P-2606

[6071]-111

M.Sc. (Part - I)

ELECTRONIC SCIENCE

ELUT-111 : Mathematical Methods in Electronics Using C. (2019 Pattern) (Semester - I) (Credit - 4)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any five questions from Q.2 to Q.7.
- 3) Questions 2 to 7 carry equal marks.

Q1) Solve any five of the following :

- a) What is mean by partial differential equation? Give example of PDE in electronics.
- b) What are the different types of differential equations? Classify & give example of each.
- c) Obtain the Laplace transform of the $e^{-3t} \cos 5u(t)$ function.
- d) Explain fgetc() function with suitable example.
- e) Give the difference between "Call By Value" and "Call By reference".
- f) What are the various data types in C.
- **Q2**) Attempt the following :
 - a) i) Examine the stability of given equation using Routh Hurwitz method. $s^3 + 4s^2 + s + 6 = 0$. [4]
 - ii) Show that Laplace transform of f'(t) = Sf(s) f(0). Find the laplace Transform of $f(t) = A \cdot e^{-\alpha t}$. [3]
 - b) Using the method of separation of variables, separate the variables of Laplace equation in spherical co-ordinate system. [5]

P.T.O.

SEAT No. :

[Total No. of Pages : 3

[10]

- Q3) Attempt the following :
 - a) i) Draw the block diagram of two port Network. Define voltage, current transfer impedance and admitance function. [4]
 - ii) The co-ordinates of points in cylindrical coordinates $\left(4, \frac{2\pi}{3}, -2\right)$. Determine co-ordinates in rectangular co-ordinates. [3]

b) State convolution theorem. Determine the Laplace Transform of
$$\frac{1}{s^3(s-5)}$$
 using convolution theorem. [5]

Q4) Attempt the following :

a)	i)	Explain loop statements in C.	[4]
	ii)	Write a C program to find quadratic equation.	[3]

- b) Define Z-transform, Inverse Z-transform & Region of convergence. Determine Z-transform of $x(t) = e^{-at}$. [5]
- Q5) Attempt the following :
 - a) i) State initial value & final value theorem. Using initial value theorem, find the value of $F(s) = \frac{s+1}{s+2}$. [4]
 - ii) Draw poles & zeros for the current I(s) in the network given by

$$I(s) = \frac{2s+1}{(s+2)(s+1)}.$$
 [3]

b) Explain the concept of pointer. Write a program to reverse a string using pointer. [5]

Q6) Attempt the following :

- a) What are the advantages of state variable approach over transfer function approach? Find the transfer function low pass passive RC filter. [7]
- b) Write a wave equation in cylindrical co-ordinate system. Separate the variables. [5]

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- Q7) Attempt any two of the following :
 - Write a short note on : [6] a) Ordinary differential equation. i) Homogenous Differential equation. ii)
 - Non-Homogenous Differential equation. iii)
 - Explain storage class in C, with suitable examples. [6] b)

[6]

- Write a short note on : c)
 - i)
 - ii)
 - iii)



Total No. of Questions : 7]

SEAT No. :

P2607

[6071]-112

M.Sc.-I ELECTRONIC SCIENCE ELUT-112 : Analog Circuit Design (CBCS 2019 Pattern) (Semester - I)

Time : 3 Hours] Instructions to the candidates: [Max. Marks : 70

[Total No. of Pages : 3

- 1) Question 1 is compulsory.
- 2) Solve any five questions from Q.2 to Q.7.
- 3) Questions 2 to Q.7 carry equal marks.

Q1) Attempt any five of the following:

- a) When reverse gate voltage of JFET changes from 4 to 3.gv, the drain current changes from 1.3 to 1.6 MA. Find the value of transconductance.
- b) Identify the following circuit & draw output waveform.



- c) What are the advantages of "re" model of transistor?
- d) What is harmonic distortion in amplifier?
- e) What is difference in double tuned implifier and stagger tuned amplifier?
- f) For inverting amplifier $R_1 = 470\Omega$, $R_F = 4.7K\Omega$, calculate the values of A_F (Voltage gain) & Input resistance.

[10]

- *Q2*) Attempt the following:
 - a) i) Discuss in detail about Miller's theorem and its dual. [3]
 - ii) Calculate the dc bias voltage and currents in the circuit shown. Neglect V_{BE} of transistor. [4]



b) Explain the working of second order low pass batterworth filter with neat circuit diagram and design it for $f_H = 1$ KHz. [5]

Q3) Attempt the following:

