Total No. of Questions : 4]

SEAT No. : ____

P1149

[Total No. of Pages : 3

[6054]-511

T.Y.B.Sc. (Regular)
MATHEMATICS
MT361 : Complex Analysis
(2019 Pattern) (Semester-VI) (36111)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) Attempt any five of the following: **[5×1=5]**

a) If $f(z)=z^2$, find $f'(z)$.

b) Show that $\log(i)=\frac{\pi}{2}i.$

c) Evaluate the integral $\int_0^1 (t+i)dt.$

d) Find $\operatorname{Res}_{z=1}\left(\frac{1}{z^2-z}\right)$

e) Give an example of a function $f(z)$ having an essential singularity.

f) Write the Maclaurin series expansion of e^z

g) Show that $f(z)=\overline{z}$ is now here analytic.

Q2) a) Attempt any one of the following. **[5]**

i) If $f'(z)\neq 0$ every where in a domainD, then show that $f(z)$ must be constant throughout D.

ii) If a function f is analytic at a given point, then prove that its derivatives of all orders analytic there too.

P.T.O.

b) Attempt any one of the following: **[5]**

i) Show that the function $u(x,y)=2x(1-y)$ is harmonic and find its harmonic conjugate.

ii) Show that

1) $\log(-ei) = 1 - \frac{\pi}{2}i$

2) $\log(1-i) = \frac{1}{2}\ln 2 - \frac{\pi}{4}i$

Q3) a) Attempt any one of the following: **[5]**

i) Show that, if a function f that is analytic at a point z_0 has a zero of order m there if and only if there is a function g, which is analytic and nonzero at z_0, such that $f(z)=(z-z0)^m g(z)$.

ii) Suppose that a function $f(z)$ is analytic inside and on a positively oriented circle C_R, centered at z_0 with radius R. If M_R denotes the maximum value of $|f(z)|$ on C_R, then prove that

$$\left|f^{(n)}(z_0)\right| \le \frac{n!M_R}{R^n}, (n = 1,2,3,.....).$$

b) Attempt any one of the following. **[5]**

i) Let C be the arc of the circle $|z|=2$ from $z = 2$ to $z = 2i$ that lies in the first quadrant. without evaluating the integral, show that

$$\left|\int_c \frac{dz}{z^2-1}\right| \le \frac{\pi}{3}$$

ii) Let C denote the positively oriented boundary of the square whose sides lie along the lines $x = \pm 2$ and $y = \pm 2$. Evaluate the integral

$$\int_C \frac{e^{-z}}{z-(\pi i/2)}dz .$$

Q4) a) Attempt any one of the following: **[5]**

i) If a function f is analytic every where in the finite plane except for a finite number of singular points interior to a positively oriented simple closed contour C, then prove that.

$$\int_c f(z)\,dz = 2\pi i \operatorname*{Res}_{z=0}\left[\frac{1}{z^2} f\left(\frac{1}{2}\right)\right]$$

ii) Let *f* be analytic every where inside and on a simple closed contour C, taken in the positive sense. If z_0 is any point interior to C, then show that , $f(z_0) = \dfrac{1}{2\pi i}\displaystyle\int_c \frac{f(z)dz}{(z - z_0)}$

b) Attempt any one of the following. **[5]**

i) Show that when 0<|z|<4,

$$\frac{1}{4z - z^2} = \frac{1}{4z} + \sum_{n=0}^{\infty} \frac{z^n}{4^{n+2}}$$

ii) Let C denote the positively oriented boundary of the circle | z |=3.

Evaluate the integral $\displaystyle\int_c \frac{z+1}{z^2 - 2z} dz$

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Total No. of Questions : 4]

SEAT No. :

P-1150

[Total No. of Pages : 3

[6054]-512
T.Y. B.Sc.
MATHEMATICS
MT - 362 : Real Analysis - II
(2019 Pattern) (CBCS) (Semester - VI) (36112)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) **Attempt any five of the following :** **[5]**

a) If mA ≠ 0 and BCA is such that mB = 0, then show that m(A – B) ≠ 0.

b) Let $f(x) = x$ $(0 \le x \le 1)$. Let $\sigma = \left\{0, \frac{1}{3}, \frac{2}{3}, 1\right\}$ be sub division of [0, 1]. Compute U[f, σ].

c) Show that C.P.V. $\int_{-1}^{1} \frac{1}{x} dx = 0$.

d) For what values of p, $\int_{0}^{1} \frac{1}{x^p} dx$ is divergent?

e) Let $f_n(x) = x^n$, $x \in [-1,1]$. Does $\{f_n\}_{n=1}^{\infty}$ converge pointwise on [–1, 1]?

f) State the Dini's Theorem.

g) Let $u_n(x) = x^n$ $(-1 < x < 1)$. Find $\sum_{n=1}^{\infty} u_n(x)$.

P.T.O.

Q2) a) **Attempt any <u>one</u> of the following :** **[5]**

i) Let $f : [a, b] \to R$ be bounded function and σ,] be subdivisions of $[a, b]$ then show that $L[f, \tau] \leq U[f, \sigma]$.

ii) State and prove second fundamental theorem of calculus.

b) **Attempt any <u>one</u> of the following :** **[5]**

i) Let $f : [a, b] \to R$ be continuous function. Show that $f \in R[a,b]$.

ii) Show that $\frac{2\pi^2}{9} \leq \int_{\pi/6}^{\pi/2} \frac{2x}{\sin x} dx \leq \frac{4\pi^2}{9}$.

Q3) a) **Attempt any <u>one</u> of the following :** **[5]**

i) If $\int_a^\infty |f(x)|\,dx$ is convergent then prove that $\int_a^\infty f(x)\,dx$ is convergent.

ii) Let f be non increasing function on $[1, \infty]$ such that $f(x) \geq 0$ $(1 \leq x < \infty)$.

Then $\sum_{n=1}^{\infty} f(n)$ will converge if $\int_1^\infty f(x)\,dx$ converges.

b) **Attempt any <u>one</u> of the following :** **[5]**

i) Discuss convergence of improper integrals $\int_0^1 \frac{\sin x}{x^{3/2}} dx$ and $\int_0^1 \frac{1}{x^{4/3}} dx$.

ii) Discuss the convergence of improper integrals $\int_1^\infty \frac{x}{1+x^2} dx$ and $\int_1^\infty \frac{43x^2}{1+2x^2+12x^4} dx$.

Q4) a) **Attempt any <u>one</u> of the following :** **[5]**

i) Show that the sequence $\{f_n\}_{n=1}^{\infty}$ of real functions converges uniformly on E if and only if for given $\in > 0$ there exist positive integer N such that $|f_m(x) - f_n(x)| < \in, (m, n \geq \mathrm{N}, x \in \mathrm{E})$.

ii) Let $\sum_{k=1}^{\infty} u_k$ be a series of functions in R[*a*, *b*] which converges to *f* on [*a*, *b*]. Prove that $f \in \mathrm{R}[a,b]$ and $\int_a^b f(x)\,dx = \sum_{k=1}^{\infty} \int_a^b u_k(x)\,dx$.

b) **Attempt any <u>one</u> of the following :** **[5]**

i) Let $f_n(x) = \frac{\sin nx}{n} (0 \leq x \leq 1)$. Show that $\{f_n\}_{n=1}^{\infty}$ converges uniformly to 0 on [0, 1], but $\{f_n'\}_{n=1}^{\infty}$ doesn't converge uniformly on [0, 1].

ii) Show that $\sum_{n=1}^{\infty} e^{-nx} x^n$ converges uniformly on [0, 10].

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Total No. of Questions : 4]

SEAT No. : ____

P1151

[Total No. of Pages : 2

[6054]-513
T.Y. B.Sc. (Regular)
MATHEMATICS
MT-363 : Ring Theory
(2019 CBCS Pattern) (Semester-VI) (36113)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right side indicates full marks.***

Q1) Attempt any five of the following. **[5×1=5]**

a) Find the characteristic of $\mathbb{Z}\times\mathbb{Z}$.

b) Is $\{0\}$ a prime ideal of $\mathbb{Z}_4$? Justify.

c) Show that $\begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix}$ is a divisor of zero in $M_2(\mathbb{Z})$.

d) Show that $25x^5 - 9x^4 - 3x^2 + 12$ is irreducible over $\mathbb{Q}$.

e) Show that the map $\phi:\mathbb{Z}\to\mathbb{Z}$ defined by $\phi(x)=3x\,\forall x\in\mathbb{Z}$ is not a ring homomorphism.

f) Show that the map $\gamma:\mathbb{Q}^*\to\mathbb{Z}^+ \cup\{0\}$ defined by $\gamma(n)=n^2$ is not an euclidean norm on $\mathbb{Q}$.

g) List the all associates of 10 in the ring $\mathbb{Z}$.

Q2) a) Attempt any one of the following. **[5]**

i) Show that a nonempty subset S of a ring R is a subring of R if and only if the following are hold

1) $0\in S$

2) $a-b\in S\ \forall a,b\in S$

3) $ab\in S\ \forall a,b\in S$.

ii) Let $f(x)\in F[x]$ be a polynomial of degree 2 or 3 then prove that $f(x)$ is reducible over F if and only if $f(x)$ has zero in F.

P.T.O.

b) Attempt <u>any one</u> of the following. **[5]**

i) If D is an integral domain and x is an interminate then

1) Describe the units in D[x].

2) Find units in $\mathbb{Z}_7[x]$.

ii) Let f be a field, $f(x) \in F[x]$ and $\alpha \in F$ then show that $f(\alpha)$ is the remainder when $f(x)$ divided by $(x-\alpha)$. Hence find the remainder when $x^6+3x^5+4x^2-3x+2$ is divided by $(x-1)$ in $\mathbb{Z}_7[x]$

Q3) a) Attempt <u>any one</u> of the following. **[5]**

i) If D is U.F.D then prove that the product of any two primitive polynomial in D[x] is again primitive.

ii) Let N be an ideal of a ring R then prove that the map $\gamma: R \to R/N$ defined by $\gamma(x) = x + N \ \forall x \in R$ is a ring homomorphism.

b) Attempt <u>any one</u> of the following. **[5]**

i) Find g.c.d of 8+6i and 5–15i in $\mathbb{Z}[i]$ by using Euclidean algorithm.

ii) Show that a commutative ring with unity is a field if and only if it has no proper non trivial ideal.

Q4) a) Attempt <u>any one</u> of the following. **[5]**

i) Show that an ideal $\langle p(x) \rangle \neq \{0\}$ of F[x] is maximal if and only if p(x) is an irreducible polynomial in F[x].

ii) If p is an irreducible element in P.I.D. D and plab for a,b$\in$ D then prove that p/a or p/b.

b) Attempt <u>any one</u> of the following. **[5]**

i) If A and B are ideals of a ring R then prove that

$A + B = \{a + b / a \in A, b \in B\}$ is an ideal of R.

ii) Let D be Euclidean domain with Euclidean norm γ. If a and b are associates in D then show that $\gamma(a) = \gamma(b)$.

Total No. of Questions : 4]

SEAT No. :

P-1153

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[6054]-515
T.Y. B.Sc. (Semester - VI)
MATHEMATICS (Paper - V)
MT-365 (A) : Optimization Techniques
(2019 Pattern) (CBCS) (36115A)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) Attempt any five of the following : **[5]**

a) Solve the game, Player A / Player B

	B_1	B_2
A_1	0	2
A_2	−1	4

b) Define two person zero sum game.

c) Find the stationary points of $f(y) = y^4$ and examine whether the function is maxima or minima.

d) What are the types of failure in the replacement problem.

e) Explain the term saddle point

f) State any two rules for construction of the project network.

g) Examine the following functions for extreme point $f(x) = x^4 + x^2$

Q2) a) Attempt any one of the following : **[5]**

i) Determine the optimal sequence of jobs that minimizes the total elapsed time based on the following information processing time on machines is given in hours and passing is not allowed :

Job	A	B	C	D	E	F	G
Machine M_1	3	8	7	4	9	8	7
Machine M_2	4	3	2	5	1	4	3
Machine M_3	6	7	5	11	5	6	12

Also Find total elapsed time & idle time for machine M_1, M_2 & M_3.

P.T.O.

ii) The running cost per year and resale price of an equipment whose purchase price is Rs. 5000 are given in following table.

Year	1	2	3	4	5	6	7	8
Running Cost in Rs.	1500	1600	1800	2100	2500	2900	3400	4000
Resale Price in Rs.	3500	2500	1700	1200	800	500	500	500

What is the best time to replace the equipment.

b) Attempt any one of the following : **[5]**

i) Show that (0,3, 1) and (2, 1, 1) are stationary points of function $f(x_1, x_2, x_3) = 2x_1x_2x_3 - 4x_1x_3 - 2x_2x_3 + x_1^2 + x_2^2 + x_3^2 - 2x_1 - 4x_2 + 4x_3$

ii) Solve the following game graphically

$$\begin{array}{c} \\ \text{Player A} \end{array} \begin{array}{c} \begin{array}{cccc} \text{Player B} & & & \\ B_1 & B_2 & B_3 & B_4 \end{array} \\ \begin{array}{c} A_1 \\ A_2 \end{array} \begin{bmatrix} 1 & 3 & -3 & 7 \\ 2 & 5 & 4 & -6 \end{bmatrix} \end{array}$$

Q3) a) Attempt any one of the following : **[5]**

i) A project schedule has following characteristics.

Activity	1-2	1-3	1-4	2-5	3-7	4-6	5-7	5-8	6-7	6-9	7-10	8-10	9-10
Duration in days	10	8	9	8	16	7	7	7	8	5	12	10	15

Draw the network of the project. Find critical path and project completion time. Also, Find total float of each non critical activity.

ii) A readymade garments manufacture has to process seven items through two stages of production viz cutting and sewing. The time taken for each of these items at the different stages are given below in appropriate units.

item		1	2	3	4	5	6	7
Process	cutting	5	7	3	4	6	7	12
Time	sewing	2	6	7	5	9	5	8

Determine a sequence of items that will minimize the total elapsed time. Also find the idle time for sewing.

b) Attempt any one of the following : **[5]**

i) The data for a PERT network is given in the following time

Activity	optimistic	Most likely	Pessimistic
1-2	2	4	6
1-3	6	6	6
1-4	6	12	24
2-3	2	5	8
2-5	11	14	28
3-4	15	24	45
3-6	3	6	9
4-6	9	15	27
5-6	4	10	16

I) Draw the project network.

II) Determine the critical path and expected project completion time.

ii) A fleet owner finds from his past records that the cost per year of an auto whose purchase price is Rs. 10,000 are given below.

Year	1	2	3	4	5	6	7
Running Cost (Rs.)	1500	1990	2300	2900	3600	4500	5500
Resale value (Rs.)	5000	2500	1250	600	400	400	400

Determine the optimum period of replacement.

Q4) a) Attempt any one of the following : **[5]**

i) Solve the following game

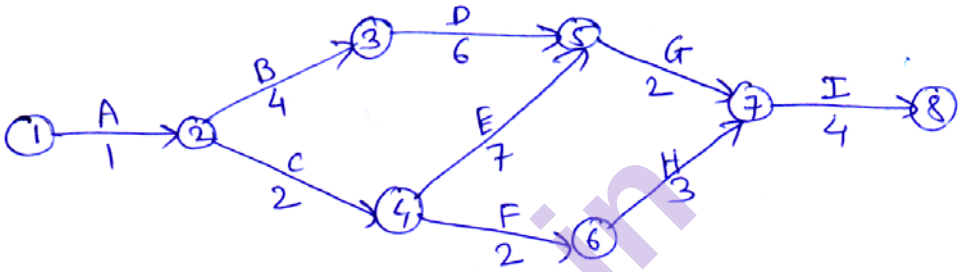
		Player B	
		B_1	B_2
Player A	A_1	1	2
	A_2	5	4
	A_3	–7	9
	A_4	–4	–3
	A_5	2	1

ii) Examine the following function for extreme points $f(x_1, x_2) = 3x_1^2 + x_2^2 - 10$

b) Attempt any one of the following : **[5]**

i) A project is represented by the following network and time estimate are given below

Task	A	B	C	D	E	F	G	H	I
t_o	1	2	1	3	2	3	4	6	2
t_m	2	2	3	4	3	5	5	7	4
t_p	3	3	5	5	4	7	6	8	6



Determine the critical path and project completion time.

ii) Construct the project network for the following project.

Activity	A	B	C	D	E	F	G
Predecessor (s)	-	-	-	A,B	A,B	C,D,E	C,D,E

Total No. of Questions : 4]

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P-1154

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[6054]-516

T.Y. B.Sc.

MATHEMATICS

MT-365(B) : Calculus Of Variation and Classical Mechanics

(2019 Pattern) (CBCS) (Semester - VI) (36115B)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) Attempt any five of the following : **[5]**

a) State principle of virtual work.

b) State the law of conservation of energy.

c) Write Rayleigh dissipation function of the nonconservative system.

d) State the relations between rectangular coordinates x, y, z and cylindrical coordinates r, Q, z.

e) Define cyclic coordinates of a system.

f) State advantages of the Lagrange's equations of motion over the Newton's equation of motion.

g) Give potential energy of the particle moving in central force field.

Q2) a) Attempt any one of the following : **[5]**

i) Derive Lagrange's equations of motion from the D'Alembert's principle.

ii) Derive Hamilton's equations of motion from the principle of least action.

P.T.O.

b) Attempt any one of the following : **[5]**

i) A particle of mass m falls a given distance Z_0 in time $t_0 = \sqrt{\frac{2Z_0}{g}}$ and the distance travelled in time t is given by $z = at + bt^2$, where a and b are constants and time to is always same. Show that $\int_0^{t_0} L\, dt$ is extremum for real values of a and b when a = 0, $b = \frac{g}{2}$, where L is the Lagrangian of the mass M.

ii) A cylinder is rolling down an inclined plane without slipping. Find its equations of motion.

Q3) a) Attempt any one of the following : **[5]**

i) Show that the Lagrange's equations of motion are invariant under the Galilean transformation.

ii) Show that $\Delta = \delta + \Delta t \frac{d}{dt}$

b) Attempt any one of the following : **[5]**

i) Show that the transformation $q = \sqrt{2p}\sin\theta$ $p = \sqrt{2p}\cos\theta$ is canonical.

ii) State Hamilton's principle and use it to obtain the equation of motion $mf = -\frac{\partial v}{\partial x}$ for a particle of mass m moving with acceleration f in a potential V.

Q4) a) Attempt any one of the following : **[5]**

i) Define the Hamiltonian and derive Hamilton's equations equations of motion from it.

ii) State and prove law of conservation of energy of the system.

b) Attempt any one of the following : **[5]**

i) A wire is bent in the form of a parabola $z = ar^2$ and a bead slides on it smoothly. The wire is rotated by means of an external agency with a constant angular acceleration α. Find the equation of motion of the bead.

ii) A book of mass M moves along a line on a smooth horizontal plane and is attached by means of a spring of elastic constant k, the other end of which is fixed to a rigid wall. A mass M hangs from the block by means of an inextensible string of length l. Discuss the equations of motion of the system.

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Total No. of Questions : 4]

SEAT No. :

P-1155

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[6054]-517

T.Y. B.Sc.

MATHEMATICS (Paper - V)

MT-365 C : Financial Mathematics

(2019 Pattern) (CBCS) (Semester - VI) (36115C)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) **Attempt any five of the following :** **[5]**

a) Explain the term market equilibrium.

b) Define start-up point for a small efficient firm.

c) Define elasticity of demand.

d) Define the term excise tax.

e) Write the expressions for Revenue R(q) and profit function $\pi(q)$ for any firm.

f) What is meant by state prices of matrix of returns?

g) What is meant by present value of an annuity?

Q2) a) **Attempt any one of the following :** **[5]**

i) Suppose that for a market on a commodity is governed by supply set S = $\{(q,p) : q - 6p = -12\}$ and demand set D = $\{(q,p) : q + 2p = 40\}$. Determine the equilibrium point E, supply & demand functions q^S, q^D and inverse supply and demand functions p^S, p^D.

ii) The supply and demand functions for a commodity are $q^S(p) = 12p - 4$, $q^D = 8 - 4p$. If an excise tax of Rs. 5 is imposed, what are the selling price & quantity sold in equilibrium.

P.T.O.

b) **Attempt any one of the following :** **[5]**

i) Show that the present value of an annuity I for N years, given the fixed rate *r*, is

$$P = \frac{I}{1+r} + \frac{I}{(1+r)^2} + ... + \frac{I}{(1+r)^N}.$$

ii) Explain the cobweb model using the effect of a disturbance over one year cycle. Draw an appropriate figure and explain it.

Q3) a) **Attempt any one of the following :** **[5]**

i) What are the maximum and minimum values of the function $f(x) = x^3 - 12x^2 + 21x + 100$.

ii) Suppose that a firm has cost function $C(q) = q + 5q$ to produce q units of its product price per unit $P(q) = 6 - 0.01q$. Find (i) Revenue function $R(q)$ (ii) Profit function $\pi(q)$ (iii) Optimal value q_m.

b) **Attempt any one of the following :** **[5]**

i) The supply and demand sets are $S = \left\{(q, p) / q = \frac{15}{2} p - 10\right\}$

$D = \{(q, p) / q = 40 - 5p\}$. Suppose that government wishes to raise as much as money possible by imposing an excise tax *m* the good, what should the value of excise tax be? What is the resulting government revenue?

ii) The demand set D for a good is $D = \{(q,p)/q(1 + p^2) = 100\}$.

A) Determine the elasticity of demand

B) For what values of p is the demand inelastic?

Q4) a) **Attempt any one of the following :** **[5]**

i) Suppose that the demand set for a commodity is D = $\{(q,p)/q^2 (2 + p^3) = 200\}$. Determine the values of p, where the demand is elastic.

ii) Find startup and breakeven point for a small efficient firm with cost function $C(q) = 800 + 70q - 12q^2 + q^3$.

b) **Attempt any one of the following :** **[5]**

i) Suppose that Quality widgets limited is an efficient small firm with $C(q) = q^3 - 10q^2 + 100q + 196$ & weakly production L = 10. Show that derivative of average cost is O, at the breakeven point.

ii) For the matrix of returns $R = \begin{bmatrix} 1.95 & 0.9 & 1.0 \\ 1.1 & 1.1 & 1.1 \\ 1.2 & 1.15 & 1.25 \end{bmatrix}$ show that there is no vector of states and Z = (0, –5000, 5000) is an arbitrage portfolio.

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Total No. of Questions : 4]

SEAT No. : ____

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[6054]-519

T.Y. B.Sc. (Regular)

MATHEMATICS

DSE-6B-MT-366 (B) : Computartional Geometry

(2019 Pattern) (CBCS) (Semester-VI) (36116 B)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) Attempt any five of the following. **[5×1=5]**

a) If a line L is transformed to the line L* using a trans formation matrix $[T]=\begin{bmatrix}3 & 4\\ 1 & 2\end{bmatrix}$ and slop of L* is $\frac{1}{4}$ then find the slop of line L.

b) If a square with sides 5cm is reflected through *y*-axis, then what is the area of transformed figure?

c) Write down the transformation matrix of reflection through the z = 0 plane.

d) Define : Trimetric projection.

e) Write parametric equation of Be'zier curve with control points B_0, B_1 and B_2.

f) Write the transformation matrix required to create bottom view of the object.

g) Write the parametric equation of circle $x^2 + y^2 = r^2$, $r > 0$.

Q2) a) Attempt any one of the following. **[5]**

i) Write an algorithm for reflection through the line $y = mx$.

ii) Derive the transformation matrix for rotation about origin through an angle Q.

P.T.O.

b) Attempt any one of the following. **[5]**

i) A line passing through the points A=[0, 3] and B=[3, 0] is transformed to another line by using the transformation matrix $[T]=\begin{bmatrix}1 & 2\\ 2 & 5\end{bmatrix}$. Find transformed line.

ii) Find the combined transformation matrix for following sequence of transformations.

1) Reflection through y-axis.

2) Rotation about origin through angle 45º.

3) Scaling in x and y co-ordinate by factors 3 and –2 units respectively.

Further apply it on point *p* [3, –2]

Q3) a) Attempt any one of the following. **[5]**

i) Write an algorithm for rotation about an axis parallel to *z* -axis.

ii) Derive the angles Q and ϕ for Dimetric projection.

Where Q is rotation about x-axis and

ϕ is rotation about y-axis.

b) Attempt any one of the following. **[5]**

i) Write Transformation matrix for reflection through the plane *y* =3.

ii) Develop the cavalier and cabinet projection for α=120º of he object

$$X=\begin{bmatrix}1 & 4 & 4 & 1\\ 0 & 1 & 4 & 1\end{bmatrix}.$$

Q4) a) Attempt any one of the following. **[5]**

i) Derive the iterative formula to generate uniformly spaced n points on the circumfernce of a circle with centre is origin and radius r.

ii) State general parametric equation of Be'zier curve and also obtain matrix representation of Be'zier cubic curve.

b) Attempt any one of the following. **[5]**

i) Find the first derivative of curve at $t = 0.3$ if B_0 [2 1], B_1 [4 4], B_2 [5, 3], B_3 [5 1] are vertices of Be'zier polygon.

Also determine the value at point $t = 0.8$ of the Be'zier curve.

ii) Find the point at infinity for the following pair of straight lines.

$x + 2y = 1$,

$x + 2y = 0$.

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Total No. of Questions : 4]

SEAT No. : ____

P1157

[Total No. of Pages : 3

[6054]-520

T.Y. B.Sc. (Regular)

MATHEMATICS

MT-366 C : LEBESGUE INTEGRATION

(CBCS 2019 Pattern) (Semester-VI) (Paper-VI) (36116C)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) Attempt any five of the following. **[5]**

a) True or false? If G is an open set of $[a, b]$ with $|G|=0$ then $G = \phi$.

b) IF $E \subset [a, b]$ with $\overline{m}E = 0$ then show that $mE = 0$.

c) Give an example of nonmeasurable function defined on $[a, b]$.

d) Let $f \in L[a, b]$ and E be set of rationals in [a,b] . Find $\int_E f$.

e) Let $f(x) = \frac{1}{3\sqrt{x}}, (0 < x \leq 1)$. Find ^2f.

f) Let $f(x) = x^4 - 1, (-2 \leq x \leq 2)$. Find f^+.

g) State the Fatou's lemma.

Q2) a) Attempt any one of the following. **[5]**

i) If $E \subset [a, b]$ then prove that $\overline{m}\,E + \underline{m}E' = b - a$.

ii) If E_1 and E_2 are measurable subsets of $[a, b]$ then prove that $E_1 \cup E_2$ and $E_1 \cap E_2$ are measurable. Also prove that $mE_1 + mE_2 = m(E_1 \cup E_2) + m(E_1 \cap E_2)$.

P.T.O.

b) Attempt any one of the following. **[5]**

i) Show that E$\subset$ [a, b] is measurable if and only if for given $\in > 0$ there exist a closed set F $\subset$ E and an open set G $\supset$ E Such that | G | – | F | < $\in$.

ii) If E_1 and E_2 are measurable subsets of [a, b] then show that symmetric difference of E_1 and E_2 is measurable.

Q3) a) Attempt any one of the following. **[5]**

i) If f is measurable function on [a, b], then prove that inverse image under f of any interval is a measurable set.

ii) If $f \in \mathbb{R}$ [a, b] then prove that $f \in$ L[a, b].

b) Attempt any one of the following. **[5]**

i) Let $f(x) = \frac{1}{x}\ (0 < x < 1)$, f (0) = 5, f (1) = 7. Show that f is measurable function on [0, 1].

ii) Let $f(x) = \begin{cases} 2, & 0 \le x < 1 \\ 4, & 1 \le x < 2 \\ 3, & 2 \le x < 3 \\ 2, & 3 \le x \le 4. \end{cases}$

for k = 2, 3, 4, $E_k = f^{-1}$ ([k, k+1]). Show that p = {E_2, E_3, E_4} is measurable partition of [0, 4].

Q4) a) Attempt any one of the following. **[5]**

i) If $f \in$ L [a, b] is bounded and g is a bounded function on [a, b] such that

f (x) = 9(x) almost every where ($a \le x \le b$) then prove that g$\in$L[a, b] and $\int_a^b g = \int_a^b f$.

ii) If f$\in$ L[a,b] then show that for given $\epsilon > 0$, there exists $\delta > 0$ such that $\left|\int_a^b f\right| < \epsilon$

Whenever E is measurable subset of [a, b] with mE< δ.

b) Attempt any one of the following. **[5]**

i) Let $f(x) = \frac{1}{x^p}$ $(0 < x \leq 1)$ and p < 1.

Show that $f \in$ L[0, 1] and $\int_0^1 f = \frac{1}{1-p}$.

ii) For $n \in$ I, Let $f_n(x) = \begin{cases} 2n & \left(\frac{1}{2n} \leq x \leq 1/n\right) \\ 0 & \left(x \in \left(0, \frac{1}{2n}\right) \cup \left(1/n, 1\right)\right) \end{cases}$.

Show that $\int_0^1 \left[\lim_{n\to\infty} f_n(x)\right] dx \neq \lim_{n\to\infty} \int_0^1 f_n(x)dx$.

Total No. of Questions : 5]

SEAT No. :

P1158

[Total No. of Pages : 2

[6054]- 521
T.Y. B.Sc. (Regular)
PHYSICS
PHY - 361 : Solid State Physics
(2019 Pattern) (Semester - VI) (36121)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Que-2 to Que-5 carry equal marks.***
4) ***Figures to right indicates full marks.***
5) ***Use of calculator or log table is allowed.***

Q1) Solve any Five of the following. **[5]**

a) Define the Co-ordination number.

b) Define the primitive cell in crystal structure.

c) Explain the terms Ferrite.

d) What is Hall effect?

e) Proove that a superconductor (B = 0) is a perfect diamagnet.

f) A distance between planes in face centered cubic is 2A°. Determine atomic diameter.

Q2) Solve the following.

a) Describe powder method for determination of crystal structure. **[6]**

b) Calculate the magnetization of 1 gm of oxygen gas at normal tempreture and pressure of earth's magnetic field. The succesptibility of oxygen is 2.1×10^{-26} and earth's magnetic field is 5×10^{-5} Tesla. Also calculate dipole moment of each atom. **[4]**

Given :- No of atom of O_2 is 32 with Avogadro Number is 6.023×10^{23}.

