

Total No. of Questions : 4]

SEAT No. :

PE-1232

[Total No. of Pages : 2

[6501]-1

T.Y. B.Sc.

MATHEMATICS

DSE-1A MT 351 : Metric Spaces

(2019 Pattern) (CBCS) (Semester - V) (35111)

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 non-programmable calculator is allowed.

Q1) Attempt any five of the following :

[5]

- a) Does $d(x, y) = (x^4 - y^4)$, $x, y \in \mathbb{R}$ defines a metric on $\mathbb{R}$?
- b) Find limit points of following subsets of $\mathbb{R}$ with usual metric
 - i) $\mathbb{Z}$
 - ii) $\mathbb{Q}^c$
- c) Is $B(x, r) = B(y, r)$ for $x \neq y$ in discrete metric space $\mathbb{R}_d$?
- d) Give an example of dense subset of $\mathbb{R}$.
- e) Define complete metric space with example.
- f) Check whether sequence $\left\{\frac{1}{n}\right\}$ is convergent in $(0, 1)$.
- g) Is $\mathbb{R}^* = \mathbb{R} \setminus \{0\}$ is connected?

Q2) a) Attempt any ONE of the following :

[5]

- i) Show that finite intersection of open sets in metric space (X, d) is open.
- ii) Let (X, d) be a metric space. Show that any convergent sequence in X is Cauchy sequence.

P.T.O.

- b) Attempt any ONE of the following : [5]
- Let (X, d) be a metric space. Define $\delta(x, y) = \min \{1, d(x, y)\}$
 $\forall x, y \in X$ then show that δ is metric on X .
 - Show that $d(x, y) = |x - y|$ defines a metric on $\mathbb{R}$.

- Q3) a)** Attempt any ONE of the following : [5]
- Let X, Y be metric spaces show that a map $f: X \rightarrow Y$ is continuous if for every closed subset V of Y , its inverse image $f^{-1}(V)$ is closed in X .
 - Prove that every convergent sequence in a metric space is bounded. Is converse true? Justify.

- b) Attempt any ONE of the following : [5]
- Let $\mathbb{R}$ be metric space with usual metric. Show that $f: \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = |x|$ is continuous.
 - Show that $\mathbb{Q}$ and $\mathbb{Q}^c$ are dense in $\mathbb{R}$.

- Q4) a)** Attempt any ONE of the following : [5]
- Show that any finite subset of metric space is compact.
 - If A and B are connected subsets of metric space X with $A \cap B \neq \emptyset$ then show that $A \cup B$ is connected.

- b) Attempt any ONE of the following : [5]
- Show that $\mathbb{R}$ is not compact with usual metric.
 - Show that the circle $\{(x, y) \in \mathbb{R}^2 / x^2 + y^2 = 1\}$ is connected.



Total No. of Questions : 4]

SEAT No. :

PE-1233

[Total No. of Pages : 2

[6501]-2
T.Y. B.Sc.
MATHEMATICS
DSE-1B : MT-352 : Real Analysis - I
(2019 Pattern) (Semester - V) (CBCS) (35112)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

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

- a) Let universe be the real numbers

Let $A = \{x \in \mathbb{R} / x > 0\}$, $B = \{x \mid -3 < x < 9\}$ and $C = \{x \mid x \leq 1\}$ then find $A \cap (B \cup C)$

- b) Whether the following statement is True or False? Justify your answer.

$$x > 0 \Leftrightarrow 2x > 0$$

- c) Find $\lim_{n \rightarrow \infty} \frac{1}{\sqrt{n+1}}$

- d) Define Cauchy sequence.

- e) Prove that $2 - 2^{1/2} + 2^{1/3} - 2^{1/4} + \dots$ diverges.

- f) Show that $\sum_{n=1}^{\infty} \frac{x^n}{n^n}$ converges, for all $x \in \mathbb{R}$

- g) Define conditional convergence.

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

- i) If S is a countable set and R is a subset of S then show that either R is empty or R is finite or R is countable.
- ii) Prove that the Set $S = \mathbb{N} \times \mathbb{N}$ of all ordered pair of positive integers is countable.

P.T.O.

- b) Attempt any one of the following : [5]
- Let Z be the set of all integers and N be the set of natural numbers then prove that $\text{card}(Z) = \text{card}(N)$.
 - Let A, B, C be sets, Prove that $C \setminus (A \cap B) = (C \setminus A) \cup (C \setminus B)$

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

- If $\{s_n\}_{n=1}^{\infty}$ and $\{t_n\}_{n=1}^{\infty}$ are sequences of real numbers if $\lim_{n \rightarrow \infty} s_n = L$ and $\lim_{n \rightarrow \infty} t_n = M$ then prove that $\lim_{n \rightarrow \infty} s_n \cdot t_n = L \cdot M$
- If $\{s_n\}_{n=1}^{\infty}$ and $\{t_n\}_{n=1}^{\infty}$ are bounded sequences of real numbers then $\lim_{n \rightarrow \infty} \text{Sup}(s_n + t_n) \leq \lim_{n \rightarrow \infty} \text{Sup} s_n + \lim_{n \rightarrow \infty} \text{Sup} t_n$

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

- Let $t_n = 1 + \frac{1}{1!} + \frac{1}{2!} + \dots + \frac{1}{n!}$. Prove that $\{t_n\}_{n=1}^{\infty}$ is non-decreasing, bounded and convergent.
- Suppose $\lim_{n \rightarrow \infty} \frac{s_n - 1}{s_n + 1} = 0$ then prove that $\lim_{n \rightarrow \infty} s_n = 1$

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

- If $\{a_n\}_{n=1}^{\infty}$ is non-increasing sequence of positive numbers and if $\sum_{n=1}^{\infty} a_n$ converges then $\lim_{n \rightarrow \infty} n \cdot a_n = 0$
- State and Prove Minkowski inequality.

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

- Show that $\sum_{n=0}^{\infty} x^n$ converges to $\frac{1}{1-x}$; if $0 < x < 1$ and diverges, if $x \geq 1$.
- Prove that the series $1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \dots$ converges absolutely, for any $x > 0$



Total No. of Questions : 4]

SEAT No. :

PE-1234

[Total No. of Pages : 2

[6501]-3
T.Y. B.Sc.
MATHEMATICS
DSE-2A-MT353 : Group Theory
(2019 Pattern) (CBCS) (Semester - V) (35113)

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) Find all subgroups of $\mathbb{Z}_7$.
- b) Show that union of subgroups need not be a subgroup.
- c) Find all cosets of the subgroup $4\mathbb{Z}$ of $2\mathbb{Z}$.
- d) Find the maximal possible order for an element of S_7 .
- e) Give an example of an abelian group which is not cyclic.
- f) Show by giving an example that a factor group of a non-abelian group may be abelian.
- g) List all the elements of $\mathbb{Z}_2 \times \mathbb{Z}_2$

Q2) a) Attempt any one of the following :

[5]

- i) Let G be a group and let $a \in G$, then prove that $H = \{a^n/n \in \mathbb{Z}\}$ is a subgroup of G .
- ii) Prove that a subgroup of a cyclic group is cyclic.

b) Attempt any one of the following :

[5]

- i) Compute the factor group $\frac{\mathbb{Z}_4 \times \mathbb{Z}_6}{\langle (0,1) \rangle}$.
- ii) List all subgroups of $\mathbb{Z}_{18}$ and draw its subgroup diagram.

P.T.O.

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

- i) State and prove Lagrange's theorem for groups.
- ii) Prove that every group is isomorphic to a group of permutations.

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

- i) Show that $\mathbb{Z}_p$ has no proper nontrivial subgroups if p is a prime number.
- ii) Let $\phi : \mathbb{Z} \rightarrow \mathbb{Z}_7$ be a group homomorphism such that $\phi(1) = \overline{4}$
 - A) Find $\phi(25)$.
 - B) Find $\ker \phi$.
 - C) To which group $\mathbb{Z}/\ker \phi$ is isomorphic.

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

- i) Show that M is maximal normal subgroup of G if and only if G/M is simple.
- ii) Let $\phi : G \rightarrow G'$ be a group homomorphism. Show that ϕ is one-to-one if and only if $\ker \phi = \{e\}$.

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

- i) Show that intersection of two subgroups of G is again a subgroup of G .
- ii) Let $\rho = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 3 & 8 & 4 & 1 & 7 & 6 & 9 & 2 & 5 \end{pmatrix} \in S_9$

Then1) Express ρ as product of disjoint cycles.

2) Express ρ as product of transpositions.

3) Determine whether ρ is odd or even permutation.

4) Find ρ^{-1}

5) Find order of ρ .



Total No. of Questions : 4]

SEAT No. :

PE-1235

[Total No. of Pages : 2

[6501]-4
T.Y. B.Sc.
MATHEMATICS
DSE-2B-MT-354 : Ordinary Differential Equations
(2019 Pattern) (Semester - V) (35114)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

Q1) Attempt any five of the following :

[5 × 1 = 5]

- a) Solve $y'' + 9y = 0$.
- b) Find general solution of Euler equation $x^2 y'' - 5xy' + 9y = 0$ on $(0, \infty)$
- c) Find particular integral of $(D^2 + 2)y = e^{2x}$.
- d) Rewrite the eqⁿ $x''' = f(t, x, x', x'')$ as a system of first order equation.
- e) State the principle of super position.
- f) Find singular points of the equation $(1 - x^2)y'' + 7xy' + 10y = 0$.
- g) Find the radius of convergence of the series $\sum_{n=0}^{\infty} n! x^n$.

Q2) a) Attempt any one of the following :

[5]

- i) Prove that $\frac{1}{F(\theta^2)} \sin(ax+b) = \frac{-x}{2a} \cos(ax+b)$, if $F(-a^2) = 0$.
- ii) Explain the method of variation of parameters to solve the equation $y'' + P(x)y' + Q(x)y = R(x)$.

b) Attempt any one of the following :

[5]

- i) Find the solution of $y'' - 7y' + 12y = 4e^{2x}$ by the method of undetermined coefficient.
- ii) Express $(2-x)y'' + 2y$ as a power series in x on open interval I that contains the origin.

P.T.O.

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

- i) Suppose that roots of the indicial equation are $(r-1) + br + c = 0$ are r_1 and r_2 , then the general solution of the Euler equation.

$ax^2y'' + bxy' + cy = 0$ on $(0, \infty)$ is $y = c_1x^{r_1} + c_2x^{r_2}$ if r_1 and r_2 are distinct real numbers; $y = x^{r_1}(c_1 + c_2 \ln x)$ if $r_1 = r_2$.

- ii) Find the general solution and a fundamental set of solution of $x^2y'' - 3xy' + 3y = 0$, given that $y_1 = x$ is a solution. —

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

- i) Find the general solution of $y' = \begin{bmatrix} 2 & 4 \\ 4 & 2 \end{bmatrix} y$.

- ii) Find a particular solution of $y'' + 3y' + 2y = \frac{1}{1+e^x}$. Then find the general solution.

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

- i) Solve $(D^3 - 3D^2 - 6D + 8)y = xe^{-3x}$

- ii) Find the general solution of $y' = \begin{bmatrix} 3 & 4 & -10 \\ 2 & 1 & -2 \\ 2 & 2 & -5 \end{bmatrix} y$.

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

- i) If $y_1 = \begin{bmatrix} y_{11} \\ y_{21} \end{bmatrix}$ and $y_2 = \begin{bmatrix} y_{12} \\ y_{22} \end{bmatrix}$ are solution of 2×2 system $y' = Ay$ on (a, b) then show that $c_1y_1 + c_2y_2$ is also a solution of system $y' = Ay$.

- ii) Compute $a_0, a_1, a_2, a_3, a_4, a_5$ in the series solution $y = \sum_{n=0}^{\infty} a_n x^n$ of the initial value problem $(1+2x^2)y'' + 10xy' + 8y = 0$, $y(0) = 2$, $y'(0) = -3$.



Total No. of Questions : 4]

SEAT No. :

PE-1236

[Total No. of Pages : 3

[6501]-5
T.Y. B.Sc.
MATHEMATICS
DSE-3A : MT-355(A) : Operations Research
(2019 Pattern) (Semester - V) (35115A)

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]

- i) What is the difference between standard form of LPP and canonical form of LPP?
- ii) Identify the direction of increase in Z of the function
Max $Z = -x_1 + 2x_2$.
- iii) Define slack variable and surplus variable.
- iv) Write the dual of the following LPP
Min $Z = 2x_1 + 9x_2 + x_3$
Subject to
$$x_1 + 4x_2 + 2x_3 \geq 5$$
$$3x_1 + x_2 + 2x_3 \geq 4$$
$$x_1, x_2, x_3 \geq 0$$
- v) Define unbalanced transportation problem.
- vi) Write the LP form of the following assignment problem

Jobs

	J ₁	J ₂	J ₃
Employee P ₁	7	6	3
Employee P ₂	9	1	4
Employee P ₃	3	6	9

- vii) Justify whether true or false : Assignment problem is a special case of the transportation problem.

P.T.O.

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

- i) Define Operations Research. Give limitations of O.R.
- ii) Explain the graphical method to solve linear programming problem.

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

- i) Consider the following LPP

$$\text{Max } Z = 2x_1 + 3x_2$$

Subject to

$$x_1 + 3x_2 \leq 6$$

$$3x_1 + 2x_2 \leq 6$$

$$x_1, x_2 \geq 0$$

A) Express the problem in equation form

B) Determine all the basic solutions of the problem and classify them as feasible and infeasible.

- ii) Solve the following LPP using graphical method

$$\text{Max } Z = 2x_1 + 3x_2$$

Subject to

$$2x_1 + x_2 \leq 4$$

$$x_1 + 2x_2 \leq 5$$

Such that $x_1, x_2 \geq 0$

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

- i) Explain north west corner method for finding initial basic feasible solution to transportation problem.
- ii) Write down assumptions for assignment problem.

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

- i) Find the initial basic feasible solution of the following transportation problem by VAM

	Destination				Supply
	D ₁	D ₂	D ₃	D ₄	
S ₁	25	55	40	60	60
Source S ₂	35	30	50	40	140
S ₃	36	45	26	66	150
S ₄	35	30	41	50	50
Demand	90	100	120	140	

- ii) Solve the following assignment problem for maximization.

		Worker			
		A	B	C	D
Job	I	12	15	17	14
	II	20	18	21	20
	III	15	16	22	18
	IV	19	18	19	16

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

- i) Write mathematical model for assignment problem to assign n-machines to n-jobs.
- ii) Explain canonical form of LPP for maximization.

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

- i) Solve the following LPP by using big-M method

$$\text{Max } Z = 3x_1 + 2x_2$$

Subject to

$$2x_1 + x_2 \leq 2$$

$$3x_1 + 4x_2 \geq 12$$

$$x_1, x_2 \geq 0$$

- ii) Obtain IBFS by least cost method of the following transportation problem

	Destination				Capacity
	D ₁	D ₂	D ₃	D ₄	
O ₁	1	2	3	4	6
Origin O ₂	4	3	2	0	8
O ₃	0	2	2	1	10
Demand	4	6	8	6	



Total No. of Questions : 4]

SEAT No. :

PE-1237

[Total No. of Pages : 2

[6501]-6

T.Y. B.Sc.

MATHEMATICS

DSE-3A MT 355(B) : Differential Geometry
(2019 Pattern) (CBCS) (Semester - V) (35115 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]

- a) Find the Cartesian equation of the parametric curve $r(t) = (e^t, t^2)$.
- b) Define curvature of a curve in $\mathbb{R}^3$.
- c) Show that second fundamental form of a plane is zero.
- d) State Frenet serret equations.
- e) Find parametric equation of unit sphere.
- f) Define smooth surface.
- g) Is the curve $\bar{\gamma}(t) = (\cos^2 t, \sin^2 t), -\infty < t < \infty$ regular? Justify.

Q2) a) Attempt any ONE of the following :

[5]

- i) Prove that a parametrised curve has a unit speed reparametrisation then it is regular.
- ii) State and prove isoperimetric inequality.

b) Attempt any ONE of the following :

[5]

- i) Is the curve $\gamma(t) = (t, \cos ht)$ for $-\infty < t < \infty$ regular? Find unit - speed reparametrisation of the curve.
- ii) Find the curvature of the circular helix $r(\theta) = (a \cos \theta, a \sin \theta, b\theta)$.

P.T.O.

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

- i) Prove that transition maps of smooth surface are smooth.
- ii) State and prove Wirtinger's inequality.

b) Attempt any ONE of the following : [5]

- i) Find the first fundamental form of the surface
 $\sigma(u, v) = (\sinh u \sinh v, \sinh u \cosh v, \sinh u)$
- ii) Determine the area of the part of the paraboloid $z = x^2 + y^2, z \leq 1$.

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

- i) Prove that the map f is equiareal.
- ii) State and prove Meusnier's theorem.

b) Attempt any ONE of the following : [5]

- i) Calculate principal curvature of helicoid
 $\sigma(u, v) = (v \cos u, v \sin u, \lambda u)$
- ii) Find equation of tangent plane of the surface $\sigma(r, \theta) = (r \cosh \theta, r \sinh \theta, r^2)$ at point $(1, 0, 1)$.



Total No. of Questions : 4]

SEAT No. :

PE-1238

[Total No. of Pages : 2

[6501]-7

T.Y. B.Sc.

MATHEMATICS

DSE-3A-MT 355 (C) : C-Programming

(2019 Pattern) (CBCS) (Semester - V) (35115C)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

Q1) Attempt any five of the following :

[5]

- a) What is difference between 3 and '3'.
- b) What is conditional operator?
- c) What is use of clrscr () function?
- d) Write syntax for do ____ while loop.
- e) Explain the meaning of following declaration :
`int a[2] = {7, 13};`
- f) Find the values of expression
 $20/7 + 20\% 7 + 20 * 2/3$
- g) Define variables in C.

Q2) a) Attempt any one of the following.

[5]

- i) Write short note on relational operator.
- ii) Write short note on conditional operator.

b) Attempt any one of the following.

[5]

- i) Write a C program to check whether given number is even or odd.
- ii) Write a C program to calculate sum of digits of an integer by using a recursion.

P.T.O.

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

- i) Compare conditional operator with if - else statement.
- ii) Write a short note on printf function.

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

- i) Write a C program to print the transpose of a matrix.
- ii) Explain the output generated by the following program.

```
#include <stdio.h>

main ()
{
    int a, b = 0;
    static int C[10] = {1,2,3,4,5,6,7,8,9,0};
    for ((a = 0; a < 0; ++a)
    if (a%2) == 0) b += c[a];
    Printf ("%a",b);
}
```

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

- i) Write a short note on two dimensional array.
- ii) Write a short note on goto statement.

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

- i) Define string with syntax and illustrations.
- ii) Write a C program to print the value of x for $f(x)$.

Where $f(x) = x^2$, if $x < 0$
 $= 25$, if $x = 0$
 $= e^x$, if $x > 0$



Total No. of Questions : 4]

SEAT No. :

PE-1239

[Total No. of Pages : 2

[6501]-8
T.Y. B.Sc.
MATHEMATICS
DSE-3B-MT-356 (B) : Number Theory
(2019 Pattern) (CBCS) (Semester - V) (35116 B)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

Q1) Attempt any five of the following :

[5 × 1 = 5]

- a) Define divisibility of two integers a and b.
- b) Define congruence relation modulo m on a and b.
- c) Evaluate $\phi(10)$.
- d) Find the value of $[3.5]$.
- e) Find reduced residue system modulo 7.
- f) Find the value of $\left(\frac{1}{5}\right)$
- g) Evaluate $\sigma(14)$

Q2) a) Attempt any one of the following :

[5]

- i) State and prove Division Algorithm theorem.
- ii) State and prove Fermat's theorem.

b) Attempt any one of the following :

[5]

- i) For $M \in \mathbb{Z}^+$, show that $(ma, mb) = m(a, b)$.
- ii) Show that $63! + 1 \equiv 0 \pmod{71}$

P.T.O.

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

i) For any positive real number x and y , show that

$$[x - y] \leq [x] - [y] \leq [x - y] + 1.$$

ii) If $b \equiv c \pmod{m}$, then show that $(b, m) = (c, m)$.

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

i) Find highest power of 3 dividing $200!$

ii) Find the value of $\left(\frac{-42}{61}\right)$.

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

i) If $f(n)$ is multiplicative function and $F(n) = \sum_{d|n} f(d)$, then show that $F(n)$ is also multiplicative.

ii) If p and q are distinct odd primes, then show that

$$\left(\frac{p}{q}\right)\left(\frac{q}{p}\right) = (-1)^{\left(\frac{p-1}{2}\right)\left(\frac{q-1}{2}\right)}.$$

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

i) Find all solutions of the equation $5x + 3y = 52$.

ii) Find the last digit of 3^{400} .



Total No. of Questions : 4]

SEAT No. :

PE-1240

[Total No. of Pages : 2

[6501]-9

T.Y. B.Sc. (Regular)

MATHEMATICS

DSE-3B MT-356(C) : Laplace Transform and Fourier Series
(2019 Pattern) (CBCS) (Semester - V) (35116C)

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) Define Dirac delta function.
- b) Find $\mathcal{L}\{\cos^2 t\}$
- c) Without using direct integration, evaluate $\int_0^\infty t^3 e^{-t} dt$.
- d) Find $\mathcal{L}^{-1}\left\{\frac{1}{s^2 + 6s + 18}\right\}$
- e) Give an example of a function of exponential order and justify it.
- f) Find $\mathcal{L}^{-1}\left\{\frac{1}{(s+3)^2}\right\}$.
- g) Give an example of an odd function and justify your answer.

Q2) a) Attempt any ONE of the following :

[5]

- i) If $\mathcal{L}\{F(t)\} = f(s)$, then prove that

$$\mathcal{L}\left\{\frac{F(t)}{t}\right\} = \int_s^\infty f(u) du.$$

- ii) If $\mathcal{L}\{F(t)\} = f(s)$, then prove that

$$\mathcal{L}\{t^n F(t)\} = (-1)^n \frac{d^n}{ds^n} f(s), \quad n \in \mathbb{N}.$$

P.T.O.

b) Attempt any ONE of the following : [5]

i) Find $\mathcal{L}\{(1 + te^{-t})^3\}$

ii) Evaluate $\int_0^\infty \frac{e^{-3t} - e^{-6t}}{t} dt$.

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

i) State and prove the convolution theorem.

ii) If $\mathcal{L}^{-1}\{f(s)\} = F(t)$, then prove that

$$\mathcal{L}^{-1}\{e^{-as} f(s)\} = \begin{cases} F(t-a), & t > a, \\ 0, & t < a. \end{cases}$$

b) Attempt any ONE of the following : [5]

i) Find $\mathcal{L}^{-1}\left\{\frac{s+1}{6s^2+7s+2}\right\}$.

ii) Find $\mathcal{L}^{-1}\left\{\frac{6s-4}{s^2-4s+20}\right\}$.

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

i) Find the Fourier series of $f(x) = x$, $-\pi \leq x \leq \pi$.

ii) Show that if f is an even function, then

$$\int_{-\pi}^{\pi} f(x) dx = 2 \int_0^{\pi} f(x) dx$$

b) Attempt any ONE of the following : [5]

i) Solve the differential equation using Laplace transforms:

$$Y''(t) - 3Y'(t) + 2Y(t) = 4t + 12e^{-t}, Y(0) = 6, Y'(0) = -1.$$

ii) Solve the differential equation using Laplace transforms:

$$Y''(t) + Y(t) = 6 \cos(2t); Y(0) = 3, Y'(0) = 1.$$



Total No. of Questions : 5]

SEAT No. :

PE-1241

[Total No. of Pages : 2

[6501]-10

T.Y. B.Sc.

PHYSICS

PHY - 351 : Mathematical Methods in Physics - II
(2019 Pattern) (Semester - V) (35121)

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 log tables & calculate is allowed.*

Q1) Solve any five of the following :

[5]

- a) State the order and degree of given differential equation.

$$\frac{d^2y}{dx^2} - \sqrt{y^2 - 5} = 0$$

- b) Write first two legendre polynomial.
c) Define inertial frame of reference.
d) Define proper length.
e) State Fuchs's theorem.
f) What is the advantages of Cartesian co-ordinate system.

Q2) Answer the following :

- a) Describe Michelson - Morley Experiment and Explain the physical significance of negative result. **[6]**
b) Express $f(x) = x^3$ in terms of legendre polynomials. **[4]**

Q3) Answer the following :

- a) Determine the metric coefficients and scale factors in the cylindrical co-ordinates. **[6]**
b) Explain whether the point at infinity is an ordinary point or singular point of the hermite differential equation $y'' - 2xy' + 2\lambda y = 0$, If singular what is the nature of singularity? **[4]**

P.T.O.

Q4) Answer the following :

- a) For function $\psi(r, \theta, \phi)$ separate the variables in Laplace's equation in spherical polar co-ordinates in the form of three ordinary differential equation. **[6]**
- b) Prove that $P_n(-x) = (-1)^n P_n(x)$. **[4]**

Q5) Attempt any four of the following :

[10]

- a) Write notes on co-ordinate system.
- b) Write notes on Twin paradox.
- c) Explain "The concept of simultaneity of two events is relative".
- d) Discuss Importance of Fuchs's theorem.
- e) Write note on Generating function for Bessel function of first kind.
- f) Find the elements of arc length & volume element in spherical polar co-ordinate.



Total No. of Questions : 5]

SEAT No. :

PE-1242

[Total No. of Pages : 2

[6501]-11
T.Y. B.Sc. (Regular)
PHYSICS
PHY-352 : Electrodynamics
(CBCS) (2019 Pattern) (Semester - V) (35122) (2 Credits)

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.*
- 4) *Use of calculator and log table is allowed.*
- 5) *Figures to the right indicate full marks.*

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

- a) What is mean by Non-polar molecule?
- b) Write Lenz's law in electromagnetic.
- c) What is Poynting Vector?
- d) Define Linear charge density. Give its S.I. unit.
- e) Give physical significance of Maxwell's equations.
- f) The permittivity of diamond is 1.46×10^{-10} . Calculate the dielectric constant of diamond.

Q2) Answer the following.

- a) Define electric vectors $\vec{D}$, $\vec{E}$ and $\vec{P}$. Find the relation between them. **[6]**
- b) Discuss the magnetic induction due to straight current carrying conductor. **[4]**

Q3) Answer the following.

- a) State Ampere's Circuital Law. Obtain the relation $\vec{\nabla} \times \vec{B} = \mu_0 \vec{J}$. **[6]**
- b) Calculate the force of interaction between the two point charges, if a dielectric medium having $k = 5.2$ interact with a force of $8.85 \times 10^{-3} \text{N}$. **[4]**

P.T.O.

Q4) Answer the following.

- a) State and Prove Poynting theorem. [6]
- b) A parallel plate capacitor of plate area $A = 100 \text{ cm}^2$ and separation $d = 1.5 \text{ cm}$ is charged by a potential of 60 volts. Then the battery is disconnected and a dielectric slab of thickness $b = 0.8 \text{ cm}$ and dielectric constant $k = 5$ inserted. Calculate the three vectors E , D and P in the dielectric. [4]

Q5) Solve any Four of the following. [10]

- a) State and explain Coulomb's law in electrostatics.
- b) Write a note on Magnetization of matter.
- c) What do you mean by uniform plane electromagnetic wave?
- d) Distinguish between paramagnetic and Ferromagnetic materials.
- e) Write a note on magnetic susceptibility.
- f) Write a note on electric polarization of the dielectric.