- a) i) Explain the application of PLL as frequency multiplier. [3]
 - ii) Explain the working of Class C tuned amplifier with input-output wave forms. [4]
- b) For a circuit Shown, Find the values : I_{DQ} , V_{GSQ} , $I_{DSS}V_D$ & V_{DS} . Given Vs=1.7V. [5]

$$\frac{18V}{V_{p}} = -2V$$

$$\frac{1}{V_{p}} = -2V$$

$$\frac{1}{V_{s}} = 1.7V$$

$$\frac{1}{V_{s}} = 1.7V$$

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- *Q4*) Attempt the following:
 - a) i) Determine the forward resistance of diod when the forward current is 5mA.at T=300k, Assume sillicon diode. [3]
 - ii) Explain the working of practical differentiator. What are the designing steps of differentiator? [4]
 - b) Explain the working of stagger tuned amplifier. [5]
- *Q5*) Attempt the following:
 - a) i) What is Hartley oscillator? Explain the working with neat circuit diagram. [3]
 - ii) What is clamper? Explain the working of +ve clamper. [4]
 - b) Explain the approximate common emittor hybrid model & determine input impedance & Voltage gain using approximate model. [5]
- *Q6*) Attempt the following:
 - a) i) Design a high pass filter with cut off frequency 1 KHZ and a pass band gain of 2. [3]
 - ii) Describe the construction of phase shift oscillator and explain its working. [4]
 - b) Explain the working of RC coupled amplifier. What are advantages and disadvantages of two stage RC coupled amplifier? [5]
- Q7) Write short note on any two of the following: [12]
 - a) Distortion in amplifier.
 - b) Crystal oscillater.
 - c) Instrumentation amplifier.



Total No. of Questions : 7]

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[Total No. of Pages : 2

[Max. Marks : 70

[6071]-113

M.Sc.

ELECTRONICS SCIENCE ELUT - 113 : Digital System Design (2019 Pattern) (Semester - I) (Paper-III) (Credits-4) (CBCS)

Time : 3 Hours]

Instructions to the candidates :

- 1) Question 1 is compulsory
- 2) Solve any five questions from Q2 to Q7.
- 3) Q.2 to Q.7 carry equal marks.

Q1) Solve any five of the following.

- a) Write basic modelling styles in verilog.
- b) Give the difference between truth table and excitation table.
- c) What is mean by simulation?
- d) Using assign statement, Write logical expression for two input AND and OR gate.
- e) Mention the various types of PLDs.
- f) What is FSM?
- *Q2*) Attempt the following:
 - a) i) Design 3-bit gray to binary code converter. [3]
 - ii) Implement the following Boolean expression using PAL, $F_1 = \Sigma_M(3,5,7)$ and $F_2 = \Sigma_M(4,5,7)$. [4]
 - b) Using half subtractor module implement a full substractor and write verilog module for it. [5]

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[10]

SEAT No. :

Q3) Attempt the following.

a)	i)	Write the difference between \$monitor and \$display.	[3]
	ii)	Write Verilog module of D-FF with synchronous reset.	[4]
b)	With	the help of block diagram, truth table explain Johnson Counter	Also
	Writ	e any two applications of it.	[5]

Q4) Attempt the following.

a)

- i) Draw and explain in short the architecture of typical FPGA. [3]
 - ii) Explain any four data types in verilog with suitable example. [4]

•

[5]

[12]

- Write verilog code for displaying count on common cathode seven b) segment display for one digit BCD counter. [5]
- **Q5**) Attempt the following.

a)	i)	Design 4 to 2 priority encoder.	[3]
	ii)	State the advantages of using PLD over fixed function ICs.	List
		various types of PLDs.	[4]
b)	Exp	blain 4-bit universal shift register.	[5]

- b) Explain 4-bit universal shift register.
- *Q6*) Attempt the following.
 - Give the classification of semiconductor memory, State their types a) i) and characteristics. [3]
 - Write a verilog code for clocked RS Flip-flop with test bench. [4] ii)
 - Explain five gate premitives. b)
- Q7) Attempt the following (any two)
 - With the appropriate block diagram explain components of a verilog a) module.
 - Write a verilog code for J.K. flip flop using behavioural modelling. draw b) the test bench waveform for the same.
 - Write four features of typical CPLD. List the different CPLD devices. c)

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[6071]-113

P-2609

[6071]-114

M.Sc. (Part - I) ELECTRONIC SCIENCE ELDT114 : Basics of Optical Communication (2019 Pattern) (Semester - I) (2 Credits)

Time : 2 Hours]

Instructions to the candidates:

- 1) Q.1 is compulsory.
- 2) Solve any three questions from Q.2 to Q.5.
- 3) Q.2 to Q.5 carry equal marks.
- 4) Neat diagrams must be drawn wherever necessary.
- 5) Use of calculator is allowed.

Q1) Attempt any five of the following.

- a) State the snell's law.
- b) State the types of losses in fiber.
- c) State different splicing technique.
- d) What are major fiber joints?
- e) Classify fiber optic based on index profile.
- f) List the factor due to which connector losses occur.
- Q2) Answer the following.
 - a) i) What do you mean by total internal reflection state condition to obtain TIR. [2]
 - ii) Explain the reasons for pulse broading due to material dispersion in optical fibers. [4]
 - b) What is fiber splice? State types of fiber splice, explain any one splicing method in detail. [4]

[Max. Marks : 35

[5]

P.T.O.