P.T.O.

Q3) Solve the following.

a) Obtaine Langevin formula for paramagnetics susceptibility. **[6]**

b) A FCC crystal has an atomic radius 1.246A°. What are d_{200}. d_{220} and d_{111} spacing? **[4]**

Q4) Solve the following.

a) Obtaine the expression for density of state in one diamesion. **[6]**

b) The Critical tempreture for metal with isotopic mass 199.5 is at 4.185° k. Calculate the isotopic mass if the critical tempreture fall to 4.133°k. **[4]**

Q5) Solve any four of the following. **[10]**

a) Obtaine Bragg's diffraction condition for reciprocal lattice.

b) State application of x-ray diffraction.

c) Explain the curie tempreture and gives curie law.

d) Write Note on diamagnetic materials.

e) Explain electron mobility and drift velocity.

f) State the limitation of classical free electron theory.

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Total No. of Questions : 5]

SEAT No. :

P-1159

[Total No. of Pages : 2

[6054]-522
T.Y. B.Sc.
PHYSICS
PHY - 362 : Quantum Mechanics
(2019 Pattern) (Semester - VI) (36122)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Que. 1 is compulsory.***
2) ***Solve any three questions from Que. 2 to Que. 5.***
3) ***Que. 2 to Que. 5 carry equal marks.***
4) ***Figures to right indicate full marks.***
5) ***Use of calculator and log table is allowed.***

Q1) **Solve any Five of the following :** **[5]**

a) What is free particle?

b) State Schrodinger's time independent equation.

c) Show that [A, B] = – [B, A], A & B are operators.

d) Find the de - Broglie wavelength of neutron moving with speed 1.38×10^{4} m/s. (Given $m_N = 1.676 \times 10^{-27}$ kg, $h = 6.625 \times 10^{-34}$ J/J)

e) What is photoelectric effect?

f) State the equation of continuity.

Q2) **Answer the following questions.** **[10]**

a) i) The velocity of waves through the medium of refractive index *n* is $\sqrt{\frac{n}{k}}$. Find the group velocity in the medium. **[3]**

ii) Show that : $[L^2, L_x] = 0$. **[3]**

b) Obtain the Schrodingers time dependent equation in one dimension. **[4]**

P.T.O.

Q3) Answer the following questions. **[10]**

a) With the help of time independent Schrodinger's equation obtain the eigen function of particle in infinitely deep potential well. **[6]**

b) Prove that : $[x, p^n] = i\hbar np^{n-1}$ by mathematical induction. **[4]**

Q4) Answer the following questions. **[10]**

a) i) Show that - $[L_x, x] = 0$. **[3]**

ii) Find the lowest energy of an electron confined to move in a one dimension potential box of 1 Å [Given m = 9.11×10^{-31} kg, $\hbar = 1.054 \times 10^{-34}$ Js] **[3]**

b) Normalize the wave function in the range of x from $-\infty$ to $+\infty$ is given by $\psi(x) = x\, e^{-\alpha x^2}$. **[4]**

Q5) Answer any Four of the following : **[10]**

a) Find the eigen value of operator $\frac{d^2}{dx^2}$ for the eigen function $e^{-i\alpha x}$.

b) Give the Physical interpretation of wave function.

c) What is Heisenberg's uncertainty principle? Write different forms of uncertainty principle.

d) What are the requirements of wave function.

e) Find the probability current density of the wave function $\psi(x) = A\, e^{ikx}$.

f) Show that $[x, p_x] = i\hbar$.

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Total No. of Questions : 5]

SEAT No. :

P1160

[Total No. of Pages : 2

[6054]-523

T.Y. B.Sc. (Regular)

PHYSICS

PHY-363 : Thermodynamics and Statistical Physics

(2019 Pattern) (Semester-VI) (36123)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q. 1 is compulsory.***
2) ***Solve any three questions from Q.2 to 5.***
3) ***Question 2 to 5 carry equal marks.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of log table and calculator is allowed.***

Q1) Solve any five of the following. **[5×1=5]**

a) Define mean free path.

b) What are Bosons?

c) What is meant by canonical ensemble?

d) State postulate of equal a priory probability.

e) State normalisation condition in probability.

f) Define Helmholtz function in thermodynamics.

Q2) Solve the following.

a) Explain Joule thomson experiment with suitable diagram. **[6]**

b) Distinguish between Bose-Einstein and Fermi Dirac statistics. **[4]**

Q3) Attempt the following.

a) i) What is Gaussian probability distribution function? Explain it with suitable diagram. **[3]**

ii) What is partition function? Obtain an expression of mean value of energy $(\overline{E})$ using partition function. **[3]**

b) Determine the mean free path of gas molecules at 127ºC temperature and one atmosphere pressure. The diameter of a gas molecule is 3.5×10^{-8}cm. Given : K=1.38×10^{-23} J/K. **[4]**

P.T.O.

Q4) Attempt the following.

a) Explain maxwell velocity distribution of molecules in an ideal gas using canonical ensemble. **[6]**

b) If $p = q = \frac{1}{2}$ and total number of possibilities N=100, determine the following. **[4]**

i) $\overline{n}_1$

ii) $\overline{\Delta m}$

iii) dispersion

Q5) Attempt any four of the following. **[10]**

a) Explain transport phenomenon.

b) Explain Internal energy and Gibb's free energy of a thermodynamic system.

c) Apply Maxwell Boltzmann statistics to two particles A and B of a gas such that they can occupy in any of the three possible quantum states S=1, 2, 3.

d) A system consists of 5 identical particles having different energy values. The energy distribution is given as follows:

Number of particles	Energy (eV)
2	$3E_0$
2	$5E_0$
1	$2E_0$

Where E_0 = 1.5eV

Determine the mean value of energy.

e) What is the probability of drawing two king in succession from pack of 52 cards.

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Total No. of Questions : 5]

SEAT No. :

P-1162

[Total No. of Pages : 4

[6054]-525

T.Y. B.Sc.

PHYSICS

PHY-365A : Electronics - II

(2019 Pattern) (Semester - VI) (Paper - V) (36125A)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Attempt any three from que. 2 to 5.***
3) ***Question 2 to 5 carries equal marks.***
4) ***Use of log table and calculator is allowed.***

Q1) Attempt any five : **[5]**

a) Write examples of SOP expression & POS expressions.

b) What is mean by dark current in photodiode?

c) Draw symbol of MOSFET.

d) State uses of optocoupler.

e) Define efficiency of an amplifier.

f) If a counter has 2 flip-flops, then how many states are possible in it?

Q2) a) With help of neat diagram explain working of 3-bit ripple counter. Also give its truth table and timing diagram. **[6]**

b) Explain process of Amplitude modulation, with neat diagram. **[4]**

Q3) a) Explain working of IC 555 as mono-stable multivibrator with neat cicruit diagram and wave form. Also derive expression for pulse width. **[6]**

b) Explain working of op-amp comparator. **[4]**

P.T.O.

Q4) a) What is shift register? Explain its all types with block diagram. Hence draw ciruit diagram of PIPO shift register using D-F/F. **[6]**

b) Attempt any one : **[4]**

i) A 5 bit counter starts with 00000 state. What will be its count after 30 clock pulses?

ii) Explain block diagram of 3 pin IC regulator.

Q5) Attempt any four : **[10]**

a) Write characteristics of ideal op-amp.

b) Explain terms SSI, MSI, LSI & VLSI in case of IC's.

c) Draw circuit diagram of half subtractor and give its truth table.

d) Write a note on LED.

e) Compare JFET and BJT.

f) Write a note on SMPS.

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Total No. of Questions : 5]

P-1162

[6054]-525

T.Y. B.Sc.

PHYSICS

PHY-365B : Advanced Electronics

(2019 Pattern) (Semester - VI) (Paper - V) (36125A)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Questions 1 is compulsory.***
2) ***Solve any three from Q. 2 to 5.***
3) ***Question 2 to 5 carries equal marks.***
4) ***Figures to the right indicates full marks.***
5) ***Use of log table and calculator is allowed.***

Q1) Solve any five of the following : **[5]**

a) What is process control?

b) Which materials are used to construct RTD and thermisters?

c) What is encoder?

d) Draw ideal characteristics of high pass filter.

e) Write any two performance parameters of DAC.

f) Define siqnal conditioning.

Q2) Solve the following :

a) Explain with neat diagram opamp as integrator. **[6]**

b) Explain 4:1 MUX with truth table. **[4]**

Q3) Solve the following :

a) Explain instrumentation amplifier as thermocouple signal conditioning. **[6]**

b) What is working principle of photoconductive cell? **[4]**

Q4) Solve the following :

a) Explain R-2R ladder type DAC with circuit diagram. **[6]**

b) How OPAMP is used for temperature sensor? **[4]**

Q5) Solve any four of the following : **[10]**

a) What are basic elements of a process control system.

b) Explain process control using ON/OFF controller.

c) Write any four advantages of opto-isolator.

d) What is positive feedback in the process of generation of laser?

e) A gas in a closed volume has a pressure of 120 psi at 100ºC. What will be the pressure at 20ºC?

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Total No. of Questions: 5]

SEAT No. :

P1163

[Total No. of Pages : 2

[6054]-526
T.Y. B.Sc. (Regular)
PHYSICS
PHY-366 P : Medical Electronics
(2019 Pattern) (Semester-VI) (Elective-II) (36126P)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Que-1 is compulsory.***
2) ***Solve any three questions from Que-2to Que-5***
3) ***Que-2 to Que-5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Use of calculator and log-table is allowed.***

Q1) Solve any five of the following. **[5]**

a) Give any two physiological effects of electricity.

b) What is action potential?

c) State the use of ECG, EEG and EMG.

d) State disadvantages of flame photometer.

e) What is calorimeter?

f) What is purpose of phonocardiography?

Q2) Answer the following questions.

a) Explain various sources of biomedical signals. **[6]**

b) What is sensor? Describe capacitive sensor used for biomedical applications. **[4]**

Q3) Answer the following questions.

a) What are the basic amplifier requirements? Draw graph for typical ranges for bio-potential. **[6]**

b) For a $1cm^2$ capacitance sensor, R is 100 MΩ. Calculater, the plate spacing required to pass sound frequencies above 20 Hz. **[4]**

P.T.O.

Q4) Answer the following questions.

a) Explain construction, working of spectrometer with suitable example. **[6]**

b) Give the difference between direct and indirect measurement of blood pressure. **[4]**

Q5) Write short notes on any five of the following. **[10]**

a) Analysis of ECG pattern.

b) Bio-potential electrodes.

c) Cardiac monitor.

d) Differential amplifier.

e) Bio-amplifier.

f) Patient safety.

Total No. of Questions : 5]

SEAT No. :

P1164

[Total No. of Pages : 2

[6054]-527
T.Y.B.Sc. (Regular)
PHYSICS
PHY - 366 Q : Physics of Nanomaterials
(2019 Pattern) (Semester - VI) (Elective - II) (Paper - VI) (36126Q)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three quetions from Q.2 to Q.5.***
3) ***Que-2 to Que-5 carry equal marks.***
4) ***Figures to the right indicates full marks.***

Q1) Solve any FIVE of the following. **[5]**

a) State the principle of UV-visible spectroscopy.

b) Define Nanocrystalline materials.

c) Give any two application of nanotechnology in space flight.

d) What is the significance of nanosize materials?

e) Give any two advantages of x-ray diffraction technique.

f) Define carbon nanotubes.

Q2) Answer the following questions.

a) Describe the sol - gel auto combustion technique in detail. **[6]**

b) State any four applications in scanning electron microscopy. **[4]**

Q3) Answer the following questions.

a) Explain the thermal properties of nanosize materials. **[6]**

b) State various applications of carbon annotubes. **[4]**

Q4) Answer the following questions.

a) Explain Top-down and Botten-up approach with neat diagram. **[6]**

b) Explain the synthesis of nanomaterial by using colloidal method. **[4]**

P.T.O.

Q5) Attempt any FOUR of the following. **10]**

a) State the properties of quantum dots.

b) Draw a typical diagram of chemical vapour deposition.

c) Explain nano-crystalline ZnO.

d) Optical properties of nanomaterials.

e) Application of nanomaterials in electronics and IT.

f) Bragg's law and Scherer formula.

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Total No. of Questions : 5]

SEAT No. :

P1165

[Total No. of Pages : 2

[6054]-528
T.Y.B.Sc. (Regular)
PHYSICS
PHY-366 (R) : Microcontroller
(2019 Pattern) (Semester - VI) (Elective) (Paper - VI) (36126 R)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Attempt any three quetions from Q.2 to Q.5.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logtable or electronic calculator is allowed.***

Q1) Attempt any Five of the following. **[5]**

a) What is stack?

b) What is meant by assembly language?

c) How (-27) is represented in 8051 microcontroller?

d) What is function of pc register?

e) What is the size of on-chip ROM of 8051 microcontroller?

f) If the crystal frequency is 12MHz, then find the period of timer clock.

Q2) a) Attempt any two of the following. **[2×3=6]**

i) What is the difference between microprocessor and microcontroller?

ii) What is meant by interrupt? Explain the different external interrupts of 8051 microcontroller.

iii) Explain any three assembler directives of 8051 microcontroller.

b) Explain the meaning of following instructions.

i) MUL AB

ii) DIV AB.

Q3) a) Attempt any two of the following. **[2×3=6]**

i) Write an assembly language program to subtract 63H from 98H using 2's complement of 63H store the result at memory location 50H.

ii) Explain the function of serial port of 8051 microcontroller. Also give its pin functions.

iii) Explain any three different arithmatic instruction of 8051 microcontroller.

d) Explain any four addressing modes of 8051 microcontroller with their suitable examples. **[4]**

P.T.O.

Q4) Attempt <u>any two</u> of the following. **[2×3=6]**

a) i) Give the different features of 8051 microcontroller.

ii) Write an assembly language program to add two 8 bit numbers 96H and 97H and store the carry and sum at memory locations 61H and 62H respectively.

iii) Draw the block diagram of architecture of 8051 microcontroller.

b) Give the meaning of following instruction. **[4]**

i) XCH A, 63H

ii) DEC R5

iii) SWAP A

iv) CPL A

Q5) Attempt <u>any FOUR</u> of the following. **[4×2.5=10]**

a) Write short note on PSW register of 8051 microcontroller.

b) Explain organisation of internal RAM of 8051 microcontroller.

c) Write short note on Timer/counter of 8051 microcontroller.

d) Write functions of IP and IE registers.

e) Write short note on I/o ports of 8051 microcontroller.

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Total No. of Questions : 5]

SEAT No. :

P-1166

[Total No. of Pages : 2

[6054]-529
T.Y.B.Sc. (Regular)
PHYSICS
PHY - 366S : LASERS
(2019 Pattern) (Semester - VI) (Paper - VI) (36126S)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

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

Q1) Solve any FIVE of the following. **[5]**

a) State any two types of coherence.

b) What is pumping?

c) Give two application of liquid lasers.

d) Define FWHM.

e) Fluorescent tube emitters light has coherence length 5042Å. Calculate coherence time.

f) Calculate optical path for He-Ne laser tube which achieves the condition for amplification having wave length 6328 Å (Given: m=1).

Q2) Attempt the following. **[6]**

a) i) Write short note on laser beam directionality.

ii) Explain four level optical pumping in laser.

b) Write short note on optical resonator. **[4]**

Q3) Attempt the following. **[6]**

a) i) Explain application of laser for isotope seperation.

ii) Explain homogeneous and in homogeneous broadening.

b) Calculate wave length of beam at which rate of spontaneous emission is equal to rate of stimulated emission for temperature of 37813 °K - (Given : R = ½). **[4]**

P.T.O.

Q4) Attempt the following. **[6]**

a) i) Explain working of Ruby laser.

ii) State losing condition under critical population inversion.

b) Find out the atomic population at temperature 6000k at the first excited level for hydrogen gas having excited energy state 3.39 ev. (Given: $E_2 = 3.39$ev. $E_1 = 13.6$ ev) **[4]**

Q5) Answer any four of the following. **[10]**

a) Explain spatial coherence.

b) Write short note on use of laser in cutting of material.

c) Explain use of He-Ne laser.

d) Obtain condition for light amplification in laser action.

e) Write note on semiconductor laser.

f) Define gain coefficient and round trip gain.

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Total No. of Questions : 5]

SEAT No. :

P-1167

[Total No. of Pages : 2

[6054]-530
T.Y.B.Sc. (Regular)
PHYSICS
PHY - 366T : Astronomy & Astrophysics-II
(2019 Pattern) (Semester - VI) (Elective - II) (36126 T)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Q.2 to 5 carry 10 marks each.***
4) ***Figures to the right indicates full marks.***

Q1) Answer any FIVE of the following. **[5]**

a) What is Corona?

b) Why we need space Telescopes?

c) Convert 1 Mpc into KM.

d) What do you mean by Multiverse?

e) To observe the photons of 1MeV, which type of telescope is required?

f) What is Apparent solar time?

Q2) a) With suitable diagrams, explain Butterfly Diagram.

OR

Explain construction and working of Hubble space Telescope (HST). **[6]**

b) Explain the structure of Milky way Galaxy. **[4]**

Q3) a) What is Hubble's law? Elaborate the significance Hubble's law in astrophysics.

OR

How distances are estimated is astronomy? **[6]**

b) Enlist: Limitations of Terrestrial telescopes. **[4]**

Q4) a) Explain, with suitable diagrams, how energy is transfered from core of the star to the outer parts of the star.

OR

With suitable diagrams, explain various photospheric phenomenon. **[6]**

b) How X-ray telescopes work? **[4]**

P.T.O.

Q5) Write short notes (Any Four). **[10]**

a) Chandra Telescope.

b) AGNs.

c) Coordinate systems in Astronomy.

d) Space-Time singularity.

e) Detectors for optical frequencies.

f) Energy production in stars.

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Total No. of Questions : 5]

SEAT No. :

P-1168

[Total No. of Pages : 1

[6054]-531
T.Y.B.Sc. (Regular)
PHYSICS
PHY-366U : Renewable Energy Sources - II
(2019 Pattern) (Semester - VI) (Elective - II) (36126 U)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Q.2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Use of calculator and log-table is allowed.***

Q1) Solve any FIVE of the following. **[5]**

a) What is meant by anaerobic digestion?
b) Give principle of wind energy management system?
c) What is benefits of energy efficiency?
d) State the factors affecting on Bio-digestion.
e) How wind is formed?
f) What are uses of Tidal energy.

Q2) Answer the following questions. **[6]**

a) Describe various Tidal Power. **[4]**
b) Discuss thermocell & its application.

Q3) Answer the following questions.

a) What are advantages & disadvantage of fixed dome & floating type biogas plant. **[6]**
b) Explain the basic principle of wind energy conversion system. **[4]**

Q4) Answer the following questions.

a) Discuss the case studies on fuel substitution. **[6]**
b) What are the classification of wind machine? Explain HAWT neat diagram. **[4]**

Q5) Write short note on Any Four of following. **[10]**

a) Objective of energy saving.
b) Diagram and working of Downdraft gosfier.
c) Construction of biogas plant.
d) Thermocell.
e) Strategies of energy management.

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Total No. of Questions : 5]

SEAT No. : ____

P1169

[Total No. of Pages : 2

[6054]-532

T.Y. B.Sc. (Regular)

PHYSICS

PHY-366(V) : Acoustics-II

(2019 Pattern) (Semester-VI) (Paper-VI) (36126V)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q. 1 is compulsory.***
2) ***Solve any three questions from Q.2 to 5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Use of calculator and log-table is allowed.***

Q1) Solve any FIVE of the following. **[5]**

a) Draw a diagarm showing cross-section of a moving coil microphone.

b) What do you mean by variable-Q graphic equalizer?

c) Give two characteristics of monophonic SRS.

d) Give significance of the expression.

$dBW=Lref^{-L}\ sens^{+20}\ \log_{10}(D_2/D_{ref})+HR$ and $W=10^{(dBw/10)}$

e) Define Directivity factor of a microphone.

f) Give the expression for sensitivity for condenser microphone.

Q2) Answer the following questions.

a) Explain Dolby Noise Reduction. Discuss Dolby NR types A,B,C,SR and S. What is Dolby Atmos? **[6]**

b) A condenser microphone diaphragm of radius 0.01m is stretched to a tension of 2.2×10^{4}N/M. It the spacing between the diaphragm and the backing Plate is 4×10^{-5}m, determine the polarizing voltage required for a sensitivity of –68 dB re 1 volt/μbar. **[4]**

P.T.O.

Q3) Answer the following questions.

a) Give the construction and working principle of a carbon microphone. Give the expression for its sensitivity and discuss the constant pressure frequency response. **[6]**

b) Determine the cut off frequency of exponential horn of flare constant 5.0 on being employed outdoors at 112°F. **[4]**

Q4) Answer the following questions.

a) Give the construction and working principle of a condenser microphone. Draw its equivalent circuit and give the expression for its sensitivity. **[6]**

b) The frequency of mechanical resonance for a cone speaker is 57Hz. The stiffness of the cone is 2×10^3 N/M. Determine the radiation reactance, if the total mass of diaphragm and voice coil is 0.01 kg. **[4]**

Q5) Write a short notes on any four of the following. **[10]**

a) Bass reflex cabinet

b) Medical ultrasound

c) Volume compressor

d) WAV File format

e) Stereo phonic SRS

f) NDT

Total No. of Questions : 5]

SEAT No. :

P-1170

[Total No. of Pages : 2

[6054]-533

T.Y. B.Sc.

PHYSICS

PHY - 3610 (W) : Scientific Data Analysis Using Python

(2019 Pattern) (Semester - VI) (SEC - III) (361210W)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Que.1 is compulsory.***
2) ***Solve any three questions from Que. 2 to Que. 5.***
3) ***Que. 2 to Que. 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Use of calculator and log-table is allowed.***

Q1) Attempt any Five questions : **[5]**

a) Which library is suitable for performing numerical computation in Python.

b) What is the purpose of the Pandas library in data analysis?

c) Which library in Python is commonly used for scientific data analysis?

d) What is the function of the "read CSV" method in Pandas?

e) Which library is commonly used for data visualization in Python?

f) What does the import Pandas as pd statement do in Python?

Q2) Answer the following questions : **[10]**

a) i) Explain the concept of Dataframe in Pandas. **[2]**

ii) Write Python code to import the Humpy library. **[2]**

iii) How can you handle missing data in Pandas Dataframe. **[2]**

b) Describe the purpose of the Matplotlib. library in data analysis. **[4]**

P.T.O.

Q3) Answer the following questions : **[10]**

a) Give CSV file named "data. CSV" with column. "Temperature" and "Humidity". Write Python code to read the file into the Pandas Dataframe and display first five rows. **[6]**

b) Give NumPy array

data = np. array ([1, 2, 3, 4, 5]),

Write Python code to calculate the mean and standard deviation of the array using NumPy function. **[4]**

Q4) Answer the following questions : **[10]**

a) i) What is the purpose of the NumPy library in Python. **[2]**

ii) How does the Pandas library facilitate data manipulation and analysis. **[2]**

iii) What is key functionality provided by the Matplotlib. library in Python? **[2]**

b) Explain role of random module in the Python. **[4]**

Q5) Write a short note on Any Four : **[10]**

a) OOP in Python

b) Exception handling in Python

c) File handling in Python

d) Generators in Python

e) Decorators in Python

▽▽▽▽

Total No. of Questions : 5]

SEAT No. :

P-1171

[Total No. of Pages : 2

[6054]-534

T.Y. B.Sc.

PHYSICS

PHY - 3610 (X) : Solar PV System : Installation, Repairing and Maintenance

(2019 Pattern) (Semester - VI) (CBCS) (361210(X))

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q. 2 to Q. 5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithm tables and calculator is allowed.***

Q1) Solve any Five of the following : **[5]**

a) Define solar cell.

b) What are the main parameters of a solar module?

c) What is the solar tracker?

d) What is the use of sunshine recorder?

e) What is the use of inverter in a solar system?

f) What is Luxmeter?

Q2) a) Explain the following :

i) Distinguish between pyranometer and pyreheliometer. **[3]**

ii) How do solar cell works. Explain it with suitable diagram. **[3]**

b) What is On-grid solar PV-System? Explain it with suitable diagram. **[4]**

P.T.O.

Q3) a) Explain the following :

i) Define sunshine recorder along with its types. **[3]**

ii) Explain solar system sizing. **[3]**

b) What is off-grid solar PV-system. Give the applications of off-grid solar PV-system. **[4]**

Q4) a) Explain the following :

i) Explain hybrid solar PV-system. **[3]**

ii) Distinguish between on-grid and off-grid solar PV-system. **[3]**

b) Explain solar tracking system hence discuss it's types. **[4]**

Q5) Write short notes on any Four of the following : **[10]**

a) Need of solar radiation measurement.

b) Solar cell, solar module and solar array.

c) Radiation at the earth surface.

d) Building integrated photovoltaic system.

e) Solar constant.

f) Pyranometer.

▽▽▽▽

Total No. of Questions : 5]

SEAT No. :

P-1172

[Total No. of Pages : 2

[6054]-535

T.Y. B.Sc.

PHYSICS

PHY-3610 (Y) : Applications of Internet of Things (IoT)

(2019 Pattern) (CBCS) (Semester - VI) (361210Y)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q.2 to 5.***
3) ***Questions 2 to 5 carry equal marks.***

Q1) Solve any five of the following : **[5]**

a) Define wireless sensor network.

b) What is automation data?

c) Give characteristics of IoT.

d) What is M_2M?

e) List any two use of SCADA is IoT.

f) Define Data.

Q2) Answer the following :

a) What are the features of IoT? **[6]**

b) Explain four layers of IoT architecture. **[4]**

Q3) Answer the following :

a) Explain M_2M communication in detail. **[6]**

b) How are M_2M technologies used. **[4]**

P.T.O.

Q4) Answer the following :

a) What is the difference between IoT & M_2M? **[6]**

b) Discuss about IoT communication model. **[4]**

Q5) Write short notes on any four of the following : **[10]**

a) Requirements of International standard.

b) Functions of C#.

c) Role of IoT in agriculture.

d) Use of M_2M communication in supply chain management solution.

e) Cloud computing.

f) Time operations.

□□□

Total No. of Questions : 5]

SEAT No. :

P-1173

[Total No. of Pages : 2

[6054]-536

T.Y. B.Sc.

PHYSICS

PHY-3610 (Z) : Calibration Techniques

(2019 Pattern) (Semester - VI) (Skill Enhancement Course - III) (361210Z)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q.2 to 5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Use of calculator and log-table is allowed.***

Q1) Solve any Five of the following : **[5]**

a) What is calibration range?

b) What is meant by harmonic comparators?

c) State the principle of Manometer Pressure Gauge.

d) What are the advantages of pressure comparators?

e) Give the classification of Instruments.

f) What is seebeck effect?

Q2) Answer the following questions :

a) With the help suitable diagram explain the working of Piezometer Gauges. **[6]**

b) Define calibration. Why it is important? **[4]**

Q3) Answer the following questions :

a) Explain different methods used for calibration. **[6]**

b) Explain in brief digital and electronic multimeter. **[4]**

P.T.O.

Q4) Answer the following questions :

a) Describe Traceability in Calibration. **[6]**

b) Explain in brief Radiation Pyrometer. **[4]**

Q5) Write short notes on <u>any Four</u> of the following : **[10]**

a) Piezometer Pressure gauge.

b) Thermoelectric effect.

c) Resistance Temperature Detector (RTD).

d) Digital and electronic multimeter.

e) CRT

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Total No. of Questions : 5]

SEAT No. :

P-1174

[Total No. of Pages : 2

[6054]-537

T.Y. B.Sc.

PHYSICS

PHY-3611(AA) : Microcontroller (Skill Development)

(2019 Pattern) (CBCS) (Semester - VI) (361211AA)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Questions 1 is compulsory.***
2) ***Attempt any three questions from Q. 2 to Q. 5.***
3) ***Figures to right indicate full marks.***
4) ***Use of logtable or electronic calculator is allowed.***

Q1) Attempt any five of the following : **[5]**

a) What is the function of PC register.

b) How (–81) is represented in 8051 microcontroller.

c) Give the function of RST pin of 8051 microcontroller.

d) What is function of IP register?

e) What is stack? How it works.

f) If the Crystal frequency is 6MHz, then find the period of timer clock.

Q2) a) Attempt any two the following : **[2 × 3 = 6]**

i) Explain the function of PUSH and POP instructions.

ii) Explain any three addressing modes of 8051 microcontroller with suitable examples.

iii) Explain the internal interrupts of 8051 microcontroller.

b) Explain the interfacing of (4 × 4) keys keyboard to an 8051 microprocessor. **[4]**

P.T.O.

Q3) a) Attempt any two of the following : **[2 × 3 = 6]**

i) Write an assembly language program to find 1's and 2's complement of number 63H. Store the result in memory location 41H and 42H.

ii) Explain the function of SP and DPTR register of 8051 microcontroller.

iii) Explain the assembler directives of 8051 microcontroller.

b) Explain with neat diagram interfacing of LCD to an 8051 microcontroller. **[4]**

Q4) a) Attempt any two of the following : **[2 × 3 = 6]**

i) Explain the function of serial part of 8051 microcontroller along with their pin functions.

ii) Draw a block diagram architecture of 8051 microcontroller.

iii) What is function of SBUF and SCON registers?

b) Explain the meaning of following instructions : **[4]**

i) MOV A, R1

ii) SWAP A

iii) DEC 60H

iv) ADDC A, R6

Q5) Write short notes on any four of the following : **[4 × 2.5 = 10]**

a) PSW register of 8051 microcontroller.

b) Timer / counter of 8051 microcontroller

c) RS - 232 Interfacing.

d) Function of DAA instruction

e) Difference between microprocessor and microcontroller.

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Total No. of Questions : 5]

SEAT No. :

P-1175

[Total No. of Pages : 2

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T.Y. B.Sc.

