Total No. of Questions : 4]

SEAT No. :

P-1011

[Total No. of Pages : 2

[6054]-301
T.Y. B.Sc.
MATHEMATICS
DSE - 1AMT - 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 $d(x, y) = x^2 - y^2$, $x, x, y \in \mathbb{R}$, defines a metric on $\mathbb{R}$? Justify.

b) Find the limit points of following subsets of $\mathbb{R}$ with usual metric
i) Q ii) $[0, 1) \cup (1, 2]$

c) Find the cluster points of (0, 1) and [0, 1) in discrete metric space $\mathbb{R}$.

d) Let $(\mathbb{R}, d)$ be a usual metric space and $x \in \mathbb{R}$. Find $B\left(0, \frac{1}{2}\right)$ and B [–1, 2].

e) Give an example of countable dense subset of $\mathbb{R}$.

f) Give an example of subset of $\mathbb{R}$ with usual metric which is complete and connected but not compact.

g) Find all compact subsets of discrete metric space $\mathbb{R}$.

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

i) Prove that arbitrary intersection of closed sets in metric space (x, d) is closed.

ii) Let (x, d) be a metric space. Show that any convergent sequence in X is cauchy sequence.

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

i) Let (x, d) be a metric space. Define $f(x, y) = \min\{1, d(x, y)\}$ for all $x, y \in X$. Show that δ is a metric on X.

ii) Let (x, d) be a metric space. $A, B \subseteq X$ then show that $\overline{A \cup B} = \overline{A} \cup \overline{B}$.

P.T.O.

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

i) Show that continuous image of compact set is compact.

ii) Let X, Y be metric spaces. Show that a map $f : x \to y$ is continuous if for every open set $V \subseteq Y$, it's inverse image $f^{-1}(v)$ is open in X.

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

i) If $f : x \to y$ is continuous and onto, then show that a map $g : Y \to Z$ is open if gof is open.

ii) Let $[a, b]$ and $[c, d]$ be metric space with usual metric then show that $[a, b]$ and $[c, d]$ are homeomorphic.

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

i) If A and B are compact subsets of $\mathbb{R}$ with usual metric then show that $A \times B$ is compact in $\mathbb{R}^2$.

ii) Let A and B are two connected subsets of X with $A \cap B \neq \phi$. Then show that $A \cup B$ is connected.

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

i) Prove that a discrete metric space (R_d) with more than one point is not connected.

ii) Give an example of continuous function $f : x \to y$ such that $\{x_n\}$ is cauchy sequence in X but $\{f(x_n)\}$ is not cauchy sequence in Y.

▽▽▽▽

Total No. of Questions : 4]

SEAT No. :

P-1012

[Total No. of Pages : 2

[6054]-302
T.Y. B.Sc. (Semester - V)
MATHEMATICS
MT352 : Real Analysis - I
(2019 Pattern) (CBCS) (35112)

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) Prove that A∨B is logically equivalent to ~((~A)∧(~B))

b) Show that the function $f(x) = x^2$ is not on to.

c) Define subsequence of real numbers.

d) Prove that $\lim_{n\to\infty} \frac{n+1}{n} = 1$

e) Show that the sequence $\left\{\log\left(\frac{1}{n}\right)\right\}_{n=1}^{\infty}$ diverges to $-\infty$.

f) Define absolutely convergent series of real numbers.

g) Is $\left\{\frac{1}{\sqrt{n}}\right\}_{n=1}^{\infty}$ lies in l^2? Justify.

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

i) If S and T are countable sets then prove that S × T is countable.

ii) If S is a countable set and R is a subset of S then prove that either R is empty or R is finite or R is countable.

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

i) Show that there exists on infinite set which is not countable.

ii) Prove that (A∪B)\(A∩B) = (A \ B)∪(B \ A)

P.T.O.

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

i) If $\{S_n\}_{n=1}^{\infty}$ is a sequence of real numbers, if C$\in\mathbb{R}$ and $\lim_{n\to\infty} S_n = L$ then prove that $\lim_{n\to\infty} cS_n = cL$.

ii) If $\{S_n\}_{n=1}^{\infty}$ is a convergent sequence of real numbers then prove that $\lim_{n\to\infty} SupS_n = \lim_{n\to\infty} S_n$.

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

i) Let $S_1 = \sqrt{2}$ and let $S_{n+1} = \sqrt{2}\sqrt{S_n}$ for n ≥ 2 Prove that $\{S_n\}_{n=1}^{\infty}$ is convergent.

ii) Prove that if $\lim_{n\to\infty} \frac{S_n}{n} = L \neq 0$ then $\{S_n\}$is not bounded

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

i) If $\sum_{n=1}^{\infty} a_n$ converges to A and $\sum_{n=1}^{\infty} b_n$ converges to B then prove that $\sum_{n=1}^{\infty}(a_n + b_n)$ converges to A + B.

ii) State and prove Schwarz inequality.

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

i) Prove that $\frac{1}{3}+\frac{1\times2}{3\times5}+\frac{1\times2\times3}{3\times5\times7}+\frac{1\times2\times3\times4}{3\times5\times7\times9}+\cdots$ converges.

ii) I) Test the convergence of $\sum_{n=1}^{\infty}\frac{n+1}{n^2+1}$

II) Show that $\sum_{n=1}^{\infty}\frac{3}{4+2^n}$ is convergent

Total No. of Questions : 4]

SEAT No. :

P-1012

[Total No. of Pages : 2

[6054]-302
T.Y. B.Sc. (Semester - V)
MATHEMATICS
MT352 : Real Analysis - I
(2019 Pattern) (CBCS) (35112)

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) Prove that A∨B is logically equivalent to ~((~A)∧(~B))

b) Show that the function $f(x) = x^2$ is not on to.

c) Define subsequence of real numbers.

d) Prove that $\lim_{n\to\infty} \frac{n+1}{n} = 1$

e) Show that the sequence $\left\{\log\left(\frac{1}{n}\right)\right\}_{n=1}^{\infty}$ diverges to $-\infty$.

f) Define absolutely convergent series of real numbers.

g) Is $\left\{\frac{1}{\sqrt{n}}\right\}_{n=1}^{\infty}$ lies in l^2? Justify.

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

i) If S and T are countable sets then prove that S × T is countable.

ii) If S is a countable set and R is a subset of S then prove that either R is empty or R is finite or R is countable.

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

i) Show that there exists on infinite set which is not countable.

ii) Prove that (A∪B)\(A∩B) = (A \ B)∪(B \ A)

P.T.O.

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

i) If $\{S_n\}_{n=1}^{\infty}$ is a sequence of real numbers, if C$\in\mathbb{R}$ and $\lim_{n\to\infty} S_n = L$ then prove that $\lim_{n\to\infty} cS_n = cL$.

ii) If $\{S_n\}_{n=1}^{\infty}$ is a convergent sequence of real numbers then prove that $\lim_{n\to\infty} SupS_n = \lim_{n\to\infty} S_n$.

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

i) Let $S_1 = \sqrt{2}$ and let $S_{n+1} = \sqrt{2}\sqrt{S_n}$ for n ≥ 2 Prove that $\{S_n\}_{n=1}^{\infty}$ is convergent.

ii) Prove that if $\lim_{n\to\infty} \frac{S_n}{n} = L \neq 0$ then $\{S_n\}$is not bounded

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

i) If $\sum_{n=1}^{\infty} a_n$ converges to A and $\sum_{n=1}^{\infty} b_n$ converges to B then prove that $\sum_{n=1}^{\infty}(a_n + b_n)$ converges to A + B.

ii) State and prove Schwarz inequality.

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

i) Prove that $\frac{1}{3}+\frac{1\times2}{3\times5}+\frac{1\times2\times3}{3\times5\times7}+\frac{1\times2\times3\times4}{3\times5\times7\times9}+\cdots$ converges.

ii) I) Test the convergence of $\sum_{n=1}^{\infty}\frac{n+1}{n^2+1}$

II) Show that $\sum_{n=1}^{\infty}\frac{3}{4+2^n}$ is convergent

Total No. of Questions : 4]

SEAT No. :

P1013

[Total No. of Pages : 2

[6054]-303

T.Y. B.Sc. (Regular)
MATHEMATICS
DSE-2A MT-353: Group Theory
(CBCS 2019 Pattern) (Semester-V) (35113)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicates full marks.***
3) ***Use of non-programmable calculator is allowed.***

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

a) Show that a group $\langle \mathbb{Z}, \bullet \rangle$ is not isomorphic to a group $\langle \mathbb{Z}^+, \bullet \rangle$

b) Find all cyclic subgroups of a group S_3.

c) Show that a group $\mathbb{Z}_4 \times \mathbb{Z}_{10}$ is not cyclic.

d) Find all orbits of the following permutation is S_8.

$$\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\ 3 & 8 & 6 & 7 & 4 & 1 & 5 & 2 \end{pmatrix} \in S_8$$

e) Prove that a group of prime order is cyclic.

f) Find the identity element of a group Q^+ under the binary operation * given by a*b=ab/2.

g) Find all cosets of the subgroup $6\mathbb{Z}$ of $2\mathbb{Z}$

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

a) Prove that every permutation defined on a finite set is expressed as a product of disjoint cycles.

b) State and prove the lagrange's theorem for a finite group.