SEAT No. :

[Total No. of Pages : 4

- Q3) Answer the following.
 - a) i) State advantages and disadvantages of fiber optic communication. [2]
 - ii) Briefly explain the problem of fresnel reflection at all types of optical fiber joint. [4]
 - b) When the mean optical power launched into an 8 km length of fiber is 120 μ w, the mean optical power at the fiber output is 3 μ w. Calculate signal attenuation in d_B per unit (Km) length. [4]
- Q4) Answer the following.
 - a) i) Compare between meridional ray and skew ray. [2]
 - ii) With neat diagram explain the term acceptance angle and acceptance cone indicating reflected ray and lost ray. [4]
 - b) Briefly outline the factors which cause intrinsic losses of fiber-fiber joints. [4]

Q5) Write short note on any four of the following. [10]

- a) Explain micro and macro bending loss in fiber cable.
- b) Write a short note on fiber buffering.
- c) What is optical repeater? Explain regenerative repeater.
- d) Explain LASER driver circuit.
- e) Write a short note on cylindrical Ferrule connectors.
- f) List the types of misalignment which may occur when jointing compatible optical fibers.

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P-2609

[6071]-114

M.Sc. (Part - I)

ELECTRONIC SCIENCE

ELDT114 : Fundamentals and Applications of PIC Microcontrollers

(2019 Pattern) (Semester - I) (Paper - IV) (CBCS-2Credits)

Time : 2 Hours]

Instructions to the candidates:

- 1) Q.1 is compulsory.
- 2) Attempt any 3 questions from Q.2 to Q.5.
- 3) Q.2 to Q.5 carry equal marks.

Q1) Attempt any five of the following.

- a) What is the role of TRISx register?
- b) What is addressing mode?
- c) Give the applications of PIC microcontroller.
- d) List the instructions for clear operation.
- e) What is the use of RAM in microcontroller?
- f) Give the size of timers in PIC.
- Q2) Attempt the following.
 - a) Explain MOVLW, ADDLW and ANDWF instructions with the help of examples. [6]
 - b) Write a note on RISC architecture. [4]
- Q3) Attempt the following.
 - a) Draw the interfacing diagram of LCD with PIC. Write PIC C program to display 'A' on LCD. [6]
 - b) What is interrupt? Give the difference between polling and interrupt.[4]

3

[Max. Marks : 35

[5]

[4]

- Q4) Attempt the following.
 - a) Explain any three instructions of control operations with the help of examples. [6]
 - b) Explain 8-bit format of Timer 0 control register. (OPTION-REG).[4]

[10]

- Q5) Attempt any four of the following.
 - a) Draw the interfacing diagram of common cathode SSD with PIC.
 - b) Draw the block diagram of Timer 0 without WDT.
 - c) Write any 5 features of PIC.
 - d) Give the difference between microcontroller and microprocessor.
 - e) Give the size and range of Timer 0 and Timer 1 registers.
 - f) Write an assembly language program to toggle PORTB continuously. (without delay)

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4

Total No. of Questions : 7]

P2610

[6071]-211

M.Sc.-I

ELECTRONIC SCIENCE

ELUT - 121 : Applied Electromagnetics, Microwaves and Antennas (2019 Pattern) (Semester-II) (Paper-I) (Credit-4)

Time : 3 Hours]

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any five questions from Q.2 to Q.7.
- 3) Questions 2 to Q.7 carry equal marks.

Q1) Solve any five of the following.

- a) Write the electric and magnetic field wave equation for conducting medium.
- b) What is VSWR?
- c) Find the reflection coefficient of a transmission line having line impedance 100Ω terminated in 100Ω load.
- d) What is stub matching in transmission lines?
- e) What is out off frequency in waveguide?
- f) Define the term : antenna gain and bandwidth.
- **Q2**) Attempt the following.
 - a) Explain cavity resonator and Q-factor of cavity resonator. [7]
 - b) Explain the radiation principle in oscillating dipole. [5]
- **Q3**) Attempt the following.
 - a) What is smith chart? Write the characteristics and applications of smith chart. [7]
 - b) Find the skin depth for copper at 10Hz and 100 Hz frequency. [5] [For copper, $\mu = \mu_0$, $6 = 5.8 \times 10^7$ s/m]

P.T.O.

[Total No. of Pages : 2

[Max. Marks : 70

[10]

SEAT No. :

- *Q4*) Attempt the following:
 - a) Derive the continuity equation. Write the significance of Maxwell's equations in wave propagation. [7]
 - b) Derive the relation between VSWR and voltage reflection coefficient ρ_{y} [5]
- **Q5**) Attempt the following.
 - a) Explain the boundary conditions at the interface seperating two medium in electromagnetic wave propagation. [7]
 - b) Explain role of an antenna in exciting TE and TM modes on waveguide. [5]
- *Q6*) Attempt of the following.

a)	Explain magnetron oscillato	or w	it	h r	ef	erenc	e to o	constru	iction,	worki	ng and
	applications.										[7]

b) Write a note on optical fiber. [5]

Q7) Attempt any two of the following.