PHYSICS

PHY-3611(AB) : Instrumentation for Agriculture

(Skill Enhancement Course - IV)

(2019 Pattern) (Semester - VI) (361211AB)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Questions 1 is compulsory.***
2) ***Solve any three questions from Q. 2 to Q. 5.***
3) ***Que - 2 to Que. 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Use of calculator and log-table is allowed.***

Q1) Solve any five of the following : **[5]**

a) State any four advantages of biosensors.

b) What are pH of soil?

c) What is upstream control system?

d) Define sucrose or sacchrose.

e) What are rain gauge devices?

f) What is leaf Area Index (LAI)?

Q2) Answer the following questions :

a) Explain the index properties of soil. **[6]**

b) What are the advantages and disadvantages of sprinkler irrigation system. **[4]**

P.T.O.

Q3) Answer the following questions : **[2 × 3 = 6]**

a) Describe principle and working of water distribution system. **[6]**

b) What is photosynthesis? How does radiations are affects photosynthesis? **[4]**

Q4) Answer the following questions : **[2 × 3 = 6]**

a) What is the role of Instrumentation of Modern Agriculture? **[6]**

b) Draw flow Diagram of fermenter and control (Batch Process) and explain it. **[4]**

Q5) Write short notes on any four of the following : **[10]**

a) Types of Agriculture sensors.

b) Lysimeters

c) Fine wire thermocouple sensor

d) Application of batch fermentation

e) Upstream and downstream control system

f) SCADA for DAM parameters and control

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Total No. of Questions : 5]

SEAT No. :

P-1176

[Total No. of Pages : 2

[6054]-539

T.Y. B.Sc.

PHYSICS

PHY-3611(AC) : Radiation Physics

(2019 Pattern) (Semester - VI) (361211AC)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Questions 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) In ionization chamber which type of gases are filled?

b) Write two application of gamma rays.

c) What is mean by stopping power.

d) Which radioactive nuclic are used in medical diagnosis?

e) Define the radiation unit Bequerel.

f) What is Geiger threshold.

Q2) Answer the following questions :

a) Describe the terms in brief of Bethe-Bloch formula & Draw plot of Bethe formula for proton. **[6]**

b) What are the safety codes & handling radiactive sources. **[4]**

Q3) Answer the following questions :

a) Describe any three applications of radiations in medical & agricultural field. **[6]**

b) What is difference between ionizing & non ionizing radiations. **[4]**

P.T.O.

Q4) Answer the following questions :

a) Which type of radiation has maximum ionizing power than other radiations? Why? **[6]**

b) Explain the materials used for sheilding gamma rays & neutrons with its characteristics. **[4]**

Q5) Write short notes on any four of the following : **[10]**

a) Photomultiple tube

b) Speciality of semiconductor detector

c) Stopping power of radiation

d) How personal dosimeter is important?

e) Equivalent dose.

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Total No. of Questions : 5]

SEAT No. :

P-1177

[Total No. of Pages : 2

[6054]-540

T.Y. B.Sc.

PHYSICS

PHY-3611 (AD) : Photography

(2019 Pattern) (CBCS) (Semester - VI) (361211AD)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Question 1 is compulsory.***
2) ***Attempt any 3 questions from Q.2 to Q.5.***
3) ***Question 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Use of calculator and log table is allowed.***

Q1) Answer any five of the following ; **[5]**

a) State the numbers of aperture.

b) What do you meant by Shutter?

c) Write the scale of aperture.

d) Draw the labeled diagram of pin hole camera.

e) Discuss the role of view finder.

f) List the parts of twin lens Reflex camera.

Q2) Answer the following questions :

a) Explain the construction and working of T.L.R. camera indetail. **[6]**

b) What do you meant by depth of field and depth of focus? **[4]**

Q3) Answer the following questions :

a) Explain lighting techniques in detail. **[6]**

b) Explain the types of Digital camera and its features. **[4]**

P.T.O.

Q4) Answer the following questions :

a) Explain the use of telezoom lens in photography. **[6]**

b) What is the use of wide angle lens and where it is used? **[4]**

Q5) Answer any four of the following : **[10]**

a) What do you meant by auto focusing?

b) Why digital camera is better than S.L.R. Camera?

c) How camera is controlled by shutter speed and aperture?

d) Why S.L.R. Camera is better than box camera?

e) State and explain angle of view of wide angle lens.

f) State and explain angle of view of Normal zoom lens.

□□□

Total No. of Questions : 5]

SEAT No. :

P1178

[Total No. of Pages : 2

[6054]- 541
T.Y. B.Sc. (Regular)
CHEMISTRY
CH - 601 : Physical Chemistry - II
(2019 Pattern) (CBCS) (Semester - VI) (36131)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Que.-2 to Que.-5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat diagrams wherever necessary.***
6) ***Use of logarithm tables and calculator is allowed.***

Q1) Solve any Five of the following. **[5]**

a) Define concentration cell.

b) Define miller indices.

c) Define binding energy.

d) Which radioisotope is used for the determination of age of water sample.

e) Calculate the cell emf of the following cell at 25°C

$$Zn\left|Zn^{2+}\right\|Cd^{2+}\left|Cd\right.$$

Given : $E^{\circ}_{zn|zn^{2+}(oxi)} = 0.76\,v$

$E^{\circ}_{cd|cd^{2+}(oxi)} = 0.44\,v$

f) What is the type of crystal system, if all the three relative axial length are equal (a = b = c) and interfecial angles are 90° ($\alpha = \beta = \gamma = 90^{\circ}$)

Q2) a) Answer any two of the following. **[6]**

i) Discuss the redox electrode with respect to

1) Formation of electrode.

2) Electrode reaction.

3) Expression for electrode potential.

P.T.O.

ii) Differentiate between crystalline and amorphous solid.

iii) Define the terms with suitable examples: Isotopes, Isobars and Isotones.

b) What do you meant by unit cell of crystal? Sketch the unit cell of simple, body centred and face centred cubic lattice. **[4]**

Q3) a) Answer any Two of the following: **[6]**

i) Enlist the characteristics of standard cell. Describe the construction and working of weston standard cell.

ii) Distinguish between reversible and irreversible cell.

iii) Explain the law of crystal symmetry.

b) What is single electrode potential of a half cell for zinc electrode dipping in a 0.01 m solution of Zinc sulphate at 25°C ($E^{\circ}_{zn} = 0.763$ Volts). **[4]**

Q4) a) Answer any Two of the following: **[6]**

i) Explain the preparation of salt bridge. Give the functions of salt bridge.

ii) Show that $\lambda = \frac{2.303}{t} \log \frac{No}{N}$ for the first order decay process, in which daughter is stable.

iii) Give advantages and disadvantages of quinhydrone electrode.

b) Actinium 228 decay 43.2% in 5 hours. Find half life of the element. **[4]**

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

a) Primary batteries.

b) Daniell cell.

c) Laue method.

d) Law of constancy of interfacial angles.

e) α - decay

f) Use of tracers in structure determination.

Total No. of Questions : 5]

SEAT No. :

P-1179

[Total No. of Pages : 2

[6054]-542
T.Y. B.Sc.
CHEMISTRY
CH - 602 : Physical Chemistry - III
(2019 Pattern) (CBCS) (Semester - VI) (36132)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat diagrams wherever necessary.***
6) ***Use of logarithm table and calculator is allowed.***

Q1) Solve Any Five of the following : **[5]**

a) A sample of polyethene has an average molecular weight of 5964 g/mol. Calculate average degree of polymerisation.

(Given : molecular weight of ethene = 28g/mol)

b) What are molecular solids?

c) State classification of solid-state reaction.

d) What is value of 'V' for Nacl.

e) What is Hedvall effect?

f) Define Ebulloscopic Constant.

Q2) a) Attempt Any Two : **[6]**

i) Obtain the equation $\Delta Tf = kf. m.$

ii) What is addition polymerization explain with suitable example.

iii) What is α? How it is defined in geometrical rate laws?

b) Explain deaquation - anation phenomenon with one example. **[4]**

P.T.O.

Q3) a) Attempt Any Two : **[6]**

i) Give mark - Houwink equation explain terms involved in it.

ii) What are semiconductors? Give two examples.

iii) Derive the integrated rate law based on contracting sphere geometrical model.

b) A 10% solution of cane sugar is isotonic with 1.754% solution of urea (molecular weight = 60). Calculate molecular weight of cane sugar. **[4]**

Q4) a) Solve Any Two : **[6]**

i) What is number average molecular weight write expression for it.

ii) Explain why cohesive energy of Nickel is greater than copper.

iii) Explain nature of plot of fraction of reactant reacted versus time based on Avrami-Erofeev nucleation model.

b) A 2% solution of KCl freezes at –0.987°C. Calculate Vant-Hoff factor for KCl if it's molecular weight = 74.5 & Kf = 1.86. **[4]**

Q5) Write notes on any four of the following : **[10]**

a) Modern Osmometer.

b) Parabolic Rate law equation.

c) Linear and cyclic polymers.

d) Thermosetting and Thermoplastic polymers.

e) n-type semiconductor.

f) Band structure of sodium.

▽▽▽▽

Total No. of Questions: 5]

SEAT No. :

P1180

[Total No. of Pages : 2

[6054]-543
T.Y.B.Sc. (Regular)
CHEMISTRY
CH-604 : Inorganic Chemistry - II
(CBCS 2019 Pattern) (Semester-VI) (36134)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5***
3) ***Q.2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat diagrams wherever necessary.***
6) ***Use of logarithm tables and calculator is allowed.***

Q1) Answer any five of the following: **[5]**

a) What is geometry of $RhCl(PPh_3)_3$?

b) What is gel?

c) Name low temperature method for synthesis of Inorganic solids?

d) Which Protein is responssible for red colour in blood?

e) Define the term-polymer

f) Which method is generally used for Preparation of $Fe(CO)_5$?

Q2) a) Answer any two of the following **[6]**

i) What is homogeneous catalysis? Mention the properties of homogeneous catalysts

ii) Distinguish between Haemoglobin and myoglobin

iii) Count the total number of electrons in the following metal carbohyls and whether they obey 18 $\bar{e}$ rule or not?

$[Re_2(CO)_{10}]$

$[V(CO)_6]$

[At. No. Re = 75, V=23]

P.T.O.

b) Answer the following. **[4]**

i) Define

1) Hydrogenation

2) Supported metal catalyst

ii) Draw structures of

1) $Si_3O_9^{6-}$

2) SiO_4^{4-}

Q3) a) Answer any two of the following: **[6]**

i) Explain hydrothermal method for synthesis of inorganic solids.

ii) Discuss Heck reaction with the help of catalytic cycle

iii) What are silicones? Give important applications of silicones.

b) Draw structures of the following metal carbonyls. **[4]**

i) $[R4_3\ (CO)_{12}]$

ii) $[Fe_2\ (CO)_9]$

iii) $[Mn_2\ (CO)_{10}]$

iv) $[Cr(CO)_6]$

Q4) a) Answer any two of the following: **[6]**

i) Give applications of organometallic compounds in industrial catalysis.

ii) What are Fe-S Proteins? Describe in brief the functions of different Fe-S clusters.

iii) Discuss the classification of heterogeneous catalysts.

b) Describe biological role of calcium and Magnesium **[4]**

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

a) Applications of silicates

b) Biological importance of Iron

c) Applications of ionic liquids

d) Friedel craft Alkylation of ferrocene

e) Properties of efficient catalyst

f) Zeolites

Total No. of Questions : 5]

SEAT No. :

P-1182

[Total No. of Pages : 5

[6054]-545

T.Y. B.Sc.

CHEMISTRY (Paper - II)

CH-607 : Organic Chemistry - II

(2019 Pattern) (CBCS) (Semester - VI) (36137)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Question No. 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Figures to right indicate full marks.***
5) ***Draw neat diagram wherever necessary.***

Q1) Solve Any five of the following : **[5]**

a) Express 2μ in cm^{-1}.

b) How many sets of protons are present in -

$CH_3 - CH_2 - O - CH_2 - CH_3$

c) Define chromophore.

d) Draw chair conformation of cis-decalin.

e) Calculate the fundamental modes of vibrations in NH_3.

f) Define chemical shift.

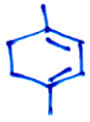
Q2) a) Attempt Any two of the following : **[6]**

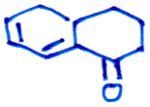
i) Draw chair conformation of cis-1, 3 dimethyl cyclohexane. Comment on their stability.

ii) Write short note on types of vibrations.

iii) Write note on coupling constant in PMR spectroscopy.

b) Calculate the λmax values of the following compounds : **[4]**

i) 

ii) 

P.T.O.

Q3) a) Attempt <u>Any two</u> of the following : **[6]**

i) What is hypsochromic shift? Aniline shows hypsochromic shift in acidic medium explain.

ii) Explain various regions in IR spectroscopy.

iii) Write note on shielding and deshielding.

b) How will you distinguish following pairs by IR spectroscopy? **[4]**

i) $CH_3 - \overset{\overset{O}{\|}}{C} - CH_3$ & $CH_3 - CH_2 - \overset{\overset{O}{\|}}{C} - H$

ii) $CH_3 - CH_2 - \overset{\overset{O}{\|}}{C} - OH$ & $CH_3 - CH_2 - CH_2 - OH$

Q4) a) Propose the structure for the compounds with following spectroscopic data (Any Two) : **[6]**

i) Molecular Formula - $C_4H_8O_2$

IR : 1740 cm^{-1}

NMR : a) 1.1 δ Triplet 3H

b) 2.1 δ Singlet 3H

c) 3.4 δ Quartet 2H

ii) Molecular Formula - C_7H_7Br

IR : 1510, 1620, 855 cm^{-1}

NMR : a) 2.3 δ Singlet 3H

b) 7.20 δ Doublet 2H

c) 6.80 δ Doublet 2H

iii) Molecular Formula - C_3H_8O

IR : 3300 cm^{-1}

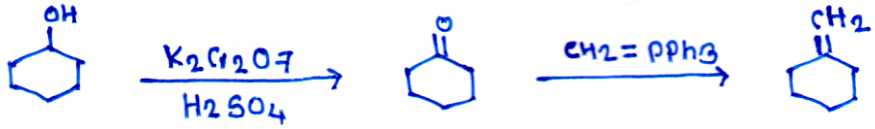
NMR : a) 1.1 δ Doublet 6H

b) 4.8 δ Singlet 1H

c) 3.9 δ Septet 1H

b) Answer the following : **[4]**

i) How will you follow following reaction by IR.



ii) How IR spectroscopy is useful for the determination of hydrogen bonding in a molecule?

Q5) Attempt <u>any four</u> of the following : **[10]**

a) Write a note on π-π^* and σ-σ^* transition.

b) TMS is used as internal standard in PMR spectroscopy. Why?

c) Draw chair conformation of trans-1, 4 dimethyl cyclohexane. Comment on their stability.

d) Give applications of UV spectroscopy.

e) Explain factors affecting on IR frequencies.

f) Write short note on splitting of PMR peaks.

□□□

TABLE – I

Characteristic Infrared Absorptions of Functional Groups

GROUP		FREQUENCY RANGE cm^{-1}	INTENSITY
A. Alkyl			
C–H (stretching)		2853–2962	(m – s)
Isopropyl – $CH(CH_3)_2$		1380 – 1385 and 1365 – 1370	(s) (s)
tert – Butyl – $C(CH_3)_3$		1385 – 1395 and 1365	(m) (s)
B. Alkenyl			
C–H (stretching)		3010 – 3095	(m)
C = C (stretching)		1620 – 1680	(v)
R– CH = CH_2		985 – 1000 and 905 – 920	(s) (s)
$R_2C = CH_2$		880 – 900	(s)
cis – RCH = CHR	(out of plane C–H bendings)	675 – 730	(s)
trans – RCH = CHR		960 – 975	(s)
C. Alkynyl			
≡ C–H (stretching)		3300	(s)
C ≡ C (stretching)		2100 – 2260	(v)
D. Aromatic			
Ar – H (stretching)		~3030	(v)
Aromatic substitution type (C–H out-of-plane bendings)			
Monosubstituted		690 – 710 and 730 – 770	(very s) (very s)
o – Disubstituted		735 – 770	(s)
m – Disubstituted		680 – 725 and 750 – 810	(s) (s)
p – Disubstituted		800 – 840	(very s)
E. Alcohols, Phenols, Carboxylic Acids			(very s)
OH (alcohols, phenols, dilute solutions)		3200 – 3550	(broad)
OH (alcohols, phenols, hydrogen bonded)		2500 – 3000	(very broad)
OH (carboxylic acids, hydrogen bonded)			
F. Aldehydes, Ketones, Esters and Carboxylic Acids			
C = O stretch			
aldehydes		1630 – 1780	(s)
ketones		1690 – 1740	(s)
esters		1680 – 1750	(s)
carboxylic acids		1735 – 1750	(s)
amides		1710 – 1780	(s)
G Amines		1630 – 1690	(s)
N – H			(s)
H. Nitriles			
C ≡ N		3300 – 3500	(m)
I. –C–O stretch (alcohol, ether, phenol		2220 – 2260	(m)
J. Nitro N = O		1000 – 1300	(s)
k. Halides			
	F	1550 – 1350	(s)
	Cl	1400 – 1000	(s)
	Br	785 – 540	(s)
		<667	(s)

TABLE – 2

Approximate Proton Chemical Shifts in NMR

TYPE OF PROTON	CHEMICAL SHIFT, DELTA, PPM (δ)		
1° Alkyl, RCH_3	0.8 – 1.0		
2° Alkyl, RCH_2R	1.2 – 1.4		
3° Alkyl R_3CH	1.4 – 1.7	Ester $R-\overset{\overset{O}{\|}}{C}-O-CH_2-R$	4 to 4.5
Allylic, $R_2C=\overset{\overset{R}{\|}}{C}-CH_3$	1.6 – 1.9		
Benzylic, $ArCH_3$	2.2 – 2.5		
Alkyl chloride RCH_2Cl	3.6 – 3.8		
Alkyl bromide, RCH_2Br	3.4 – 3.6		
Alkyl iodide, RCH_2I	3.1 – 3.3		
Ether, $ROCH_2R$	3.3 – 3.9		
Alcohol, $HOCH_2R$	3.3 – 4.0		
Ketone, $RC(=O)CH_3$	2.1 – 2.6	$R-\overset{\overset{O}{\|}}{C}-CH_2-$	2.4 δ
		$R-\overset{\overset{O}{\|}}{C}-\overset{\|}{C}H-$	2.5 δ
Aldehyde, $RC(=O)H$	9.5 – 9.8		
Vinylic, $R_2C=CH_2$	4.6 – 5.0		
Vinylic $R_2C=\overset{\|}{C}H$	5.2 – 5.7		
Aromatic, ArH	6.0 – 9.5		
Acetylenic, $RC\equiv CH$	2.5 – 3.1		
Alcohol hydroxyl, ROH	0.5 – 6.0[a]		
Carboxylic, $RC(=O)OH$	10 – 13[a]		
Phenolic, ArOH	4.5 – 7.7[a]		
Amino R– NH_2	1.0 – 5.0		

[a]The chemical shifts of these groups vary in different solvents and with temperature and concentration.

TABLE – 3

U.V. Absorption rules for diene chromosphores

1) Parent	215 nm	6) – halogen	5 nm
2) Each extra conjugation	30 nm	7) – SR	30 nm
3) Homoannular	39 nm	8) – NR_2	60 nm
4) Exocylic double bond	05 nm	9) – OH,– OR	5 nm
5) Each alkyl (R) substituent directly attached to double bonded carbon	05 nm		

U.V. Absorption rules for Enone System

1) Parent	215 nm (207 nm for aldehyde) (202nm for five member ring)		
2) Each extra conjugation	30 nm	6) – Cl	α 15 nm
3) Homoannular	39 nm	7) – OH, –OR	β 12 nm
4) Substituents		8) – SR	α 35 nm
a) Alkyl group at α	10 nm	9) – NR2	β 30 nm
b) Alkyl group at β	12 nm		β 85 nm
c) Alkyl group at γ, δ & higher	18 nm		β 95 nm
5) Exocylic double bond	05 nm		

Total No. of Questions: 5]

SEAT No. : ____

P1183

[Total No. of Pages : 2

[6054]-546
T.Y. B.Sc. (Regular)
CHEMISTRY
CH-608 : Organic Chemistry-III
(CBCS 2019 Pattern) (Semester-VI) (36138)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Questions 1 is compulsory.***
2) ***Solve any three questions from Que-2to Que-5***
3) ***Questions 2 to Que-5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat diagrams wherever necessary.***

Q1) Attempt Any Five of the following. **[5]**

a) What is Simmons - smith reaction?

b) How Seo_2 is prepared?

c) What do you mean by ylide?

d) What is the molecular formula of Diterpenoids? Give one example.

e) What is disconnection?

f) What is carbeine?

Q2) a) Attempt Any two of the following. **[6]**

i) Explain Hofmann rearrangement with mechanism.

ii) Write the retrosynthesis and synthesis of

$$H_3C - CH = CH - \overset{\overset{O}{\|}}{C} - H$$

iii) Write synthesis of methyl heptenone from 2,4 dibromo -2- methyl butane

b) Answer the following. **[4]**

i) Give source and uses of Ephedrine.

ii) Write application of DMSO.

P.T.O.

Q3) a) Attempt any two of the following **[6]**

i) Discuss Michael reaction with mechanism.

ii) Discuss Isoprene and special isoprene rule.

iii) Explain mechanism involved in oxidation reaction by using DDQ.

b) Answer the following. **[4]**

i) How will you explain acyclic nature of citral?

ii) Give the methods of generation of Nitrenes

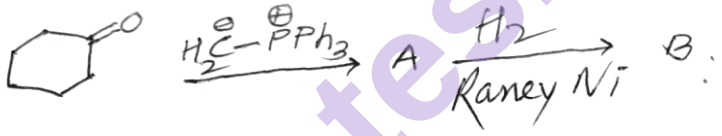
Q4) a) Attempt any two of the following. **[6]**

i) What is oxidation? Give two applications of O_sO_4.

ii) Discuss Hofmann exhaustive methylation.

iii) Give preparation properties and applications of $LiAlH_4$.

b) Identify A & B & rewrite the reactions **[4]**

i) 

ii) 

Q5) Attempt Any Four of the following. **[10]**

a) Write short note on wolff rearrangement.

b) Discuss Synthon and synthetic equivalent with example.

c) What is carbanion? Give two methods for generation of carbanion

d) Write short note on Mcmurry reaction.

e) Write disconnection approach and synthesis of acetophenone.

f) Give structure and applications of DIBAL.

Total No. of Questions : 5]

SEAT No. :

P-1184

[Total No. of Pages : 2

[6054]-547

T.Y. B.Sc.

CHEMISTRY

CH-610 (A) : Chemistry of Soil & Agrochemicals

(2019 Pattern) (CBCS) (Semester - VI) (361310A)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Question No. 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Draw neat diagrams wherever necessary.***

Q1) Solve any five of the following : **[5]**

a) What are fumigants?

b) What is soil testing?

c) What is Night soil?

d) Explain the term soil fertility.

e) Define nano pesticides.

f) Name the tools required for soil sampling.

Q2) a) Answer any two of the following : **[6]**

i) Explain surface soil & subsoil.

ii) Describe physical functions of soil.

iii) What are insecticides? Give classification of insecticides on the basis of mode of action.

b) Describe the construction & working of biogas (Gober gas) plant with neat diagram. **[4]**

P.T.O.

Q3) a) Answer any two of the following : **[6]**

i) Explain the role of biofertilizer in soil.

ii) What is acid soil? Explain in brief classification of acid soil.

iii) What is soil temperature? Explain factor's affecting soil temperature.

b) What are Manures? Give the factors that affect the composition of F.Y.M. **[4]**

Q4) a) Answer any two of the following : **[6]**

i) Explain reclamation of alkaline soil.

ii) Define fungicides. Give classification of fungicides. Explain in brief organic fungicides.

iii) Explain the advantages of use of nano-pesticides over conventional pesticides.

b) Define vermiculture. Describe small culturing technique along with proper diagram. **[4]**

Q5) Write short Note (Any four) : **[10]**

a) Ion exchange capacity of soil.

b) Green manuring.

c) Application of fertilizer in liquid form.

d) Classification of soil structure.

e) Collection of soil sample from the field.

f) Factor's affecting efficiency of fertilizers.

Total No. of Questions : 5]

SEAT No. :

P-1185

[Total No. of Pages : 2

[6054]-548

T.Y. B.Sc.

CHEMISTRY

CH-610 (B) : Introduction to Forensic Chemistry

(2019 Pattern) (CBCS) (Semester - VI) (361310B)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Question No. 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat diagrams wherever necessary.***
6) ***Use of logarithmic table and calculator is allowed.***

Q1) Solve any five of the following : **[5]**

a) Define the term forensic science.

b) Define designer drugs.

c) Write long form of NOPS.

d) Define suspect.

e) Define crime scene.

f) Write long form of WADA.

Q2) a) Answer any Two of the following : **[6]**

i) What are roles and responsibilities of Forensic scientist?

ii) Define narcotic drugs. Discuss effect of narcotic drugs on human body.

iii) Explain how HPLC is useful in analysis of NDPS drugs.

b) Answer the following : **[4]**

i) As per NDPS act, crime is decided in which situations.

ii) Explain microcrystalline testing of drug of abuse.

P.T.O.

Q3) a) Answer any two of the following : **[6]**

i) Explain withdrawal symptoms of NDPS drugs.

ii) Explain various functions of forensic science.

iii) Explain crime scene management.

b) Answer the following : **[4]**

i) Explain Dope test done in sports.

ii) Explain duties of forensic scientist.

Q4) a) Answer any two of the following : **[6]**

i) Explain violation of WADA code.

ii) Explain classification of NDPS drugs based on origin.

iii) Explain code of conduct of forensic scientist.

b) Answer the following : **[4]**

i) How searching of vehicle done in NDPS case.

ii) Define depressants and give example.

Q5) a) Answer any two of the following : **[6]**

i) Explain punishments under NDPS act, 1985.

ii) Explain collection and preservation of drug evidence.

iii) Explain searching of dwelling as per NDPS act.

b) Answer the following : **[4]**

i) Explain the term addictive potential.

ii) Explain skills required for to become forensic scientists.

□□□

Total No. of Questions : 5]

SEAT No. :

P-1186

[Total No. of Pages : 2

[6054]-549

T.Y. B.Sc.

CHEMISTRY

CH-611 (A) : Analytical Chemistry - II

(2019 Pattern) (CBCS) (Semester - VI) (361311A)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Question No. 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Question No. 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat diagram wherever necessary.***
6) ***Use of logarithm tables and calculator is allowed.***

Q1) Solve any five of the following : **[5]**

a) Give the Van Deemter equation.

b) What is interference?

c) Define detection limit.

d) What do you mean by isocratic elution?

e) Calculate Distribution ratio, when concentration of solute in aqueous phase is 0.5 and concentration of solute in organic phase is 0.2.

f) Define the term chromatography.

Q2) a) Solve any two of the following : **[6]**

i) Describe in brief flame ionization detector.

ii) Discuss the premix burner in AAS.

iii) Discuss the principle of FES.

b) In solvent extraction of uranium with 8-hydroxyquinolene in chloroform, the volume of aqueous and organic phases was 25 ml each. When the extraction percentage was 99.8%, calculate the distribution ratio. **[4]**

P.T.O.

Q3) a) Answer any two of the following : **[6]**

i) Discuss in brief electron capture detector.

ii) Describe the applications of FES.

iii) Explain in brief hallow cathode lamp used in AAS.

b) In chromatographic analysis of lemon oil a peak for limolene has a retention time of 8.36 min with a base line width of 0.96 min. Calculate the number of theoratical plates. **[4]**

Q4) a) Answer any two of the following : **[6]**

i) Sketch an ideal HPLC chromatogram and explain the terms retention time, peak area and peak height.

ii) What is HETP? What is it's importance?

iii) Draw a block diagram of flame photometer, explain in brief role of each component.

b) 2 grams of solute are dissolved in 100 ml aqueous solution. Calculate the amount of solute remaining in aqueous phase after **[4]**

i) a single extraction with 80 ml of organic solvent.

ii) four successive extractions with 20 ml of organic solvent. Distribution ratio for the extraction is 5.

Q5) Write a short note on any four of the following : **[10]**

a) Relationship between D and K_D.

b) Open tubular column.

c) Longitudinal diffusion in Von Deemter equation.

d) Important features of HPLC.

e) Total consumption burner.

f) Estimation of Mg in water by AAS.

□□□

Total No. of Questions : 5]

SEAT No. :

P-1187

[Total No. of Pages : 2

[6054]-550

T.Y. B.Sc.

CHEMISTRY

CH-611 (B) : Chemistry of Cosmetics and Perfumes

(2019 Pattern) (CBCS) (Semester - VI) (361311B)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Question No. 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat diagrams wherever necessary.***

Q1) Attempt any five of the following : **[5]**

a) Write the name of cream that disappear after rubbing application.

b) State the purpose of addition of dibutylphthalate in nail preparation.

c) What are base note perfumes?

d) How much percentage of aromatic compounds are present in Eae de cologne and how many hours it can long last?

e) What do you mean by body care products?

f) What is import registration certificate?

Q2) a) Answer the following (Any two) : **[6]**

i) Give an account of cosmetics for eyes.

ii) Write a note on sandal wood oil.

iii) Functions of CDSCO.

b) Answer the following : **[4]**

i) What are the functional raw materials and how do they contribute towards functional properties.

ii) Define perfumes and fragrances.

P.T.O.

Q3) a) Attempt any two of the following : **[6]**

i) Write the composition of shampoo. Give the type and ideal characteristics of shampoo.

ii) Give the names of any three perfumary oils with their source and chemical contents.

iii) What is legal manufacturer or a brand owner.

b) Answer the following : **[4]**

i) Mention the preparations used for shaving.

ii) What are the conditions for onsite examination after the acceptance of application by state drug control department for manufacture of cosmetics.

Q4) a) Answer the following (any two) : **[6]**

i) Give an account of cosmetics for nails.

ii) Write in detail the methods of isolation of essential oils.

iii) List the required documents in Maharashtra state for application to get license for manufacture of cosmetics.

b) Attempt the following : **[4]**

i) Write any four uses of Muscone.

ii) Mention the post approval changes for which the firm can apply online on SUGAM portal of CDSCO.

