

b) Draw neat diagram of three phase voltage source grid connected inverter connected with associated d-q frame control structure and Explain system modelling steps. **[8]**

OR

Q6) Explain variable structure control design with one application as DC-DC power stage. **[16]**

Total No. of Questions : 6]

SEAT No. : ____

P753

[Total No. of Pages : 2

[6005]-698

S.Y. M.E. (Electrical Engineering) (Control System)

ADVANCED DRIVES AND CONTROL

(2017 Credit Pattern) (Semester-III) (603101)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrm must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Write a note on " Matching of Power Electronics Controller and electric motor to drive its load" . **[5]**

b) Write in detail about torque pulsation in separately excited d.c. motor supplied from solid state controllers. **[4]**

c) Write in detail about necessity of derating of induction motor fed from inverter. **[5]**

d) Write a note on Dynamic D-q model in connection with speed control of induction motor. **[4]**

OR

Q2) a) Prove the steady state stability criterion of electrical drive. **[4]**

b) With neat diagram, explain system model and derive the transfer function of the converter fed D.C.motor. **[5]**

c) Write a note on Pulse Width Modulated inverter. **[4]**

d) Explain static krammer control of drive using induction motor. **[5]**

Q3) Explain in detail with reference to synchronous motor drive.

a) Trapezoidal SPM drive. **[8]**

b) Sinusoidal SPM drive. **[8]**

OR

P.T.O.

Q4) Write a note on

a) Switched Reluctance motor drive. **[8]**

b) Wound field machine drive. **[8]**

Q5) a) Write a note on modern trends in electric drives control. **[8]**

b) Explain the working principle of Phase Locked Loop (PLL) system and discuss the application of PLL in the closed loop controlled drives. **[8]**

OR

Q6) Explain in detail the role of following in the closed loop control system of the electrical drive

a) PI controller **[8]**

b) PID controller **[8]**

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Total No. of Questions : 6]

SEAT No. :

P-754

[Total No. of Pages : 2

[6005]-699

M.E. (Electrical) (Control Systems)

SYSTEM IDENTIFICATION AND ADAPTIVE CONTROL

(2017 Pattern) (Semester - III) (603102)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates :

1) ***Answer Q. 1 or 2, Q. 3 or 4, Q. 5 and Q. 6 are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of algorithmic tables slide rule, Mollier charts, and electronic pocket calculator and steam table is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) With the help of neat diagram explain the process of system identification. **[5]**

b) Derive least square estimate of θ for model given by $y = \Phi\theta$. **[4]**

OR

Q2) a) Compute the QR factorization of matrix : $\begin{bmatrix} 12 & 27 \\ 4 & 2 \\ 6 & 10 \end{bmatrix}$. **[5]**

b) Explain the parametric and non-parametric methods of system identification. **[4]**

Q3) a) With the help of block diagram explain 'self tuning regulator'. **[5]**

b) Prove the matrix inversion lemma:
$[A + BCD]^{-1} = A^{-1} - A^{-1}B[C^{-1} + DA^{-1}B]^{-1}DA^{-1}$. **[4]**
$[A + BCD]^{-1} = [A + BCD]\{A^{-1} - A^{-1}B[C^{-1} + DA^{-1}B]^{-1}DA^{-1}\}\ I = I$

P.T.O.

OR

Q4) Write short notes on any three : **[9]**

a) Recursive estimation.

b) Instrumental variable method

c) Model structure.

d) Maximum likelihood method.

e) Bayesian learning.

f) Pattern recognition.

Q5) a) Explain pole placement design and derive the Diophantine equation. **[8]**

b) What do you understand by persistently existing signal? What is the order of following signals: **[8]**

a) white noise

b) step signal

c) sum of sinusoids

Q6) With the help of both MIT rule and Lyapunov theory, design an MRAS for system described by $G(s)=\frac{b}{s+a}$ where a and b are unknown. The controller is given by $u(t) = \theta_1 u_c(t) + \theta_2 y(t)$ and the desired closed loop model is $\frac{dy_m}{dx} = -a_m y_m + b_m u_c$. Draw simulation diagram and compare two methods.

Assume $V(\theta)=\frac{1}{2}\left[e^2 + \frac{1}{by}(b\theta_2 + a - a_m)^2 + \frac{1}{by}(b\theta_1 - b_m)^2 \right]$. **[16]**

✷ ✷ ✷

Total No. of Questions : 4]

SEAT No. : ____

P-3515

[Total No. of Pages : 2

[6005]-701
F.Y. M.E. (Electrical)
(Power Electronics and Drives)
LINEAR SYSTEMS THEORY AND DESIGN
(2017 Pattern) (Semester - I) (503301)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data if necessary.***
4) ***Use of electronic calculator is allowed.***

Q1) a) For the points A(1,1,3) , B (3,2,6), C(–1,0,5) Find the direction cosines of the vector $\overline{AB}$ & $\overline{AC}$. **[4]**

b) Determine if the following sets of vectors are linearly independent or dependent **[4]**

i) $v_1 = (3,–1)$ and $v_2=(–2,2)$

ii) $v_1 = (12,–8)$ and $v_2=(–9,6)$

Q2) a) Find the eigen values & eigen vectors of the following matrix **[5]**

$$A=\begin{bmatrix} 2 & 0 & 1 \\ -1 & 4 & -1 \\ -1 & 2 & 0 \end{bmatrix}$$

b) Find mean, mode, median, variance, standard deviation for the following data **[5]**

ID	1	2	3	4	5	6	7	8	9	10	11
Xi	25	35	55	15	40	25	55	35	45	5	20

OR

b) The following data represent the heights of 16 adults in centimeters. **[5]**
162; 168; 177; 147; 189; 171 ; 173; 168;178 ; 184; 165; 173; 179; 166; 168; 165;
Divide the data into 5 equal length intervals between and draw a histogram, frequency polygon also find frequency density for each class.

P.T.O.

Q3) a) Explain Gaussian distribution with diagram and its properties. **[8]**

OR

a) Explain test of significance with procedure and significance. **[8]**

b) Researchers have conducted a survey of 1600 coffee drinkers asking how much coffee they drink in order to confirm previous studies. Find the value of Chi square ($x2$), degrees of freedom. As per previous studies 72% of the country drink the coffee.

Comment on: Are the distribution same at α=0.05. **[8]**

Response	Expected Coffee drinkers	Observed coffee drinkers
2 cups/week	240	206
1 cup/week	208	193
1 cup/day	432	462
2+ cup/day	720	739

Probability of exceeding critical value of Chi square distribution			
Df (degree of freedom)	0.05	0.01	0.001
1	3.841	6.635	10.828
2	5.991	9.210	13.816
3	7.815	11.345	16.266
4	9.488	13.277	18.467
5	11.070	15.086	20.515
6	12.592	16.812	22.458
7	14.067	18.475	24.322
8	15.507	20.090	26.125
9	16.919	21.666	27.877
10	18.307	23.209	29.588

Q4) a) Fit a least square line for the following data using X and Y values from the table. **[8]**

Xi	1	2	3	4	5	6	7
Yi	0.5	2.5	2	4	3.5	6	5.5

b) Explain method of extended differences & method of sequential differences for graphical representation of data and parameter determination. **[8]**

OR

b) Explain method of least square for graphical representation & curve fitting of data, also state relationship of terms in a linear regression equation. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

P-3516

[Total No. of Pages : 2

[6005]-702

F.Y. M.E. (Power Electronics & Drives)

MODELLING AND ANALYSIS OF ELECTRICAL MACHINES

(2017 Pattern) (Semester - I) (503302)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Figures to the right indicate full marks.***
2) ***Assume suitable data, if necessary.***

Q1) a) Draw necessary diagrams to explain the common essential features of rotating electrical machine. **[5]**

b) Explain what is meant by 'power invariance' in transformation theory applied to Electrical machines. **[5]**

OR

Q2) a) Derive the transformations for currents between two-phase (α, β) rotating winding and two-phase (*d*-*q*) rotating winding. **[5]**

b) Explain Kron's primitive machine with necessary sketches, How are the various windings of a machine represented in the primitive machine. **[5]**

Q3) a) Discuss the transfer function model of DC shunt motor. **[5]**

b) Derive the transfer function model of DC series motor. **[5]**

OR

Q4) a) Discuss the Principle of Vector control. Explain with the help of vector phasor diagram. **[4]**

b) Write and discuss two axis (d-q) Voltage equation matrix model in various reference frame. **[6]**

P.T.O.

Q5) a) A 3-phase 50 Hz cylindrical-rotor synchronous machine has the following parameters : **[7]**

Self-inductance for phase a = 3.15 mH

Armature leakage inductance = 0.35 mH

For this machine calculate the mutual inductance between armature phases and its Synchronous reactance.

b) Derive expressions for armature mutual inductance of salient pole synchronous machine from a consideration of its basic parameters. **[8]**

OR

Q6) a) From the torque matrix of a3-phase salient pole alternator and its phasor diagram, derive an expression for synchronous power in terms of the load angle. **[8]**

b) Starting from the impendence matrix of a 3-phase salient pole synchronous machine fitted with amortisseurs, obtain an expression for the instantaneous electromagnetic torque and explain the significance of the various terms in it. **[7]**

Q7) a) Discuss Performance prediction of -Induction machine with stator electric transients neglected in a linearised machine model. **[7]**

b) Explain Linearization of machine equations. **[8]**

OR

Q8) Write short notes on :

a) Eigen values of typical induction machine **[8]**

b) Eigen values of typical synchronous machine **[7]**

Total No. of Questions : 6]

SEAT No. :

P3517

[Total No. of Pages : 2

[6005]-703

First Year M.E. (Electrical) (Power Electronics & Drives)

POWER CONVERTERS - I

(2017 Pattern) (Semester -I) (503303)

Time :3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt Q.1or Q.2, Q.3 or Q.4, Q.5 or Q.6.***
2) ***Use of electronic calculator is allowed.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain with a neat diagram Transfer characteristic and output characteristics of a power mosfet. **[10]**

b) Explain with a neat diagram and waveforms the working of a single phase full wave rectifier supplying a RLE load for continuous conduction mode. Derive the equation for average output voltage. **[8]**

OR

Q2) a) A single phase full a wave ac voltage regulator feeds a load of R = 10 ohms with an input voltage of 230 V and 50 Hz. Firing angle of both the Thyristors is 30 degrees. **[10]**

Calculate:

i) rms value of output voltage

ii) load power and input power factor

iii) average and RMS current of thyristors

b) Explain the Buck Converter with necessary wave forms. **[8]**

Q3) a) With a neat diagram explain the working of a full wave ac voltage regulator with resistive load derive expression for average output voltage. **[8]**

b) A 230 V 1kW electric heater is fed through AC voltage controller from 230 V, 50Hz Ac supply. Find the load power for a firing angle delay of 70 degrees. **[8]**

OR

P.T.O.

Q4) a) Explain the internal and external methods to control the output voltage of inverter. **[8]**

b) A single phase voltage controller is employed for controlling the power flow from230 V 50Hz into a load circuit containing R = 4Ω and ωL=3Ω Calculate. **[8]**

i) The control range of firing angle
ii) Maximum value of RMS load current maximum power and power factor.

Q5) a) With a neat diagram and relevant waveform explain the working of a single phase to single phase step down midpoint type cycloconverter supplying RL load for discontinuous load current **[8]**

b) With a neat diagram and waveforms explain the working of three- phase to single phase cycloconveter. **[8]**

OR

Q6) a) Draw the circuit diagram and explain the principle of operation of a 1 phase bridge type Cycloconverter. What is the relation between triggering angles of the thyristor of positive and negative converters. **[10]**

b) What are the applications of cyclo converters? **[6]**

♦ ♦ ♦

Total No. of Questions : 6]

SEAT No. :

P3518

[Total No. of Pages : 2

[6005]-704

F.Y.M.E. (Electrical) (Power Electronics and Drives)

RESEARCH METHODOLOGY

(2017 Pattern) (Semester - I) (503304)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2. Q.3. or Q.4. Q.5. or Q.6.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Black figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of logarithmic tables slide rule, mollier charts, Electronic pocket calculator and steam tables is allowed.***

Q1) a) Explain the importance of literature review in defining the problem. **[6]**

b) Write a short note on measure of central tendency. **[4]**

c) What is the significance of using LaTeX in report or research paper writing? **[4]**

d) Give important highlights of the patent law. **[4]**

OR

Q2) a) What are the steps in defining and formulating the research problem? **[6]**

b) Elaborate on the measure of relationship. **[4]**

c) Explain the procedure of writing equations in LaTeX as a separate equation and equation within the text. **[4]**

d) What are the ways to reduce the plagiarism? **[4]**

Q3) a) Explain the steps involved in writing a research paper. **[8]**

b) What is the significance of the survey paper? **[8]**

OR

P.T.O.

Q4) a) How research paper writing is different from research proposal writing? **[8]**

b) What are the components of the budget in the research proposal? **[8]**

Q5) a) What care must be taken in preparing the oral presentation of the project? **[8]**

b) What is the significance of report writing? **[8]**

OR

Q6) a) Explain the different types of the reports. **[8]**

b) What are the precautions for writing research report? **[8]**

Total No. of Questions : 6] **SEAT No. :**

P3519 **[Total No. of Pages : 2**

[6005]-705
F.Y. M.E. (Electrical) (Power Electronics & Drives)
AC & DC DRIVES
(2017 Pattern) (Semester -II) (503307)

Time :3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer Q.1or Q.2, Q.3 or Q.4, Q.5 or Q.6.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain thermal model of motor for heating and cooling. **[6]**

b) Discuss speed control of D.C. separately excited motor fed from single phase full converter for contiuous mode operation. **[6]**

c) Explain the motoring control and regenerative braking operation of a separately excited dc motor fed from chooper. **[6]**

OR

Q2) a) Explain the four quadrant operations of an electric drive for hoist application. **[6]**

b) Discuss various types of braking system followed in D.C. drives. **[6]**

c) Explain with suitable diagram working priniciple of VSI fed induction motor. **[6]**

Q3) a) Explain principle of field oriented control of induction motor. **[4]**

b) Explain direct vector control. **[4]**

c) Derive expression for flux vector. **[4]**

d) Explain sensor less vector control. **[4]**

OR

P.T.O.

Q4) a) Explain what do you understand by D.C. Motor analogy. **[4]**

b) Explain indirect vector control of induction motor. **[4]**

c) Explain PWM switching & SVM swiching **[4]**

d) Describe the advantages and major applications of vector controlled induction motors. **[4]**

Q5) a) Explain working principle of BLDC motor. **[4]**

b) What are the main features of stepper motors which are responsible for its wide spread use? **[4]**

c) What are the advantages of BLDC motor over conventional D.C. drives? **[4]**

d) Explain principle of operation of PMDC drives. **[4]**

OR

Q6) a) Describe the main control strategies of BLDC motors. **[4]**

b) What are the main types of stepper motors? **[4]**

c) Write the main applications of BLDC motors. **[4]**

d) Explain principle of torque generation in BLDC motors. **[4]**

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Total No. of Questions : 5]

SEAT No. :

P3520

[Total No. of Pages : 2

[6005]-706

F.Y.M.E. (Electrical) (Power Electronics and Drives)

POWER CONVERTERS - II

(2017 Pattern) (Semester - II) (503308)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figure to the right indicate full marks.***

Q1) Answer any three. **[18]**

a) What are the limitations of PWM technique. How they are overcome in Space Vector Modulation?

b) Explain with circuit diagram and switching pattern H bridge multilevel inverter.

c) Explain ZCS inverter.

d) Explain with circuit diagram and output waveform fly back converter.

Q2) a) Design a heat sink for a dc-dc Buck system. **[10]**

b) For the Buck converter, find the peak device current, the peak dissipation and the case to ambient thermal resistance. Use maximum junction temperature of 160ºC and the ambient temperature to be at 50ºC and the case temperature should not exceed 70ºC. Duty ratio is 50%. The thermal impedance at 400mS is Z=0.4ºC/W. **[6]**

OR

Q3) Derive thermal model of Power Electronic system. **[16]**

P.T.O.

Q4) a) How winding area and utilization factor are obtained while designing inductor. **[8]**

b) An inductor is to be designed to meet the following specifications:L=150 micro H; I rms = 4 A sinewave ; f = 100 kHz;Ts=100 C and Ta = 30 C. The inductor is to be fabricated on a double-E core made from 3F3 ferrite. The windings are be made with foil conductors which have kcu = 0.6. A core size ofa = 2 cm is chosen for the design. The emissivity E of the surface of the completed inductor equals 0.9 and that the vertical height is 3a. **[8]**

i) Determine the conductor cross-sectional area, Acu, and number of turns N. Ignore eddy currents and the proximity effect.

ii) Specify the length of the air gaps in the core. Assume $\sum g = 3mm$

OR

Q5) a) Explain with flow chart single pass inductor design procedure. **[8]**

b) Explain turn on snubber and overvoltage snubber. **[8]**

Total No. of Questions : 5]

SEAT No. :

P-3521

[Total No. of Pages : 2

[6005]-707

M.E. (Power Electronics & Drives) (Electrical)

ADVANCED CONTROL SYSTEMS

(2017 Pattern) (Semester - II) (503309)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates :

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data if necessary.***
4) ***Use of electronic calculator is allowed.***

Q1) a) Explain Luenberger Observer. **[4]**

b) Discuss the following with reference to sliding mode control. **[5]**

i) Manifolds and Sliding Surfaces

ii) Sliding Mode Equations

OR

Q2) Consider the system having the state equation. **[9]**

$\dot{x} = Ax + Bu$

where

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -1 & -5 & -6 \end{bmatrix} \quad B = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$$

By using the state feedback control $u = -kx$. It is desired to have closed loop poles at $s = -2 \pm j4$ and $s = -10$. Determine the state feedback gain matrix k.

P.T.O.

Q3) a) Explain in detail non-linear extended state observer. **[4]**

OR

a) Write the short note on application of non-linear slide mode observer in real life system with advantages and disadvantages. **[4]**

b) Explain any one of the following in detail. **[5]**

i) direct sliding control for Buck DC/DC converter

ii) direct sliding control for Boost DC/DC converter

Q4) a) Discuss the various equilibrium points in non-linear control system. **[8]**

b) Explain Lyapunov's stability criterion for non-linear systems. **[8]**

Q5) a) Expalin Input Output Linearization in detail. Also explain Normal form and Zero dynamics. **[8]**

b) Transform the following system to normal form. **[8]**

$$\dot{x} = \begin{bmatrix} -x_1^3 \\ \cos x_1 \cos x_2 \\ x_2 \end{bmatrix} + \begin{bmatrix} \cos x_2 \\ 1 \\ 0 \end{bmatrix} u \text{ and } y = x_3$$

Total No. of Questions : 6]

SEAT No. : ____

P755

[Total No. of Pages : 2

[6005]-708

S.Y. M.E. Electrical (Power Electronics & Drives)

SPECIAL APPLICATIONS OF POWER ELECTRONICS

(2017 Pattern) (Semester-III) (603301)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of logaritmic tables slide rule, Mollier charts, electronic pocket calculator and stem tables is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain construction Multi terminal HVDC system and HVDC light with suitable diagram. **[9]**

b) Describe Zegbee network in detail. **[9]**

OR

Q2) a) Explain TSR and TCR in detail. **[9]**

b) Explain Smart buildings with its advantages. **[9]**

Q3) Write short note on the following.

a) Distributed Energy Resources. **[8]**

b) Wide Area monitoring protection and control. **[8]**

OR

Q4) a) Explain is Clean Development Mechanism in smart grid. **[8]**

b) Explain importance of implementating microgrids. **[8]**

P.T.O.

Q5) Write Short note on the following.

a) SMPS **[8]**

b) Electronic Ballast **[8]**

OR

Q6) Explain Power Electronics application in

a) Electronic Heating and Welding. **[8]**

b) AC-DC electric locomotive systems. **[8]**

Total No. of Questions : 6]

SEAT No. :

P-756

[Total No. of Pages : 2

[6005]-709

M.E. (Electrical) (Power Electronics & Drives)

ENERGY MANAGEMENT AND POWER QUALITY

(2017 Pattern) (Semester - III) (603302)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates :

1) ***Solve Q.1 or Q.2, Q.3 or Q.4 and Q.5 or Q.6.***
2) ***Figures to the right side indicate full marks.***
3) ***Use of Calculator is allowed.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain VFD controlled operation of fans and pumps. **[9]**

b) Enlist various electrical Grounding aspects in power electronics circuits. **[9]**

OR

Q2) a) Explain various Grounding Problems and actions to elimination them. **[9]**

b) What effects power quality disturbances produce in power system? **[9]**

Q3) a) What is power quality benchmarking? Explain in detail. **[8]**

b) Explain with block diagram various voltage regulation devices. **[8]**

OR

Q4) a) Explain operation of harmonic filter and steps to design a harmonic filter. **[8]**

b) Write note on power quality state estimations. **[8]**

P.T.O.