 $\mathbf{ }$

a)	Explain the cavity resonator.	[6]
/		L~J

- b) Write a note on TE and TM mode of waveguide. [6]
- c) What is microstripline? What are different types of microstriplines? Write its applications. [6]



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[6071]-212

M.Sc. (Part - I)

ELECTRONIC SCIENCE

ELUT-122 : Instrumentation And Measurement Techniques (2019 Pattern) (Semester - II) (Credit System)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any five questions from Q.2 to Q.7.
- 3) Questions 2 to 7 carry equal marks.
- 4) Neat diagrams must be drawn whenever necessary.
- 5) Use of non-programmable calculator is allowed.

Q1) Solve any five of the following :

- a) State different types of strain gauges.
- b) What is Resolution?
- c) Draw equivalent circuits of piezoelectric trans ducer.
- d) Give classification of instruments.
- e) Enlist advantages of potentiometer transducer.
- f) "Measurements by direct method are not always possible". Comment.

Q2) Answer the following :

- a) Discuss generalized instrumentation system with block diagram. [7]
- b) An experiment is conducted to calibrate a copper-constant thermocouple. With cold junction at 0°, emf obtained at boiling point of water (100°C) and boiling point of sulfur (445°C) are 5 mV and 25 mV respectively. If the relation is assumed to be $e t_1 t_2 = a(t_1 t_2) + b(t_1^2 t_2^2)$ [5]
 - i) Determine constants a and b.
 - ii) The above thermocouple indicates 2 mV with the cold junction at 40°C. Determine the unknown hot junction temperature.

[10]

SEAT No. :

[Total No. of Pages : 3

Q3) Answer the following :

- What are strain gauges? Derive the expression for gauge factor. [7] a)
- b) Derive the first order electrical system gives the output voltage, $e_0 = \text{Ei}[1 - \exp(-t/\tau)].$ [5]

Q4) Answer the following :

- Describe the construction and working of thermocouple. Discuss any a) two methods of measurement of their output voltage. [7]
- b) The output of an LVDT is connected to a 5V voltmeter through an amplifier whose amplification factor is 250. An output of 2mV appears across the terminals of LVDT when the core moves through a distance of 0.5 mm. Calculate the sensitivity of the LVDT and that of the whole set up. The millivoltmeter scale has 100 divisions. The scale can be read to 1/5 of a division. Calculate the resolution of the instrument in 100 [5] mm.

O5) Answer the following :

- What is loading effect? Describe the loading effect due to shunt a) connected instrument. How loading effect is minimized in above case? [7]
- Write difference between static characteristics and dynamic b) characteristics. Define following terms : [5]
 - i) True value
 - Acuracy ii)
 - Standard Deviation iii)

Q6) Answer the following :

- With neat diagram explain construction and working of LVDT. State a) applications of it. [7]
- What is relative limiting error in measurement. A 0-150V voltmeter b) has a guaranteed accuracy of 1 percent of full scale reading. The voltage measured by this instrument is 75V. Calculate percentage relative limiting error. Comment upon the result. [5]

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Q7) Write short notes on any two of the following :

- a) Null type instrument
- b) Ultrasonic flow meter
- c) Thermisters



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Total No. of Questions : 7]

SEAT No. :

[Total No. of Pages : 2

[6071]-213 M.Sc. - I

ELECTRONIC SCIENCE ELUT-123 : Foundation of Semiconductor Devices (2019 Pattern) (CBCS) (Semester - II)

Time : 3 Hours]

P2612

[Max. Marks : 70

Instructions to the candidates:

- 1) Q.1 is compulsory.
- 2) Solve any Five questions from Q.2 to Q.7.
- 3) Questions 2 to Q.7 carry equal marks.
- 4) Neat diagrams must be drawn wherever necessary.
- 5) Use of non programmable calculator is allowed.

Q1) Solve any five of the following :

- a) What are the advantage of Unipolar transistor over bipolar transistor?
- b) Define mass action law.
- c) The Lattice constant of a simple cubic cell is 5.63 A°. Calculate distance between the nearest (100) plane.
- d) Draw band and bond structure of P type of semiconductor material.
- e) What do you mean by binary compound semiconductor? Give example.
- f) For JFET $V_{GS} = -3V$, $V_{P} = -6V$ and $I_{DSS} = 10$ mA Calculate I_{D} .
- Q2) Attempt the following questions :
 - a) Describe the lattice structure of Simple Cubic (SC) Body centered Cubic (BCC) and Face Centered Cubic (FCC). Find out packing fraction of SC, BCC and FCC. [7]
 - b) Explain Eber Moll model for NPN BJT. [5]
- **Q3)** Attempt the following questions :
 - a) Explain energy band diagram in MOS capacitor with n type substrate in Accumulation, Depletion and Inversion mode. [7]