Q5) Write the short notes on any four of the following : **[10]**

a) Hair colourant

b) Livetone

c) Date of expiry of cosmetics

d) Face powder

e) Role of natural products in cosmetics

f) Regulation to import and manufacture of cosmetics containing mercury, lead and Arsenic.

□□□

Total No. of Questions : 5]

SEAT No. :

P 1188

[Total No. of Pages : 2

[6054] - 551

T.Y.B.Sc. (Regular)

BOTANY

BO - 361 : Plant physiology and metabolism

(2019 Pattern) (Semester - VI) (Paper - I) (36141)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question no.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Figures to the rights indicate full marks.***
5) ***Draw heat and labelled diagrams wherever necessart.***

Q1) Attempt any Five of the following. **[5]**

a) What are marcronutri hents?

b) Define photosynthesis.

c) Give the name to organ in respiration in plants.

d) Give the function of guard cells.

e) What is girdling?

f) Define phytoharmones

Q2) a) Give physiological role of Ethylene. **[6]**

b) Describe physiological role of phosphorus. **[4]**

Q3) a) What is TCA cycle? Describe with the help of schematic representation. **[6]**

b) Give the mechanism of pressure flow model.

P.T.O.

Q4) a) What are C_4 plants? Give an outline of C_4 pathway. **[6]**

b) Describe the mechanism of stomata opening with the help to suitable hypothesis. **[4]**

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

a) Non-cyclic photo phosphorylation.

b) Role of microelements in plants.

c) Electron transpert chain in mitochondria.

d) Quantusome.

e) Plasmodesmata.

f) Photomorphogenesis.

Total No. of Questions : 5]

SEAT No. :

P-1189

[Total No. of Pages : 2

[6054]-552
T.Y. B.Sc. (Semester - VI)
BOTANY
BO - 362 : Biochemistry
(2019 Pattern) (CBCS) (Paper - II) (36142)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Question 1 is compulsory.***
2) ***Attempt any three questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat labelled diagrams wherever necessary.***

Q1) Attempt any five of the following : **[5]**

a) Write two functional groups of biomolecules.

b) What is week interaction of water?

c) Define amino acid.

d) What is holoenzyme?

e) Write two examples of polysaccharides.

f) Write two sources of Vitamin C.

Q2) a) Describe functions of carbohydrates. **[6]**

b) Explain monosaccharides. **[4]**

Q3) a) Describe various factors affecting enzyme activities. **[6]**

b) Explain Miller and Urey's experiment. **[4]**

Q4) a) Describe classification of amino acids. **[6]**

b) Explain functions of lipids. **[4]**

P.T.O.

Q5) Write short notes on any four of the following : **[10]**

a) Oligosaccharides

b) Secondary structure of protein

c) Induced fit model

d) Properties of lipids

e) Structure of water molecule

f) Biomolecule in cell

▽▽▽▽

Total No. of Questions: 5]

SEAT No. : ____

P1190

[Total No. of Pages : 2

[6054]-553
T.Y.B.Sc. (Regular)
BOTANY
BO-363 : Plant pathology
(2019 Pattern) (CBCS) (Semester-VI) (36143)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Attempt any 3 questions from Q.2 to Q.5***
3) ***Q.2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat labelled diagrams wherever necessary.***

Q1) Attempt any five of the following. **[5]**

a) Define plant pathology.

b) What is full form of IARI?

c) What is penetration?

d) What is defence mechanism?

e) Name the causal organism of citrus canker.

f) What is EMS?

Q2) a) Write a note on pure culture methods. **[6]**

b) Describe the pre-existing chemical defence mechanism in plants. **[4]**

Q3) a) Write a note on disease cycle. **[6]**

b) Describe the causal organism, symptoms, & disease management of Tikka disease of groundnut. **[4]**

P.T.O.

Q4) a) Comment on the non-parasitic diseases caused by Air pollutants. **[6]**

b) Describe Bacteria as plant pathogen. **[4]**

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

a) Exponential model.

b) Eradication.

c) Infection.

d) Induced structural defence in plants.

e) Causal organism and symptoms of Bunchy top of Banana.

f) Koch's postulates.

Total No. of Questions : 5]

SEAT No. :

P-1191

[Total No. of Pages : 2

[6054]-554
T.Y. B.Sc. (Semester - VI)
BOTANY
BO - 364 : Evolution & Population Genetics
(2019 Pattern) (CBCS) (Paper - IV) (36144)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Question no. 1 is compulsory.***
2) ***Attempt any three questions from Q.2 to Q.5.***
3) ***Q.2 to Q.5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat labelled diagrams wherever necessary.***

Q1) Attempt any five of the following : **[5 × 1 = 5]**

a) Define organic evolution.

b) Write age of earth.

c) What are direct evidences of evolution?

d) What is allopatric speciation?

e) Define seasonal isolation.

f) Write name of theory written by Darwin.

Q2) a) Write a note on theory of inheritance of acquired characters. **[6]**

b) What is fossilization? Write favourable conditions for fossilization. **[4]**

Q3) a) Define speciation. Explain any one example of sympatric speciation. **[6]**

b) What is Hardy Weinberg law of gene frequencies? Write its equation. **[4]**

Q4) a) Write a note on primordial soup. **[6]**

b) What is geological time scale? Write a note on Era with one example. **[4]**

P.T.O.

Q5) Write short notes on <u>any four</u> : **[4 × 2½ = 10]**

a) Panspermia theory.

b) Example of indirect evidences.

c) Biogeographical relation of evidences of evolution.

d) Race.

e) Gene pool & population.

f) Origin of genetic code.

▽▽▽▽

Total No. of Questions : 5]

SEAT No. :

P-998

[Total No. of Pages : 2

[6054]-555

T.Y. B.Sc.

BOTANY

BO-365 : Advanced Plant Biotechnology

(2019 Pattern) (CBCS) (Semester - VI) (Paper - V) (36145)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Attempt any 3 questions from Q. 2 to Q. 5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat and labelled diagrams wherever necessary.***

Q1) Attempt any 5 of the following : **[5]**

a) What is blue biotechnology?

b) Define callus.

c) What are vectors?

d) Define germplasm conservation.

e) What is recombinant DNA technology?

f) Define fermentation.

Q2) a) What is explant? Write about the factors considered during selection of explant. **[6]**

b) Explain in brief DNA polymerase. **[4]**

Q3) a) Give detail account of citric-acid production. **[6]**

b) Explain the applications of cryopreservation. **[4]**

P.T.O.

Q4) a) Write about patenting of biotechnological investigations. **[6]**

b) Describe pluripotency. **[4]**

Q5) Write short notes on any four of the following : **[10]**

a) Importance of biotechnology in healthcare.

b) Electroporation method of gene transfer.

c) Recombinant vaccines

d) Bioplastics

e) Metabolic Engineering of cyclodextrins

f) Animal viruses

⌘⌘⌘

Total No. of Questions: 5]

SEAT No. : ____

P1192

[Total No. of Pages : 2

[6054]-556
T.Y. B.Sc. (Regular)
BOTANY
BO 366 : Plant Breeding and Seed Technology
(CBCS 2019 Pattern) (Semester-VI) (Paper-VI) (36146)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Que-2to Que-5***
3) ***Questions 2 to Que-5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat labelled diagrams wherever necessory.***

Q1) Attempt Any Five of the following **[5]**

a) Define acclimatization

b) Give any two scopes of plant breeding

c) What is long form of SSC?

d) Give objectives of mutation breeding

e) What is nucleus seed?

f) Give importance of seed legislation.

Q2) a) What is hybridization? Explain procedure of pedegree method of hybridization **[6]**

b) Write steps involved in clonal selection method. **[4]**

Q3) a) Explain National seed corporation **[6]**

b) Define mutation. Give types of mutation **[4]**

Q4) a) Define purity analysis. Write a note on moisture testing **[6]**

b) Wrie merits and demerits of plant intruduction **[4]**

P.T.O.

Q5) Write short notes on any four of the following **[10]**

a) Dehumidification in seed storage

b) Totipotency

c) Seed borne fungi

d) Hybrid vigour

e) Phases of seed certification

f) Duties of seed inspector

Total No. of Questions : 5]

SEAT No. :

P-1193

[Total No. of Pages : 2

[6054]-557

T.Y. B.Sc.

BOTANY (Paper - X)

BO-3610 : Nursery and Gardening Management

(2019 Pattern) (CBCS) (Semester - VI) (361410)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Question 1 is compulsory.***
2) ***Attempt any 3 questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat labelled diagrams wherever necessary.***

Q1) Solve any five of the following : **[5]**

a) Enlist types of Nursery Beds.

b) Define texture of Gargen.

c) Explain term of layering.

d) Define vegetative propagation.

e) What is raphe?

f) What are hi-tech Nurseries.

Q2) a) Define cutting. How cuttings are managed? Explain method of hardening of plants. **[6]**

b) Comment on infrastructure required for Nursery. **[4]**

Q3) a) Give Botanical Name, method of cultivation, Pests and disease management of lady's finger. **[6]**

b) Write method of selection of cuttings and add a note on glass house cutting. **[4]**

P.T.O.

Q4) a) Write different aspects of park and its components. **[6]**

b) Write structure and types of seeds. **[4]**

Q5) Write short notes on <u>any four</u> of the following : **[10]**

a) Method of storage and marketing of vegetables.

b) Applications of CAD in landscape gardening.

c) Various aspects of cultivations of vegetables.

d) Advantages of layering.

e) Factors affecting of seed viability.

f) Home gardening.

□□□

Total No. of Questions : 5]

SEAT No. :

P-1194

[Total No. of Pages : 2

[6054]-558

T.Y. B.Sc. (Semester - VI)

BOTANY

BO-3611 : Biofertilizers

(2019 Pattern) (CBCS) (Paper - XI) (361411)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Question one is compulsory.***
2) ***Attempt any three questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat labelled diagrams wherever necessary.***

Q1) Attempt any five of the following : **[5]**

a) Mention any two bacteria associated with legume plants.

b) Write the role of lignite in Biofertilizer.

c) Define biological nitrogen fixation.

d) Write any two applications of BGA.

e) What is organic manure.

f) Give any two scopes of Biofertilizer.

Q2) a) Write on mass multiplication of Azatobacter. **[6]**

b) Give Mycorrhizal applications in Agriculture. **[4]**

Q3) a) Give the classification of organic residues. **[6]**

b) Describe the cyanobacterial association in plants. **[4]**

Q4) a) Describe the Ecto and Endo-mycorrhiza with suitable examples. **[6]**

b) Explain the advantages of Biofertilizer. **[4]**

P.T.O.

Q5) Write short notes on any four of the following : **[10]**

a) Phosphate solubelizing bacteria.

b) Preparation of powder inoculant.

c) Compost

d) Azolla-Anabaena relationship.

e) Colonization of AM-Fungi.

f) Maintenance of basic culture in vermicompost.

□□□

Total No. of Questions : 5]

SEAT No. :

P 1195

[Total No. of Pages : 2

[6054] - 559

T.Y.B.Sc. (Regular)

ZOOLOGY

ZO - 361 : Medical & Forensic Zoology

(2019 Pattern) (CBCS) (Semester - VI) (Paper - I) (36151)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

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

Q1) Solve any Five of the following. **[5]**

a) What is Atherosclerosis?

b) What is Forensic entomology?

c) What is Tuberculosis?

d) What is renal calculi?

e) Define mummification.

f) Define poison.

Q2) a) Discuss different types of mechanical injuries. **[6]**

OR

Discuss the biological examination of hair of the deceased person.

b) Explain Rigor mortis. **[4]**

Q3) a) Discuss the complications & preventive measuress in myocardial infarction. **[6]**

OR

Describe the abnormal constituents present in urine.

b) Discuss the causes of Diabetis typ II. **[4]**

P.T.O.

Q4) a) Describe the scope & applications of Forensic zoology. **[6]**

OR

Describe the medical evidence documentation to be prepared in sexual assolt case.

b) Describe the symptoms of Hepatitis. **[4]**

Q5) Write short notes on <u>any four</u> of the following. **[10]**

a) Renal failure

b) Radio active poisons

c) Livor mortis

d) Dialysis

e) Medical Jurisprudence

f) Cardiovascular poisons

Total No. of Questions : 5]

SEAT No. :

P-1196

[Total No. of Pages : 2

[6054]-560

T.Y. B.Sc.

ZOOLOGY (Paper - II)

ZO - 362 : Animal Physiology

(2019 Pattern) (CBCS) (Semester - VI) (36152)

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) ***Q.2 to Q.5 carry equal marks.***

Q1) Solve any five of the following : **[5]**

a) Write source of Vitamin D.

b) What is digestion?

c) What is inhalation?

d) Define pace maker.

e) What is sarcolemma?

f) What is ECG?

Q2) a) Discuss hormonal regulation in Menstrual cycle. **[6]**

OR

Explain sliding filament theory of muscle contraction.

b) Islets of Langerhans. **[4]**

Q3) a) Describe various component of balance diet. **[6]**

OR

Describe mechanism of respiration.

b) Write functions of blood. **[4]**

P.T.O.

Q4) a) Explain physiology of urine formation. **[6]**

OR

Discuss the hormones secreated by adenohypophysis and their role.

b) Sketch and labelled structure of human heart. **[4]**

Q5) Write short notes on any four of the following : **[10]**

a) Respiratory pigments

b) Heart beat

c) Dialysis

d) Draw & labelled skeletal muscle

e) Role of parathyroid hormone

f) Constituents of blood

▽▽▽▽

Total No. of Questions: 5]

SEAT No. : ____

P1197

[Total No. of Pages : 2

[6054]-561
T.Y.B.Sc. (Regular)
ZOOLOGY
ZO-363: Molecular Biology
(2019 Pattern) (CBCS) (Semester-VI) (Paper-III) (36153)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

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

Q1) Solve any Five of the following. **[5]**

a) Define Nucleotides.

b) What is okazaki Fragments.

c) Write the Name of initiation codon.

d) Write the Function of promoter in Lac operon

e) Define Splicing.

f) Write the basic unit of chromatin organisation.

Q2) a) Describe the basic mechanism of transcrition in Eukaryotes. **[6]**

OR

Describe the restriction enzyme in Recombinant DNA technology.

b) Polyadenylation of M-RNA. **[4]**

Q3) a) Define cloning vector explain Plasmid as cloning vector. **[6]**

OR

Explain the properties of Genetic code.

b) Explain the structural gene in Lac operon. **[4]**

P.T.O.

Q4) a) Discuss TMV4 as model organism to prove RNA act as genetic material. **[6]**

OR

Discuss DNA replication is semiconservative replication wtih suitable experiment.

b) Photo repair mechanism of DNA damage. **[4]**

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

a) Rho-dependent termination of transcription in prokaryotes

b) Base excision repair of DNA damage.

c) Write three difference in prokaryotic & eukaryotic translation.

d) DNA Finger printing (write application only)

e) Heterochromation

f) 5' capping of MRNA.

Total No. of Questions : 5]

SEAT No. :

P-1199

[Total No. of Pages : 2

[6054]-563

T.Y. B.Sc.

ZOOLOGY

ZO-365 : Techniques in Biology

(2019 Pattern) (CBCS) (Semester - VI) (Paper - V) (36155)

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) Expand the term ELISA.

b) Give any two applications of GDS.

c) What is the average time range for clotting of blood in normal individual?

d) Define the term magnification in microscopy.

e) Which software is used to analys image?

f) Which sensors are more susceptible to noise?

Q2) a) Explain in brief the principle and types of ELISA. **[6]**

OR

Explain in brief the basic principle of microscopy with any two examples.

b) Enlist the steps involved in section cutting in microtomy. **[4]**

Q3) a) Describe briefly feulgen reaction and give its significance. **[6]**

OR

Explain in brief Simpson and shanon diversity index.

b) Expand PCR and briefly mentioned its used in DNA Barcode. **[4]**

P.T.O.

Q4) a) What is biodiversity? Add note on transect sampling method. **[6]**

OR

What is PCR? Explain application of PCR in various methods.

b) What is the main advantages of Fluroscence microscopy. **[4]**

Q5) Write notes on any four : **[10]**

a) Tissue fixation

b) Digital camera

c) Monoclonal antibiodies

d) SEM

e) Explain Ideal Fixative

□□□

Total No. of Questions : 5]

SEAT No. :

P1200

[Total No. of Pages : 2

[6054]- 564
T.Y. B.Sc. (Regular)
ZOOLOGY
ZO - 366 : Evolutionary Biology (Paper-VI)
(2019 Pattern) (CBCS) (Semester - VI) (36156)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q.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) What is speciation?

b) Define unfavourable variations.

c) Hardy - Weinberg law.

d) Define- Homology.

e) What is natural selection.

f) Define-mutagens.

Q2) a) Explain pre-zygotic Isolation. **[6]**

OR

Discuss Euthiopian Realm with reference to fauna.

b) Give significance of extinction. **[4]**

Q3) a) Explain origin of plastids as symbionts in Eukaryotic cells. **[6]**

OR

Explain factors influencing speciation.

b) Explain, salient features of mutation theory. **[4]**

P.T.O.

Q4) a) Describe embryological evidences from evolution. **[6]**

OR

Discuss characters of Cro-magnon man.

b) Use & disuse theory. **[4]**

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

a) Sympatric speciation.

b) Zygotic mortality in Isolation.

c) Sources of variation.

d) Analogous organs.

e) Gene frequency & gene pool.

f) Distinguishing characteristics of Homo-erectus.

Total No. of Questions : 5]

SEAT No. : ____

P1201

[Total No. of Pages : 2

[6054]-565

T.Y. B.Sc. (Semester - VI)

ZOOLOGY (Paper - VII)

ZO - 3610 : Environmental Impact Assesment

(2019 Pattern) (CBCS) (361510)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q1 is compulsory.***
2) ***Solve any three Question from Q2 to Q5.***
3) ***Q2 to Q5 carry equal marks.***

Q1) Solve any five of the following : **[5]**

a) Define air pollution.

b) Define Natural resources.

c) What is Regional EIA?.

d) Define Mitigation.

e) Define screening.

f) Enlist types of water pollution.

Q2) a) Describe three pillars of sustainable development. **[6]**

OR

Describe National Tribunal Act 2010.

b) Describe Natural Resources. **[4]**

Q3) a) Describe UN-17 sustainable development. **[6]**

OR

Describe Role of Environment consultant.

b) Write the notes on carrying capacity. **[4]**

P.T.O.

Q4) a) Describe needs of sustainable development. **[6]**

OR

Describe Environmental Protection Act 1986.

b) Explain Role of EIA. **[4]**

Q5) Write short notes on any four : **[10]**

a) Comprehensive EIA.

b) Outer environment.

c) Baseline studies.

d) Sound pollution.

e) Importance of Environment.

f) Biodiversity conservation.

x x x

Total No. of Questions : 5]

SEAT No. :

P 1202

[Total No. of Pages : 2

[6054] - 566

T.Y.B.Sc. (Regular)

GEOLOGY

GL - 321 : Geology of India - II

(2019 Pattern) (Semester - VI) (Paper - I) (36161)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q.no.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Q.No2 to Q.5 carry equal marks.***

1) Answer the following question in 2-3 line (ANY FIVE) one mark wach. **[5]**

a) The deposits of 'Cretaceous of Trichinopoly' appears along which river basin?

b) Enlist the coal mines in India (any three).

c) Which system is known as 'Age of Trilobites'?

d) Enlist the epoch of silurian system in chronological order.

e) Dhosa oolites belongs to which formation?

f) Along which stratigraphic boundary were dinasaur extinct?

Q2) Answer the following.

a) Explain the type locality, fossil assemblages, epoch, Lithology and systematic classification of ordovician system. **[6]**

b) Precambrian - Cambrian boundary. **[4]**

Q3) Answer the following.

a) Give the brief account of their distribution, geographical location, lithological succession, structure and economic importance of Deccan province. **[6]**

b) Tectonic division of Himalaya. **[4]**

P.T.O.

Q4) Answer the following.

a) Give the brief account of their distribution, stratigraphic succession,age and economic importance of 'Tertiary of Assam'. **[4]**

b) Tertiary formation along Kerala and Mysore coast. **[4]**

Q5) Write short notes on any FOUR (2.5 marks each) **[10]**

a) Highlights of Cenozoic era.

b) K - G. Basin.

c) Stratigraphic succession of Gondwana supergroup.

d) Lameta beds.

e) Type locality and fossils in Devonian system.

f) List of various 'Vertebrate fossils' in Siwalikes.

Total No. of Questions : 5]

SEAT No. :

P1203

[Total No. of Pages : 2

[6054]-567

T.Y. B.Sc. (Semester - VI)

GEOLOGY

GL - 322 : Mining & Mineral Exploration

(2019 Pattern) (36162)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Q2 to Q5 carry equal marks.***

Q1) **Answer the following in 2-3 sentences. (Any five)** **[5]**

a) What are Gossans?

b) What is strip mining?

c) State the stages of mineral exploration.

d) What are Grab samples?

e) Geobotanical guides.

f) Hypogene type of Wall rock alteration.

Q2) **Explain the following.**

a) Magnetic method of prospecting. **[6]**

b) Describe open cast mining.. **[4]**

P.T.O.

Q3) **Explain the following.**

a) Electromagnetic (Loop) method of prospecting. **[6]**

b) Geobotanical Prospecting. **[4]**

Q4) **Answer the following.**

a) National mineral policy. **[6]**

b) Geochemical Prospecting. **[4]**

Q5) **Explain the following. (Any five)** **[10]**

a) Basic principals of ore reserve estimation.

b) Ore Samples.

c) Stratigraphic and lithological guides.

d) Mineralogical guides.

e) What is Pitting in mining?

f) What are magnetometers or magnetic variometers?

x x x

Total No. of Questions: 5]

SEAT No. :

P1204

[Total No. of Pages : 2

[6054]-568
T.Y.B.Sc. (Regular)
GEOLOGY
GL-323 : Oceanography
(2019 Pattern) (Semester-VI) (Paper-III) (36163)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions form Q.2 to Q.5.***
3) ***Q.2 to 5 carry equal marks.***

Q1) Answer the following questions in 2-3 lines (Any5) **[5]**

a) Draw verticle profile of temperature. (seawater)

b) Enlist the physical properties of ocean any two.

c) Define salinity in short.

d) Enlist any three coastal landforms.

e) Draw verticle profile of density.

f) Define halocline.

Q2) Answer the following.

a) Explain ocean currents in detail. **[6]**

b) Give brief introduction of CRZ. **[4]**

Q3) Answer the following.

a) Describe El-nino in detail. **[6]**

b) Explain relationship between climate and ocean. **[4]**

P.T.O.

Q4) Answer the following.

a) Explain coastal erosion and conservation method. **[6]**

b) Describe sea level change in brief. **[4]**

Q5) Answer the following write a short note on (Any five). **[10]**

a) Oceanic crisis.

b) La-Nina.

c) Effects of sealevel changes.

d) Type of coasts.

e) Thermocline.

f) Pychocline.

Total No. of Questions : 5]

SEAT No. :

P1207

[Total No. of Pages : 2

[6054]- 571
T.Y. B.Sc. (Regular)
GEOLOGY
GL - 326 : Geological Field Methods and Mapping
(2019 Pattern) (Semester - VI) (36166) (Paper-VI)

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) ***Q2 to Q5 carry equal marks.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) Answer the following questions in 2-3 lines. **[5]**

a) What is planimetric map?

b) What is bearing?

c) What is attitude of beds?

d) What is navigation?

e) What are lineations?

Q2) Answer the following.

a) What is bearing? Explain front and back bearing. **[6]**

b) Write a note on lithology preparation and interpretation. **[4]**

Q3) Answer the following.

a) Write a note on interpretation of topographic sheet in the field and marking location on toposheet. **[6]**

b) Add a note on data collection in the field. **[4]**

P.T.O.

Q4) Answer the following.

a) Explain use and applications of Brunton compass and GPS in field work. **[6]**

b) Write a note on discrimination and tracing of different types of contacts. **[4]**

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

a) Sample selection criteria.

b) Field equipments.

c) Lithological symbols.

d) Latitude and Longitude.

e) Logistics.

f) Traverse mapping.

Total No. of Questions : 5]

SEAT No. :

P-1208

[Total No. of Pages : 2

[6054]-572

T.Y. B.Sc. (Semester - VI)

GEOLOGY

Sec - III : Applications of Remote Sensing in Geosciences

(361610) (2019 Pattern)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Q2 to Q5 carry equal marks.***
4) ***Neat diagram must be drawn wherever necessary.***

Q1) Answer the following in 2-3 lines. **[5]**

a) Define Remote sensing.

b) Define Black Body.

c) What is Tip and Tilt?

d) What is low sun angle photography?

e) Oceansat.

Q2) Answer the following :

a) Explain the process and elements involved in Remote sensing of earth resources. **[6]**

b) Discuss applications of remote sensing in mineral resources and groundwater. **[4]**

Q3) Answer the following :

a) Explain following photo recognition elements **[6]**

i) Tone

ii) Texture

iii) Pattern

b) Give different types of photography according to orientation of camera axis. **[4]**

P.T.O.

Q4) Answer the following :

a) Explain photo characteristics of sandstone and shale. **[6]**

b) Explain orbit characteristics and sensor of Landsat 7. **[4]**

Q5) Write a note on (any 4) **[10]**

a) Stefan Boltzman law.

b) Atmospheric Window.

c) Scale of Aerial photograph.

d) Vertical Exaggeration.

e) Hyper spectral scanner.

x x x

Total No. of Questions : 5]

SEAT No. :

P-1209

[Total No. of Pages : 2

[6054]-573

T.Y. B.Sc.

GEOLOGY

SEC-IV : Oil Field Services

(2019 Pattern) (Semester - VI) (Revised) (361611)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

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

Q1) **Answer any following questions in 2-3 lines (any 5) :** **[5]**

a) Define the term, Platform.

b) Define the term, drill ship.

c) Give two advantages of cable tool drilling.

d) What do you mean by BOP?

e) Enlist any three functions of drilling fluids.

f) Define the term GTO.

Q2) **Answer the following :**

a) Discuss circulatory system in rotary drilling with labelled diagram. **[6]**

b) Explain in brief Blow out preventer. **[4]**

Q3) **Answer the following :**

a) Explain coring in petroleum geology. Give their applications. **[6]**

b) Explain in brief principle, techniques and tools in mud logging. **[4]**

P.T.O.

Q4) **Answer the following :**

a) Explain Gamma ray logging in detail. **[6]**

b) Explain directional rotary drilling in detail. **[4]**

Q5) **Write short notes on (any four) :** **[10]**

a) Oil wells.

b) Formation testing.

c) Cable tool drilling.

d) Properties of drilling mud.

e) SP logs.

f) Caliger logs.

□□□

Total No. of Questions : 5]

SEAT No. :

P1210

[Total No. of Pages : 2

[6054]-574
T.Y.B.Sc. (Regular)
GEOLOGY
GL - SEC - V : Watershed Development
(2019 Pattern) (Semester - VI) (361612)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

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

Q1) Answer the following question in 2-3 lines (any 5). **[5]**

a) Write down the full form of IWRM and explain in brief.

b) What is biological method?

c) What are the Entisols?

d) What is Agronomic practices?

e) Define soil conservation?

f) Define A forestation?

Q2) Answer the following.

a) Coastal methods. **[6]**

b) Soil as resources. **[4]**

Q3) Answer the following:

a) What are the methods of soil conservation? **[6]**

b) Explain components of the water resources system with diagram. **[4]**

Q4) Answer the following.

a) What is watershed modelling explain in brief. **[6]**

b) What is watershed management. **[4]**

P.T.O.

Q5) Write notes on any five of the following: **[10]**

a) Conjunctive use of surface & groundwater resources.

b) Role of NGO's in watershed development.

c) Watershed characteristics.

d) Sustainability of water resources.

e) Groundwater analysis in watershed development

f) Importance of water resources in watershed.

✡ ✡ ✡

Total No. of Questions : 4]

SEAT No. : ____

P1211

[Total No. of Pages : 2

[6054]- 575
T.Y. B.Sc. (Regular)
STATISTICS
ST - 361 : Distribution Theory - II
(2019 Pattern) (Semester - VI) (Paper-I) (36171)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicates full marks.***
3) ***Use of statistical tables and calculator is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following: **[1 each]**

A) In each of the following cases, choose the correct alternative:

a) If $X \to LN(0, \mu, \sigma^2)$ then median of X is

i) μ ii) e^{μ}

iii) $e^{\mu-\sigma^2}$ iv) $e^{\mu+\frac{1}{2}\sigma^2}$

b) Which one of the following is symmetric distribution

i) Weibull ii) Lognormal

iii) Pareto iv) Laplace

c) If $X \to L(\mu, \lambda)$ then mean deviation about mean is

i) λ ii) $\frac{1}{\lambda}$

iii) $\frac{1}{\mu}$ iv) μ

B) State whether each of the following statement is TRUE or FALSE:

[1 Each]

a) If (X, Y) follows bivariate normal distribution with parameters $\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho$ then X and Y are independent if and only if $\rho = 0$.

b) For the Pareto distribution with the parameter λ mean of the distribuiton exist if $\lambda \leq 1$.

P.T.O.

Q2) Attempt Any Two of the following questions. **[5 each]**

a) Obtain first and third quartiles of Weibull distribution with parameters α and β.

b) Let $X \rightarrow L(0,1)$ then find $P[X \leq 2]$.

c) Let $X_1, X_2, \ldots, Xn$ be the random sample of size n from $LN(0, \mu, \sigma^2)$ distribution then show that geometric mean of these observations has $LN\left(0, \mu, \frac{\sigma^2}{n}\right)$ distribution.

Q3) Attempt Any Two of the following questions. **[5 each]**

a) If (X, Y) follows bivariate normal distribution with parameters $\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho$ find marginal distribution of X.

b) Let $X \rightarrow N(0, 3)$ distribution truncated to the right at X = 8. Find mean of the resulting distribution.

c) If the random variable X has Laplace distribution with location parameter μ and scale parameter λ then find mean of random variable X.