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

a) Let $\sigma = (1, 2, 5, 4)\ (2, 3)$ be a permutation in S_5.
Find the index of a subgroup $\langle \sigma \rangle$ in S_5.

b) Let $\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 6 & 5 & 2 & 4 & 3 & 1 \end{pmatrix}$ be a permutation in S_6.

P.T.O.

i) Write σ as a product of disjoint cycles.
ii) Find order of σ .
iii) Write σ as a product of transpositions.
iv) State whether σ is odd or even.
v) Find an inverse of σ.

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

a) Prove that if G be a group & if $a \in G$, then $H = \{a^n \mid n \in \mathbb{Z}\}$ is a subgroup of a group G.

b) Prove that if G is a group with binary operation * and if $a, b \in G$, then the linear equations $a*x=b$ and $y*a=b$ have unique solutions x and y in G .

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

a) Let G be the set of all real numbers except –1. Define * on G by $a*b = a + b + ab$. Show that $\langle G, * \rangle$ is a group.

b) Find all subgroup of $\mathbb{Z}_{18}$ and give their subgroup diagram.

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

a) Prove that a group homomorphism $\phi : G \to G'$ is one-to-one map if and only if ker $(\phi) = \{e\}$.

b) Let H be a subgroup of a group G. Prove that the following are equivalent for H to be normal subgroup of G:

i) $ghg^{-1} \in H \quad \forall g \in G, h \in H$
ii) $gHg^{-1} = H \quad \forall g \in G$
iii) $gH = Hg \quad \forall g \in G$

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

a) Compute the factor group $(\mathbb{Z}_4 \times \mathbb{Z}_6) / \langle (0,2) \rangle$

b) Show that if a finite group G contains a non trivial subgroup of index 2 in G, then G is not simple.

● ● ●

Total No. of Questions : 4]

SEAT No. :

P1014

[Total No. of Pages : 2

[6054]-304
T.Y.B.Sc. (Regular)
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 side indicate full marks.***

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

a) Solve the initial value problem $y''+7y' + 12y = 0$, $y(0) = -1$, $y'(o) = 0$.

b) Find particular integral of $(D^2 + 4)\, y = \cos 3x$.

c) State the principle of superposition.

d) Find singular points of the equation $(1 - x^2)\, y'' + 7xy' + 10y = 0$.

e) Find the general solution of $x^2\, y'' - 5xy' + 9y = 0$ on $(0, \infty)$.

f) Write the system.

$$y_1'' = 2y_1 - 2y_2$$
$$y_2' = 5y_1 + 3y_2$$

in matrix form.

g) Verify that $y_1 = e^x$ and $y_2 = xe^x$ are solutions of $y''-2y' + y = 0$ on $(-\infty, \infty)$.

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

i) Prove that $\frac{1}{F(D)} e^{\alpha x} = \frac{e^{\alpha x}}{F(\alpha)}, F(\alpha) \neq 0.$

ii) Explain the method of reduction of order to solve the equation $y'' + P(x)\, y' + Q(x)\, y = R(x)$.

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

i) Solve $(D^2 + 2)\, y = x^2\, e^{3x}$.

ii) Find a series solution in x for the equation $(1-x^2)\, y''- 8xy'-12y = 0$.

P.T.O.

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

i) Explain the method of variation of parameter to solve the equation $y'' + P(x)y' + Q(x)y = R(x)$.

ii) If $y' = \begin{bmatrix} y_{11} \\ y_{21} \end{bmatrix}$ and $y_2 = \begin{bmatrix} y_{12} \\ y_{22} \end{bmatrix}$ are solutions of 2×2 system $y' = Ay$ on (a,b) then show that $c_1 y_1 + c_2 y_2$ is also a solution of the system $y' = Ay$. Also of $w = \begin{vmatrix} y_{11} & y_{12} \\ y_{21} & y_{22} \end{vmatrix}$ then show that.

$$w' = \begin{vmatrix} y_{11}' & y_{12}' \\ y_{21} & y_{22} \end{vmatrix} + \begin{vmatrix} y_{11} & y_{12} \\ y_{21}' & y_{22}' \end{vmatrix}$$

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

i) Find general solution of $y' = \begin{bmatrix} 3 & 5 & 8 \\ 1 & -1 & -2 \\ -1 & -1 & -1 \end{bmatrix}$.

ii) Find a particular solution of $y'' + 3y' + 2y = 7\cos x - \sin x$.

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

i) Explain the method of undetermined coefficients to solve the equation $y'' + p(x)y' + Q(x)\,y = R(x)$.

ii) Show that the coefficients $\{a_n\}$ in any solution $y = \sum_{n=0}^{\infty} a_n (x - x_0)^n$ of equation $(1 + A(x - x_0)^2)y'' + B(x - x_0)\,y' + cy = 0$ satisfy the recurrence relation $a_{n+2} = \dfrac{k(n)}{(n+2)(n+1)} a_n, n \geq 0$.

Where $k(n) = An(n-1) + Bn + C$.

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

i) Find general solution of $y' = \begin{bmatrix} 3 & 4 \\ -1 & 7 \end{bmatrix} y$.

ii) Find a particular solution y_p of $x^2 y'' - 2xy' + 2y = x^{9/2}$ given that $y_1 = x$ and $y_2 = x^2$ are solutions of the complementry equation $x^2y'' - 2xy' + 2y = 0$

✡ ✡ ✡

Total No. of Questions : 4]

SEAT No. :

P1015

[Total No. of Pages : 3

[6054]-305
T.Y.B.Sc. (Regular)
MATHEMATICS
MT - 355 (A) : Operations Research
(2019 Pattern) (CBCS) (Semester - V) (35115A)

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]**

i) Identify the direction of decrease of $z = -3x_1 + x_2$.

ii) Define linear programming problem.

iii) Write the following LPP in equation form.

Maximize $z = 3x_1 + 2x_2 + 4x_3$

Subject to $2x_1 - 3x_2 \leq 5$

$x_1 + 2x_2 + 3x_3 \leq 4$

$3x_1 + 2x_2 \leq 2$

and $x_1, x_2, x_3 \geq 0$

iv) Write the dual of following LPP

Maximize $z = 1x_1 + 2x_2 + 3x_3$

Subject to $-x_1 + x_2 + x_3 \leq 1$

$3x_1 + x_2 - x_3 \leq 2$

and $x_1, x_2, x_3 \geq 0$

v) Explain, how to resolve the degeneracy of a solution in a TP?

vi) Write following TP as a balanced TP

1	2	1	3	5
4	2	5	9	5
3	2	4	7	2
2	4	3	1	

vii) Define slack and surplus variables.

P.T.O.

*Q2)*A) Attempt any ONE of the following. **[5]**

i) Explain, with an example that assignment problem is a special case of transportation problem.

ii) Obtain an IBFS for following transportation problem using matrix-minima method.

13	11	15	20	2
17	14	12	13	6
18	18	15	12	7
3	3	4	5	

B) Attempt any ONE of the following. **[5]**

i) Solve following LPP using graphical method.

Maximize $z = 5x_1 + 4x_2$

Subject to

$$6x_1 + 4x_2 \leq 24$$
$$x_1 + 2x_2 \leq 6$$
$$-x_1 + x_2 \leq 1$$
$$x_2 \leq 2$$
and $x_1, x_2, \geq 0$

ii) Using simplex method, show that following LPP has an alternate solution exists, hence find it.

Maximize $z = x_1 + x_2$

Subject to

$$x_1 + 2x_2 \leq 20$$
$$x_1 + x_2 \leq 15$$
and $x_1, x_2, \geq 0$

Q3) A) Attempt any ONE of the following. **[5]**

i) Explain Hungarian method to solve the assignment problem.

ii) Solve following assignment problem to minimize the total cost.