[10]

- b) Draw diagram indicating the Fermi Dirac distribution function for [5]
 - i) Intrinsic Semiconductor.
 - ii) n type semiconductor.
 - iii) P type semiconductor.
- Q4) Attempt the following questions :
 - a) Derive Schrodinger time independant and time dependant wave equation. [7]
 - b) A current of 50A is established in a slab of copper that is 0.5 cm thick and 2 cm wide. The slab is placed in a magnetic field β of 1.5T. The magnetic field is perpendicular to the plane of the slab and to the current. The Free electron concentration in Cu is 8.4×10^{28} m⁻³. What will be the magnitude of the Hall voltage across the width of the slab? [5]

Q5) Attempt the following question :

- a) Explain substitutional and interstitial defect using suitable sketches. [7]
- b) Explain the working of HBT. [5]
- **Q6)** Attempt the following questions :
 - a) Using Fermi-Dirac distribution function, obtain an expression for concentration of electron in conduction band and hole in valance band of semi conductor. [7]
 - b) Explain the construction and operation of a MESFET. [5]
- **Q7)** Write short notes on any two of the following : [12]
 - a) Effect of temperature on mobility of carriers.
 - b) Types of bond in solid.
 - c) Hall effect. Derive relation for Hall coefficient.

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SEAT No. :

P2613

[6071]-214

M.Sc. -I

ELECTRONIC SCIENCE ELDT-124 : Fiber Optic Communication Systems (2019 Pattern) (CBCS) (Semester - II) (Paper-IV)

Time : 2 Hours] Instructions to the candidates:

- 1) *Q. 1 is compulsory.*
- 2) Solve any three questions from Q.No.2 to Q.No.5.
- 3) Q.2 to Q.5 carry equal marks.

Q1) Solve any Five of the following.

- a) List the three functional types of optical amplifiers.
- b) Define attenuation in fiber.
- c) What is an optical switch?
- d) List the four basic elements that contributes to the rise time.
- e) Mention the three types of optical couplers.
- f) What is a fiber Bragg grating.

Q2) Answer the following:

- a) i) What is an optical add/drop multiplexer in fiber optic cable? State advantages of OADM. [2]
 - ii) Explain the process of measurement of attenuation in optical fiber cable. [4]
- b) Explain the working of Optical Time Domain Reflectometer (OTDR).[4]
- *Q3*) Answer the following:
 - a) i) Mention any two names of lasers and their main use with respect to medical field. [2]
 - ii) Describe the working of optical amplifier. [4]

[Max. Marks: 35

[Total No. of Pages : 4

[5]

P.T.O.

- b) For a multimode fiber following parameters are recorded. LED with drive circuit has rise time of 15ns. LED spectral width=40nm, Material Dispersion related rise time degradation=21ns over 6km link, receiver band width = 25 MH₂, modal dispersion rise time=3.9nsec, calculate system rise time. [4]
- *Q4*) Answer the following:
 - a) i) What is dispersion in optical fiber? List the methods of dispersion.[2]
 - ii) Explain the concept of integrated optics. [4]
 - b) Design an optical fiber link for transmitting 30 Mb/Sec of data for distance of 8km with BER of 10⁻⁹. [4]
- *Q5*) Write a short note on any four of the following:
 - a) Rise time budget
 - b) Raman amplifier.
 - c) Optical Isolators.
 - d) Optical power meter.
 - e) Laser welding.
 - f) Line coding in optical links.

[4×2.5=10]

P2613

[6071]-214 M.Sc.-I

ELECTRONIC SCIENCE

ELDT-124 : Fundamentals and Applications for AVR Micro Controller (2019 Pattern) (CBCS) (Semester - II) (92215)

Instructions to the candidates:

Time : 2 Hours]

- 1) Q.1 is compulsory.
- 2) Solve any Three questions from Q.2 to Q.5.
- 3) Q.2 to Q.5 carry equal marks.

Q1) Attempt any five of the following:

- a) Write the pin function of SCL and SDA pins of AVR (AT mega 16) micro controller.
- b) Which flag bit of status register updated when SEH and CLH instruction executed in AVR microcontroller.
- c) State the bit capacity of timer registers present in AVR (AT mega 16).
- d) What memory address in assigned to timer 0, timer 1 & timer 2 overflow interrupt in the interrupt vector table?
- e) State the function of the SQW/OUT pin of the DS1307 real time clock.
- f) Find the step angle if stepper motor needs 200 steps to complete one revolution?
- **Q2**) Answer the following:
 - a) i) Write assembly language program to get the status of switch is connected to PBO and send it to LED connected to PBT. [2]
 - ii) Draw and explain the DAC interfacing diagram with AVR micro controller and write 'c' program to generate square wave. [4]
 - b) Draw the status register format and explain each Flag bit in detail of AVR micro controller. [4]

3

[5]