Total No. of Questions : 5]

SEAT No. :

PE-1243

[Total No. of Pages : 2

[6501]-12

T.Y. B.Sc.

PHYSICS

PHY-353 : Classical Mechanics

(2019 Pattern) (Semester - V) (Paper - III) (35123)

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 5 carry equal marks.
- 4) Figure to the right carry equal marks.
- 5) Use of log table and calculator is allowed.

Q1) Solve any five of the following :

[5]

- a) State the law of conservation of linear momentum.
- b) What do you mean by geostationary orbit?
- c) State any two examples of elastic scattering.
- d) What are holonomic constraints?
- e) Find the reduced mass of system of two particles having equal masses.
- f) Define impact parameter.

Q2) Answer the following :

- a) Show that the path of charged particle moving in uniform transverse electric field is parabola. [6]

OR

Obtain Hamiltonian and Hamilton's equation of motion for a simple pendulum from its Lagrangian.

- b) Explain exoergic and endoergic process. [4]

P.T.O.

Q3) Answer the following :

- a) State and prove Kepler's first law of planetary motion. [6]

OR

Obtain the relation between differential cross-section in lab and CM systems.

- b) An electron that has velocity $\vec{V} = (2 \times 10^6)\hat{i} + (3 \times 10^6)\hat{j}$ in m/s moves through magnetic field of induction $\vec{B} = (0.04)\hat{i} - (0.12)\hat{j}$ in tesla. Find the force acting on the electron. [4]

Q4) Answer the following :

- a) A Hamiltonian of one degree of freedom has the form $H = \frac{p^2}{2m} + \frac{1}{2}kq^2$. Find Lagrangian corresponding to this Hamiltonian. [6]

OR

What is meant by inelastic scattering? Obtain Q-value equation in inelastic scattering process.

- b) Show that for artificial satellite square of period of satellite is proportional to the cube of the radius of orbit. [4]

Q5) Attempt any four of the following: [10]

- a) Explain degrees of Freedom.
- b) Explain laboratory system in a two body scattering problem.
- c) What is meant by central force?
- d) Explain centre of mass of the system of particles.
- e) Explain limitations of Newtonian mechanics.



Total No. of Questions : 5]

SEAT No. :

PE-1244

[Total No. of Pages : 2

[6501]-13

T.Y. B.Sc.

PHYSICS

**PHY-354 : Atomic and Molecular Physics
(2019 Pattern) (CBCS) (Semester - V) (Paper - IV) (35124)**

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) *Question no. 2 to 5 carries equal marks.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of calculator and logtable is allowed.*

Q1) Attempt any five :

[5]

- a) Write electronic configuration of Sodium ($z = 11$).
- b) Define orbital quantum number.
- c) Define Fluorescence.
- d) Calculate possible values of m_l for $l = 4$.
- e) Define reduced mass of a system.
- f) State Hund's rule.

Q2) a) Explain in detail vector Atom model.

[6]

- b) Find singlet and triplet terms in s-p configuration for L-S coupling.[4]

Q3) a) Discuss the energy levels of sodium atom and draw energy level diagram. **[6]**

- b) State applications of Zeeman effect. **[4]**

P.T.O.

- Q4)** a) Discuss Rutherford's atomic model in detail. [6]
- b) The spacing between vibrational level of "CO" molecule is 0.08eV. Calculate value of force constant. (Given : mass of carbon = 12 & mass of oxygen = 16 times mass of proton = 1.67×10^{-27} kg) [4]

Q5) Attempt any four : [10]

- a) Explain characteristics of Raman spectra.
- b) Explain j-j coupling.
- c) What are three major types of molecular spectra.
- d) Give applications of Raman spectroscopy.
- e) What are the limitations of Bohr's atomic model.
- f) For $S=1$, we get triplet. Explain?



Total No. of Questions : 5]

SEAT No. :

PE-1245

[Total No. of Pages : 2

[6501]-14
T. Y. B.Sc.
PHYSICS
PHY-355 : Computational Physics
(2019 Pattern) (Semester - V) (CBCS) (35125)

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 calculator and log tables is allowed.*

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

- a) What are the advantage of flowchart?
- b) What is recursion?
- c) What is Pixel?
- d) State any two limitations of Newton-Raphson method.
- e) What is the difference between ++× and ×++?
- f) What are the graphic files?

Q2) Answer the following questions :

- a) What is operator? Describe several types of operators that are included in C language. **[6]**
- b) What do you mean by graphic mode and graphic driver? **[4]**

P.T.O.

Q3) Answer the following questions :

- a) What are iterative techniques? How will you classify these methods? [6]

OR

- a) What is the purpose of automatic variable? How it is defined? What is its scope? [6]
b) Write C-Program to sum square of all integers from 1 to 5. [4]

Q4) Answer the following questions :

- a) What is the purpose of return statement? Write syntax for use of return statement can multiple expression be included in a return statement? [6]

OR

- a) Describe logical operators included in C. What is the purpose of each?[6]
b) Use trapezoidal rule with four steps to estimate [4]

$$\int_0^2 \frac{x}{\sqrt{2+x^2}} dx.$$

Q5) Answer the following (any four) : [10]

- a) Describe Simpsons 1/3rd method of computing integrals.
b) What is the graphics? State its applications.
c) Correct library functions correct explanation
d) Classification criterion of iterative techniques
e) Correct conditional operator use of conditional operator to form conditional expression.



Total No. of Questions : 5]

SEAT No. :

PE-1246

[Total No. of Pages : 2

[6501]-15

T.Y. B.Sc.

PHYSICS

PHY - 356(A) : Astronomy and Astrophysics - I
(2019 Pattern)(Semester - V)(Elective - I)(35126 A)

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 5 carry equal marks.*
- 4) *Figures to the right indicate full marks.*

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

- a) What is Meteor Shower?
- b) What is aparent magnitude?
- c) Define resolving power of a telescope.
- d) What do you mean by constellations?
- e) Explain globular cluster.
- f) Why planet earth is not shrinking under its own gravity.

Q2) Answer the following questions.

- a) i) Draw a neat and labelled 'tuning fork' diagram. **[3]**
ii) Write a note on Neutron Star. **[3]**
- b) Write a note on spectral classification of stars. **[4]**

Q3) Answer the following questions.

- a) Explain in detail, construction and working of CCD. What are its advantages. **[6]**
- b) Write a note on dark energy. **[4]**

P.T.O.

Q4) Answer the following questions.

- a) Explain the Big Bang Theory along with its evidences. [6]

OR

With the help of a suitable diagram, explain construction and working of a Newtonian telescope. [4]

- b) Write a note on Celestial Hemisphere. [4]

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

- a) Co-ordinate system in astronomy
- b) Star dial
- c) Milky way galaxy
- d) Working of a photometer
- e) Pulsars
- f) Total Solar Eclipse



Total No. of Questions : 5]

SEAT No. :

PE-1247

[Total No. of Pages : 2

[6501]-16

T. Y. B.Sc.

PHYSICS

**PHY-356 (B) : Elements of Materials Science
(2019 Pattern) (Semester - V) (Paper - VI) (35126B)**

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 calculator and log table is allowed.*
- 6) *Neat diagrams must be drawn wherever necessary.*

Q1) Solve any five of the following :

[5]

- a) Enlist different types of ceramics.
- b) Define term 'phase'.
- c) What is plastic deformation?
- d) Find elastic strain in a metal rod stressed at 60 MPa (Modulus of elasticity = 10^6 MPa).
- e) What are hard ferrites? Give any one example of hard ferrite.
- f) State Gibb's phase rule.

P.T.O.

- Q2) a)** Answer any two of the following questions : [6]
- i) Explain importance and objectives of phase diagram [3]
 - ii) Write short note on different types of smart materials [3]
 - iii) Explain line defect [3]
- b) Discuss Ax-type crystal structure of CsCl type [4]
- Q3) a)** Answer any two of the following questions : [6]
- i) Write short note on phase diagram of two component system [3]
 - ii) What is atomic diffusion? State types of diffusions. [3]
 - iii) Explain three electrical properties of ceramics. [3]
- b) Calculate thermal stress for polymer changing the dimensions due to change in temperature 400K (Young's modulus = 2.3×10^{-12} N/m², linear coefficients of thermal expansion = 120×10^{-6} °C⁻¹) [4]
- Q4) a)** Answer any two of the following questions : [6]
- i) Write short note on grain and twin boundaries [3]
 - ii) State and prove lever rule. [3]
 - iii) Explain impurities in solid with examples [3]
- b) Find out CRSS value for Al crystal to slip on plane (111) and in direction (110) with 3.5 MPa stress is applied in the direction (111) plane. [4]
- Q5)** Attempt any four of the following : [10]
- a) What is piezoelectric effect?
 - b) Explain Schottky defect.
 - c) Explain three types of systems.
 - d) Define plasticity and toughness.
 - e) Describe deformation by slipping with neat diagram.
 - f) Explain three different types of strengths of ceramics.



Total No. of Questions : 5]

SEAT No. :

PE-1248

[Total No. of Pages : 2

[6501]-17

T.Y. B.Sc.

PHYSICS

PHY-356 (C) : Biophysics

(2019 Pattern) (Semester - V) (Elective - I) (35126 C)

Time :2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any three questions from question Q. 2 to question Q. 5.
- 3) Question no. 2 to 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 do you mean by codon?
- b) What do you mean by half-cell potential?
- c) State the principle of spectrophotometer.
- d) Define Non-polarizable electrodes.
- e) What is mitochondria?
- f) Define Viscosity.

Q2) Answer the following questions :

- a) Describe the structure of DNA with suitable examples. [6]
- b) Describe the different types of ECG electrodes. [4]

Q3) Answer the following questions :

- a) Describe the construction and working of colorimeter. [6]
- b) The distance between two consecutive R waves is 30 mm and the paper speed is 50mm/sec. Find the heart rate? [4]

P.T.O.

Q4) Answer the following questions :

- a) Describe the magnetic Resonance imaging techniques with suitable examples. [6]
- b) What is amino acid? Describe the primary structure in detail with examples. [4]

Q5) Attempt any four of the following : [10]

- a) State the principle of SEM.
- b) Write a short note on "ultrasonography".
- c) Write a short note on "Half cell potential".
- d) What is polarizable electrode.
- e) What is Redox potential?
- f) What is Biostatistics and Biometry?



Total No. of Questions : 5]

SEAT No. :

PE-1249

[Total No. of Pages : 2

[6501]-18

T.Y. B.Sc.

PHYSICS

PHY - 356(D) : Renewable Energy Sources - I
(2019 Pattern)(Semester - V)(Elective - I) (35126D)

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 5 Question 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 are renewable energy sources?
- b) What is meant by Zenith?
- c) State Principle of solar dryer.
- d) Define an efficiency of 'Flat Plate Collector'.
- e) Define fill factor.
- f) Give advantages of concentrating collectors.

Q2) Answer the following questions.

- a) Explain use of hydrogen as potential source of energy. [6]
- b) Describe construction and working of Liquid Flat Plate Collector (FPC). [4]

Q3) Answer the following questions.

- a) Explain how chemical energy is stored? [6]
- b) Explain I-V characteristics of solar cell and explain Fill Factor (FF) and maximum conversion efficiency, [4]

P.T.O.

Q4) Answer the following questions.

- a) Discuss environmental degradation due to use of conventional energy. **[6]**
- b) Describe the box type solar cooker with neat diagram. **[4]**

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

- a) Solar pond
- b) p-i-n Solar Cell
- c) Selective Coating
- d) Solar insolation
- e) Super capacitors
- f) Photovoltaic Panels



Total No. of Questions : 5]

SEAT No. :

PE-1250

[Total No. of Pages : 2

[6501]-19

T. Y. B.Sc.

PHYSICS

PHY- 356 E: Applied Optics

(2019 Pattern) (Semester - V) (Elective - I) (35126E)

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 calculator and log table is allowed.

Q1) Solve any five of the following :

[5]

- a) Explain Fermat principle in short?
- b) Describe law of refraction from Fermat principle?
- c) What do you mean by nodal points?
- d) What do you mean by zone plate?
- e) State Malus law?
- f) State any one application of fibre optics?

P.T.O.

Q2) Answer the following questions :

- a) i) Explain two slit Fraunhofer Diffraction pattern? [6]
- ii) Describe Holography in brief ?
- b) i) State any two applications of Holography. [4]
- ii) What do you mean by single mode & multimode fibers?

Q3) Answer the following questions :

- a) i) Explain the advantages of fibre optics in brief? [6]
- ii) What do you mean by Fabry-perot etalon?
- b) i) Explain quarter wave plate in brief? [4]
- ii) Explain applications of fibre optics?

Q4) Answer the following questions :

- a) Explain the laws of reflections? [6]
- b) State the principle of holography in brief [4]

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

- a) Explain the characteristics of holography?
- b) What do you mean by total internal reflection of light?
- c) Describe Fresnel half period zone?
- d) Explain double refraction of light?
- e) Difference between positive & negative crystal?
- f) Describe importance of coherence?



Total No. of Questions : 5]

SEAT No. :

PE-1251

[Total No. of Pages : 2

[6501]-20

T.Y. B.Sc.

PHYSICS

**PHY-365 (F) : C# Programming
(2019 Pattern) (Semester - V) (35126 F)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any three questions from question Q. 2 to question Q. 5.
- 3) Question no. 2 to 5 carries equal marks.

Q1) Solve any five

[5]

- a) What is C#?
- b) Why use C#?
- c) What is IDE and why it is used.
- d) What are the types of variables in C#?
- e) What is the general syntax used to declare the variable in C#? Give two example.
- f) Explain the significance of the "Const" keyword.

Q2) Describe following questions :

- a) What are the operators used in C#? Describe each operator with an example. **[6]**
- b) What do you mean by methods in C#? **[4]**

Q3) Explain following :

- a) Draw a flowchart of Bisection method & Explain logically the flow of program. **[6]**
- b) What is ADO.NET? **[4]**

P.T.O.

Q4) Discuss following :

- a) ADO.NET [6]
- b) Insert, update & delete operation. [4]

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

- a) Variable
- b) Constants
- c) Data fetching from SQL sever data base.
- d) Implicit & Explicit casting.
- e) Methods.



Total No. of Questions : 5]

SEAT No. :

PE-1252

[Total No. of Pages : 2

[6501]-21

T.Y. B.Sc.

PHYSICS

PHY - 356(G) : ACOUSTICS - I

(2019 Pattern)(Semester - V)(Paper - VI) (35126G)

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 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) Determine velocity of sound in air at 40°C
- b) Define Vibrato in music.
- c) What is frequency range of Human Speech?
- d) Define reverberation time.
- e) What is principle of active noise control?
- f) Determine sound power level in an enclosure with 20 watt of acoustic power. ($r_e 10^{-12}$ watts)

Q2) a) Describe mechanism of hearing. Sketch the curves representing thresholds of the ear. [6]

b) Write a note on Musical Instruments Digital Interface (MIDI). [4]

Q3) a) Describe the characteristics of expansion chamber mufflers and their applications. [6]

b) Calculate the reverberation time of a room with volume 1000 m³ and surface area of 500 m² [4]

P.T.O.

- Q4)** a) Write a note on Haas effect. What is meant by audio delay? [6]
b) Determine the room modes 800, 302, 122 and 222 for a seminar Hall of Size $54 \times 36 \times 15$ ft. What do you conclude? ($C = 1130$ ft/sec) [4]
- Q5)** Write short notes on any four of the following : [10]
a) Acoustic Standards and reference conditions.
b) Anechoic chamber
c) Pros & cons of headphones
d) Audiometry
e) Helmholtz Resonator.
f) FET analysis.



Total No. of Questions : 5]

SEAT No. :

PE-1253

[Total No. of Pages : 2

[6501]-22

T.Y. B.Sc.

PHYSICS

**PHY - 3510(H) : Python Programming
(2019 Pattern) (Semester - V) (351210H) (Sec - I)**

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 calculator and log table is allowed.*

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

- a) Define seaborn.
- b) What is string line?
- c) What does the break statement do in python?
- d) What are the key features of python?
- e) How to call function?
- f) What are the types of variables in python?

Q2) Solve the following questions :

- a) Explain what is range () function and how it is used in list? [6]
- b) List out the plots that can plot with seaborn. [4]

Q3) Attempt the following questions :

- a) Explain string data type in python. [6]
- b) Which are basic tuple operation? Explain with example. [4]

P.T.O.

Q4) Solve the following questions :

- a) Write Python program to find the factorial of a given number. [6]
- b) Write a python program to calculate the area and circumference of circle.[4]

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

- a) Features of pandas in python
- b) Functools module
- c) Dictionary Data type in Python
- d) Scipy
- e) What are different output formats supported by matplotlib library?
- f) Identifier.



Total No. of Questions : 5]

SEAT No. :

PE-1254

[Total No. of Pages : 2

[6501]-23

T.Y. B.Sc.

PHYSICS

PHY-3510 (I) : Energy Studies (Skill - 1)
(2019 Pattern) (Semester - V) (Paper - X) (351210 I)

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 carries equal marks.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of calculators and log table is allowed.*

Q1) Solve any five of the following :

[5 × 1 = 5]

- a) Define the term airmass.
- b) Define efficiency of flat solar collector.
- c) What are the benefits of using electric vehicles.
- d) Define solar constant.
- e) What are the challenges in using biomass energy?
- f) State various forms of energy storages.

Q2) Answer the following :

- a)
 - i) Write limitations to photovoltaic efficiency.
 - ii) What is biogas? Explain different types of biogas plant. **[6]**
- b) Give facts and myths about various energy sources. **[4]**

P.T.O.

Q3) Answer the following :

- a) Explain the steps in installation of a roof top solar PV system design.[6]
- b) Give the difference between invertors and convertors. [4]

Q4) Answer the following :

- a) Explain three energy sources to understand their environmental production and distribution aspects. [6]
- b) Describe horizontal axis wind machine with suitable diagram. [4]

Q5) Attempt any four of the following : [10]

- a) Explain the structure of sun with diagram.
- b) What is meant by thermal gasifier?
- c) Discuss photovoltaic principle.
- d) Explain about supercapacitors.
- e) Distinguish between renewable and non-renewable energy sources.
- f) What is meant by energy audit?



Total No. of Questions : 5]

SEAT No. :

PE-1255

[Total No. of Pages : 2

[6501]-24

T. Y. B.Sc.

PHYSICS

**PHY-3510 (J) : Introduction to Arduino
(2019 Pattern) (Semester - V) (SEC - I) (351210J)**

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 calculator and log table is allowed.*

Q1) Solve any five of the following :

[5]

- a) What is the default bootloader of the Arduino UNO?
- b) What is Arduino
- c) Who is developer of Arduino.
- d) How many digital pins UNO boards has?
- e) Which are two main functions used in Arduino program.
- f) Which processor supports the Arduino Zero?

P.T.O.

Q2) Solve the following questions :

- a) State the features of Arduino [6]
- b) Explain the structure and function of Pin 6:3.3V, Pin Y: 5V and Pin 8: GND. [4]

Q3) Attempt the following questions :

- a) What is structure of Arduino program? Explain in brief [6]
- b) Describe data types : i) Void ii) Double [4]

Q4) Solve the following questions :

- a) Explain various loops used in Arduino. [6]
- b) What is AT mega 328p microcontroller? [4]

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

- a) Write a program to blink LED in Arduino.
- b) What is IDE
- c) What is function of SPI?
- d) List control structure used in Arduino
- e) Embedded System.
- f) Write and explain 3 important parts of Arduino.



Total No. of Questions : 5]

SEAT No. :

PE-1256

[Total No. of Pages : 2

[6501]-25

T.Y. B.Sc.

PHYSICS

**PHY - 3510(K) : Sensors and Transducers
(2019 Pattern) (Semester - V) (351210K)
(Skill Enhancement Course - I)**

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 calculator and log table is allowed.*

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

- a) What is Primary application of Hall Effect Sensor?
- b) What is transducer?
- c) Which sensor is used to detect the presence of an object?
- d) Which effect is utilize by magnetic sensor for force, torque and proximity sensing.
- e) What is the primary characteristic of Light Dependent Resister (LDR).
- f) What is the advantage of using thermocouple over a thermister.

Q2) Answer the following questions :

- a) Describe strain gauge transducer. **[6]**
- b) What is a Resistance Temperature Detector (RTD). Explain its materials.**[4]**

Q3) Answer the following questions :

- a) Explain Helix Strip biomettalic thermometer. **[6]**
- b) What are the advantages of using a Potentiometric Sensor? Explain its resolution. **[4]**

P.T.O.

Q4) Answer the following questions :

- a) Describe the operation of LVDT for measuring displacement. How is its operation dependent on the position of the core. **[6]**
- b) Explain thermo emf Sensors. **[4]**

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

- a) Application of capacitive sensors.
- b) Material Expansion type sensors.
- c) Light Dependent Resistor (LDR)
- d) Advantage of thermocouple.
- e) Importance of transducer.
- f) Magnetic Sensors.



Total No. of Questions : 5]

SEAT No. :

PE-1257

[Total No. of Pages : 2

[6501]-26

T.Y. B.Sc.

PHYSICS

**PHY-3511 L : Physics Workshop Skill
(Skill Enhancement Course - II)
(2019 Pattern) (Semester - V) (351211 L)**

Time :2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any three questions from question Q. 2 to question Q. 5.*
- 3) *Question no. 2 to 5 carries equal marks.*
- 4) *Figures to the right indicates full marks.*
- 5) *Use of calculator and log table is allowed.*

Q1) Solve any five of the following :

[5 × 1 = 5]

- a) Define precision.
- b) State function of electron gun.
- c) What is signal generator?
- d) Enlist the main components of Cathod Ray tube.
- e) What is peak voltage of 210 volts R.M.S. main AC voltage in CRO.
- f) State limitations of analog instruments.

Q2) Answer the following questions :

- a) Draw block diagram of RLC bridge. Explain its working. **[6]**
- b) State different types of errors and Explain any two types in brief. **[4]**

Q3) Answer the following questions :

- a) Draw block diagram of digital multimeter & Explain working. **[6]**
- b) Write principles of measurement of DC voltage and DC current, AC voltage and AC current. **[4]**

P.T.O.

Q4) Answer the following questions :

- a) What is Digital oscilloscope. Discuss its principle and working with the help of neat labeled diagram. [6]
- b) A sinusoidal voltage of 20V peak to peak is applied to the input of CRO. The timebase setting is 5ms/division. If the display shows 3 dimensions for one complete cycle of the waveform, what is the frequency of the input signal? [4]

Q5) Write short note on any four of the following :

[10]

- a) Dual trace oscilloscope.
- b) Q-meter
- c) Significance of CRO.
- d) AC millivoltmeter.
- e) Distortion factor meter.



Total No. of Questions : 5]

SEAT No. :

PE-1258

[Total No. of Pages : 2

[6501]-27

T. Y. B.Sc.

PHYSICS (Skill Enhancement Course - II)

PHY-3511 (M) : Biomedical Instrumentation

(2019 Pattern) (CBCS) (Semester - V) (351211M)

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 calculators and log table is allowed.*

Q1) Solve any five of the following :

[5]

- a) Define T-wave in ECG.
- b) What is transducer?
- c) Define cardiac cycle.
- d) What is biosensor?
- e) What is the standard unit of measurement for ECG?
- f) What is diastolic pressure?

P.T.O.

- Q2)** a) Describe the principle and application of pulse oximetry in measuring oxygen saturation. [6]
- b) Cardiac output and calculate the cardiac output for patients whose heart rate is 60 beats/min. If the stroke volume is 50 ml/beat. [4]
- Q3)** a) Draw the block diagram of an ECG. Describe in detail the block diagram of an ECG with suitable example. [6]
- b) Describe in detail transducer for body temperature measurement. [4]
- Q4)** a) Describe in detail phonocardiography with suitable example. [6]
- b) What is blood pressure? Explain its importance in cardiovascular health. [4]
- Q5)** Write short notes on any four of the following : [10]
- a) Resting potential
- b) What is an ultrasound?
- c) Application of ECG in clinical diagnosis.
- d) Biosensors
- e) What is displacement transducer?
- f) Write short note on “ Electro Conduction System of Heart”.



Total No. of Questions : 5]

SEAT No. :

PE-1259

[Total No. of Pages : 2

[6501]-28

T.Y. B.Sc.

PHYSICS

**PHY - 3511(N) : Non-Destructive Testing Techniques
(2019 Pattern) (Semester - V) (351211N)**

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 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 continuity? Give its types.
- b) What are the limitations of visual inspection method.
- c) What are the advantages of water suspendable developer?
- d) Give the principle of liquid penetrant method.
- e) State the principle of magnetic resonance imaging.
- f) What are the Principle of eddy current testing technique?

Q2) Answer the following questions :

- a) State the principle of acoustic emission testing technique. Explain the various stages in acoustic emission testing method. [6]
- b) Explain in brief liquid leak non-destructive testing method. [4]

Q3) Answer the following questions :

- a) Explain method of NDT with portable electromagnetic yokes. [6]
- b) Explain how X-ray is useful for non-destructive testing in the field of medicine. [4]

P.T.O.

Q4) Answer the following questions:

- a) Explain How MRI is useful in the field of medicine? [6]
- b) Explain dry particle inspection testing method in NDT. [4]

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

- a) Equipment used in visual testing method.
- b) Limitations of thermography testing method.
- c) Advantages of non-aqueous developer.
- d) Passive approach of thermography testing method.
- e) Limitation of echo method of ultrasonic testing technique.
- f) Advantages of visual inspection method.



Total No. of Questions : 5]

SEAT No. :

PE-1260

[Total No. of Pages : 2

[6501]-29

T.Y. B.Sc.

PHYSICS

**PHY-3511 (O) : Accoustics Applications
(2019 Pattern) (Semester - V) (351211O)**

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.*
- 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) Define sone.
- b) What do you understand by transmission loss?
- c) What is noise cancellation feature of a head phone?
- d) What is a graphic equalizer?
- e) What is acoustic delay?
- f) What is a sonic boom?

Q2) Answer the following questions :

- a) With the help of a neat diagram, explain the working of a direct radiator type Loudspeaker. **[6]**
- b) Write a note on basics of audio signal processing. **[4]**

P.T.O.

Q3) Answer the following questions :

- a) State different types of microphones. What is the selection criteria of microphones? Write the equation for sensitivity of carbon microphone. [6]
- b) Define the following terms : [4]
 - i) Consonance
 - ii) Dissonance
 - iii) Harmonics
 - iv) Overtones

Q4) Answer the following questions :

- a) What is speech intelligibility. Explain the studio articulation test. [6]
- b) What is the need of a loudspeaker cabinet? Explain the working of a Bass Reflex Cabinet. [4]

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

- a) Sound Absorption Materials.
- b) Musical scales.
- c) Monophonic sound recording system.
- d) MP3 Audio file format.
- e) FM Microphones.
- f) Types of Musical Instruments.