	A	B	C	D
I	15	13	14	17
II	11	12	15	13
III	13	12	10	11
IV	15	17	14	16

B) Attempt any ONE of the following. **[5]**

i) Solve the following LPP using Big-m method,

Maximize $z = 2x_1 + 3x_2$

Subject to

$$x_1 + x_2 \geq 5$$
$$x_1 + 2x_2 \geq 6$$

and $x_1, x_2 \geq 0$

ii) Obtain the dual of following LPP.

Minimize $z = 2x_1 + 5x_3$

Subject to

$$x_1 + x_2 \geq 2$$
$$2x_1 + x_2 + 6x_3 \leq 6$$
$$x_1 - x_2 + 3x_3 = 4$$

and $x_1, x_2, x_3 \geq 0$

Q4) A) Attempt any ONE of the following. **[5]**

i) Explain, how do we convert maximization of transportation problem (TP) into minimization of TP with an example.

ii) Solve following restricted assignment problem to minimize the total cost.

	M_1	M_2	M_3	M_4
P_1	5	5	–	2
P_2	7	4	2	3
P_3	9	3	5	–
P_4	7	2	6	7

B) Attempt any ONE of the following. **[5]**

i) Solve the following TP using north-West corner rule.

	D_1	D_2	D_3	D_4	Supply
O_1	6	5	8	5	30
O_2	5	11	9	7	40
O_3	8	9	7	15	50
Demand	35	28	32	25	

ii) Solve the following assignment problem to maximize the total profit.

	A	B	C	D	E
I	80	80	85	95	90
II	78	90	104	95	93
III	70	72	80	60	70
IV	100	101	100	102	95
V	62	60	61	65	67

✡ ✡ ✡

Total No. of Questions : 4]

SEAT No. :

P1016

[Total No. of Pages : 2

[6054]-306
T.Y.B.Sc. (Regular)
MATHEMATICS
MT - 355 (B) : Differential Geometry
(2019 Pattern) (CBCS) (Semester - V) (35115B)

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) Is $\gamma\ (t) = (t^2, t^4)$ a parametrisation of the parabola $y = x^2$?

b) Find the Cartesian equation of the parametrised curve $\gamma\ (t) = (e^t, t^2)$.

c) What is arc length?

d) Show that the curve $\gamma\ (t) = (t, t^2)$ is regular.

e) Calculate the first fundamental form of $\sigma\ (u, v) = (u, v, u^2 + v^2)$.

f) Prove that second fundamental form of plane is zero.

g) State the isoperimetric inequality.

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

i) Prove that any reparametrisation of a regular curve is regular.

ii) Let γ be a unit speed curve in $\mathbb{R}^3$ with constant curvature and zero torsion prove that γ is part of circle.

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

i) Show that the curve $\gamma\ t = \left(\frac{1+t^2}{t}, t+1, \frac{1-t}{t}\right)$ is planar.

ii) Show that the ellipse $\gamma\ (t) = (a\ cost, b\ sint)$.

Where a and b are positive constants is simple closed curve and compute area of interior.

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

i) Prove that the transition map of smooth surface are smooth.

P.T.O.

ii) Prove that any tangent developable is isometric to a plane.

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

i) Show that an open disc in xy plane is a surface.

ii) Find equation of tangent plane of the surface $\sigma(u,v) = (u, v, u^2 - v^2)$ at point (1, 1, 0).

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

i) Prove that $\|\sigma_u \times \sigma_v\| = (EG - F^2)^{1/2}$.

ii) State and prove the Archimedes theorem.

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

i) Compute the second fundamental form of elliptic parabaloid $\sigma(u, v) = (u, v, u^2 + v^2)$.

ii) Show that $\sigma(u, v) = (\text{sech } u, \cos v, \text{sech } u \sin v, \tanh u)$ is regular surface patch for the unit sphere).

✡ ✡ ✡

Total No. of Questions : 4]

SEAT No. :

P1017

[Total No. of Pages : 2

[6054]-307
T.Y.B.Sc. (Regular)
MATHEMATICS
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 the right indicate full marks.***

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

a) What is the difference between 23 and "23"?

b) Find the value of the following expression: 20/7+20% 7 + 20 * 2/3.

c) Write a for loop to calculate the following sum: 0+1+2+--------+30.

d) Write a syntax of conditional operator in c-language.

e) List any two keywords.

f) Define recursion.

g) Describe the array that is defined by the statement "Char Name (20)".

Q2) A) Attempt any ONE of the following. **[5]**

a) Write a note on logical operator in c language.

b) Explain brief about print f and scan f function.

B) Attempt any ONE of the following. **[5]**

a) Write a c-program to check whether given integer is prime or not.

b) Write a c-program to find real roots of the quadratic equation.

Q3) A) Attempt any ONE of the following. **[5]**

a) Explain switch statement with an illustration. Also write its syntax.

b) Write a short note on 'Break' and 'Continue' statement in c language.

B) Attempt any ONE of the following. **[5]**

a) Write a c program to find the factorial of a number using recursive function.

b) Write a c program to find sum of digits of a given number.

P.T.O.

Q4) A) Attempt any ONE of the following. **[5]**

a) Write a short note on two dimensional arrays.

b) What are the function prototypes? What is their purpose? Where with in a program are function prototypes normally placed?

B) Attempt any ONE of the following. **[5]**

a) Write a c-program to print the transpose of a matrix of order 3×3.

b) Write a c-program to find binomial coefficient C_r^n .

✡ ✡ ✡

Total No. of Questions : 4]

SEAT No. :

P1018

[Total No. of Pages : 2

[6054]-308

T.Y.B.Sc. (Regular)

MATHEMATICS

DSE-3B, MT 356 (B) : Number Theory

(2019 Pattern) (Semester-V) (35116B)

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

Instructions to the candidates:

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

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

a) If (a,b)=2, then find (a,b+3a).

b) Find the number of positive integers ≤ 3600 that are prime to 3600.

c) If (n,7)=1, then prove that n^6-1 is divisible by 7.

d) Write a single congruence that is equivalent to the pair of congruences $x \equiv 1$ (Mod 4), $x \equiv 2$ (mod 3).

e) Let x be a real number , then prove that $0 \leq x-[x]<1$.

f) Compute $\left(\frac{29}{11}\right)$.

g) Define pythagorean triple of positive integers. Give an example of it.

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

i) State and prove division algorithm.

ii) Prove that $ax \equiv ay$ (mod m) if and only if $x \equiv y\left(\text{mod}\frac{m}{(a,m)}\right)$.

P.T.O.

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

i) Show that $7 / 3^{2n+1} + 2^{n+2}, \forall n \geq 0.$

ii) Solve $19x \equiv 29 (\text{mod}\, 35)$.

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

i) Prove that $\sigma(n) = \prod_{p^{\alpha} \| n} \left(\frac{p^{\alpha+1} - 1}{p - 1} \right)$, for every positive integer n, and a prime p.

ii) Let p be an odd prime and $(a, p) = 1$. then prove that $\left(\frac{a}{p} \right) \equiv a^{\left(\frac{p-1}{2} \right)} (\text{mod}\, p)$.

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

i) For any real number *x*, prove that $[x] + [x + \frac{1}{2}] = [2x]$.

ii) Prove that 3 is quadratic residue of 13, but a quadratic non-residue of 7.

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

i) If *x*, *y*, *z* is a primitive pythagorean triple, then prove that one of the integres *x* or *y* is even while the other is odd.

ii) If P and Q are odd and positive with (P,Q)=1, then prove that $\left(\frac{\text{P}}{\text{Q}} \right) \left(\frac{\text{Q}}{\text{P}} \right) \equiv (-1)^{\left\{ \left(\frac{p-1}{1} \right) \right\} \left\{ \left(\frac{Q-1}{2} \right) \right\}}$.

b) Attempt any one of the following:

i) Apply Wilson's theorem to show that

$63! + 1 \equiv 0 (\text{mod}\, 71)$ and

$61! + 1 \equiv 0 (\text{mod}\, 71)$.

ii) Find all solutions of $10x - 7y = 17$. **[5]**

● ● ●

Total No. of Questions : 4]

SEAT No. : ____

P1019

[Total No. of Pages : 2

[6054]-309

T.Y. B.Sc. (Regular)

MATHEMATICS

MT-356 (C) : Laplace Transform and Fourier Series

(2019 Pattern) (Semester-V) (35116 C)

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 delta function.

b) Give an example of odd function.

c) Find $L[\cos^2 t]$

d) Find $L^{-1}\left[\frac{1}{(s+2)^2}\right]$

e) Evaluate $\int_{-\infty}^{\infty} x^3 \cos x dx$

f) $\int_0^{\infty} x^6 e^{-x} dx$

g) State the convolution theorem.