[Max. Marks : 35]

- *Q3*) Answer the following:
 - a) i) What is the content of R21 and status flag register after execution of following instruction. [2]

LDI R21, 0×FF LDI R22, 0×01 ADD R21, R22

- ii) For 10- bit ADC have Vref=5V. calculate the D₀-Dg digital output if the analog input is 1) 0.8V 2) 1.8v [4]
- b) Draw and explain architecture block diagram of AVR (AT Mega 16) micro controller. [4]

Q4) Answer the following:

- a) i) What are the types of addressing modes? [2]
 - ii) What are the types of seven segment display? And draw and explain interfacing of seven segment display with AVR micro controller.[4]
- b) Write an AVR 'C' program to convert ASCII digits of '4' and '7' to packed BCD and display them on PORT B. [4]
- Q5) Write short notes on any four of the following: $[4 \times 2.5 = 10]$
 - a) Timer/Counter control register (TCCR)
 - b) Data memory of AVR micro controller.
 - c) Features of AVR micro controller.
 - d) The X-register, Y-register & Z-register of AVR micro controller.
 - e) Modes of I²C (Inter-integrated circuit) serial protocol.
 - f) Real Time Clock (RTC) DS1307 module.



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[Total No. of Pages : 2

[6071]-311

M.Sc. (Part-II) ELECTRONIC SCIENCE ELT231 : Advanced Communication Systems (2019 Pattern) (Semester - III) (CBCS) (Credit-4)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Q.1 is compulsory.
- 2) Solve any five questions from Q.2 to Q.7.
- 3) Questions 2 to 7 carry equal marks.

Q1) Solve any <u>five</u> of the following.

- a) State kepler's IIIrd Law.
- b) Define the term modulation.
- c) What will be output of balanced modulator?
- d) State one application of space wave propagation.
- e) A 50 kw carrier is to be modulated to a level of 80% What is the total side band power in this case.
- f) Write a short note on EBCDIC code.
- Q2) Attempt the following.
 - a) State SDLC protocol with appropriate frame format explain function of each block in detail. [7]
 - b) Draw Block diagram of electronic communication system state function of each block in brief. [5]

Q3) Attempt the following

- a) Discuss smart Antenna concept in detail write benefits, advantages & disadvantages of smart Antenna. [7]
- b) Draw block diagram of micro wave transmitter and receiver and explain it's working. [5]

P.T.O.

[10]

SEAT No. :

- *Q4*) Attempt the following.
 - a) With the help of diagram explain the working of adaptive delta modulation and write advantages & disadvantages. [7]
 - b) The maximum peak to peak voltage of an AM wave is 12mv & the minimum voltage is 4mv. calculate the modulation factor. [5]
- **Q5**) Attempt the following.

a)	Explain microwave antenna and wide band antenna in detail.	[7]
----	--	-----

- b) Describe satellite multiple access technique. [5]
- *Q6*) Attempt the following.

a)	What is PCM? With the help of block diagram and	d wave form explain in
	detail.	[7]
b)	Explain External & internal noise.	[5]

Q7) Write a short note on any two of the following.

a)	GPRS	[6]
b)	QAM	[6]
c)	Cellular radio system	[6]

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SEAT No. :

P2615

[6071]-312

M.S.c.-II

ELECTRONIC SCIENCE

ELT -232 : Mechatronics and Robotics (2019 Pattern) (Semester - III) ((Credit-4) (Theoy)

Time : 3 Hours] Instructions to the candidates:

1) Question 1 is compulsory.

- 2) Solve any five questions from Q.2 to Q.7.
- 3) Figures to the right indicates full marks.
- 4) Neat diagram must be drawn wherever necessary.

Q1) Attempt any five of the following:

- a) Why 'sensor' is primary element of control system?
- b) What are industrial applications of tactile sensors?
- c) What are basic building blocks of mechanical systems?
- d) What is the difference in transient response of a control system and steady response of control system?
- e) What is role of mechanism in mechatronic systems?
- f) What is link?

Q2) Attempt the following:

- a) i) What is encoder? Explain in brief. [3]
 - ii) What is dashpots in mechanical system? [4]
- b) Write a short note on freedom & constraints. [5]

Q3) Attempt the following:

a)	i)	Explain the working of DC motor.	[3]
	ii)	Write a short note on solenoid.	[4]

b) What are the basic building blocks of rotational system? Explain in brief.[5]

[5×2=10]

P.T.O.

[Max. Marks : 70

[Total No. of Pages : 2

Q4) Attempt the following:

27)	Attempt the following.						
	a)	i)	Explain the first order system.	[3]			
		ii)	Explain the working of brush type dc motor.	[4]			
	b)	Expl	ain the working of BJTs & MOSFETs as switches	[5]			
Q5)	Atte	mpt tl	ne following:				
	a)	i)	What is trajectory interpolation? Explain.	[3]			
		ii)	What are the specifications of stepper motor?	[4]			
	b)	Expl	ain the working of synchronous motor.	[5]			
Q6)	Atte	mpt tl	ne following:				
	a)	i)	Explain the construction & working of thyristor.	[3]			
		ii)	Explain the working of second order system.	[4]			
	b)	Wha	t are three main types of sensors for force feedback? Explain.	[5]			
Q7)	Atte	mpt a	ny two of the following:	[12]			
	a)	Wha	t is rotational and translation motion? Write a short note on cor	npo-			
		sitio	n of rotations.				