Total No. of Questions : 5]

SEAT No. :

PE-1261

[Total No. of Pages : 2

[6501]-30
T.Y. B.Sc.
CHEMISTRY
CH-501 : Physical Chemistry - I
(2019 Pattern) (CBCS) (Semester - V) (35131)

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 5 carry equal marks.*
- 4) *Figures to the right indicate full marks.*
- 5) *Draw neat diagrams wherever necessary.*
- 6) *Use of logarithm table & calculator is allowed.*

Q1) Solve any five of the following :

[5]

- a) Define the term photosynthesis.
- b) State Lambert's Law.
- c) What do you mean by wave function?
- d) What is constitutive property?
- e) Calculate reduced mass of $^{14}\text{N}^{16}\text{O}$ molecule.
- f) Define refractive index.

Q2) a) Answer any two of the following.

[6]

- i) What is quenching of fluorescence? Discuss the factors affecting quenching of fluorescence.
 - ii) Derive time independent Schrodinger's wave equation.
 - iii) Dipole moment of BF_3 is zero and dipole moment of NH_3 is 1.46 D, explain.
- b) Calculate the percentage ionic character of HBr from the following data.

[4]

Dipole moment of HBr = 0.79 D

Bond length of HBr = 1.42×10^{-8} cm

Electronic charge $q = 4.8 \times 10^{-10}$ esu

P.T.O.

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

- i) Describe stretching and bending vibrations of CO₂ molecule.
 - ii) What is harmonic oscillator? How zero point energy can be determined.
 - iii) Explain the term photolysis and photosensitization.
- b) If the bond length of ¹H³⁵Cl is 1.274 Å, calculate reduced mass and moment of inertia of the molecule. [4]

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

- i) What is chemical actinometer? Discuss Uranyl oxalate actinometer.
 - ii) Distinguish between polar and nonpolar molecules
 - iii) What is the maximum degeneracy of the energy level in 3-D box with $E = \frac{gh^2}{8ma^2}$
- b) When a substance 'A' was exposed to light. 0.002 moles of it reacted in 1204 seconds. In the same 'A' absorbed 2×10^6 photons of light per second. Calculate the quantum yield of reaction. [4]

[Given : Avagadro's number = 6.023×10^{23}]

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

- a) Draw plots of ψ and ψ^2 for particle in 1-D box.
- b) Thermal and photochemical reactions.
- c) Phosphorescence.
- d) Quantum theory of Raman effect.
- e) Dipole moment



Total No. of Questions : 5]

SEAT No. :

PE-1262

[Total No. of Pages : 2

[6501]-31

T.Y. B.Sc.

CHEMISTRY (Theory)

CH-502 : Analytical Chemistry - I

(CBCS) (2019 Pattern) (Semester - V) (35132) (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) Q.2 to Q.5 carry equal marks.
- 4) Figures to the right indicate full marks.
- 5) Draw neat labelled diagrams wherever necessary.
- 6) Use of log table and calculators are allowed.

Q1) Solve any 5 of the following :

[5]

- a) What is digestion?
- b) What is cation?
- c) TGA stands for?
- d) Give two radiation sources used in U.V visible spectrophotometer.
- e) Define the term Analyze used in instrumental methods of Analysis.
- f) Calculate transmittance of a solution if absorbance is 0.3467.

Q2) a) Answer any two of the following :

[6]

- i) What is coprecipitation? Explain coprecipitation with suitable example.
 - ii) Explain construction and working of phototube with neat and labelled diagram.
 - iii) What is common ion effect? Explain it with dissociation of NH_4O_4 in presence of NH_4Cl
- b) Explain criteria for choosing an analytical method with respect to [4]
- i) Accuracy
 - ii) Precision
 - iii) Sensitivity
 - iv) Robustness

P.T.O.

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

- i) Explain determination of Pk value of an indicator using U.V. visible spectroscopy.
 - ii) Explain Homogeneous precipitation with suitable example.
 - iii) Draw schematic diagram of thermobalance and explain its components.
- b) When a 0.005M solution is placed in 4 cm path length cell shows an absorbance of 0.25. What will be the absorbance of the solution, if it is placed in a 1 cm pathlength cell? [4]

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

- i) Explain method of removal of interfering borate radical.
 - ii) Give applications of Differential Thermal Analysis (DTA)
 - iii) Explain Mole ratio method by Yoe and Jones.
- b) Calculate the gravimetric factor for the following stoichiometric conversion. [4]

Analyse (molar mass)	Precipitate (molar mass)
P (30.97)	Ag ₃ PO ₄ (418.58)

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

- a) Calculate the % loss for the following reaction.
- $$\text{CaCO}_{3(s)} \xrightarrow{\Delta} \text{CaO}_{(s)} + \text{CO}_2 \uparrow$$
- (At wt of Ca = 40, C = 12, O = 16)
- b) What are the different methods used for preparation of original solution in Inorganic Qualitative Analysis?
 - c) Give schematic diagram of double beam spectrophotometer.
 - d) Calculate absolute error and relative error for the following : Measured value is 0.69 and expected value is 0.68.
 - e) What is the role of organic precipitant in gravimetric analysis, Give the structure of DMG.
 - f) What are the condition of ideal wash liquid in gravimetric analysis?



Total No. of Questions : 5]

SEAT No. :

PE-1263

[Total No. of Pages : 2

[6501]-32
T.Y. B.Sc.
CHEMISTRY
CH-504 : Inorganic Chemistry - I
(2019 Pattern) (CBCS) (Semester - V) (35134)

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.*
- 4) *Figures to the right indicate full marks.*
- 5) *Draw neat diagrams wherever necessary.*
- 6) *Use of logarithm tables & calculator is allowed.*

Q1) Answer the following (any five) :

[5]

- a) What is symmetry symbol for s-orbital.
- b) What do you mean by inert complex?
- c) Calculate the magnetic moment Ti^{2+} ion by using Spin only formula (Ti at No.22)
- d) Define overall formation constant.
- e) Which d orbitals are involved in π bonding according to MOT?
- f) Define superconductor.

Q2) a) Answer any two of the following.

[6]

- i) Discuss π - bonding in complexes.
- ii) Explain the factor affecting lability of metal complexes.
- iii) Why d-block element forms complexes?

b) Answer the following.

[4]

- i) Discuss oxidation state of d-block elements.
- ii) What is trans effect? Explain with suitable example.

P.T.O.

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

- i) Explain classification of inorganic reactions.
 - ii) What is lanthanite contraction? Why $\text{La}(\text{OH})_3$ is more basic than $\text{Lu}(\text{OH})_3$?
 - iii) Distinguish between intrinsic and extrinsic semiconductors.
- b) What is misch-metal? Explain preparation and uses of misch-metal.[4]

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

- i) Explain the synthesis of transuranic element by heavy ion bombardment methode.
 - ii) Why elements Cd, Zn, Hg have lower melting points as compared to other d-block elements.
 - iii) Discuss the structure of semi conducting oxide $\text{YBa}_2\text{Cu}_3\text{O}_{7-8}$
- b) Explain effect of π - bonding on 10Dq of complexes. [4]

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

- a) Assumptions of MOT.
- b) Catalytic activity of d-block element.
- c) Solvent extraction method for lanthanite separation.
- d) P-type semiconductor.
- e) Effect of temprature on conductivity of metal.
- f) Nephelauxetic effect and series.



Total No. of Questions : 5]

SEAT No. :

PE-1264

[Total No. of Pages : 2

[6501]-33
T.Y. B.Sc.
CHEMISTRY
CH-505 : Industrial Chemistry - I
(2019 Pattern) (CBCS) (Semester - V) (35135)

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 unit process.
- b) Write any two uses of nitric acid.
- c) Define the term yield.
- d) Define the term molasses.
- e) What are surfactants?
- f) Explain the term chromophore.

Q2) a) Attempt any two of the following.

[6]

- i) Distinguish between lead chamber process and contact process for manufacture of sulphuric acid.
- ii) Discuss conditions favourable for fermentation.
- iii) Write the synthesis and uses of aniline yellow.

b) Write a short note on :

[4]

- i) Batch process.
- ii) Detergent builders.

P.T.O.

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

- i) Give applications of bagasse.
- ii) What are the advantages of detergents.
- iii) Give the synthesis and uses of Fluorescein.

b) Answer the following : [4]

- i) Discuss the Functions of HR.
- ii) Write a note on cleaning action of detergent.

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

- i) Explain Manufacture of nitric acid by Ostwald's process.
- ii) What are the characteristics of good dye?
- iii) Give the synthesis and uses of Alizarin.

b) Answer the following : [4]

- i) Explain the term quality control.
- ii) Write note on trade marks.

Q5) Attempt any Four of the following : [10]

- a) Write a short note on sulphuric acid fog.
- b) What are basic requirements of Fermentation?
- c) Write comparison between sulphitation and carbonation process.
- d) Write short note on coffee still.
- e) Distinguish between Soap and Detergent.
- f) Discuss the raw materials required for manufacture of soap.



Total No. of Questions : 5]

SEAT No. :

PE-1265

[Total No. of Pages : 2

[6501]-34

T.Y. B.Sc.

CHEMISTRY

CH-507 : Organic Chemistry - I

(2019 Pattern) (CBCS) (Semester - V) (35137)

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.

Q1) Attempt any five of the following :

[5]

- a) What is cope rearrangement?
- b) Why pyridine is more basic than pyrrole?
- c) What is E1_cB elimination?
- d) Give any two examples of active methylene compounds.
- e) State Hoffman elimination.
- f) Thiophene is aromatic in nature. Explain.

Q2) a) Attempt any two of the following :

[6]

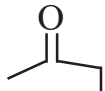
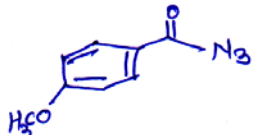
- i) Kinetic isotopic effect is not observed in E1 mechanism. Justify.
- ii) Pyridine undergoes electrophilic substitution mainly at position 3. Explain.
- iii) How will you prepare succinic acid from Diethyl malonate?

b) Answer the following :

[4]]

- i) Explain Claisen rearrangement.
- ii) 2- Bromopentane on heating with NaOMe gives 70% 2- pentene. Explain.

P.T.O.

- Q3) a)** Attempt any two of the following : **[6]**
- What is Mc - Lafferty rearrangement? Discuss the mechanism with suitable example.
 - Explain $k_H/k_D = 7$ in E2 elimination.
 - What is the reaction of following reagents with faran?
 - $\text{SO}_3/\text{pyridine}$
 - CHCl_3/KOH
 - $\text{CH}_3\text{COCl}/\text{AlCl}_3, \text{Benzene}$
- b)** Predict the product & Justify your answer. **[4]**
- 
 $\xrightarrow{m\text{-CPBA}} \text{'A'} + \text{'B'}$
 - $\text{H}-\text{C}\equiv\text{C}-\text{H} \xrightarrow[\Delta]{\text{HCN}} \text{'A'} \xrightarrow[\text{liq. NH}_3(\Delta)]{\text{NaNH}_2} \text{'B'}$
- Q4) a)** Discuss any two of the following : **[6]**
- Explain the formation & stability of carbocation.
 - Discuss any two name reactions for synthesis of primary amine.
 - What is the reaction of following reagents on pyridine?
 - $\text{Na NH}_2/\text{liq. NH}_3, 100^\circ\text{C}$
 - $\text{Na}/\text{C}_2\text{H}_5\text{OH}$
 - $\text{C}_6\text{H}_5\text{Li}/100^\circ\text{C}$
- b)** Identify the products A & B in the following reactions. **[4]**
- 
 $\xrightarrow{\Delta} \text{'A'} \xrightarrow{\text{H}_2\text{O}/\text{H}^+} \text{'B'}$
 - $\text{H}_3\text{C}-\text{CH}_2-\underset{\text{Br}}{\text{CH}}-\text{CH}_3 \xrightarrow[\Delta]{\text{alc. KOH}} \text{'A'} \xrightarrow{\text{Raney Ni}} \text{'B'}$
- Q5) Write short note on (Any four) :** **[10]**
- Curtius rearrangement.
 - Paal - knorr synthesis.
 - Evidences of E2 elimination.
 - Electrophilic substitution reaction of Naphthalene.
 - Beckmann Rearrangement.
 - Comparison between E1 & E2 elimination.



Total No. of Questions : 5]

SEAT No. :

PE-1266

[Total No. of Pages : 3

[6501]-35
T. Y. B.Sc.
CHEMISTRY
CH - 508: Chemistry of Biomolecules
(2019 Pattern) (CBCS) (Semester - V) (35138)

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) Figures to the right indicate full marks.*
- 4) Questions 2 to 5 carry equal marks.*
- 5) Draw neat diagram wherever necessary.*
- 6) Use of logarithm table and calculator is allowed.*

Q1) Solve any five of the following :

[5]

- a) Define lipids.
- b) Define carbohydrates
- c) Define eukaryotic cell
- d) Define conjugated proteins
- e) Define K_m
- f) What are hormones?

P.T.O.

- Q2) a)** Attempt any two of the following : **[6]**
- i) Explain the reaction amino acids with
 - 1) Sanger's reagent 2) Dansyl chloride
 - ii) What is action of excess of phenylhydrazine on glucose?
 - iii) Explain typical bacterial cell with diagram.
- b)** Solve the following : **[4]**
- i) Why LDL called as bad cholesterol and HDL as a good cholesterol?
 - ii) Discuss the effect of enzyme concentration on rate of enzyme catalysed reaction.
- Q3) a)** Answer any two of the following : **[6]**
- i) Discuss the non polar amino acids.
 - ii) Discuss the formation of ring structure of glucose from open chain structure.
 - iii) What are hormones? Describe classification of hormones.
- b)** Answer the following : **[4]**
- i) What are enzyme inhibitors & Give examples.
 - ii) Give reactions of alkaline hydrolysis of triacylglycerols.
- Q4) a)** Answer any two of the following : **[6]**
- i) Describe hydrogenation of oils? Give its importance.
 - ii) Discuss the concept of anomers.
 - iii) Give the significance of lipoproteins.
- b)** Solve the following : **[4]**
- i) Draw the structure of Maltose.
 - ii) Write short note on Inversion.

Q5) Write short note on any four of the following :

[10]

- a) Discuss tertiary structure of protein.
- b) Amphoteric nature of amino acids.
- c) Explain conjugated enzymes.
- d) Discuss amino acids derived hormones.
- e) Discuss reactions of glucose with acid and base.
- f) Discuss the concept of epimers.



Total No. of Questions : 5]

SEAT No. :

PE-1267

[Total No. of Pages : 2

[6501]-36

T.Y. B.Sc.

CHEMISTRY

**CH-510 (A) : Introduction to Medicinal Chemistry
(2019 Pattern) (CBCS) (Semester - V) (351310A)**

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 5 carry equal marks.
- 4) Figures to the right indicate full marks.
- 5) Draw neat diagrams wherever necessary.
- 6) Use of logarithm tables & Calculator is allowed.

Q1) Solve any five of the following :

[5]

- a) What are Immunobiologicals?
- b) Name any two antiviral agents.
- c) Define Therapeutic Index.
- d) What is selective toxicity?
- e) Name any two non-infectious diseases.
- f) Draw the structure of Aspirin.

Q2) a) Solve any two of the following :

[6]

- i) Draw the structure of penicillin. Write two shortcomings of penicillin.
- ii) What are anti-inflammatory agents? Give their 2 types. Write mode of action of NSAIDs.
- iii) Write note on : fungal infections and antifungal agents.

b) Answer the following :

[4]

What are sulphonamides? Discuss their mode of action and applications.

P.T.O.

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

- i) Define : Hypnotics & sedatives. Write characteristics of ideal sedatives.
- ii) Write note on : Sources of drugs.
- iii) Discuss Lipinski rule of five.

b) Answer the following : [4]

What is pharmacophore? Discuss 'Drug-Receptor' interactions.

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

- i) Write note on : CVDS and CRDs.
- ii) Discuss historical background of drug design and development.
- iii) Explain various physico-chemical parameters of drugs in designing.

b) Answer the following : [4]

What is pain? Define and write types of analgesic agents with one example each.

Q5) Draw structure, write any 2 properties and uses of any four drugs. [10]

- a) Amphotercin-B
- b) Salvarsan.
- c) Acyclovir.
- d) Cis platin
- e) Prednisone.



Total No. of Questions : 5]

SEAT No. :

PE-1268

[Total No. of Pages : 3

[6501]-37
T. Y. B.Sc. (Regular)
CHEMISTRY
CH-510 (B): Polymer Chemistry
(2019 Pattern) (CBCS) (Semester - V) (351310 B)

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 the logarithm tables and calculator is allowed.*

Q1) Attempt the following (any five) :

[5]

- a) Define the term-Homopolymer
- b) Bakelite was invented by the chemist_____.
- c) Give any two initiators used in cationic polymerization.
- d) What is meant by polymerisation?
- e) LDPE is the abbreviation used for _____
- f) Calculate the molecular weight of polyethylene polymer whose D_p value is 20,000.

P.T.O.

Q2) Attempt the following (any two) : **[6]**

- a)
 - i) Discuss solution polymerization in detail. Give its merits.
 - ii) Write the method of preparation, Properties and important uses of polytetra fluoroethylene (Teflon)
 - iii) Give the full account of free radical polymerization.
- b) Distinguish between the following : **[4]**
 - i) Natural and synthetic polymers
 - ii) Organic and Inorganic polymers.

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

- a)
 - i) What is glass transition temperature? Discuss any two factors affecting glass transition temperature.
 - ii) Discuss end group analysis method for determining number average molecular weight.
 - iii) What are conducting polymer? Draw the structure and give its commercial applications.
- b) What is addition polymerization? Give full account of cationic polymerization. **[4]**

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

- a)
 - i) Explain the method of preparation and uses of polystyrene.
 - ii) Give full account of suspension polymerisation.
 - iii) Explain in detail polyester.
- b) A certain polymer sample contain fractions A,B and C with their number and molecular weight as shown below. **[4]**

Fraction A: 50 molecules with molecular weight 7000 each

Fraction B: 70 molecules with molecular weight 6000 each

Fraction C: 100 molecules with molecular weight 4000 each

Calculate the number average molecular weight for the polymer.

Q5) Write short notes on any four of the following :

[10]

- a) Functionality of Monomer.
- b) Micelles in emulsion polymerization.
- c) Co-ordination polymerization.
- d) Polymethyl methacrylate.
- e) Polyisoprene.
- f) Relative viscosity.



Total No. of Questions : 5]

SEAT No. :

PE-1269

[Total No. of Pages : 2

[6501]-38
T. Y. B.Sc.
CHEMISTRY
CH-511 (A): Environmental Chemistry
(2019 Pattern) (CBCS) (Semester - V) (351311A)

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 tables and calculator is allowed.*

Q1) Solve any five of the following :

[5]

- a) Define “pollutant”.
- b) Define “condensation”
- c) What is pure water?
- d) Which method is used to detection of chloride in water analysis?
- e) Define “Eutrophication”.
- f) Define “sludge digestion”.

P.T.O.

- Q2) A) Attempt any two of the following : [6]**
- a) Explain Hydrological cycle.
 - b) Explain scope and importance of environmental chemistry.
 - c) Explain types of Eutrophication.
- B) Write short note on : [4]**
- a) Chemical oxygen demand.
 - b) Biological oxygen demand.
- Q3) A) Attempt any two of the following : [6]**
- a) Explain with diagram the carbon cycle.
 - b) Explain Nitrification and De-nitrification.
 - c) Explain sampling and preservation of water sample.
- B) Attempt the following : [4]**
- What is tertiary or Biological treatment of waste water?
- Q4) A) Attempt any two of the following : [6]**
- a) Describe activated sludge process.
 - b) Explain the determination of Dissolved oxygen by Winklar method.
 - c) Explain water pollution and its classification.
- B) Attempt the following : [4]**
- Explain ion exchange method for industrial waste water treatment.
- Q5) Write short notes on any four of the following : [10]**
- a) Biological Nitrogen Fixation
 - b) Types of Pollutant.
 - c) Surfactant.
 - d) Curcumin method
 - e) Ultrafiltration
 - f) Function of Atmosphere.



Total No. of Questions : 5]

SEAT No. :

PE-1270

[Total No. of Pages : 2

[6501]-39
T.Y. B.Sc.
CHEMISTRY
CH - 511(B) : Chemo-Informatics
(2019 Pattern)(Semester - V)(CBCS) (351311B)

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) *Figures to the right indicate full marks.*
- 4) *Draw neat diagrams wherever necessary.*
- 5) *Use of logarithm table and calculator is allowed.*

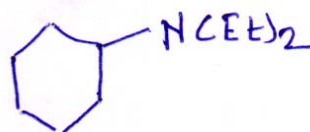
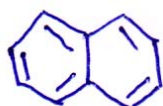
Q1) Answer any Five of the following: **[5]**

- a) Define line notation.
- b) What is Chemoinformatics?
- c) Give one example of spectraviewer program.
- d) What are 3D Structure?
- e) What is SMILE?
- f) What is Software?

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

- i) What is chromophore modeling? Explain with suitable example.
- ii) Explain the Futurstick opportunities of machine learning and artificial intelligence.
- iii) What is drug likeness rule? Give its limitations.

b) Write SMILE Notation for the following molecules. **[4]**



P.T.O.

- Q3)** a) Answer Any Two of the following : **[6]**
- i) Explain virtual screening in drug design.
 - ii) Describe application of ChEMBL.
 - iii) How do similarity and diversity search method work in chemoinformatics.
- b) Explain the importance of chemoinformatics in predicting and optimizing chemical reactions. **[4]**
-
- Q4)** a) Answer Any Two of the following : **[6]**
- i) What are molecular descriptors? How they are used in QSAR?
 - ii) Discuss how chemoinformatics supports quantum chemical calculations.
 - iii) Explain the significance of connection table.
- b) Describe the different types of chemoinformatics tools and their application. **[4]**
-
- Q5)** Write a note on any Four of the following: **[10]**
- a) Computer aided drug design.
 - b) Virtual Screening in drug design.
 - c) Machine Learning algorithms.
 - d) Role of chemoinformatics in predicting molecular properties.
 - e) Significance of molecular docking in chemoinformatics.
 - f) Applications of Gaussian and Schrodinger.



Total No. of Questions : 5]

SEAT No. :

PE-1271

[Total No. of Pages : 2

[6501]-40

T.Y. B.Sc.

BOTANY

BO-351 : Algae & Fungi

(2019 Pattern) (CBCS) (Semester - V) (Paper - I) (35141)

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) Question 2 to 5 carry equal marks.
- 4) Figures to right indicate full marks.
- 5) Draw neat labelled diagrams wherever necessary.

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

- a) Write any two general characters of thallophyta.
- b) Write any two examples of lower cryptogams.
- c) What are the different pigments present in group Algae?
- d) What is mycelium?
- e) Which is causal organism for Tikka disease of groundnut?
- f) What is mycobiont?

Q2) a) Explain the life cycle of Batrachospermum with reference to taxonomic position, occurrence, thallus structure & reproduction with neat labelled diagrams. [6]

b) Describe different types of mode of nutrition in group fungi. [4]

Q3) a) Explain in detail reproduction in Puccinia. [6]

b) Explain different methods of vegetative reproduction in Algae. [4]

P.T.O.

Q4) a) Describe lifecycle of Nostoc with reference to taxonomic position, thallus structure & reproduction with neat labelled diagram. [6]

b) What is lichen? Explain the different types of lichen thallus with neat labelled diagram. [4]

Q5) Write short note (Any four) : [10]

- a) Algae in industries.
- b) Thallus structure of Mucor
- c) Akinetes
- d) Thallus structure of Sargassum
- e) Symptoms of Tikka disease of groundnut.
- f) Significance of mycorrhizae.



Total No. of Questions : 5]

SEAT No. :

PE-1272

[Total No. of Pages : 2

[6501]-41

T.Y. B.Sc.

BOTANY

BO-352 : Archegoniate

(2019 Pattern) (CBCS) (Semester - V) (35142)

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) Question the 2 to 5 carry equal marks.
- 4) Figures to right indicate full marks.
- 5) Draw neat and labelled diagrams wherever necessary.

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

- a) What is Archegonium?
- b) Which generation is dominant in bryophytes?
- c) Give any two similarities between bryophytes and pteridophytes.
- d) Define apospory.
- e) Name the spore producing organ of Psilotum.
- f) Define Siphonostele.

Q2) a) Describe external morphology of Psilotum sporophyte. [6]

b) Write general characters of class Hepaticae. [4]

Q3) a) Explain progressive evolution theory of gametophyte in bryophytes.[6]

b) Describe internal structure of Equisetum stem. [4]

P.T.O.

Q4) a) Describe internal structure of selaginella strobilus. [6]

b) Describe external morphology of Funaria gametophyte. [4]

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

- a) Vegetative reproduction in Marchantia.
- b) Structure of mature Archegonium in Funaria.
- c) Strobilus theory of evolution in pteridophytes.
- d) General characters of class Psilopsida.
- e) Life cycle pattern of homosporous pteridophytes.
- f) Rhizophore of Selaginella.



Total No. of Questions : 5]

SEAT No. :

PE-1273

[Total No. of Pages : 2

[6501]-42

T. Y. B.Sc.

BOTANY

BO-353 : SPERMATOPHYTA AND PALAEOBOTANY

(2019 Pattern) (Semester - V) (Paper - III) (35143)

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) *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 five of the following :

[5]

- a) Define speciation.
- b) Mention any one example of family Amaranthaceae.
- c) What is artificial system of classification?
- d) What is pycnoxylic wood?
- e) Write any two characters of Gymnosperms.
- f) What is fossile?

P.T.O.

- Q2)** a) Give an account of distinguishing characters, floral formula and floral diagram of family Cannaceae. [6]
- b) Explain biological species concept. [4]
- Q3)** a) Describe T.S. of Pinus needle. [6]
- b) Give diagnostic characters and one example of family Amaranthaceae. [4]
- Q4)** a) Describe T.S. of Gnetum stem. [6]
- b) Give an account of Royal Botanical garden Kew. [4]
- Q5)** Write short notes on any four of the following : [10]
- a) Transitional combination theory
- b) Petrification
- c) Holoendemism
- d) Distinguishing characters of family Oleaceae.
- e) General characters of Order Gnetales.
- f) Importance of herbarium.



Total No. of Questions : 5]

SEAT No. :

PE-1274

[Total No. of Pages : 2

[6501]-43

T.Y. B.Sc.

BOTANY

BO-354 : Plant Ecology

(2019 Pattern) (CBCS) (Semester - V) (Paper - IV) (35144)

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) Define population.
- b) What are plant indicators?
- c) Define mortality?
- d) What is physiognomy?
- e) Write two advantages of remote sensing.
- f) Give any two goals of sustainable development.

Q2) a) Describe Raunkjer's life form classification.

[6]

b) Explain in brief biotic components of ecosystem.

[4]

Q3) a) Describe the phases of EIA.

[6]

b) Explain the causes of speciation.

[4]

P.T.O.

Q4) a) Discuss various types of environmental audits. [6]

b) Describe the Age pyramids. [4]

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

a) Sustainability indicators

b) Application of remote sensing in disaster management.

c) Certification process.

d) Benefits of EIA.

e) Sedimentation.

f) Food webs.



Total No. of Questions : 5]

SEAT No. :

PE-1275

[Total No. of Pages : 2

[6501]-44

T.Y. B.Sc. (Regular)

BOTANY

BO - 355 : Cell and Molecular Biology

(2019 Pattern)(CBCS)(Semester - V)(Paper - V)(35145)

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) Question 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) Enlist the types of cell.
- b) Enlist any two functions of Golgi apparatus.
- c) Define Nucleus.
- d) What is Karyotype?
- e) What is DNA replication?
- f) What is translation?