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

i) If L[F(t)]=f(s), then prove that $L\left[\int_0^t F(u)du\right] = \frac{f(s)}{s}$

ii) State and prove change of scale property.

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

i) Solve : $y''' + y'' = e^t + t + 1$; $y(0) = y'(0) = y''(0) = 0$

ii) Solve : $y'' + y = 6\cos 2t$; $y(0) = 3$, $y'(0) = 1$

P.T.O.

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

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

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

$$L^{-1}(f(s)g(s)) = \int_0^t G(u)F(t-u)du .$$

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

i) Find the fourier series for the function

$$f(x) = \begin{cases} \pi + x, -\pi < x < 0 \\ \pi - x, \ 0 < x < \pi \end{cases}$$

ii) Obtain the fourier expansion of

$$f(x) = e^x, -\pi \le x \le \pi$$

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

i) If L [F(*t*)]=*f*(*s*), the show that

$$L\left[\frac{f(t)}{t}\right] = \int_s^\infty f(s)ds$$

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

$$L^{-1}\left(e^{-as} f(s)\right) = \begin{cases} F(t-a) \ ; t > a \\ 0 \qquad ; t < a \end{cases}$$

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

i) Find $L^{-1}\left(\frac{s^2}{(s-1)^4}\right)$

ii) Evaluate $\int_0^\infty t^2 e^{-4t} \cos h2t \, dt$

● ● ●

Total No. of Questions : 5]

SEAT No. : ____

P1020

[Total No. of Pages : 2

[6054]-310

T.Y. BSc. (Regular)

PHYSICS

PHY-351 : Mathematical Methods in Physics-II

(2019 Pattern) (Semester-V) (35121)

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

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

a) State fuch's theorem.

b) Write first two legendre Polynomial.

c) Define scale factor.

d) Define inertial from of reference.

e) What is cartesian co-ordinate system?

f) Give an example of partial differential equation.

Q2) Attempt all of the following: **[6]**

a) Explain time dilation using lorentz transformation equation. Also discuss Twin paradox.

b) Explain metric coefficient in general curvilinear co-ordinate system. Express length element in terms of metric coefficient for orthogonal co-ordinate system. **[4]**

P.T.O.

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

a) Obtain series solution of legendre equation $(1-x^2)\,y''-2xy'+l\,(l+1)y=0$ by frobenius method. for $k=0$ and $a_1=0$ where k is indicial constant and a_1 is coefficient of power series.

b) Prove that $P'_{n+1}(x)\,P'_{n-1}(x)=(2_{n+1})\,P_n(x)$ **[4]**

Q4) Attempt the following.

a) Explain michelson morley experiment with suitable diagram. Discuss the negative result of the experiment. **[6]**

b) Show that point $x=0$ is regular singular point of the bessel differential equation $x^2y''+xy'+(x^2-n^2)\,y=0$ n is a constant. **[4]**

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

a) Determine spherical polar co-ordinates of point A A : A (x=1, y=2, z=3)

b) Prove that $H_n(x)=(-1)^n H_n(-x)$

c) Ameter stick is projected into the space at a high speed that length of stick is contracted to 50 cm. How fast is it going?

d) Explain gradient and divergence in cartesian co-ordinate system.

e) Explain the following terms of ordinary differential equation.

i) Order

ii) Degree

iii) Linearity

iv) Homogenity.

f) Explain party function with examples.

Total No. of Questions : 5]

SEAT No. :

P1021

[Total No. of Pages : 2

[6054]-311
T.Y.B.Sc. (Regular)
PHYSICS
PHY-352 : Electrodynamics
(2019 Pattern) (Semester - V) (Paper - II) (35122)

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) ***Q.2 to Q.5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Use of log table and calculator is allowed.***

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

a) State Biot-Savart's law.

b) Write any two Maxwell's equations in differential form in free space.

c) What is Non-polar molecule?

d) What is poynting vector?

e) What is the electric field intensity 0.9 meter away from a charge 7×10^{-5} coulomb?

f) Calculate the velocity of propagation C in free space Given: $\mu_0 = 4x\times10^{-7}$ wb/A-m; $\in_0 = 8.85\times10^{-12}$ C^2/Nm^2.

Q2) Answer the following.

a) Explain the terms $\vec{B}, \vec{H}$ and $\vec{M}$. Obtain the relation between them. **[6]**

b) State and explain Ampere's force law. **[4]**

Q3) Answer the following.

a) State Faraday's law of electromagnetic induction and prove that

$$\vec{\nabla}\times\vec{E} = \frac{-\partial\vec{B}}{\partial t}\ .$$ **[6]**

b) A 20 cm long wire carrying a current of 10 amp is held at an angle of 30° with the direction of uniform magnetic field of strength 1 wb/m^2. Calculate the force acting on the wire. **[4]**

P.T.O.

Q4) Answer the following.

a) State and prove Poynting's theorem. **[6]**

b) The electric susceptibility of a material is 44.25×10^{-12} e^2/Nm^2. What is the value of dielectric constant? **[4]**

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

a) Write a short note on three broad classes of magnetic materials.

b) Distinguish between diamagnetic and ferromagnetic materials.

c) What do you mean by displacement current?

d) What are the advantages of Gauss's law over Coulomb's law?

e) Write a note on magnetic susceptibility.

f) Explain the term potential energy of system of charges.

✡ ✡ ✡

Total No. of Questions : 5]

SEAT No. :

P1022

[Total No. of Pages : 2

[6054]-312
T.Y.B.Sc. (Regular)
PHYSICS
PHY - 353 : Classical Mechanics
(2019 Pattern) (Semester - V) (Paper - III) (35123)

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

Instructions to the candidates:

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

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

a) Define centre of mass of the system.

b) What is meant by exoergic and endoergic process?

c) State the different types of constraints.

d) What is meant by central force?

e) A charged particle having charge 2×10^{-19}c enters into magnetic field of induction 6×10^{-4}T with velocity 3×10^{4} m/s with an angle 30º with field. Find the force acting on particle.

f) Determine reduced mass of system of two masses 4 kg and 6kg.

Q2) Answer the following.

a) How does a two body problem is reduced to a one body problem. **[6]**

OR

Obtain an expression for path described by charged particle moving in uniform electric field perpendicular to the direction of electric field. **[6]**

b) State and prove Kepler's second law of planetary motion. **[4]**

Q3) Answer the following.

a) Explain limitation of Newtonian mechanics. **[6]**

OR

Find relation between scattering angle. In the lab and C.M. system in two body elastic scattering. **[6]**

b) Show that the gravitational force $\vec{F}g$ between two masses m_1 and m_2 separated by distance r is conservative force $\left[\vec{F}g = \frac{Gm_1m_2}{r^3}\vec{r}\right]$. **[4]**

P.T.O.

Q4) Answer the following.

a) From D' Alembert's principle. Obtain Lagranges' equation of motion. **[6]**

OR

Derive differential equation of orbit in central force motion. **[6]**

b) A system of particles consists of particles 3 gm located at A (2, 3, 0), 5 gm at point B (–2, –3,2) and 2gm at point (3, 1, 1). Find the co-ordinates of centre of mass of system. **[4]**

Q5) Write a short note on any Four of the following. **[4×2½=10]**

a) Degree of Freedom.

b) Difference between elastic and inelastic scattering.

c) Holonomic constraint.

d) Differential cross-section.

e) Characteristics of central force.

✡ ✡ ✡

Total No. of Questions : 5]

SEAT No. :

P1023

[Total No. of Pages : 2

[6054] - 313

T.Y.B.Sc. (Regular)

PHYSICS

PHY - 354 : Atomic and Molecular Physics

(2019 Pattern) (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 question 2,3,4,5.***
3) ***Questions 2 to 5 carries equal marks.***
4) ***Use of calculator and log table is allowed.***

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

a) Write electronic configuration of carbon atom.

b) Define Normal Zeeman effect.

c) What are possible values of M_l for l=3?

d) Define equivalent electrons.

e) What is mean by reduced mass of a system?

f) What is mean by orthohelium?

Q2) a) With help of neat diagram, explain four spectral series in sodium atom. **[6]**

b) Explain classical theory of Raman effect. **[4]**

Q3) a) Explain the four quantum numbers in detail. **[6]**

b) Determine term symbols for ground state of Hydrogen and Lithium atoms. **[4]**

P.T.O.