- b) Write a short note on cams.
- c) Write a short note on : Roll-pitch-yaw representation.



P-2616

[6071]-313

M.Sc. (Part - II) (Semester - III) ELECTRONIC SCIENCE ELT-233 : Control Systems (2019 Pattern) (CBCS)

Time : 3 Hours]

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any five question from Q2 to Q7.
- 3) Figures to the right indicate full marks.
- 4) Q.2 to Q.7 carry equal marks.
- 5) Neat diagrams must be drawn wherever necessary.

Q1) Solve any five of the following.

- a) List components of SCADA.
- b) Sketch the output of PD controller for a step input.
- c) Write principle of control valves.
- d) What is closed loop control system? Give example of it.
- e) How solenoids are classified?
- f) Determine transfer function of low pass Filter (RC)
- Q2) Attempt the following.
 - a) With the help of block diagram explain room temperature control system. [7]
 - b) Determine the range of K for stability of unity feed back system whose

open loop transfer function is
$$G(S) = \frac{K}{S(S+1)(S+2)}$$
 [5]

- Q3) Attempt the following.
 - a) Explain the concept of gain margin and phase margin. Explain how these values help in studying stability of Bode plot. [7]
 - b) Elaborate the statement 'Evolution of process control has been from mannual to computer to network control. [5]

[Total No. of Pages : 2

SEAT No. :

[Max. Marks : 70

[10]

P.T.O.

- Q4) Attempt the following.
 - a) Explain feed forward & adaptive control system with suitable example.

[7]

- b) Explain the concept of stability with suitable examples predict stability of control system from location of it's closed loop poles in the s-plane.
 [5]
- Q5) Attempt the following.
 - a) Define root locus for a control system consider control system with $G(S)H(S) = \frac{K}{K}$

$$G(S)H(S) = \frac{1}{S(S+2)}$$
 obtain the nature of root. [7]

- b) Explain application of control system for speed control of dc motor.[5]
- Q6) Attempt the following.
 - a) Find the stability of control system having characteristics equation (use routh criteria) [7] $F(S) = S^5 + 3S^4 + S^3 + 3S^2 + S + 3 = 0$
 - b) Draw a graph of PD controller output as a function of time $K_p = 5$, $K_p = 0.5S$, and $P_o = 20\%$ when input in the following form [5]



Q7) Write short notes on any <u>two</u> of the following.

a)	Direct digital control	[6]
b)	Zeigler Nichols method for process Loop tunning.	[6]

c) Solenoid [6]

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Total No. of Questions : 5]

SEAT No. :

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[Total No. of Pages : 4

[6071]-314

M.Sc. (Part - II) ELT234 : ELECTRONIC SCIENCE Wireless Communication System - I (2019 Pattern) (Semester - III) (Credit - 2)

Time	e : 2 H	Iours] [Max. Marks : 3	35
Instr	uctio	ns to the candidates:	
	1)	Question 1 is compulsory.	
	2)	Question 2 to Q.5 carry equal marks.	
	3)	Solve any three questions from Q.2 to Q.5.	
Q1)	Ans	wer any Five : [!	5]
	a)	What is the full form of RFID? [2	1]
	b)	What is the full form of WLL? [2	1]
	c)	What is the full form of CDMA?[]	1]
	d)	What is the full form of GSM? [2	1]
	e)	What is the full form of GPRS? [2	1]
	f)	What is the full form of WLAN? [2	1]
Q2)	a)	Explain GPRS system architecture in details.	6]
	b)	Explain the need of wireless networks as compare to Wire Networks	s. 4]
Q3)	a)	Write note on:	
		i) Cordless phone	3]
		ii) Paging systems [.	3]
	b)	Explain RAKE receiver in details.	4]

Q4) a)	Explain concept of spread spectrum.	[6]
b)	Explain MIMO - OFDM System in details.	[4]

 $[4 \times 2^{1/2} = 10]$ Q5) Write any four short notes :

- 3G wireless networks a)
- 2G wireless networks b)
- CDMA 2000 Cellular Technology c)
- Soft hand off d)
- GSM speech coding f)



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[6071]-314

M.Sc. (Part - II)

ELT234 : ELECTRONIC SCIENCE

Fundamentals of Internet of Things (Elective theory Course) (2019 Pattern) (Semester - III) (Credit - 2)