Q2) a) Explain the structure and functions of Mitochondria. [6]

b) Explain Avery, McCarty and Macleod Experiment. [4]

Q3) a) Define promoters. Explain Eukaryotic Promoters. [6]

b) Explain packaging of DNA into chromosomes in eukaryotes. [4]

Q4) a) Give a brief account of regulation of Tryptophan operon. [6]

b) Describe calcium signalling pathway in plants. [4]

P.T.O.

Q5) Write short notes on any four of the following :

[10]

- a) Structure of cell wall.
- b) Ultrastructure of nucleus.
- c) r-RNA
- d) Elongation of translation of Eukaryotes.
- e) Enzymes involved in eukaryotic DNA replication.
- f) Functions of Vacuoles.



Total No. of Questions : 5]

SEAT No. :

PE-1276

[Total No. of Pages : 2

[6501]-45

T.Y. B.Sc.

BOTANY

BO-356 : Genetics

(2019 Pattern) (CBCS) (Semester - V) (Paper - VI) (35146)

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) Question 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) What is Linkage?
- b) Define Transversion?
- c) What is epistasis?
- d) What $2n + 1$ denotes.
- e) Define Multiple Allele.
- f) Write any two types of Mutations.

Q2) a) What is sex-linked Inheritance? Explain X-linked Inheritance with suitable example. [6]

b) What is Monohybrid cross? Explain with suitable example. [4]

Q3) a) Write in detailed on Aneuploidy. [6]

b) Comment on Complementary Gene Interaction with suitable example. [4]

P.T.O.

- Q4)** a) What is Quantitative Inheritance? Explain with suitable example. [6]
b) Explain sporophytic self-Incompatibility with suitable example. [4]

Q5) Write Notes on any four : [10]

- a) Law of segregation.
- b) Test cross.
- c) Mutation.
- d) Petite Mutant in Yeast.
- e) Application of Genetics.
- f) Inversion.



Total No. of Questions : 5]

SEAT No. :

PE-1277

[Total No. of Pages : 2

[6501]-46

T.Y. B.Sc.

BOTANY

BO - 3510 : Medicinal Botany

(351410)(2019 Pattern)(CBCS)(Semester - V)(Paper - X)

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) 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) Define Medicinal Botany.
- b) Which state is the origin of siddha system of medicine.
- c) What is ethnoecology?
- d) Define Nursery.
- e) What are the 'Panchamahabhutas'?
- f) Define Indegenous System of Medicine.

Q2) a) What is In-Situ conservation? Mention importance of National Parks. **[6]**

b) Explain medicinal uses of Ashwagandha. **[4]**

Q3) a) Define Ethnobotany. Mention the brief account of ethenic communities of India. **[6]**

b) Describe the concept of 'Tridosha' **[4]**

P.T.O.

- Q4)** a) Explain the plants used to cure Diabetics. **[6]**
- b) Describe objectives of Nursery. **[4]**
- Q5)** Write a short notes on any four of the following : **[10]**
- a) Folk medicine.
- b) Endemic medicinal plants.
- c) Sacred grove
- d) Applications of Ethnobotany
- e) Air - layering
- f) Biosphere reserves



Total No. of Questions : 5]

SEAT No. :

PE-1278

[Total No. of Pages : 2

[6501]-47

T.Y. B.Sc.

BOTANY

**BO-3511 : Plant Diversity and Human Health
(2019 Pattern) (CBCS) (Semester - V) (351411)**

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) *Question 2 to 5 carry equal marks.*
- 4) *Figures to the right indicate full marks.*
- 5) *Draw neat labelled diagram wherever necessary.*

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

- a) What is ecosystem diversity?
- b) Define Agrobiodiversity.
- c) Give the full form of UNEP.
- d) What is meant by Coild Life Sanctuary?
- e) Write any two examples of medicinal plants.
- f) Enlist the values of biodiversity.

Q2) a) Explain Ex-situ conservation methods to maintain biodiversity. **[6]**

b) Write the role of IUCN in biodiversity conservation. **[4]**

Q3) a) Write about use of Agrobiodiversity. **[6]**

b) Give the importance of medicinal plants with examples. **[4]**

P.T.O.

- Q4)** a) Write an information of any two biosphere reserves. [6]
b) Explain the factors causing loss of species diversity. [4]

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

- a) Terrestrial Ecosystem.
- b) Beta and Gamma diversity.
- c) National parks.
- d) Importance of wild plants.
- e) Fiber Yielding Plants.
- f) Maintenance of Biodiversity.



Total No. of Questions : 5]

SEAT No. :

PE-1279

[Total No. of Pages : 2

[6501]-48

T.Y. B.Sc.

ZOOLOGY

ZO-351 : Pest Management

(2019 Pattern) (CBCS) (Semester - V) (Paper - I) (35151)

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 5 carry equal marks.

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

- a) What is Parasitoides?
- b) What is quarantine in Pest Management?
- c) Define sanitation.
- d) What is biological control?
- e) Define Entomopathogen.
- f) What is Predator?

Q2) a) Discuss biological measures with weed killers and their mass production. [6]

OR

Describe principle and components of IPM.

b) Explain systemic insecticides. [4]

Q3) a) Explain in detail insecticidal classification based on mode of action.[6]

OR

Explain prevention, suppression and eradication of pests.

b) Write uses of fungi and viruses in pest management. [4]

P.T.O.

Q4) a) Describe various methods of insecticide residue detection. **[6]**

OR

Explain the types of damages caused by the Pest.

b) Write advantages and disadvantages of IPM. **[4]**

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

- a) Crop rotation.
- b) Herbicides.
- c) Types of Pesticide.
- d) Maximum Permissible residue limit.
- e) Tillage.
- f) Safe handling of insecticides.



Total No. of Questions : 5]

SEAT No. :

PE-1280

[Total No. of Pages : 2

[6501]-49
T.Y. B.Sc.
ZOOLOGY
ZO-352 : Histology
(2019 Pattern) (CBCS) (Semester - V) (Paper - II) (35152)

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 5 carry equal marks.*

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

- a) Define tissue
- b) What is the function of parietal cells.
- c) What is the term heterodont?
- d) What is the function of zona glomerulosa of adrenal gland?
- e) Define histology.
- f) Write the function of corpus luteum.

Q2) a) Explain the histological structure of skin with the help of well labelled diagram. **[6]**

OR

Describe the histological structure of adrenal gland with the help of neat labelled diagram.

b) Write a note on C.S. of lung. **[4]**

Q3) a) Explain the T.S. of duodenum with the help of well labelled diagram. **[6]**

OR

Describe the histological structure of Testis (T.S.) with the help of neat labelled diagram.

b) Explain the histological structure of thyroid gland with neat labelled diagram. **[4]**

P.T.O.

- Q4)** a) Explain the histological structure of bone with the help of neat labelled diagram. [6]

OR

Discuss the histology of juxtaglomerular complex with its function.

- b) Draw a well labelled diagram of V.S. of tooth. [4]

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

- a) Taste buds in tongue.
- b) Rugae in stomach
- c) Adenohypophysis.
- d) Graffian follicle.
- e) Striated muscles
- f) T.S. of trachea.



Total No. of Questions : 4]

SEAT No. :

PE-1281

[Total No. of Pages : 2

[6501]-50
T. Y. B.Sc.
ZOOLOGY
ZO-353 : BIOLOGICAL CHEMISTRY
(CBCS) (2019 Pattern) (Semester - V) (Paper - III) (35153)

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 Bronsted acid.
- b) What are glycosidic bonds?
- c) Define non-essential amino acid.
- d) What are enzymes?
- e) What is Obesity?
- f) Give any two examples of monosaccharides.

P.T.O.

Q2) a) Give an account on IUB system of enzyme classification. **[6]**

OR

What is the biological significance of glycogenesis and glycogenolysis?

b) Explain the tertiary structure of protein with example. **[4]**

Q3) a) Describe competitive inhibition in enzyme. **[6]**

OR

What are carbohydrates? Give its biological importance.

b) What is Atherosclerosis? **[4]**

Q4) a) Derive Handerson - Hasselbalch equation and give its application. **[6]**

OR

What are Isoenzymes? Explain isoenzymes with example.

b) Write in brief importance of Biochemistry in Life sciences. **[4]**

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

a) Cofactor

b) Significance of carrier protein

c) PKV

d) Myocardial Infarction

e) Hypoglycemia



Total No. of Questions : 5]

SEAT No. :

PE-1282

[Total No. of Pages : 2

[6501]-51
T.Y. B.Sc. (Regular)
ZOOLOGY
ZO-354 : Genetics
(2019 Pattern) (Semester - V) (Paper - IV) (35154)

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 5 carry equal marks.*

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

- a) What is an allele?
- b) What is panmictic mating?
- c) Define hypodiploidy.
- d) What are base analogs?
- e) Define hypertrichosis.
- f) Define muton.

Q2) a) With the help of an example, explain the Law of Independent Assortment. **[6]**

OR

Explain the Hardy-Weinberg Law and give it's significance.

- b) Explain in detail ABO blood group system and give it's medico-legal importance. **[4]**

Q3) a) Explain the concept of Incomplete dominance by using a suitable example. **[6]**

OR

What are point mutations? Describe the various types of point mutations.

- b) What is genetic counselling? Discuss the steps involved in genetic counselling. **[4]**

P.T.O.

Q4) a) Describe the different types of structural alterations in chromosomes.[6]

OR

Describe XX-XY and ZZ-ZW type of sex determination in animals.

b) Explain the genetic basis of Down's syndrome & enlist its characteristic features. [4]

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

- a) Somatic mutation
- b) Parthenogenesis
- c) Haemophilia
- d) Intercalating agents
- e) Lethal alleles
- f) Patau syndrome.



Total No. of Questions : 5]

SEAT No. :

PE-1283

[Total No. of Pages : 2

[6501]-52

T.Y. B.Sc.

ZOOLOGY

ZO - 355 : Developmental Biology

(2019 Pattern)(CBCS)(Semester - V)(Paper - V)(35155)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any 3 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) Define growth
- b) Morphogenesis
- c) Organizer
- d) Chemotaxis
- e) Fertilization
- f) Cell Determination

Q2) a) Describe different types of eggs based on yolk amount & distribution with suitable examples. [6]

OR

- a) Describe detailed process of prevention of Polyspermy.
- b) Explain the structure of Hens egg. [4]

Q3) a) Describe any three basic cell movements in gastrulation. [6]

OR

- a) What is blastula? Add a note on different types of blastula with suitable examples.
- b) Describe different types of Cleavage. [4]

P.T.O.

Q4) a) Describe Fertilizin-Antifertilizin reaction. **[6]**

OR

a) Explain the process of fertilization & cleavage formation in chick development.

b) Draw neat labeled structure of human Ovum. **[4]**

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

a) Spermeogenesis

b) Meroblastic Cleavage

c) Fertilization cone

d) Germplasm theory

e) Acrosome reaction

f) Coeloblastula



Total No. of Questions : 5]

SEAT No. :

PE-1284

[Total No. of Pages : 2

[6501]-53
T.Y. B.Sc.
ZOOLOGY
ZO - 356 : Parasitology
(2019 Pattern)(CBCS)(Semester - V)(Paper - VI)(35156)

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 Medical Entomology.
- b) What is Definitive host?
- c) Define Superficial endoparasite.
- d) What is Encystation?
- e) Define structural specificity.
- f) Vector

Q2) a) Explain Life cycle of Taenia Solium in Pig. **[6]**

OR

- a) Describe morphology, pathogenicity & Treatment of Plasmodium Vivax.
- b) What is a host? Describe their types. **[4]**

Q3) a) Explain Life Cycle of Ascaris lumbricoides. **[6]**

OR

- a) Describe morphology and pathogenicity of Head louse.
- b) Control measures of Rat flea. **[4]**

P.T.O.

- Q4)** a) Describe in detail the mode of infection, pathogenicity and treatment of E. histolytica. [6]

OR

- a) What is host specificity? Explain Ecological host specificity.
b) Write morphology and control measures of soft tick. [4]

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

- a) Prophylaxis of Taenia Solium
b) Paratenic Host
c) Control measures of Ascaris lumbricoides.
d) Enlist branches of Parasitology.
e) Preventive measures of malaria.
f) Sporozoites.



Total No. of Questions : 5]

SEAT No. :

PE-1285

[Total No. of Pages : 2

[6501]-54

T.Y. B.Sc.

ZOOLOGY

ZO-3510 : Aquarium Management

(2019 Pattern) (CBCS) (Semester - V) (Paper - VII) (351510)

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 5 carry equal marks.

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

- a) What is aquarium?
- b) Angels fish.
- c) Write two common diseases of aquarium fish.
- d) How to manage Ammonia level in aquarium?
- e) Write the two rules & regulation of aquarium fish rearing.
- f) Write two examples of endemic aquarium fish species in India.

Q2) a) Describe the sexual diamorphism in sword tail fish. [6]

OR

Describe the scope of aquarium fish industry as cottage industry.

- b) Aquarium fish handling and packing. [4]

Q3) a) Write the budget for setting up an aquarium. [6]

OR

Write the importance of aquarium fish preservation and describe any two methods of aquarium fish preservation,

- b) Explain different types of live food for aquarium fishes. [4]

P.T.O.

Q4) a) Explain the Natural & Induced breeding methods for aquarium fishes.[6]

OR

Describe the three physico-chemical parameters of water for aquarium fish culture.

b) Write common characters of Guppy fish. [4]

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

- a) Exotic aquarium fish species in India.
- b) Causes of aquarium fish mortality.
- c) Gold fish.
- d) Composition of formulated fish food for aquarium fishes.
- e) Nutritional values of fish.
- f) Fish forwarding techniques.



Total No. of Questions : 5]

SEAT No. :

PE-1286

[Total No. of Pages : 2

[6501]-55
T. Y. B.Sc.
ZOOLOGY
ZO-3511 : POULTRY MANAGEMENT
(CBCS) (2019 Pattern) (Semester - V) (351511)

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) a) What is poultry? **[5]**

b) Define Broiler.

c) Describe poultry manure.

d) What is Ranikhet Disease?

e) What is AGMARK?

f) Define indigenous breed.

Q2) a) Explain requirements for establishment of poultry farms. **[6]**

OR

Describe digestive system of chicken.

b) Explain the process of egg formation in chicken. **[4]**

P.T.O.

Q3) a) Describe internal and external parasite of poultry bird. **[6]**

OR

Explain in details poultry byproducts.

b) Explain nutritional deficiency conditions in chicken. **[4]**

Q4) a) Describe general aspects of breeding for broiler. **[6]**

OR

Describe the vaccination schedule for poultry birds.

b) Explain present and future prospects poultry farming in India. **[4]**

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

- a) Selection of poultry birds
- b) Lighting schedule for poultry
- c) Methods of preservation of eggs.
- d) Feeder.
- e) Egg incubation
- f) Feed ingredients.



Total No. of Questions : 5]

SEAT No. :

PE-1287

[Total No. of Pages : 2

[6501]-56
T.Y. B.Sc. (Regular)
GEOLOGY
GL-311 : Geology of India - I
(2019 Pattern) (Semester - V) (35161)

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 Nos. 2 to 5 carry equal marks.

Q1) Answer the following in 2-3 sentences. (Any five) :

[5]

- a) What are Khondalites?
- b) Name older greenstone belt of Dharwar craton.
- c) Name any two important acidic intrusive found on Singhbhum - Odisha craton.
- d) Name the two cratons which form the Aravalli craton.
- e) Give the lithostratigraphic subdivisions of Cuddapah Supergroup.
- f) Give economic importance of Aravalli craton.

Q2) Write notes on:

- a) Sausar group. **[6]**
- b) Stratigraphic succession of Iron Ore Group. **[4]**

Q3) Write notes on:

- a) Stratigraphic succession of Chattisgarh group. **[6]**
- b) Stratigraphic succession and lithology of Bhilwara Supergroup. **[4]**

P.T.O.

Q4) Write notes on:

- a) Geographical distribution of Delhi Supergroup. [6]
- b) Charnockite series. [4]

Q5) Answer the following. (Any five) [10]

- a) Banded Gneissic complex.
- b) Singhbhum granite.
- c) Chamundi granite.
- d) Lithology of Kurnool group.
- e) Lithology of Singhora group of Chattisgarh basin.
- f) Geographical distribution of Kaladgi Supergroup.



Total No. of Questions : 5]

SEAT No. :

PE-1288

[Total No. of Pages : 2

[6501]-57
T.Y. B.Sc.
GEOLOGY
GL-312 : Mineral Resources
(2019 Pattern) (Semester - V) (35162)

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 Nos. 2 to 5 carry equal marks.

Q1) Answer the following in 2-3 sentences. (Any five) :

[5]

- a) Define ore minerals.
- b) Define metalliferous deposits.
- c) What is dissemination?
- d) What is metasomatic replacement?
- e) Define Vug.
- f) What are Gossans?

Q2) Answer the following:

- a) Explain magmatic seggregations.

[6]

- b) Give the uses of Uranium & Thorium.

[4]

Q3) Answer the following :

- a) Describe early magmatic concentration deposits.

[6]

- b) Give the geographical distribution of Lead-Zinc deposits in India.

[4]

P.T.O.

Q4) Answer the following:

- a) Describe mineral deposits by evaporation. [6]
- b) Describe requirements of supergene sulphide enrichment. [4]

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

- a) Zone of oxidation
- b) Geographical distribution of chromite deposits in India,
- c) Khetri copper belt.
- d) Geographical distribution of Iron ores in India.
- e) Occurrences of uranium & Thorium deposits in India.



Total No. of Questions : 5]

SEAT No. :

PE-1289

[Total No. of Pages : 2

[6501]-58
T. Y. B.Sc.
GEOLOGY
GL-313 : MARINE GEOLOGY
(2019 Pattern) (Semester - V) (Paper - III) (35163)

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 questions in 2-3 lines (Any 5) :

[5]

- a) Draw a neat labelled diagram of Physiographic divisions of Ocean.
- b) How Indian Ocean is different from Atlantic & Pacific Oceans.
- c) Define Explosion Seismology
- d) Define : Stromatolites.
- e) Define : Minamata disease.
- f) Give the existing EEZ area of India.

P.T.O.

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

a) Explain the Ocean floor rocks. **[6]**

b) Explain the Structure of Indian Ocean **[4]**

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

a) Define Lithogenous sediments. Give its origin and Composition in detail. **[6]**

b) Why are sediments interesting to Oceanographers. **[4]**

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

a) Explain marine environmental problems associated with petroleum pollution. Give its any one case study. **[6]**

b) Explain the disputes of EEZ. **[4]**

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

a) Define atoll and explain its formation.

b) Origin of Indian Ocean.

c) Seismic profiling.

d) Other types of Chemical pollutants.

e) Distribution of Biogenous sediments.

f) Importance of EEZ



Total No. of Questions : 5]

SEAT No. :

PE-1290

[Total No. of Pages : 2

[6501]-59
T.Y. B.Sc.
GEOLOGY
GL-314 : Engineering Geology
(2019 Pattern) (Semester - V) (Paper - IV) (35164)

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) *Neat diagrams must be drawn wherever necessary.*

Q1) Answer the following in 2-3 lines. (Any five) : **[5]**

- a) What is Brazilian test?
- b) Foundation rock.
- c) Porosity of rock.
- d) Name 2 gravity dams in India.
- e) Diagrammatic representation of Arch Dam.
- f) Nature of bed rock for Bridge construction.

Q2) a) Explain the factor controlling engineering property of rock: **[6]**

- i) Strength of rock
- ii) Elasticity of rock
- b) Define Building store. Explain factors influencing engineering usefulness of rocks. **[4]**

Q3) a) Explain site selection of Dam and Reservoir. **[6]**

- b) Enlist types of tunnels and mention name and location of any five tunnels in India. **[4]**

P.T.O.

- Q4)** a) Explain types of Bridges. Write a note on Mumbai - sea link. [6]
b) Give significance of geology in engineering and environmental projects.[4]

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

- a) Use of rock as an aggregate
- b) Foundation rock of Dam
- c) Specific gravity of rock
- d) Jawahar Tunnel
- e) Types of aggregates
- f) Grouting.



Total No. of Questions : 5]

SEAT No. :

PE-1291

[Total No. of Pages : 2

[6501]-60
T.Y. B.Sc.
GEOLOGY
GL-315 : Hydrogeology
(2019 Pattern) (Semester - V) (35165) (Revised Syllabus)

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. 2 to 5 carry equal marks.*

Q1) Answer the following question in 2-3 line (any five) :

[5]

- a) What is Gyben-Herzberg relation.
- b) Enlist major ions in groundwater
- c) What is Turbulent flow
- d) What is capillary water
- e) Define Hydrogeology
- f) Define specific retention.

P.T.O.

Q2) Answer the following :

- a) What are pumping tests? Explain procedure. [6]
- b) Enlist aquifer properties, explain any two in detail. [4]

Q3) Answer the following :

- a) Physical and chemical properties of water. [6]
- b) What is saline water intrusion in costal aquifers. [4]

Q4) Answer the following :

- a) What is well - inventory? Explain procedure [6]
- b) Explain Grain-size analysis method. [4]

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

- 1) Hydrogeology in Maharashtra
- 2) Fractured crystalline groundwater resources
- 3) Geogenic groundwater contamination
- 4) Vertical distribution of ground water
- 5) Aquifer and Aquitard
- 6) Perched aquifer



Total No. of Questions : 5]

SEAT No. :

PE1292

[Total No. of Pages : 2

[6501]-61
T.Y.B.Sc. (Regular)
GEOLOGY
GL 316 : Applied Geophysics
(Revised 2019 Pattern) (Semester - V) (35166)

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 No. 2 to 5 carry equal marks.

Q1) Answer the following question in 2-3 line (any 5). **[5]**

- a) What is electrode polarization.
- b) Define self potential.
- c) Define electrolytic polarization.
- d) Define Air Borne surveys.
- e) Define Anamoly.
- f) What is Gravimeter.

Q2) Answer the following.

- a) Explain fied procedure for electrode polarization method. **[6]**
- b) Type of magnetometers. **[4]**

Q3) Answer the following.

- a) Explain magnetic method for mineral exploration. **[6]**
- b) Explain resistivity method. **[4]**

P.T.O.

Q4) Answer the following.

- a) Explain principles of gravimeter. [6]
- b) Explain origin of self potential. [4]

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

- a) Seismic reflection method
- b) Principles of resistivity method
- c) Anomalies in electrical method
- d) Air borne surveys
- e) Gravimeter
- f) Magnetic anomalies



Total No. of Questions : 5]

SEAT No. :

PE-1293

[Total No. of Pages : 2

[6501]-62
T.Y. B.Sc.
GEOLOGY
GL-SEC-I : Geotechnology
(2019 Pattern) (Semester - V) (351610)

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. 2 to 5 carry equal marks.*

Q1) Answer the following questions in 2-3 line (any five) :

[5]

- a) Define Rotary drilling.
- b) Define Rock Quality Designation (RQD).
- c) Define foundation.
- d) Define levelling.
- e) Enlist any two objectives of surveying.
- f) What is main principle of Surveying.

P.T.O.

Q2) Answer the following :

- a) Explain determination of field density of soil by sand replacement method. [6]
- b) Explain Seive analysis of soil in detail. [4]

Q3) Answer the following :

- a) Define Bench marks and its types in detail. [6]
- b) Explain Double packer permeability test with neat labelled diagram in brief. [4]

Q4) Answer the following :

- a) Define foundations, types of foundations in details draw neat labelled diagrams of various foundations [6]
- b) Explain Plastic limit of soil and its determination. [4]

Q5) Write short notes on ANY FIVE of the following : [10]

- a) Triaxial Test.
- b) Explain Auger drilling and it's uses.
- c) The collimation system of computation of reduced level.
- d) Differential free swell test
- e) Uses of oven in geotechnical laboratory
- f) Enlist essential parts of Theodolite.



Total No. of Questions : 5]

SEAT No. :

PE-1294

[Total No. of Pages : 2

[6501]-63
T.Y. B.Sc.
GEOLOGY
SEC - II : GEMOLOGY & GEM TESTING
(2019 Pattern)(Semester - V) (351611)

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 5 carry equal marks.*
- 4) *Near diagrams must be drawn wherever necessary.*

Q1) Answer the following questions in 2-3 lines (any 5) : **[5]**

- a) Define Gemstone.
- b) What is sheen of a gemstone?
- c) Name varieties of rare gemstones.
- d) Which instruments are used for gem identification?
- e) Define Pleochroism.
- f) Write method of specific gravity determination.

Q2) Answer the following :

- a) Write a note on organic gemstone with examples. **[6]**
- b) Write in brief : Formation of Gemstones. **[4]**

Q3) Answer the following :

- a) Use of gem treatments and it's types. **[6]**
- b) Write a note on causes of colours in gemstones. **[4]**

P.T.O.

Q4) Answer the following :

- a) Describe gem species of Corundum W.R.T. their physical and optical properties. [6]
- b) Write a note on Polariscopes. [4]

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

- a) Distinction between synthetic & natural gemstones.
- b) Write a note on Diamond.
- c) Write a note on fluorescence with examples.
- d) Write a note on gem testing by Refractometer.
- e) Write a note on Dichroscope.
- f) Write a note on Opaque gem varieties.



Total No. of Questions : 4]

SEAT No. :

PE-1295

[Total No. of Pages : 2

[6501]-64

T.Y. B.Sc. (Regular)

STATISTICS (Principal)

ST-351 : Distribution Theory - I (Paper - I)

(2019 Pattern) (CBCS) (Semester - V) (35171)

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) If $X \sim \text{Cauchy}(0, 1)$ then expected value is _____.
 - a) 1
 - b) 0
 - c) λ
 - d) does not exist
 - ii) If $X_1, X_2, \dots, X_{10}$ are iid random variable from exponential distribution with parameter λ then the distribution of $X_{(1)}$ is _____.
 - a) λ
 - b) 5λ
 - c) 10λ
 - d) $n\lambda$
 - iii) If $X \sim \beta_1(2, 2)$ then the median of the distribution is _____.
 - a) 1
 - b) 0
 - c) $1/2$
 - d) does not exist
- b) State whether each of the following statement is true or false : **[1 each]**
 - i) If $X \sim \text{Cauchy}(0, 1)$ then distribution of $\frac{1}{X}$ is also follows $\text{Cauchy}(0, 1)$.
 - ii) Mean of the second kind of beta distribution is $\frac{n}{m-1}$.

P.T.O.

Q2) Attempt any two of the following :

[5 each]

- a) Let X_1, X_2, X_3 be a random sample from a distribution of the continuous type having pdf, $f(x) = 2x, 0 < x < 1$ zero elsewhere. Compute the probability that the smallest of X_1, X_2, X_3 exceeds the median of the distribution.
- b) State the pdf of first kind beta distribution and obtain its mean.
- c) Toss a fair coin 150 times. Use the central limit theorem to find an approximation for the probability that the number of heads is at least 70.