Q4) a) Derive expression for rotational energy levels of rigid diatomic molecule. Hence draw allowed rotational energy levels of a rigid diatomic molecule. **[6]**

b) Find out singlet and triplet terms in p-p configuration. **[4]**

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

a) Write note on Paulli's Exclusion principle.

b) Compare Normal and Anamolous Zeeman effect.

c) Write Applications of Raman Spectroscopy.

d) Write applications of UV - VIS Spectroscopy.

e) Write postulates of Bohr's theory.

f) Write note on Fluoressence.

Total No. of Questions : 5]

SEAT No. :

P-1024

[Total No. of Pages : 2

[6054]-314

T.Y. B.Sc.

PHYSICS

PHY-355: Computational Physics

(2019 Pattern) (Semester - V) (Paper - IV) (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) ***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 the term preprocessor in 'c'.

b) Give the syntax of scanf function.

c) Write the use of getch ( ) function.

d) What do you mean by algorithm?

e) State the function of initgraph ( ).

f) Write any two rules of variable declaration.

Q2) Answer the following question :

a) Explain the while loop. Why it is called as top tested loop? State the difference between while and do while loop. **[6]**

b) Define the term array. How array elements are passed in function? Explain. **[4]**

P.T.O.

Q3) Answer the following :

a) State different types of 'C' operators. Explain any two types of operators with the help of suitable example. **[6]**

b) Using Bisection method find the root of the equation **[4]**

$x^3 - 1.8x^2 - 10x + 17 = 0.$

Q4) Answer the following question :

a) Explain in details identifiers and keywords in 'C' language. **[6]**

b) How the user defined function can be accessed? Explain the concept of function. **[4]**

Q5) Answer the following (Any four) : **[10]**

a) What is nesting of loops? Explain if-else nested loop.

b) Write a 'C' program to draw circle, ellipse and arc.

c) Explain pointers in 'C' language.

d) Write short note on storage class.

e) What do you mean by flow chart? Draw various symbols used in flowchart. Give their meaning.

f) State output of following 'C' program.

```
# include <studio.h)
main ( )
{
      int digit;
      clrscr ( );
      for (digit = 0; digit < = 5; digit ++)
            {
                  printf ("%d\t", digit);
            }
            getch ( )
            }
```

Total No. of Questions : 5]

SEAT No. :

P-1025

[Total No. of Pages : 2

[6054]-315

T.Y. B.Sc.

PHYSICS

PHY-356 (A) : Astronomy and Astrophysics - I

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

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

Instructions to the candidates :

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

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

a) What is Asteroid?

b) What do you mean by constellations?

c) What are eclipsing binaries?

d) What is Resolving Power of telescopes?

e) What is Event Horizon?

f) What are pulsars?

Q2) a) Explain Assumptions and evidences of Big Bang Theory. **[6]**

OR

Explain in detail, construction and working of CCD. What are its advantages.

b) Short Note on Neutron star. **[4]**

Q3) a) Explain the process of Stellar Nucleosynthesis. **[6]**

OR

Compare Apparent magnitude with Absolute magnitude. Explain the scale of magnitude for celestial objects.

b) Write a note : Co-ordinate system in Astronomy. **[4]**

P.T.O.

Q4) a) What are Cepheid variables? How do the pulsate? **[6]**

OR

Explain Kepler's Laws of planetary motion.

b) Write a note Spectral classification of stars. **[4]**

Q5) Write Short Notes (Any Four) : **[10]**

a) Doppler Effect

b) Supernova

c) Radio Interferometry

d) Proton-proton cycle

e) Astrometric Binaries.

f) Black Holes.

□□□

Total No. of Questions : 5]

SEAT No. :

P-1026

[Total No. of Pages : 2

[6054]-316

T.Y. B.Sc.

PHYSICS (Paper - VI)

PHY - 356(B) : Elements of Material Science

(2019 Pattern) (Semester - V) (35126B)

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

Instructions to the candidates:

1) ***Question No. 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Use of calculator and logtable is allowed.***

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

a) What is CRSS?

b) Give any two properties of single phase alloy.

c) What is solid solution?

d) What is soft ferrite?

e) If stress produced in stretching wire is 5×10^6 N/m^2 by an applied force of 10N. What is cross-sectional area of the wire?

f) The density of unit cell of compound cds is 4.99 gm/cm^3 and its mass is 959.48×10^{-24} gm. What is volume of unit cell.

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

i) Explain impurities in solid.

ii) What is Ceramic phases?

iii) Describe Creep and Fatigue.

b) Discuss Ax-structure of CsCl type. **[4]**

P.T.O.

Q3) a) Answer <u>any two</u> of the following questions : **[6]**

i) Explain any three thermal properties of material

ii) Explain semi conducting properties of ceramic.

iii) With the help of diagram explain phase diagram of single component system.

b) A copper has resistivity of 17×10^{-9} Ohm-meter. What is resistance of wire which is 0.06 cm in diameter and 30m long? **[4]**

Q4) a) Answer <u>any two</u> of the following questions : **[6]**

i) Explain the term vacancy.

ii) Draw and explain the phase diagram of NaCl and water.

iii) Explain impurities in solid with example.

b) Calculate thermal stress for polymer. Change the dimension due to change in temperature 400ºK. Young's modular is 2.3×10^{-12} N/m^2 and linear coefficient of thermal expansion for polymer is 1.20×10^{-6} 0C^{-1}. **[4]**

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

a) Explain strength and dielectric constant of ceramic material.

b) State and prove lever rule.

c) What is dielectric properties of ceramics.

d) Explain Pb-Sn Eutectic type phase diagram.

e) Explain superconducting properties of ceramics.

f) Explain the line defect.

Total No. of Questions : 5]

SEAT No. :

P-1027

[Total No. of Pages : 2

[6054]-317

T.Y. B.Sc.

PHYSICS

PHY-356 (C) : Biophysics (Elective - I)

(2019 Pattern) (CBCS) (Semester - V) (35126C)

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

Instructions to the candidates :

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

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

a) Define Viscosity.

b) Define resting potential.

c) State the principle of Transmission Electron Microscope.

d) Define polarizable electrodes.

e) Define Osmosis.

f) Define Biostatistics and Biometry.

Q2) Answer the following :

a) Describe in detail structure and working of Neuron. **[6]**

b) Describe in detail the functional aspects of cell membrane. **[4]**

Q3) Answer the following :

a) State the principle of colorimeter. Describe in detail construction and working of colorimeter. **[6]**

b) Describe in detail the construction and working of computed Tomography. **[4]**

P.T.O.

Q4) Answer the following :

a) Describe in detail construction and working of Nuclear magnetic resonance. **[6]**

b) Explain the different types of ECG electrodes. **[4]**

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

a) Write a short note on primary structure of protein.

b) What is Non-polarizable electrodes?

c) What do you mean by spectrophotometer?

d) Write a short note on "Action potential".

e) Write a short note on Gibb's free energy.

f) Write a short note on "Half cell potential".

□□□

Total No. of Questions : 5]

SEAT No. :

P-1028

[Total No. of Pages : 2

[6054]-318

T.Y. B.Sc.

PHYSICS

PHY - 356 (D) : Renewable Energy Sources - I

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

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

Instructions to the candidates:

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

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

a) What are non-conventional energy sources?

b) What is principle of solar dryer?

c) What is meant by Zenith?

d) What is solar module?

e) Define efficiency of solar cell.

f) Give advantages of concentrating collectors.

Q2) Answer the following questions.

a) Describe the construction and working of Solar Concentrating Collectors (SCC). **[6]**

b) Describe the box type solar cooker with neat diagram. **[4]**

Q3) Answer the following questions.

a) Explain I-V characteristics of solar cell and explain fill factor (FF) and maximum conversion efficiency. **[6]**

b) Explain how chemical energy is stored? **[4]**

P.T.O.

Q4) Answer the following questions.

a) Draw a neat diagram of direct, diffuse and total solar radiation. **[6]**

b) Describe construction and working of Liquid flat Plate Collector (FPC). **[4]**

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

a) Solar insolation

b) p-i-n solar cell

c) Selective coating

d) Heat insolation

e) Tidal energy

f) Photovoltaic panels

▽▽▽▽

Total No. of Questions : 5]

SEAT No. :

P-1029

[Total No. of Pages : 2

[6054]-319

T.Y. B.Sc.

PHYSICS

PHY - 356 (E) : Applied Optics

(2019 Pattern) (CBCS) (Semester - V) (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) ***Question 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Use of calculator and log table is allowed.***

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

a) Define Malus law in brief.

b) What is numerical aperture?

c) Define reflection matirx of an optical system.

d) Define refraction matrix of optical system.

e) Define quarter wave plate.

f) What do you meant by polarizing angle?