Time : 2 Hours]			[Max. Marks : 35			
Instructions to the candidates:						
	1)	Question 1 is compulsory.				
	2)	Solve any three questions from Q.2 to Q.5.				
	3)	Questions 2 to 5 carry equal marks.				
Q1)) Solve any Five of the following : [5]					
	a)	Define Network node.				
	b)	What is full form of EPCIS?				
	c)	What is the need of QOS in IoT?				
	d)	What is the main purpose of rounting protocol?				
	e)	Define IoT				
	f)	What is device intelligence?				
Q2)	a)	i) Explain web of things.	[2]			
		ii) Draw and explain WSN Architecture.	[4]			
	b)	Explain working of RFID Tag. [4]				
Q3)	a)	i) What is the basic overview of IoT?	[2]			
		ii) What are different types of Nodes in WSN? Ex	plain it in short. [4]			
	b)	What are the basic requirement capability of IoT dev	vice? [4]			

- *Q4*) a) What is basic difference between barcode and RFID? [2] i)
 - What are the challenges or risks associated with IoT? ii) [4]

[10]

How satellite communication technology use in IoT? b) [4]

Q5) Short notes on any four of the following :

- Data link layer protocol a)
- Integration Approaches b)
- c) Smart meter
- City Automation d)
- IoT Architecture e)
- æææ f) Traffic characteristics

Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

[6071]-411

M.Sc.-II

ELECTRONIC SCIENCE

ELT - 241 : PLC Programming and Applications (2019 CBCS Pattern) (Semester-IV)

Time : 2 Hours]

P2619

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any three questions from Q.2 to Q.5.
- 3) Questions 2 to Q.5 carry equal marks.
- 4) Neat diagrams must be drawn wherevr necessory.

Q1) Solve any five of the following.

- a) What are the common type of PLC programming devices.
- b) List features of PLC.
- c) Draw symbol of examine IF open (XIO) instruction and explain its.
- d) List various PLC brand available in market.
- e) Define Scan cycle in PLC
- f) What is master control Reset (MCR) in PLC.

Q2) Attempt the following.

- a) Explain with the diagram sinking and sourcing concept in DC input modules of PLC. [6]
- b) Explain any four comperision instruction used in PLC. [4]
- *Q3*) Attempt the following.
 - a) Draw block diagram of PLC. Write Function of each block. [6]
 - b) Draw ladder diagram for following logic gate [4]
 - i) OR
 - ii) NOR
 - iii) AND
 - iv) NAND

[Max. Marks : 35

[5]

- *Q4*) Attempt the following:
 - a) Explain the application of PLC in two way trafic light controller. Draw & explain ladder logic for traffic light controller. [6]
 - b) With reference to PLC discrete output modules. [4]
 - i) What type of field out put devices are suitable for use with them?
 - ii) List three examples of discrete o/p (output) devices.
- *Q5*) Write short notes on any four of the following.

[10]

- a) HMI
- b) Latch instruction in PLC
- c) Analog to digital converter (ADC) module in PLC.

- d) Communication module in PLC
- e) Counters in PLC
- f) Memory organization in PLC

Total No. of Questions : 7]

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[6071]-412

M.Sc. (Part - II) ELECTRONIC SCIENCE ELT-243 : Technical Writing (2019 Pattern) (Semester - IV)

Time : 3 Hours]

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any five questions from Q.2 to Q.7.
- 3) Question 2 to 7 carry equal marks.
- 4) Neat diagrams must be drawn whenever necessary.

Q1) Solve any five of the following :

- a) What is technical communication?
- b) List three types of reading.
- c) What is mean by conference?
- d) Define authors.
- e) What is mean by interpersonal communication?
- f) Define critical thinking.
- **Q2**) Solve the following ;
 - a) What is presentation strategies? Explain purpose of the presentation.
 - [7]
 - b) Describe key-note speech & Expert lecture in brief. [5]

Q3) Solve the following :

- a) What is barrier? Explain different types of barrier in brief. [7]
- b) Describe the flow of communication.

P.T.O.

[5]

[Total No. of Pages : 2

[*Max. Marks* : 70

[10]

[1 otal No. of Pages

SEAT No. :

Q4) Solve the following :

2.)							
	a)	What is mean by technical presentation? Explain in brief					
		i)	Class Room Presentation				
		ii)	Individual Presentation				
		iii)	Public Speaking				
	b)	Wha	at is report? Describe structure of report in brief.	[5]			
<i>0</i> 5)	Solv	ve the	e following ·				
20)	, sorve the following .						
	a)) What is Thesis? Write structural point for making Thesis each point in brief.					
	b)	Des	cribe the flow of communication.	[5]			
Q6)	Solv	ve the following :					
	a)	Wha Exp	at is Interview? Write its purpose and sequence of Intervi- lain in brief any two types.	iews. [7]			
	b)	Drav	w and explain process of communication.	[5]			
Q7)	27) Write		ort notes on any two of the following.	[12]			
	a)	Gro	up discussion				
	b)	7 C	's of communication				
	c)	Para	agraph				

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