Q5) a) Explain the necessity and application of intelligent system in power quality monitoring. **[8]**

b) Write detail note on Power quality monitoring standards. **[8]**

OR

Q6) a) Explain objectives and consideration of power quality monitoring. **[8]**

b) List various power quality monitoring instruments and briefly explain their use. **[8]**

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Total No. of Questions : 8]

SEAT No. :

P-3522

[Total No. of Pages : 3

[6005]-710

F.Y. M.E. Electrical (Power System)

COMPUTER APPLICATIONS IN POWER SYSTEM

(2017 Pattern) (Semester - I) (503201)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume Suitable data, if necessary.***

Q1) a) Minimize $F(x) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ starting from point $x = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$ using Steepest Descent method. Perform only one iteration. **[5]**

b) Define the following terms : **[4]**

i) Objective function

ii) Design vector

iii) Design surface

iv) Relative minimum

OR

Q2) a) Determine the maximum and minimum value of function : **[5]**

$f(x) = 12x^5 - 45x^4 + 40x^3 + 5$

b) What is Fibonacci numbers? Explain Fibonacci for unconstrained optimization technique. **[4]**

Q3) a) With the help of flowchart explain contingency analysis and security evaluation procedure. **[5]**

b) Give the classification of buses for three phase load flow problem. **[4]**

OR

P.T.O.

Q4) a) Derive AC-DC load flow equations. Also state the assumptions. **[5]**

b) State the assumptions made in Decoupled and Fast Decoupled Load Flow methods. **[4]**

Q5) a) Define economical load dispatch problem without considering & with considering losses. **[8]**

b) The fuel cost of two units are : **[8]**

$F_1 = 1.5 + 20P_1 + 0.1P_1^2$ Rs/ hour

$F_2 = 1.9 + 30P_2 + 0.1P_2^2$ Rs/ hour

If the total demand on the generators is 200 MW, find the economic load scheduling of two units.

OR

Q6) a) Explain solution of economic load dispatch problem using Newton-Raphson method. **[8]**

b) The incremental fuel cost for two plants are given by : **[8]**

$$\frac{dF_1}{dP_1} = 0.1P_1 + 22 Rs / MW - hr$$

$$\frac{dF_2}{dP_2} = 0.12P_2 + 16 Rs / MW - hr$$

If both units operate at all time and maximum and minimum loads on each unit are 100 MW & 20 MW respectively, determine the economic operating schedule of the plant for the load of 40 MW. Neglect transmission loss. Also find incremental fuel cost.

Q7) a) The transmission loss coefficients B_{mn} expressed in pu on the base of 100 MVA of a power system having three plants are given by : **[8]**

$$B_{mn} = \begin{bmatrix} 0.01 & -0.001 & -0.002 \\ -0.001 & 0.02 & -0.003 \\ -0.002 & -0.003 & 0.03 \end{bmatrix}$$

Three plants supply power of 100 MW, 200MW, 300MW respectively into the network. Calculate the transmission loss and incremental transmission losses of the plant.

b) Derive transmission loss coefficient using sensitivity factor. **[8]**

OR

Q8) a) Explain economical load dispatch for active & reactive power balance. **[8]**

b) Show that transmission loss is a function of generation and load. **[8]**

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Total No. of Questions : 5]

SEAT No. :

P-3523

[Total No. of Pages : 2

[6005]-711

F.Y. M.E. (Electrical) (Power Systems)

POWER SECTOR ECONOMICS AND MANAGEMENT

(2017 Pattern) (Semester - I) (503202)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) Attempt any three of following : **[18]**

a) Explain role of CEA in power sector.

b) Explain Regulatory Process in India.

c) Calculate life cycle cost for following project having capital investment of 500000 and cash flows for five years are 100000, 150000, 250000, 200000 and 150000 and discount rate of 11%.

d) Discuss different tariff principles and time of day tariff.

e) Explain deregulation experiences from Nordic pool.

f) Explain role of ISO and also explain max ISO model.

Q2) a) Explain Forward and Future Contracts. **[8]**

b) Explain market settlement process. Also explain market clearing price. **[8]**

OR

Q3) a) What is market power? Discuss reasons for existence of market power. **[8]**

b) Explain factors affecting the operations of energy market. **[8]**

P.T.O.

Q4) a) Explain different methods of transmission pricing. **[8]**

b) What is transmission rights? Explain effect on it on system operation. **[8]**

OR

Q5) a) What is congestion in power network? Explain methods to avoid congestion. **[8]**

b) Discuss transmission planning and its importance in restructured power system. **[8]**

Total No. of Questions : 6]

SEAT No. : ____

P3524

[Total No. of Pages : 2

[6005]-712
F.Y.M.E. (Electrical) (Power Systems)
POWER SYSTEM MODELING
(2017 Pattern) (Semester - I) (503203)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Solve Total Three questions. Answer 1 question from Q.1 or Q.2. Q.3 or Q.4. and Q.5 or Q.6 each.***
2) ***Assume suitable data if necessary.***
3) ***Write down all the assumptions made.***
4) ***Given $F^{abc} = [P]F^{dq0}$, where Park's transformation***

$$[P] = \begin{bmatrix} k_d \cos\theta & k_q \sin\theta & k_o \\ k_d \cos\left(\theta - \frac{2\pi}{3}\right) & k_q \sin\left(\theta - \frac{2\pi}{3}\right) & k_o \\ k_d \cos\left(\theta + \frac{2\pi}{3}\right) & k_q \sin\left(\theta + \frac{2\pi}{3}\right) & k_o \end{bmatrix}$$

(Where, $K_d = K_q = \sqrt{2/3}$ and $K_0 = \sqrt{1/3}$)

Q1) What is transformer? Write down assumptions for ideal transformer. Develop mathematical model of an ideal transformer. **[18]**

OR

Q2) Elaborate need of excitation system in power system. Explain working of the excitation system with the help of functional block diagram. **[18]**

Q3) Explain with the help of suitable diagram working of brushless excitation control scheme of alternator. **[16]**

OR

P.T.O.

Q4) With the help of equivalent circuit diagram, develop the mathematical model of self excited dc exciter. Also, draw the block diagram to represent it clearly. **[16]**

Q5) Discuss in details static load modeling in power system? Write about the assumptions and approximations involved in it. **[16]**

OR

Q6) Elaborate need of Clarke's transformation and Kron's transformation; and write about their applications in power system. **[16]**

Total No. of Questions : 6]

SEAT No. : ____

P3525

[Total No. of Pages : 2

[6005]-713
F.Y.M.E. (Electrical) (Power System)
RESEARCH METHODOLOGY
(2017 Pattern) (Semester - I) (503204)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer any one question from each pair of questions: Q.1 or Q.2. Q.3. or Q.4. Q.5. or Q.6.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the righ side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What are the different components of a research paper? **[4]**

b) What is the need for research? **[4]**

c) What are the measures of quality of research? **[4]**

d) Draw the flowchart of simplex algorithm. **[6]**

OR

Q2) a) What is the difference between a research proposal and a research paper? **[4]**

b) What care must be taken in selecting the research problem? **[4]**

c) Describe the process of drafting and filing the patent. **[4]**

d) Explain the standard form of the linear programming problem. **[6]**

Q3) a) Explain the characteristics of a Constrained Problem. **[8]**

b) Give classification of constraint optimization techniques. **[8]**

OR

P.T.O.

Q4) a) Explain basic approach of penalty function method. **[8]**

b) Explain convex programming problem. **[8]**

Q5) a) Explain the concept of genetic algorithm with its application. **[8]**

b) Explain the simulated annealing method of optimization with its application. **[8]**

OR

Q6) a) What is linear regression? Explain with mathematical expressions. **[8]**

b) Compare particle swarm optimization and ant colony algorithm. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3526

[Total No. of Pages : 2

[6005]-714

F.Y.M.E. Electrical Engineering (Power Systems)

POWER SYSTEM DYNAMICS

(2017 Pattern) (Semester - II) (503207)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable additional data, if necessary.***
5) ***Use of non-programmable calculator is allowed.***

Q1) With the use of relevant diagrams and formulae, explain the point-by-point technique for analyzing transient stability. State clearly the assumption made. **[12]**

OR

Q2) Describe in brief. **[12]**

a) Small disturbance voltage stability

b) Voltage stability and

c) Voltage collapse

Also, discuss various factors affecting voltage instability and collapse.

Q3) Explain in brief the operation of power system stabilizer (PSS) with the help of neat block diagram. **[14]**

OR

Q4) Derive an expression for small signal analysis of multimachine system considering simplified model of synchronous machine. State any assumption made. **[14]**

Q5) Draw a diagram of a synchronous generator using model 1.1 and calculate the stator voltage equations. **[12]**

OR

P.T.O.

Q6) Derive rotor voltage equations for synchronous generator by model 1.1. **[12]**

Q7) Derive the stator voltage expressions for the small signal analysis of single machine model with field circuit only. Write down assumptions involve in it. **[12]**

OR

Q8) Explain the SVC characteristics and its model. Also explain effect of its inclusion in the dynamics of SMIB. **[12]**

Total No. of Questions : 6]

SEAT No. :

P3527

[Total No. of Pages : 2

[6005]-715

First Year M.E. (Electrical) (Power Systems)

POWER SYSTEM PLANNING & RELIABILITY

(2017 Pattern) (Semester - II) (503208)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt Q.No. 1 or Q.No. 2, Q.No. 3 or Q.No. 4, Q.No. 5 or Q.No. 6.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Explain weather sensitive forecasting in details. **[6]**

b) Explain Markov process in details for reliability evaluation. **[6]**

c) Write short note on reliability cost. **[6]**

OR

Q2) a) Explain co-relation method of load forecasting. **[6]**

b) A power system having 5 units of 100 MW each with of FOR - 0.03. The load model is linear in nature having maximum load of 400 MW and minimum load of 150 MW. Calculate the system LOLE. **[6]**

c) Explain steepest descent method for reliability evaluation. **[6]**

Q3) a) Explain load point indices in a transmission line. **[8]**

b) Explain the role of construction monitoring of transmission line projects. **[8]**

OR

Q4) a) Explain causes of failure of transmission line in details. **[8]**

b) Explain goals of short term transmission planning in details. **[8]**

P.T.O.

Q5) a) Explain effects of dis-connectors, circuit breakers and isolators on distribution systems. **[8]**

b) Explain network re-configuration method in distribution systems. **[8]**

OR

Q6) a) Explain the effect of weather in distribution system planning in details. **[8]**

b) Explain distribution system reliability indices in details. **[8]**

Total No. of Questions : 5]

SEAT No. :

P-3528

[Total No. of Pages : 2

[6005]-716

F.Y. M.E. (Electrical) (Power System)

HVDC AND FLEXIBLE AC TRANSMISSION

(2017 Pattern) (Semester - II) (503209)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Assume Suitable data if necessary.***
3) ***Figures to tire right side indicate fall marks.***
4) ***Use of Calculators is allowed.***

Q1) **Solve any Three :** **[3 × 6 = 18]**

a) Explain the details of HVDC system with function of different components.

b) Draw & explain the individual & combined CC & CEA converter control characteristics.

c) Explain the technological development in control and protection, for better performance and reliability of HVDC transmission system.

d) Write short note on grounding of multi-terminal HVDC.

e) State and explain different configuration with potential applications of multi-terminal HVDC system.

Q2) a) Compare HVDC light with HVDC transmission system with advantages & disadvantages. **[8]**

b) Deduce the complete equivalent circuit of rectifier and inverter & draw its characteristics. **[8]**

OR

Q3) a) Write short note on power converter control issues. **[8]**

b) What is DC link converter? List different types of topologies. Explain any one in detail. **[8]**

P.T.O.

Q4) a) How series FACTS devices respond to the problem of Sub Synchronous Resonance? **[8]**

b) With phasor diagram explain the different modes of operation of UPFC. Give the details of working in each mode. **[8]**

OR

Q5) a) State the salient features of UPFC and explain block diagram for a basic UPFC control scheme. **[8]**

b) Discuss the modeling of TCSC for various power system studies in detail. **[8]**

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Total No. of Questions : 5]

SEAT No. : ____

P757

[Total No. of Pages : 2

[6005]-717

S.Y. M.E. (Electrical) (Power Systems)

ADVANCED POWER SYSTEM PROTECTION

(2017 Pattern) (Semester-III) (603201)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Assume suitable data, if necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculators is allowed.***

Q1) Solve any Three: **[3 × 6 = 18]**

a) A 1200/5, C400 CT is connected on the l000/5 tap & secondary side resistance is 0.51Ω. What is the maximum secondary burden that can be used and we can maintain rated accuracy at 20 times rated symmetrical secondary current?

b) What are the assumptions made for conducting short circuit studies of a power system network?

c) Differentiate between measuring and protective CT. Derive expression for ratio error and phasor angle error of a P.T.

d) Elaborate various types of faults in power systems.

e) By mistake someone has interchanged the terminals of measurement CT and protection CT. Both CT are at the same place and having same current ratings. What will happen in normal condition and abnormal condition?

Q2) a) How do sampling theorem help in conversion of analog signals into digital signals? **[8]**

b) Explain the phenomenon of D.C offset. How D.C. offset and harmonics are considered in Least Error squared (LES) technique? **[8]**

OR

Q3) a) Explain digital protection scheme based upon fundamental signal. **[8]**

b) How false tripping of digital relay is prevented in the event of magnetizing inrush current phenomenon in a power transformer? **[8]**

P.T.O.

Q4) a) With a neat block diagram explain hardware design of digital protection of transmission line. Explain function of each block. **[8]**

b) Explain digital protection of EHV/UHV transmission line based upon travelling wave phenomenon. **[8]**

OR

Q5) a) Write a note on computer graphics display and its applications. **[8]**

b) How do different distance relays perform with respect to their behavior on load and effect of arc resistance on the reach? **[8]**

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Total No. of Questions : 5]

SEAT No. : ____

P-758

[Total No. of Pages : 2

[6005]-718

S.Y. M.E. (Electrical Power Systems)

POWER QUALITY ASSESSMENT & MITIGATION

(2017 Pattern) (Semester - III) (603202)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates :

1) ***Question No. Q.1 is compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data if necessary.***

Q1) Attempt any three of the following : **[18]**

a) What are different power quality attributes? Also explain how these are classified on the basis of time.

b) Why RMS voltage variation is important consideration in power system operation? Explain assessment and control measures for RMS voltage variation.

c) What is voltage flickers'? Explain in detailed sources introducing voltage flickers.

d) Discuss the process of evaluation of coefficients of Fourier series used for harmonics analysis.

e) Discuss methods for sag measurements - One cycle method and half cycle method.

f) Why triplen harmonics require special treatment? Explain sources which produce triplen harmonics.

P.T.O.

Q2) a) Explain conventional criteria and advance criteria for design of harmonic filters. **[8]**

b) Discuss the various computer tools available for harmonic study. **[8]**

OR

Q3) a) Explain in detailed series harmonic resonance. Also discuss consequences of harmonics resonance. **[8]**

b) How harmonic sources can be located in power system? Do capacitors amplifying problems? Explain with justification. **[8]**

Q4) a) Discuss different approaches used for power quality monitoring. **[8]**

b) Explain requirements of power quality monitors. What are special requirements of power quality monitoring for transient conditions? **[8]**

OR

Q5) a) With suitable diagram explain construction of power quality monitor. **[8]**

b) Discuss different indices used for power quality monitoring and Assessment. **[8]**

Total No. of Questions : 8]

SEAT No. :

P-3529

[Total No. of Pages : 2

[6005]-721

M.E. (Electronics)

ANALOG & DIGITAL CMOS DESIGN

(2017 Pattern) (Semester - I) (504101)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data, if necessary.***

Q1) a) Explain three different modes of MOSFET operation with proper diagrams, viz. Accumulation, Depletion and Inversion. **[5]**

b) Explain advantages of stick diagram and draw it for logic : (A+B. C) **[5]**

Q2) a) Discuss in detail photolithography and Ion Implantation. **[5]**

b) Explain the Body Effect in MOSFET. Discuss its consequences on threshold voltage and MOSFET performance. **[5]**

Q3) a) What is RC-delay model? Illustrate it with example of any circuit. **[5]**

b) Explain the various components of Delay in Logic gates. **[5]**

Q4) a) Explain Static, dynamic and short circuit power dissipations in MOSFET. Explain, how to calculate dynamic power dissipation? **[5]**

b) What are the efforts to compensate delay in Logic gates? **[5]**

Q5) a) With neat diagram explain Cascode Amplifiers. What are the advantages? **[5]**

b) Explain, how to design a diode using MOSFET? What is the MOSFET's region of operation when using MOSFET as a diode? Explain the condition between VDG and VT for enhancement device. Also write, I and V characteristic equations of the MOS diode.. **[5]**

P.T.O.

Q6) a) Write short notes on : **[5]**

i) Current mirrors,

ii) Voltage Reference

b) Explain the operation of sense Amplifier in SRAM & DRAM. **[5]**

Q7) a) Draw and explain BICMOS Circuits. **[5]**

b) Implement two input NAND and NOR gates using MOFETs. Calculate logical efforts and delays for both implementations. Write the reasons why NAND is preferred over NOR in logic design. **[5]**

Q8) a) Compare different logic circuit families. **[5]**

b) Write short note on: Sense Amplifier as a Read Circuitry. **[5]**

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Total No. of Questions : 8]

SEAT No. :

P-3530

[Total No. of Pages : 2

[6005]-722

M.E. (Electronics) (Digital Systems)

MULTIRATE SIGNAL PROCESSING

(2017 Pattern) (Semester - I) (504102)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve any five questions.***
2) ***Assume suitable data if necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) Explain Decimation and interpolation process with suitable example. **[5]**

b) Explain bilinear transform method of IIR filter design. What is wrapping effect? **[5]**

Q2) a) Design a 2-stage interpolator which is used to increase sampling rate from 64 kHz to 2048 kHz.

PB ripple - 0.02, SB ripple = 70dB, Freq. band of interest = 0 - 30 kHz. **[5]**

b) What is need of wavelet packet? Explain wavelet packet decomposition. **[5]**

Q3) a) Draw & explain DFT filter bank. **[5]**

b) Draw & explain construction of band pass filter using lowpass filter. **[5]**

Q4) a) Explain least mean square algorithm for adaptive IIR filtering. **[5]**

b) Explain system identification using adaptive filters using block diagram. **[5]**

P.T.O.

Q5) a) Explain the term Haar wavelet and wavelet filter bank with suitable equations. **[5]**

b) How wavelet transform can provide image filtering? Explain in detail. **[5]**

Q6) a) Explain use of adaptive filter for echo cancellation. **[5]**

b) Explain the concepts of image resizing with example. **[5]**

Q7) a) Write a note on sampling rate conversion by a rational factor. Also comment on sequence of multirate. **[5]**

b) Derive the expression for output spectrum of decimeter in terms of input spectrum. **[5]**

Q8) a) What is DCT? Write equation of DCT. List advantages & disadvantages of DCT. **[5]**

b) Explain applications of multirate DSP in ADC/DAC. **[5]**

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Total No. of Questions : 8]

SEAT No. : ____

P3531

[Total No. of Pages : 2

[6005]-723
First Year M.E. (Electronics - Degital System)
EMBEDDED SYSTEM DESIGN
(2017 Pattern) (Semester - I) (504103)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagoram must be drawn.***
3) ***Right figure indicates full marks.***

Q1) a) How Design metrics of embedded systems are constrained? Justify. **[5]**

b) Explain IDE used for Arduino, Rasberry Pi. Write application too. **[5]**

Q2) a) Which ARM cortex core is right for ; A,R,M? Explain with reason. **[5]**

b) Draw & explain cortex-M3 based Microcontroller. **[5]**

Q3) a) Compare VxWorks and Micro-C/OS-II. **[5]**

b) Explain services provided by a RTOS Kernel. **[5]**

Q4) a) Explain Task creation and measurments in RTOS. **[5]**

b) Describe structure of Android application. **[5]**

Q5) a) Explain Linux Kernel. **[5]**

b) What are advantages of Embedded Linux? **[5]**

P.T.O.

Q6) a) Explain the procedure for porting Linux on ARM. **[5]**

b) Explain Device drive. List its type. **[5]**

Q7) a) Explain importance of certification. **[5]**

b) Describe design of Digital Camera. **[5]**

Q8) a) Discuss ARM as a case study with respect to design and O.S. **[5]**

b) Explain failure and testing in embedded system. **[5]**

Total No. of Questions : 8]

SEAT No. :

P3532

[Total No. of Pages : 2

[6005]-725
F.Y.M.E. (Electronics - Digital Systems)
ADVANCED DSP PROCESSORS
(2017 Pattern) (Semester - II) (504107)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any 5 questions.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Explain the features of program sequencer unit of a programable DSP with neat block diagram **[5]**

b) Explain fixed point and floating point formats **[5]**

Q2) a) What is real time processing? Explain the role of DSP processor in real time processing **[5]**

b) How to create and build project in code compressor? **[5]**

Q3) a) Draw and Explain architecture of TMS 320 C54 XX **[5]**

b) Why circular buffers are required in DSP processor ? How they are implemented **[5]**

Q4) a) Explain different addressing modes of DSP processor **[5]**

b) Explain functioning barrel shiffer in TMS320C54XX **[5]**

Q5) a) Explain different types of inturrupts in TMS320C54XX **[5]**

b) Draw and Explain architecture of blackfin processor **[5]**

P.T.O.