Q3) Attempt any two of the following :

[5 each]

- a) Define order statistic and for $X_1, X_2, X_3 \dots X_n$ i.i.d. random variables with pdf $f(x)$ and CDF $F(x)$ find the pdf of $X_{(n)}$.
- b) Find the interquartile range of Cauchy Distribution.
- c) State the pdf of Second kind beta distribution and obtain its mean.

Q4) Attempt any one of the following :

- a) If $X \sim G(\alpha, \lambda_1)$ and $Y \sim G(\alpha, \lambda_2)$ and X and Y are independent variables then prove that $X + Y$ and $\frac{X}{X + Y}$ are independent and $X + Y \sim G(\alpha, \lambda_1 + \lambda_2)$ and $\frac{X}{X + Y} \sim \beta_1(\lambda_1, \lambda_2)$. **[10]**
- b) i) Find first four raw moments of second kind beta distribution. **[5]**
ii) $X \sim C(0, 1)$ then find the distribution of $W = X^2$. **[5]**



Total No. of Questions : 4]

SEAT No. :

PE-1296

[Total No. of Pages : 3

[6501]-65

T.Y. B.Sc. (Regular)

STATISTICS (Principal)

ST-352 : Theory of Estimation (Paper - II)

(2019 Pattern) (CBCS) (Semester - V) (35172)

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 table and calculator is allowed.
- 4) Symbols and abbreviations have their usual meaning.

Q1) Attempt each of the following :

a) Choose the correct alternative for each of the following : [1 each]

i) Let $X_1, X_2, \dots, X_n$ be a random sample from $Normal(\mu, \sigma^2)$. A

statistic $T = \frac{\sum_{i=1}^n (X_i - \bar{X})^2}{n}$ is used to estimate σ^2 . The mean square

error of T is

- | | |
|---------------------------------|---------------------------------|
| a) $\frac{2\sigma^4}{n-1}$ | b) $\frac{2(n-1)\sigma^4}{n^2}$ |
| c) $\frac{(2n-1)\sigma^4}{n^2}$ | d) $\frac{\sigma^4}{(n-1)^2}$ |

ii) Let $X_1, X_2, \dots, X_n$ be a sample from an exponential distribution with parameter λ . The likelihood function is :

$$L(\lambda) = \lambda^n e^{-\lambda \sum_{i=1}^n x_i}$$

What is the MLE for λ ?

- | | |
|-------------------------------------|---------------------|
| a) $\bar{X}$ | b) $1/\bar{X}$ |
| c) $\frac{1}{n} \sum_{i=1}^n X_i^2$ | d) $\sqrt{\bar{X}}$ |

P.T.O.

Q4) Attempt any one of the following :

- a) i) Suppose $X_1, X_2, \dots, X_5$ be a random sample from $N(\mu, \sigma^2)$. Define

$$T_1 = \frac{X_1 + X_2 + \dots + X_5}{5}, \quad T_2 = \frac{2X_1 + X_3 + 3X_5}{6}$$

Check whether T_1 and T_2 are unbiased for μ , Which among the two is more efficient. [5]

- ii) Suppose that $X_1, X_2, \dots, X_n$ is a random sample from Bernoulli(θ) distribution. Verify whether $T = \sum_{i=1}^n X_i$ is sufficient statistic for θ . [5]

- b) i) Let $X_1, X_2, \dots, X_n$ be a random sample from $N(\mu, 4)$. Find Fisher information function $I(\mu)$. Check whether $\bar{X}$ is minimum variance bound unbiased estimator (MVBUE) of μ . [5]

- ii) Let $X \rightarrow B(n = 3, p)$ One observation on X is available It is known that p is either $\frac{1}{2}$ or $\frac{1}{3}$. Write the likelihood function. Find the most likely value of p for $x = 2$ or $x = 3$. [5]



Total No. of Questions : 4]

SEAT No. :

PE-1297

[Total No. of Pages : 2

[6501]-66

T.Y. B.Sc.

STATISTICS (Principal)

ST-353 : Design and Analysis of Experiments

(2019 Pattern) (CBCS) (Paper - III) (Semester - V) (35173)

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 their usual meaning.

Q1) Attempt each of the following :

- a) Choose the correct alternative in each of the following. [1each]
 - i) In Completely Randomized Design (CRD), with replications $\gamma_1 = 6$, $\gamma_2 = 5$, $\gamma_3 = 4$ and $\gamma_4 = 5$, error degrees of freedom.
A) 16 B) 15
C) 14 D) 19
 - ii) In 2^2 factorial experiment, simple effect of factor A at second level b_1 of B is
A) $(a) - (1)$ B) $(b) - (1)$
C) $(ab) - (a)$ D) $(ab) - (b)$
 - iii) In 2^3 factorial experiment the expression for interaction effect ABC is
A) $\frac{1}{4}(a-1)(b+1)(c+1)$ B) $\frac{1}{4}(a+1)(b+1)(c+1)$
C) $\frac{1}{4}(a+1)(b-1)(c-1)$ D) $\frac{1}{4}(a-1)(b-1)(c-1)$
- b) State whether each of the following statements is true or false: [1 each]
 - i) The variations due to assignable causes can be detected
 - ii) For validity of F test in analysis of variance, one of the assumption is various treatment and environmental effects are additive in nature.

P.T.O.

Q2) Attempt any two of the following. **[5 each]**

- a) Obtain the formula of efficiency of LSD over corresponding RBD by using rows as blocks.
- b) Explain the procedure for statistical analysis of 2^k factorial design
- c) Show that mean sum of squares due to error is unbiased estimator of error variance σ^2 in Randomized Block Design (RBD).

Q3) Attempt any two of the following. **[5 each]**

- a) State the model for Latin square design (LSD) with assumptions. Obtain the least squares estimators of parameters involved in this model.
- b) Define and explain with example Linear Treatment contrasts and orthogonal treatment contrasts.
- c) Explain the procedure for testing for equality of two specified treatment effects using critical difference method in case of CRD.

Q4) Attempt any one of the following.

- a)
 - i) Explain the procedure for analysis of non-normal data using Square root transformation for counts data. **[5]**
 - ii) Explain terms total and partial confounding in factorial experiments. **[5]**
- b)
 - i) Explain Yate's procedure to obtain factorial effect totals in 2^3 factorial experiment **[5]**
 - ii) State the layout and model of completely randomized design (CRD) along with appropriate assumption. Give the break up of total sum of squares into various components. **[5]**



Total No. of Questions : 4]

SEAT No. :

PE-1298

[Total No. of Pages : 2

[6501]-67

T.Y. B.Sc.

STATISTICS

**ST-354 : Statistical Process and Product Control
(2019 Pattern) (Semester - V) (Paper - IV) (35174)**

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) Which of the following is not one of the seven Process Control (PC) Tools?
A) Control Charts B) Check sheet
C) Pie Chart D) Pareto Chart
 - ii) When both upper and lower specification limits are given, the proportion of non-conformities is:
A) $P[X < USL] + P[X > LSL]$
B) $P[X < USL] - P[X > LSL]$
C) $P[X > USL] + P[X < LSL]$
D) $F[X < UCL] + P[X > LCL]$
 - iii) Control limits of c chart are based on
A) Uniform distribution B) Hypergeometric distribution
C) Binomial distribution D) Poisson distribution
- b) State whether each of the following statements is true or false :**[1 each]**
 - i) Dispersion of a process is monitored in R chart.
 - ii) If the lower control limit (LCL) for a p-chart comes out to be negative, then LCL is taken as 0.

P.T.O.

Q2) Attempt **any two** of the following. **[5 each]**

- a) Explain what are specification limits and tolerance limits, along with the comparison between them.
- b) Explain the construction of p- chart for variable sample size when standards are not given based on stabilized control limits.
- c) Distinguish between 100% inspection and sampling inspection.

Q3) Attempt **any two** of the following. **[5 each]**

- a) Explain the cause and effect diagram as one of the seven Process Control (PC) tools.
- b) For a sample of size 4, it is given that $\bar{\bar{X}} = 310$, $\bar{R} = 4.118$ given that control limits are 310 and 302 respectively. If the process average shifts to 308, calculate the probability of detecting this shift after the second sample.
- c) Write a note on acceptance sampling plan with rectification.

Q4) Attempt **any one** of the following.

- a) i) For a production process with size $n = 5$, $k = 25$, $\sum \bar{X}_i = 662.50$ and $\sum R_i = 9.00$. Assuming the process is in statistical control, estimate the process average and process standard deviation. If the specification limits are 26.40 ± 0.50 . Estimate the fraction nonconforming. **[6]**
- ii) Define the following terms with respect to a Single Sampling Plan: **[4]**
 - A) Acceptable Quality Level
 - B) Average Total Inspection
 - C) Producers risk(α)
 - D) Consumers risk (β)
- b) i) Explain the basis of control charts, Also justify the use of 3σ control limits for non-normal populations by means of Chebychev's inequality. **[6]**
- ii) Define Capability Performance Index (C_{pk}) and state its interpretations. What can be said about C_{pk} if process mean is centred at the norm? **[4]**



Total No. of Questions : 4]

SEAT No. :

[Total No. of Pages : 3

PE1299

[6501]-68

T.Y.B.Sc. (Regular)

STATISTICS

ST 355 : Operation Research-I

(2019 Pattern) (Semester-V) (35175)

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) The longest path in the network diagram is called _____.
 - i) head path
 - ii) sub path
 - iii) critical path
 - iv) sub critical path
 - b) _____ specifies the objective or goal of solving the Linear Programming Problem(LPP).
 - i) objective function
 - ii) decision variables
 - iii) constraints
 - iv) opportunity cost
 - c) The incoming variable column in the simplex algorithm is called
 - i) key column
 - ii) incoming column
 - iii) important column
 - iv) variable column
- B) State whether each of the following statements is true or false: **[1 each]**
- a) If the number of rows and columns in an assignment problem are not equal than it is called 'unbalanced assignment problem.
 - b) For obtaining Initial Basic Feasible Solution of transportation problem by using least cost method penalties are obtained.

P.T.O.

Q2) Attempt any two of the following.

[5 each]

- a) Solve the following Linear Programming Problem (LPP) using the Simplex Method:

$$\text{Maximize } Z = 3x + 2y$$

subject to

$$x + 2y \leq 8$$

$$2x + y \leq 6$$

$$x, y \geq 0$$

- b) Solve the transportation problem. Following matrix shows the cost of transportation.

From	To			Supply
	1	2	3	
A	10	18	9	100
B	4	3	11	200
C	6	9	15	400
Demand	250	150	300	700

- c) Define the following terms used in LPP.

- i) alternate solution.
- ii) feasible solution.
- iii) basic solution.
- iv) degenerate solution.
- v) unbounded solution.

Q3) Attempt any two of the following.

[5 each]

- a) Define terms

- i) Merge Events
- ii) Burst Events
- iii) Predecessor activity
- iv) Successor activity
- v) Dummy activity

- b) Obtain dual of the following problem

$$\text{Min } Z = 5x + 2y$$

Subject to

$$6x + y \geq 6$$

$$4x + 3y \geq 12$$

$$x + 2y = 9$$

$$x, y \geq 0$$

- c) Explain how an Assignment Problem (A.P.) may be considered as a special case of a Transportation Problem. (T.P.). When can it be said that an optimal solution to A.P. has been reached?

Q4) Attempt any one of the following.

- a) i) State the characteristics/ requirements of: [5]
Standard form of L.P.P. and Canonical form of L.P.P.
- ii) A project consists of nine activities with the following relevant information. [5]

Activity	A	B	C	D	E	F	G	H	I
Immediate Predecessor	-	-	-	A	A	B,D	C	C	F,G
Time Duration	8	10	8	10	16	17	18	14	9

Construct the project network diagram. Calculate the total float for each activity and hence indicate the critical path.

- b) i) Describe Hungarian method of solving assignment problem (minimization case). [5]
- ii) A company sells two different products A and B . The company makes profit of Rs. 40 and Rs. 30 per unit respectively on two products. The products are produced by a common production process and are sold in two different markets. The production process has capacity of 30000 man- hours. It takes 3 hours to produce a unit of product A and 1 hour to produce a unit of product B. The market has been surveyed and company officials found out that the minimum units that can be sold for product A and B are 8000 and 12000 respectively. Formulate the above as a linear programming problem. [5]



Total No. of Questions : 4]

SEAT No. :

PE1300

[Total No. of Pages : 2

[6501]-69

T.Y.B.Sc. (Regular)

STATISTICS (Principal)

ST-356 : Regression Analysis

(CBCS 2019 Pattern) (Semester - V) (Paper - VI) (35176)

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 table 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) In univariate logistic regression model, estimate of odds ratio is given by:

i) $\ln \hat{\beta}_1$

ii) $\frac{1}{\hat{\beta}_1}$

iii) $\sqrt{\hat{\beta}_1}$

iv) $e^{\hat{\beta}_1}$

b) An outlier is indicated by

- i) Large value of MSres
- ii) Large studentized residual
- iii) Small Cp statistic
- iv) Large value of R^2

c) In simple linear regression, estimate of β_0 is given by :

i) $\bar{y} - \hat{\beta}_1 \bar{x}$

ii) $\bar{x} - \hat{\beta}_1 \bar{y}$

iii) $\bar{y} + \hat{\beta}_1 \bar{x}$

iv) $\bar{x} + \hat{\beta}_1 \bar{y}$

P.T.O.

- B) In each of the following, state whether the given statement is true or false:
- When we fit the model $y = \beta_0 + \epsilon$ to the given data then $R^2 = 0$.
 - The sum of residuals in any regression model that contains an intercept term is always zero.

Q2) Attempt any two of the following. [5 each]

- Explain the procedure to fit multiple linear regression model,
 $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \epsilon$.
- Write a short note on plot of residuals against the fitted value.
- State the logistic regression model with single regressor. Explain logit transformation.

Q3) Attempt any two of the following. [5 each]

- What are outliers? How do they affect regression coefficients? Discuss how outliers are to be treated in regression analysis.
- Explain the role of coefficient of multiple determination as a criterion for evaluating the subset regression model in variable selection method.
- State the formulae for standardized residual and studentized residual for linear regression model. Also state the difference between them.

Q4) Attempt any one of the following.

- Write a short note on corrective measures for variance stabilizing transformation. [5]
 - Consider the simple linear regression model, $y = \beta_0 + \beta_1 x + \epsilon$ with $E(\epsilon) = 0$, $\text{var}(\epsilon) = \sigma^2$ and $\epsilon_i, i = 1, 2, \dots, n$ are uncorrelated. Show that,

$$\text{cov}(\hat{\beta}_0, \hat{\beta}_1) = \frac{-\bar{x}\sigma^2}{\sum_{i=1}^n (x_i - \bar{x})^2} \quad [5]$$

- Explain how residual plots are useful in verifying the assumptions in linear regression model. [5]
 - Explain the test procedure of likelihood ratio test in logistic regression. [5]



Total No. of Questions : 5]

SEAT No. :

PE-1301

[Total No. of Pages : 2

[6501]-70

T.Y. B.Sc. (Regular)

GEOGRAPHY

GG-351 : Regional Geography of India - I
(2019 Pattern) (Semester - V) (35181)

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) Name the boundary between India and China.
- b) Which is the Southern most location of India?
- c) State the major physical divisions of India.
- d) Name the tributaries of the Indus.
- e) Name any two districts of rain shadow zone in Maharashtra.
- f) Define soil degradation.

Q2) a) Describe the India's land frontiers. [6]

OR

Describe the location and extent of India.

b) Write a short note on laterite soils. [4]

Q3) a) Describe the Peninsular Plateau region of India. [6]

OR

Describe the Western Coastal plains of India.

b) Write a short note on mechanism of monsoon. [4]

P.T.O.

Q4) a) Explain the Indus River system. **[6]**

OR

Describe the Narmada River system.

b) Write in brief on mountain forests in India. **[4]**

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

- a) The Lakshadweep Islands.
- b) The Purvanchal
- c) The Krishna River System.
- d) El Nino and La Nina effect on monsoon
- e) Contour Bunding
- f) Alpine forests



Total No. of Questions : 5]

SEAT No. :

PE1302

[Total No. of Pages : 2

[6501]-71

T.Y.B.Sc. (Regular)

GEOGRAPHY

GG 352 : Geography of Economic Activities - I

(CBCS 2019 Pattern) (Semester - V) (35182)

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 economic activities?
- b) What is primary economic activities?
- c) Mention the type of secondary economic activities.
- d) Which physical factor affect on economic activities?
- e) What is resource?
- f) Write the types of resources?

Q2) a) Describe post industrialization development of economic activities. **[6]**

OR

Describe the water resource planning policy of Government of India.

b) Explain role of energy resources in economic development. **[4]**

Q3) a) Explain the Weber's model of industrial location.

[6]

OR

Discuss the indices network analysis.

b) Explain the economic factors effect on economic development. **[4]**

P.T.O.

Q4) a) Describe the classification of resources. **[6]**

OR

Describe the classification of economic activities.

b) Explain the significance of labour in economic activities. **[4]**

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

- a) Natural resources.
- b) Global energy crisis.
- c) Tertiary economic activities.
- d) Non - Renewable resources.
- e) Metallic resources.
- f) Quinary economic activities.



Total No. of Questions : 5]

SEAT No. :

PE-1303

[Total No. of Pages : 2

[6501]-72

T. Y. B.Sc. (Regular)

GEOGRAPHY

GG-353 : Fundamental of Tourism

(CBCS) (2019 Pattern) (Semester - V) (35183)

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 Tourism.
- b) What is Tourist?
- c) What is leisure?
- d) Give any two types of tourism.
- e) Write any two name of the famous waterfall in India.
- f) Write any two name of religious tourist place in India.

P.T.O.

Q2) a) Describe the nature and scope of tourism geography. **[6]**

OR

Describe the concept of Natural tourism and its significance in India.

b) Explain the role of geography in tourism. **[4]**

Q3) a) Explain the medical tourism potential of India. **[6]**

OR

Explain the pilgrimage tourism development in India.

b) Describe the concept of sustainable tourism. **[4]**

Q4) a) Discuss the positive and negative impact of social factors on tourism. **[6]**

OR

Discuss the role of MICE in tourism development.

b) Explain the concept of Agro tourism. **[4]**

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

a) Recreation

b) Cultural tourism.

c) Geotourism.

d) Religious tourism.

e) Negative impact of tourism.

f) Positive impact of tourism.



Total No. of Questions : 5]

SEAT No. :

PE1304

[Total No. of Pages : 2

[6501]-73

T.Y. B.Sc. (Regular)

GEOGRAPHY

GG-354 : Geography of Soil - I

(CBCS 2019 Pattern) (Semester - V) (35184)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

Q1) Solve any five of the following :

[5]

- a) Define porosity.
- b) Define calcification.
- c) Mention any two chemical properties of the soil.
- d) Mention the approaches to study the soil geography.
- e) Write any two features of 'A' Horizon of the soil profile.
- f) Define soil.

Q2) a) Explain the types of Physical Weathering.

[6]

OR

Describe the laterisation process of soil formation.

- b) Explain the nature of the soil geography.

[4]

P.T.O.

Q3) a) Explain the approaches to study the soil geography. **[6]**

OR

Describe the importance of soil studies in geography.

b) Discuss the factors affected on soil density. **[4]**

Q4) a) Describe the factors affected on soil moisture. **[6]**

OR

Explain in detail about soil water.

b) Discuss the alkalinity in the soil. **[4]**

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

- a) Soil PH
- b) Soil Humus
- c) Soil structure
- d) O Horizon of soil profile
- e) Parent rock as a soil forming factor
- f) Irrigation efficiancy of soil

x x x

Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE1305

[6501]-74

T.Y.B.Sc. (Regular)

GEOGRAPHY

**GG-355 : Management of Natural Disasters
(2019 Pattern) (CBCS) (Semester-V) (35185)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

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

- a) What do you understand by the term disaster?
- b) Define hazards.
- c) What is tsunami?
- d) Define the term drought.
- e) What is vulnerability?
- f) Write any two impact of cyclone.

Q2) a) Describe in brief the disaster management cycle. **[6]**

OR

Write the classification of natural disasters.

b) Discuss the community based disaster management. **[4]**

Q3) a) Describe the causes and impact of flood in India. **[6]**

OR

Describe the impact and distribution of landslides in India.

b) Write the role of government in mitigation to disasters. **[4]**

P.T.O.

Q4) a) Describe atmospheric disaster mapping in India. [6]

OR

Describe in brief the mitigation for disaster risk reduction.

b) Explain role of RS and GIS in disaster management. [4]

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

- a) Earthquake
- b) Drought
- c) Role of NGO's in response and mitigation to disasters.
- d) Do's and don'ts during disaster.
- e) Warning and alarm system.
- f) Geo-physical disaster in India.



Total No. of Questions : 5]

SEAT No. :

PE1306

[Total No. of Pages : 2

[6501]-75

T.Y.B.Sc. (Regular)

GEOGRAPHY

GG-356 : Geoinformatics - I

(CBCS 2019 Pattern) (Semester - V) (35186)

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 the term 'GIS'.
- b) Give any two component of GIS.
- c) Give any two data sources of GIS.
- d) What is topological errors.
- e) Define the term spatio temporal.
- f) What do you understand by term 'DEM'.

Q2) a) Describe in detail the historical development of GIS. **[6]**

OR

Discuss in detail the functions of GIS.

b) Explain raster data and write its characteristics. **[4]**

Q3) a) Explain in detail the processes of query analysis. **[6]**

OR

Write the concept of topographic analysis with example.

b) Explain the concept of topological errors. **[4]**

P.T.O.

Q4) a) Describe in detail the data sources of GIS. **[6]**

OR

Explain data types of GIS.

b) Explain the term multicriteria analysis in GIS. **[4]**

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

- a) Importance of Geoinformatics
- b) Vector data
- c) Overlay analysis
- d) Attribute data linking
- e) Aerial photographs
- f) TIN



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE1307

[6501]-76

T.Y. B.Sc. (Regular)

GEOGRAPHY

**GG 3510 : Research Methodology - I
(2019 Pattern) (CBCS) (Semester - V) (351810)**

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 research?
- b) Define research methodology.
- c) Null hypothesis - define.
- d) What is conceptual research?
- e) What is research problem?
- f) Define research design.

Q2) a) Describe types of research. [6]

OR

Explain various steps in research process.

b) Write characteristics of research. [4]

Q3) a) Describe characteristics of good research design. [6]

OR

Describe importance of research design.

b) Write a short note on applied research. [4]

P.T.O.

Q4) a) Explain the various sources of the research problem. **[6]**

OR

Describe techniques involved in defining a research problem.

b) Write in short on objectives of assumption about the research problem. **[4]**

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

- a) Objectives of research
- b) Descriptive research
- c) Hypothesis formulation
- d) Introduction to research methodology
- e) Research problem
- f) Research process



Total No. of Questions : 5]

SEAT No. :

PE1308

[Total No. of Pages : 2

[6501]-77

T.Y.B.Sc. (Regular)

GEOGRAPHY

SEC-GG - 3511 : Elementary Surveying

(CBCS 2019 Pattern) (Semester - V) (351811)

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 radial method of surveying?
- b) Define geodetic surveying.
- c) Write the methods of dumpy level.
- d) Define contour.
- e) Write any two advantages of DGPS surveying.
- f) Mention the methods of total station surveying.

Q2) a) Discuss the demerits of total station. **[6]**

OR

Explain the characteristics of total station.

b) Write the parts of dumpy level. **[4]**

Q3) a) Describe the function of methods of prismatic surveying. **[6]**

OR

Explain the function & methods of theodolite surveying.

b) Write the functions of total station. **[4]**

P.T.O.

Q4) a) Explain the advantages of drone surveying. **[6]**

OR

Discuss the applications of surveying.

b) Write the methods of surveying. **[4]**

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

- a) Dumpy level
- b) Setting up of prismatic compass
- c) Drone surveying
- d) Demerits of plane table surveying
- e) Intersection method of plane table surveying
- f) Features of total station



Total No. of Questions : 5]

SEAT No. :

PE-1309

[Total No. of Pages : 2

[6501]-78

T.Y. B.Sc.

MICROBIOLOGY

MB-351 : Medical Microbiology - I
(2019 Pattern) (CBCS) (Semester - V) (35191)

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.
- 4) Draw neat & labelled diagram wherever necessary.

Q1) Solve any five of the following :

[5]

- a) What is meant by intoxication?
- b) Define cystitis.
- c) Which of the virus can cause diarrhea?
 - i) Rotavirus
 - ii) Influenza virus
 - iii) Poliovirus
 - iv) Herpes virus
- d) Cryptococcosis is caused by _____.
- e) Write any two pathogens of urinary tract system.
- f) Write any two symptoms of leprosy.

Q2) a) Describe any two of the following.

[6]

- i) Cohort studies
- ii) Causative agent & symptoms of leptospirosis
- iii) Lab diagnosis of Mycobacterium tuberculosis

b) Write a note on spotted fevers.

[4]

P.T.O.

Q3) a) Explain any two of the following. [6]

- i) Principles & methods of clinical trials of drugs.
- ii) Sources & reservoirs of infections.
- iii) Functions of Liver.

b) Diagrammatically describe gastrointestinal system. [4]

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

- i) Non vaccine preventable bacterial diseases.
- ii) Laboratory diagnosis of Treponema.
- iii) Causative agents & symptoms of central nervous system.

b) Write in detail pathogenicity, lab diagnosis and epidemiology of salmonella. [4]

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

- a) Viability characteristics of Rickettsia.
- b) Pathogenicity of Neisseria gonorrhoeae.
- c) Causative agents & symptoms of respiratory tract infections.
- d) Diseases of urogenital system.
- e) Pathogenicity of streptococcus pneumoniae.
- f) Case control studies



Total No. of Questions : 5]

SEAT No. :

PE1310

[Total No. of Pages : 2

[6501]-79

T.Y.B.Sc. (Regular)

MICROBIOLOGY

MB - 352 : Immunology - I

(2019 Pattern) (Semester - V) (CBCS) (35192)

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) Draw neat, labelled diagram wherever necessary.

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

- a) Define adjuvant with example.
- b) Write application of direct ELISA.
- c) Enlist phagocytic cells.
- d) Enlist cardinal signs of inflammation.
- e) What are PRPs? Write any one example.
- f) Define antibody affinity.

Q2) a) Describe in detail (any two). **[6]**

- i) Structure of MHC in man.
- ii) T-dependent antigen
- iii) Vascular & Cellular changes during inflammation.

b) Describe the antigenic nature of antibody molecule. **[4]**

Q3) a) Explain in detail (any two) : **[6]**

- i) Types of grafts.
- ii) Characteristics of light & heavy chain domains.
- iii) Thymic selection process.

b) Explain Ouchterlony gel precipitation reactions. **[4]**

P.T.O.

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

- i) Discuss mixed lymphocyte reaction.
- ii) Diagrammatically represent the structure of MHC I molecule.
- iii) Discuss heavy chain gene organization.

b) Discuss in detail the classical complement pathway. **[4]**

Q5) Write short note on (any four). **[10]**

- a) Macrophages
- b) Lymphatic system
- c) Isoantigens
- d) HAT selection
- e) Adjuvant
- f) Antibody avidity



Total No. of Questions : 5]

SEAT No. :

PE1311

[Total No. of Pages : 2

[6501]-80

T.Y. B.Sc. (Regular)

MICROBIOLOGY

MB-353 : Enzymology

(2019 Pattern) (Semester - V) (35193)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question No. 1 is compulsory.
- 2) Solve any 3 questions from Q.2, Q.3, Q.4 and Q.5.
- 3) Figures to the right indicate full marks.
- 4) Draw neat labelled diagrams wherever necessary.