Q4) Attempt Any One of the following quesions.

a) i) If (X, Y) follows bivariate normal distribution with parameters $\mu_1 = 3, \mu_2 = 1, \sigma_1^2 = 16, \sigma_2^2 = 25, \rho = 0.6$ find $P\left[-3 < X < 3 \middle| Y = -4\right]$ and $P[3 < Y < 8]$. **[6]**

ii) Obtain distribution function of Pareto distribution with parameter λ. **[4]**

b) i) Let (X, Y) follows bivariate normal distribution with parameters $\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho$ then find the conditional distribution of X given Y = y. Also show that $E\left[X \middle| Y = y\right]$ represent regression line of X on Y. **[6]**

ii) Find mean of Weibull distribution with parameter α and β. **[4]**

Total No. of Questions : 5] **SEAT No. :**

P1212 **[Total No. of Pages : 3**

[6054]-576

T.Y. B.Sc. (Semester - VI)

STATISTICS (Principal)

ST 362 : Testing of Hypotheses

(2019 Pattern) (Paper - II) (CBCS) (36172)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of calculator and statistical table is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following:

A) Choose the correct alternative in each of the following: **[1 each]**

a) Which of the following is parametric test

i) Sign test ii) Run test

iii) Mann Whitney test iv) F Test

b) For exponential distribution with mean α the critical region to test $H_0 : \alpha = \alpha_0$ against $H_1 : \alpha > \alpha_0$ will be :

i) $\sum X_i < c$ ii) $\sum X_i > c$

iii) $\left|\sum X_i\right| = c$ iv) $\left|\sum X_i\right| \neq c$

P.T.O.

c) For likelihood ratio test, the likelihood ratio statistic $\Lambda(\underline{x})$ is such that

i) $O < \Lambda(\underline{x}) < 1$ ii) $\Lambda(\underline{x}) < 0$

iii) $\Lambda(\underline{x}) < 1$ iv) either $\Lambda(\underline{x}) < 0$ or $\Lambda(\underline{x})$

B) State whether **each** of the following statements is true or false: **[1 each)**

a) Run test is a parametric test.

b) The value of the likelihood ratio statistic close to one indicates that data supports the alternative hypothesis.

Q2) Attempt any two of the following: **[5 each]**

a) Let $X_1, X_2,..., X_n$ be a random sample from Binomial distribution with parameters (m = 10, P) .Construct MP test of size α for testing H_0: P = 0.5 against H_1: P = 0.4.

b) To test the hypothesis H_0: m =3 against H_1: m = 1, where m is average number of accidents on express highway. It is decided to reject H_0 if X < 2. Find probability of type I error and power of the test, where X denotes the number of accidents on express highway. Assume that X follows Poisson distribution.

c) Construct likelihood ratio test for testing H_0: $\mu = \mu_0$ against H_1: $\mu > \mu_0$ based on random sample of size n from $N(\mu, \sigma^2)$ distribution, where σ^2 is unknown.

Q3) Attempt any two of the following: **[5 each]**

a) The following table gives the probability distribution under H_0 and H_1, which are as follows H_0: X follows probability distribution P_0 against H_1: X follows probability distribution P_1. Find all possible critical regions of size 0.05 and find the best critical region amongst them.

x	0	1	2	3
P_0	0.05	0.90	0.025	0.025
P_1	0.25	0.35	0.25	0.15

b) Let X be a random variable with p.d.f.

$f(x,\beta) = (\beta + 1)\, x^{\beta}$, $0 < x < 1$

$= 0$, otherwise

Find UMP test of level of significance 5% for testing the null hypothesis $H_0: \beta = \beta_0$ against $H_1: \beta = \beta_1$ $(\beta_1 < \beta_0)$. On the basis of single observation from the distribution of X.

c) Following is a random sample drawn from the continuous population in the order in which the observations are made:

33, 27, 53, 21, 49, 47, 44, 40, 43, 49, 16, 25.

Test the hypothesis of randomness of the sample. Use 5% level of significance.

Q4) Attempt any one of the following:

A) a) Define the empirical distribution. State and prove any four properties of it. **[5]**

b) Describe Kolmogorov Smirnov Test. **[5]**

B) a) Define the following terms. **[1 each]**

i) P value

ii) Most powerful test

iii) Level of the significance

iv) Power function

v) Type II error

b) Weights of certain objects are measured. On the basis of the following data can we conclude that median weight is 6 units. Use 5 % level of significance.

5.64, 7.12, 5.40, 4.67, 7.02, 5.82, 5.98, 5.78, 7.45, 7.68

Assuming that lengths are symmetrically distributed about their median, test whether the process is operating properly. Use 5% l.o.s. **[5]**

Total No. of Questions : 4]

SEAT No. :

P1213

[Total No. of Pages : 3

[6054]-577
T.Y.B.Sc. (Regular)
STATISTICS
ST-363 : Sampling Theory
(2019 Pattern) (Semester - VI) (Paper-III) (36173)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicates full marks.***
3) ***Use of calculator and statistical table is allowed.***
4) ***Symbols and abbreviations have thier usual meaning.***

Q1) Attempt each of the following. **[1 each]**

A) Choose the correct alternative in each of the following:

a) In stratified random sampling with proportional allocation ___

i) $n_i \alpha N_i$ ii) $n_i \alpha N_i S_i$

iii) $n_i \alpha \frac{NiSi}{Ci}$ iv) $n_i \alpha \frac{NiSi}{si}$

b) A sample of size n is selected from a population of size N, under simple random sampling without replacement (SRSWOR). The variance of the estimator of population mean is

i) $\frac{N-1}{Nn}S^2$ ii) $\frac{N-n}{Nn}S^2$

iii) $\frac{N-n}{N}S^2$ iv) $\frac{N-1}{N}S^2$

c) The estimator of population total (Y_T) in case of systematic sampling is given by

i) $N\bar{y}_{sys}$ ii) $\bar{y}_{sys}$

iii) $\frac{N-1}{N}\bar{y}_{sys}$ iv) $\frac{N}{N-1}\bar{y}_{sys}$

b) State whether each of the following statement is true or false: **[1 each]**

i) In sampling for attributes the population mean squares (S^2) is $\frac{Npq}{N-1}$.

ii) $\bar{y}_{lr} = \bar{y} + \hat{\beta}(\bar{X} - \bar{x})$ is an unbiased estimator of population mean in regression method of estimation.

Q2) Attempt any two of the following: **[5each]**

a) Obtain an unbiased estimator of population mean in systematic sampling. Also obtain variance of this estimator.

b) Explain the ratio method of estimation. Show that ratio estimator of population mean is not an unbiased estimator. State the expression for its standard error.

c) Explain the stratified random sampling method. Suggest an unbiased estimator of population total under stratified random sampling. Obtain the expression for its variance under Neyman allocation.

Q3) Attempt any two of the following: **[5 each]**

a) Obtain the formula for sample size in SRSWR method, so as to achieve the predetermined precision in the estimation of population proportion of a certain attribute, with given confidence coefficient.

b) For a population with linear trend Yi=i, for i=1,2,3,.....,N. Obtain the expression for variance of the estimator of population mean when SRSWOR and Systematic sampling is used.

c) In SRSWOR, derive an expression for the variance of an unbiased estimator of the population mean.

Q4) Attempt any one of the following:

a) i) With usual notations by ignoring finite population correction, prove that var $(\bar{y})_{SRSWOR} \geq Var\,(\bar{y}_{st})_{prop.} \geq Var\,(\bar{y}_{st})_{Ney}$ **[7]**

ii) Write a short note on non sampling error. **[3]**

b) i) In usual notations, show that Var $(\bar{y}_{sys}) = \frac{N-1}{N}S^2 - \frac{k(n-1)}{N}S^2_{wsy.}$

Also compare systematic sampling with SRSWOR. **[6]**

ii) A simple random sample without replacement of size n = 50 was drawn from a village in which there are N = 500 households, there are only 8 households in the sample each possessing a transistor radio. Estimate the total number of hoseholds in the village possessing transistor radios and calculate the standard error of the estimate. **[4]**

Total No. of Questions : 4]

SEAT No. :

P-1214

[Total No. of Pages : 3

[6054]-578
T.Y. B.Sc.
STATISTICS (Principal)
ST - 364 : Introduction to Survival Analysis
(2019 Pattern) (CBCS) (Paper - IV) (Semester - VI) (36174)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of statistical tables and calculator is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) **Attempt each of the following :**

a) **Choose the correct alternative in each of the following : [1 each]**

i) Twelve ceramic capacitors are subjected to a life test. In order to reduce the test time, the test is terminated after eight capacitors fail. It is an example of,

A) Type I censoring B) Type II censoring

C) Right random censoring D) Left random censoring

ii) Let T be lifetime random variable then P[$a < T < b$] for $a < b$ is,

A) $\bar{F}(a) - \bar{F}(b)$ B) $\bar{F}(b) - \bar{F}(a)$

C) $F(a) - F(b)$ D) $f(b) - f(a)$

iii) Interrelation between survival function and hazard function is,

A) $r(t) = \exp\left\{-\int_t^{\infty} \bar{F}(x)dx\right\}$

B) $r(t) = \exp\left\{-\int_0^{t} \bar{F}(x)dx\right\}$

C) $\bar{F}(t) = \exp\left\{-\int_t^{\infty} r(x)dx\right\}$

D) $\bar{F}(t) = \exp\left\{-\int_0^{t} r(x)dx\right\}$

P.T.O.

b) State whether each of the following statements is true or false : **[1 each]**

i) Empirical survival function $\left(\bar{F}_n(x)\right)$ is unbiased estimator of survival function $\left(\bar{F}(x)\right)$.

ii) Makeham family with parameter $\theta > 0$ belongs to DFR class of life distribution.

Q2) **Attempt <u>any two</u> of the following :** **[5 each]**

a) Explain survival function. Hence, derive the expression of Product Limit Estimator of survival function.

b) Define DFRA and NWU class of lifetime distribution. Hence, show that DFRA $\Rightarrow$ NWU.

c) Let the lifetimes of an individuals are : 125.68, 130.62, 71.06, 120.30, 94.56, 47.29, 44.14, 66.13, 64.02, 86.46, 100.47, 118.51. Using this information obtain 99% confidence band of $\bar{F}_{89}(t)$.

Q3) **Attempt <u>any two</u> of the following :** **[5 each]**

a) Define Increasing Failure Rate in Average (IFRA) class of life distribution. State and prove the characteristics property of IFRA class of life distribution.

b) With usual notations, derive the Greenwoods formula for variance of an actuarial estimator.

c) With usual notations show that,

$$r(t) = \frac{f(t)}{\bar{F}(t)}$$

where $r(t)$ be the hazard function, $f(t)$ be the probability density function (pdf) and $\bar{F}(t)$ be the survival function. Hence for the given pdf $f(t) = 10 * exp(-10t)$, $t > 0$, find the value of hazard function.

Q4) Attempt <u>any one</u> of the following : [10 each]

a) i) Write a note on log-normal distribution as a lifetime distribution. Find its failure rate and comment on its ageing classes for various values of σ. **[5]**

ii) The time to failure in operating hours of a critical solid-state power unit has the hazard function $r(t) = 0.003 * \left(\frac{t}{500}\right)^{0.5}$ for $t \geq 0$. Then, what is the reliability if the power unit must operate continuously for 50 hours? Also, determine the design life if a reliability of 0.9 is desired. **[5]**

b) i) Let $T_1, T_2, ..., T_n$ be a random sample of size n drawn from an exponential distribution with parameter λ. Define sample spacings and normalized spacings from the above sample. Hence obtain the distribution of normalized spacings. **[8]**

ii) A component has cumulative distribution function $F(t) = 1 - \exp\left(-(t/2)^{0.5}\right), t > 0$. Find its failure rate and comment on its ageing class. **[2]**

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Total No. of Questions : 4]

SEAT No. : ____

P-1215

[Total No. of Pages :3

[6054]-579
T.Y. B.Sc. (Statistics)
ST - 365(A) : ACTUARIAL STATISTICS
(2019 Pattern) (Semester - VI) (Paper - V) (CBCS) (36175)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of statistical tables and calculator is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following : **[1 each]**

a) In each of the following cases, choose the correct alternative :

i) Which of the following statement is false related to the pure risk?

a) It can be insured

b) It cannot be insured

c) It involves no possibility of gain, either a loss occurs or no loss occurs

d) It is possibility of financial loss without the possibility of gain

ii) Range set of possible values of curtate future life time of (x) is

a) $(-\infty, \infty)$ b) $\{0,1,2,....\}$

c) $(0, \infty)$ d) $\{x, x+1,...\}$

iii) The net single premium of n year endowment insurance is denoted by

a) A_x b) $A_{x:\overline{n}|}^{1}$

c) $A_{x:\overline{n}|}$ d) $A_{x:\overline{n}|}^{1}$

P.T.O.

b) In each of the following state whether the given statement is true or false : **[1 each]**

i) If the payments are due at the beginning of payment intervals, then annuities are known as an annuities-due or annuities payable in advance.

ii) In equivalence principle, premium P is found such that E(*z*) = E(*y*)

Q2) Attempt any two of the following : **[5 each]**

a) Find the accumulated value of 10 year annuity immediate of Rs. 2000 p.a . if the effective rate of interest is 5%.

b) Define force of interest and derive the expression for it. Show that $v = e^{-\delta}$.

c) If effective rate of interest is 6.5% per annum, then obtain

i) Accumulated value of Rs. 1,00,000 at the end of 5th year,

ii) present value of Rs. 50,000 due at the end of sixth year

Q3) Attempt any two of the following : **[5 each]**

a) For a certain insect population, the probability q_x obtained for 5 weeks are given below:

x	0	1	2	3	4	5
q_x	0.1	0.2	0.3	0.4	0.6	1

Taking cohort of 10,000, construct the life table with value for l_x, d_x, L_x, T_x.

b) Derive the expression of actuarial present value of one unit benefit in a whole life annuity immediate.

c) Examine whether the following can serve as survival function for $x \geq 0$:

i) $S(x) = e^{(x-0.7(2^x-1))}$

ii) $S(x) = \dfrac{1}{(1+x)^2}$

Q4) Attempt any One of the following :

a) i) On 5th June 2010,(60) bought a Rs. 1,00,000 whole life insurance policy with death benefit payable at the end of year of death. The policy is purchased by means of annual premiums, payable at the start of each year policy remains in force. The policy holder died on 10th August 2017 and the loss to the insurer was 45,000. If i = 0.06, what was the annual premium paid? **[5]**

ii) Explain each of the following terms : **[3]**

a) A_x

b) $A_{x:\overline{n}|}^{1}$

c) $A_{x:\overline{n}|}$

iii) Explain the concept of equivalence principle premiums. **[2]**

b) i) Explain the concept of utility function $U(\omega)$. If G is one time premium and X is loss random variable with E(X) = μ, then prove that G $\geq \mu$. **[6]**

ii) State any two properties of survival function S(x). Derive the expression for S(x) in terms of force of mortality μ_x. **[4]**

Total No. of Questions : 4]

SEAT No. :

P-1216

[Total No. of Pages : 3

[6054]-580

T.Y. B.Sc.

STATISTICS (Principal)

ST-365(B) : Operations Research - II

(2019 Pattern) (CBCS) (Semester - VI) (Paper - V) (36176)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of calculator and statistical table is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following :

a) Choose the correct alternative in each of the following : **[1 each]**

i) In _____ analysis items are separated according to their criticality.

A) FSN B) ABC

C) XYZ D) VED

ii) In _____ decision making environment, decision maker has the complete knowledge of every decision choice.

A) uncertainty B) risk

C) certainty D) ambiguity

iii) The courses of action that are to be selected on a particular occasion with some fixed probabilities are _____ strategies.

A) pure B) plane

C) mixed D) unfair

b) State whether each of the following statement is true or false :**[1 each]**

i) The time taken by the job in moving from one machine to another machine is significant.

ii) The rollback concept is used in decision tree to solve a problem.

P.T.O.

Q2) **Attempt any two of the following :** **[5 each]**

a) Explain decision making under uncertainty. Explain the coefficient of optimum criterion of decision making.

b) Write reasons for carrying inventory.

c) In a small manufacturing company, the maintenance cost and resale value of an equipment is as given below :

Year	1	2	3	4	5	6	7
Maintenance cost	1500	1990	2300	2900	3600	4500	5500
Resale value	5000	2500	1250	600	400	400	400

Determine the optimum period of replacement.

Q3) **Attempt any two of the following :** **[5 each]**

a) Define sequencing and write any five assumptions of it.

b) Explain the algebraic method in solving the problem of game theory.

c) A company likes to enter the market of water supply. For this work, company must purchase the water tank. The following pay-off matrix gives different purchase decisions :

Demand of Water tank	Probability	Payoff (Rs.) due to decision to purchase water tank				
		0	1	2	3	4
0	0.3	0	–90	–110	–130	–15
1	0.4	0	90	20	–50	–120
2	0.3	0	110	220	130	40

Determine the expected monetary value and number of water tank to be purchase.

Q4) **Attempt any one of the following :**

a) i) Solve the following payoff matrix by matrix method for player A. **[6]**

Competitor A	Competitor B		
	Social media	Television	News paper
Social media	10	5	–2
Television	13	12	13
Newspaper	12	14	14

ii) Define the following terms : **[4]**

A) No passing rules.

B) Decoupling inventory.

C) Ordering cost.

D) Zero-sum game.

b) i) A manufacturer has to supply the customer 24,000 units of the product per year. This demand is fixed and known. The customer has no storage space so the manufacturer has to ship a day's supply each day. If the manufacturer fails to supply, the penalty is Rs. 0.20 per unit per month. The inventory holding cost amounts to Re. 0.10 per unit per month and the set-up cost is Rs. 350 per production run. Find the optimum lot size for the manufacturer. **[6]**

ii) Explain the procedure of coefficient of pessimism criterion. **[4]**

⌘⌘⌘

Total No. of Questions : 4]

SEAT No. : ____

P1217

[Total No. of Pages : 3

[6054]-581
T.Y. B.Sc. (Regular)
STATISTICS
ST - 366 (A) : Stochastic Processes
(2019 Pattern) (Semester - VI) (Paper - VI) (36177)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of calculator and statistical table is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) A) Attempt each of the following: **[1 each]**

Choose the correct alternative in each of the following:

a) Let X_t be the number of incoming calls at a switchboard in an interval (0, t). Then the state space of a stochastic process $\{X_t, t \in T\}$ is

i) $\{0,1,2,...,t\}$ ii) $[0, t]$

iii) $\{0,1,2,...,\}$ iv) $(0, t)$

b) A state j is said to be absorbing iff

i) $p_{jj} = 0, p_{jk} = 1, j \neq k$ ii) $p_{jj} = 1, p_{jk} = 0, j \neq k$

iii) $p_{jj} = 0, p_{jk} = 0, j \neq k$ iv) $p_{jj} = 1, p_{jk} = 1, j \neq k$

c) Let $\{N(t), t \geq 0\}$ be a Poisson process with parameter λ, mean number of occurrences in an interval of length t is

i) λt ii) $\frac{1}{\lambda t}$

iii) $\lambda^2 t$ iv) $\frac{1}{\lambda}$

B) State whether each of the following statements is true or false: **[1 each]**

a) The sum of elements in each column of one step transition probability matrix is always 1.

b) If all states of a Markov chain are transient or null persistent then there does not exist a stationary distribution.

P.T.O.

Q2) Attempt <u>any two</u> of the following: **[5 each]**

a) State and prove Chapman-Kolmogorov equation for Markov chain.

b) Describe a Poisson process with suitable illustration. Also state three postulates of Poisson process.

c) Let $\{X_n, n \geq 0\}$ be a Markov chain has state space $S = \{1,2,3\}$ and one step transition probability matrix P as

$$P = \begin{bmatrix} 0.2 & 0.1 & 0.7 \\ 0.5 & 0.3 & 0.2 \\ 0.4 & 0.2 & 0.4 \end{bmatrix}$$

With initial probability distribution $P[X_0 = i] = \frac{1}{3}, i = 1,2,3$

Find :

i) $P[X_2 = 3 | X_0 = 2]$

ii) $P[X_2 = 2, X_1 = 3, X_0 = 1]$

iii) $P[X_2 = 2, X_1 = 1 | X_0 = 1]$

Q3) Attempt <u>any two</u> of the following: **[5 each]**

a) If $\{N_1(t), t \geq 0\}$ and $\{N_2(t), t \geq 0\}$ are two independent Poisson processes with parameter λ_1 and λ_2 respectively, then shows that $P[N_1(t) = k | (N_1(t) + N_2(t) = n)] = \binom{n}{k} p^k q^{n-k}$, where $p = \frac{\lambda_1}{\lambda_1 + \lambda_2}$ and $q = \frac{\lambda_2}{\lambda_1 + \lambda_2}$.

b) Define the following terms:

i) Markov chain

ii) State and state space of a Markov chain

iii) Stationary distribution

c) Mr. Patel tried not to be late for class too often. If he has late one day, he is 90% sure to be on time next time. If he is on time, then the next time there is 30% chance of his being late. In the long run, how often is he late for class?

Q4) Attempt <u>any one</u> of the following:

a) i) Let $\{X_n, n \geq 0\}$ be a Markov chain with three states 0, 1, 2 and one step transition probability matrix P as

$$P = \begin{bmatrix} 0 & 1 & 0 \\ \frac{3}{4} & 0 & \frac{1}{4} \\ 0 & 1 & 0 \end{bmatrix}$$

1) Is a Markov chain Irreducible?
2) Show that state 0 is non-null persistent and aperiodic.
3) Is a state 0 ergodic?

[1+2+2]

ii) Explain different types of stochastic processes with illustrations. **[5]**

b) i) Let $\{X_n, n \geq 0\}$ be a Markov chain with state space S = {0, 1, 2} have the transition probability matrix P as

$$P = \begin{bmatrix} \frac{1}{2} & \frac{1}{2} & 0 \\ \frac{3}{4} & 0 & \frac{1}{4} \\ 0 & 1 & 0 \end{bmatrix}$$

1) Is a Markov chain Irreducible?
2) Show that state 0 is non-null persistent and aperiodic.
3) Is a state 0 ergodic?

[1+2+2]

ii) Describe Random Walk model. **[5]**

Total No. of Questions : 4]

SEAT No. :

P1218

[Total No. of Pages : 3

[6054]-582

T.Y. B.Sc. (Regular)

STATISTICS

ST 366 (B) : Reliability Theory and Applications

(2019 Pattern) (CBCS) (Semester-VI) (36178) (Paper-VI)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of statistical tables and scientific claculator is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following: **[1 each]**

A) Choose the correct alternative in each of the following.

a) Consider the parallel system of 4 identical components having the reliability of each individual component is 0.68 then the reliability of the system is

i) 0.99 ii) 0.21

iii) 0.01 iv) 0.79

b) Reliability of system is always lies between

i) 0 and 1 ii) –1 and 1

iii) 0 and ∞ iv) $-\infty$ and ∞

c) A path vector is a vector $\underline{x}$ such that

i) $\phi(\underline{X})=1$ ii) $\phi(\underline{X})=0$

iii) $\phi(\underline{X})=\infty$ iv) 0.50

B) State whether each of the following statements is true of false. **[1 each]**

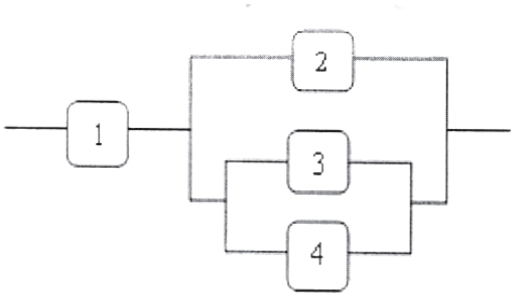
a) The structure function of a system with single component is $\phi(x)=1-x$.

b) Reliability of series system is more than that of parallel system with equal number of components.

P.T.O.

Q2) Attempt any two of the following: **[5 each]**

a) For the system having following reliability block diagram.



Find structure function of the system. Also find its reliability function.

b) Consider the coherent system with structure function $\phi(x) = (x_1 x_2) \coprod (x_3 x_4)$. Find reliability function of this system using minimal path sets.

c) Show that dual of k-out-of-n system is n-k+1- out-of-n system. Hence show that dual of a series system is a parallel system.

Q3) Attempt any two of the following: **[5 each]**

a) i) Show that, $E(T) = \int_0^\infty R(t)dt$, where, T is a lifetime and R (t) =1–F (t) is a reliability function of a component.

ii) Write note on pivotal decomposition of structure function.

b) Show that $r(t) = \frac{f(t)}{F(t)}$, provided F (*t*) <1, where r (*t*) is hazard rate function.

c) Compute the hazard rate for weibull distribution. Also comment on its ageing class.

Q4) Attempt any one of the following: **[10]**

a) i) The failure time in years of 10 item as follows:

0.09, 1.05, 4.32, 2.17, 4.06, 0.70, 4.35, 3.56, 2.06, 2.77 Find the 95% confidence interval for the parameter θ assuming that failure times are $Exp(\theta)$. Also find the exact confidence interval for mean life time and reliability function when $t = 2$ years.

ii) Show that F belongs to IFR class then F belongs to IFRA class.

[7+3]

b) i) If an integrated circuit chip has a constant failure rate of 0.05 per thousand hours. Find the probability that it will survive at least 10,000 hours.

ii) Let $\phi(x) = x_1(x_2 \coprod x_3)$ be a structure function for the system. Using this structure function find structural importance of each component in the system.

iii) Discuss general models of reliability data, repairable and non-repairable systems with illustration. **[2+5+3]**

Total No. of Questions : 4]

SEAT No. : ____

P1219

[Total No. of Pages : 3

[6054]-583

T.Y. BSc. (Regular)

STATISTICS

ST-366 (C) : MEDICAL STATISTICS AND CLINICAL TRIALS

(2019 Pattern) (CBCS) (Semester-VI) (Paper-VI) (36179)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***use of statistical tables and calculator is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following: **[1 each]**

A) In each of the following cases, choose the correct alternative:

a) A study that begins with test on animals is called as

i) Pre-Clinical ii) Phase-I

iii) Phase-II iv) Phase-III

b) In epidemiology, logit function of probability π is given by

i) $In\left[\frac{1-\pi}{\pi}\right]$ ii) $In\left[\frac{\pi}{1-\pi}\right]$

iii) $In\left[(1-\pi)\pi\right]$ iv) $In\left[\frac{\pi}{1+\pi}\right]$

c) The graph drawn by Dr. John snow could find the cause of

i) Malaria ii) Scurvy

iii) Puerperal fever iv) Cholera

B) In each of the following, state whether the given statement is true of false: **[1 each]**

a) Asthma is a chronic disease.

b) Malaria makes a person paralyzed

P.T.O.

Q2) Attempt any two of the following: **[5 each]**

a) Write a note on Bioequivalence.

b) Define the following terms:

i) Incidence

ii) Prevalence

iii) Epidemiology

iv) Precision

v) Risk

c) Discuss in brief about the discovery of drug for disease Rabies.

Q3) Attempt any two of the following: **[5 each]**

a) Define odds ratio. How it is estimated? Discuss how confidence interval is obtained for odds ratio?

b) Explain in brief Phase III study in clinical trials.

c) A patient of high blood pressure in given intravenous injection of 160mg of beta blocker. Blood samples are taken for 8 hours and concentration values are recorded. Results are given below. Estimate C_{max}, T_{max}. Also calculate $AUC_{(0,480)}$.

Time (min)	30	60	120	150	240	360	480
Concentration (mg/ml)	500	320	200	100	50	25	15

Q4) Attempt any one of the following: **[10 each]**

a) i) Data are recorded on pain sensitivity of sibling pairs. Out of 95 brother sister pairs each individual was classified into three categories viz. Oversensitive, normal and robust. The counts are given in the table below. **[5]**

Brother → / Sister ↓	Oversensitive	Normal	Robust	Total
Oversensitive	12	12	14	38
Normal	9	25	11	45
Robust	5	3	4	12
Total	26	40	29	95

Apply Bowker's test for mirror image symmetry.

ii) Write a note on linear growth model. **[5]**

b) i) Discuss in brief about the statistical analysis plan in clinical trials. **[5]**

ii) Write a short note on Bioavailability. **[5]**

Total No. of Questions : 5]

SEAT No. :

P 1220

[Total No. of Pages : 2

[6054] - 584

T.Y.B.Sc. (Regular)

GEOGRAPHY

GG - 361 : Regional Geography of India - II

(2019 Pattern) (Semester - VI) (36181)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q.No.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) What is death rate.

b) Define Nucleated settlements.

c) Name any two bauxite producing states in india.

d) Write any two name of major IT industry in india.

e) State the components required for thermal power genertion.

f) What is limonite.

Q2) a) Descuss about coal distribution of india. **[6]**

OR

Explain the factors affecting population growth in india.

b) Explain the iron are distribution in india. **[4]**

Q3) a) Elaborate the importance of communication system in india. **[6]**

OR

Discuss the development of Automobile industry in india.

b) Explain the role of roads in the economic development of india. **[4]**

P.T.O.

Q4) a) Describe the various types of agriculture. **[6]**

OR

Explain the factors affecting population distribution in india.

b) Discuss about cotton textile industry in india. **[4]**

Q5) Write short notes on any Four of the following. **[10]**

a) Population growth

b) Circular pattern of settlement

c) Mineral

d) Iron and Steel Industry

e) Communication system in india

f) Sedentary farming

Total No. of Questions : 5]

SEAT No. : ____

P1221

[Total No. of Pages : 2

[6054]-585

T.Y. B.Sc. (Semester - VI)

GEOGRAPHY

GG - 362 : Geography of Economic Activities - II

(2019 Pattern) (CBCS) (36182)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q.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) What is Limonite.

b) Write two advantages of plantation Agriculture.

c) Write two advantages of Industrilisation in India.

d) Define Industrial Fishing.

e) Name any two copper producing countries in the world.

f) Name any two Iron ore producing state in India.

Q2) a) Describe the use of GIS in economic activities. **[6]**

OR

Explain the web based economic activities in India.

b) Explain the global distribution of copper ore. **[4]**

P.T.O.