Q6) a) Compare TMS320C54XX and TMS320C6713 **[5]**

b) Explain the use of visual DSP ++ to program a DSP processor **[5]**

Q7) a) Describe the pipelining operation of TMS 320C54XX **[5]**

b) Discribe power consumption and management aspect of DSP processor? **[5]**

Q8) a) What is the role of compiler, assembler, linker, simulator, emulator? **[5]**

b) Explain the role of **[5]**

i) Arithmatic format

ii) Data width

iii) Speed of choosing the right in DSP processor

Total No. of Questions : 8]

SEAT No. :

P3533

[Total No. of Pages : 2

[6005]-726
F.Y.M.E. (Electronics-Digital Systems)
PLDs & ASIC DESIGN
(2017 Pattern) (Semester - II) (504108)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions from the following.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the righ indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain comparatively with block diagrams; Combinational and Sequential circuits. **[5]**

b) State FSM issues. Explain any one of them. **[5]**

Q2) a) Explain Top down approach to System Design. **[5]**

b) What is System On Chip? What are the advantages and disadvantages of SOC? **[5]**

Q3) a) Explain the architecture and functional block of CPLD XC95XX series. **[5]**

b) Write short notes w.r.t. VHDL on: **[5]**

i) Test bench

ii) Packages

Q4) a) Explain the Data Flow and Behavioral modeling techniques in VHDL with proper examples. **[5]**

b) Write Structural Model VHDL code for Full Adder using half adders. Clearly indicate: **[5]**

i) Library declarations.

ii) Entity.

P.T.O.

iii) Architecture Name.

iv) Component Declarations.

v) Signal Declarations and,

vi) Component Instantiation.

Q5) a) What is FPGA and Why FPGA's are used? **[4]**

b) What is System On Programmable Chip (SOPC)? Explain in short. **[4]**

c) What is Bus Functional Model (BFM) Simulation? **[2]**

Q6) a) Explain the architecture of Altera FPGA with block diagram. **[6]**

b) What is meant by Hardware-software Co-Simulation? **[2]**

c) What is Static timing analysis in FPGA? Why it is required? **[2]**

Q7) a) Write short note on IP cores in ASICs. **[5]**

b) Explain different Programming technologies in ASIC. **[5]**

Q8) a) What is a Custom IC? Explain Custom IC Design flow. **[5]**

b) What is the standard cell based ASIC design? What is the roll of cell libraries in ASIC design? In short, explain the steps in ASIC cell libraries design. **[5]**

Total No. of Questions : 8]

SEAT No. :

P-3534

[Total No. of Pages : 2

[6005]-727

F.Y. M.E. (Electronics) (Digital Systems)

IMAGE PROCESSING AND COMPUTER VISION

(2017 Pattern) (Semester - II) (504109)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any 5 questions from each section.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***All questions carry equal marks.***

Q1) a) Explain in detail Morphological operations opening and closing. **[5]**

b) Write short note on Principal component analysis. **[5]**

Q2) a) Explain different types of histogram equalization techniques and draw Histogram for high contrast image. **[5]**

b) Write short note on Erosion. **[5]**

Q3) a) Explain RGB color model with the help of neat diagram. **[5]**

b) Write short note on segmentation in HIS color space. **[5]**

Q4) a) Why there is a need of color image compression? How it is done. **[5]**

b) How color edges are detected explain in detail. **[5]**

Q5) a) Write short note on points in rigid transformation. **[5]**

b) What is image rectification and how it is done. **[5]**

Q6) a) Which different point based methods are used in image registration? Explain any one in detail. **[5]**

b) Explain in detail distance transform approach used in image registration. **[5]**

P.T.O.

Q7) a) Write short note on surface representation. **[5]**

b) Explain in detail plane Sweep algorithm. **[5]**

Q8) a) Explain in detail how facial animation is implemented using 3D head modeling. **[5]**

b) Write short note on range data merging. **[5]**

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Total No. of Questions : 8]

SEAT No. : ____

P759

[Total No. of Pages : 1

[6005]-728

S.Y. M.E. (Electronics) (DS)

SYSTEM ON CHIP DESIGN

(2017 Pattern) (Semester-III) (604101)

Time : 2½ Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer any 5 questions.***
2) ***Figures to the right side indicate full marks.***
3) ***Draw neat diagram.***
4) ***Assume Suitable data.***

Q1) a) Explain system on chip **[5]**

b) List advantages & disadvantages of SoC. **[5]**

Q2) a) Explain basic memory chip architecture **[5]**

b) Explain floor planning rules **[5]**

Q3) a) Explain AMBA standard bus architecture **[5]**

b) Explain overhead analysis **[5]**

Q4) a) Explain software configurable processors **[5]**

b) Explain SoC interconnect architecture. **[5]**

Q5) a) Explain metastability problem. **[5]**

b) Explain synthesis **[5]**

Q6) a) Explain voltage margins. **[5]**

b) Explain clock gating **[5]**

Q7) a) Explain derating factor **[5]**

b) Explain simulation **[5]**

Q8) a) Explain SoC flow **[5]**

b) Explain DPM policies. **[5]**

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Total No. of Questions : 8]

SEAT No. :

P-760

[Total No. of Pages : 2

[6005]-729

M.E. (Electronics-Digital System)

WIRELESS SENSOR NETWORK FOR IOT

(2017 Pattern) (Semester - III) (604102)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any Five questions.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) List any five challenges of wireless sensor network. **[5]**

b) Explain any one real time application of WSN. **[5]**

Q2) a) What are the hardware components of WSN. **[5]**

b) Explain optimization goals of WSN. **[5]**

Q3) a) Explain Zig-bee Protocol for WSN. **[5]**

b) Explain fundamentals of MAC - Protocol. **[5]**

Q4) a) Explain Blue - tooth protocol for WSN. **[5]**

b) Explain IEEE 802.11.4 MAC Protocol. **[5]**

Q5) a) Explain Big-data and IoT Analytics in detail. **[5]**

b) Compare IPV-4 and IPV-6. **[5]**

Q6) a) What are link layer technologies in IoT. **[5]**

b) Explain Web-Socket protocol. **[5]**

P.T.O.

Q7) a) Explain any one real time application of IoT. **[5]**

b) List and explain any two data protocols. **[5]**

Q8) a) Explain IoT reference architecture. **[5]**

b) Explain importance of Ethics in IoT. **[5]**

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Total No. of Questions : 8]

SEAT No. :

P-3535

[Total No. of Pages : 2

[6005]-731

M.E. (E & TC) (Communication Networks)

MODELLING AND SIMULATION OF COMMUNICATION NETWORKS

(2017 Pattern) (Semester - I) (504101)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Draw neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***

Q1) a) Explain the graphical technique for post processing. **[4]**

b) What are different techniques to generate uniformly distributed random numbers? Explain multiplication algorithm with prime modulus. **[4]**

c) What is the role of simulation in communication system? **[2]**

Q2) a) What is up-sampling and down-sampling? Illustrate these concepts with reference to simulation of communication network. **[4]**

b) What are PN sequence generators? What are the properties of PN sequence generators? Why do we need them in simulating communication systems? **[4]**

c) What is direct component and quadrature component of a signal? **[2]**

Q3) a) What are parameters for the performance estimation in simulation? **[4]**

b) Compare and contrast the following techniques to test random number generators? **[4]**

i) Scatter plots

ii) Durbin-Watson Test

c) Explain the principle of multicarrier modulation OFDM. **[2]**

P.T.O.

Q4) a) Elaborate various methodologies used in mapping a problem into a simulation model. **[4]**

b) What are correlated Gaussian numbers? Why do we need them? Explain any one technique to generate correlated Gaussian numbers in detail. **[4]**

c) What are the steps in simulation and model building? **[2]**

Q5) a) What are the different techniques used to reduce run time of the Monte Carlo method? Hence explain importance of sampling. **[4]**

b) Enlist factors to be considered while simulating nonlinearities. **[4]**

c) Explain simulation model for simple communication (Assume any communication system). **[2]**

Q6) a) What is tapped delay line model for LTV system? How various tap gains are generated? **[4]**

b) Explain random process model with reference to time varying system. **[4]**

c) Why is semi analytic simulation technique used in network analysis? **[2]**

Q7) a) What are categories of a communication channel? Explain multipath fading in wireless communication channel. **[4]**

b) What are the various parameters that must be considered while simulating a radio channel? **[4]**

c) What is discrete memory less channel model? **[2]**

Q8) a) Write an algorithm to demonstrate two state Markov model for discrete channel with memory. **[4]**

b) With an example explain Monte Carlo Estimation. **[4]**

c) Explain valid and invalid use of tail extrapolation. **[2]**

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Total No. of Questions : 8]

SEAT No. :

P-3536

[Total No. of Pages : 2

[6005]-732

S.Y. M.E. (E & TC)

COMMUNICATION NETWORKS

High Speed Communication Networks

(2017 Pattern) (Semester - I) (504502)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer any 5 Questions out of 8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***All questions carry equal marks.***

Q1) a) Give two applications of wireless LANs and explain why wireless LANs would be appropriate for these applications. **[5]**

b) Compare and contrast performance of TCP over UBR and ABR. **[5]**

Q2) a) How does streaming protocol work? What are different streaming protocols? Explain any one in detail. **[5]**

b) Describe various characteristics of queuing system. **[5]**

Q3) a) Why is video filtering is needed? Explain working principle of video filtering? **[6]**

b) Explain H.264/AVC coder. **[4]**

Q4) a) How does Cell Delay Variation relate to performance of Congestion control in ATM networks? **[5]**

b) How does streaming protocol work? What are different streaming protocols? Explain any one in detail. **[5]**

P.T.O.

Q5) a) Explain any two Dynamic Protocols. **[6]**

b) Explain Frame Relay network with an example of its application. **[4]**

Q6) a) Discuss two ATM protocols. **[5]**

b) What is the need of Wireless LANs? Explain with an example. **[5]**

Q7) a) Explain the working with architecture of 802.11. **[6]**

b) Describe with diagram the connection of ATM in ATM cell. **[4]**

Q8) a) How is Congestion control achieved in Frame Relay? **[5]**

b) Discuss and compare various mechanisms of congestion control. **[5]**

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Total No. of Questions : 8]

SEAT No. :

P3537

[Total No. of Pages : 2

[6005]-733
S.Y.M.E. (Electronics & Telecommunication)
COMMUNICATION NETWORKS
Network Security
(2017 Pattern) (Semester - I) (504503)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt any five questions out of eight questions.***
2) ***Assume suitable data, wherever necessary.***
3) ***Right hand side number indicate marks.***

Q1) a) What is RSA algorithm? Explain generation of public & private keys and hence generation of Cipher text through RSA algorithm/ **[5]**

b) What is a Substitute byte transformation in AES? **[5]**

Q2) a) Differentiate passive attack from active attack with example. **[5]**

b) What are the security management features available in operating system? **[5]**

Q3) a) What is the significant importance of security models? **[5]**

b) What are the two main techniques used for intrusion detection? Explain. **[5]**

Q4) a) S/MIME and PGP are sister protocols. Discuss the quality they share. **[5]**

b) What is the difference between SSL and TSL certificates. **[5]**

Q5) a) What are the advantages of cyber security? **[4]**

b) Explain the brute force attack. How to prevent it? **[3]**

c) What is black box testing and white box testing? **[3]**

P.T.O.

Q6) a) What are botnets in Cyber Security? **[4]**

b) How cyber security affects the online transaction? **[3]**

c) What is the primary security risk associated with VoIP? **[3]**

Q7) a) What are the different types of email security? **[4]**

b) What is mean by SET? What are the features of SET? **[3]**

c) What are the protocols used to provide IP security? **[3]**

Q8) a) Which protocol suite contains the encapsulating security payload? **[4]**

b) Explain Kerberos? What are the authentication requirements defined by Kerberos. **[3]**

c) Give the steps for preparing envelope data MIME? **[3]**

Total No. of Questions : 8]

SEAT No. :

P3538

[Total No. of Pages : 2

[6005]-734

F.Y.M.E./S.Y.M.E. Electronics / E & TC (All Branches)

RESEARCH METHODOLOGY

(2017 Credit Pattern) (Semester - I) (504504)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of cell phone is prohibited in the examination hall.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) a) What are the functions of literature review in research? **[5]**

b) What is the process involved in problem identification? Explain the steps Involved in problem identification. **[5]**

Q2) a) Explain the characteristics of static and dynamic instrumentation? What is the role of instrument in research? **[5]**

b) Explain the various steps involved in research. What are the characteristics of good research? **[5]**

Q3) a) What is measure of skewness? Explain the eight steps of ANOVA with example. **[5]**

b) Explain regression analysis with suitable example. **[5]**

Q4) a) How to develop hypothesis for a research problem and what are its characteristics. **[5]**

b) Write short notes on Principal component analysis. **[5]**

Q5) a) Describe the different measurement scale used in process system. **[5]**

b) Explain importance of nonlinear analysis of system in engineering research. **[5]**

P.T.O.

Q6) a) How the outcome of the research is evaluated and what are the measures? **[5]**

b) Describe in brief, the outline and structure layout of a research report, covering all relevant points. **[5]**

Q7) a) Explain state vector machine and uncertainty analysis. **[5]**

b) Explain the ethics and plagiarism check of the research article. What are the various tools available? **[5]**

Q8) a) How to prepare Institutional Research proposal to setup research and development cell in your institute? Explain with example. **[5]**

b) Explain importance of literature survey during research work? **[5]**

Total No. of Questions : 8]

SEAT No. : ____

P3539

[Total No. of Pages : 2

[6005]-735

S.Y.M.E. (E & TC) (Communication Network)

TRAFFIC ANALYSIS AND QOS

(2017 Pattern) (Semester - II) (504507)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer Q.No.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams to be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) What are the standards used for the various layers in the Ethernet based network that is managed by the internet management protocol? Assume that Ethernet runs on 10 Mbps on an unshilelded twisted pair cable. **[7]**

b) Explain briefly the difference between the database of a network management system and its MIB. How do you implement each in a network management system? **[6]**

OR

Q2) a) As a network manager, you are responsible for the operation of a network. You notice heavy traffic in a host that is on a TCP/IP network and want to find out the details. **[7]**

i) What basic network monitoring tool (s) would you use?

ii) What would you look for in your results?

b) Write a short note on MIB Engineering. **[6]**

Q3) a) Draw the diagram for Operations Support System for Traffic Measurement and explain in brief **[6]**

b) Write notes on TMN Standards. **[6]**

OR

Q4) a) Draw and explain TMN physical architecture. **[6]**

b) Write a note on Broadband Network Management. **[6]**

P.T.O.

Q5) a) What is the need for high speed LAN? Explain in brief. **[6]**

b) What is the need for QoS? Explain in brief. **[6]**

OR

Q6) a) What are the two types of QoS solutions? Explain in brief. **[6]**

b) What are the types of Network Traffic? Explain in brief. **[6]**

Q7) a) Describe congestion control in Data Networks and Internet. **[7]**

b) Write a note on effects of congestion in Data Networks. **[6]**

OR

Q8) a) Describe congestion control in ATM Networks. **[7]**

b) Compare TCP and UDP protocols. **[6]**

Total No. of Questions : 8]

SEAT No. :

P3540

[Total No. of Pages : 2

[6005]-736

S.Y. M.E. (E & TC) (Communication Networks)

BROADBAND WIRELESS TECHNOLOGIES

(2017 Credit Pattern) (Semester - II) (504508)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figure to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain Single carrier cyclic prefix systems in detail with suitable diagrams. **[5]**

b) Discuss the space-time codingin multi-input-multi-output (MIMO) system. **[5]**

Q2) a) Discuss the performance of MIMO for frequency selective fading channels. **[5]**

b) Discuss in detail about SVD based Eigen beamforming technique. **[5]**

Q3) a) Compare Time hopping and Direct sequencespread spectrum techniques in ultrawideband system. **[5]**

b) Explain Carrier sense multiple access with collision avoidance MAC in detail. **[5]**

Q4) a) Explain ALOHA and slotted Aloha protocols in Media Access control. **[5]**

b) Discuss the polling MAC protocol in wireless broadband networks with suitable diagrams. **[5]**

Q5) a) Explain the Importance of Routing Protocolsin Wireless Broadband Networks. **[5]**

b) Compare the multirate DS-CDMA system with conventional CDMA system. **[5]**

P.T.O.

Q6) a) Discuss the different Data link layer Protocolsin Wireless Broadband Networks. **[5]**

b) Explain Dynamic BW allocation algorithm (DBA) in WiMAX? **[5]**

Q7) a) Explain the architecture of Ethernet Passive Optical Networks (EPONS) in detail. **[5]**

b) Explain the difference between passive and active optical network. **[5]**

Q8) Write a short note on (any two)

a) Hybrid WOBAN **[5]**

b) Scalable broadband access networks **[5]**

c) BW management for Multichannel EPONS **[5]**

Total No. of Questions : 8]

SEAT No. : ____

P-3541

[Total No. of Pages : 2

[6005]-737

S.Y. M.E. (E & TC) (Communication Network)

SDR AND COGNITIVE RADIO

(2017 Pattern) (Semester - II) (504509)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer Q. No. 1 or 2, Q. No.3 or 4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams to be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Write on history of Cognitive Radio and its evolution from 3G to 4G technology . **[7]**

b) Discuss on convergence between military and commercial systems established in the concept of Cognitive Radio? **[6]**

OR

Q2) a) Detail merits and demerits of Cognitive Radio Technology? **[7]**

b) What are the advancements in Software Defined Radio? **[6]**

Q3) a) Discuss in detail Cognitive Radio Architecture. **[6]**

b) What are the steps in end-to-end communication in the case of Cognitive Radio? **[6]**

OR

Q4) a) Discuss different layer wise architecture of Cognitive Radio. **[6]**

b) Write short note on frequency plans available for Cognitive Radio Networks. **[6]**

P.T.O.

Q5) a) Write the salient features in architecture of SCA. **[6]**

b) How is compliance accomplished between SCA and JTRS? **[6]**

OR

Q6) a) Give the details on requirements of CORBA? **[6]**

b) Write on the significant features of Real Time Operating Systems. **[6]**

Q7) a) Write in detail on operation of phased array antennas. **[7]**

b) Discuss adaptive techniques applied to antennas? **[6]**

OR

Q8) a) Write short note on baseband signal processing. **[7]**

b) How is Radio Frequency design done in Cognitive Radio? **[6]**

Total No. of Questions : 8]

SEAT No. :

P761

[Total No. of Pages : 2

[6005]-738

S.Y. M.E. (E & TC)/(Communication Networks)

4G LTE CELLULAR SYSTEMS

(2017 Pattern) (Semester-III) (604501)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Q.No. 1 or 2, Q.No. 3 or 4, Q.No. 5 or 6, Q.No. 7 or 8.***
2) ***Neat diagrams to be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Explain the characteristic features of LTE and LTE Advanced. **[7]**

b) Write on the different protocol stacks in standardization of LTE. **[6]**

OR

Q2) a) Describe in detail LTE advanced E-UTRAN architecture. **[7]**

b) Explain the role of Mobility management entity in LTE. **[6]**

Q3) a) Detail the RF requirements for LTE. **[7]**

b) Explain how carrier aggregation is accomplished in LTE. **[6]**

OR

Q4) a) Describe in detail the research challenges in spectrum sharing. **[7]**

b) Illustrate the methodology involved in retransmission control. **[6]**

Q5) a) Explain the operation in OFDMA. **[6]**

b) Explain the funtioning of Software Defined Radio. **[6]**

OR

Q6) a) What are MIMO adaptive switching schemes? **[6]**

b) Differentiate between co-operative MIMO and single site MIMO. **[6]**

P.T.O.

Q7) a) Write in detail on centralized CoMP architecture. **[6]**

b) Discuss the relay basic schemes in CoMP. **[6]**

OR

Q8) a) Give the point of differences between LTE and Wi-Max **[6]**

b) Write short notes on Wi-Max standards evoluation. **[6]**

Total No. of Questions :8]

SEAT No. :

P762

[Total No. of Pages : 2

[6005]-739

S.Y.M.E. (E&TC) (Communication Networks)

Modern Communication Receiver Design & Technology

(2017 Pattern) (Semester - III) (604502)

Time : 2 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any Five questions.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams tobe drawn wherever necessary.***

Q1) a) Enlist the various types of superheterodyne receiver. **[5]**

b) Explain the weaver architecture of image reject mixer. **[5]**

Q2) a) With the help of suitable block diagram, explain the ideal receiver. **[5]**

b) Explain Drift-Canceling Loops and the Barlow-Wadley Receiver with suitable diagram. **[5]**

Q3) a) Explain the design of Automatically Switched Half-Octave Filter Banks for HF transceiver. **[5]**

b) Explain the system composite noise figure with block diagram. **[5]**

Q4) a) What is the switching mechanism of front end filters for the best dynamic range performance. **[5]**

b) Define the following terms in brief w.r.t. dynamic range **[5]**

i) Linear composite dynamic range (LCDR):

ii) Spurious-free, second-order dynamic range (IP2SFDR)

P.T.O.