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

- a) Dialysis is a method of concentration of enzymes state true or false.
- b) Define specific activity.
- c) _____ is active form of chymotrypsinogen.
 - i) Chymotrin
 - ii) Trysinogen
 - iii) Chymotrypsin
 - iv) Trypsin
- d) Define international unit of an enzyme.
- e) Enlist any two radioisotopes used in enzyme assays.
- f) Enlist any two commonly occurring amino acids at active site of an enzyme.

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

- i) Describe molecular exclusion chromatography technique for enzyme purification
 - ii) Enlist properties of allosteric enzymes.
 - iii) What are advantages & disadvantages of radioisotope assays of enzyme?
- b) How enzymes are purified on the basis of their charge. **[4]**

P.T.O.

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

- i) Describe proteolytic modification of Zymogens.
- ii) Diagrammatically describe X-ray crystallography.
- iii) What are advantages of Line Weaver Burk equation over Michaelis Menton equation.

b) Describe adsorption chromatography technique for enzyme purification.**[4]**

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

- i) How enzyme compartmentation helps in metabolic regulation of enzyme?
- ii) What is the significance of k_M in enzyme kinetics.
- iii) Enlist various methods of disruption of cell to obtain enzyme for purification? What precautions are necessary to follow during this step?

b) Write the occurrence & structure of thiamine & vitamin D. **[4]**

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

- a) Spectrophotometric assays.
- b) Use of inhibitors to determine amino acid residue at active site of an enzyme.
- c) V_{max} .
- d) Feedback repression.
- e) Enzyme purification chart.
- f) Multienzyme complex.

x x x

Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE1312

[6501]-81

T.Y. B.Sc. (Regular)

MICROBIOLOGY

MB 354 : Genetics

(2019 Pattern) (CBCS) (Semester - V) (35194)

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.*
- 4) *Draw neat and labelled diagrams wherever necessary.*

Q1) Solve any five of the following :

[5]

- a) Define 'Replicon'.
- b) What is 'TATA' Box? Mention its role.
- c) Define 'RNA Splicing'.
- d) What is competent cell?
- e) What are X-gal?
- f) State True or False : Closer together the genes in chromosomal DNA, the recombination frequency increases during contrasduction.

Q2) a) Describe in detail (Any Two)

[6]

- i) Prokaryotic RNA polymerase.
- ii) 5' - capping of eukaryotic mRNA.
- iii) tRNA structure

b) Diagrammatically represent interrupted mating experiment.

[4]

P.T.O.

- Q3) a)** Explain in detail (Any Two) [6]
- i) Properties of F plasmid
 - ii) Specialized transduction
 - iii) Concept of gene linkage
- b) Diagrammatically explain Replication Fork. [4]
- Q4) a)** Explain in detail (Any Two) [6]
- i) Prepriming of DNA Replication process.
 - ii) Role of Eukaryotic RNA polymerase I.
 - iii) Formation of Hfr cell.
- b) Explain with suitable diagram 'Discovery of Transformation' by Frederick Griffith. [4]
- Q5) Write short notes on (Any Four) [10]**
- a) 'ter' sequence
 - b) Central dogma of Biology.
 - c) Lac I gene
 - d) Induction of Lac operon.
 - e) Transformasomes.
 - f) Transduction in Salmonella typhi.

x x x

Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE1313

[6501]-82

T.Y.B.Sc. (Regular)

MICROBIOLOGY

**MB 355 : Fermentation Technology-I
(2019 Pattern) (CBCS) (Semester-V) (35195)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

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

- a) Define strain improvement.
- b) What is media optimization?
- c) State true or false : Holding time is more for continuous sterilization.
- d) Compound with low boiling point is separated by _____.
- e) What do you mean by SOP?
- f) What are endotoxins?

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

- i) Describe advantages of Plackett & Burman design.
- ii) Draw diagram of continuous sterilization.
- iii) Describe any one type of industrial centrifuge.

b) Explain use of replica plate technique for isolation of mutants. **[4]**

Q3) a) Explain the following (Any two). **[6]**

- i) Process of rDNA technology.
- ii) Biological assay of antimicrobial compound.
- iii) Scale down in fermentation.

b) Explain in detail Del factor and write its advantages. **[4]**

P.T.O.

- Q4)** a) Discuss the following (Any two). [6]
- i) Disadvantages of classical and full factorial approach.
 - ii) Advantages of batch sterilization.
 - iii) Sterility checking of fermentation products.
- b) Discuss in detail the use of revertants in strain improvement. [4]

Q5) Write short notes (Any four). [10]

- a) Isolation of analogue resistant mutants.
- b) Objectives of media optimization.
- c) Filter sterilization.
- d) Liquid-Liquid extraction.
- e) IPR
- f) Non recurring expenditure of fermentation industry.



Total No. of Questions : 5]

SEAT No. :

PE1314

[Total No. of Pages : 2

[6501]-83

T.Y.B.Sc. (Regular)

MICROBIOLOGY

MB 356 : Agricultural Microbiology

(2019 Pattern) (CBCS) (Semester - V) (35196)

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 perennation.
- b) What is polyetic disease? Write example.
- c) Write examples of any two plant microbe interactions.
- d) Write significance of microorganisms in soil.
- e) Enlist methods of dissimination of microorganisms.
- f) Define rhizosphere.

Q2) a) Describe any two of the following.

[6]

- i) Chemical control of plant diseases.
- ii) Biofilm on plant surfaces.
- iii) Use of plant viruses in genetic engineering.

b) Describe in detail the mechanism of diazotrophy and micronutrient availability.

[4]

P.T.O.

- Q3) a)** Explain any two of the following. **[6]**
- i) Shuttle vectors.
 - ii) Explain disease triangle.
 - iii) Methods of eradication in plant disease control.
- b) Explain transgenic crops w.r.t. improved varieties & new variants of plants. **[4]**
-
- Q4) a)** Describe any two of the following. **[6]**
- i) Soil micro biome.
 - ii) Any two applications of plant biofilms.
 - iii) Symptoms of canker.
- b) Describe in detail the integrated paste management. **[4]**
-
- Q5) Write short notes on any four.** **[10]**
- a) Mosaic disease of plants.
 - b) Forecasting of plant disease.
 - c) Monocyclic disease.
 - d) Edible vaccines.
 - e) Potassium mobilization.
 - f) BT resistant crops.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE1315

[6501]-84

T.Y. B.Sc. (Regular)

MICROBIOLOGY

MB-3510 : Marine Microbiology

(2019 Pattern) (CBCS) (Semester - V) (351910)

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) *Draw neat & labelled diagrams wherever necessary.*

Q1) Solve any five of the following.

[5]

- a) What is biofilm?
- b) Define halophiles.
- c) Define bioprospecting.
- d) What is ecology?
- e) What is tar ball?
- f) What is marine snow?

Q2) a) Describe in detail. (Any Two)

[6]

- i) Hydrocarbon degradation by marine microorganism.
- ii) Role of Archaea in bioremediation & significance of archaea.
- iii) Marine habitat & polar habitat.

b) Draw neat labelled diagram of box cover & explain its sampling method.

[4]

P.T.O.

- Q3) a)** Explain in detail. (Any Two) **[6]**
- i) VBNC culturing method.
 - ii) Bioremediation of hydrocarbon pollutants.
 - iii) Hydrothermal vent habitat.
- b) Write a note on different types of extremophiles & give significance of any one type of extremophiles. **[4]**
-
- Q4) a)** Explain in detail. (Any Two) **[6]**
- i) Naskin samples.
 - ii) Biogeochemical cycling in marine environment.
 - iii) Formation of coral reefs & its importance in marine ecosystem.
- b) Write in details bioremediation of hydrocarbon pollutant. **[4]**
-
- Q5) Write short notes on (Any Four)** **[10]**
- a) Deep sea habitat
 - b) Thermophiles
 - c) Marine fungi
 - d) Salt marshes habitat
 - e) Heavy metal bioremediation by marine microorganism
 - f) Costal ecosystem applications



Total No. of Questions : 5]

SEAT No. :

PE1316

[Total No. of Pages : 2

[6501]-85

T.Y.B.Sc. (Regular)

MICROBIOLOGY

MB 3511 : Dairy Microbiology

(2019 Pattern) (Semester - V) (351911)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any three questions from question 2 to question 5.
- 3) Question 2 to 5 carry equal marks.
- 4) Draw neat & labelled diagrams wherever necessary.

Q1) Solve any five of the following.

[5]

- a) Define toned milk.
- b) What causes ropiness of milk.
- c) Brucellosis is milk borne disease. State true/false.
- d) What is bio film?
- e) pH of milk is ____
- f) Water adulteration in milk can be detected by
 - i) Refracto meter
 - ii) Lactometer
 - iii) Homogenizer
 - iv) Pasteurizer

Q2) a) Describe any two of the following.

[6]

- i) Skimmed milk
- ii) Importance of bactofugation
- iii) Role of pasteurization

b) Explain preservation of milk by physical & chemical methods.

[4]

P.T.O.

- Q3) a)** Explain any two of the following. **[6]**
- i) Milk borne diseases
 - ii) Role of immunoglobulins
 - iii) Good manufacturing practices
- b) Explain in detail bio film formation on equipment & their control measures. **[4]**

- Q4) a)** Discuss any two of the following. **[6]**
- i) Food grade preservatives
 - ii) Standard operating practices
 - iii) Physicochemical properties of milk
- b) Explain in detail sources of contamination of raw milk & importance of quality of milk. **[4]**

- Q5)** Write short notes on any four of the following. **[10]**
- a) Thermisation
 - b) Boiling of milk
 - c) Lycozyme & Lactoferrin
 - d) Difference between colostrum & milk
 - e) Stormy fermentation
 - f) Homogenized milk



Total No. of Questions : 5]

SEAT No. :

PE1317

[Total No. of Pages : 2

[6501]-86

T.Y.B.Sc. (Regular)

PSYCHOLOGY

Cognitive Psychology

(2019 Pattern) (Semester - V) (Paper - I) (35201)

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) Who gave the sociocultural theory of cognitive psychology.
- b) Define attention.
- c) Define perceptual constancy.
- d) State the types of long term memory.
- e) Founder of insightful learning.
- f) Define forgetting.

Q2) a) Explain the divided attention, selective attention, sustained attention. [6]

OR

How does operent conditioning affect learning behaviour?

- b) Critically evaluate the information processing perspective of cognitive psychology. [4]

Q3) a) Explore the practical applications of cognitive psychology. [6]

OR

Describe the various causes of forgetting.

- b) Evaluate the laws of trial and error method of learning. [4]

P.T.O.

Q4) a) Explain the insightful learning method with the help of experiment. **[6]**

OR

Describe the factors affecting problem solving.

b) Illustrate the process involved in sensation, attention & Perception. **[4]**

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

- a) Thinking - Cognitive process
- b) Nature of cognitive psychology
- c) Internal determinants of attention
- d) Colour constancy
- e) Types of attention
- f) Episodic memory



Total No. of Questions : 5]

SEAT No. :

PE1318

[Total No. of Pages : 2

[6501]-87

T.Y.B.Sc. (Regular)

PSYCHOLOGY

Psychopathology - I

(2019 Pattern) (Semester - V) (Paper - II) (35202)

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 stress.
- b) What is DSM based classification means?
- c) What is Alzheimer?
- d) Define anxiety.
- e) What is cognitive disorders?
- f) Define OCD.

Q2) a) Explain the Behaviouristic model.

[6]

OR

Discuss the criteria of abnormal behaviour.

b) Discuss the treatment for OCD.

[4]

Q3) a) Explain the Amnestic syndrome.

[6]

OR

Discuss causes of abnormal behaviour.

b) Explain in details the psychodynamic model of abnormality.

[4]

P.T.O.

Q4) a) Explain the various types of intellectual disability. **[6]**

OR

Discuss the pre DSM classification of mental disorder.

b) Explain the diathesis stress model of abnormality. **[4]**

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

- a) DSM. 5
- b) Panic disorder
- c) Schizophrenia
- d) Mania
- e) Delirium
- f) Dementia



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE1319

[6501]-88

T.Y. B.Sc. (Regular)

PSYCHOLOGY

Statistical Methods

(2019 Pattern) (Semester - V) (Paper - III) (35203)

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 variable.
- b) Define percentile rank.
- c) What is bar graph?
- d) What is mode?
- e) Who introduced the product moment method of correlation?
- f) What is graph?

Q2) a) What are Pictogram? How can statistical data be represented through such diagram? Illustrate with an example. **[6]**

OR

Compute average deviation from the following data

Scores	80-84	85-89	90-94	95-99	100-104	105-109	110-114
Frequency	4	4	3	0	3	3	1

b) Evaluate the inferential statistics. **[4]**

P.T.O.

Q3) a) Explain the various types of scales of measurement. **[6]**

OR

Find the rank order correlation coefficient from the following data.

Individuals	A	B	C	D	E	F	G	H	I	J
Rating by one	18	14	15	17	12	13	10	9	7	6
Rating by Second	15	16	14	13	9	10	8	7	11	6

b) Evaluate the type of measures of variability. **[4]**

Q4) a) Enumerate the needs and advantages of statistics in the field of Psychology. **[6]**

OR

Compute the Median from the achievement scores of the 25 students as given in the following.

72, 75, 77, 67, 72, 81, 78, 65, 86, 83, 67, 82, 76, 76, 69, 70, 83, 71, 62, 72, 72, 61, 67, 68, 64

b) Evaluate the application of Normal distribution curve. **[4]**

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

- a) Characteristics of normal probability.
- b) Application of range.
- c) Product moment correlation.
- d) Application of Central Tendency.
- e) Ratio Scale.
- f) Basics of graph.

x x x

Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE1320

[6501]-89

T.Y. B.Sc. (Regular)

PSYCHOLOGY

Organizational Behavior

(2019 Pattern) (Semester - V) (Paper - IV) (35204)

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 organizational behaviour.
- b) Define learning.
- c) What is stress?
- d) Define motivation.
- e) What is job stress?
- f) Define leadership.

Q2) a) What are biographical characteristics of Individual behavior.

[6]

OR

Discuss the challenges of organizational behavior.

- b) Critically evaluate the extrinsic and intrinsic motivation.

[4]

P.T.O.

Q3) a) Explain the various factors affecting on job satisfaction. **[6]**

OR

Discuss the application of emotional intelligence in organizational setting.

b) Evaluate the trait and behavioral models of leadership. **[4]**

Q4) a) Explain job enrichment in organizational planning. **[6]**

OR

Explain the group dynamics in organizational setting.

b) Compare any two theories of motivation. **[4]**

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

- a) Consequences of conflicts.
- b) Sources of stress.
- c) Contingency model of Leadership.
- d) Opportunities of organizational behavior.
- e) Role of Power in Leadership.
- f) Incentive system.

x x x

Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE1321

[6501]-90

T.Y.B.Sc. (Regular)

PSYCHOLOGY

Positive Psychology

(2019 Pattern) (Semester-V) (Paper-V) (35205)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

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

- a) Define positive psychology.
- b) Who is the founder of positive psychology?
- c) Define happiness.
- d) Define positive emotion.
- e) Define resilience.
- f) Define trait.

Q2) a) Elaborate the importance and significance fo positive psychology as newly emerging branch of psychology. **[6]**

OR

Distinguish between hedonic and eudaimonic happiness.

b) Describe the relationship between well being & happiness. **[4]**

Q3) a) Explain in brief the relation of positive psychology with health psychology. **[6]**

OR

Explain the effects of positive psychology on wellbeing.

b) Relate the positive traits and virtues in happiness. **[4]**

P.T.O.

Q4) a) Describe the three aspects of wellbeing. [6]

OR

Discuss the 7 cs of resilience behavior.

b) Analyse the process of cultivating positive emotions. [4]

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

- a) Growth through trauma
- b) Clinical perspective of resilience
- c) Basic types of positive emotions
- d) Self realization process
- e) Positive emotions & success
- f) Traditional psychology



Total No. of Questions : 5]

SEAT No. :

PE1322

[Total No. of Pages : 2

[6501]-91

T.Y.B.Sc. (Regular)

PSYCHOLOGY

Counseling Psychology

(2019 Pattern) (Semester - V) (35206) (Paper - VI)

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 initial disclosure.
- b) What is directive counseling.
- c) State the types of psychological tests.
- d) What is Eclectic approach?
- e) Define Positive regard.
- f) What are the application of psychological tests.

Q2) a) Explore the existential approach of counseling. [6]

OR

Explain the stages of positive regard in counseling.

- b) Differentiate between premarital and marital counseling. [4]

Q3) a) Describe the advantages and challenges of family counseling. [6]

OR

Discuss the application and limitations of psychological tests in counseling.

- b) Differentiate between directive and non directive counseling. [4]

P.T.O.

Q4) a) Explain the main concepts of humanistic approach. **[6]**

OR

Describe the process of diagnosis of problem during counseling.

b) Justify the implication of behaviouristic approach in counseling. **[4]**

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

- a) Advantages of career counseling.
- b) Genuineness
- c) Test interpretation in counseling.
- d) Challenges in building trust during counseling.
- e) Limitations of diagnosis.
- f) Challenges following ethics in counseling.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE1323

[6501]-92

T.Y. B.Sc. (Regular)

PSYCHOLOGY

SEC - I : Basic Counseling Skills

(2019 Pattern) (Semester - V) (352010)

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 Counseling.
- b) State the benefits of counseling.
- c) Why is eye contact important in counseling?
- d) Define immediacy.
- e) What is empathy?
- f) Who gave the concept of empathy in counseling?

Q2) a) Explain the various types of counseling. [6]

OR

Explain the importance and tips of active listening in counseling.

- b) Analyze the different signs of showing attention and interest to the clients. [4]

Q3) a) Explain the stages of counseling. [6]

OR

Explain the various communication skills of counselors.

- b) Differentiate between genuineness and concreteness. [4]

P.T.O.

Q4) a) Describe the types of empathy and importance of empathy. **[6]**

OR

Explain the role of clothing and grooming of a counselor in counseling.

b) Distinguish between open ended and close ended questions. **[4]**

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

- a) Goals of Counseling.
- b) Facial expressions of counselor.
- c) Self disclosure.
- d) Paraphrasing of questions.
- e) Additive empathy.
- f) Advantages of relation skills.



Total No. of Questions : 5]

SEAT No. :

PE1324

[Total No. of Pages : 2

[6501]-93

T.Y.B.Sc. (Regular)

PSYCHOLOGY

SEC - II : Personality Development

(2019 Pattern) (New) (Semester - V) (352011)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

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

- a) State the full form of SWOT.
- b) Define introversion.
- c) What is non verbal communication?
- d) Define team.
- e) What is manner?
- f) Define career.

Q2) a) Explain the various types of written communication. **[6]**

OR

Discuss the role of team workers.

b) Analysis the SWOT Analysis in personality development. **[4]**

Q3) a) Explain the challenges and advantages of self assessment. **[6]**

OR

Explore the tips to avoid interview mistakes.

b) Describe the obstacles of career planning. **[4]**

P.T.O.

Q4) a) Explain the various benefits of goal setting and types of goal setting. **[6]**

OR

Explain the email etiquettes and techniques of email etiquettes.

b) Analyze the behaviour characteristics of introvert personality. **[4]**

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

a) Characteristics of ambient personality.

b) Building interpersonal relations.

c) Types of interview questions.

d) Types of layouts.

e) Skills in team workers.

f) Office etiquettes.



Total No. of Questions : 5]

SEAT No. :

PE1325

[Total No. of Pages : 2

[6501]-94

T.Y.B.Sc. (Regular)

ELECTRONIC SCIENCE

EL 351 : Digital Design Using Verilog

(Revised 2019 CBCS Pattern) (Semester - V) (Paper - I) (2 Credits)

(35221)

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.*

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

- a) Verilog HDL is suitable for design of _____
- b) Which is most basic statement used in data flow modeling.
- c) //A = 1b1 B = 2'b10 then what is result of {A, B}
- d) What is main advantage of logic synthesis tool?
- e) RTL in logic synthesis stands for _____.
- f) Find out in-valid identifier name-
 - i) integer var - a
 - ii) integer &var - a

Q2) Attempt the following.

- a)
 - i) Draw symbols for but/not gate primitives in verilog. [2]
 - ii) Write a short note on keywords and identifiers used in verilog. [4]
- b) Write a note on verilog predefined gate primitives, other than but/not gate primitives. [4]

Q3) Attempt the following.

- a)
 - i) What is the result of following bitwise operation- [2]
//X = 4'b1000, Y = 4'b1111
 - 1) NX
 - 2) X|Y
 - ii) Compare VHDL and verilog HDL. [4]
- b) Explain with suitable example arithmetical and logical operators used in verilog. [4]

P.T.O.

Q4) Attempt the following.

- a) i) What are the different looping statements in verilog. [2]
- ii) Explain with suitable diagram programmable array logic (PAL). [4]
- b) Write a short note on PLD's. [4]

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

- a) Explain with suitable block diagram programmable Array logic.
- b) Write a verilog code for two bit magnitude comparator.
- c) Draw the flow chart for logic synthesis from RTL to optimized gate level representation.
- d) Write a short note on structured procedures in verilog.
- e) Write verilog code for full adder using data level modeling.
- f) Write short note on FPGA.



Total No. of Questions : 5]

SEAT No. :

PE1326

[Total No. of Pages : 2

[6501]-95

T.Y.B.Sc. (Regular)

ELECTRONIC SCIENCE

EL-352 : Microcontroller Architecture & Programming

(Revised 2019 Pattern) (CBCS -2 Credits) (Semester - V) (Paper - II)

(35222)

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) *Q.2 to Q.5 carry equal marks.*

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

- a) What is Von - Neumann architecture?
- b) What do you mean by machine language?
- c) What is the use of hex file?
- d) Define compiler.
- e) List the functions used to insert delay in AVR C program.
- f) State the role of 'en' pin in LCD.

Q2) Attempt the following.

- a) i) How many bidirectional I/O pins ATmega16 have? State the dual function of PORTA in AVR ATmega16. [2]
ii) Explain any four bitwise operators with example in C. [4]
- b) Write AVR C program for hexadecimal to ASCII conversion. [4]

Q3) Attempt the following.

- a) i) Define variable and array. [2]
ii) Write AVR C program to generate triangular wave using DAC. [4]
- b) Draw the interfacing diagram for interfacing of LED on pin 0 of PORTB and write AVR C program to toggle it continuously. [4]

P.T.O.

Q4) Attempt the following.

- a) i) Draw the interfacing diagram of stepper motor with AVR ATmega16. [2]
ii) Give the features of AVR ATmega16. [4]
- b) Give the classification of microcontroller on the basis of architecture and instruction set. [4]

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

- a) What is the role of EEPROM in AVR?
- b) Write the syntax of 'While' loop.
- c) Give an example of 'if' statement.
- d) Write short note on two - dimensional array.
- e) Write AVR C program to read data from PORTA and send its complement to PORTD.
- f) Write AVR C program to convert decimal number into Hexadecimal and load MSD to PORTD & LSD to PORTC.



Total No. of Questions : 5]

SEAT No. :

PE1327

[Total No. of Pages : 2

[6501]-96

T.Y. B.Sc. (Regular)

ELECTRICAL SCIENCE

EL - 353 : Analog Circuit Design and Applications

(2019 Pattern) (CBCS) (Semester - V) (Paper - III) (35223)

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 Question 5 carry equal marks.

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

- a) Which parameter of the op-amp is taken into consideration for amplifying an input signal in microvolts.
- b) Exponential term in log amplifier is due to exponential behaviour of which part of diode.
- c) State the name of component used as fast switch in sample and hold circuit.
- d) State the working principle of Quartz crystal.
- e) What do you mean by CCS used in block diagram of function generator.
- f) What is the number of voltage regulator IC which provides - gv at the output?

Q2) Attempt the following :

- a) i) Draw the circuit diagram of op-amp to remove the output offset voltage used as inverting amplifier. **[2]**
ii) Draw the circuit diagram of practical log amplifier using diode and op-amp. Derive the equation for output voltage. **[4]**
- b) Draw and explain the working of astable multivibrator using op-amp. **[4]**

P.T.O.

Q3) Attempt the following :

- a) i) Write a note on virtual ground of op-amp. [2]
- ii) Draw and explain the circuit diagram of peak detector. [4]
- b) With the help of circuit diagram explain square and triangular wave generator using two op-amps. [4]

Q4) Attempt the following :

- a) i) Draw the internal block diagram of 3-pin voltage regulator IC. [2]
- ii) Draw and explain the circuit diagram of inverting Schmitt trigger using op-amp. [4]
- b) With the help of circuit diagram explain dual power supply using bridge rectifier and voltage regulating IC LM 340 and LM320. [4]

Q5) Attempt any four of the following : [10]

- a) Define output offset voltage of op-amp and state its ideal and practical value.
- b) State any five parameters of op-amp.
- c) State the name of basic and derived waveform used in function generator.
- d) Draw the block diagram of PLL as frequency multiplier and write its output equation.
- e) State three conditions used in any oscillator circuit and state the Barkhaussain condition.
- f) Explain the role of constant current source used in function generator IC 8038 and draw the symbol of it.

x x x

Total No. of Questions : 5]

SEAT No. :

PE1328

[Total No. of Pages : 2

[6501]-97

T.Y. B.Sc. (Regular)

ELECTRONIC SCIENCE

EL-354 : Nanoelectronics

(Revised 2019 Pattern) (Semester - V) (Paper - IV) (35224)

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.

Q1) Attempt any five of the following :

[5]

- a) What is flash memory.
- b) What do you mean by quantum confinement.
- c) What is function of condensor lense in TEM.
- d) Which common instrument is used for recording of diffraction pattern.
- e) What is CNT.
- f) What is semiconductor Nanowire.

Q2) a) Attempt the following :

- i) List application of Nanotechnology in electronics. **[2]**
- ii) What is metamaterials? State its properties. **[4]**
- b) Explain working of resonance tunneling diode. Draw its I-V characteristics.**[4]**

P.T.O.

Q3) a) Attempt the following :

- i) Explain 2-dimensional system with example. [2]
 - ii) List main components used in UV visible spectrophotometer? State its application. [4]
- b) What is STM. State its working principle. [4]

Q4) a) Attempt the following :

- i) What information does the XRD pattern of a crystal provide? [2]
 - ii) Explain lattice - matched and lattice mismatched materials. [4]
- b) Write brief note on working and characteristics of carbon nanotube based Field effect transistor (FET). [4]

Q5) Attempt any four of the following : [10]

- a) What is SEM? What are back scattered electron?
- b) Explain coulomb blockade effect.
- c) What is organic semiconductor state its application.
- d) Explain quantum dot laser.
- e) What is AFM? State different operating modes in AFM.
- f) What makes nanowire interesting? What are their applications.

x x x

Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE1329

[6501]-98

T.Y.B.Sc. (Regular)

ELECTRONIC SCIENCE

EL-355 : Signals and Systems

(2019 Pattern) (CBCS) (Semester-V) (Paper-V) (35225)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

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

- a) Give the classification of signals.
- b) What do you mean by sampling of a signal?
- c) State the classification of systems.
- d) What is aliasing effect in sampling of a signal?
- e) Define inverse laplace transform of a function.
- f) State the condition for periodicity of DT signal.