Q2) Answer the following questions.

a) Explain the method of recording and reconstruction of holography. **[6]**

b) Measure the acceptance angle for optical fiber whose core refractive index is 1.4 cladding refractive index is 1.39. **[4]**

Q3) Answer the following questions.

a) Explain optical fiber in detail. **[6]**

b) Measure specific rotation which rotates the plane of polarization 12.2° in 40% sugar solution of 25cm length. **[4]**

P.T.O.

Q4) Answer the following questions.

a) Explain Fresnel diffraction in detail with diagram. **[6]**

b) Discuss the diffraction obtained by a narrow slit illuminated by parallel beam of light. **[4]**

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

a) State any four advantages of an optial fiber.

b) Explain cardinal points of an optical system.

c) Describe numerical aperture.

d) State and explain brestwers law.

e) Write a short note on Fabry-Perot etalon.

f) Draw neat labeled diagram of polarimeter.

Total No. of Questions : 5]

SEAT No. :

P-1030

[Total No. of Pages : 2

[6054]-320

T.Y. B.Sc.

PHYSICS

PHY - 356(F) : C# Programming

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

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three out of question Q2 to Q5.***
3) ***All sub questions in Questions - 5 carries equal marks.***

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

a) What is the difference between a for loop and a while loop in C#?

b) What is a delegate in C#?

c) What is a nullable type in C#?

d) What is the difference between the "= =" operator and the "Equal" method in C#?

e) What is the purpose of the "using" statement in C#?

f) What are the types of variable in C#?

g) What is Boxing in C#?

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

a) What are the operators used in C#? Describe the each operator with an example. **[6]**

b) Methods in C# write in brief. **[4]**

P.T.O.

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

a) Describe object oriented programming. **[6]**

b) Describe SQL database and types of data. **[4]**

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

a) Discuss the differences between value types and reference types in C#. Provided examples of each and explain how they behave differently. **[6]**

b) What are the differences between interfaces and abstract classes in C#? What would you use one over the other, and why? **[4]**

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

a) Variables

b) Constants

c) Data fetching from SQL server data base

d) Implicit and Explicit casting.

e) Boxing and unboxing.

Total No. of Questions : 5]

SEAT No. :

P-1031

[Total No. of Pages : 2

[6054]-321

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) ***Q.2 to Q.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 Intensity level and Sound Pressure Level.

b) What is tremelo?

c) Determine Sound Power Level in an enclosure with 1.0 Watt of acoustic power ($W_0 = 10^{-12}$ watts).

d) Define quality factor in case of Helmholtz Resonator.

e) Find T_{60} for an office which has a volume of 1800 m^3 and total sound absorption of ISO metric sabine.

f) What do you mean by free field?

Q2) a) Explain the analogies between electrical, mechanical and acoustical systems. **[6]**

b) Write a note on acoustic standards and reference conditions. **[4]**

P.T.O.

Q3) a) With the help of neat diagram explain hearing mechanism. **[6]**

b) The Resonator frequency of flanged Helmholtz Resonator is 330 Hz. Determine its volume if length and radii are 0.0068m and 0.0073m respectively. (C = 343 m/s). **[4]**

Q4) a) Discuss the effect of density, thickness and airspace on sound absorption using corresponding curves. **[6]**

b) On the level detector type T_{60} reverberation time measuring instrument the upper and lower levels and 2V and 1V respectively. The number of counts displayed by the counter is 1000 for an enclosure with T_{60} = 1.1 sec. Determine the on-board clock frequency. **[4]**

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

a) Expansion chamber Muffler.

b) Anechoic Chamber.

c) Pitch and timbre.

d) Decibel scales.

e) Pros and Cons of headphones.

f) FFT analysis.

Total No. of Questions : 5]

SEAT No. :

P-1032

[Total No. of Pages : 2

[6054]-322

T.Y. B.Sc.

PHYSICS

PHY-3510(H): Python Programming

(2019 Pattern) (Semester - V) (351210H)

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

Instructions to the candidates :

1) ***Q1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Q2 to Q5 carry equal marks.***
4) ***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) Which are the different conditional statements?

b) Which are data types in Python?

c) Explain any two tuple operations with an example.

d) Define Seaborn.

e) How to call function?

f) What are the types of variables in Python?

Q2) Answer the following questions :

a) Explain list data type in Python. **[6]**

b) Which are basic tuple operations? Explain with example. **[4]**

P.T.O.

Q3) Answer the following questions :

a) Explain Datetime Module with an example. **[6]**

b) List out the plots that can plot with Seaborn. **[4]**

Q4) Answer the following questions :

a) Write Python program to find the sum of first 100 natural numbers. **[6]**

b) Write a Python generator function that reverses a given string. **[4]**

Q5) Write short notes on any Four of the following : **[4 × 2½ = 10]**

a) Explain how to delete elements in Dictionary.

b) Program structure of Python programming

c) Dictionary data type in Python.

d) Functools Module.

e) Write a Python function to check whether a number is in a given range.

f) Basic tuple operations.

✷ ✷ ✷

Total No. of Questions : 5]

SEAT No. :

P-1033

[Total No. of Pages : 2

[6054]-323

T.Y. B.Sc.

PHYSICS

PHY-3510(I): Energy Studies (Skill - 1)

(2019 Pattern) (Semester - V) (Paper - X) (351210I)

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

Instructions to the candidates :

1) ***Q1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Q2 to Q5 carry equal marks.***
4) ***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 Solar constant.

b) What is meant by Zenith angle?

c) What is the principle of Solar dryer?

d) Define Fill Factor.

e) What are the various forms of energy storage?

f) State Photovoltaic principle.

Q2) Answer the questions :

a) What do you mean by renewable energy sources? Explain with examples. **[6]**

b) Calculate efficiency of Flat plate collector for the given values Q_k = 300 Kcal/hr, Ac = 1.5m^2, I = 500 Kcal/hr.m^2. **[4]**

P.T.O.

Q3) Answer the following :

a) Describe the construction and working of liquid flat plate collector (FPC). **[6]**

b) Give facts and myths about various energy sources. **[4]**

Q4) Answer the following :

a) Explain steps in installation of a roof top solar PV system design. **[6]**

b) Explain recent trends in batteries. **[4]**

Q5) Solve any Four of the following : **[4 × 2½ = 10]**

a) Advantages of Wind Mills.

b) Super capacitors - Explain.

c) Explain concentrating collector.

d) What do you mean by biomass?

e) Explain future trends in electric cars.

f) Distinguish between renewable & non-renewable energy sources.

✷ ✷ ✷

Total No. of Questions : 5]

SEAT No. :

P-1034

[Total No. of Pages : 2

[6054]-324

T.Y.BSc.

PHYSICS

PHY - 3510 (J) : Introduction to Arduino

(2019 Pattern) (Semester - V) (351210J)

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

Instructions to the candidates:

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

a) List two types of data types of data in Arduino.

b) Write any two logical and relational operators.

c) How many analog pins Arduino Mega boards has?

d) What is SPI?

e) Which is most popular board in Arduino family?

f) What is the function of AREF?

Q2) **Solve the following :**

a) Explain the structure of Arduino program. **[6]**

b) Explain modulo and assignment operators. **[4]**

P.T.O.

Q3) **Solve the following :**

a) Differentiate between digital and analog pins of Arduino. **[6]**

b) Write any four advantages of Arduino. **[4]**

Q4) **Solve the following :**

a) Write any six features of Arduino. **[6]**

b) What is AT mega 328p microcontroller? **[4]**

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

a) What is ADC of Arduino UNO?

b) What is IDE?

c) Which are the functions used in Arduino program?

d) Explain how function can be declared in Arduino.

e) Define embeded system.

Total No. of Questions : 5]

SEAT No. :

P-1035

[Total No. of Pages : 2

[6054]-325

T.Y.BSc.

PHYSICS

PHY - 3510 (K) : Sensors and Transducers

(2019 Pattern) (Semester - V) (351210K)

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

Instructions to the candidates:

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

a) What is strain gauge?

b) What is a transducer?

c) What is mean by gauge factor?

d) Why are capacitive sensors important?

e) What is primary sensor?

f) What are the two applications of capacitive transducer?

Q2) **Answer the following questions :**

a) Describe strain gauge transducer? **[6]**

b) Explain thermo emf sensors. **[4]**

P.T.O.