Q5) a) Give the Classification of frequency synthesizer forms. **[5]**

b) Explain the Gilbert Cell Mixers with suitable diagram. **[5]**

Q6) a) Explain the Double-Balanced Mixer with it's performance characteristics. **[5]**

b) Explain the brute force, direct, coherent mixer synthesizer with suitable diagram. **[5]**

Q7) a) Explain with block diagram the front end designing of High frequency Rx/Tx. **[5]**

b) What is the significance of Automatic Gain Control (AGC) in Receivers. **[5]**

Q8) a) Enlist different Noise Blanker & state the importance of Noise Blanker in IF receiver. **[5]**

b) What are design considerations for Audio and Baseband Amplifier of receiver? **[5]**

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Total No. of Questions : 8]

SEAT No. :

P-3542

[Total No. of Pages : 2

[6005]-751

F.Y. M.E. (E & TC) (Microwave)

ELECTROMAGNETICS AND ANTENNA THEORY

(2017 Pattern) (Semester - I) (504301)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) A 100V/m plane wave of 300MHz frequency travels in the +Zz direction in an infinite lossless medium with $\varepsilon r = 9$, $\mu r = 1$ and $\rho = 0$. Write complete time domain expression for E and H. **[8]**

b) Determine the length of the dipole whose input resistance is 50ohms.(194) **[2]**

Q2) a) Find the radiation resistance of a single turn and 8-turn small circular loop. The radius of the loop a $\lambda/25$ and the medium is free space. **[6]**

b) Explain the Equivalence principle and illustrate its applications in aperture antenna analysis with a suitable example. **[4]**

Q3) Describe the following antennas with illustrative structural diagrams, radiation pattern, features **[10]**

a) Plane Reflector antenna

b) H-Plane pyramidal and conical horn antenna

P.T.O.

Q4) A rectangular aperture with a constant field distribution, with a = 3λ and b = 2λ, is mounted on an infinite ground plan, Compute the **[10]**

a) FNBW in the E-plane

b) HPBW in the E-plane0

c) FSLBW in the E-plane

d) FSLMM in the E-plane

e) Directivity

Q5) a) Give the comparison of various radiating elements such as infinitesimal dipole, small dipole, finite length dipole and half wave length dipole. **[6]**

b) Explain the salient features of Microtrip antenna and explain the working principle with relevant diagram. **[4]**

Q6) a) What is array factor? Derive the expression for the array factor of an N-element uniform linear array. **[5]**

b) Give the structural features and radiation characteristics of following antennas : **[5]**

i) V Antenna

ii) Yagi Uda Antenna

Q7) a) Design an rectangular microstrip antenna with L = 0.906 cm and W = 1.186 cm, substrate hight h = 0.1588 cm and dielectric constant of εr = 2.2, centre frequency of 10GHz, find the directivity. **[6]**

b) Explain the following method of analysis in Microstrip patch antenna **[4]**

Finite Element Method

Q8) a) With reference to uniform plan wave explain the following parameters: Reflection Coefficient, VSWR. **[5]**

b) Derive an expression for boundary conditions for boundary between two different magnetic materials. **[5]**

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Total No. of Questions : 6]

SEAT No. :

P-3543

[Total No. of Pages : 2

[6005]-752

F.Y. M.E. (E & TC) (Microwave)

RF AND MICROWAVE CIRCUITS

(2017 Pattern) (Semester - I) (504302)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Use of electronics pocket calculator is allowed:***
4) ***Assume suitable data if necessary.***
5) ***Figures to the right indicates full marks.***

Q1) a) Write a note on dynamic range and sources of noise in microwave circuits. **[6]**

b) Derive the equation of scattering matrix for two hole directional coupler. **[4]**

Q2) a) Explain with working of following microwave components using proper diagrams : **[6]**

i) Wilkinson Power divider

ii) Two hole Coupler

b) Explain working of two hole directional coupler. **[4]**

Q3) a) Derive the expressions for propagation constant, impedance, and power flow for the lossless coaxial line. **[5]**

b) For an arbitrary N port microwave device, derive the relationship between transmission (ABCD)matrix and impedance matrix. **[5]**

Q4) a) How inter symbol interference affects on wireless communication? Derive expression for roll of factor. **[5]**

b) Write short note on conversion gain and distortion. **[5]**

P.T.O.

Q5) a) How RF diode differs from conventional semiconductor diode? Explain construction and working of Schottky diode with related parametric derivation. **[6]**

b) Explain MESFET in terms of Construction, Working & frequency response. **[4]**

Q6) a) Describe in detail construction and operating principal of PIN diode. **[6]**

b) Explain operating principle of Tunnel diode. **[4]**

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Total No. of Questions : 6]

SEAT No. :

P3544

[Total No. of Pages : 1

[6005]-753
First Year M.E. (E & TC) (Microwave)
MICROWAVE MEASUREMENTS
(2017 Pattern) (Semester - I) (504303)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt any Five questions.***
2) ***Assume suitable data, if necessary.***

Q1) a) Derive the expression for impedance and reflection coefficient for Loss less two conductor transmission line. **[5]**

b) Define phase velocity and phase constant for sinusoidal waves of transmission line. Derive the equation for phase velocity and phase constant. **[5]**

Q2) a) What is the significance of attenuation in measurement. Draw a practical Circuit used for attenuation. **[5]**

b) Explain Noise with method to reduce it. **[5]**

Q3) a) State the different elements of Network analyzer. Give the significance of any one element. **[5]**

b) State the different types of power sensors explain any one. **[5]**

Q4) a) Draw and Explain the Block schematic spectrum Analyzer. **[5]**

b) Give the advantages of power sensors in Microwave Measurement. **[5]**

Q5) State the different types of power splitter used in RF power measurement, Explain any one. **[10]**

Q6) a) Draw and Explain the Noise figure Analyzer. **[5]**

b) Explain how the signal analysis is done using spectrum Analysis. **[5]**

Total No. of Questions : 6]

SEAT No. :

P3545

[Total No. of Pages : 1

[6005]-755
F.Y.M.E. (E & TC) (Microwave)
COMPUTATIONAL ELECTROMAGNETICS
(2017 Pattern) (Semester - II) (504307)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of electronics pocket calculator is allowed.***
4) ***Assume suitable data if necessary.***
5) ***Figures to the right indicates full marks.***

Q1) a) Explain the applications of one dimensional FDTD analysis with a suitable example. **[5]**

b) Derive Green's function corresponding to PDF for free space. **[5]**

Q2) a) Explain in detailed method of weighted residual. **[5]**

b) Explain overview of various computational method. **[5]**

Q3) a) Write a detailed note on implementation of boundary conditions in FDTD. **[5]**

b) Explain the principle of variational method with a suitable example. **[5]**

Q4) What is functional? If a functional is defined as $F[y(x)] = \int_0^1 y(x)dx$, then what is the functional for $y(x) = x^2$, $y(x) = \cos x$ **[10]**

Q5) Explain Yee's Algorithm with an illustrative Flow chart with suitable example. **[10]**

Q6) Write a detailed note on a comparative study of the following computational methods with reference to Preprocessing, Level of discretization, stability of solution, matrix storage, numerical dispersion, spurious solutions, distinctive feature. **[10]**

a) FDM

b) FDTD

c) FEM

d) MoM

Total No. of Questions : 6]

SEAT No. :

P3546

[Total No. of Pages : 1

[6005]-756
First Year M.E. (E&TC) (Microwave)
RF AND MMIC TECHNOLOGY
(2017 Pattern) (Semester - II) (504308)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of electronics pocket calculator is allowed.***
4) ***Assume suitable data, if necessary.***
5) ***Figure to the righ indicate full marks.***

Q1) a) Explain any three design approaches used in MMIC technology. **[6]**

b) Write a note on multi chip module technology. **[4]**

Q2) a) Explain MMIC technology used for design of HBT device. **[6]**

b) What are the advantages and disadvantages of MMIC technology. **[4]**

Q3) a) State the Synthesis process of linear and non linear MMIC devices with example. **[5]**

b) What is difference between Micro strip couplers and splitters. **[5]**

Q4) a) Explain the structure of multilayer directional coupler. **[5]**

b) Explain how matrix decomposition is performed in microwave circuit. **[5]**

Q5) a) Explain the method of harmonic balance used in microwave circuit. **[6]**

b) How MMIC Measurement is carried out? Explain MMIC test system. **[4]**

Q6) a) Discuss design steps for phase shifter circuit in detail. **[6]**

b) Explain in detail integrated CAD design environment. **[4]**

Total No. of Questions : 8]

SEAT No. :

P-3547

[Total No. of Pages : 2

[6005]-757

F.Y. M.E. (E & TC) (Microwave)

WIRELESS COMMUNICATION SYSTEM

(2017 Pattern) (504309) (Semester - II)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Explain the concept of cell splitting and cell sectoring and its need in cellular communication. **[5]**

b) Explain the hand off mechanism used in Cellular Communication. **[5]**

Q2) a) Discuss how probability and distributions are needed for Tele-Traffic analysis. **[5]**

b) Prepare chart showing Evolution of wireless communications systems from 1G to 4G and explain. **[5]**

Q3) a) Explain the effect of earth's curvature with respect to mobile channel. **[5]**

b) Write short note on Radio Wave Propagation. **[5]**

Q4) a) What are the causes of fast and small fading? Distinguish between them. **[5]**

b) Discuss the Propagation path-loss models. **[5]**

P.T.O.

Q5) a) Define the following terms of mobile channel : **[5]**

i) Coherence bandwidth

ii) Coherence time

iii) Level crossing rate

iv) Average fade duration

v) Fade margin

b) Explain all types of GSM services in detail. **[5]**

Q6) a) Explain GSM frame and slot structure. **[5]**

b) Explain the control channels in CDMA. **[5]**

Q7) a) Compare and contrast GSM and CDMA. **[5]**

b) Explain the UMTS network architecture. **[5]**

Q8) a) What is data rate? Discuss GPRS and its limitations. **[5]**

b) Explain the MAC layer protocol in UMTS. **[5]**

Total No. of Questions : 6]

SEAT No. : ____

P763

[Total No. of Pages : 2

[6005]-758

S.Y. M.E. (E & TC) (Microwave)

EMI AND EMC TECHNIQUES

(2017 Pattern) (Semester-III) (604301)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Use of electronics pocket calculator is allowed.***
4) ***Assume Suitable data if necessary.***
5) ***Figures to the right side indicate full marks.***

Q1) a) Define the terms EMI and EMC, what are the hazards due to EMI and illustrate with an example. **[3]**

b) Give five examples each of Manmade and natural sources of EMI . **[3]**

c) What are Electrostatic Discharge and what are its effects? **[4]**

Q2) a) Explain what are the class A, B and Class C interferences? **[3]**

b) Which parameters are consider for antenna EMI prediction. **[3]**

c) List different types of EMI control techniques and explain Grounding with an illustrative example. **[4]**

Q3) a) Define the terms EMI predication, what are the various models of EMI prediction, explain any of the prediction technique in detail. **[5]**

b) What do you mean by culling? How is it used in EMI prediction. **[3]**

c) What is radiation emission and susceptibility? **[2]**

Q4) What is the radiation emission and radiation susceptibility, draw the set up to measure the RE and RS measurement set up and explain the procedure to carry out the measurements. **[10]**

P.T.O.

Q5) a) Write a short note on various antennas used in EMI measurements. **[5]**

b) What is anechoic chamber, draw the diagram with labels of each component and explain the measurement procedure. **[5]**

Q6) a) What are the various standards of EMI/EMC and Explain the MIL STD 461/462. **[5]**

b) What is the role of filter in EMI control and explain the Low pass filter use in EMI control and also write the design steps of Low pass filter?**[5]**

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Total No. of Questions : 8]

SEAT No. :

P-764

[Total No. of Pages : 2

[6005]-759

M.E. (E & TC) (Microwave)

RADAR AND SATELLITE COMMUNICATIONS

(2017 Pattern) (Semester - III) (604302)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any Five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) How radar system predicts shape and size of the objects. Explain with suitable equations. **[5]**

b) Write a short note on pulse radar. **[5]**

Q2) a) How the basic radar range equation can be manipulated for an application of tracking. **[5]**

b) Explain the display methods used for different radars. **[5]**

Q3) a) Write short note on Surveillance radar system. **[5]**

b) Compare GO, PO estimation methods used for RCS. **[5]**

Q4) a) Explain the signal processing methods of radar system. **[5]**

b) Explain the application of radar as remote sensing. **[5]**

Q5) a) Define Kepler's Laws and explain its significance in satellite communication. **[5]**

b) Explain the methods of launching satellite in geostationary orbit. **[5]**

P.T.O.

Q6) a) Write short note on antenna used in satellite communication. **[5]**

b) A satellite at a distance of 37,000km from the surface of the earth ,radiates a power of 10 watts in the direction of earth station, f=10 GHz, Gain of receiving antenna is 30 dB, The transmitting antenna gain is 52.3 dB and effective area is $10m^2$. Calculate path loss EIRP and received power. **[5]**

Q7) a) Explain the satellite subsystem power requirements and management. **[5]**

b) Describe the recent trends in satellite system and its applications. **[5]**

Q8) a) Define deviation and inclination angles along with their significance. **[5]**

b) Explain FDMA technique in satellite communication. **[5]**

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Total No. of Questions : 8]

SEAT No. :

P-3548

[Total No. of Pages : 2

[6005]-761

M.E. (E & TC) (Signal Processing)

MATHEMATICS FOR SIGNAL PROCESSING

(2017 Pattern) (504401) (Semester - I)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Assume suitable data. if necessary.***
3) ***Use of Non-programmable calculator is allowed.***

Q1) a) Show that the components of vector B along and perpendicular to a vector A in the plane of A and B are : **[6]**

$$\frac{A,B}{A^2} \text{ and } \frac{(A \times B) x A}{A^2}$$

b) Explain the various properties of scalar and dot product. **[6]**

OR

Q2) a) A rigid body is spinning with angular velocity 27 rad/sec about an axis parallel to 2i + j – 2k passing through a point i + 3j – k. Find the velocity of the point of the body whose position vector is 4i + 8j + k. **[6]**

b) Find the torque about the point 2i + j – k of a force represented by 4i + k acting through the point i – j + 2k. **[6]**

Q3) a) Explain the properties of the determinants. **[6]**

b) Solve the equation : **[7]**

$$\begin{vmatrix} x+2 & 2x+3 & 3x+4 \\ 2x+3 & 3x+4 & 4x+5 \\ 3x+5 & 5x+8 & 10x+17 \end{vmatrix} = 0$$

OR

P.T.O.

Q4) a) Define Matrix and discuss various properties of special matrices. **[6]**

b) Explain various properties of Eigen values. **[7]**

Q5) a) Three coins are tossed simultaneously resulting in the sequence of heads and tails. Find the following probabilities **[6]**

i) First two tosses match

ii) Exactly two heads

iii) Not two heads

b) State and prove Baye's theorem. **[6]**

OR

Q6) a) A random variable X is defined by (for b > a)

$$f_x(x) = \frac{1}{b-a}, a \le x \le b$$
$$= 0, \text{elsewhere}$$

Verify that $f_X(X)$ satisfies the properties of pdf. What type of pdf is this? Find the cumulative distribution function and plot it as a function of X. Sketch the variations of $f_X(X)$ and $F_X(X)$ with X. **[6]**

b) The probability distribution function of a random variable X is defined as : **[6]**

f(X) = a exp(-b|X|) where X ranges from

Find the cumulative distribution function the relationship between a and b and the probability that the outcome X lies between 1 and 2.

Q7) a) Explain with mathematical relevance stationary and non-stationary stochastic process. **[7]**

b) A stochastic process X(t) has a mean value mx and autocorrelation $R_X(\tau)$. **[6]**

Find the mean and autocorrelation of the process Y(t) where :

Y(t) = X(t) – X(t-T)

OR

Q8) a) Determine the PSD and the mean square value of the sinusoidal process X(t) defined by : X(t) = A cos $(2\pi f_c t + \Phi)$. **[7]**

Where Φ is a random variable uniformly distributed over $(0, 2\pi)$

b) Explain with mathematical relevance properties of Guassian Process. **[6]**

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Total No. of Questions : 7]

SEAT No. :

P-3549

[Total No. of Pages : 2

[6005]-762

M.E. (E & TC) (Signal Processing)

DIGITAL IMAGE AND VIDEO PROCESSING

(2017 Pattern) (Semester - I) (504402)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any 5 questions from each section.***
2) ***Your answers will be valued as a whole.***
3) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
4) ***Assume suitable data. if necessary.***

Q1) a) Define Discrete Cosine Transform (DCT) and its inverse transformation. Discuss any three properties of DCT. **[5]**

b) Explain the process of image sampling and quantization. **[5]**

Q2) a) Explain the following color models in detail. **[5]**

i) CMY

ii) HIS

b) Explain following image enhancement operations in detail. **[5]**

i) Contrast streching

ii) Spatial domain filtering

Q3) a) For a given 4 × 4 image having gray scales between [0, 9], perform histogram equilization and draw the histogram of image before and after equalization. **[5]**

$$\begin{bmatrix} 2 & 3 & 3 & 2 \\ 4 & 2 & 4 & 3 \\ 3 & 2 & 3 & 5 \\ 2 & 4 & 2 & 4 \end{bmatrix}$$

b) Define the process of image restoration. Explain any four important noise probability density functions. **[5]**

P.T.O.

Q4) a) Explain winier filtering of image restoration in detail. **[5]**

b) What is loss less and lossy compression? Explain the Huffman coding in detail and with example. **[5]**

Q5) a) Explain the Transform based Image compression technique in detail. **[5]**

b) What is image segmentation? Discuss image segmentation with atleast 4 Morphological operators in detail. **[5]**

Q6) a) Explain how boundaries are represented using Moment representation and shape features. **[5]**

b) How Multi-level and Adaptive thresholding are different. **[5]**

Q7) a) Explain the color models in video. **[5]**

b) What is motion estimation? Explain the concept of block based motion estimation. **[5]**

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Total No. of Questions : 8]

SEAT No. : ____

P3550

[Total No. of Pages : 2

[6005]-763
F.Y.M.E. (E & TC)
ADVANCED DIGITAL SIGNAL PROCESSING
(2017 Pattern) (Semester - I) (504403)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) Write the procedure for FIR filter design by Frequency Sampling Method. What is the drawback in FIR filter design using windows and Frequency Sampling method? How it is overcome? **[6]**

b) Differentiate IIR Filter and FIR Filter. **[2]**

OR

Q2) a) Compare Digital and Analog Filters. What is IIR Filter? State important features of IIR Filter. **[6]**

b) What is Frequency warping? **[2]**

Q3) a) What is Multirate DSP system? State the concept of Decimation and Interpolation. **[4]**

b) Write in brief about adaptive telephone echo cancellation. **[4]**

OR

Q4) a) Consider the discrete time signal, x(n) = {1, 2, 3, 4} Determine the up-sampled version of the signals for the sampling rate multiplication factor, i) 1=2 ; ii) I = 3; iii) I =4 **[6]**

b) State the Weiner Hopf Equation. **[2]**

P.T.O.

Q5) a) Explain what is meant by the term "ergodicity". Is the sinusoid X(t) = Acos(wct+Q) with random phase-Q uniformly distributed on [0;2p] ergodic? (There is no justification required). **[9]**

b) Compare Time averages and Ensemble averages. **[8]**

OR

Q6) a) What does "Characterization of Random Processes" mean? Explain the process. **[9]**

b) What is Ergodicity? Explain.

Are the wide sense stationary process and Ergodic Process reasonable assumptions for a video signal? **[8]**

Q7) a) Explain VLIW Architecture in detail. **[9]**

b) Write the advantages and applications of FIR Filters and IIR filters.

State the applications of Decimation and Interpolation. **[8]**

OR

Q8) a) Explain the process of implementation of FIR filter with the help of an example. **[9]**

b) Write a brief note on Booth's Multiplication algorithm. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

P3551

[Total No. of Pages : 2

[6005]-765
F.Y.M.E. (E & TC) (Signal Processing)
BIOMEDICAL SIGNAL PROCESSING
(2017 Pattern) (Semester - II) (504407)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Attempt any Five Questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain Heart Structure with diagram. **[5]**

b) Define Cell Junction. Explain electrical activity of cell **[5]**

Q2) a) Explain different Bio-transducers. **[5]**

b) Explain Electrical Activity of heart with diagram. **[5]**

Q3) a) Write note on different Medical Images. **[4]**

b) Explain with block diagram Biomedical Instrumentation System. **[6]**

Q4) a) Explain instrumentation amplifier. **[4]**

b) Explain any two properties of Radon Transform. **[6]**

Q5) a) Write a note on MRI and Functional MRI (FMRI). **[4]**

b) Write a note on Eigen Analysis Spectral Analysis. **[4]**

c) Define non stationary signal with example. **[2]**

P.T.O.

Q6) a) Discuss the Autoregressive (AR) analysis. **[4]**

b) Explain in detail electromechanical models of signal generation. **[4]**

c) What is PET Image. **[2]**

Q7) a) Discuss the model based approach for spectral estimation. **[4]**

b) Explain Spectral Analysis of Heart rate. **[4]**

c) Write a note on Lattice adaptive filter. **[2]**

Q8) a) Explain the use of autocovariance in analysis of heart rate variability. **[4]**

b) Write a short note on RLS and Lattice Filter. **[4]**

c) What is role of Isolation amplifier. **[2]**

Total No. of Questions : 8]

SEAT No. :

P-4226

[Total No. of Pages : 2

[6005]-766

M.E. (E & TC) (Signal Processing)

SPEECH PROCESSING

(2017 Pattern) (Semester - II) (504408)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***All questions carry equal marks.***
5) ***Your answers will be valued as a whole.***
6) ***Use of logarithmic tables slide rule. Mollier charts, electronic pocket calculator and steam tables is allowed.***
7) ***Assume suitable data. if necessary.***

Q1) a) Explain speech production system and explain LTV model of Speech production in detail. **[6]**

b) Explain voiced and unvoiced speech signals and how it is used for decision making? **[4]**

Q2) a) Explain LTI model for speech production system? How limitations of LTI is overcome in LTV model. **[6]**

b) Explain the following terms : **[4]**

i) Spectrogram

ii) Autocorelation

Q3) a) What is Levinson Durbin algorithm for LPC of Speech signals? Explain. **[5]**

b) Explain the transformation from LPC to LSP and LSP to LPC. **[5]**

P.T.O.