Q3) a) Describe in detail iron ore production in India. **[6]**

OR

Explain the factors of automobile industry developed in India.

b) Discuss the web based platform in Tourism. **[4]**

Q4) a) Describe the Auto Cluster development in India. **[6]**

OR

Explain the characteristic of dairy Farming.

b) Explain the major IT park in India. **[4]**

Q5) Write short notes on any Four of the following : **[10]**

a) Electronic Good.

b) Service Industry.

c) Industrial Hub.

d) E commerce.

e) Types of Agriculture.

f) Mineral oil products.

Total No. of Questions : 5]

SEAT No. :

P1222

[Total No. of Pages : 2

[6054]-586
T.Y. B.Sc. (Regular)
GEOGRAPHY
GG 363 : Tourism Activities and Management
(CBCS : 2019 Pattern) (Semester - VI) (36183)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q.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) Write two objective of ITDC.
b) Write two objective of MTDC.
c) Define the concept of tourism product.
d) Write two characteristic of dharmshala.
e) Which are the main advantages of the tourist place 'Ellora'?
f) State any two factor influesing choice of tourism.

Q2) a) Describe the employability of tourism activities. **[6]**

OR

Describe the importance of tourism mapping.

b) Explain the role of tourist guide in tourism development. **[4]**

Q3) a) Explain the tourism as an economic activities. **[6]**

OR

"Goa is the Prime destination in tourism of India" Discuss.

b) Explain the role of foreign exchange earnings in tourism activities. **[4]**

P.T.O.

Q4) a) Discuss national tourism policy of 2002. **[6]**

OR

Discuss tourism infrastucture development in India.

b) Explain the educational tour planning management. **[4]**

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

a) Tourism management.

b) objective of tour plan.

c) Types of Hotel.

d) Role of travel agent.

e) Travel agency.

f) Promotion of tourism.

Total No. of Questions : 5]

SEAT No. :

P-1224

[Total No. of Pages :2

[6054]-588
T.Y. B.Sc. (GEOGRAPHY)
GG - 365 : Management of Man-Made Disaster
(2019 Pattern) (CBCS) (Semester - VI) (36185)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5***
3) ***Questions 2 to 5 carry equal marks.***

Q1) Slove any five of the following: **[5]**

a) Write any two types of pollution.

b) Define the term hazard.

c) Write any two effects of oil spill.

d) What is biological hazard?

e) Define the term eutrophication.

f) Give any two examples of physical hazard.

Q2) a) Discuss the factors contributing to man-made disaster. **[6]**

OR

Explain biological disaster with examples.

b) Discuss the effects of man-induced landslides. **[4]**

Q3) a) Explain the causes and effects of soil erosion. **[6]**

OR

Describe in detail about the management of forest fires.

b) Write in brief about Chernobly nuclear disaster. **[4]**

P.T.O.

Q4) a) Describe causes and effects of industrial chemical accidents. **[6]**

OR

Write about the causes, effect and management of pandamic Covid-19.

b) Discuss the case study of Austrialian forest fire. **[4]**

Q5) Write a short notes on any four of the following : **[10]**

a) Physical hazards.

b) Classification of man-made disaster.

c) Management of chemical hazard.

d) Desertification.

e) Effect of arsenic in ground water.

f) Noise pollution.

Total No. of Questions : 5]

SEAT No. : ____

P1225

[Total No. of Pages : 2

[6054]-589

T.Y.B.Sc. (Regular)
GEOGRAPHY
GG - 366 : Geoinformatics-II
(2019 Pattern) (CBCS) (Semester-VI) (36186)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q.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 the term remote sensing.

b) What is electromagnetic energy?

c) What is atmospheric interactions?

d) Define the term infrared scanner.

e) What is flying height?

f) Mention the names of any two types of cameras.

Q2) a) Discuss remote sensing as a tool for resource survey. **[6]**

OR

Discuss historical development of remote sensing in India.

b) Explain electromagnetic spectrum with diagram. **[4]**

Q3) a) Describe in detail the process of remote sensing. **[6]**

OR

Explain the properties of electromagnetic waves.

b) Write in brief about the types of aerial photographs. **[4]**

P.T.O.

Q4) a) Describe the geometry of aerial photographs. **[6]**

OR

Discuss the elements of visual interpretation.

b) Explain the concept of Geo-stationary satellite. **[4]**

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

a) LANDSAT

b) INSAT

c) Sun Synchronous.

d) Aerial cameras.

e) Passive sensor.

f) IR colour photos.

Total No. of Questions : 5] **SEAT No. :**

P-1226 **[Total No. of Pages : 2**

[6054]-590

T.Y. B.Sc. (Semester - VI)

GEOGRAPHY

GG 3610 : Research Methodology - II

(2019 Pattern) (361810) (CBCS)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Question 2 to 5 carry equal marks.***

Q1) Solve any five of the following : **[5]**

a) What is research?

b) What is data?

c) Write any two merits of questionnaire method.

d) Write any two characteristics of a good research report.

e) Write various parts of the research report.

f) Write any two types of research report.

Q2) a) Explain various sources of secondary data. **[6]**

OR

Explain the questionnaire method in detailed.

b) Write a short note on demerits of questionnaire method. **[4]**

Q3) a) Describe characteristics of good research report writing. **[6]**

OR

Explain about research paper in detailed.

b) Write a short note on review article. **[4]**

P.T.O.

Q4) a) Describe case study method in detail. **[6]**

OR

Explain the structure and organization of research reports.

b) Write in short on the references and bibliography. **[4]**

Q5) Write short notes on any four of the following : **[10]**

a) Syndicated sources.

b) Main aspects of a questionnaire.

c) Dissertation.

d) The footnotes.

e) Abstract.

f) Research journals.

x x x

Total No. of Questions : 5]

SEAT No. :

P-1227

[Total No. of Pages : 2

[6054]-591

T.Y. B.Sc.

GEOGRAPHY

GG - 3611 : Total Station Surveying

(2019 Pattern) (Semester - VI) (361811) (CBCS)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Question 2 to 5 carry equal marks.***

Q1) Solve any five of the following : **[5]**

a) Write the least count of total station.

b) Mention the angles measured in total station.

c) Define total station.

d) Write the formula for distance measurement in total station.

e) Define centering.

f) What is the elaboration for EDM in surveying.

Q2) a) Explain the procedure for measurement of agriculture farm with total station. **[6]**

OR

Explain the measurement of cross profile with the help of total station.

b) Write the merits of total station. **[4]**

Q3) a) Discuss the various parameters of total station. **[6]**

OR

Explain the repetation angle measurement in total station.

b) Write the error sources of total station. **[4]**

P.T.O.

Q4) a) Explain the various applications of total station. **[6]**

OR

Explain the procedure for measurement of College Campus with total station

b) Write the measuring angles of total station. **[4]**

Q5) Write short notes on any four of the following : **[10]**

a) Demerits of total station.

b) Setting height of instruments of total station.

c) Parts of total station.

d) Offset measurement in total station.

e) Prism & Non-prism mode in total station.

f) Setting up of coordinate value for occupied point.

▽▽▽▽

Total No. of Questions : 5]

SEAT No. :

P-1228

[Total No. of Pages : 2

[6054] - 592

T.Y.B.Sc. (Regular)

MICROBILOGY

MB - 321 : Microbiology - II

(2019 Pattern) (Semester - VI) (Paper - I) (36191)

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 Q.5 carry equal marks.***

Q1) Solve any five od the followin. **[5]**

a) Enlist routes of drug administration

b) Tazobactam acts on which parts of cell

c) Write two examples of malarial parasites

d) What is aspergillosis

e) Enlist the methods of cultivation of viruses

f) Name the female mosokuitoe species through which Dengue is transmitted

Q2) a) Describe any two of the following. **[6]**

i) Mechonism of action of Amphoteric.B

ii) Laboratory diagnosis of malaria

iii) Symptoms of Influenza

b) Describe Hepatitis with respect to pathogenesis and Laboratory diagnosis **[4]**

P.T.O.

Q3) a) Explain any Two of the following. **[6]**

i) Prophylaxsis of Japaneses Encephalitis

ii) Pathogenesis of cryptococcus noformans

iii) Characteristis of Rotavirus

b) Describe the mechanism of drug resistance **[4]**

Q4) a) Describe any two of the following. **[6]**

i) Role of Rifamycin

ii) Histoplasmosis

iii) Epidemiology of corona virus

b) Draw neat labelled diagram of cycle of Entamorba histolytica **[4]**

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

a) Antigenic shift in influenza virus

b) Types of cell culture

c) Prophylaxis of Hepatitis A virus

d) Horizontal gene transter

e) Symptoms of cryptococcosis

f) FMD virus.

Total No. of Questions : 5]

SEAT No. :

P1229

[Total No. of Pages : 2

[6054]-593

T.Y. B.Sc. (Semester - VI)

MICROBIOLOGY

MB - 362 : Immunology - II

(2019 Pattern) (CBCS) (36192)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q.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) Exogenous antigens are processed via ___ pathway and presented to _____ cells.

b) Define chemokines.

c) What is redundancy? Write example.

d) Enlist cytokines involved in T cell activation.

e) What is paracrine action? Write example.

f) Treatments for immunodeficiency would not include _____.

i) Antibiotics

ii) Bone marrow transplant

iii) Interleukins

iv) Anti CD4 antibody

Q2) a) Explain any two of the following : **[6]**

i) Immunosuppression

ii) CVID with one example.

iii) Clonal deletion.

b) Explain cell adhesion molecules with examples. **[4]**

P.T.O.

Q3) a) Describe any two of the following : **[6]**

i) Diagnosis and treatment of Myesthenia Gravis.

ii) Immune response to superantigens.

iii) Immunological tolerance.

b) Describe in detail mechanism of type II hypersensitive reaction. **[4]**

Q4) a) Discuss any two of the following : **[6]**

i) Importance of immune response in vaccination.

ii) Induction of anergy in cells.

iii) Primary and secondary response kinetics.

b) Discuss in detail ADCC with neat labelled diagram. **[4]**

Q5) Write short notes on any four : **[10]**

a) Tumor necrosis factors.

b) Immune response to foreign transplanted cells.

c) Components of type I hypersensitive reaction.

d) Complement deficiencies.

e) Tuberculin test.

f) Types of autoimmune diseases.

Total No. of Questions : 5]

SEAT No. :

P1230

[Total No. of Pages : 2

[6054]-594
T.Y. B.Sc. (Regular)
MICROBIOLOGY
MB - 363 : Metabolism
(CBCS 2019 Pattern) (Semester - VI) (36193)

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) ***Question 2 to 5 carry equal marks.***

Q1) Solve any five of the following. **[5]**

a) Define passive transport.

b) Name the multienzyme complex used in fatty acid synthesis.

c) Urea synthesis occurs exclusively in _____

i) Kidney

ii) Pancreas

iii) Gall bladder

iv) Liver

d) State first law of thermodynamics.

e) Give one example of purple bacteria.

f) List any two components of mitochondrial ETC.

Q2) a) Attempt the following (any two): **[6]**

i) Enlist the steps in starch synthesis.

ii) Describe facilitated diffusion.

iii) Explain arrangement of components of ETC.

b) Diagrammatically represent non-cyclic photophosphorylation. **[4]**

P.T.O.

Q3) a) Explain the following (any two) **[6]**

i) Steps in beta oxidation of fatty acids

ii) Structure of ATP synthatase

iii) Sonophores

b) Describe the concept of high energy compounds. Give one example of acyl phosphates as high energy compound. **[4]**

Q4) a) Discuss the following (any two) **[6]**

i) Reduction reaction in calvin cycle.

ii) Active transport.

iii) Entropy

b) Describe with structures, urea cycle. **[4]**

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

a) Free energy

b) Peptidoglycan synthesis

c) Cyanobacteria

d) Energetics of mitochondrial ETC.

e) Phosphotransferase system.

f) Starch degradation.

Total No. of Questions : 5]

SEAT No. : ____

P-1232

[Total No. of Pages :2

[6054]-596
T.Y. B.Sc. (Microbiology)
MB - 365 : FERMENTATION TECHNOLOGY - II
(2019 Pattern) (Semester - VI) (CBCS) (36195)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Answer any three questions from Question Q.2 to Q.5***
3) ***Questions 2 to 5 carry equal marks.***

Q1) Solve any five of the following : **[5]**

a) What is solid state fermentation?

b) The important growth factor requirement for Glutamic acid production is _____.

c) Phenyl Acetic Acid acts as _____ in penicillin fermentation.

i) solvent ii) substrate

iii) antifoam iv) precursor

d) State True or False

Esterases can be purified by ammonium sulfate precipitation.

e) The organism used for citric acid fermentation is _____.

f) What are probiotics?

Q2) a) Attempt the following (Any two) **[6]**

i) What are proteases? Add a note on recovery.

ii) Explain the significance of precursors in penicillin biosynthesis.

iii) Enlist steps in production of yogurt.

b) Explain product recovery and applications of bioethanol. **[4]**

P.T.O.

Q3) a) Answer the following (any two) **[6]**

i) Describe the phases in streptomycin fermentation.

ii) Describe Glutamic acid fermentation with a flow sheet.

iii) Describe lagering process in beer.

b) Illustrate with the help of flow diagram lactic acid fermentation. **[4]**

Q4) a) Answer the following (any two) **[6]**

i) Describe any one method of acetic acid fermentation.

ii) Describe production of bioemulsifiers.

iii) Describe production of semisynthetic penicillin.

b) Describe ripening of cheese. **[4]**

Q5) Write short notes on Any four of the following : **[10]**

a) Production of inactirated polio vaccine

b) Pretreatment in bioethanol production

c) Bakers yeast production

d) Antisera production

e) Steroid biotransformation

f) Applications of amylases

Total No. of Questions : 5]

SEAT No. :

P1233

[Total No. of Pages : 2

[6054]-597

T.Y.B.Sc. (Regular)
MICROBIOLOGY
MB 366 : FOOD MICROBIOLOGY
(2019 Pattern) (CBCS) (Semester-VI) (36196)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***

Q1) Attempt the following (any five): **[5]**

a) Define D-value.

b) What is fermented food?

c) What is food spoilage?

d) Define TDP.

e) What are intrinsic factors?

f) ISO stands for _____.

Q2) a) Explain the following (any two) **[6]**

i) Contamination & spoilage of canned food.

ii) Food regulatory authority FDA.

iii) Contamination of egg & poultry products.

b) Describe microbial food poisoning with suitable example. **[4]**

Q3) a) Describe the following (any two) **[6]**

i) Sensory character of food.

ii) Health effects of prebiotic.

iii) Use of radiation method for food preservation.

b) Explain classification of food in detail. **[4]**

P.T.O.

Q4) a) Explain the following (any two) **[6]**

i) Spoilage of cereals & cereal products.

ii) Textural factors of food.

iii) Extrinsic factor affecting microbial growth in food.

b) Describe food infection caused by salmonella typhimurium. **[4]**

Q5) Write short notes on any five of the following: **[10]**

a) Inhibitory substances in food.

b) Food sanitation.

c) Contamination of spices & condiments.

d) Importance of F value.

e) Flavour factors of food.

f) Canning.

Total No. of Questions : 5]

SEAT No. :

P1234

[Total No. of Pages : 2

[6054]-598

T.Y. B.Sc.

MICROBIOLOGY

Skill Based Elective Course

MB 3610 : Waste Management

(2019 Pattern) (Semester - VI) (CBCS) (361910)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Questions from 2 to 5 carry equal marks.***

Q1) Solve any five of the following : **[5]**

a) Define Ts.

b) What is the use of grit chamber in waste treatment?

c) Define BOD.

d) Define 'Attached Growth'.

e) Enlist any two methods of aerobic digestion.

f) Enlist microorganisms producing biogas.

Q2) a) Describe any two of the following : **[6]**

i) Sewarage system of sewage collection.

ii) Composting.

iii) Need of treatment & waste water.

b) Diagramatically describe biological waste management process. **[4]**

P.T.O.

Q3) a) Explain <u>any two</u> of the following : **[6]**

i) By products of municipal waste.

ii) Aerated lagoons.

iii) Advantages & disadvantages of water carriage system.

b) Draw neat labelled diagram of trickling filter. **[4]**

Q4) a) Discuss <u>any two</u> of the following : **[6]**

i) Removal of pathogenic microorganisms from waste water.

ii) Activated sludge.

iii) Management of e-waste.

b) What are the different steps of management of dairy waste? **[4]**

Q5) Write short notes on <u>any four</u> of the following : **[10]**

a) Fluidized bed reactor.

b) Role of microorganisms in waste water treatment

c) Design of effluent treatment plant.

d) Hazards of e-waste.

e) Advantages & disadvantages of aerobic digestion model.

f) Screen chambers.

Total No. of Questions : 5]

SEAT No. :

P1235

[Total No. of Pages : 2

[6054]-599

T.Y. B.Sc.

MICROBIOLOGY

MB - 3611 : Nano-Biotechnology

(2019 Pattern) (CBCS) (Semester - VI) (361911)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Question 2 to 5 carry equal marks.***

Q1) Solve any five of the following : **[5]**

a) Define nanoscale bioassemblies.

b) Enlist any two microorganisms used for silver nanoparticles synthesis.

c) Write any two applications of sulfide nanoparticles.

d) What is peptide nanoparticles?

e) State true or false : Silver nanoparticles can be potential antimicrobial agent.

f) What is biosensor?

Q2) a) Explain any two of the following : **[6]**

i) Microbial synthesis of magnetic nanoparticles.

ii) Importance of non-magnetic oxide nanoparticles.

iii) Use of X-ray diffraction technique for characterization of nanoparticles.

b) Discuss use of nanoparticles in drug delivery. **[4]**

Q3) a) Describe any two of the following : **[6]**

i) Importance of Au-Ag alloy nanoparticles.

ii) DLS technique for characterization of nanoparticles.

iii) Use of non-magnetic oxide nanoparticles.

b) Discuss metallic nanomaterials as potential antimicrobial agent. **[4]**

P.T.O.

Q4) a) Discuss any two of the following : **[6]**

i) Liposomes and protein nanotubes.

ii) Application of nanoparticles in wastewater treatment.

iii) Use of nanoparticles in cell targeting.

b) Explain importance of TEM technique for characterization of nanoparticles. **[4]**

Q5) Write short notes on any four of the following : **[10]**

a) Nanoparticles based biosensor.

b) UV-visual spectroscopy.

c) Nanoparticles in animal industry.

d) X-ray Photoelectron Spectroscopy (XPS).

e) FTIR.

f) Bioassemblies.

▽▽▽▽

Total No. of Questions: 5]

SEAT No. : ____

P1236

[Total No. of Pages : 2

[6054]-600
T.Y. Bsc. (Regular)
NANOSCIENCE
N.S. 361 : Polymer Heterostructure and their Applications
(2019 Pattern) (Semester-VI) (Paper-I) (36261)

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 cary equal marks***
4) ***Draw neat and Labelled diagram wherever necessary***
5) ***Figure to the right indicate full marks***

Q1) Attempt any five of the following **[5]**

a) Give full form of P_3HT.

b) Define laser

c) Define ex-situ polymerisation

d) Which reagent is used for pickning enwsion as pickning agents?

e) Define photo-integrated circuit

f) Which process used to by preparation of Silica nanoparticles

Q2) a) Attempt any ONE of the following. **[6]**

i) Write note on Host Polymer characterisation

ii) Write detail Host polymer characterisation

b) Explain synthesis of Heterostructure by In situ polymerisation using metals **[4]**

Q3) a) Attempt any one of the following **[6]**

i) Explain in detail organic Solae cell and types of Junctions

ii) Explain detail applications of laser

b) Explain p p-Het erostructure **[4]**

P.T.O.

Q4) a) Attempt any one of the following **[6]**

i) Explain differential scanning analysis

ii) Write the difference between Homogenous and Heterogeneous catalysis

b) Write short on pickning emulsion **[4]**

Q5) Write Short note on any Four of the following **[10]**

a) Uses of Transistor

b) In-situ polymerisation

c) Homojunction

d) Laser diocle Applications

e) Organic photovoltaic cell

f) Physisorption

Total No. of Questions : 5]

SEAT No. : ____

P1237

[Total No. of Pages : 2

[6054]-601

T.Y. B.Sc. (Semester - VI)

NANOSCIENCE AND NANOTECHNOLOGY

NS - 362 : Functional Nanomaterials

(2019 Pattern) (Paper - II) (36262)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Draw neat and labelled diagram wherever necessary.***
4) ***Figures to the right indicate full marks.***

Q1) Solve any five of the following : **[5]**

a) What is Taylor cone?

b) Define metal organic frameworks?

c) Write down the formula for porosity.

d) Define Exciton?

e) Draw the diagram for one-dimensional oxide nanostructures.

f) Define Nanocrystals?

Q2) a) Solve any one of the following : **[6]**

i) Explain the optical properties of Titania nanotubes arrays.

ii) Explain the shape and composition control of semiconductor nanocrystals.

b) Explain the LBL assembly with semiconductor nanoparticles and nanowires. **[4]**

P.T.O.

Q3) a) Solve any one of the following : **[6]**

i) Explain the synthesis methods of Boron-Nitride nanotubes.

ii) Explain the synthesis of semiconductor nano-crystals inorganic solvents.

b) Explain the four synthesis generations. **[4]**

Q4) a) Attempt any one of the following : **[6]**

i) Explain the electro spinning process.

ii) Explain the nanofabric yarn preparations.

b) Explain the nanofabric production. **[4]**

Q5) Attempt any four of the following : **[10]**

a) Explain the properties of MOF's.

b) Explain the Laser-Assisted method.

c) Write a short note on Laser.

d) Explain Aqueous synthesis of semiconductor nanocrystals.

e) Explain the key processing parameters.

f) Explain the Ball-Milling and Anneling.

Total No. of Questions : 4]

SEAT No. :

P1238

[Total No. of Pages : 1

[6054]-602
T.Y.B.Sc. (Regular)
NANOSCIENCE AND NANOTECHNOLOGY
NS - 363 : Applications of Nanobiotechnology
(2019 Pattern) (Semester - VI) (36263)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Draw a diagram wherever necessary.***
3) ***Figures on right side indicate full marks.***

Q1) a) Answer the following questions. **[10]**

i) Define the term Biosensor.

ii) What are protein-micro-Nano-array.

iii) What is general use of all transducer types.

iv) What are various sizes of carbon-nono tubes.

v) Define the term quantum dots.

b) List any two medical conditions in which nano medicine are applicable. **[1]**

Q2) Answer the following (Any Two). **[8]**

a) Draw neat labelled diagram of ATP synthese complex.

b) Hypertension can be cure using nano medicine. Justify the sentence.

c) List various types of Transducer.

Q3) Answer the following (Any Two). **[8]**

a) Write short account on use of nano medicine in fungal diseases.

b) What are mechanical transducer?

c) What is drug? Explain various routes of drug administration.

Q4) Write short note (Any Two). **[8]**

a) Woobing gel.

b) Nano-patches.

c) Applications of Biomaterials.

✡ ✡ ✡

Total No. of Questions : 5]

SEAT No. :

P-1240

[Total No. of Pages : 2

[6054]-604

T.Y. B.Sc.

NANOSCIENCE AND NANOTECHNOLOGY

NS - 365 : Energy Storage Devices and Applications

(2019 Pattern) (Semester - VI) (Paper - V) (36265)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any three questions of the Q.2 to Q.5.***
3) ***Draw the neat and labelled diagram wherever necessary.***
4) ***Figure to the right indicate full marks.***

Q1) Attempt any Five of the following : **[5]**

a) Define container.

b) What is fusion?

c) Define supercapacitor.

d) Define primary battery.

e) Define cell voltage.

f) Define separator.

Q2) a) Attempt any One of the following : **[6]**

i) What is renewable resources? Explain it's different types.

ii) What is non-renewable resources? Explain it's different types.

b) Explain the need of Energy storage. **[4]**

Q3) a) Attempt any One of the following : **[6]**

i) Explain the sensible heat storage.

ii) Explain the different types of supercapacitor.

b) Explain the Latent heat storage. **[4]**

P.T.O.

Q4) a) Attempt any One of the following : **[6]**

i) Design and working of Electrode of battery.

ii) Explain the Thermal Energy Storage.

b) Explain the Electrical Energy storage. **[4]**

Q5) Attempt any Four of the following : **[10]**

a) Explain the construction of battery.

b) Explain the working of battery.

c) Explain the term Nuclear energy.

d) Explain the term Nuclear fusion.

e) Short note - Electrochemical Pseudocapacitor.

f) Short note - Hybrid Capacitor.

▽▽▽▽

Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages : 2

[6054]-605

T.Y. B.Sc. (Regular)

NANOSCIENCE AND NANOTECHNOLOGY

NS-366 : Photocatalysis For Environmental Pollution Control

(2019 Pattern) (Paper-VI) (Semester-VI) (36266) (Elective-II)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three of questions from Q.2 to Q.5.***
3) ***Question 2 to 5 carry equal marks.***
4) ***Draw neat & labelled diagram wherever necessary.***
5) ***Figure to the right indicate full marks.***

Q1) Attempt any five of the following: **[5]**

a) Define auto catalysis.

b) Explain and law of photochemistry.

c) Define Black-Body radiation.

d) What is p-type semiconductor.

e) Define catalyst.

f) Define adsorption isotherm.

Q2) A) Attempt any one of the following **[6]**

a) Write short note on solar spectrum analysis.

b) Explain photo catalyst surface and active species.

B) Explain in detail ‘principle of eightoxer solid. **[4]**

Q3) A) Attempt any one of the following: **[6]**

a) Explain short note on. Environmental remediation.

b) Write the detail purification of water & air.

B) Factors affecting catalyst on kinetics of reaction. **[4]**

P.T.O.

Q4) A) Attempt <u>any one</u> of the following. **[6]**

a) Write in detail application of metal nano particles in organic reactions.

b) Write in detail catalytic efficiency and turnover frequency.

B) Explain photo catalyst surface and active species. **[4]**

Q5) Write short note on <u>any four</u> of the following. **[10]**

a) Lock & key model.

b) Hetero genous catalyst.

c) Red lasec pointer.

d) Tyndall effect.

e) Inhibition.

f) Chemisorption.

Total No. of Questions : 5]

SEAT No. :

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[Total No. of Pages : 2

[6054]-606

T.Y. B.Sc.

NANOSCIENCE AND NANOTECHNOLOGY

NS-3610: Data Analysis and Computer Applications

(2019 Pattern) (Semester - VI) (362610)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5***
3) ***Draw the neat and labelled diagram wherever necessary.***
4) ***Figure to the right indicates full marks.***

Q1) Attempt any FIVE of the following : **[5]**

a) Give one example of the qualitative data type.

b) What is range of the following data: 2.9, 3.0, 3.3, 1.9, 2.6, 2.5.

c) Give the one example of the quantitative data type.

d) Find the medium for the following data: 10, 23, 34, 12, 30.

e) What is the range of correlation coefficient 'r'?

f) Define the term 'Parameter'?

Q2) a) Attempt any ONE of the following : **[6]**

i) Find arithmetic Mean and Mode for the following data :

Marks	0-10	10-20	20-30	30-40	40-50
No. of students	3	7	10	6	4

ii) What is mean by measures of dispersion? Write expressions of them in case of grouped frequency distribution.

b) Write a short note on regression analysis. **[4]**

P.T.O.

Q3) a) Attempt any ONE of the following : **[6]**

i) Following data gives income and expenditure of 5 families. Find the covariance between income and expenditure.

Income (in thousands)	10	12	14	16	18
Expenditure (in thousands)	6	7	9	12	15

ii) Find variance and standard deviation for the following data :

0.1, 0.2, 0.2, 0.4, 0.1, 0.5, 0.9, 0.4, 0.3, 0.6.

b) Write merits and demerits of scatter diagram. **[4]**

Q4) a) Attempt any ONE of the following : **[6]**

i) Explain the procedure to find mean of the grouped frequency distribution in MS-Excel.

ii) Find co-relation coefficient between X and Y if

$\sum x = 75, \sum y = 100, n = 25, \sum xy = 325, \sum x^2 = 250, \sum y^2 = 500$.

b) Find Median and Mode for the following data : **[4]**

0.345, 0.231, 0.220, 0.120, 0.220, 0.111, 0.102

Q5) Attempt any FOUR of the following : **[10]**

a) Write the sample space for the experiments :

i) tossing a coin twice

ii) rolling a die

b) Give probability mass function of Binomial distribution. Also, write real life situation where the Binomial distribution is used.

c) What are types of correlation?

d) Find Geometric mean for the following data :

1.2, 3.4, 2.3, 1.0, 1.5, 3.0

e) Define Normal distribution.

f) Write two demerits of Mean.

Total No. of Questions : 5]

SEAT No. :

P1243

[Total No. of Pages : 2

[6054]-607

T.Y. B.Sc.

NANOSCIENCE AND NANOTECHNOLOGY

NS - 3611 : Renewable Energy and Energy Harvesting

(2019 Pattern) (Semester - VI) (362611)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Draw the neat and labelled diagram wherever necessary.***
4) ***Figure to the right indicate full marks.***

Q1) Attempt any five of the following : **[5]**

a) Define solar pond?

b) Define Accumulator?

c) What is Energy storage?

d) Define wind?

e) Define solar distillation?

f) Define Hydropower?

Q2) a) Attempt any one of the following : **[6]**

i) Explain construction and working of salt gradient solar pond.

ii) Explain description of a basin type solar still.

b) Explain the principle of photovoltaic solar cell. **[4]**

Q3) a) Attempt any one of the following : **[6]**

i) Explain construction and working of vertical axis wind turbines.

ii) Explain wind energy conversion.

b) Write down advantages and disadvantages of vertical axis wind turbines. **[4]**

P.T.O.

Q4) a) Attempt any one of the following : **[6]**

i) Explain the mechanical equipment of hydropower plant.

ii) Explain open cycle ocean thermal electric conversion system.

b) Explain hybrid cycle ocean thermal electric conversion system. **[4]**

Q5) Attempt any four of the following : **[10]**

a) Explain power channel.

b) Explain Bio-fuling.

c) What is photovoltaic effect?

d) Explain I-V characteristics of solar cell.

e) Define power coefficient?

f) Explain Thwaits slot.