Q2) Attempt the following.

- a) i) Find Laplace transform of e^{at} . **[2]**
ii) Define even and odd CT type signals and draw their waveforms. **[4]**
- b) Check whether the following continuous time system is time invariant or time variant . $y(t)=\sin x(t)$ **[4]**

Q3) Attempt the following.

- a) i) State Nyquist's rate for sampling of a signal. **[2]**
ii) Find $L^{-1}\left\{\frac{4s+12}{s^2+8s+16}\right\}$ **[4]**
- b) Find the Laplace transform of $f'(t)$. **[4]**

P.T.O.

Q4) Attempt the following.

- a) i) Define Nyquist's frequency in sampling of a signal. [2]
- ii) Using the Laplace transform, solve $y' - y = e^{3t}$, $y(0) = 2$. [4]
- b) Explain digital signal processing system with a neat block diagram. [4]

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

- a) What is meant by a non-linear CT system? State the condition for a CT system to be a non-linear.
- b) Define Fourier series for a periodic function.
- c) What do you mean by sampling of a signal? Define the sampling frequency.
- d) What is a non-linear DT system? State the condition for a DT system to be a non-linear.
- e) Define LT of a function and find LT of 1.
- f) State the role of anti-aliasing filter in sampling process.



Total No. of Questions : 5]

SEAT No. :

PE1330

[Total No. of Pages : 2

[6501]-99

T.Y.B.Sc. (Regular)

ELECTRONIC SCIENCE

EL 356(A) : Optics and Fiber Optic Communication

(Revised 2019 CBCS Pattern) (Semester - V) (Paper - VI(A)) (35226A)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any three questions from question 2 to question 5.
- 3) Question 2 to 5 carry equal marks.

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

- a) What is splicing of optical fiber?
- b) State any two advantages of optical fiber communication.
- c) Define the term dispersion in optical fiber.
- d) Compare between coherent and non - coherent source.
- e) State advantages of LASER diode.
- f) What is SONET?

Q2) Attempt the following.

- a) i) Draw block diagram of optical transport network. **[2]**
ii) Explain the method for measurement of numerical aperture with suitable diagram. **[4]**
- b) Explain ray transmission theory in step index multimode fiber with its index profile. State its advantages over single mode fiber. **[4]**

Q3) Attempt the following.

- a) i) State applications of SDH. **[2]**
ii) With the help of block diagram, explain function of optical fiber communication system. **[4]**
- b) Explain the principle of operation of LASER diode with suitable diagram. **[4]**

P.T.O.

Q4) Attempt the following.

- a) i) Define the terms acceptance angle and critical angle. [2]
- ii) Explain scattering loss in optical fiber. [4]
- b) Calculate responsivity of photodiode if quantum efficiency is 0.44 at $0.8\ \mu\text{m}$ wavelength. [4]

[Given : $e = 1.602 \times 10^{-19}$ coulomb, $h = 6.63 \times 10^{-34}$ J.S.

$$c = 3 \times 10^8 \text{ m/s}]$$

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

- a) A multimode fiber having core refractive index 1.48 and cladding refractive index 1.44. Calculate critical angle and numerical aperture.
- b) Write a short note on fiber connectors.
- c) Explain concept of pulse broadening in optical fiber.
- d) With suitable diagram, explain working principle of P-I-N photodiode.
- e) Explain mesh and tree topology with suitable diagram.
- f) What is SDH? State its function.



Total No. of Questions : 5]

SEAT No. :

PE1331

[Total No. of Pages : 2

[6501]-100

T.Y.B.Sc. (Regular)

ELECTRONIC SCIENCE

**EL 356(B) : Electronic Product Design and Entrepreneurship
(2019 CBCS Pattern) (Semester - V) (Paper - VI (B)) (35226B)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any three questions from question 2 to question 5.
- 3) Question 2 to question 5 carry equal marks.

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

- a) What is MTBF?
- b) What do you mean by simulation?
- c) Define memo.
- d) What is the meaning of integration?
- e) What is documentation?
- f) What is in-circuit emulator?

Q2) Attempt the following.

- a) i) Give the meaning of proposal document. **[2]**
ii) Describe various stages in electronic product development. **[4]**
- b) Explain top-down approach with the help of block diagram. **[4]**

Q3) Attempt the following.

- a) i) Describe technical presentation. **[2]**
ii) Write in short the role of inspection in quality control. **[4]**
- b) Write a short note on “Motivational factors” to become entrepreneur. **[4]**

P.T.O.

Q4) Attempt the following.

- a) i) Enlist any four applications of ergonomics in product design. [2]
- ii) Compare assembler with compiler by giving any four points. [4]
- b) Explain a role of entrepreneur in economic development. [4]

Q5) Attempt the following (any four). [10]

- a) Explain any five requirements of ergonomics.
- b) Give the significance of EMI and EMC.
- c) Explain failure rate in product development.
- d) Write any five steps in preparation of effective document.
- e) Explain in short verification of product.
- f) Write any five types of entrepreneurship.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE1332

[6501]-101

T.Y. B.Sc. (Regular)

ELECTRONIC SCIENCE

ELSEC 351 : Electronic Design Automation Tools

(CBCS 2019 Pattern) (Semester - V) (Paper - X) (352210)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Q.1 is compulsory.
- 2) Solve any three 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 is the purpose of EDA tools?
- b) What is AC analysis in PSPICE?
- c) How many types of libraries are available in PSPICE?
- d) In which EDA tool virtual instrument is available?
- e) What is the purpose of status line in multisim?
- f) What is transient analysis?

Q2) Attempt the following.

- a) i) What is the purpose of wire tool and place tool in PSPICE? **[2]**
ii) Write a note on circuit mod and explain the steps involved in it for circuit simulation. **[4]**
- b) Write a short note on Orcad. State the names of analysis performed by using Orcad. **[4]**

Q3) Attempt the following.

- a) i) What is the capture file in PSPICE? **[2]**
ii) State any four advantages of circuit simulation. **[4]**
- b) Write a note on output files used in PSPICE. **[4]**

P.T.O.

Q4) Attempt the following.

- a) i) What is the role of simulate button in multisim and which kind of simulation multisim supports? [2]
- ii) What is netlist detail and DRC in circuit simulation. [4]
- b) Which files are needed for circuit simulation? Describe each one in detail. [4]

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

- a) Write a short note on LTSPICE.
- b) Explain stimulus editor used in PSPICE.
- c) What is the role of create and edit component tool used in any circuit simulation software?
- d) What is schematic capture in multisim?
- e) Write a short note on Proteus software.
- f) What is the role of schematic capture in proteus?



Total No. of Questions : 5]

SEAT No. :

PE1333

[Total No. of Pages : 2

[6501]-102

T.Y.B.Sc. (Regular)

ELECTRONIC SCIENCE

ELSEC 352 : Internet of Things and Applications

(CBCS 2019 Pattern) (Semester - V) (Paper - XI) (352211)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any three questions from question 2 to question 5.
- 3) Question 2 to 5 carry equal marks.

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

- a) What is the physical design of an IoT device?
- b) Where is z-wave used?
- c) How does a smart irrigation system work?
- d) Name the factors that IoT enhances transport and traffic management?
- e) What is smart agriculture in IoT?
- f) Name the key enabling technologies of IoT?

Q2) Attempt the following. [10]

- a) i) What are the characteristics of e-Health systems? [2]
ii) Explain the characteristics and applications of IoT in smart cities.[4]
- b) Explain Bluetooth and BLE technologies with applications in IoT. [4]

Q3) Attempt the following. [10]

- a) i) What is a smart Grid and how does it work? [2]
ii) Explain the characteristics and components of a smart home. [4]
- b) Discuss the major issues and challenges in IoT. How can they be addressed? [4]

P.T.O.

Q4) Attempt the following. [10]

- a) i) How does IoT improve daily life? [2]
- ii) Compare the role of IoT in healthcare and smart cities. [4]
- b) Describe integrated pest management (IPM) and the role of IoT in it. [4]

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

- a) How is IoT used in smart farming?
- b) Write applications of IoT.
- c) The role of IoT in smart governance.
- d) Technical Building blocks of IoT.
- e) What is MQTT protocol and its role in IoT communication?
- f) What are common applications of IoT in smart home?



Total No. of Questions : 4]

SEAT No. :

PE1334

[Total No. of Pages : 1

[6501]-103

T.Y.B.Sc. (Regular)

DEFENCE AND STRATEGIC STUDIES

DS 501 : Study of Disaster

(2019 Pattern) (Semester - V) (35231)

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 does an earthquake explain?
- b) What is a synonym for Cataclysm?
- c) What is Physiography?
- d) What is a man-made disaster?
- e) What is Mitigation?

Q2) Write short notes on (any two). **[10]**

- a) Safety Majors of Disaster
- b) Tsunami
- c) NIDM

Q3) Attempt the following questions (any two). **[10]**

- a) What is the concept of disaster and disaster risk?
- b) What is the role of information technology in disaster preparedness?
- c) Explain the Disaster Management Mechanism.

Q4) Answer in details (any one). **[10]**

- a) Explain in detail Bhopal Gas Tragedy.
- b) Describe in detail Historic Development of Flood Management.



Total No. of Questions : 4]

SEAT No. :

PE1335

[Total No. of Pages : 1

[6501]-104

T.Y.B.Sc. (Regular)

DEFENCE AND STRATEGIC STUDIES

**DS 502 : United Nation Organization (Part - I)
(2019 Pattern) (Semester - V) (35232)**

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 Dignity and equality?
- b) Write the meaning of the General Assembly.
- c) Write the meaning of the Security council.
- d) International court of justice.
- e) Who is the Secretary - General of the UN.

Q2) Write short notes on (any two). **[10]**

- a) UNHCR
- b) UN Charter
- c) UDHR

Q3) Attempt the following questions (any two). **[10]**

- a) What are the main purposes of the UN?
- b) State the role of the General Assembly.
- c) How does a country become a Member of the United Nations?

Q4) Answer in details (any one). **[10]**

- a) Describe in detail the UN Sustainable Development Goals.
- b) Explain the role of the Security Council in Global Peace and Security.



Total No. of Questions : 4]

SEAT No. :

PE1336

[Total No. of Pages : 1

[6501]-105

T.Y. B.Sc. (Regular)

DEFENCE AND STRATEGIC STUDIES

DS-503 : International Relations - I

(2019 Pattern) (Semester - V) (35233)

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 bipolar two?
- b) Write the types of realism in international relations.
- c) Define Idealism.
- d) What is radicalism in international relations?
- e) What is International Relations?

Q2) Write short notes on (any two) **[10]**

- a) Vietnam War
- b) Multipolar
- c) Unipolar

Q3) Attempt the following questions (any two) **[10]**

- a) What is the significance of international relations?
- b) What is the most important theory in international relations?
- c) What is hegemony in international relations?

Q4) Answer in details (any one) **[10]**

- a) How many types of game theories are there? Explain in detail.
- b) What is political theory in international studies?

x x x

Total No. of Questions : 4]

SEAT No. :

PE1337

[Total No. of Pages : 1

[6501]-106

T.Y. B.Sc. (Regular)

DEFENCE AND STRATEGIC STUDIES

DS-504 : Terrorism

(2019 Pattern) (Semester - V) (35234)

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 are human rights?
- b) Define Left Wing Terrorism.
- c) What is National Security?
- d) What are the Causes of Terrorism?
- e) What is terrorism?

Q2) Write short notes on (any two) **[10]**

- a) Profiling and the principle of non-discrimination.
- b) Insurgency in North East India.
- c) Religious Extremist Terrorism.

Q3) Attempt the following questions (any two) **[10]**

- a) What are the economic consequences of terrorism?
- b) Explain the accountability and the human rights of victims.
- c) State the Social Impact of Terrorism on National Development.

Q4) Answer in details (any one) **[10]**

- a) State the Impact of Terrorism on National Development.
- b) Explain the impact of terrorism on human rights.

x x x

Total No. of Questions : 4]

SEAT No. :

[Total No. of Pages : 2

PE1338

[6501]-107

T.Y.B.Sc. (Regular)

DEFENCE AND STRATEGIC STUDIES

DS 505 : Research Methodology

(2019 Pattern) (Semester-V) (35235)

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 methodology in a research?
- b) What is research formulation?
- c) Define Research problems.
- d) Define social research.
- e) What is scientific research?

Q2) Write short notes on (any two).

[10]

- a) Social research
- b) Research Hypothesis
- c) Research

P.T.O.

Q3) Attempt the following questions (any two).

[10]

- a) Explain the meaning and concept of research.
- b) Write the five objectives of research.
- c) State the process of problem formulation.

Q4) Answer in details (any one).

[10]

- a) Describe in detail significance and characteristics of research.
- b) Describe in detail variables in research.



Total No. of Questions : 4]

SEAT No. :

PE1339

[Total No. of Pages : 1

[6501]-108

T.Y.B.Sc. (Regular)

DEFENCE AND STRATEGIC STUDIES

**DS 506(A) : Major Global Conflict - I
(2019 Pattern) (Semester - V) (35236A)**

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 conflict of oil?
- b) What is the matter between Israel and Palestine?
- c) What is the question of Palestine?
- d) What caused the Afghanistan issue?
- e) What is the importance of Kashmir.

Q2) Write short notes on (any two). **[10]**

- a) Afghanistan Issue
- b) Historical Background Israel Palestine
- c) Suez Canal

Q3) Attempt the following questions (any two). **[10]**

- a) Write examples of religious conflict?
- b) State the Afghanistan Issue's Brief historical account of wars.
- c) State the Oil-Source of Conflict.

Q4) Answer in details (any one). **[10]**

- a) Explain the Israel Palestine Historical Background.
- b) What is the significance of Kashmir in India's history?



Total No. of Questions : 4]

SEAT No. :

PE1340

[Total No. of Pages : 1

[6501]-109

T.Y.B.Sc. (Regular)

DEFENCE AND STRATEGIC STUDIES

**DS 506(B) : Regional Security System - I
(2019 Pattern) (Semester - V) (35236B)**

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) Which country SAARC has the highest population?
- b) Where is the headquarters of NATO situated?
- c) What is the main purpose of NATO?
- d) Why did Pakistan join CENTO?
- e) When was ASEAN established?

Q2) Write short notes on (any two). **[10]**

- a) WARSAW
- b) SAARC
- c) ASEAN

Q3) Attempt the following questions (any two). **[10]**

- a) What is the role of the World Trade Organization?
- b) State the Structure of ASEAN.
- c) Explain the Origin and Development.

Q4) Answer in details (any one). **[10]**

- a) Is WTO a success or failure?
- b) Explain the Origin and Development ASEAN.



Total No. of Questions : 4]

SEAT No. :

PE1341

[Total No. of Pages : 1

[6501]-110

T.Y. B.Sc. (Regular)

DEFENCE AND STRATEGIC STUDIES

DS 507A : India's Maritime Security - I

(2019 Pattern) (Semester - V) (35237A)

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) Define maritime security.
- b) Write the definition of Boundaries.
- c) What is the meaning of coastal boundaries?
- d) Define Maritime Boundaries.
- e) What is the coast guard?

Q2) Write short notes on. (any two) [10]

- a) Territorial waters of India
- b) Exclusive Economic Zone
- c) Maritime safety and security

Q3) Attempt the following questions. (any two) [10]

- a) What is the strategic importance of the Indian Ocean?
- b) State the Human and Drugs Trafficking. Piracy of India.
- c) Write the aims of maritime security.

Q4) Answer in details (any one) [10]

- a) Explain the Duties, Responsibilities and Limitations of Indian Coast Guards.
- b) Explain the China string of pearls in the Indian Ocean and its security implications.



Total No. of Questions : 4]

SEAT No. :

PE1342

[Total No. of Pages : 1

[6501]-111

T.Y. B.Sc. (Regular)

DEFENCE AND STRATEGIC STUDIES

DS 507(B) : Peace and Conflict Studies - I

(2019 Pattern) (Semester - V) (35237B)

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 main aim of regionalism?
- b) What is the Cold War?
- c) Define Track I Diplomacy.
- d) What is the real meaning of peace?
- e) Define Conflict.

Q2) Write short notes on (any two) [10]

- a) Post Cold War
- b) Nature and Forms of Conflict
- c) Regionalism

Q3) Attempt the following questions (any two) [10]

- a) What do you mean by peace movement?
- b) State the Confidence Building Measures.
- c) What is the cold war in international relations?

Q4) Answer in details (any one) [10]

- a) Describe the Success of Disarmament and Arms Control in today's War Scenario.
- b) What is the relationship between peace and conflicts?



Total No. of Questions : 4]

SEAT No. :

PE1343

[Total No. of Pages : 1

[6501]-112

T.Y.B.Sc. (Regular)

DEFENCE AND STRATEGIC STUDIES

**DS 508(A) : Chhatrapati Shivaji Maharaj Military System
(2019 Pattern) (Semester - V) (35238A)**

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 Swarajya?
- b) Define the army of mavala.
- c) Define Military discipline.
- d) What is Hindavi swarajya?
- e) Write the meaning of Chhatrapati.

Q2) Write short notes on (any two). **[10]**

- a) Mughal
- b) Chhatrapati Shivaji Maharaj
- c) Adil Shahi

Q3) Attempt the following questions (any two). **[10]**

- a) State the Economic State of during Chhatrapati Shivaji Maharaj's time.
- b) Explain the Battle of Pratapgad.
- c) Explain the Battle of Kolhapure.

Q4) Answer in details (any one). **[10]**

- a) Explain in detail the Campaign of Mirza Raje Jay Singh and Treaty of Purandar.
- b) Explain in detail the Political and Cultural state of Maharashtra during Chhatrapati Shivaji Maharaj's time.



Total No. of Questions : 4]

SEAT No. :

PE1344

[Total No. of Pages : 1

[6501]-113

T.Y.B.Sc. (Regular)

DEFENCE AND STRATEGIC STUDIES

**DS 508 (B) : Chhatrapati Shivaji Maharaj As Strategic Thinker
(2019 Pattern) (Semester - V) (35238B)**

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 Forts?
- b) What is Ship building?
- c) Define Guerilla Leader.
- d) What is foresight?
- e) What is Organization?

Q2) Write short notes on (any two). **[10]**

- a) Chhatrapati Shivaji Maharaj
- b) Strategic Thinker
- c) Guerilla Leader

Q3) Attempt the following questions (any two). **[10]**

- a) State the Structure of Maratha Army.
- b) Explain the Ch. Shivaji as a Military Leader.
- c) Explain the Leader of Guerrilla Warfare.

Q4) Answer in details (any one). **[10]**

- a) Explain in detail the Principles and Characteristics of Guerrilla Warfare.
- b) Explain in detail about Ch. Shivaji's foresight for developing the Navy.



Total No. of Questions : 4]

SEAT No. :

PE-1345

[Total No. of Pages : 1

[6501]-114

T.Y.B.Sc (Defence and Strategic Studies)

**DS 509(A): WORLD MILITARY HISTORY (1900-1945)
(2019 Pattern) (Semester - V) (35239A) (Regular)**

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 Peace?
- b) What is World War II?
- c) Define Balkan War.
- d) Define Conflict.
- e) What is the meaning of safety and security?

Q2) Write short notes on (any two)

[10]

- a) War
- b) Treaty of versails
- c) Cold war

Q3) Attempt the following questions (any two)

[10]

- a) Explain the main causes of World War I.
- b) Explain the Effect of World War II.
- c) Explain the Effect of the Cold war.

Q4) Answer in details (any one)

[10]

- a) Explain in detail the Peace Programme of Widrow Wilson.
- b) Explain in detail theTechnology used in World War I.



Total No. of Questions : 4]

SEAT No. :

PE1346

[Total No. of Pages : 1

[6501]-115

T.Y.B.Sc. (Regular)

DEFENCE AND STRATEGIC STUDIES

DS 509 (B) : India's Foreign Policy

(2019 Pattern) (Semester - V) (35239B)

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 Policy?
- b) Define Foreign Policy.
- c) Define India's Foreign Policy.
- d) Define Neighborhood.
- e) What is Diplomacy?

Q2) Write short notes on (any two). **[10]**

- a) Foreign Policy
- b) India's Foreign Policy
- c) Look East Policy

Q3) Attempt the following questions (any two). **[10]**

- a) Explain the Elements of Foreign Policy.
- b) State the Meaning and Concept Foreign Policy.
- c) What are the principles of foreign policy.

Q4) Answer in details (any one). **[10]**

- a) Explain in detail the India's Neighborhood First Policy.
- b) What are the main elements and approaches to the study of foreign policy?



Total No. of Questions : 4]

SEAT No. :

PE-1347

[Total No. of Pages : 1

[6501]-116

T.Y.B.Sc (Defence and Strategic Studies)

**DS 510 INTRODUCTION TO HUMAN RIGHTS AND DUTIES
(2019 Pattern) (Semester - V) (352310) (Regular)**

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 Human rights?
- b) Define Values.
- c) How does the internet impacts on social rights?
- d) What is Dignity?
- e) Define Liberty.

Q2) Write short notes on (any two) [10]

- a) Human rights
- b) Minorities
- c) Tribes

Q3) Attempt the following questions (any two) [10]

- a) What are the main concepts of human rights?
- b) What is a famous quote about human rights?
- c) Explain the Human Rights and Gender Issues.

Q4) Answer in details (any one) [10]

- a) Explain in detail the Significance of Human Rights Education.
- b) What is a famous quote about human rights?



Total No. of Questions : 4]

SEAT No. :

PE-1348

[Total No. of Pages : 1

[6501]-117

T.Y.B.Sc (Defence and Strategic Studies)

DS-511 : HUMAN RIGHTS AND UN

(2019 Pattern) (Semester - V) (352311) (Regular)

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 Value?
- b) How did human rights develop?
- c) Define preamble.
- d) What is the mission?
- e) Define liberty.

Q2) Write short notes on (any two)

[10]

- a) Human Rights
- b) UN
- c) Equality

Q3) Attempt the following questions (any two)

[10]

- a) Does the EU protect human rights?
- b) State the Historical background of the Universal Declaration of Human Rights.
- c) Explain the Importance of the Universal Declaration of Human Rights.

Q4) Answer in details (any one)

[10]

- a) Explain in detail the Freedom, equal dignity and rights of Human Rights.
- b) Are human rights applied the same to all humans?



Total No. of Questions : 5]

SEAT No. :

PE1349

[Total No. of Pages : 1

[6501]-118

T.Y.B.Sc. (Regular)

ENVIRONMENTAL SCIENCE

**EVS-351 : Terrestrial Ecosystem and Management
(2019 Pattern) (Semester - V) (Paper - I) (35241)**

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) Answer all of the following.

[5×1=5]

- a) Enlist the parameters of Terrestrial environment.
- b) Define : Terrestrial biodiversity.
- c) Give any two examples of Keystone species.
- d) Define the term : Carbon Sequestration.
- e) Write the full form of GIS and RS.

Q2) a) Write in brief about Temperate grassland biome.

[6]

b) Explain Line Transect method of vegetation sampling.

[4]

Q3) a) Write the reasons and control measures for Forest fires.

[6]

b) Discuss : Andaman and Nicobar as biodiversity hotspot of India.

[4]

Q4) a) Describe various biogeographic regions of the world.

[6]

b) Write about the general structure of terrestrial community.

[4]

Q5) Write short notes on any four of the following.

[10]

- a) Biogeographic regions of India.
- b) Role of NGOs in sustainable utilisation of resources.
- c) Threats to Terrestrial Ecosystems.
- d) Traditional methods for forest management.
- e) Core principles of ecosystem management.
- f) Carbon Sequestration potential of Terrestrial ecosystems.



Total No. of Questions : 5]

SEAT No. :

PE1350

[Total No. of Pages : 2

[6501]-119

T.Y.B.Sc. (Regular)

ENVIRONMENTAL SCIENCE

EVS 352 : Wildlife Biology and Management

(2019 Pattern) (Semester - V) (35242)

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.

[5×1=5]

- a) What is insect?
- b) What is Arachnids?
- c) What does mean by reptiles?
- d) What is visual encounter survey?
- e) What is track and sign technique?
- f) What is Artificial stocking in wildlife management technique?

Q2) a) Explain Terrestrial Habitat with example.

[6]

b) Describe direct count method with example.

[4]

Q3) a) Write note on Deforestation.

[6]

b) Write in brief of Habitat destruction.

[4]

P.T.O.

Q4) a) Write note on DNA fingerprinting technique. **[6]**

b) Explain Eco-tourism in brief. **[4]**

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

a) Silent valley movement

b) Bio-telemetry

c) Monocot with examples

d) HEP

e) Threats to wildlife - developmental projects.

f) Write short note on exploitation of animals and plants.



Total No. of Questions : 5]

SEAT No. :

PE1351

[Total No. of Pages : 1

[6501]-120

T.Y. B.Sc. (Regular)

ENVIRONMENTAL SCIENCE

EVS - 353 : Water and Soil Quality

(2019 Pattern) (Semester - V) (Paper - III) (35243)

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 Water Resources.
- b) What is meant by water stress Index?
- c) Full form of GAP.
- d) What is meant by soil Aeration?
- e) Enlist the causes of soil sickness.
- f) Enlist various Micronutrients found in soil.

Q2) a) Write short note on - Secondary Treatment of waste water. **[6]**

b) Explain water cycle in the environment. **[4]**

Q3) a) Write short note on - Soil Toxicology. **[6]**

b) Explain in detail Application of GIS and Remote sensing in management of water resources. **[4]**

Q4) a) Explain in detail various soil conservation Techniques. **[6]**

b) Write short note on - River water pollution. **[4]**

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

- a) Water Quality Standards
- b) Characteristics of sewage.
- c) Water Borne diseases.
- d) Sea water pollution.
- e) Remediation of contaminated site.
- f) Composition of soil.

x x x

Total No. of Questions : 5]

SEAT No. :

PE1352

[Total No. of Pages : 2

[6501]-121

T.Y. B.Sc. (Regular)

ENVIRONMENTAL SCIENCE

**EVS-354 : Atmospheric and Global Climate Change
(2019 Pattern) (Semester - V) (Paper - I) (35244)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

Q1) Attempt any five of the following.

[5×1=5]

- a) Which process is functional to remove carbon from the atmosphere.
- b) Write any two names of green house gases.
- c) Which are the three types of atmospheric stability.
- d) When did Kyoto protocol end?
- e) What do you meant by carbon credit?
- f) Name the atmospheric layer present on the earth.

Q2) Attempt the following :

- a) What is EI - Nino caused by. How does monsoon develops? **[6]**
- b) What affects the earth energy balance. **[4]**

P.T.O.

Q3) Attempt the following :

- a) What are the 5 elements of kyoto protocol. [6]
- b) What is meant by clean development mechanism. [4]

Q4) Attempt the following :

- a) What is plume in air pollution. Write short note on plume behaviour. [6]
- b) How does atmospheric window affect global warming. [4]

Q5) Attempt any four of the following : [10]

- a) Montreal protocol.
- b) Carbon Footprint
- c) Urban heat Island
- d) Types of energy transfer
- e) La-Nina

x x x

Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE1353

[6501]-122

T.Y.B.Sc. (Regular)

ENVIRONMENTAL SCIENCE

EVS-355 : Environmental Legislation and Policy

(2019 Pattern) (Semester-V) (Paper-V) (35245)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

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

- a) Write the short title of Air Act.
- b) What does Agenda 21 states?
- c) State any 2 role of SPCB in a state.
- d) What is the main aim of Rio Declaration?
- e) Write any 2 definitions under Hazardous Waste Management Rules, 2016.
- f) In which year Motor Vehicle Act has been enacted.