Q4) a) Explain : **[5]**

i) Principle of linear predictive analysis?

ii) Burg algorithm

b) What is LSF? What is its significance? Explain the procedure of conversion of LPC to LSF. **[5]**

Q5) a) Explain : **[5]**

i) Forward linear prediction.

ii) AMDF method.

b) Explain cepstrum analysis for speech signal. What is the importance of formants. **[5]**

Q6) a) Explain Perceptual linear prediction in details. **[5]**

b) Explain the Wavelet analysis of speech. **[5]**

Q7) a) Explain ADPCM. **[4]**

b) Forward and backward adaptive quantizers. **[6]**

Q8) a) Explain following speech enhancement methods along with its merits and demerits. **[5]**

i) spectral subtraction.

ii) Adaptive noise cancellation.

b) Explain : **[5]**

i) Speaker recognition and verification

ii) Speech recognition

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Total No. of Questions : 8]

SEAT No. :

P-3552

[Total No. of Pages : 2

[6005]-767

F.Y. M.E. (Electronics and Telecommunications) (Signal Processing)

COMPUTER VISION

(2017 Pattern) (Semester - II) (504409)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt any 5 questions.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Make suitable assumptions wherever necessary.***

Q1) a) Explain Image matting and compositing in Computational photography. **[5]**

b) Explain with schematic diagram of digital camera. List any four specifications. **[5]**

Q2) a) Write short note on challenges and applications of computer vision. **[5]**

b) Explain Perspective camera model with suitable diagram. **[5]**

Q3) a) Explain Epipolar geometry in detail with respect to stereo vision. **[4]**

b) Explain Stereo parameters. **[6]**

Q4) a) Explain simple stereo system with suitable diagram. **[4]**

b) Explain volumetric representations in detail. **[6]**

Q5) a) Explain how to do feature alignment using least squares. **[4]**

b) Explain with neat diagram image stitching. **[4]**

c) Define following image features: - i) Edge & ii) line. **[2]**

P.T.O.

Q6) a) Explain meaning of good feature and describe basic idea of Harris Corner detector with relevant mathematics. **[4]**

b) Explain scale invariant feature transform. **[4]**

c) Define following image features: - i) Corners & ii) Curve. **[2]**

Q7) a) Describe any one differential technique for motion estimation. **[4]**

b) What is brightness consisting in optical flow estimation? **[4]**

c) Define optical flow in images. **[2]**

Q8) a) Explain Kalman filter and list its applications. **[4]**

b) Explain Iterative Estimation w.r.t. Optical flow. **[4]**

c) Define motion field in images. **[2]**

Total No. of Questions : 8]

SEAT No. :

P765

[Total No. of Pages : 1

[6005]-768
S.Y. M.E. (E & TC Signal Processing)
STATISTICAL SIGNAL PROCESSING
(2017 Pattern) (Semester-III) (604401)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve any five questions from Q.1 to Q. 8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***
5) ***Use of Non-programmable calculartor is allowed.***

Q1) a) Explain the special types of random processes. **[6]**

b) Explain Spectral Factorization. **[4]**

Q2) a) Explain ARMA Process. **[6]**

b) Compare Autocorrelation and covariance methods. **[4]**

Q3) a) Explain Least Square Method for signal modeling & its disadvantages. **[6]**

b) Explain PADE approximation method. **[4]**

Q4) a) State and explain Shank's Method for signal modeling. **[6]**

b) Explain All-pole modeling. **[4]**

Q5) a) Explain FIR & IIR Wiener Filter. **[6]**

b) What are advantages of lattice filters? **[4]**

Q6) a) Explain LMS algorithm with applications. **[6]**

b) Explain forward covariance method. **[4]**

Q7) a) Explain principle of estimation & its applications. **[6]**

b) Explain need of adaptive filters. **[4]**

Q8) a) Explain the properties of estimates with unbiased & consistent estimators. **[6]**

b) Explain Bartlett's Method. **[4]**

Total No. of Questions : 7]

SEAT No. :

P-766

[Total No. of Pages : 2

[6005]-769

M.E. (E & TC) (Signal Processing)

STILL IMAGE AND VIDEO COMPRESSION

(2017 Pattern) (Semester - III) (604402)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any Five questions.***
2) ***Your answer will be valued as a whole.***
3) ***Assume suitable data, if necessary.***

Q1) a) What are the merits of VQ over scalar quantization. How structured VQ is used for image compression. **[5]**

b) Define wavelets. Explain the concept of multi-resolution analysis & the scaling function. How wavelets are used for Image compression. **[5]**

Q2) a) How the Linde-Buzo_Gray algorithms are used for compression. Explain. **[5]**

b) Explain the JPEG-2000 encoder with respect to Preprocessor, Core encoder and ROI encoding. **[5]**

Q3) a) Explain Picture types I,P,B and D pictures. **[4]**

Q4) a) Explain model decoder and its type. Also explain the parameters D,B,R. **[5]**

b) An I picture is coded at 50 kbits. If the quantizer step size is linearly distributed between 10 and 16, find the complexity index for this picture. **[5]**

P.T.O.

Q5) a) What are the different types of pictures defined in MPEG-1 standard for trade off between coding efficiency and random access? Briefly explain the inter-independence among these pictures types in a typical video sequence. **[6]**

b) Explain Audio Psycho acoustic model in detail. **[4]**

Q6) a) Explain the following: **[6]**

i) Spatial scalability

ii) Temporal scalability

iii) SNR scalability

b) Explain the low bit rate video coding standard H.264. **[4]**

Q7) Explain following concepts in short with respect to MPEG-1. **[10]**

i) Video structure & GOP

ii) Picture slice & Macro-block

iii) Motion estimation

iv) Video Buffer

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Total No. of Questions : 8]

SEAT No. :

P-3553

[Total No. of Pages : 2

[6005]-771

F.Y. M.E. (E & TC) (VLSI & Embedded Systems)

DIGITAL CMOS DESIGN

(2017 Pattern) (Semester - I) (504201)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Assume suitable data if necessary.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of non programmable calculator is allowed.***

Q1) a) What is λ parameter? What is its significance? With help of suitable diagram, explain layout of MOSFET using λ parameters. **[5]**

b) Draw dc & ac equivalent circuits of MOSFET. Explain g_m, r_d and C_{gs}. **[5]**

Q2) a) Derive the expression for power delay product. What is its significance while designing the CMOS circuits? **[5]**

b) Derive the expression for dynamic and total power dissipations in the CMOS. **[5]**

Q3) a) What is wiring parasitic? Explain with suitable schematics. **[4]**

b) List various CMOS layout design rules. **[4]**

c) Draw the cross section of CMOS Inverter. **[2]**

Q4) a) With the help of suitable diagrams, explain delay model. **[4]**

b) What is need of transistor sizing? Explain with suitable example. **[4]**

c) Write note on logical efforts. **[2]**

P.T.O.

Q5) a) Design CMOS logic for Y = ABCD + E + FGH. Compute area on chip. **[4]**

b) What is effect on logic "1" and "0" if Pull-Up and Pull-Down networks are made up of N and P devices respectively in CMOS logic? Give example. **[4]**

c) Explore the concept and utility of tristate logic with example. **[2]**

Q6) a) Draw D flip-flop using transmission gates. Give timing diagram. **[4]**

b) With suitable schematic and timing diagram, explain dynamic hazards. What is solution to it? **[4]**

c) How to design the ckt immune to meta-stability? **[2]**

Q7) a) Mention the concept of ratioed logic. Draw the appropriate ckt diagram and explain. **[4]**

b) What are the merits and demerits of differential circuits? **[4]**

c) Explore Domino logic. **[2]**

Q8) a) What are the techniques of low power ckt design in CMOS. Explain in brief. **[4]**

b) List various materials that are used for performance improvement of CMOS. **[4]**

c) Write note on BiCMOS logic. **[2]**

Total No. of Questions : 8]

SEAT No. :

P-3554

[Total No. of Pages : 2

[6005]-772

F.Y. M.E. (E & TC) (VLSI & Embedded System)

RECONFIGURABLE COMPUTING

(2017 Pattern) (Semester - I) (504202)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions out of eight questions.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain flow of program execution for Von Neumann computer architecture. **[5]**

b) Brief and explain on instruction level parallelism and its usage. **[5]**

Q2) a) What is Reconfigurable computing? State advantages. **[5]**

b) Elaborate Garp's non-symmetrical RPF as fine-grained architecture. **[5]**

Q3) a) Explain DSP processor as domain specific processor, give example of DSP processors. **[5]**

b) Draw and explain multi-context LUT and its utility. **[5]**

Q4) a) Explain the significance of Reconfigurable Computing w.r.t interconnects. **[5]**

b) What is FPGA, explain flow design, how it is useful in Reconfigurable Computing. **[5]**

P.T.O.

Q5) a) Draw and explain architecture of DPGA w.r.t. RC. **[5]**

b) Explain PAM as Reconfigurable computing with example. **[5]**

Q6) a) What are the communication protocol involved in a network? **[5]**

b) Explain J-Bit as Reconfiguration Project Design Approach. **[5]**

Q7) a) What is partially reconfigurable computing, give example of any present device? **[5]**

b) Elaborate Reconfigurable Computing for Software Defined Radio. **[5]**

Q8) a) Explain Pattern matching by automation based text searching. **[5]**

b) Draw the architecture of adaptive controller ad explain it for control of complex Mechatronics system. **[5]**

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Total No. of Questions : 8]

SEAT No. :

P3555

[Total No. of Pages : 2

[6005]-773

First Year M.E. (E&TC) (VLSI and Embedded Systems)
EMBEDDED SYSTEM DESIGN
(2017 Pattern) (Semester-I) (504203)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions from eight questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) List the different design metrics in Embedded System. Explain the market window. **[5]**

b) Compare the different types of development platform trends in terms of IDE, board details and applications. **[5]**

Q2) a) Explain system on chips in Embedded systems. **[5]**

b) Draw and explain V design model for Embedded systems. **[5]**

Q3) a) What is need of pin connect block in LPC - 1768? Explain use of PINSE:x registers. **[4]**

b) Explain the Bluetooth protocol with suitable diagram with reference to ARM CORTEX M3 microcontroller. **[3]**

c) What is role of Barrel shifter in ARM processor. **[3]**

Q4) a) What is Nested Vector Interrupt Controller in ARM-M3? Explain it. **[6]**

b) Draw and explain the structure of CMSIS Standard of Cortex series. **[4]**

Q5) a) What is Embedded Linux? Explain the development tools required for Linux application development. **[5]**

b) Explain file structure and its use in Embedded Linux. **[5]**

P.T.O.

Q6) a) Explain how kernel initialization and space initialization is carried out in Embedded Linux. **[5]**

b) Explain various storage consideration in Embedded Linux. **[5]**

Q7) a) Explain Automated Meter Reading (AMR) as embedded system with respect to

Block diagram, **[6]**

Design considerations,

flow chart.

b) How to do the failure analysis in Embedded system. **[4]**

Q8) a) Explain testing and documentation for embedded system. **[4]**

b) Explain Digital Camera in Embedded system. **[6]**

Total No. of Questions : 8]

SEAT No. :

P3556

[Total No. of Pages : 2

[6005]-775
F.Y.M.E. (E & TC) (VLSI & Embedded Systems)
ANALOG CMOS DESIGN
(2017 Pattern) (Semester - II) (504207)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt any Five question.***
2) ***Figures to the right in bold indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) How does MOSFET behave as an resistor? Draw VI characteristics of the mos active resistor? What are its applications? **[5]**

b) Draw a schematic diagram and equivalent small and large signal models for the cmos inverter. **[5]**

Q2) a) Explain the effect of channel length modulation and body effect on MOSFET. **[5]**

b) What is the need of voltage and current references? Explain the concept of BGR with its necessity. **[5]**

Q3) a) Draw the schematic of the cmos difference amplifier with the current mirror load write the expression for ICMR, CMRR and 3dB frequency**[5]**

b) Which are the dominant noises in CMOS op-amp? Explain the techniques to reduce these noises. **[5]**

Q4) a) With respect to important porformance parameters, compare active load, current source, load and push-pull inverter. **[5]**

b) What is micropower op-amp? Explain the techniques used in the micropower op-amp. **[5]**

P.T.O.

Q5) a) What is the need of compensation in multistage amplifiers? Explain miller compensation in two-stage CMOS op-amp. **[5]**

b) What is slew rate? How propogation delay is related to slew rate, derive the relation **[5]**

Q6) a) Draw and explain single-ended and double-ended CMOS differential amplitirs. **[5]**

b) Write note on the stability of Op-amp and its effect on slew rate. What are different ways to improve stability? **[5]**

Q7) a) Explain the practical considerations for Low Noise Amplifier (LNA) Design **[5]**

b) Explain differential LNA with neat circuit diagram. **[5]**

Q8) a) What are the techniques to improve the bandwidth? How to use zeros as a bandwidth enhancer? Explain shunt peaking in an amplifier Give the exprersion for extended bandwidth. **[5]**

b) How nonlinear systems work as linear mixers. Explain square-low MOSFET mixer with neat circuits. **[5]**

Total No. of Questions : 8]

SEAT No. : ____

P3557

[Total No. of Pages : 2

[6005]-776
F.Y.M.E. (E & TC) (VLSI & Embedded Systems)
SYSTEM ON CHIP
(2017 Pattern) (Semester - II) (504208)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain RTL Based Chip Design Flow. **[4]**

b) What is Metastability? Explain the Problems Due to Metastability? **[6]**

Q2) a) How to determine the hardware implementation of an FSMD? **[4]**

b) Control Flow Modeling and the Limitations of Data Flow Models? **[6]**

Q3) a) Explain the Hardware schematic for a counter with Timing Diagram. **[4]**

b) Write ASIP Design flow & How ASIP design flow show better performance that SOC design based on hardware. **[6]**

Q4) a) What is Simulation - Synthesis Mismatch? **[4]**

b) Which are the Factors Affecting Delay and Slew? **[6]**

Q5) a) What are Causes of Power Dissipation? **[4]**

b) Write a note on Bus Synchronization along with the Challenges in it and Enable Synchronization Method? **[6]**

P.T.O.

Q6) Explain the difference between the following terms: **[10]**

a) Control hazard and data hazard

b) One-Way and Two-Way Handshake

Q7) a) Explain different Timing Parameters for Digital Logic? **[4]**

b) What are the Design Issues and Techniques for image codec? **[6]**

Q8) a) Write a note on 'A SOC Controller for Digital Still Camera'. **[4]**

b) Explain the Important Issues for Embedded Compilers. **[6]**

Total No. of Questions : 8]

SEAT No. :

P-3558

[Total No. of Pages : 2

[6005]-777

F.Y. M.E. (E & TC) (VLSI & Embedded System)

EMBEDDED AUTOMOTIVE SYSTEMS

(2017 Pattern) (Semester - II) (Credit System) (504209)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Assume suitable data if necessary.***
3) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) What is hybrid technology? Explain various operating models and compare advantages and disadvantages of each. **[5]**

b) Explain the working of spark plug & disk braking system with suitable diagram. **[5]**

Q2) a) Explain with suitable diagram Fuel Injectors in Petrol engine. Also describe security & warning system. **[5]**

b) Explain the open loop and closed loop control mode. **[5]**

Q3) a) Explain with the aid of a labeled sketch the operation of a wheel speed sensor. **[5]**

b) What are selection criteria of sensors for automotive applications. **[5]**

Q4) a) Explain the closed loop ignition control with its waveform. **[5]**

b) Make a clearly labeled sketch to show an exhaust gas recirculation system. **[5]**

Q5) a) Draw & explain electronic fuel control and electronic ignition system configuration. **[5]**

b) Explain working principle of tyre pressure monitoring system? **[5]**

P.T.O.

Q6) a) Comment on Anti-lock braking system & Electronic steering system. **[5]**

b) What is the role of control system strategies in fine tunning of automotive system? **[5]**

Q7) a) Compare LIN & Flex Ray with respect to automotive applications. **[5]**

b) Explain Protocol wakeup & startup with respect to Flex-Ray protocol. **[5]**

Q8) a) With respect to CAN explain error handling and protocol extension. **[5]**

b) Why is it important to calibrate a test equipment? Hence explain vehicle calibration tool. **[5]**

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Total No. of Questions : 8] **SEAT No. :**

P767 **[Total No. of Pages : 1**

[6005]-778

S.Y. M.E. (E & TC)(VLSI & Embedded Systems)
TESTING AND VERIFICATION OF VLSI CIRCUITS
(2017 Pattern) (Semester-III) (604201)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer any five questions. Each question carries 10 marks.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data, if necessary.***

Q1) a) Differentiate between Defect, Fault and Error with suitable example. **[5]**

b) Compare the terms verification and testing with respect to VLSI process. **[5]**

Q2) a) Illustrate different types of testing? **[5]**

b) Briefly discuss how VLSI technology trends have affected the domain of testing. **[5]**

Q3) a) What is fault simulation and logic simulation? What is the need of fault Simulation? **[5]**

b) Explain briefly Observability and Controllability. **[5]**

Q4) a) Explain combinational circuit test generation using suitable Example. Tell how it is different from sequential circut test generation. **[10]**

Q5) a) Differentiate between Analog Testing and Digital Testing. **[5]**

b) Explain different test pattern generation methods for BIST. **[5]**

Q6) a) What is DFT ? Discuss its need. **[5]**

b) Explain LFSR and Signature compaction of BIST. **[5]**

Q7) a) Write a short note on “SoC Testing” **[5]**

b) What is a ATPG. Explain in brief. **[5]**

Q8) a) Write a short note on “Embedded Core Testing” **[5]**

b) Explain the terms equivalence checking and model checking in short. **[5]**

Total No. of Questions :8] SEAT No. :

P768 [Total No. of Pages : 2

[6005]-779

M.E. (E &TC) (VLSI & Embedded Systems)

ASIC DESIGN

(2017 Pattern) (Semester - III) (604202)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt any Five questions out of Eight.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Write short note on logic level optimization. **[5]**

b) Draw and explain ASIC Design Flow. **[5]**

Q2) Explain the terms **[5]**

i) Constants

ii) Variable

iii) Attributes

b) Write VHDL code and test-bench code for 4-bit shift register. **[5]**

Q3) a) Write short note on power Dissipation **[4]**

b) Explain in brief system partitioning technique in ASIC. **[4]**

c) Write CAD tools used in ASIC Design. **[2]**

Q4) a) Explain in detail floor planning in ASIC with one example. **[4]**

b) Write short note on routing techiniques in ASIC. **[4]**

c) What are the goals and objectives of placement. **[2]**

P.T.O.

Q5) a) Explain power optimization techiniques in ASIC. **[4]**

b) With one example describe time optimization technique. **[4]**

c) How to estimate delays in ASIC Design. **[2]**

Q6) a) Explain in detail different time constraints in ASIC Design. **[4]**

b) Write short note on static timing analysis. **[4]**

c) How to design ASIC library. Comment on uses of library. **[2]**

Q7) a) Describe with one example gate level mixed mode simulation. **[4]**

b) Write short note on scan and partial test. **[4]**

c) Explain design challenges in mixed signal ASIC Design. **[2]**

Q8) a) Describe in brief Automatic Test pattern Generator. **[4]**

b) Write short note on memory testing. **[4]**

c) What is the signal integrity issues occured in ASIC Design. **[2]**

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Total No. of Questions : 5]

SEAT No. :

P-3559

[Total No. of Pages : 3

[6005]-801

M.E. (Information Technology)

MATHEMATICAL FOUNDATION OF INFORMATION TECHNOLOGY

(2017 Pattern) (SEMESTER - I) (514401)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) **Solve any two**

a) Calculate the mean deviation and its coefficient from the following data: **[5]**

Class:	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency :	5	8	12	15	20	14	12	6

b) Explain in detail about the various operators involved in genetic algorithm. **[5]**

c) A problem on probability is given to four students A,B,C,D whose probability of solving the problem are 1/2, 3/4, 1/4, 2/5 respectively. What is the probability that the problem will be solved? **[5]**

Q2) **Solve any two**

a) Suppose a genetic algorithm uses chromosomes of the form x = abcdefgh with a fixed length of eight genes. Each gene can be any digit between 0 and 9. Let the fitness of individual x be calculated as : **[5]**

$f(x) = (a + b) - (c + d) + (e + f) - (g + h)$,

and let the initial population consist of four individuals with the following chromosomes:

P.T.O.