▽▽▽▽

Total No. of Questions: 5]

SEAT No. :

P1244

[Total No. of Pages : 2

[6054]-608
T.Y. B.Sc. (Regular)
ELECTRONIC SCIENCE
EL-361 : Modern Communication Systems
(2019 Pattern) (CBCS) (Semester-VI) (Paper-I) (36221)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Attempt any Three questions from Q2 to Q5.***
3) ***Q2 to Q5 carry equal marks.***

Q1) Attempt any five of the following **[5]**

a) State the advantages of delta modulation over PCM.

b) What is a MODEM?

c) Define quantization noise in PCM.

d) Define sampling of a signal.

e) What is handoff in cellular phone system?

f) What is keying? Define ASK.

Q2) Attempt the following: **[2]**

a) i) State different types of multiplexing techniques used in electronic Communication

ii) Explain the granular noise distortion in delta modulation. **[4]**

b) Explain the cellular concept of mobile communication system. **[4]**

Q3) Attempt the following:

a) i) State units and demerits of ASK. **[2]**

ii) Explain FSK generation with a neat block diagram **[4]**

b) Explain the concept of cell and cluster in cellular phone system. **[4]**

P.T.O.

Q4) Attempt the following **[2]**

a) i) State merits and demerits of PCM.

ii) Explain delta modulator with a neat block diagram **[4]**

b) Explain the satellite system transponder model with a neat block diagram. **[4]**

Q5) Attempt any Four of the following: **[10]**

a) State merits and demerits of FSK.

b) Explain any one parameter of a satellite system.

c) Define segmentation and dualization in cellular phone system.

d) State Shannon's theorem in sampling

e) Define Nyquist bandwidth and give its relation with bit rate.

f) State three basic sections of satellite system.

Total No. of Questions : 5]

SEAT No. :

P1245

[Total No. of Pages : 2

[6054]-609

T.Y. B.Sc. (Semester - VI)

ELECTRONIC SCIENCE

EL - 362 : Embedded System Design Using Microcontrollers

(2019 Pattern) (Paper - II) (CBCS) (2 Credits) (36222)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Q2 to Q5 carry equal marks.***

Q1) Solve any five of the following : **[5]**

a) Write any two advantages of embedded system.

b) Give the instructions for logical AND & EXOR operation.

c) What is the function of 'MOVWF' instruction?

d) Give the full form of 'ARM'.

e) Write any two elements of Automotive Embedded system.

f) Write the function of PINSELO register.

Q2) Attempt the following :

a) i) Give the 32-bit format of status register of ARM. **[2]**

ii) Explain in brief the elements of embedded system. **[4]**

b) Explain block diagram of washing machine in short. **[4]**

P.T.O.

Q3) Attempt the following :

a) i) Which segments of 7 segment display should be ON to display '1' and '5' digits. **[2]**

ii) Write the PIC C program to display character 'A' on LCD. **[4]**

b) Write the features of PIC16F887 micro controller. **[4]**

Q4) Attempt the following :

a) i) Write a short note on General purpose file Registers. **[2]**

ii) Explain ARM architecture in short. **[4]**

b) Explain the types of memory in ARM. **[4]**

Q5) Attempt any four of the following : **[10]**

a) What are the various blocks in digital camera?

b) Write any three difference between embedded system versus General computing system.

c) Draw the interfacing diagram of stepper motor union with PIC 16F887.

d) Write any five application areas of an Embedded system.

e) Write the PIC C program to make LED ON/OFF at pin RA4, according to switch connected at pin RC2.

f) Write the PIC C program to generate sawtooth wave using DAC.

Total No. of Questions : 5]

SEAT No. :

P1246

[Total No. of Pages : 2

[6054]-610
T.Y. B.Sc. (Regular)
ELECTRONIC SCIENCE
EL - 363 : Industrial Electronics
(CBCS 2019 Pattern) (Semester - VI) (Paper - III) (36223)

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) ***Question 2 to 5 carry equal marks.***

Q1) Attempt any FIVE of the following. **[5]**

a) State any two applications of induction heating.

b) What is an electric drive?

c) What is an inverter?

d) List advantages of hybrid vehicle.

e) Draw circuit symbol and I.V characteristics of Diac.

f) State the different operating regions of power transistor.

Q2) Attempt the following

a) i) Explain working principle of dc motor. **[2]**

ii) Explain the working of off-line UPS with suitable diagram. **[4]**

b) What is PHEV? State its advantages and disadvantages. **[4]**

Q3) Attempt the following.

a) i) 'In high speed power electronics applications, fast recovery time is required', comment. **[2]**

ii) Write a note on AC motor. **[4]**

b) How electric vahicle battery works? What is trickle charging? **[4]**

P.T.O.

Q4) Attempt the following.

a) i) List the types of batteries used in electric vehicle. Which is more efficient? **[2]**

ii) Draw circuit symbol and constructional diagram of PUT. Explain its working. **[4]**

b) Draw the circuit diagram of half bridge inverter and explain its working. Draw input and output waveforms of it. **[4]**

Q5) Attempt any FOUR of the following. **[10]**

a) Explain armature control method to control speed of dc motor with suitable diagram.

b) Explain the working principle of ac motor.

c) Why dv/dt protection is needed? Explain.

d) Explain working principle of SCR.

e) Write a note on SMPS.

f) Explain the concept of dielectric heating.

Total No. of Questions : 5]

SEAT No. :

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[Total No. of Pages : 2

[6054]-612
T.Y. B.Sc.
ELECTRONIC SCIENCE
EL - 365 : Process Control Systems
(2019 Pattern) (Semester - VI) (Paper - V) (CBCS) (36225)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

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

Q1) Attempt any Five of the following : **[5]**

a) Define Dead time element.
b) What is the need for a controller?
c) Define error & offset.
d) Which are the two major type of control system?
e) Define Instrument.
f) What is meant by data acquisition system?

Q2) Attempt the following : **[10]**

a) i) When combined analog/digital systems are used, what are limitations associated with it? **[2]**
   ii) Explain discrete state process control. **[4]**
b) With a neat graph of error & controller output, discuss working of integral control mode. **[4]**

Q3) Attempt the following : **[10]**

a) i) State disadvantages of null method compared to deflection method. **[2]**
   ii) Explain process control principle. **[4]**
b) What are the advantages & disadvantages of proportional Integral Control Systems. **[4]**

P.T.O.

Q4) Attempt the following : **[10]**

a) i) What is the effect of PD & PI controller on the system performance? **[2]**

ii) Describe the functional element of an instrument with block diagram. **[4]**

b) Explain zero order system? Give its one example. **[4]**

Q5) Attempt any Four of the following : **[10]**

a) Define :

i) Accuracy ii) Sensitivity

iii) Resolution iv) Range

v) Span

b) What are the drawbacks with respect to proportional controller?

c) Define sinusoidal transfer function.

d) Define the following terms :

i) Plant ii) Compensator

iii) Sensor iv) Actuators

v) Feedback loop

e) Explain signal conditioning.

f) Write the difference between deflection & null type method.

▽▽▽▽

Total No. of Questions : 5]

SEAT No. :

P1249

[Total No. of Pages : 2

[6054]-613

T.Y. B.Sc. (Regular)

ELECTRONIC SCIENCE

EL-366 (A) : PLC & SCADA (Paper-VI)

(2019 Pattern) (Semester-VI) (36226A)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q. 1 is compulsory.***
2) ***Solve any three questions from Q.2 to 5.***
3) ***Question 2 to 5 carries equal marks.***

Q1) Attempt any FIVE. **[5]**

a) PLC is abbravation of what?

b) SCADA is abbravation of what?

c) “SCADA is process” justify.

d) LAN is abbravation of what?

e) RTU is abbravation of what?

f) DCS is abbravation of what?

Q2) a) Write a note on RTU. **[6]**

b) Explain the need of PLC in industry. **[4]**

Q3) a) Write a note on SCADA and LAN **[6]**

b) Compare in four points SCADA VS PLC **[4]**

Q4) a) What is ladder logic diagram? Explain in details. **[6]**

b) Write a note on DCS. **[4]**

P.T.O.

Q5) Write short notes on any five. **[10]**

a) SCADA security.

b) Limitations of SCADA

c) PLC system block diagram.

d) Machine control Terminology

e) PLC configuration diagram.

f) SCADA Hardware

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Total No. of Questions : 5]

SEAT No. :

P1250

[Total No. of Pages : 2

[6054]-614

T.Y. B.Sc. (Regular)

ELECTRONIC SCIENCE

EL-366 B Sensors and Systems

(2019 Pattern) (CBCS) (Semester-VI) (36226B)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q. 1 is compulsory.***
2) ***Solve any three questions from Q.2 to 5.***
3) ***Question 2 to 5 carry equal marks.***

Q1) Solve any five of the following. **[5]**

a) Define the term sensitivity of sensor.

b) State the name of temperature sensor which consists of two different types of metals.

c) Write the name of amplifier use to amplify the signal in the range of few microvolt.

d) State the names of actuators known to you.

e) What do you mean by MMF, which is develop in AC motar.

f) Write the names of any two sensors use in building management system.

Q2) Attempt the following.

a) i) Draw the circuit diagram of Instrumentation amplifier using three op-AMP. **[2]**

ii) Write a short note on light sensor and explain the signal conditioner circuit use for light sensors. **[4]**

b) With the help of block diagram explain the data aquistion system use to sence the light, load and temperature. **[4]**

P.T.O.

Q3) Attempt the following.

a) i) State any two advantages of AC motor over DC motor. **[2]**

ii) With the help of setup diagram explain the working of four pole stepper motor. **[4]**

b) Explain the chemical sensor by using proper block diagram. **[4]**

Q4) Attempt the following.

a) i) Define the term percentage of line regulation of power supply use in amplifier circuit. **[2]**

ii) Daraw the circuit diagram of bridge amplifier using RTD as one arm and write the equation for zero output voltage. State any two advantages of bridge amplifier. **[4]**

b) With the help of neat diagram explain the woking at DC motor. **[4]**

Q5) Attempt any four of the following. **[10]**

a) What do you mean by NTC and PTC terms use in thermistor. Draw the graph of NTC and PTC thermistar.

b) Write a short note on PT-100 as temperature sensor.

c) State the applications of servo motor.

d) Write the names of parts use in AC motor.

e) State the name of signal conditioner circuit use for

i) RTD as temperature sensor and

ii) Thermocouple as temperature sensor.

f) Draw the block diagram of building management system using any two sensors.

❖ ❖ ❖

Total No. of Questions : 5]

SEAT No. :

P-1251

[Total No. of Pages : 2

[6054]-615

T.Y. B.Sc.

ELECTRONIC SCIENCE

ELSEC-361: Design of Printed Circuit Boards

(362210) (2019 Pattern) (CBCS) (Semester - VI) (Paper - X)

Time : 2 Hours] *[Max. Marks : 35*

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.***

Q1) Attempt any five of the following : **[5]**

a) What do you mean by Pad stacks?

b) Define foot print.

c) Give acronym of SMD.

d) Why FR-4 material used in PCB?

e) What is lamination in PCB?

f) What is DRC in PCB?

Q2) Attempt the following :

a) i) With giving the disadvantages explain autorouting. **[2]**

ii) Explain in short conductor spacing in PCB. **[4]**

b) Describe the layered structure of PCB. **[4]**

Q3) Attempt the following :

a) i) Mention any four electrical properties of laminates. **[2]**

ii) Write a short note on advantages of PCB. **[4]**

b) Explain various tools used in PCB designing. **[4]**

P.T.O.

Q4) Attempt the following :

a) i) Define the terms: Vias, Pad Tracks. **[2]**

ii) Mention four types of PCB and explain any one. **[4]**

b) Write a short note on conductor spacing in PCB. **[4]**

Q5) Attempt <u>any five</u> of the following : **[10]**

a) Write a short note on materials used in PCB manufacturing.

b) Explain types of component used in PCB.

c) Explain layered colored structures of PCB.

d) Write in short: Laminates used in PCB.

e) Describe mechanical design considerations.

f) Explain NEMA used in PCB.

Total No. of Questions : 5]

SEAT No. :

P-1252

[Total No. of Pages : 2

[6054]-616

T.Y. B.Sc.

ELECTRONIC SCIENCE

ELSEC- 362 : Mobile Application Development (MAD) (Paper - XI)

(2019 Pattern) (CBCS) (2 Credits) (Semester - VI) (362211)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Q.2 to Q5 carry equal marks.***
3) ***Attempt any three questions from Q.2 to Q.5.***
4) ***Use of colorful pencils (other then red) for diagrams is not restricted.***

Q1) Attempt any five : **[5]**

a) What is base of Android operating system? **[1]**

b) What is Android version number for "Donut"? **[1]**

c) What is the purpose to use Android & Emulator? **[1]**

d) "Java and Ada language are used to develop various types of Applications in Eclipse", Justify. **[1]**

e) Which Android version has release date unconfirmed at the time of writing. **[1]**

f) What is Roll form of SDK? **[1]**

Q2) a) Write note on "Features of Android" **[6]**

b) Write note on "Anatomy of Android Applications". **[4]**

Q3) a) List and explain any six types of Botton in Android user interface views. **[6]**

b) Draw only flow chart of a simple calculator. **[4]**

P.T.O.

Q4) a) i) Give the Names of two location based services. **[2]**

ii) List any two importance of display map in mobile application. **[4]**

b) What is role of progress bar view? Give any two examples. **[4]**

Q5) Write any four short notes : **[4 × 2.5 = 10]**

a) AVD. **[2½]**

b) SDK manager. **[2½]**

c) Five needs of mobile application. **[2½]**

d) Android devices in the market. **[2½]**

e) Mobile application interface designing. **[2½]**

f) Need of Picker. **[2½]**

▽▽▽▽

Total No. of Questions: 5]

SEAT No. : ____

P1253

[Total No. of Pages : 2

[6054]-617
T.Y. B.Sc. (Regular)
PSYCHOLOGY
Personality Theories
(2019 Pattern) (Semester-VI) (Paper-I) (36201)

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 from 2 to 5 carry equal marks.***

Q1) Solve any Five of the following. **[5]**

a) The PEN model of personality has introduced by ____?

b) Define self actualization.

c) What is operant conditioning?

d) Define ego integrity

e) State the names of defense mechanism

f) Define Self.

Q2) a) Explain in detail Roger's theory of personality. **[6]**

OR

Explain skinner's behavioral perspectives of personality.

b) Compare cognitive and social perspectives of personality. **[4]**

Q3) a) Explain Erikson's Hierarchical model of personality. **[6]**

OR

Explain Carl jungs analytical theory of personality.

b) Discuss Psychosexual stages of personality development according to Freud's theory. **[4]**

P.T.O.

Q4) a) Explain the characteristics of good personality theory. **[6]**

OR

Explain Psychoanalytical perspective in detail.

b) Compare cardinal and secondary traits. **[4]**

Q5) Write short Notes on any of the following. **[10]**

a) Inferiority Feeling

b) Collective unconscious

c) Archetypes

d) Personal construct

e) Types of personality theory

f) Chattell's taxonomy

Total No. of Questions : 5]

SEAT No. : ____

P1254

[Total No. of Pages : 2

[6054]-618

T.Y. B.Sc. (Semester - VI)

PSYCHOLOGY

36202 : Psychopathology - II

(2019 Pattern) (Paper - II)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Question from 2 to Q5 carry equal marks.***

Q1) Solve any five of the following : **[5]**

a) What is drug dependence?

b) What is insomnia?

c) What is personality disorder?

d) State types of communication disorder?

e) What is Binge eating disorder.

f) State cluster C Personality disorder.

Q2) a) Explain in detail paranoid. Schizoid and Schizotypal disorder. **[6]**

OR

Explain in detail causes, symptoms and treatment of ADHD.

b) Compare dependent and avoidant personality disorder. **[4]**

P.T.O.

Q3) a) Explain in detail addiction disorder. **[6]**

OR

Explain causes, symptoms and treatment of communication disorder.

b) Compare Anorexia Nervose and Bullemia nerosa. **[4]**

Q4) a) Explain various sleep disorder. **[6]**

OR

Explain Autism spectrum disorder.

b) Compare Alcohol Abuse and dependence disorder. **[4]**

Q5) Write short notes on any four of the following : **[10]**

a) Psychoactive Drugs.

b) Pica disorder.

c) Withdrawal symptoms.

d) Drug Abuse.

e) OCD.

f) Narcolepsy.

x x x

Total No. of Questions : 5]

SEAT No. :

P1255

[Total No. of Pages : 2

[6054]-619
T.Y.B.Sc. (Regular)
PSYCHOLOGY
Educational Psychology
(2019 Pattern) (Semester - VI) (36203) (Paper - III)

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) What is educational Psychology?

b) What is cognitive development?

c) Define learning.

d) What is meaning of positive learning environment?

e) What is project based teaching.

f) What is emotional development?

Q2) a) Discuss the role and scope of educational psychology. **[6]**

OR

Discuss the role of brain in cognitive development.

b) Illustrate the importance of culture on students development. **[4]**

Q3) a) Discuss the importance of behavioral approach in learning. **[6]**

OR

Discuss about classroom management in detail.

b) Illustrate the role of motivation in learning and teaching. **[4]**

Q4) a) Explain the information processing approach of learning. **[6]**

OR

Explain General principles of development and its importance in education.

b) Compare cognitive and constructivistic views of learning. **[4]**

P.T.O.

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

a) Functions of educational Psychology.

b) Learner centred teaching method.

c) Lesson planning.

d) Experiential learning.

e) Nature of educational psychology.

f) Language development.

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Total No. of Questions : 5]

SEAT No. :

P-1257

[Total No. of Pages :2

[6054]-621
T.Y. B.Sc. (Psychology)
REHABILITATION PSYCHOLOGY
(2019 Pattern) (Paper - V) (Semester - VI) (36205)

Time : 2 Hours] *[Max. Marks : 35*

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.***

Q1) Slove any five of the following: **[5]**

a) Define community

b) What is stigma

c) Define coping

d) State the types of counselling

e) Define psychotherapy

f) State the names of approaches in rehabilitation programes

Q2) a) Explain the impact of disability on individual & family. **[6]**

OR

Describe rehabilitation programmes in vocational training units.

b) Differentiate the intervations for family burden and work performance. **[4]**

Q3) a) Elaborate the historical perspective of rehabilitation. **[6]**

OR

Explain the community based rehabilitation program.

b) Analyse the advantages of hostel and day care rehabilitation. **[4]**

P.T.O.

Q4) a) Describe the advantages and disadvantages of hospital and residential rehab programmes. **[6]**

OR

Explain any two approaches of rehabilitation programmes.

b) Investigate the difference between individual & group counselling. **[4]**

Q5) Write a short notes on Any four of the following : **[10]**

a) Halfway home rehabilitation

b) Assessment of disability

c) Psychiatric disorder

d) Goals of rehabilitation

e) Roles of edectic

f) Objectives of rehab

Total No. of Questions : 5]

SEAT No. : ____

P1258

[Total No. of Pages : 2

[6054]-622
T.Y. B.Sc. (Regular)
PSYCHOLOGY
Psychotherapies
(2019 Pattern) (Semester-VI) (Paper-VI) (36206)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q. 1 is compulsory.***
2) ***Solve any three questions from Q.2 to 5.***
3) ***Questions 2 to 5 carry equal marks.***

Q1) Solve any five of the following. **[5]**

a) Define Assertiveness.

b) State the full form of REBT

c) Define psychotherapy

d) Founder of cognitive therapy

e) What is tocken economy?

f) State the full form of TA

Q2) a) Describe the key concepts of transactional analysis. **[6]**

OR

Explain the components and effectiveness of cognitives therapy.

b) Illustrate the therapeutic process. **[4]**

Q3) a) Explain the various types of psychotherapies. **[6]**

OR

What are the 5 percepts of vipasana? Explain the techniques of vipasana as a psychotherapy.

b) Examine the process and effects of art therapy. **[4]**

P.T.O.

Q4) a) Describe the objectives an usages of psychotherapy. **[6]**

OR

Explain the key elements and three steps involved in systematic desensitization.

b) What are the process and purposes of dance therapy. **[4]**

Q5) Write a short notes on any four of the following. **[10]**

a) Goals of family therapy

b) Types of eastern therapies

c) Multimodal Psychotherapy

d) History of mindfulness

e) Advantages of Aversive therapy

f) Application of psychoanalytic therapy

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Total No. of Questions : 5]

SEAT No. :

P-1259

[Total No. of Pages : 2

[6054]-623

T.Y. B.Sc.

PSYCHOLOGY

SEC-I: Basic Therapeutic Skills

(2019 Pattern) (Semester - VI) (362010)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5***
3) ***Questions from 2 to 5 carry equal marks.***

Q1) Solve any Five of the following : **[5]**

a) Define active listening.

b) Define concreteness.

c) State any two objectives of Psychotherapy.

d) Name the types of empathy.

e) State the types of Communication.

f) State the types of thinking.

Q2) a) Explain the various effective lisening skills of therapist. **[6]**

OR

Describe the importance of critical thinking in psychotherapists.

b) What are the concern related to the therapist client relationship. **[4]**

Q3) a) Explain the techniques and factors influencing on psychotherapy. **[6]**

OR

Descibe the importance of genuineness skills among therapist.

b) Differentiate between reflecting and paraphrasing in counseling. **[4]**

P.T.O.

Q4) a) Explain the process and components of building rapport. **[6]**

OR

Describe the various key elements in interpretation skills of therapists.

b) Examine the challenges for setting boundaries in counselling. **[4]**

Q5) Write Short Notes on any four of the following : **[10]**

a) Components of Empathy.

b) Immediacy.

c) Advantages of Psychotherapy.

d) Therapeutic skills of counsellors.

e) Communication skills of therapists.

f) Clarifying questions skills.

Total No. of Questions : 5]

SEAT No. :

P-1260

[Total No. of Pages : 2

[6054]-624

T.Y. B.Sc.

PSYCHOLOGY

SEC- II : Soft Skills

(2019 Pattern) (Semester - VI) (362011)

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 from 2 to 5 carry equal marks.***

Q1) Solve any five of the following : **[5]**

a) Define Manner.

b) State the effective time management techniques.

c) Define hard skills.

d) Name the types of etiquettes.

e) Define Non-verbal communication.

f) What is formal communication?

Q2) a) Explain the benefits of active listening. **[6]**

OR

Describe the various obstacles in time management.

b) Justify the relationship between soft skills and success. **[4]**

Q3) a) Illustrate the different types of soft skills. **[6]**

OR

Differentiate between social and official etiquettes.

b) Elaborate the process of goal setting. **[4]**

P.T.O.

Q4) a) Describe the various types and component of interview etiquettes. **[6]**

OR

Distinguish between formal and informal communication.

b) Examine the effective time management scheduling. **[4]**

Q5) Write short notes on (Any four) : **[10]**

a) Process of communication.

b) Telephone etiquettes.

c) Nature of soft skills.

d) Importance of soft skills.

e) Benefits of goal setting.

f) Body language.

▽▽▽▽

Total No. of Questions: 5]

SEAT No. :

P-1261

[Total No. of Pages : 2

[6054]-625
T.Y. B.Sc. (Regular)
ENVIRONMENTAL SCIENCE
EVS-361: Aquatic Ecosystem and Management
(2019 Pattern) (Semester-VI) (Paper-I) (36241)

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) ***Question No. 2 to Question No. 5 carry equal marks.***

Q1) Attempt any Five of the following.

a) Define the term Aquatic Ecosystem Management. **[1]**

b) Enlist Ramset sites of India. **[1]**

c) Define Limiting factor & write few examples . **[1]**

d) What are planktons? Write one example. **[1]**

e) Differentiate between Species & Ecosystem biodiversity. **[1]**

f) Define wetlands. **[1]**

Q2) Answer the following.

a) Describe any one method of Aquatic ecosystem sampling. **[6]**

b) Explain the need to conserve wetlands. **[4]**

Q3) Answer the following.

a) Describe the zonation in Marine ecosystem. **[6]**

b) Explain the ecological significance of Mangrove vegetation. **[4]**

Q4) Answer the following.

a) Explain in detail about Estuarine ecosystem. **[6]**

b) Discuss the importance of G/S technology in conservation of aquatic resources. **[4]**

P.T.O.

Q5) Write short notes on Any Four of the following. **[10]**

a) Write the negative impacts of tourism.

b) Define coral bleaching. Write its causes.

c) Write about the types of communities found in aquatic ecosystems.

d) Enlist the ecosystem services of wetlands .

e) Mention any five characteristics of ecotourism.

f) Explain how climate change is affecting coral reefs?

Total No. of Questions : 5]

SEAT No. : ____

P1262

[Total No. of Pages : 2

[6054]-626

T.Y. B.Sc. (Semester - VI)

ENVIRONMENTAL SCIENCE

EVS 362 : Nature Conservation

(2019 Pattern) (Paper - II) (36242)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Q2 to Q5 carry equal marks.***

Q1) **Solve any five of the following :** **[5]**

a) What is mean by Biosphere reserve?

b) What are the four biodiversity hotspots in India?

c) What is IUCN?

d) What does mean by seed banks?

e) What is in-situ conservation?

f) What is the role of BNHS?

Q2) **Answer the following :**

a) What are various objectives of nature conservation? **[6]**

b) Write in brief about SPCB. **[4]**

P.T.O.

Q3) **Answer the following :**

a) Importance of awareness in nature conservation - write in detail. **[6]**

b) What are the functions of MOEFCC? **[4]**

Q4) **Answer the following :**

a) Explain various roles of IUCN in nature conservation. **[6]**

b) Explain administrative setup of CPCB. **[4]**

Q5) **Write a short note on any four of the following :**

a) National park. **[2½]**

b) Importance of WWF. **[2½]**

c) Wildlife sanctuaries. **[2½]**

d) Field gene banking. **[2½]**

e) Whaling mission. **[2½]**

f) Ex-situ conservation. **[2½]**

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Total No. of Questions : 5]

SEAT No. :

P-1263

[Total No. of Pages : 2

[6054]-627

T.Y.B.Sc. (Regular)

ENVIRONMENTAL SCIENCE

EVS - 363 : Air and Noise Quality

(2019 Pattern) (Semester - VI) (Paper - III) (36243)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) *Q.1 is compulsory.*
2) *Solve any three questions from Q.2 to Q.5.*
3) *Questions from 2 to 5 carries equal marks.*

Q1) Solve any FIVE of the following. **[5]**

a) Define the term Atmosphere.

b) Enlist the major air pollutants found in urban air.

c) Define the term sound power and sound Intensity.

d) Enlist various instruments used to measure sound levels.

e) Define the term noise quality standards.

f) What is meant by stack gas sampling.

Q2) a) Write short note on causes and effects of Noise Pollution on human health. **[6]**

b) Explain the principle and working of gravity setting chamber with a neat labelled diagram. **[4]**

Q3) a) Write a short note on Indoor air pollution. **[6]**

b) Explain the effects and control measures of global warming. **[4]**

Q4) a) Explain the effects of Air pollution on human health, plants, materials and other organisms. **[6]**

b) Write a short note on status of air pollution in India. **[4]**

P.T.O.

Q5) Write short note on Any Four of the following. **[10]**

a) Annoyance Rating Scheme.

b) Advantages of Fabric filters.

c) Air Quality Index (AQI) and Air Pollution Tolerance Index (APTI).

d) El-Nino and la-Nina phenomena.

e) Noise Indices.

f) Effects of Ozone layer depletion on environment and human health.

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Total No. of Questions : 5]

SEAT No. :

P-1265

[Total No. of Pages :2

[6054]-629
T.Y. B.Sc. (Environmental Science)
EVS - 365 : ENVIRONMENTAL GOVERNANCE : EMS,EIA & ISO - 14000
(2019 Pattern) (Semester - VI) (Paper - V) (36245)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Answer any three questions from Question Q.2 to Q.5***
3) ***Question Q.2 to Q.5 carry equal marks.***

Q1) **Attempt any five of the following :**

a) Write any 2 benefits of Environment Audit. **[1]**

b) Define Environmental Governance. **[1]**

c) Enlist any 4 methods of data collection in EIA. **[1]**

d) What is ISO/207 TC function. **[1]**

e) Write any 2 benefits of EMP. **[1]**

f) Write any 2 disadvantages of EIA. **[1]**

Q2) **Answer the following :**

a) Write the Benefits & objectives of Environmental Audit. **[6]**

b) Explain the Attributes of Environmental Governance. **[4]**

Q3) **Answer the following :**

a) Discuss the Issues and challenges of Environmental Governance. **[6]**

b) Write a note on cost-benefit analysis. **[4]**

P.T.O.

Q4) **Answer the following :**

a) Draw a neat labelled diagram of step of EIA and explain the process of EIA. **[6]**

b) Explain the benefit and scope of ISO 14000. **[4]**

Q5) **Write a Short note on Any four of the following : (10 Marks)**

a) Environment management system **[2½]**

b) Life cycle Assessment **[2½]**

c) Public participation **[2½]**

d) Elements of Governances **[2½]**

e) Network method **[2½]**

f) Audit report preparation **[2½]**

Total No. of Questions : 5]

SEAT No. :

P1266

[Total No. of Pages : 2

[6054]-630

T.Y. B.Sc. (Regular)

ENVIRONMENTAL SCIENCE

EVS-366 : ENVIRONMENTAL BIOTECHNOLOGY-II

(2019 Pattern) (Semester-VI) (Paper-VI) (36246)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

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

Q1) Attempt any FIVE of the following. **[5×1=5]**

a) What are the advantages of Bioremediation?

b) What is the role of biotechnology in pollutant remediation air, water and Soil?

c) What are coliforms in water?

d) Why PDA is used for fungus?

e) What affects the efficiency of bioteaching?

f) What are xenobiotics also called?

Q2) Answer the following.

a) What are the different types of biofilters for wastewater treatment. **[6]**

b) What bacteria is commonly tested in water analysis and why? **[4]**

Q3) Answer the following.

a) What is mean by phytoremediation. Explain in detail factors affecting on phytoremediation process **[6]**

b) How Xenobiotics are produced? **[4]**

P.T.O.

Q4) Answer the following.

a) Define biomethanation process with detail explanation and neat labeled diagram of design of digester. **[6]**

b) Which agar is used for plate count? **[4]**

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

a) Activated sludge

b) Biofilm reactors

c) Biosorption of metals

d) Problems in Biomethanation

e) Phyto-valatilization

f) Biotechnological approach to address environmental problems.