Q3) **Answer the following questions :**

a) Explain the working principle of resistive potentiometer transducer. **[6]**

b) What are the different types of capacitive sensors used for displacement measurement? **[4]**

Q4) **Answer the following questions :**

a) Explain the working principle of variable capacitance transducer. **[6]**

b) What type of capacitive sensors are used in pressure transmitters? Explain it. **[4]**

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

a) LVDT.

b) RTD material.

c) Applications of capacitives sensors.

d) Material expansion type sensors.

e) Importance of capacitive sensors.

Total No. of Questions : 5]

SEAT No. :

P-1036

[Total No. of Pages : 2

[6054]-326
T.Y. B.Sc. (Semester - V)
PHYSICS
PHY-3511(L) : Physics Workshop Skill
(2019 Pattern) (Skill Enhancement Course - II) (351211L)

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

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
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 precision.

b) State limitations of analog instruments.

c) What is working principle of Q. meter?

d) Give the balancing condition of dc. bridge.

e) What is distortion factor?

f) What do you mean by function generator?

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

a) Draw a neat block diagram of CRO. Explain function of each block. **[6]**

b) Explain working principle of voltmeter. **[4]**

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

a) Explain in detail the working of low frequency signal generator. **[6]**

b) Write a note on RLC bridge. **[4]**

P.T.O.

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

a) Explain the working of digital multimeter with the help of block diagram. **[6]**

b) Write a note on error's in measurement. **[4]**

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

a) Draw block diagram of AC millivoltmeter.

b) Explain effect of loading.

c) State application of function generator.

d) Write characteristics of digital meters.

e) What do you mean by dual trace oscilloscope?

f) Write short note on Q. meter.

Total No. of Questions : 5]

SEAT No. :

P-1037

[Total No. of Pages : 2

[6054]-327

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 question 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) What is diastolic pressure.

b) What are the different types of biomedical sensors.

c) What are the different types of ECG leads.

d) What are the different performance charactristics of Transducers.

e) What are the different types of ECG Recorders.

f) Define blood pressure.

Q2) Answer the following :

a) State the Resting potential. Describe in detail the working of Resting potential with suitable examples. **[6]**

b) Describe the effect of artifacts on ECG recording. **[4]**

Q3) Answer the following :

a) Describe in detail direct blood pressure measurement with suitable diagram. **[6]**

b) Describe in detail transducer for body temperature measurements. **[4]**

P.T.O.

Q4) Answer the following :

a) Describe in detail cardiovascular system in detail with suitable diagrams. **[6]**

b) Describer in detail basic and essentials of biomedical instrumentation system. **[4]**

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

a) Write a short note on "pulse oximetry".

b) Write a short note on "Heart Sounds".

c) How to interpretation for the Electrocardiogram.

d) Write a short note on "Action potential".

e) What do you mean by ECG.

f) Write a short note on Electro-conduction system of heart.

⌘⌘⌘

Total No. of Questions : 5]

SEAT No. :

P-1038

[Total No. of Pages : 2

[6054]-328

T.Y. B.Sc. (Physics)

SKILL ENHANCEMENT COURSE - II

PHY-3511 (N) : Non-Destructive Testing Techniques

(2019 Pattern) (Semester - V) (351211N)

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

Instructions to the candidates :

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

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

a) What are the factors influencing on the selection of NDT method?

b) What are the limitations of non-aqueous developer?

c) Give the principle of liquid penetrant method.

d) Define non-destructive testing.

e) State the principle of MRI testing method.

f) State the principle of acoustic emmision testing technique.

Q2) Answer the following questions :

a) Explain Helium leak 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 importance of non-destructive testing in the field of medicine. **[4]**

P.T.O.

Q4) Answer the following questions :

a) Explain in brief the method of NDT with portable electromagnetic yokes. **[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) Computer tomography.

c) Helium leak testing method.

d) Limitation of dry powder developer.

e) Advantages of echo method of ultrasonic testing technique.

f) Advantages of visual inspection method.

□□□

Total No. of Questions : 5]

SEAT No. :

P-1039

[Total No. of Pages : 2

[6054]-329

T.Y. B.Sc.

PHYSICS

PHY - 3511 (O) : Acoustics Applications

(2019 Pattern) (Semester - V) (CBCS) (3512110)

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) What do you understand by sonic boom?

b) What is audio signal processing?

c) State two types of microphones.

d) Define reverberation time.

e) What is an active sonar?

f) What is hearing loss?

g) State two types of loudspeakers.

Q2) Answer the following questions.

a) With the help of a neat diagram explain working of a carbon microphone. **[6]**

b) Write a note on stereophonic sound recerding system. **[4]**

Q3) Answer the following questions.

a) i) Write a note on C weighted sound level. **[3]**

ii) Write a note on per cussion instruments. **[3]**

b) i) Draw the schematic of a condensor microphone. **[2]**

ii) A condensor microphone has a sensitivity of 0.1 SI units. What will be its sensitivity in dB? **[2]**

P.T.O.

Q4) Answer the following questions.

a) i) Write a note on sound absorption materials. **[3]**

ii) Write a note on ultrasono graphy. **[3]**

b) Explain the following terms. **[4]**

i) Loudness ii) Bass

iii) Treble iv) Rhythm

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

a) MP3 systems

b) Loudspeaker cabinets

c) Graphic Equalizer

d) Folded Horn

e) Harmonics and overtones

f) Headphones

▽▽▽▽

Total No. of Questions : 5]

SEAT No. :

P1040

[Total No. of Pages : 2

[6054]-330

T.Y. B.Sc. (Regular)

CHEMISTRY

CH-501 : PHYSICAL CHEMISTRY-I

(2019 Pattern) (CBCS) (Semester-V) (35131)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q.2 to 5.***
3) ***Questions 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 and calculator is allowed.***

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

a) Dipole moment of BF_3 is zero, while that of NH_3 is 1.46 D explain.

b) Write the equation for rotational constant.

c) Define the term quantum yield.

d) What is zero point energy?

e) Give the selection rule for rotational spectroscopy.

f) Why H_2 molecule is Raman active?

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

i) What is degeneracy corresponding to $E = \frac{14h^2}{8ma^2}$ for particle in three dimensional box.

ii) Define the term dipole moment. How dipole moment helps to find percentage ionic character of a compound.

iii) Distinguish between photochemical and thermal reaction.

b) i) What will be corresponding wavelength for a vibrational frequency 1.5×10^{15} Hz.

ii) What are polar and non-polar molecules?

[4]

P.T.O.

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

i) Explain vibration-rotational spectrum of diatomic molecule.

ii) What is de-Broglie hypothesis? Derive the expression for de-broglie wave length in terms of kinetic energy.

iii) Explain isotope effect in rotational spectrum.

b) Calculate the uncertainty in velocity of cricket ball (mass=0.13 kg) if its uncertainty in posittion is of the order of 1° A. **[4]**

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

i) Define the following terms

1) Photosensitization

2) Photocatalysis

3) Einstein

ii) What is Raman effect? Explain the mechanism of Raman effect with respect to quantum theory.

iii) Draw the plot of ψ and ψ^2 for particle in one dimentional box.

b) Calculate the rotational constant of No molecule if bond length is 1.15 A°

[At. wt. N=14, 0=16, N=6.023×10^{23}] **[4]**

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

a) Phosphorescence.

b) Jablonski diagram.

c) The Heisenberg's uncertainty principle.

d) Conditions for well behaved function.

e) Specific and molar refraction.

f) Merits and demerits of microware rotational spectroscopy.

❖ ❖ ❖

Total No. of Questions : 5]

SEAT No. :

P1041

[Total No. of Pages : 2

[6054]-331
T.Y.B.Sc. (Regular)
CHEMISTRY
CH - 502 : Analytical Chemistry-I
(2019 Pattern) (CBCS) (Semester - V) (35132)

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

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any 3 questions from Q.2 to Q.5.***
3) ***Figures to the right indicate full marks.***
4) ***Q.2 to Q.5 carry equal marks.***
5) ***Draw neat labelled diagram wherever necessary.***
6) ***Use of logtables and calculators are allowed.***

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

a) What is digestion?

b) Calculate the absorbance of a solution whose transmittance is 0.45.

c) Magnesium belongs to which group of inorganic qualitative analysis?

d) What is cation?

e) What is TGA stands for?

f) Define absorbance.

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

i) Describe a typical TG curve.

ii) Describe coprecipitation.

iii) How the interfering phosphate anion is removed?

b) Give the classification of analytes based on their wt% in the sample. **[4]**

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

i) Write in brief about types of TGA.

ii) Explain common ion effect.

iii) What are the conditions for good precipitation?

b) When a 0.005 M solution is placed in a 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 1cm path length cell. **[4]**

P.T.O.