$x1$ = 6 5 4 1 3 5 3 2

$x2$ = 8 7 1 2 6 6 0 1

$x3$ = 2 3 9 2 1 2 8 5

$x4$ = 4 1 8 5 2 0 9 4

Evaluate the fitness of each individual, showing all your workings, and arrange them in order with the fittest first and the least fit last.

b) Calculate the quartile deviation for the data given below : **[5]**

Daily wages (Rs.) :	35-36	36-37	37-38	38-39	40-41	41-42	42-43
No.of wage earners :	14	20	42	54	45	21	8

c) Explain single point cross over and two point crossover with example. **[5]**

Q3) **Solve any two**

a) Using genetic algorithm maximize $f(x) = x^2$ over (0,1,2.....31) with initial x values of (13,24,8,16). Show one crossover and mutation operation. **[5]**

b) The theory predicts the proportion of beans, in the four groups A,B,C, and D should be 9:3:3:1. I an experiment among 1600 beans, the number in the four groups were 882,313,287 and 118. Does the experiment result support the theory? Apply chi square test. **[5]**

c) What are the different applications of probability, tree and graphs in Computer field? **[5]**

Q4) **Solve any two**

a) The profit P earned, by a company, on some item is function of its units produced say X and is given by $P = 800X - 2X^2$,If the company's expenditure or interest, rent and salary of the staff be Rs. 1 lakh, show that the company will always be in loss. **[5]**

b) Let G = (V,E) be an undirected graph with k components and $|v| = n$ and $|E| = m$. prove that $m > = n - k$. **[5]**

c) Define the following terms **[5]**

i) Mean

ii) Mode

iii) Median with example

Q5) **Solve any two**

a) A department store, A, has four competitors : B,C,D, and E. Store A hires a consultant to determine if the percentage of shoppers who prefer each of the five stores is the same. A survey of 1100 randomly selected shoppers is conducted, and the results about which one of the stores shoppers prefer are below. Is there enough evidence using a significance level $\alpha = 0.05$ to conclude that the proportions are really the same? **[5]**

b) Write a short note on the following, **[5]**

i) Multicollinearity

ii) Partial association between two variables

c) Describe the concepts involved in real-coded genetic algorithm. **[5]**

Total No. of Questions : 7]

SEAT No. :

P-3560

[Total No. of Pages : 2

[6005]-802

F.Y. M.E. (Information Technology)

ADVANCE SOFTWARE ENGINEERING & PROJECT MANAGEMENT

(2017 Pattern) (Semester - I) (514402)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions from seven questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) What is Specialized Process Model. Discuss any two types of it. **[5]**

b) Explain Operational Specifications. Enlist it's types. **[5]**

Q2) a) Discuss any two design concepts. **[5]**

b) Draw and Explain hierarchy of Classification of specification styles. **[5]**

Q3) a) Explain with suitable diagram various dimensions of design model. How process dimension are different from abstract dimension. **[5]**

b) Enlist various Agile process models. Explain any two agile process models. **[5]**

Q4) a) What are the common sources of risks in project? Explain various risk mitigation and monitoring practices? **[5]**

b) Discuss various code cloning techniques with eg. **[5]**

Q5) a) Explain project scheduling process with eg. Which problems may be encountered during scheduling? **[5]**

b) Discuss the various quality attributes used to assess quality of the software. **[5]**

P.T.O.

Q6) a) Explain why the process of project planning is iterative and why a plan must be continually reviewed during software project. **[5]**

b) Explain Distributed Software Engineering with respect to case study. **[5]**

Q7) Write a short note on any two : **[10]**

a) Aspect Oriented Programming

b) Pair Programming

c) AUP

d) CMMI-IPPD

□□□

Total No. of Questions : 8]

SEAT No. :

P3561

[Total No. of Pages : 2

[6005]-803

First Year M.E. (Information Technology)

APPLIED ALGORITHMS

(2017 Pattern) (Semester-I) (514403)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Suppose you have algorithms with the five running times listed below. (Assume these are the exact running times). How much slower do each of these algorithms get when you **[4]**

i) double the input size, or

ii) increase the input size by one?

1) n^3
2) $100n^2$
3) $n \log n$
4) 2^n

b) Write and explain an algorithm to determine whether any pair of line segments intersects. **[6]**

Q2) a) Explain asymptotic notations: Big O, Omega, and Theta notations with suitable example. **[4]**

b) Write an algorithm for binary search. Write its complexity and remove the recurrence from the equation. **[6]**

Q3) a) Write down the steps of Miller-Rabin algorithm for primality test. Using it test the number 561 for primality. **[4]**

b) Explain the standard and slack forms of linear programming. **[6]**

Q4) a) Write and explain the pointer doubling algorithm with suitable example. **[4]**

b) What is the need & significance of randomized algorithm? State the properties of randomized algorithm. Explain different classes of randomized algorithm. **[6]**

P.T.O.

Q5) a) Explain in detail the "Concept of Reducibility". **[4]**

b) Write and explain the greedy algorithm to solve the online k-server problem defined on planner trees. **[6]**

Q6) a) Explain vertex cover problem using linear programming. **[4]**

b) What is B-Tree? What are its properties? Construct a B-tree with minimum degree t=3 by inserting elements 10, 20, 30, 40, 50, 60, 70, 80 and 90 in an initially empty B-Tree. **[6]**

Q7) a) Write and explain Johonson's algorithm for sparse graph. **[4]**

b) Explain Approximation algorithm with example of traveling-salesman problem. **[6]**

Q8) a) Write an algorithm to compute convex hull using divide and conquer approach. **[4]**

b) Write and explain an algorithm to find a solution of 2D-Closest pair problem. Also analyze the same. **[6]**

Total No. of Questions : 6]

SEAT No. :

P3562

[Total No. of Pages : 1

[6005]-804
F.Y.M.E. (Information Technology)
RESEARCH METHODOLOGY
(2017 Pattern) (Semester - I) (514404)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Describe Meaning of Research, Objectives of Research. **[5]**

b) What are the techniques involved in defining a research problem? **[5]**

Q2) a) Distinguish between alternative hypothesis and null hypotheses. **[5]**

b) Define the term 'Literature Review'. Enumerate the objectives and significance of literature review. **[5]**

Q3) a) Explain different merits of collecting data. **[5]**

b) Discuss statistical functions: Correlation, Multiple Regression analysis. **[5]**

Q4) a) What do you understand by research report or thesis? Indicate its need and importance in the research work. **[5]**

b) What do you understand by the Research proposal? Define the criteria for evaluating the Research proposal. **[5]**

Q5) a) What are Intellectual Property rights? Write about its importance. **[5]**

b) Introduce Indian patent laws, process of patenting a research finding, Copy right. **[5]**

Q6) a) Discuss practical and efficient three-pass method for reading research papers. **[5]**

b) Discuss different types of technical papers. **[5]**

Total No. of Questions : 5]

SEAT No. :

P3563

[Total No. of Pages : 2

[6005]-805
F.Y. M.E. (Information Technology)
CYBER SECURITY & FORENSICS
(2017 Pattern) (Semester - II) (514407)

Time :3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) Solve any two.

a) Define & explain the term "Computer Forensics". **[5]**

b) Define Security triad: Confidential, Integrity, Availability. **[5]**

c) Explain Identification and Authentication, Phishing and Spoofing. **[5]**

Q2) Solve any two.

a) State the objectives of Computer Forensics. **[5]**

b) Explain Firewalls, VPNs, Intrusion Detection, and filters. **[5]**

c) Explain The Clark - wilson Model. **[5]**

Q3) Solve any two.

a) Explain Key Establishment and Authentication, Key Establishment Protocols. **[5]**

b) What is Cyber stalking, Violent Crime and Digital Evidence. **[5]**

c) Explain Domain Name System (DNS) and DNS cache poisoning. **[5]**

Q4) Solve any two.

a) Explain Forensic Analysis Fundamentals. **[5]**

b) Explain Windows Forensic Analysis - NTFS Overview. **[5]**

c) Explain Identification of Electronic Data, Forensic Preservation of Data. **[5]**

P.T.O.

Q5) Solve any two.

a) Explain Bitlocker and Encrypting File System(EFS) **[5]**

b) Explain Data Gathering and Observation, Hypothesis Formation, Evaluating Hypotheses, Conclusions and Reporting. **[5]**

c) Explain Intrusion investigation - Introduction, Methodologies, Preparation, Case Management and Reporting. **[5]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

P3564

[Total No. of Pages : 2

[6005]-806
First Year M.E. (Information Technology)
CLOUD AND DATA TECHNOLOGIES
(2017 Pattern) (Semester - II) (514408)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the concept of Threat Agents and Cloud Security Threats. **[6]**

b) Write a note on Cloud-Enabling Technology. **[4]**

Q2) a) Differentiate the functionalities of Pay-Per-Use Monitor and Audit Monitor. **[6]**

b) Explain Billing Management System for Cloud Computing. **[4]**

Q3) a) Explain Non-Disruptive Service Relocation Architecture. **[6]**

b) Demonstrate Multi-tier system architecture in Cloud Computing. **[4]**

Q4) a) Explain concept of Hypervisor Clustering Architecture and Resource Reservation Architecture. **[6]**

b) Explain concept of Bare-Metal Provisioning Architecture. **[4]**

Q5) a) Write a brief note on **[6]**

i) Exploratory Data Analysis

ii) Spam Filters.

b) Explain the concept Cost Metrics and Pricing Model of cloud computing. **[4]**

P.T.O.

Q6) a) Discuss concept of Data Science and Risk. **[4]**

b) Explain with suitable example Data Visualization and Fraud Detection. **[6]**

Q7) a) Explain The dialectical relationship between Cloud computing and big data. **[5]**

b) Explain Problems related to Big data technologies. **[5]**

Q8) a) Discuss Storage Workload Management Architecture. **[5]**

b) Discuss in detail Service Quality Metrics and SLAs. **[5]**

Total No. of Questions : 5]

SEAT No. :

P-3565

[Total No. of Pages : 3

[6005]-807

F.Y. M.E. (Information Technology)

INFORMATION TECHNOLOGY ORIENTED OPERATIONS RESEARCH

(2017 Pattern) (Semester - II) (514409)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***All question are compulsory.***
2) ***Assume Suitable Data, if necessary.***
3) ***Neat Diagram must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

Q1) **Solve Any Two :**

a) Solve the following LPP using the Simplex method : **[5]**

Minimize $Z = 5x_1 + 3x_2$,

subject to $x_1 + x_2 >= 2$

$5x_1 + 2x_2 >= 10$

$-2x_1 - 8x_2 >= -12$ and $x_1, x_2 \geq 0$

b) Describe the importance of formulating an Operations Research model. **[5]**

c) Solve using the Graphical method : **[5]**

Maximize $Z = 6x_1 + 4x_2$,

subject to $15x_1 + 15x_2 <= 300$

$30x_1 + 10x_2 <= 500$

$20x_1 + 50x_2 <= 40$ and $x_1, x_2 \geq 0$

Q2) **Solve Any Two :**

a) 'What is Operations Research? Discuss on the characteristics of the model. **[5]**

b) Construct the dual of the following primal : **[5]**

Maximize $Z = 3x_1 - 2x_2 + 4x_3$

subject to $3x_1 + 5x_2 + 4x_3 \geq 7$

$6x_1 + x_2 + 3x_3 \geq 4$

$7x_1 - 2x_2 - x_3 \leq 10$

$x_1 - 2x_2 + 5x_3 \geq 3$

$4x_1 + 7x_2 - 2x_3 \geq 2$ and $x_1, x_2, x_3 \geq 0$

P.T.O.

c) Determine the initial basic feasible solution using : **[5]**

i) Least Cost Method

ii) Vogel's Approximation Method

10	8	7	2	9	4
6	2	5	4	4	8
4	10	1	3	9	9
3	3	4	5	6	

Q3) **Solve Any Two :**

a) Find the Optimal solution for the following transportation problem : **[5]**

2	2	3	2	3	60
2	1	5	6	2	35
3	4	4	4	1	40
22	45	20	18	30	

b) Solve the following Assignment problem : **[5]**

16	13	22	15	17	-
17	-	22	20	16	18
19	18	15	-	16	14
-	21	14	19	15	15
20	12	18	13	-	19

c) Apply the rule of dominance and find the value of game : **[5]**

2	4	2	3	1	3
1	4	2	3	7	–5
1	4	1	2	0	2
2	4	2	3	4	–1
2	4	2	3	3	–2

Q4) **Solve Any Two :**

a) What is Game Theory? Write a short note on applications of game theory. **[5]**

b) Consider the following Payoff table, which strategy should be chosen considering : **[5]**

i) Maximin Criterion

ii) Maximax Criterion

iii) Minimax Criterion

iv) Laplace Criterion

		States of Nature		
		N1	N2	N3
	S1	6	4	2
Strategies	S2	8	3	7
	S3	9	7	5

c) Explain the assumption underlying Game theory. **[5]**

Q5) **Solve Any Two :**

a) Use Dynamic programming to solve : **[5]**

Minimize $Z = y_1^3 + y_2^3 + y_3^3$

Subject to $y_1 + y_2 + y_3 = 40$

Where $y_1, y_2, y_3 \geq 0$

b) Consider the following activity details for a project : **[5]**

Activity	Predecessor	Duration (Weeks)
A	--	5
B	A	2
C	A	6
D	B	12
E	D	10
F	D	9
G	D	5
H	B	9
I	C,E	1
J	G	2
K	F,I,J	3
L	K	9
M	H,G	7
N	M	8

i) Draw network for this project.

ii) Find critical path and project completion time.

iii) Determine Total float for each activity.

c) Discuss different time estimates used in PERT. **[5]**

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Total No. of Questions : 7]

SEAT No. :

P769

[Total No. of Pages : 2

[6005]-808

S.Y. M.E. (Information Technology)

MOBILE AD-HOC NETWORKS

(2017 Pattern) (Semester-III) (5144013)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any 5 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) High-frequency X-rays and Gamma rays are not normally used for wireless communication.Explain why. **[5]**

b) Why do we have four address fields in IEEE 802.11 MCA as against only two in IEEE 802.3 MCA frame? **[5]**

Q2) a) Discuss the differences in topology reorganization in DSDV and CGSR routing protocols. **[5]**

b) Explain AODV routing protocol with suitable diagram. **[5]**

Q3) a) Draw the Classifications of Multicast Routing Protocols. Explain Bandwith efficient multicast routing protocol (BEMRP) in detail. **[5]**

b) Enlist design goals and Operation of Multicast Routing Protocol. **[5]**

Q4) a) Why Does TCP Not Perform Well in Ad Hoc Wireless Networks? Explain in detail the enhancements done to TCP that improved the performance of TCP in ad hoc wireless Ad Hoc Network. **[5]**

b) Explain operations of any two Transport Layer Solutions. **[5]**

i) TCP-BuS

ii) Ad Hoc TCP(ATCP)

iii) Slipt TCP

P.T.O.

Q5) a) List and explain how some of the inherent properties of the wireless ad hoc networks introduce difficulties while implementing security in routing protocols. **[5]**

b) Enlist and gives brief descriptions of the different Attacks pertaining to the network layer in the network protocol stack. **[5]**

Q6) a) Write an algorithm for SWAN AIMD rate control mechanism. **[5]**

b) Compare and Contrast distributed power control algorithms in ad hoc wireless networks over the centralized power control algorithms? **[5]**

Q7) a) Explain the key encrypting key (KEK) algorithm. **[5]**

b) Compare and Contrast the hybrid coordinator (HC) of the IEEE 802.11e MAC protocol with the point coordinator (PC) of the IEEE 802.11 MAC protocol. **[5]**

Total No. of Questions : 7]

SEAT No. :

P-770

[Total No. Of Pages : 2

[6005]-809
S.y.M.E. (Information Technology)
ADVANCED OPERATING SYSTEM
(2017 Pattern) (Semester-III) (5144014)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates :

1) ***Answer any five questions from seven questions.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Differentiate among the following types of operating systems with respect to properties and features. **[5]**

i) Time Sharing

ii) Parallel processing

iii) Network

iv) Distributed

b) Explain the desirable features of a good message passing system. **[5]**

Q2) a) Describe the mechanisms for handling multi datagram messages in IPC. **[5]**

b) Explain the Architecture of Distributed Shared Memory with suitable diagram. **[5]**

Q3) a) Explain the implementation of RPCMechanism with suitable diagram. **[5]**

b) Explain any two consistency models in DSM. **[5]**

P.T.O

Q4) a) Discuss the Lamport's Clock Synchronization Algorithm. **[5]**

b) Discuss the features of good Distributed File system. **[5]**

Q5) a) Explain the probe based distributed algorithm for deadlock detection in a distributed systems. **[5]**

b) Explain the working principle of file caching scheme in DFS. **[5]**

Q6) a) Explain the design issues in the file systems wrt any Mobile OS of your choice. **[5]**

b) Explain the case study with its architecture: Android. **[5]**

Q7) **Write short notes on following: (Any Two)** **[10]**

a) Election Algorithms

b) Scheduling in Mobile OS

c) Distributed Computing Models

Total No. of Questions : 7]

SEAT No. :

P-3566

[Total No. of Pages : 2

[6005]-811

M.E. (Instrumentation & Control) (Process and Biomedical Instrumentation)

MATHEMATICAL METHODS IN INSTRUMENTATION

(2017 Pattern) (Semester - I) (506101)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Assume suitable data, if necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***

Q1) a) Define Euclidean inner product and Euclidean norm of a vector. **[2]**

b) If $\overline{u} = (-1,1,2), \overline{v} = (2,-1,2)$ then find Euclidean inner product

$< 2\overline{u} - 3\overline{v}, 3\overline{u} + \overline{v} >$ **[4]**

c) Determine basis and dimension of vectors (3, 8, –3, –5), (1, –2, 5, –3), (2, 3, 1, –4) in a vector space V = R^4. **[4]**

Q2) a) Let $\overline{v}_1 = (1,0,1)\ \overline{v}_2 = (-1,1,0)$ be an orthonormal set of vectors in R^3, if $\overline{u} = (1,2,3)$ find orthogonal projection $\overline{u}$ on W and orthogonal component of $\overline{u}$ to W. **[5]**

b) Show that the set $B = (\overline{u}_1, \overline{u}_2, \overline{u}_3)$ where $\overline{u}_1 = (0,1,0)\ \overline{u}_2 = (1,0,1)$ $\overline{u}_3 = (1,0,-1)$ is an orthogonal basis of R^3. **[5]**

Q3) a) Determine the value of y when $x = 0.1$, by Euler modified method given that $\frac{dy}{dx} = x + y, y(0) = 1$ and $h = 0.1$. **[4]**

b) Explain Gauss Elimation method with suitable example. **[6]**

P.T.O.

Q4) a) The first four central moments of a distribution are 0,2.5, 0.7 and 18.75. Comment on the skewness and kurtosis of the distribution. **[5]**

b) The probability that a bomb dropped from a plane will strike the target is $\frac{1}{5}$. If six bombs are dropped, find the probability that exatly two will strike the target. **[5]**

Q5) a) A continuous random variable X has a probability density function given by $f(x) = 2e^{-2x}$, $x \geq 0$ and $f(x) = 0$, $x < 0$. **[5]**

Find

i) Find moment generating function,

ii) The first four moment about origin.

b) Explain the terms Skweness and Kurtosis with suitable examples. **[5]**

Q6) a) A joint density function of two random variable X and Y is given by **[6]**

$f(x,y) = \frac{xy}{96}, 0 < x < 4, 1 < y < 5$. And $f(x, y) = 0$, otherwise.

Find

i) E(X),

ii) E(Y),

iii) E(2X + 3Y)

b) Explain Bay's theorem with suitable examples. **[4]**

Q7) a) If on an average one ship in every ten is wrecked, find the probability that out of five ship expected to arrive, 4 at least will arrive safely. **[5]**

b) Let R^4 have a Euclidean inner product, Find the cosine of angle between the vectors $\bar{u} = (-1,2,3,4)$ and $\bar{v} = (4,1,2,1)$. **[5]**

▽▽▽▽

Total No. of Questions : 7]

SEAT No. :

P-3567

[Total No. of Pages : 2

[6005]-812

M.E. (Process Instrumentation & Control)

TRANSDUCER DESIGN

(2017 Pattern) (Semester - I) (506102)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right candidates indicate full marks.***
4) ***Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam table is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Write short note on chemical sensor. **[5]**

b) Suggest the suitable non contact type transducer used to measure the temperature of furnace, elaborate the concept with neat sketch. **[5]**

Q2) a) Explain static and dynamic characteristics of instruments. **[5]**

b) Write a short notes on MEMS. **[5]**

Q3) a) Explain chemical sensor in detail with neat sketch and state its applications. **[5]**

b) Differentiate between torque, angular velocity and power. **[5]**

Q4) a) Suggest suitable scheme to measure torque of a rotating shaft using stain gauge. **[5]**

b) Specify the different level measurement approach's in the industry, suggest suitable transducer used for liquid level measurement. **[5]**

P.T.O.