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Total No. of Questions : 5]

SEAT No. :

P-1267

[Total No. of Pages : 2

[6054]-631

T.Y. B.Sc.

ENVIRONMENTAL SCIENCE

EVS-3613: Solid Waste Management

(2019 Pattern) (Semester - VI) (362410)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

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

Q1) Attempt any FIVE of the following :

a) What is biomedical waste? **[1]**

b) Which techniques used for disposal of hazardous waste? **[1]**

c) What is effluent treatment plant? **[1]**

d) Define aerobic treatment for waste management. **[1]**

e) What is Refuse Derived fuel? **[1]**

f) What are the types of industrial waste? **[1]**

Q2) Answer the following :

a) Discuss the drawbacks in waste management techniques. **[6]**

b) What are the effects of landfill leachate on soil and ground water. **[4]**

Q3) Answer the following :

a) Describe the effects of solid waste on water quality and aquatic life. **[6]**

b) What are the green techniques for waste treatment/management? **[4]**

P.T.O.

Q4) Answer the following :

a) Discuss the different waste to energy recovery processes. **[6]**

b) Write note on waste management hierarchy. **[4]**

Q5) Write a short note on Any Four of the following : **[10]**

a) Hazardous waste. **[2½]**

b) Transportation of solid waste. **2½]**

c) Stack emission monitoring. **2½]**

d) 4R's for waste management. **2½]**

e) Composting. **2½]**

f) Integrated waste management. **2½]**

Total No. of Questions : 5]

SEAT No. :

P-1268

[Total No. of Pages :2

[6054]-632
B.Sc. (Environmental Science)
EVS - 3614 : URBAN ECOSYSTEM
(2019 Pattern) (Semester - VI) (Paper - XI) (362411)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

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

Q1) Attempt any five of the following :

a) What is example of commodification of nature. **[1]**

b) Define resource consumption. **[1]**

c) What are the main causes of urban pollution. **[1]**

d) Define urban dwelling. **[1]**

e) Enlist any three types of poverty. **[1]**

f) Where the energy used in urban areas. **[1]**

Q2) Answer the following :

a) What are the principle and objectives of urban environment managment. **[6]**

b) What is importance of town planning. **[4]**

Q3) Answer the following :

a) In brief explain the commodification of land. **[6]**

b) What is ecological principle in urban planning. **[4]**

P.T.O.

Q4) Answer the following :

a) What is public space in sustainable urban development. **[6]**

b) What are the four stages of urban planning. **[4]**

Q5) Write a short note on any four of the following : **[10]**

a) Objectives of smart city. **[2½]**

b) Changes of sustainability. **[2½]**

c) Characterstics of urban sprawl. **[2½]**

d) Causes of sinking city. **[2½]**

e) Bad effects of slum **[2½]**

f) Relation between urbanization and infrastructure. **[2½]**

Total No. of Questions: 4]

SEAT No. : ____

P1269

[Total No. of Pages :1

[6054]-633
T.Y. B.Sc. (Regular)
DEFENCE STUDIES
DS 601 : Armed Forces and Disaster Management
(2019 Pattern) (Semester-VI) (36231)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) Define the following questions. **[5]**

a) What do you mean by security?
b) What does environmental science do?
c) State the Meaning of Natural Disaster.
d) State the Meaning of Man made Disaster.
e) State the role of the Armed Forces in Rescue Operations.

Q2) Write short notes on (any two) **[10]**

a) Industrial Disaster
b) NDRF
c) NGO

Q3) Attempt the following questions (any two) **[10]**

a) What is security and give the example?
b) Explain the Importance of Team-Building in Disaster Management.
c) State the Emerging Trends in Disaster mitigation.

Q4) Answer in details (any one) **[10]**

a) What are the principles of disaster preparedness?
b) Explain the organizational Structure for Disaster preparedness.

Total No. of Questions : 4]

SEAT No. :

P-1270

[Total No. of Pages : 1

[6054]-634
T.Y. B.Sc. (Semester - VI)
DEFENCE AND STRATEGIC STUDIES
DS 602 : United Nation Organization Part - II
(2019 Pattern) (36232)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) Define the following questions. **[5]**

a) What is an example of collective security?

b) What is the highest function of the UN?

c) Define Arms control.

d) State the Function of Trusteeship Council.

e) State the role of India in the UN.

Q2) Write short notes on (any two) : **[10]**

a) General Assembly.

b) ICJ

c) UDHR

Q3) Attempt the following questions (any two) : **[10]**

a) UN Role in Human rights.

b) What is the main purpose of UDHR?

c) State the Future Threats in Globalization.

Q4) Answer in details (any one) : **[10]**

a) What are the functions of the Economic and Social Council?

b) Explain the Origin of the UN.

Total No. of Questions : 4]

SEAT No. :

P1271

[Total No. of Pages : 1

[6054]-635
T.Y.B.Sc. (Regular)
DEFENCE STUDIES
DS - 603 : International Relation Part - II
(2019 Pattern) (Semester - VI) (36233)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) Define the following questions. **[5]**

a) What is the best definition of state?
b) Define Nation State.
c) What is the best definition of Nation?
d) Define Sovereignty.
e) State the Function of Nonalignment.

Q2) Write short notes on (any two). **[10]**

a) Liberalisms.
b) Normative Approaches.
c) Feminist Theories.

Q3) Attempt the following questions (any two). **[10]**

a) What is the importance of international relations?
b) Explain the Traditional Approaches in International Relations.
c) Scientific Approaches in International Relations.

Q4) Answer in details (any one). **[10]**

a) Explain the role of the Economic and Social Council.
b) What are the types of international relations?

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Total No. of Questions : 4]

SEAT No. : ____

P1272

[Total No. of Pages : 2

[6054]-636

T. Y. B. Sc.

DEFENCE AND STRATEGIC STUDIES

Counter Terrorism

(2019 Pattern) (Semester - VI) (36234)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) Define the following questions. **[5×1=5]**

a) What is intelligence and counter terrorism?.

b) What's the definition for military?

c) Define paramilitary.

d) State the role of media in counter Terrorism.

e) Define international community.

Q2) Write short notes on (any two) **[10]**

a) Counter Terrorism

b) Law Enforcement Mechanism

c) International Community

Q3) Attempt the following questions (any two) **[10]**

a) Explain the Counter Terrorism in Jammu and Kashmir.

b) What are the measures to counter terrorism?

c) State the Role of Military in Counter Terrorism.

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Q4) Answer in details (any one) **[10]**

a) Explain the Role of Paramilitary in Counter Terrorism.

b) What is the difference between military and Army?

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Total No. of Questions : 4]

SEAT No. :

P-1273

[Total No. of Pages : 2

[6054]-637

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS-606 (A) : Major Global Conflict - II

(2019 Pattern) (Semester - VI) (36236A)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) Define the following questions : **[5 × 1 = 5]**

a) Why are environmental issues important?
b) Define Conflict.
c) What is the meaning of safety and security?
d) Define Global Conflict.
e) Define Neighbors.

Q2) Write short notes on (any two) : **[10]**

a) Global Warming
b) Pollution
c) Indian ocean

Q3) Attempt the following questions (any two) : **[10]**

a) What is the nuclear deal between India and the US?
b) Explain the India China Conflict Historical Background.
c) State the Galwan Valley Conflict.

Q4) Answer in details (any one) : **[10]**

a) Describe the Iran USA Conflict.
b) Explain the Environmental Issue.

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P.T.O.

Total No. of Questions : 4]

P-1273

[6054]-637

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS-606 (B) : Regional Security System - II

(2019 Pattern) (Semester - VI) (36236B)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) Define the following questions : **[1 × 5 = 5]**

a) Write the quad countries name.
b) Write the SCO countries name.
c) How many countries are BRICS?
d) How many countries are BIMSTEC?
e) Write the full form UE.

Q2) Write short notes on (any two) : **[10]**

a) Structure of BRICS
b) Structure of SCO
c) Origin of BIMSTEC

Q3) Attempt the following questions (any two) : **[10]**

a) What is the main purpose of BIMSTEC?
b) What is the main purpose of BRICS?
c) What is the main purpose of QUAD?

Q4) Answer in details (any one) : **[10]**

a) Explain the structure, Objectives of QUAD.
b) State the Origin and Development of BIMSTEC.

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Total No. of Questions : 4]

SEAT No. :

P1274

[Total No. of Pages : 2

[6054]-638
T.Y. B.Sc. (Regular)
DEFENCE AND STRATEGIC STUDIES
DS 607 (A) : India's Maritime Security-II
(2019 Pattern) (Semester-VI) (36237A)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) Define the following questions. **[5×1=5]**

a) Define Maritime Security.

b) How do you determine maritime boundaries?

c) What are the four maritime zones?

d) Define Environment.

e) Define Naval Strategies.

Q2) Write short notes on (any two). **[10]**

a) Maritime Security

b) Maritime Strategy

c) Indian Ocean

Q3) Attempt the following questions (any two). **[10]**

a) Explain the Impact of Superpower Rivalries in the Indian Ocean on India's Maritime Security.

b) Explain the Maritime Security Strategy under British-Indian Era.

c) What is an example of a maritime boundary?

Q4) Answer in details (any one). **[10]**

a) What is the classification of maritime boundaries?

b) Describe in detail the Strategic Culture of the Indian Ocean.

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Total No. of Questions : 4]

P1274

[6054]-638
T.Y. B.Sc. (Regular)
DEFENCE AND STRATEGIC STUDIES
DS 607 (B) : Peace and Conflict Studies-II
(2019 Pattern) (Semester-VI) (36237B)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) Define the following questions. **[5×1=5]**

a) Define peace.
b) Define conflict.
c) What is the purpose of security?
d) Why is peace building important?
e) Define Conflict Studies.

Q2) Write short notes on (any two). **[10]**

a) Peace Studies
b) Outcomes of Conflict
c) Types of security

Q3) Attempt the following questions (any two). **[10]**

a) What is the concept of peace building?
b) State the Nature and Impact of Peace.
c) What is the benefit of security?

Q4) Answer in details (any one). **[10]**

a) How do you promote peace building?
b) Explain the U.N. System: Methods of Pacific Settlements of Disputes.

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Total No. of Questions : 4]

SEAT No. :

P-1275

[Total No. Of Pages : 2

T.Y.B.Sc.[6054]-639
(DEFENCE AND STRATEGIC STUDIES)
DS 608(A) Indian Military History (1947-2020)
(Semester-VI) (2019 Pattern) (36238A)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) **Define the following questions:** **[5 × 1 = 5]**

i) Define Military

ii) What is the best definition of history?

iii) What do you mean by military history?

iv) What was the first military in history?

v) Define Security.

Q2) **Write short notes on (any two)** **[10]**

i) Indo-Pak War of 1947.

ii) India-China war of 1962.

iii) Real hero of 1965 war.

Q3) **Attempt the following questions (any two)** **[10]**

i) Why is military history important?

ii) Explain the Causes of 1962 India-China war

iii) What happened in 1965 Pak-Indo war?

Q4) **Answer in details (any one)** **[10]**

i) Explain in detail the Effect of the 1962 war.

ii) What is known as history?

P.T.O

Total No. of Questions : 4] **[6054]-639**

T.Y.B.Sc. (DEFENCE AND STRATEGIC STUDIES)
DS 608(B) British Indian Military History
(Semester-VI) (2019 Pattern) (36238B)

[Max. Marks : 35

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) **Define the following questions:** **[5 × 1 = 5]**

i) Define Military History.

ii) What do you mean by nationalism?

iii) Define Swadeshi Movements

iv) Define Revolt.

v) What was Gandhian nationalism?

Q2) **Write short notes on (any two)** **[10]**

i) British Indian Military History.

ii) Modern India

iii) Quit India Movement

Q3) **Attempt the following questions (any two)** **[10]**

i) Explain the Revolutionary Movements in India.

ii) What is nationalism and its example?

iii) State the Impact of the rule of East India company.

Q4) **Answer in details (any one)** **[10]**

i) Explain in detail the Consequences of the 1857 revolt.

ii) What are the characteristics of Gandhian nationalism?

Total No. of Questions : 4]

SEAT No. :

P-1276

[Total No. of Pages :2

[6054]-640
T.Y.B.Sc. (Semester - VI)
DEFENCE AND STRATEGIC STUDIES
DS - 609(A) : Cold war and Post Cold War (1945 - 1991)
(2019 Pattern) (36239(A))

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) Define the following questions : **[5 × 1 = 5]**

a) What is the true meaning of war?

b) What was the cold war?

c) Define post cold war?

d) Define Defence

e) Define security.

Q2) Write short notes on (any two) **[10]**

a) War

b) Cold war

c) Post cold war

Q3) Attempt the following questions (any two) **[10]**

a) Explain the meaning and concept of the cold war.

b) Explain the causes of the cold war.

c) How did the cold war impact the world?

Q4) Answer in details (any one) **[10]**

a) Explain in details the first phase of the cold war 1946 - 1953.

b) What happened in the post-cold war?

P.T.O.

Total No. of Questions : 4]

P-1276

[6054]-640
T.Y.B.Sc. (Semester - VI)
DEFENCE AND STRATEGIC STUDIES
DS - 609(B) : India's Defence Policy
(2019 Pattern) (36239(B))

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) Define the following questions : **[5 × 1 = 5]**

a) What is the best meaning of policy?

b) What do you mean by defence policy?

c) Define defence collaboration.

d) Define defence.

e) Define security.

Q2) Write short notes on (any two) **[10]**

a) Defence policy.

b) Defence collaboration.

c) Make in India.

Q3) Attempt the following questions (any two) **[10]**

a) What are the principles under the national defence policy?

b) Explain the elements of defence policy.

c) What is policy and its types?

Q4) Answer in details (any one) **[10]**

a) Explain in detail India's defence policy from 1947-1962.

b) Does India have a national defence policy.

Total No. of Questions : 4]

SEAT No. :

P1277

[Total No. of Pages : 1

[6054]-641

T.Y.B.Sc. (Regular)

DEFENCE AND STRATEGIC STUDIES

DS - 610 : Introduction to Cyber Security/Information Security

(2019 Pattern) (Semester - VI) (362310)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) Define the following questions. **[5 × 1 = 5]**

a) Define media.

b) Define cyber.

c) What is the best definition of information?

d) What does vulnerability mean?

e) Define threat modelling.

Q2) Write short notes on (any two). **[10]**

a) Security Password.

b) Cyber security.

c) Transmission media.

Q3) Attempt the following questions (any two). **[10]**

a) Explain the types of networking.

b) What is meant by a secure network?

c) Describe basic communication systems.

Q4) Answer in details (any one). **[10]**

a) What are cyber threats explain with examples?

b) Explain in detail Basics of threat and vulnerability.

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Total No. of Questions : 4]

SEAT No. :

P1278

[Total No. of Pages : 1

[6054]-642
T.Y.B.Sc. (Regular)
DEFENCE STUDIES
DS - 611 : Human Rights and India
(2019 Pattern) (CBCS) (Semester - VI) (362311)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) Define the following questions. **[5 × 1 = 5]**

a) Define Human rights.

b) Who is the current National Commission for Women?

c) State the fundamental rights.

d) Explain the role of the national human right commission.

e) Who gives the concept of Sarvodaya?

Q2) Write short note on (any two). **[10]**

a) Human rights.

b) National Human rights commission.

c) National commission for schedule caste and schedule tribes.

Q3) Attempt the following questions (any two). **[10]**

a) Explain a brief look at various aspects of human rights in India.

b) What are the basic principles of human rights?

c) Explain in detail judicial organs on an international level.

Q4) Answer in details (any one). **[10]**

a) Explain the national Human Rights Commission of India.

b) Explain in detail Maharashtra State Commission for Protection of Child Rights.

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Total No. of Questions : 5]

SEAT No. :

P-1279

[Total No. of Pages : 2

[6054]-643

T.Y. B.Sc. (Vocational)

BIOTECHNOLOGY

VBT - 321 : Biotechnology in Agriculture and Environment

(2019 Pattern) (CBCS) (Semester - VI) (36571)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q.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) Enlist any two organisms involved in hydrogen gas production.

b) What is meant by Xenobiotics?

c) Name the two important types of bioremediation.

d) Enlist the selective media used for culturing phosphate solubilizers.

e) Write any one feature of an ideal biosensor.

f) Give any one application of phytoremediation.

Q2) a) Answer any two of the following : **[6]**

i) What is herbicide? Explain the process of biodegradation of atrazine.

ii) Describe the mechanism of action of Cry protein on the insect digestive system.

iii) What do you understand by biosensors? Give the role of transducer and biological component in biosensors.

b) Explain any one genetically modified plant in detail. **[4]**

OR

Give any four features of Azolla - Anabaena as biofertilizers. **[4]**

P.T.O.

Q3) a) Write short note on <u>any one</u> of the following : **[6]**

i) Process of bioethanol production.

OR

ii) Phytodegradation.

b) What is bioremediation. Explain any one ex-situ method of bioremediation. **[4]**

OR

Give any four features of <u>Rhizobium</u>. **[4]**

Q4) a) Answer <u>any two</u> of the following : **[6]**

i) Write any three applications of biosensors.

ii) Explain the stages involved in biogas production.

iii) Write any two applications of bioremediation. Enlist any two methods of in-situ bioremediation.

b) Give any three features of <u>Azotobacter</u>. Give any two advantages of <u>Azotobacter</u> as biofertilizer. **[4]**

OR

Define hyper accumulators. What are phytochelatins and metallothioneins? Give their role in phytoextraction. **[4]**

Q5) Write short notes on <u>any four</u> of the following : **[10]**

a) Antisense RNA technology.

b) Advantages of biopesticides.

c) Phosphate solubilizers.

d) Leghemoglobin.

e) Applications of phytoremediation.

f) Effects of Chemical Pesticides on environment.

Total No. of Questions : 5]

SEAT No. :

P-1280

[Total No. of Pages : 2

[6054]-644

T.Y. B.Sc. BIOTECHNOLOGY (Vocational)

VBt-322: Bio-entrepreneurship and Biotechnology for Health

(2019 Pattern) (Semester - VI) (36572)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

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

Q1) Answer the following : **[5]**

a) Give any two applications of biotechnology in healthcare.

b) What is meant by project formulation?

c) What is measure of nanoscale?

d) Enlist any two criteria for product selection.

e) Name any one enzyme used in regenerative medicine.

f) Give any function of IBC.

Q2) a) Answer any Two of the following : **[6]**

i) Enlist and explain different types of entrepreneurs.

ii) Explain the role of Biotechnology in Healthcare.

iii) What is DIC? Explain role of DIC in promoting business.

b) Answer any One of the following : **[4]**

i) Explain in detail ICICI as financial institution.

ii) Explain in detail components and role of IAEC.

P.T.O.

Q3) a) Answer any Two of the following : **[6]**

i) What is role of Market Survey in business development?

ii) What are major advancements made in Nanomedicine?

iii) Explain role of personalized medicine in Healthcare.

b) Answer any One of the following : **[4]**

i) What are different skills and attributes of an entrepreneurs?

ii) Explain scope and concept of bioentrepreneurship.

Q4) a) Answer any Two of the following : **[6]**

i) What are biomedical devices. Give its applications.

ii) What are co-operative orgnisations? Explain any one co-operative organisations.

iii) What are Liposomes and Michelles in Nanobiotechnology. Give its applications.

b) Answer any One of the following : **[4]**

i) What are properties and applications of stem cells.

ii) Comment on FDA as Government Regulatory Authority.

Q5) Write short notes on the following (Any Four) : **[10]**

a) Tissue Engineering.

b) Generalized medicine.

c) MIDC.

d) Disadvantages of Nanomedicines.

e) Joint Stock Company.

Total No. of Questions : 5]

SEAT No. :

P-1281

[Total No. of Pages : 2

[6054]-645

T.Y. B.Sc. (Vocational)

SEED TECHNOLOGY

ST - 3.4 : Seed Farm Management, Processing and Storage

(2019 Pattern) (CBCS) (2 Credits) (Semester - VI) (36891)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Que.2 to Que.5.***
3) ***Questions 2 to 5 carry equal marks.***

Q1) Solve any five of the following : **[5]**

a) Define farm business.

b) Give any 2 objective of seed farm management.

c) Define seed.

d) What is Seed storage?

e) Define Seed treatment.

f) What is seed processing?

Q2) Attempt the following questions.

a) Give the uses of farm management as personal matter. **[6]**

b) Draw the basic flow pattern in seed processing plant & explain it. **[4]**

Q3) Attempt the following questions.

a) What is need of seed treatment? **[6]**

b) Draw the basic flow pattern in seed processing plant. **[4]**

P.T.O.

Q4) Attempt the following questions.

a) What is seed cleaning? Explain it details. **[6]**

b) Write a note on storage containers. **[4]**

Q5) Write short notes on <u>any four</u> of the following : **[10]**

a) In-list types of layouts.

b) In-list bagging methods.

c) Write a note on panogen Seed treter

d) In-list storage containers.

e) An Introduced the farm management.

f) In-list the factors which are affecting the seed storage.

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Total No. of Questions : 5]

SEAT No. :

P-1282

[Total No. of Pages : 2

[6054]-646

T.Y. B.Sc. (Vocational)

SEED TECHNOLOGY

ST-3.5: Biotechnology and Intellectual Property Rights

(2019 Pattern) (Semester - VI) (CBCS) (2 Credits) (36892)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

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

Q1) Solve any ***five*** of the following : **[5]**

a) What is Callus?

b) Define Transgenic.

c) Which medium is used for Banana culture?

d) What is a Recombinant DNA technique?

e) Which chemicals are used in production of artificial seed?

f) What is Inoculation?

Q2) Attempt the following questions :

a) Explain Embryogenesis. **[6]**

b) Give the scope of Biotechnology. **[4]**

Q3) Attempt the following questions :

a) Explain Caulogenesis? **[6]**

b) Explain tissue culture technique in Banana. **[4]**

P.T.O.

Q4) Attempt the following questions :

a) Explain PCR technique. **[6]**

b) Explain Embryo culture technique. **[4]**

Q5) Write short notes on any **Four** of the following : **[10]**

a) Scope of Biotechnology.

b) Application of Transgenics.

c) Rights of patentee.

d) Western Blotting.

e) Need of intellectual property rights.

f) Artificial seed.

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Total No. of Questions : 5]

SEAT No. :

P-1283

[Total No. of Pages : 2

[6054]-647
T.Y. B.Sc. (Semester - VI)
INDUSTRIAL MICROBIOLOGY
IMB-365 : Bio-entrepreneurship and Intellectual Property Rights
(2019 Pattern) (CBCS) (36825)

Time : 2 Hours] *[Max. Marks : 35*

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.***

Q1) Attempt any five : **[5]**

a) Define IPR

b) Define Patent.

c) What is trademark?

d) What is WIPO?

e) What is WTO?

f) Define Entrepreneurship.

Q2) a) Attempt any two of the following : **[6]**

i) Write note on attributes and skills of entrepreneurship

ii) Describe Entrepreneurial behaviour

iii) Elaborate need of entrepreneurship

b) Draw flow chart of Entrepreneurial process. **[4]**

P.T.O.

Q3) a) Attempt any two of the following : **[6]**

i) Describe biotechnology industry commercialization for drug

ii) Write note on sole proprietorship

iii) Describe diagnostic companies with respect to translational biotechnology industry.

b) Explain theories of Intellectual property Rights. **[4]**

Q4) a) Attempt any two of the following : **[6]**

i) Describe startup-Biotechnology business models.

ii) What is corporate structure in start up business?

iii) Describe scope of marketing in startup business.

b) Write note on Digital marketing. **[4]**

Q5) Describe in short any four of the following : **[10]**

a) Funding organizations in Business.

b) Role of organizations in promoting entrepreneurship.

c) Business funding banks.

d) Role of co-operative societies in funding process for business.

e) Marketing channels in starting business.

f) Role of Government in business fundings.

Total No. of Questions : 5]

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T.Y. B.Sc. (Vocational)

INDUSTRIAL MICROBIOLOGY

IMB-366: Recombinant DNA Technology

(2019 Pattern) (CBCS) (Paper - VI) (Semester - VI) (36826)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Q1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Q2 to Q5 carry equal marks.***

Q1) Solve any **five** of the following : **[5]**

a) Draw the structure of ddNTP.

b) Draw Vector map for BAC.

c) What is CDNA library?

d) What is BAMH1?

e) Sanger sequencing is also known as _____.

f) What is Reverse transcriptase?

Q2) a) Solve any two of the following : **[6]**

i) What is Blue-white screening?

ii) Explain Maxam & Gilbert sequencing technique.

iii) What is micro array?

b) Explain site directed mutagenesis. **[4]**

P.T.O.

Q3) a) Solve <u>any two</u> of the following : **[6]**

i) Explain diagrammatically Replica plate technique.

ii) Discuss Bacteriophages as vector in RDT.

iii) Explain DNA Polymorphisms.

b) Describe DNA Fingerprinting. **[4]**

Q4) a) Solve <u>any two</u> of the following : **[6]**

i) Short note on impact of RDT on Human Genome project.

ii) Write a short note on Development of human insulin.

iii) Explain Real-time PCR with help of a diagram.

b) Enlist all steps of molecular cloning. **[4]**

Q5) Write short notes on (any Four) : **[10]**

a) Metagenomics.

b) Megaplasmids.

c) Sticky ends & Blunt ends.

d) Nucleases in RDT.

e) Fetal DNA Analysis.

f) Invitro packaging of viral vector.

Total No. of Questions : 5]

SEAT No. :

P1285

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T.Y.B.Sc. (Vocational) (Regular)
INDUSTRIAL MICROBIOLOGY
IMB - 3610 : Introduction to Bioinformatics
(2019 Pattern) (CBCS) (Semester - VI) (368210)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) *Question 1 is compulsory.*
2) *Solve any Three questions from Question No. 2 to Question No. 5.*
3) *Question No. 2 to Question No. 5 carry equal marks.*

Q1) Solve any five of the following: **[5]**

a) Write full form of EMBL.
b) Give an example of a search engine used in bioinformatics.
c) What is role of bioinformatician.
d) State an example of protein database.
e) What are orthologous sequences?
f) What is KEGG?

Q2) a) Solve any two of the following. **[6]**

i) What is the importance of sequence alignment?
ii) What is culture independent approach.
iii) Explain Global and local alignment.

b) Write short note on Genbank. **[4]**

Q3) a) Solve any two of the following. **[6]**

i) Explain applications of Bioinformatics.
ii) What is Homology modelling?
iii) Write note on FASTA.

b) Enlist and describe different data submission tools. **[4]**

Q4) a) Solve any two of the following. **[6]**

i) Discuss impact of bioinformatics on modern day science.
ii) What are primary databases? State examples.
iii) Write short note on curated and uncurated data.

b) Write a short note on scoring matrices used for alignment. **[4]**

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

a) MEGA.
b) NCBI.
c) BLAST.
d) Structure databases.
e) Multiple sequence alignment.
f) Role of Bioinformatics in sequence data analysis.

✡ ✡ ✡

Total No. of Questions : 5]

SEAT No. :

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T.Y. B.Sc. (Voc)

ENTREPRENEURSHIP DEVELOPMENT

(EEM365): Electronic Equipment Maintenance

(2019 Pattern) (Semester - VI) (CBCS) (36811) (Paper - V)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Question 2 to Question 5 carry equal marks.***

Q1) Solve any Five of the following : **[5]**

a) State two disadvantages of sole proprietorship.

b) State hours of work for adult female and male workers as per Factories Act 1948.

c) State two methods of market survey.

d) What is VAT?

e) Define SSI.

f) What is meant by term Fixed Capital?

Q2) a) Solve the following :

i) State first four sequential stages of project formulation. **[2]**

ii) Explain various types of entrepreneur. **[4]**

b) Discuss SWOT analysis. **[4]**

P.T.O.

Q3) a) Solve the following :

i) Comment on "Modern concept of marketing is consumer centric. **[2]**

ii) "Innovation is special tool for an entrepreneur". Comment. **[4]**

b) Explain characteristics of entrepreneur. **[4]**

Q4) a) Solve the following :

i) "Marketing channels have a vital role to play in distribution of consumer goods. Comment. **[2]**

ii) Explain relative merits & demerits of partnership. **[4]**

b) Explain any two pricing strategies. **[4]**

Q5) Attempt any four of the following : **[10]**

a) Discuss role of MIDC.

b) Discuss functions of DIC.

c) What are advantages of digital marketing?

d) Explain Breakdown point analysis.

e) Explain the meaning of technical feasibility of a project.

f) Discuss payment of Wages Act.

Total No. of Questions : 5]

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P-1287

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T.Y. B.Sc. (Vocational)

ELECTRONIC EQUIPMENT MAINTENANCE

EEM-366: Medical Instrumentation

(2019 Pattern) (CBCS) (Semester - VI) (Paper - VI) (36812)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Q1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Q2 to Q5 carry equal marks.***
4) ***Draw figures wherever necessary.***
5) ***Figures to the right indicate full marks.***

Q1) Attempt any FIVE of the following : **[5]**

a) What is the relatively static membrane potential of quiescent cells called?

b) What type of electrodes are required for an EEG signal?

c) What is defibrillation?

d) Classify the five bands of EEG analysis.

e) Give full form of CNS.

f) What is the use of jelly in ECG measurement?

Q2) Answer the following :

a) Describe in detail the different types of biomedical signals with their sources. **[6]**

OR

Explain in detail the block diagram of a biomedical instrumentation system.

b) Write a short note on the electrode tissue interface. **[4]**

P.T.O.

Q3) Answer the following :

a) Explain the different types of recorders used in writing systems. **[6]**

OR

Explain the 'reflex arc'.

b) Explain in detail the dispersion phenomenon in diffraction gratings. **[4]**

Q4) Answer the following :

a) Explain the effects of electric current on human body. **[6]**

OR

Explain leakage currents and the type of leakage currents.

b) Explain in detail the precautions that should be taken to minimise electric hazards. **[4]**

Q5) Write in short (Any 4) : **[10]**

a) Explain in detail the four types of ECG waves and draw their waveforms.

b) Discuss blood cell counter.

c) What are contact potentials.

d) Explain the measurement of skin contact impedance.

e) Write a short note on flame photometer.