Q2) Answer the following.

- a) Write short note on Montreal Protocol, 1987. **[6]**
- b) Explain the concept of Environmental Governance. **[4]**

Q3) Answer the following.

- a) Write a note on Paris summit. **[6]**
- b) What are penalties for the section stated under Wildlife (Protection) Act, 1972. **[4]**

P.T.O.

Q4) Answer the following.

- a) Explain the functions of pollution control boards under Environmental Protection Act. [6]
- b) What are the role of Ministry of Environment, Forests & Climate change. [4]

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

- a) Environmental Ethics
- b) Copenhagen summit
- c) Sustainable Development
- d) Article 48A
- e) Role of CPCB
- f) Fundamental Duties



Total No. of Questions : 5]

SEAT No. :

PE1354

[Total No. of Pages : 2

[6501]-123

T.Y.B.Sc. (Regular)

ENVIRONMENTAL SCIENCE

**EVS-356 : Environmental Biotechnology - I
(2019 Pattern) (Semester - V) (35246)**

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 No. 2 to 5 carry equal marks.

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

- a) What are goals the environmental biotechnology?
- b) What is biopesticide?
- c) Which bacteria are used in bioleaching?
- d) What are two types of biofuels?
- e) Write any two reasons why GMOs are used?
- f) What is biogas called?

Q2) a) Explain in detail with suitable examples on applications of biotechnology in forestry. [6]

b) How can agricultural waste be reduced? [4]

Q3) a) What are the key elements of Cartagena protocol? [6]

b) How does GMO affect the environment? [4]

P.T.O.

Q4) a) How important is micro - propagation in crop production? **[6]**

b) Write any four important applications of environmental biotechnology.**[4]**

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

- a) Biofertilizers prevent pollution
- b) Advantages of GMO
- c) Draw a diagram of composting design
- d) Biodiesel
- e) Role of biotechnology in conservation species
- f) Chemical characteristics of vermicompost.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE1355

[6501]-124

T.Y. B.Sc. (Regular)

ENVIRONMENTAL SCIENCE

EVS3511:Remote Sensing, GIS and Modelling

(2019 Pattern) (Semester - V) (352410)

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 2-5 carry equal marks.

Q1) Solve any five of the following.

[5×1=5]

- a) Define spectral signature.
- b) Enlist any four elements of Image Interpretation.
- c) Give difference in Land use and Land cover.
- d) Define Measure of Dispersion.
- e) Give any two types of Kurtosis.
- f) What is the main use of Temporal Resolution images?

Q2) a) Define platforms. Explain the types of platforms.

[6]

b) Explain components of GIS.

[4]

Q3) a) Explain basic Geometric characteristics of Aerial Photograph.

[6]

b) Write the Application of Remote sensing and GIS in Water Resource Management.

[4]

P.T.O.

Q4) a) Explain in detail Measures of central tendency. **[6]**

b) Write in detail about measurement of height on Aerial Photograph. **[4]**

Q5) Write short notes on any 4 of the following. **[10]**

a) Principle of relative Tonality

b) Resolution

c) Types of distribution

d) Atmospheric window

e) Sensors in Remote sensing

f) Types of Z-Tests in statistics



Total No. of Questions : 5]

SEAT No. :

PE1356

[Total No. of Pages : 2

[6501]-125

T.Y.B.Sc. (Regular)

ENVIRONMENTAL SCIENCE

EVS - 3512 : Soil Health Management

(2019 Pattern) (Semester - V) (352411)

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) Attempt any five of the following.

[5×1=5]

- a) What are the two classification of fertilizers?
- b) What are the concept of Ecological Pest?
- c) What are benefit of contour farming?
- d) What is mean by in-situ soil moisture conservation?
- e) Enlist any four major pest that affect agricultural crop.
- f) Are the energy crop sustainable?

Q2) Attempt of the following.

- a) What are plant nutrient? Write symptoms of nutritional deficiency in plants.**[6]**
- b) What are methods used for collection of runoff water? **[4]**

Q3) Attempt of the following.

- a) What are mechanical measures of soil conservation? **[6]**
- b) What are bio - pesticides and its types? How diseases are managed? **[4]**

P.T.O.

Q4) Attempt of the following.

- a) What is soil fertility? Explain in details scheme of soil health card. [6]
- b) What are pesticides? How pesticides degrades Environment? [4]

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

- a) Soil Health card
- b) Contour cultivation
- c) Energy crop
- d) IPM
- e) Scheme for fertilizer
- f) Agriculture drainage system



Total No. of Questions : 5]

SEAT No. :

PE1357

[Total No. of Pages : 2

[6501]-126

T.Y.B.Sc. (Regular)

NANOSCIENCE AND NANOTECHNOLOGY

NS - 351 : Polymer & Nanocomposites

(2019 Pattern) (Semester - V) (35261) (Paper - I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 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 and labelled diagram wherever necessary.*
- 5) *Figures to the right indicate full marks.*

Q1) Attempt any five of the following.

[5]

- a) Define polymer nanoscience.
- b) Define composite material. Give examples.
- c) What is polymer modification?
- d) What are CNT's? Give form of CNT's.
- e) What is pyrrolytic technique.
- f) Define thermoplast polymer.

Q2) a) Attempt any one of the following.

[6]

- i) Differentiate between the thermoplastics and thermosetting polymer.
- ii) Distinguish between for SWCNT and MWCNT in polymer nanocomposites.

b) Explain in detail In-Situ polymerisation.

[4]

P.T.O.

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

- i) Write in detail application of layered and non - layered nano and micro particles.
- ii) Describe salient features of polymer modification with carbon nanotubes.

b) Explain latex stage mixing and melt mixing. **[4]**

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

- i) Explain the terms dispersion and nucleating effect.
- ii) Explain the terms short fibers and long fibers.

b) Write in detail classification of polymer composite. **[4]**

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

- a) Applications of composites.
- b) Thermoplast rubber
- c) Single walled carbon nanotubes
- d) Interculation
- e) Particulate fillers



Total No. of Questions : 5]

SEAT No. :

PE1358

[Total No. of Pages : 2

[6501]-127

T.Y.B.Sc. (Regular)

NANOSCIENCE AND NANOTECHNOLOGY

NS-352 : Nanophysics

(2019 Pattern) (Semester - V) (Paper - II) (35262)

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) What is probability density?
- b) Define metal?
- c) Draw the diagram of photoluminescences.
- d) Define Nanoparticles?
- e) Write equations of Gibb's canonical distribution.
- f) What is continuous variable probability?

Q2) a) Attempt any one of the following.

[6]

- i) Define binomial distribution? Explain expression of the binomial distribution.
- ii) Explain optical absorption spectroscopy.

b) Consider binomial distribution for system for which $p = \frac{1}{3}, q = \frac{2}{3}, N = 6$.

Determine standard deviation and find probability that n is in range $\langle n \rangle - \sigma$ to $\langle n \rangle + \sigma$.

[4]

Q3) a) Attempt any one of the following.

[6]

- i) Explain Bose - Einstein (B-E) statistics.
- ii) Explain Maxwell - Boltzmann (M-B) statistics.

b) Explain the quantum size effect.

[4]

P.T.O.

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

- i) Explain insulator and semiconductor.
 - ii) Explain energy bandgap structure with suitable diagram.
- b) A vessel of volume 'V' is mentally divided into two equal parts. The vessel contains σ molecules. Calculate probability distribution using binomial and Gaussian distribution in the passes graphically. **[4]**

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

- a) Explain thermoluminescence.
- b) Explain photoluminescence.
- c) Write the uses of nanocluster.
- d) Explain Fermi-Dirac (F-D) statistics.
- e) Explain quantum distribution function.
- f) Write applications of x-ray absorption fine structure.



Total No. of Questions : 5]

SEAT No. :

PE1359

[Total No. of Pages : 2

[6501]-128

T.Y. B.Sc. (Nanoscience & Nanotechnology) (Regular)

NS - 353 : NANOBIO TECHNOLOGY

(2019 Pattern) (Semester - V) (Paper - III) (35263)

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 5 carry equal marks.*
- 4) *Draw a neat labelled diagram wherever necessary.*
- 5) *Figures to the right indicates full marks.*

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

- a) What are cofactors?
- b) What is use of Ion-channels.
- c) Write any two names of disaccharides.
- d) Write any one use of carbon-nanotubes.
- e) Define the term proteins.
- f) Define the term Enzymes.

Q2) a) Attempt any one of the following : **[6]**

- i) Explain classification of Nano-Material.
- ii) With the help of diagram explain lytic cycle.

b) Write a short note on ferritin. **[4]**

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

- i) Define and explain Monosacchride with classification.
- ii) What are Enzymes? Explain mechanism of action of enzyme.

b) Write short notes on Exosomes. **[4]**

P.T.O.

Q4) a) Attempt any one of the following : **[6]**

- i) What are Lipids? Explain simple lipids.
- ii) What are Restriction Enzymes? Explain mode of action of Restriction Enzymes with example.

b) How Enzymes are classified. **[4]**

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

- a) Quantum dots
- b) Phospholipids
- c) Glucolipids
- d) Cosmid
- e) Ganger's DNA sequencing.

x x x

Total No. of Questions : 5]

SEAT No. :

PE1360

[Total No. of Pages : 2

[6501]-129

T.Y. B.Sc. (Nanoscience and Nanotechnology) (Regular)

NS-354 : CARBON BASED NANOMATERIALS

(2019 Pattern) (Semester - V) (Paper - IV) (35264)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory*
- 2) *Solve any three question from Q.2 to Q.5.*
- 3) *Question 2 to 5 carry equal marks.*
- 4) *Draw neat and labelled diagram wherever necessary.*
- 5) *Figures to the right indicate full marks.*

Q1) Attempt any five of the following.

[5]

- a) Define Allotropes of carbon.
- b) Give the examples of allotrops of carbon.
- c) Give the names of two forms of Graphite.
- d) Give the introduction of carbon.
- e) Give the names of methods for production of carbon nanotubes.
- f) Give the temperature range for SWCNT and MWCNT in CVD method.

Q2) a) Attempt any one of the following

[6]

- i) Give Introduction of carbon.
- ii) Explain Arc. discharge method.

b) Explain the term supercapacitor.

[4]

P.T.O.

Q3) a) Attempt any one of the following [6]

- i) Give the Mechanical properties of CNT's.
- ii) Explain the term water purification from CNT's.

b) Explain Biological applications of carbon based Nanomaterials. [4]

Q4) a) Attempt any one of the following [6]

- i) Give the difference between graphite and diamond.
- ii) Explain in detail CND method.

b) Give the detail thermal properties of Graphite. [4]

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

- a) Graphite
- b) Catalysis
- c) Fullerenes
- d) Biosensors
- e) FET
- f) Super capacitor

x x x

Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE1361

[6501]-130

T.Y.B.Sc. (Regular)

NANOSCIENCE & NANOTECHNOLOGY

NS-355 : Energy Conversion Devices and Applications

(2019 Pattern) (Semester-V) (Paper-V) (35265)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

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

- a) What is dye-sensitised solar cell?
- b) What is perovskite solar cell?
- c) Write equation of fill factor.
- d) Define photovoltaic solar cell.
- e) Draw the diagram of plastic solar cell.
- f) What is energy of light with a wavelength of 662nm?

Q2) a) Attempt any one of the following. **[6]**

- i) Explain introduction and construction of DSSCs.
- ii) Explain and design thin film solar cell.

b) Explain properties of working photo electrode. **[4]**

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

- i) Explain mechanism of photo absorption and power generation.
- ii) Explain the mechanism of excitons in polymer.

b) Explain photophysics of various perovskite material. **[4]**

P.T.O.

- Q4)** a) Attempt any one of the following. [6]
- i) Explain the minority carrier lifetime and diffusion length measurement.
 - ii) Explain greenhouse effect.
- b) Explain the mechanism of DSSCs. [4]

- Q5)** Attempt any four of the following. [10]
- a) Explain planer heterojunction solar cell.
 - b) Write properties of dyes.
 - c) Explain history of perovskite solar cell.
 - d) Write properties of sunlight.
 - e) Draw the labelled diagram for donar and acceptor polymer.
 - f) What wavelength of light with energy $3 \times 10^{-19} \text{J}$



Total No. of Questions : 5]

SEAT No. :

PE1362

[Total No. of Pages : 2

[6501]-131

T.Y.B.Sc. (Regular)

NANOSCIENCE AND NANOTECHNOLOGY

N.S. 356 : Environmental Nanotechnology and Applications

(2019 Pattern) (Semester - V) (Paper - VI) (35266) (Elective - I)

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 No. 2 to 5 carry equal marks.*
- 4) *Draw neat and labelled diagram wherever necessary.*
- 5) *Figures to the right indicate full marks.*

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

- a) List the physiochemical properties of waste water.
- b) Define engineered nanomaterials.
- c) Define ultrafine dust / particles.
- d) Give sources of air pollution.
- e) Give example of catalyst.
- f) What is seive effect.

Q2) a) Attempt any one of the following. **[6]**

- i) Give the detail properties of sensors.
- ii) Give the uses of graphene based sensors.

b) Explain the air pollution? **[4]**

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

- i) Explain in brief methods for waste water treatment.
- ii) Explain methods for the measurement of air pollution and its control methods.

b) Explain hierarchy of solid structure and adsorption. **[4]**

P.T.O.

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

- i) Explain in detail Advantages of nanomaterials.
- ii) Explain nanocomposites for environmental applications.

b) Explain pollution control equipments in detail. **[4]**

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

- a) Anaerobic filters
- b) Water pollution
- c) Waste water collection
- d) Gaseous contaminants
- e) Sugar industry
- f) Fabric filters



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE1363

[6501]-132

T.Y. B.Sc. (Regular)

NANOSCIENCE AND NANOTECHNOLOGY

NS-3510 : Basic Instrumentation Skills

(2019 Pattern) (Semester - V) (Paper - 3510) (352610)

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 indicates full marks.*

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

- a) Define range.
- b) Define sensitivity.
- c) What is pulse generator?
- d) Define Functional generator.
- e) Define distortion.
- f) What is Error?

Q2) a) Attempt any one of the following. **[6]**

- i) What is Error Measurement? Explain its different Types.
- ii) Explain the Block diagram and working of digital multimeter.

b) Write down the characteristics of digital instrument. **[4]**

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

- i) Explain construction and working of DC bridges.
- ii) Explain construction and working of AC bridges.

b) Explain the working of basis of LCR meter. **[4]**

P.T.O.

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

- i) Explain Basic controls of CRO.
- ii) Explain chemical composition of CRO.

b) Write down the specifications of function generator. **[4]**

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

- a) Write application of pulse generator.
- b) Write applications of functional generator.
- c) Write advantages and disadvantages of DSO.
- d) Explain the different types of pulse generator.
- e) Write difference between analog instruments and digital instruments.
- f) Write short note on multimeter.



Total No. of Questions : 5]

SEAT No. :

PE1364

[Total No. of Pages : 2

[6501]-133

T.Y.B.Sc. (Regular)

NANOSCIENCE AND NANOTECHNOLOGY

NS - 3511 : C - Programming

(CBCS 2019 Pattern) (Semester - V) (352611)

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) What is constant in C?
- b) What is flowchart?
- c) Write syntax for print f function.
- d) What is use of close graph in graphics program.
- e) Write syntax to draw line.
- f) What is use of “% f ” in control string.

Q2) a) Explain different output functions used in C. [6]

OR

Explain logical operator & conditional operator used in C.

- b) Write C program to display sum difference, multiplication, division, modulo any numbers entered by user. [4]

Q3) a) Explain different type constant used in C. [6]

OR

What do you mean by Algorithm? Write advantage and limitations for algorithm.

- b) What is two dimensional array? Give its example. [4]

P.T.O.

Q4) a) Explain “for” statement and “While” statement. **[6]**

OR

Write C-program to calculate sum of first 1 to 10 number using while & do.....while loop.

b) Write C program to draw simple cubic structure. **[4]**

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

- a) Variables and its declaration.
- b) Break statement.
- c) What is array? Why arrays are used?
- d) Assignment operators
- e) Syntax to draw circle, Arc & Ellipse.
- f) Program to find area of circle



Total No. of Questions : 5]

SEAT No. :

PE1365

[Total No. of Pages : 2

[6501]-134

T.Y.B.Sc. (Regular)

INDUSTRIAL MICROBIOLOGY

IMB 3510 : Plant Tissue Culture

(CBCS 2019 Pattern) (Semester - V) (Vocational) (Paper - V) (358210)

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 Q.5 carry equal marks.

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

- a) State importance of protoplast fusion.
- b) What is the importance of Golden rice?
- c) What is meant by Haploid plants?
- d) Optimal pH of PTC is _____
- e) What are syn seeds?
- f) Father of plant tissue culture_____

Q2) Solve the following:

- a) Describe the types of different plant tissue culture. **[6]**

OR

Describe different advantages of plant tissue culture over conventional farming.

- b) Short note on tharsgenic plants. **[4]**

Q3) Solve the following.

- a) Explain gene gun method of transformation. **[6]**

OR

Explain the process of Agrobacterium Tumifaciens mediated transformation.

- b) Enlist and describe at least two types of transgenic plants with examples.**[4]**

P.T.O.

Q4) Solve the following.

- a) Discuss protocol for setting a callus culture from data plant. [6]

OR

Explain advantages and applications of plant tissue culture.

- b) Write a short note on virus free plants. [4]

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

- a) Protoplast fusion.
- b) Types of media used for PTC.
- c) Aseptic conditions during PTC
- d) Ri plasmid
- e) Growth hormone for plant growth
- f) Somatic embryos



Total No. of Questions : 5]

SEAT No. :

PE-1366

[Total No. of Pages : 2

[6501]-135

T. Y. B.Sc. (Vocational Biotechnology)

VBT-311 : Animal and Plant Tissue Culture

(2019 Pattern) (CBCS) (Semester - V) (Paper - V) (35571)

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

- a) What is callus culture?
- b) Give fullform of DMEM.
- c) Name any two breast cancer cell lines.
- d) Name enzyme used for disaggregation in ATC.
- e) Define animal Tissue Culture.
- f) Give role of auxin in Animal Tissue culture.

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

- i) Explain in detail Hairy root culture.
- ii) Discuss any two biological methods of genettransfer.
- iii) Write a note on Artificial seed production along with its significance.

b) Answer any one of the following : **[4]**

- i) Comment on 'Evolution of cell line'.
- ii) Name any two contaminants in Animal Tissue culture. Discuss methods to eradicaat contaminants in Animal tissue culture.

P.T.O.

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

- i) What is induction of somatic embryos and give its significance.
- ii) Give diagrammatic representation of monoclonal antibody production.
- iii) What are secondary metabolites. Give its significance.

b) Answer any one of the following : **[4]**

- i) Give characterization of all lines in detail.
- ii) Explain in detail primary and secondary cultures in example.

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

- i) Comment of Basic Design of Animal Tissue culture Lab.
- ii) What are cell fusion studies. Give any one example.
- iii) What is organogenesis. Add a note on indirect organogenesis.

b) Answer any one of the following : **[4]**

- i) Give flowchart for process used in In Vitro fertilization.
- ii) Comment on advantages and disadvantages of somaclonal variations.

Q5) Write short notes on (any four) : **[10]**

- a) Callusogenesis
- b) Rhizogenesis
- c) Secondary metabolites
- d) History of Animal tissue culture.
- e) Hormones used in plant tissue culture.



Total No. of Questions : 5]

SEAT No. :

PE-1367

[Total No. of Pages : 2

[6501]-137

T.Y. B.Sc.

INDUSTRIAL MICROBIOLOGY (Vocational)

IMB - 355 : Applications of Microbial Systems

(2019 Pattern)(Semester - V)(CBCS) (35825)

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 5 carry equal marks.*

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

- a) 'Cheese is Functional Fermented dairy product' State true or false.
- b) Name any two fermented dairy products.
- c) Mention any two benefits of kefir with respect to health.
- d) What is yoghurt?
- e) Name two bacteria used in Fermented milk products.
- f) Give health benefit of Lassi.

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

- i) Write note one waste water.
 - ii) Describe sludge characterisation.
 - iii) Write note on Biological treatment of waste water.
- b) Draw Flow chart for waste water analysis. **[4]**

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

- i) Justify the significance of tertiary waste water treatment
 - ii) Describe removal of ROC.
 - iii) Write short note on In situ Bio-remediation
- b) Illustrate ETP design in waste water treatment. **[4]**

P.T.O.

- Q4)** a) Attempt any two of the following : **[6]**
- i) Write a note on dairy microbiology.
 - ii) 'Fermented dairy products are nutritionally enriched' Justify.
 - iii) Describe starter cultures in dairy products with example.
- b) Define probiotics, prebiotics and functional foods. **[4]**

- Q5)** Attempt any four of following : **[10]**
- a) Write note on role of microbes in soil.
 - b) Describe Agro-wastes.
 - c) Explain in short What is nutrient recycling in soil?
 - d) State the role of microorganisms in Biofuels.
 - e) Justify the importance of microorganisms in sustainable agriculture.
 - f) In short describe Biopesticides.



Total No. of Questions : 5]

SEAT No. :

PE1368

[Total No. of Pages : 1

[6501]-138

T.Y.B.Sc. (Regular)

SEED TECHNOLOGY

ST-3.1 : Seed Pathology and Entomology

**(CBCS 2019 Pattern) (Semester - V) (Vocational) (Paper - V)
(2 Credits) (35891)**

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) What is pest?
- b) Define storage fungi.
- c) Define disease.
- d) What is seed damage?
- e) What is sanitation?
- f) Give any two names of insect pests.

Q2) a) Comment on seed borne Nematodes. [6]

b) Write the objectives of seed health testing. [4]

Q3) a) Explain the seed transmitted pathogens. [6]

b) What is importance of seed testing? [4]

Q4) a) Comment on seed borne fungi - Alternaria sp. [6]

b) Write the factors affecting seed storage. [4]

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

- a) Plant quarantine.
- b) Seed pathology.
- c) Methods of seed health testing.
- d) Seed treatment.
- e) Common insect pest in vegetables.
- f) Air conditioning.



Total No. of Questions : 5]

SEAT No. :

PE-1369

[Total No. of Pages : 2

[6501]-139

T.Y. B.Sc. (Vocational) (Paper - VI)

BIOTECHNOLOGY

VBt - 312 : Industrial Biotechnology

(2019 Pattern)(Semester - V)(CBCS) (36672)

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 Q. 5 carry equal marks.*
- 4) *Draw neat labelled diagram wherever necessary.*

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

- a) Define industrial biotechnology.
- b) Why is agitation necessary in a fermenter?
- c) Give any one application of citric acid.
- d) Name any two nitrogen sources used in fermentation medium.
- e) Enlist the parameters that must be measured and controlled during fermentation process.
- f) In which phase of growth are secondary metabolites produced?

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

- i) Define fermentation. Add a note on its historical development.
 - ii) Distinguish between primary metabolites and secondary metabolites.
 - iii) Write a short note on synthetic media.
- b) Give a generalized schematic presentation of a typical fermentation process. Add a note on the component parts of a fermentation process. **[4]**

P.T.O.

- Q3)** a) Answer any two of the following : **[6]**
- i) Define major mutations. With the help of an example, explain how major mutations are useful in strain improvement?
 - ii) Explain the technique of sporulation in submerged media used for inoculum development in fungi.
 - iii) Define screening. What do you understand by primary screening and secondary screening?
- b) Answer any one of the following : **[4]**
- i) What is meant by antifoaming agents? Give three approaches to solve the problem of foaming during fermentation process.
 - ii) Enlist the methods for measuring temperature during fermentation process. Add a note on any one method for measuring temperature.
- Q4)** a) Answer any one of the following : **[6]**
- i) Describe continuous fermenter in detail.
 - ii) Explain the process of production of amylase.
- b) Describe any two methods involved in downstream processing. **[4]**
- Q5)** Write short notes on any four of the following. **[10]**
- a) Role of precursors in fermentation media.
 - b) Control of pH during fermentation process.
 - c) Advantages of air-lift fermenters.
 - d) Types of beer.
 - e) Flocculation step of downstream processing.
 - f) Objectives of inoculum development.



Total No. of Questions : 5]

SEAT No. :

PE1371

[Total No. of Pages : 2

[6501]-141

T.Y. B.Sc. (Vocational) (Regular)

INDUSTRIAL MICROBIOLOGY

IMB 356 : Cell Culture Technology

(2019 CBCS Pattern) (Semester - V) (35826) (Paper - VI)

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 5 carry equal marks.*

Q1) Solve any 5 of the following.

[5]

- a) State the importance of Alexis carrel in ATC.
- b) State an example of finite and infinite cell line.
- c) What is the role of serum in ATC media?
- d) State importance of IVF.
- e) Why is inverted microscope used for observing cell cultures in ATC lab?
- f) State the application of m Ab.

Q2) Solve the following :

- a) Describe the process of microinjection technique.

[6]

OR

Describe the process of large scale culture of animal cells.

- b) Diagrammatically explain concept of contact inhibition and Hayflick limit.[4]

P.T.O.

Q3) Solve the following :

- a) Explain the structure, function and application of Hollow Fibre Reactor.[6]

OR

Explain the concept of stem cells and stem cell therapy.

- b) Write a short note on organ culture. [4]

Q4) Solve the following :

- a) Discuss the impact of Transgenic organisms. [6]

OR

Discuss the impact of development of hybridoma technology.

- b) Write a short note on application of Animal cell culture. [4]

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

- a) Types of animal cell culture based on morphology.
- b) Role of sodium bicarbonate in ATC medium.
- c) Large scale culture of Animal cells.
- d) Different methods of disaggregation of animal cells from tissue.
- e) Characterization of cell lines.
- f) Difference between normal and transformed cells.

x x x

Total No. of Questions : 5]

SEAT No. :

PE1372

[Total No. of Pages : 2

[6501]-142

T.Y. B.Sc. (Vocational) (Regular)

SEED TECHNOLOGY

ST-3.2 : Entrepreneurship Development

(2019 CBCS Pattern) (Semester - V) (35892) (2 Credits) (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) *Question 2 to 5 carry equal marks.*

Q1) Solve any five of the following.

[5]

- a) What is Entrepreneurship Development?
- b) Full form of VAT.
- c) Write any one key element of entrepreneurship.
- d) What is Business organization?
- e) Write full form of TDS.
- f) What is Marketing Mix?

Q2) a) State the identification of opportunities for entrepreneurship.

[6]

b) Explain sole proprietorship and partnership.

[4]

Q3) a) Explain in detail the Role of MIDC and DIC.

[6]

b) Explain the different mode of Employment.

[4]

P.T.O.

- Q4)** a) Define small scale industries and explain the type of small scale industries.[6]
b) Write the need and scope of Entrepreneurship. [4]

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

- a) Market segmentation
- b) Patent Rules
- c) Pollution Control Board
- d) Commercial and Co-operative Banks
- e) Factory Act
- f) Digital Marketing

x x x