Q5) a) Explain gas sensors in brief and state its applications. **[5]**

b) Classify and state selection criteria of transducers and illustrate performance characteristics of transducer. **[5]**

Q6) a) Specify the need of signal conditioning, and explain signal level and bias changes. **[5]**

b) Explain the role of ADC and DAC in interfacing of sensor with suitable example. **[5]**

Q7) a) Explain the concept of loading, divider circuits, and bridge circuits in brief. **[5]**

b) Comment on pH and conductivity, suggest suitable scheme for pH measurement of water in tank. **[5]**

▽▽▽▽

Total No. of Questions : 6]

SEAT No. :

P3568

[Total No. of Pages : 1

[6005]-813

F.Y.M.E. (Instrumentation & Control) (Process Instrumentation)

INDUSTRIAL AUTOMATION

(2017 Pattern) (Semester-I) (506103)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Elaborate with example hazard and operability study. **[5]**

b) What are the components of DCS? **[5]**

Q2) a) What are the OPC Technologies? **[5]**

b) Elaborate with an example 'Sequential Function Chart'. **[5]**

Q3) a) Develop point to point and multi-drop network configuration using HART protocol. **[5]**

b) Analyze architecture of DCS. **[5]**

Q4) a) Elaborate with example hazard and operability study. **[5]**

b) Explain in brief application of safety system. **[5]**

Q5) Develop programmable ladder diagram for motor speed control using VFD. **[10]**

Q6) Develop programmable ladder diagram for two lights are to flash on and off at different intervals. One is on 4 seconds and off 4 seconds. The other is on for 7 seconds and off 7 seconds. Two lights are to flash alternately, one for 4 Seconds, one for 7 Seconds. After five cycles both lights must go off. **[10]**

Total No. of Questions : 7]

SEAT No. :

P3569

[Total No. of Pages : 1

[6005]-814

F.Y.M.E. (Instrumentation & Control) (Process Instrumentation)

RESEARCH METHODOLOGY

(2017 Pattern) (Semester - I) (506104)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Figure to the righ indicate full marks.***
4) ***Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam table is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) What are the techniques involved in defining research problem. **[5]**

b) Distinguish between research method and methodology **[5]**

Q2) a) Write a short notes on Scope and objectives of research problem. **[5]**

b) Write a short notes on Linear scaling for receiver and fidelity of instrument. **[5]**

Q3) a) Explain primary and secondary data collection methods. **[5]**

b) Distinguish between point estimate and interval estimate. **[5]**

Q4) a) Write a short notes on uncertainty analysis. **[5]**

b) Write a short notes on asymptotic analysis. **[5]**

Q5) a) Explain hypothesis in details. State the qualities of good hypothesis. **[5]**

b) Explain: Static & Dynamic Characteristics of instruments. **[5]**

Q6) a) Discuss the structure of a typical Engineering Research Proposal and in short elaborate each point. **[5]**

b) Explain the significance of curve fitting in Engineering Research and the procedure to be followed for the same. **[5]**

Q7) a) Describe the layout of research proposal **[5]**

b) Explain Linear Regression Equation **[5]**

Total No. of Questions : 6]

SEAT No. :

P3570

[Total No. of Pages : 1

[6005]-815

M.E. - I (Instrumentation & Control Process Instrumentation)

PROCESS DYNAMICS AND CONTROL

(2017 Pattern) (Semester -II) (506107)

Time :3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) Elaborate procedure for calculating Relative Gain Array 2×2 systems. Decide the pairing of variables for a given relative matrix. **[10]**

$$\begin{bmatrix} 1 & 1 & -1 \\ 3 & -4 & 2 \\ -3 & 4 & 0 \end{bmatrix}$$

Q2) a) Elaborate with suitable block diagram "Gain Scheduling Adaptive Control". **[5]**

b) Develop with suitable application protection of equipment by override control **[5]**

Q3) Derive fundamental model of stirred tank heater. **[10]**

Q4) a) Analyze model forms of MPC **[5]**

b) Comment on Decoupling of loops **[5]**

Q5) a) What is the significance of SPC in Process Plants? **[5]**

b) Comment on effect of zeros and time delay. **[5]**

Q6) Develop a Cascade control configuration for the shell & tube Heat Exchanger, controlling the outlet stream temperature using steam flow as the manipulated variable. Explain with suitable block diagram "Internal Model Control". **[10]**

♦ ♦ ♦

Total No. of Questions : 5]

SEAT No. :

P3571

[Total No. of Pages : 2

[6005]-816

First Year M.E. (Instrumentation and Control)

(Process Instrumentation)

EMBEDDED SYSTEM DESIGN

(2017 Pattern) (Semester - II) (506108)

Time :3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) Attempt any two of the following.

a) List and discuss different addressing modes of AVR microcontroller. **[5]**

b) Draw and elaborate with neat schematic Port-A of AT Mega8535 AVR microcontroller. **[5]**

c) Explain Timer/Counter prescalers of AVR μC. **[5]**

Q2) Attempt any two of the following.

a) Elaborate memory organization of ARM processor. **[5]**

b) Discuss the Registers used in the ARM THUMB instruction set. **[5]**

c) Elaborate different modes of operation of ARM processor along with its advantages and disadvantages. **[5]**

Q3) Attempt any two of the following.

a) Write short note on ISA Bus. **[5]**

b) Compare between SPI vs. I^2C. **[5]**

c) Discuss CAN Protocol. **[5]**

P.T.O.

Q4) Attempt any one of the following.

a) Design and develop system for controlling direction and speed of DC motor using 8051 microcontroller. Elaborate the scheme. **[10]**

b) Design and develop system for monitoring CO gas using ARM - LPC2148 microcontroller. Elaborate the scheme. **[10]**

Q5) Attempt any one of the following.

a) Design complete embedded system for weather monitoring using LPC2148 µC. Consider suitable parameters and explain. **[10]**

b) Design complete embedded system using AVR µC for automotive dash board. Select proper sensors. Draw the suitable block diagram and explain interfacing circuit in detail. **[10]**

Total No. of Questions : 5]

SEAT No. :

P-3572

[Total No. of Pages : 2

[6005]-817

F.Y. M.E. (Instrumentation & Control) (Process Instrumentation)

CONTROL SYSTEM

(2017 Pattern) (Semester - II) (506109)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Figure to the right candidates indicate full marks.***
4) ***Use of electronic pocket calculator.***
5) ***Assume suitable data, if necessary.***

Q1) **Attempt any two Questions :**

a) The response of system is $y(t)=e^{|x(t)|}$. Test whether system is linear or non linear. **[5]**

b) Elaborate the concept of phase plane analysis. **[5]**

c) Illustrate the following physical non linearities; Dead zone, Saturation, Friction with example. **[5]**

Q2) **Attempt any two Questions :**

a) Explain following points related to nonlinear system; **[5]**

i) Stable node

ii) Unstable node

iii) Saddle point

iv) Stable focus

v) Unstable focus

b) Write short note on describing function with common nonlinearities. **[5]**

c) Elaborate the construction of phase trajectories by delta method. **[5]**

P.T.O.

Q3) **Attempt any two Questions :**

a) Determine a Lyapunov function for the nonlinear system given by **[5]**

$$x_1 = x_2$$

$$x_2 = -x_1 - x_2$$

b) Consider the nonlinear system **[5]**

$$x_1 = x_2$$

$$x_2 = -x_1 - x_1^2 x_2$$

Investigate the stability of the equilibrium points.

c) Check the stability of the system described by **[5]**

$$x_1 = -x_1 + 2x_1^2 x_2$$

$$x_1 = x_2$$

Use variable gradient method.

Q4) **Attempt any two Questions :**

a) Elaborate the Krasovskii Method of constructing lyapunov function. **[5]**

b) Describe the term zero dynamics with example. **[5]**

c) What do you mean stabilization, discuss with example. **[5]**

Q5) **Attempt any one Question :**

a) Explain variable structure systems. Give the examples of variable structures. **[10]**

b) Discuss various merits and drawbacks of sliding mode control. **[10]**

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Total No. of Questions : 5]

SEAT No. :

P771

[Total No. of Pages : 2

[6005]-818
S.Y. (Instrumentation & Control) (Process Instrumentation)
ADVANCED SIGNAL PROCESSINGS
(2017 Pattern) (Semester - III) (606101)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Figure to the right candidates indicate full marks.***
4) ***Use of electronic pocket calculator.***
5) ***Assume suitable data, if necessary.***

Q1) Attempt any two Questions.

a) Determine output response of an LTI system whose impulse response. **[5]**

$$h(n)=\left\{\begin{matrix}1 & 4 & \underset{\uparrow}{1} & -2 & 1\end{matrix}\right\} \text{ and } x(n)=\left\{\begin{matrix}1 & \underset{\uparrow}{3} & 5 & -1 & 1\end{matrix}\right\}$$

b) Design a Butterworth low pass filter using bilinear transformation by taking T =0.5 sec to satisfy following specification. **[5]**

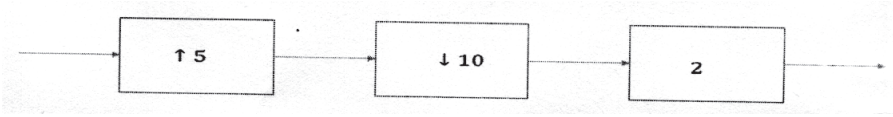
$$0.707 \le \left|H\left(e^{i\omega}\right)\right| \le 1.0 \text{ for } 0 \le \omega \le 0.45\pi$$

$$\left|H\left(e^{i\omega}\right)\right| \le 0.2 \qquad \text{for } 0.65\pi \le \omega \le \pi$$

c) Discuss different methods of the digital FIR filter design. **[5]**

Q2) Attempt any two questions.

a) Consider multirate system as shown in figure, find $y(n)$ as function of $x(n)$. **[5]**



b) The transfer function of an FIR filter is given by **[5]**

$$H(Z)=0.3+0.6_Z^{-1}+0.7Z^{-2}+0.18Z^{-3}+0.85Z^{-4}++0.25Z^{-5}+0.28Z^{-6}+0.42_Z^{-7}+0.89Z^{-8}$$

Obtain the poly phase decomposition of H(z) to decompose into 2 and sections.

P.T.O.

c) Explain the Short Time Fourier Transform. List various Properties of STFT. **[5]**

Q3) Attempt any two Questions.

a) Explain identities used in mutirate signal Processings. **[5]**

b) Consider the discrete time signal $x(n) = \{1\ \ 3\ \ 5\ \ 7\}$. **[5]**
Determine the up scaled version of the signal for sampling rate conversion.
I = 2, I = 3, I = 4

c) Compare LMS and RLS filters **[5]**

Q4) Attempt any two Questions.

a) Determine the frequency resolution of the Barlett, Welch and Blackman-Tukey methods of power spectrum estimates for a quality factor Q = 20. Assume that overlap in Welch's method is 50% and length of the sample sequence is 3000. **[5]**

b) With basic model of speech production, explain speech parameter estimation using homomorphic deconvolution. **[5]**

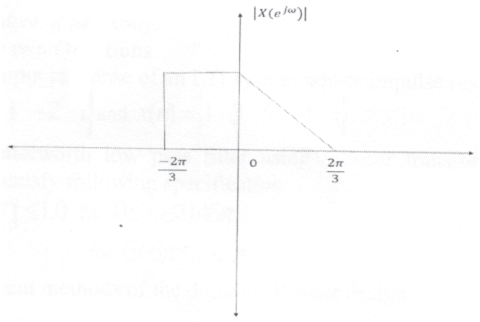
c) Explain ARMA modeling for power spectrum estimation. **[5]**

Q5) Attempt any one Question.

a) Explain ARMA modeling for power spectrum estimation. **[10]**

b) Autocorrelation values $\gamma_{yy}(0) = 4, \gamma_{yy}(1) = 2$ and $\gamma_{yy}(2) = 0$ are given for a process of a single sinusoid with additive white noise. Determine the frequency, its power, and variance of white noise. **[10]**

c) Consider a random variable X with a pdf as shown in Figure. Find A, mean value of X, and variance of X. **[10]**



Set-1

Total No. of Questions : 7]

SEAT No. :

P-772

[Total No. Of Pages : 2

[6005]-819

S.Y.M.E. (Process Instrumentation & Control)

BUILDING AUTOMATION

(2017 Pattern) (Semester-III) (606102)

Time : 2 Hours] *[Max. Marks : 50*

Instructions to the candidates :

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam table is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain with neat sketch building life safety system **[6]**

b) Write a short notes on Central processing unit of FACP **[4]**

Q2) a) List various types of reader in biometric access control system, Explain authentication with example. **[6]**

b) Write a short notes on PIDS. **[4]**

Q3) a) Explain single duct, constant volume, single zone systems Air conditioning system with neat sketch. **[6]**

b) Write a short notes on Air Handling Unit (AHU) **[4]**

Q4) a) What is Vapour compression cycle? Explain any one type of evaporator used in vapour compression cycle. **[6]**

b) Write a short notes on Chilled water coil. **[4]**

P.T.O

Q5) a) Explain features of primary controller and secondary controller in DDC with neat sketch. **[6]**

b) Write short notes on green building. **[4]**

Q6) a) Explain different steps in DDC control design process. **[6]**

b) Write a short notes on BACnet protocol. **[4]**

Q7) a) Explain Project Management, what are the charactertics of project. **[6]**

b) Write a short note on project closure & signoff. **[4]**

Total No. of Questions : 3] **SEAT No. :**

P-3573 **[Total No. of Pages : 1**

[6005]-822

M.E. (Printing)

PRINTING TECHNOLOGY MANAGEMENT

(2017 Pattern) (508102) (Semester - I)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***All questions compulsory.***
3) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) State different packaging products in the market today. **[9]**

b) What is the purpose for various designs in packaging. **[9]**

OR

Explain Managing the Supply Chain for the production of publishing house. **[18]**

Q2) a) How is ISO significant in the production of newspaper production. **[8]**

b) State and explain any one ISO standard that is used for newspapers. **[8]**

OR

a) Explain what is long term and short-term forecasting. **[8]**

b) How to reduce cost of quality while implementing a quality assurance program in a commercial printing house. **[8]**

Q3) Explain steps for process control in a Offset CTP unit. **[16]**

OR

What is process capability? Define and explain with suitable examples. **[16]**

▽▽▽▽

Total No. of Questions : 3]

SEAT No. :

P3574

[Total No. of Pages : 1

[6005]-823

F.Y. M.E. (Printing Engineering & Graphic Communication)

MODERN TRENDS IN PRINTING

(2017 Pattern) (Semester - I) (508103)

Time :3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Draw neat diagram wherever necessary.***
2) ***Figures to right indicate full marks.***

Q1) Explain in detail Inline flexo press. **[18]**

OR

Explain in detail stack flexo press. **[18]**

OR

Explain in detail factors affecting ink trasfer in offset. **[18]**

OR

Explain the effect of viscosity on gravure print quality. **[18]**

Q2) Explain the working of ELS system for a web press. **[16]**

OR

Explain the correlation of impression pressure and dot fidelity. **[16]**

Q3) Mention the care and maintenance for flexo process. **[16]**

OR

Explain the factors affecting ink transfer in offset. **[16]**

♦ ♦ ♦

Total No. of Questions : 3]

SEAT No. : ____

P3575

[Total No. of Pages : 1

[6005]-825

F.Y.M.E. (Printing Engineering & Graphic Communication)

COLOUR SCIENCE

(2017 Pattern) (Semester - II) (508107)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Assume suitable data wherever necessary.***
3) ***Figures on right indicate marks.***
4) ***All questions are compulsory.***

Q1) Describe following terms. **[18]**

a) Iluminant metamerism

b) Observer metamerism

Q2) "Perceptbility and Acceptability are two important Quality measore units in printing industy". Explain in details. **[16]**

Q3) a) What causes simultaneous contrast. **[16]**

b) What colors see together best contrast.

Total No. of Questions : 6]

SEAT No. :

P3576

[Total No. of Pages : 2

[6005]-826

First Year M.E. (Printing Engg. & Graphic Communication)

WEB HANDLING ON PRESS

(Semester - II) (2017 Pattern) (508108)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***All questions compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain the procedure for splicing in case of flying web splicer. State its advantages over zero speed. **[9]**

b) What is the significance of corona treatment? Explain any one methodology of treatment done for plastic films. **[9]**

OR

Q2) a) Write short notes on : **[18]**

i) Factors influencing tension in printing unit of gravure press.

ii) Why preconditioning of web in case of plastic reels is needed.

Q3) a) Explain procedure to check and control registration during printing in a gravure press. **[8]**

b) Where is the position of compensator roller? State the significance of the compensator roller for registration purpose. **[8]**

OR

Q4) State the factors controlling tension in the printing zone & in the rewind tension zone. Write short notes on following: Tensioning devices such as Brakes & Clutches. **[16]**

P.T.O.

Q5) What is Static and Dynamic balancing. How is it measured and calculated? Why does balance of rollers change in printing machine. **[16]**

OR

Q6) a) What is a wrap angle? Why is it important to maintain a specific wrap angle for the web? **[8]**

b) How is the deflection in the transport rollers measured? What problems occur due to deflection in rollers. **[8]**

Total No. of Questions : 6] **SEAT No. :**

P-3577 **[Total No. of Pages : 2**

[6005]-827

M.E. (Printing Engineering and Graphic Communication)

SUBSTRATE AND INK

(2017 Pattern) (508109) (Semester - II)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Solve Questions Q.1 or Q.2, Q.3 or Q.4 and Q.5 or Q.6.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures on right indicate marks.***
4) ***Assume suitable data wherever necessary.***

Q1) a) State and explain importance of refining stage in paper manufacturing. **[6]**

b) Discuss any two optical properties of paper and testing methods. **[6]**

c) Give typical formulation of sheet fed lithographic ink. **[6]**

OR

Q2) a) Explain Paper manufacturing and dewatering stages with suitable diagrams. **[9]**

b) What is Hydrogen bonding mechanism & What is outcome? **[9]**

Q3) Calculate paper required for printing 3000 copies of 8" × 11" size 4-page leaflet in 2+2 color. **[16]**

OR

Q4) Calculate paper required for printing 1000 copies of 8" × 11" size 4-page brochure in 4+4 color. **[16]**

P.T.O.

Q5) Comment on following. **[16]**

a) VOC and its significance in printing inks

b) Quality control for printing materials

OR

Q6) Comment on following. **[16]**

a) QC for paste Ink

b) Hazardous waste in printing.

▽▽▽▽

Total No. of Questions : 3]

SEAT No. :

P773

[Total No. of Pages : 1

[6005]-828

S.Y.M.E. (Printing Engineering and Graphic Communication)
PRINTED ELECTRONICS AND RFID
(2017 Pattern) (Semester - III) (608101)

Time : 2 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data wherever necessary.***
4) ***Figures to the right indicate marks.***

Q1) a) Comment on following (any three). **[12]**

i) Stretchable Electronics.

ii) Use of paper and polymer in low cost electronics.

iii) Conventional method of electronics manufacturing.

iv) Use of conventional printing methods for electronics manufacturing.

b) Discuss functional inks for use in printed electronics. **[6]**

Q2) Discuss Identifying and Tagging Everything with upcoming changes in technology. **[16]**

Q3) Discuss use of printed electronics in Smart Packaging. **[16]**

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Total No. of Questions : 3]

SEAT No. :

P-774

[Total No. Of Pages : 1

[6005]-829

S.Y.M.E. (Printing Engineering & Graphic Communication)

Advances in Converting and Packaging

(2017 Pattern) (Semester-III) (608102)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates :

1) ***Draw neat diagram wherever necessary.***
2) ***Figures to the right indicate full marks.***

Q1) a) Explain the converting techniques used for packaging. **[18]**

OR

b) Explain in detail coating techniques used for packaging. **[18]**

OR

c) Explain in detail dry lamination for converting. **[18]**

OR

d) Explain in detail varnishing technique **[18]**

Q2) a) Explain in detail Cast film extrusion process. **[16]**

OR

b) Polyethylene plays an important role in packaging. Explain **[16]**

Q3) a) Explain in detail aseptic packaging. **[16]**

OR

b) Explain in detail report packaging. **[16]**

Total No. of Questions : 6]

SEAT No. :

P-3578

[Total No. of Pages : 2

[6005]-832

M.E. (Production) (CAD/CAM) (Manufacturing and Automation)

RESEARCH METHODOLOGY

(2017 Pattern) (511102) (Semester - I)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4 and Q.5 & Q.6 are compulsory.***
2) ***Assume suitable data, if necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagram must be drawn wherever necessary.***

Q1) a) Explain legal aspects related with the research. **[5]**

b) Briefly describe the different steps involved in a research process. **[5]**

OR

Q2) Explain following in brief : **[10]**

a) Brain storming technique.

b) Delphi method.

Q3) a) Explain various Principles of Modeling. **[5]**

b) Explain process of formulation of model based on simulation. **[5]**

OR

Q4) Write short notes on : **[10]**

a) Experimentation Strategies.

b) Laboratory Experiments.

P.T.O.

Q5) a) What do you mean by process optimization? Explain it in brief. **[8]**

b) Explain General Factorial Design. **[7]**

Q6) Write short notes on : **[15]**

a) Principles of Thesis Writing.

b) Uni-variate analysis.

c) Non parametric tests.

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

P3579

[Total No. of Pages : 2

[6005]-833

F.Y. M.E. (Production) (CAD/CAM)
COMPUTER AIDED DESIGN
(2017 Pattern) (Semester-I) (511301)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4, and Q5 or Q6.***
2) ***Q7 and Q8 are compulsory.***
3) ***Figures to the right indicate full marks.***
4) ***Draw neat self-explanatory sketches wherever necessary.***
5) ***Use of calculator is allowed.***
6) ***Assume suitable data, if necessary.***

Q1) Define Explicit, Implicit and parametric representation of geometrical entities. and their advantages and disadvantages. **[5]**

OR

Q2) Why parametric representation of geometrical entities are preferred in CAD software? Explain your answer with non-parametric and parametric equations of appropriate geometric entity. **[5]**

Q3) What is Homogeneous Coordinate System? Explain the necessity of Homogeneous Coordinate system for transformation of geometric entities using suitable example. **[5]**

OR

Q4) Differentiate between Forward Engineering and Reverse Engineering. **[5]**

Q5) The coordinates of four control points are given by V_0=[2, 2, 0], V_1=[2, 3, 0], V_2=[3, 3, 0], V_3=[3, 2, 0]. Find the equation of Bezier curve, find the points on the curve for t=0, ¼, ½, ¾, and 1, also plot the curve for the given data. **[7]**

OR

Q6) Explain various types of surface entities. Derive parametric equation of analytical surface models. **[7]**

P.T.O.

Q7) a) Discuss in brief the basic elements of CSG model. Explain the main building operation of CSG scheme with examples. **[8]**

b) What is Z-buffer algorithm for B-REP and CSG model? **[7]**

Q8) Write short note on any three: **[18]**

a) Visual Realism

b) Types of animations

c) Parametric programming

d) CAD/CAM integration

e) Hidden line removal algorithm

Total No. of Questions : 6]

SEAT No. :

P3580

[Total No. of Pages : 2

[6005]-834

F.Y.M.E. (Production Engineering) (CAD/CAM)

COMPUTER AIDED MANUFACTURING

(2017 Pattern) (Semester - I) (511302)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

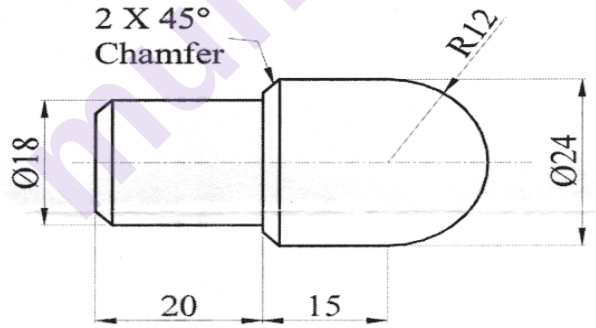
1) ***Answer Q.1 or Q.2. Q.3 or Q.4. and Q.5 & Q.6. are compulsory.***
2) ***Assume suitable data, if necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Explain various types of CNC machine tools. **[5]**

b) Write short note on virtual manufacturing. **[5]**

OR

Q2) Write NC program for the following job and also explain the meaning of each step (block). **[10]**



Q3) a) Explain CNC-Press in detail. **[5]**

b) Write short note on (any one). **[5]**

i) CNC - WEDM

ii) CNC - CMM

OR

P.T.O.

Q4) a) With the help of neat block diagram explain various elements of ASRS. **[5]**

b) Explain Automated Guided Vehicle (AGV) system. **[5]**

Q5) a) Write short note on machine vision. **[7]**

b) What is mean by automatic inspection? Explain various automatic inspection methods in brief. **[8]**

Q6) a) Comment and elaborate Digital Manufacturing. **[8]**

b) Write note on future automated factory and its impact on society. **[7]**

Total No. of Questions : 8]

SEAT No. :

P3581

[Total No. of Pages : 1

[6005]-835
F.Y.M.E. (Production) (CAD/CAM)
(Manufacturing and Automation)
COMPUTER INTEGRATED MANUFACTURING
(2017 Credit Pattern) (Semester - II) (511305)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4 and Q5 or Q.6.***
2) ***Q.7 and Q.8 are compulsory.***
3) ***Figures to the right indicate full marks.***
4) ***Draw neat self - explanatory sketches wherever necessary.***
5) ***Use of calculator is allowed.***

Q1) What is FMC? How does FMC ensure flexibility in manufacturing? **[5]**

OR

Q2) What are the benefits of GT to the manufacturing industry? **[5]**

Q3) What are the potential benefits of CIM? How can you apply the CIM in the case of i) Job shop production ii) Mass Production? **[5]**

OR

Q4) What is a relational database? Describe the architecture of database management system. **[5]**

Q5) What are the components of PLM software? Explain. **[7]**

OR

Q6) Which are the typical sensors that are normally used in robot? Explain. **[7]**

Q7) a) What are the communication interfaces used in computer-to-computer communication? Explain in brief. What are the commonly used interface cards? **[8]**

b) What are the components of small local area network in CIM setup? Explain. **[7]**

Q8) Write short notes on any three. **[18]**

a) The FMC software

b) ASRS

c) GKS implementation in a CAD workstation

d) ESPRIT - CIM OSA model

Total No. of Questions : 8]

SEAT No. :

P3582

[Total No. of Pages : 3

[6005]- 836

First Year M.E. Production (Manufacturing & Automation)

ARTIFICIAL INTELLIGENCE AND ROBOTICS

(2017 Pattern) (511306) (Semester - II)

Time :3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to right indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain with neat sketch Puma arm robot configuration. **[4]**

b) Carry out forward and inverse kinematic analysis of 2 DOF serial planar manipulator. **[6]**

Q2) a) The coordinates of the point p on the body are given by [4, 2, 3] T. Rotate the body about y axis by 90º and then about z axis by 40º. Find the new coordinates of the point p with respect to the fixed frame. **[4]**

b) Carry out forward kinematic analysis of 2P serial planar manipulator. **[6]**

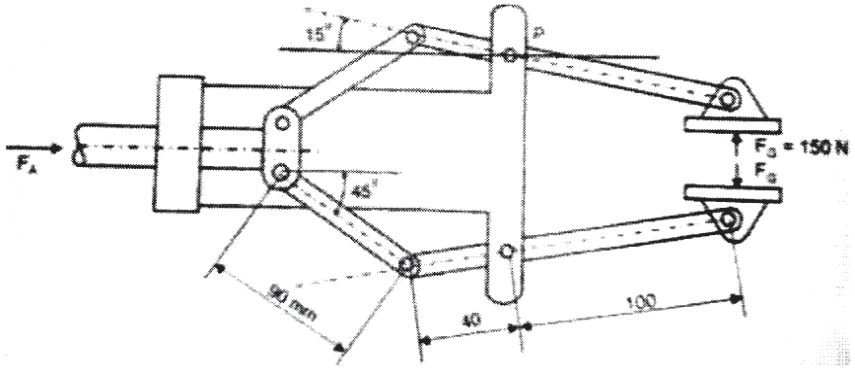
Q3) a) For a pick and place type of robot, the link parameters table is given below. Determine the location of the end point of the link 3 w.r.t. to the base. **[6]**

i	α_{i-1}	a_{i-1}	d_{i-1}	θ_{i-1}
1	0	0.2	0	10º
2	90	0	0.5	40º
3	0	0.10	0.2	50º

b) Derive arm matrix for a spherical robot. **[4]**

P.T.O.

Q4) a) Fig shows linkage mechanism and the gripper dimensions used to handle a work-piece for a machining operation. The gripping factor is required to be 210N. Calculate this required actuating force FA applied to plunger. P is pivot point in a mechanism **[7]**



b) Explain working principle of electromagnetic grippers. **[3]**

Q5) a) A robot arm with revolute joint is stationary at $\theta = 30^o$. It is required to move it to $\theta = 65^o$ in 4 seconds. Find the coefficient of cubic polynomial that accomplishes this motion and brings the manipulator to rest at goal point. Hence determine the angular position, velocity and acceleration at t = 2 seconds. **[4]**

b) Write and explain a robot program for color sorting task. **[6]**

Q6) a) The 6×6 array of pixels indicating each element as the gray level of pixel is given below. i) Construct the histogram and find threshold value. ii) Convert it into black and white image. iii) perform shape analysis (first and second order moments, centroids, run length encoding, principal angle) **[6]**

13	13	10	15	15	14
9	11	14	16	15	15
8	13	14	16	15	15
7	11	15	16	15	15
7	14	14	14	17	14
8	7	8	12	12	8

b) Sketch and explain a six component wrist sensors based on strain gauge element for force sensing. **[4]**

Q7) a) Explain the different ways by which robot teaching can be performed. **[6]**

b) Explain the working of AI with suitable example. **[4]**

Q8) a) What is function of encoder? Explain the principle of operation of incremental encoder. **[5]**

b) Discuss ANN technique with suitable example. **[5]**

Total No. of Questions : 6]

SEAT No. :

P-3583

[Total No. of Pages : 2

[6005]-837

M.E. (Production) (CAD/CAM)

COMPUTATION TECHNIQUES IN CAD/CAM

(2017 Pattern) (511307) (Semester - II)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4 and Q.5 or Q.6 are compulsory.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain in short the steps in static analysis. **[4]**

b) Describe dynamic analysis in FEA. **[6]**

OR

Q2) a) Explain in short photoelastic method of stress analysis. **[5]**

b) What are classification of fatigue testing machines and explain any one? **[5]**

Q3) a) What is discretization? Any one method of numerical discretization. **[5]**

b) Explain in short numerical method for convection. **[5]**

OR

Q4) a) Solve the following differential equation using Euler's method **[5]**

$$\frac{dy}{dx} = 1 + xy$$

Given : $y(0) = 1$ and

Also find y for $x = 0\ (0.1)\ 0.5$

b) Apply Runga Kutta method of 4^{th} order to solve differential equation **[5]**

$$\frac{dy}{dx} = x + y^2,\ y(0) = 1$$

to find y for $x = 0.2$ with $h = 0.1$

P.T.O.

Q5) Write short note on (any three) : **[15]**

a) Integer programming

b) Gradient base method

c) Direct search methods

d) Point elimination methods

Q6) a) Solve the following unconstraint non-linear optimization problem using Simulated Annealing (SA) (only one Iteration) **[7]**

$$\min(z) = (x_1^2 + x_2 - 11)^2 + (x_1 + x_2^2 - 7)^2$$
$$+ 0.1\ [(x_1 - 3)^2 + (x_2 - 2)^2]$$

Subjected to:

$$-6 \le x_1, x_2 \le 6$$

b) Minimize **[8]**

$$f(x_1, x_2) = x_1^2 + x_2^2 - 2x_1 - 4x_2 + 5$$

Such that

$0 \le x_1, x_2 \le 4$

Using Steepest Descent (Cauchy) method. Perform first iteration only.

Assume initial point as $x_1 = \begin{Bmatrix} 0 \\ 0 \end{Bmatrix}$

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

P775

[Total No. of Pages : 2

[6005]-838

S.Y. M.E. (Production-Manufacturing & Automation) (CAD/CAM)
COMPUTATIONAL INTELLIGENCE IN TOOL DESIGN
(2017 Credit Pattern) (Semester-III) (611101)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Explain 3-2-1 principle with neat sketch. **[6]**

b) Explain applications of Computer Aided Fixture Design. **[4]**

Q2) a) Explain use of computer software to calculate percentage utilization of strip **[6]**

b) A square hole 40mm×40mm is pierced in a circular blank of size 100mm,

[Given : Thickness of strip = 1mm, Shear strength of he material = 200 MPa.] Calculae Cutting force and Press tonnage. **[4]**

Q3) a) Explain important Variables in closed die forging **[6]**

b) Explain design procedure to design blocking impressin in forging. **[4]**

Q4) Write short notes on: **[10]**

a) Clamping stability analysis in fixture design.

b) Sensor based safety press working

Q5) a) Explain types bolster plates of Injection molding. **[6]**

b) Explain types of cooling system of injectioin molding. **[4]**

P.T.O.

Q6) a) Explain submerged plunger type die casting process. **[6]**

b) Explain ejection system die casting process. **[4]**

Q7) a) Describe optimal design of feed system of sand casting. **[6]**

b) Describe sand casting solidification. **[4]**

Q8) Write short notes on: **[10]**

a) Heat transfer in injection mold design.

b) Types of die casting dies.

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Total No. of Questions : 6]

SEAT No. :

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[Total No. Of Pages : 2

[6005]-839
S.Y.M.E. (Production Engineering) (CAD/CAM)
Computer Aided Process Planning
(Semester-III) (2017 Pattern) (511311)

Time : 2 Hours] *[Max. Marks : 50*

Instructions to the candidates :

1) ***Q.No.5 and Q.No.6 are compulsory.***
2) ***Answer to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of non-programmable calculator is allowed.***
6) ***Assume suitable data, if necessary.***

Q1) a) What are types of trends? Explain with suitable sketches. **[5]**

b) Describe the computerized method for design of facility layout. **[5]**

OR

Q2) a) Explain rank order clustering algorithm used for group technology **[5]**

b) Discuss the benefits of design rationalization. **[5]**

Q3) a) Briefly describe various measures of performance in multiple machine scheduling problem with independent jobs. **[5]**

b) Explain with neat block diagram of MRP-I and its component. **[5]**

OR

Q4) a) What is capacity planning? Explain with suitable example. **[6]**

b) Discuss MRP-II (Manufacturing Resource planning) **[4]**

P.T.O

Q5) a) The demand for the product for last 10 years is given below. Estimate the demand for next two years by regression method. **[8]**

year	2010	2011	2012	2013	2014	2014	2015	2016	2017	2018	2019	2020
units	142	135	124	167	179	156	112	172	171	180	172	162

b) Explain the generic model of ERP system. **[7]**

Q6) **Write short notes on the following:** **[15]**

a) SFDC

b) Parts classification and coding

c) DCS-Distributed control system

Total No. of Questions : 8]

SEAT No. :

P3584

[Total No. of Pages : 2

[6005]-841

First Year M.E. (Production Engineering)(Manufacturing & Automation)

ADVANCED MANUFACTURING PROCESSES

(2017 Pattern) (Semester-I) (511103)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of electronic pocket calculator and logrithmic tables is allowed.***

Q1) a) How mold filling and solidification simulation help to improve casting quality? **[4]**

b) Which are the important steps followed in the modern foundries during sand casting? **[4]**

c) How conventional machining processes fail to fulfill demands of modern industries.? **[2]**

Q2) a) Describe important characteristics EDMed parts. **[4]**

b) Which are the non-conventional machining processes used for machining of advanced engineering materials? **[4]**

c) List out important blow molding defects with their remedies. **[2]**

Q3) a) Explain with neat sketch working principle Abrasive water jet machining. **[4]**

b) How to identify arc welding defects and remove them? **[4]**

c) Differentiate between destructive and Non-destructive testing's. **[2]**

Q4) a) Describe principle of material removal, advantages and limitations of ECM. **[5]**

b) Explain various arc welding defects with their causes and remedies. **[5]**

P.T.O.

Q5) a) A wire of 15 mm diameter is to be reduced to 7.5 mm diameter. The die angle is 15º and the coefficient of friction at dies and wire interface is 0.5. The flow stress of wire material is 340 N/mm^2. Determine drawing stress and drawing load if the drawing speed is 0.7 m/s. **[4]**

b) Explain metal high speed hot forging with neat sketch. **[4]**

c) List out various the non-conventional forming processes. **[2]**

Q6) a) Explain metal stretch forming with neat sketch. **[4]**

b) Explain high energy rate forming with neat sketch. **[4]**

c) Differentiate between hot forming and cold forming. **[2]**

Q7) a) Explain important process parameters of electro-hydraulic forming. **[4]**

b) A tube of 12 mm external diameter and 1mm thickness is to be reduced to 16 mm external diameter and 0.5 mm thickness. The die angle is 24º and plug angle is 16º. The coefficients of friction at die and tube interface and tube and plug (mandrel) interface is 0.5. The flow stress of tube material is 340 N/mm^2. The tube drawing is carried at a speed of 0.4 m/s. Calculate the fixed plug. **[4]**

c) What is high speed blanking? **[2]**

Q8) a) Explain various rolling problems. **[5]**

b) Explain forming limit diagram. **[5]**

Total No. of Questions : 8]

SEAT No. :

P3585

[Total No. of Pages : 2

[6005]-842

F.Y.M.E. (Production Engg.) (Manufacturing and Automation)

INDUSTRIAL AUTOMATION

(2017 Pattern) (Semester - I) (511104)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve Any 5 Questions.***
2) ***Figure to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***
5) ***Use of Logarithmic Table, Slide rule is Electronic pocket calculator is allowed.***

Q1) a) For a swash plate type of pump following data operates: [6] Number of pistons = 6 Piston diameter = 25 mm Pitch circle diameter of the cylinder = 180 mm. Input power = 8 KW. γ Volumetric efficiency = 90% Mechanical efficiency = 89 Calculate theoretical pump displacement and angle of swash plate if maximum pressure and speed at which pump operates is 200 bar and 1000 rpm respectively. **[6]**

b) Explain with neat sketch pressure compensated flow control valve. **[4]**

Q2) Draw the suitable pneumatic circuit using cascade system to actuate cylinder 'A', cylinder 'B' and cylinder 'C' as per following sequence: **[10]**

a) Cylinder A extends

b) Cylinder B extends

c) Cylinder C extends

d) Cylinder A retracts

e) Cylinder C retracts

f) Cylinder B retracts.

P.T.O.

Q3) Write short notes on:

a) Design aspects of hydraulic accumulator. **[5]**

b) Selection criteria for P, PI, and PID controllers. **[5]**

Q4) a) A feeder selector device at one of the stations of an automatic assembly machine has a feed rate of 25 parts/min and provides a throughput of one part in four. The ideal cycle time of the machine is 10 sec. The feeder stops for 20 parts in feed track and will starts while 10 parts in feed track. Determine how long will it take for the feeder to turn on once it is turned off and how long it will take to turn off once it is turned on? **[6]**

b) List Out the Different Types of Feeder **[4]**

Q5) Write a short note on following.

a) Automated Guided Vehicles Guideline Technology **[5]**

b) Design aspects of hydraulic accumulator **[5]**

Q6) a) Classify the robot manipulators. **[5]**

b) Explain robot programming languages. **[5]**

Q7) Explain the Concept of the Following.

a) Explain discrete event simulation and its applications in manufacturing. **[5]**

b) Explain the Role of Artificial Intelligence in Manufacturing. **[5]**

Q8) Write short notes on:

a) 10 Principal of Material Handling System. **[5]**

b) Artificial Neural Networks in manufacturing automation. **[5]**

Total No. of Questions : 8]

SEAT No. :

P-3586

[Total No. of Pages : 2

[6005]-843

M.E. (Production) (Manufacturing & Automation)

ADDITIVE MANUFACTURING

(2017 Pattern) (Semester - II) (511109)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Classify the different additive manufacturing processes. **[4]**

b) Explain the importance of additive manufacturing in product development. **[5]**

OR

Q2) a) What are the different tooling used in additive manufacturing. **[4]**

b) Explain the various materials used in additive manufacturing. Elaborate any one. **[5]**

Q3) a) Explain the tool path generation in additive manufacturing. **[4]**

b) Explain in brief MIMICS. **[5]**

OR

Q4) a) Explain the model reconstruction in additive manufacturing. **[4]**

b) Explain the importance of data processing in additive manufacturing. **[5]**

Q5) a) Explain the Selective Laser Sintering with reference to its working process advantages and disadvantages. **[8]**

b) Explain the medical and Bio-Additive manufacturing with its applications, advantages and disadvantages. **[8]**

OR

P.T.O.

Q6) a) Explain the solid based additive manufacturing process with reference to its principle, working process, advantages and disdvantages. **[8]**

b) Explain the STL FORMAT in Rapid Prototyping, what are its advantages and disadvantages. **[8]**

Q7) a) Explain with neat sketch the Electron Beam Melting process. **[8]**

b) Write short note on Computer Aided Tissue Engineering (CATE). **[8]**

OR

Q8) a) Explain the Stereo-lithography with reference to its working process, advantages and disadvantages. **[8]**

b) Write short note on processing of additive manufacturing parts. **[8]**

▽▽▽▽

Total No. of Questions : 6]

SEAT No. : ____

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[Total No. of Pages : 2

[6005]-844

M.E. (Production (Manufacturing & Automation))

MECHATRONICS

(2017 Pattern) (611102) (Semester - III)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Q. No. 5 and Q. No.6 are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of non-programmable calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) What changes made mechanical systems to become electromechanical? **[5]**

b) Explain working and construction of strain Gauges with a neat sketch. **[5]**

OR

Q2) a) Describe with suitable application force weight sensor. **[5]**

b) In a certain system, an electric heating element was found to increase the temperature of a piece of metal 25° for each ampere of current. The metal expands 0.001 in /degree and pushes on a load sensor which outputs 1 V/0.005 in. of compression. Find the transfer function of three components and draw block diagram and also determine overall transfer function. **[5]**

Q3) a) Draw pin diagram of a Microcontroller 8051. **[3]**

b) Develop a conceptual design of a camera sensors based control system for counting a number of boxes being packed for dispatch. Assume suitable data if necessary. **[7]**

OR

P.T.O.

Q4) a) Describe the specification of Programming Logic Controllers. **[6]**

b) Explain with suitable example simple latch circuit. **[4]**

Q5) a) Construct a ladder logic diagram and outline narrative sequence for pneumatic cylinders clamping as A+B+B+A– **[6]**

b) Explain application of PLC system for robotic arc welding. **[9]**

Q6) Write short notes on the following : **[15]**

a) Microprocessor and microcontroller

b) PID and PLC

c) Advance mechatronics system in refrigerator