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

i) What is Tyndall effect? What are the important properties of colloidal particles.

ii) Write in brief about photovoltaic cell with diagram.

iii) Explain single beam colorimeter with diagram.

b) Calculate the gravimetric factor for the following stoichiometric conversion. **[4]**

Analyte (molar mass)	Precipitate (molar mass)
P (30.97)	Ag_3Po_4 (418.58)

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

a) Write a note on use of DMG in gravimetric analysis.

b) Calculate absolute and relative error for the experimentally reported measurement value is 0.60 ppm and the expected value is 0.56 ppm.

c) Explain washing of the precipitate.

d) Explain the form solubility product. Give are application of it in qualitative analysis.

e) Explain determination of pk value of indicator using spectro photometry.

f) Calculate % loss for following reaction $CaCO_3 \rightarrow CaO+CO_2$ (At wt Ca = 40, C = 12, O = 16)

✡ ✡ ✡

Total No. of Questions : 5]

SEAT No. :

P1042

[Total No. of Pages : 2

[6054] - 332

T.Y.B.Sc.(Regular)

CHEMISTRY

CH - 504 : Inorganic Chemistry - I

(CBCS 2019 Pattern) (Semester - V) (35134)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions form Q.No.2 to Q.No.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Figure to the right indicate full marks.***
5) ***Draw neat diagrams whenever necessary.***
6) ***Use of logarithm tables and calculation is allowed.***

Q1) Answer the following (Any five) **[5]**

a) What is symmetry symbol for $dx^2–y^2$ and dz^2 orbital?

b) Define superconductors.

c) Why Na Metal has more conductivity than Mg metal.

d) Write symbol of element having At.No 122.

e) What is formation constant?

f) Calculate the magnetic moment for cr^{2+} ion by using spin only formula (At.No of Cr = 24).

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

i) Explain the bombardment with accelerated particle for the preparation of trans uranic element.

ii) What is n-type semiconductor? explain with the help of N(E) curve.

iii) Explain labile and inert complexes on the basis of crystal field theory.

P.T.O.

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

i) Explain the reaction profile of reaction with dissociative mechanism in ligand substitution reaction.

ii) Explain oxidation state of d–block element.

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

i) Explain chelate effect.

ii) Why d - block elements form co-ordination complexes.

iii) Write assumptions of M O T.

b) Disuss the ion exchange method for separation of lanthanides. **[4]**

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

i) Explain the complex formation ability of d-block elements.

ii) Explain nuclear fuels.

iii) What is super conductor and give its applications.

b) Draw and explain the molecular orbital energy level diagram for $[Ti(H_2O)_6]^{3+}$ with out π - bonding. **[4]**

Q5) Write a note on any four. **[10]**

a) Lanthanide contraction

b) N(E) curve

c) Charge transfer spectra

d) Electroneutrality principal

e) Non-stoichiometric compounds

f) Effect of impurity on conductivity of metal

Total No. of Questions : 5]

SEAT No. :

P1043

[Total No. of Pages : 2

[6054] - 333

T.Y.B.Sc. (Regular)

CHEMISTRY

CH - 505 : Industrial Chemistry - I

(CBCS 2019 Pattern) (Semester - V) (35135)

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

Instructions to the candidates:

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

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

a) Define the term 'field'.

b) What is unit operation.

c) Write any two uses of nitric acid.

d) What is Fermentation?

e) What are dyes?

f) Explain the term chromophore.

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

i) Explain the physicochemical principal involved in the manufacture of ammonia.

ii) Discuss conditions favourable for fermentation.

iii) What are the characteristics of a good dye?

b) Write a short note on. **[4]**

i) Batch process.

ii) Detergent builders.

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

i) Write the synthesis and uses of Fluorescein.

ii) Explain the concentration of cane Juice by 'multiple effect evaporator'.

iii) Give the importance of fermentation industry.

P.T.O.

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

i) Discuss the function of HR.

ii) Explain the term 'Detergent and surfactants.

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

i) Distinguish between Lead chamber process and contact process for manufacture of sulphuric acid.

ii) Synthesis and uses of phenolphthalein.

iii) Give the synthesis and uses of Alizarin.

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

i) Explain the term 'Quality control'.

ii) Explain favourable condition required for good fermentation.

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

a) Explain the physico-chemical principles involved in the manufacture of sulphuric acid.

b) Discuss the raw materials required for manufacture of soap.

c) Give the classification of dye according to their application.

d) Give General properties and uses of any two pigments.

e) What is ment by beer? Discribe beer making process shortly.

f) Write a short note on Micelle formation.

Total No. of Questions : 5]

SEAT No. :

P-1044

[Total No. of Pages : 2

[6054]-334

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) Give the synthesis of pyrrole from 1,4 - diketone.

b) Name any two rearrangement reactions which involves Isocynate intermediate.

c) What is kinetic isotopic effect.

d) What type of sigmatropic shift present in cope rearrangement?

e) Furan is aromatic in nature. Explain.

f) Give any two examples of active methylene compounds.

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

i) Pyridine undergoes electrophilic substitution mainly at postion 3. Explain.

ii) What is E_1 elimination? Discuss the evidences for E_1 elimination.

iii) Explain the factors affecting the migratory aptitude observed in case of baeyer villiger rearrangement.

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

i) Explain claisen rearrangement.

ii) 2- Bromobutane on heating with NaOMe gives 75% 2-Butene. Explain.

P.T.O.

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

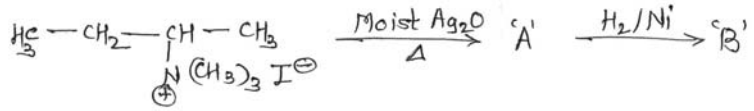
i) What is the reaction of the following reagents with furan?

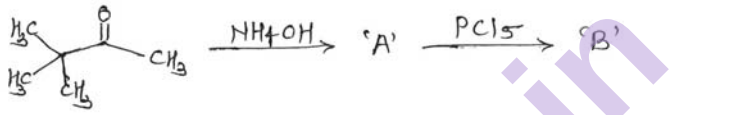
1) $CHCl_3$/KOH
2) SO_3/Pyridine
3) Phenyl diazonium salt

ii) Explain the synthesis of succinic acid from ethyl acetoacetate.

iii) Describe the reaction of Isocynate intermediate with R-OH, H_2O and RNH_2.

b) Predict the product and justify answer. **[4]**

i) 

ii) 

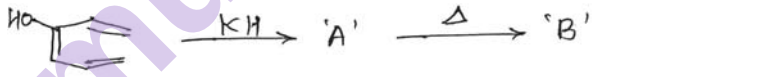
Q4) a) Discuss any two of the following : **[6]**

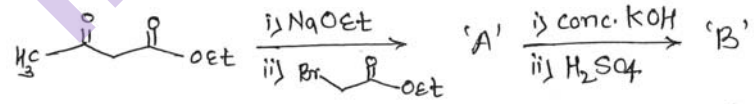
i) Explain the orientation and reactivity in E_2 elimination by saytzeft rule.

ii) Discuss any two name reactions for synthesis of primary amine.

iii) Comment on aromaticity of pyrrole, thiophene and pyridine.

b) Identify the products 'A' and 'B' in the following **[4]**

i) 

ii) 

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

a) Synthesis of pyridine.

b) Beckmann rearrangement.

c) Preparation of Diethyl malonate.

d) Haworth synthesis of anthracene.

e) Comparison between E_1 & E_2 mechanism.

f) Favorskii rearrangement.

✕ ✕ ✕

Total No. of Questions : 5]

SEAT No. :

P-1045

[Total No. of Pages : 2

[6054]-335

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) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Figures to the right indicate full marks.***
4) ***Questions 2 to 5 carry equal marks.***
5) ***Draw neat diagrams whrenevr necessary.***
6) ***Use of logarithm tables and calculator is allowed.***

Q1) **Solve <u>any five</u> of the following :** **[5]**

a) Define Epimers.

b) Write any two cell organeller.

c) Define hormone.

d) Draw structure of Glycine.

e) What are lipids?

f) Define Coenzyme.

Q2) a) Attempt any two : **[6]**

i) What are oligosaccharides? Explain with an example.

ii) What is peptide bond? Explain its features.

iii) Discuss steroid hormones with suitable examples.

b) Describe the effect of pH and temperature on the catalytic activity of the enzyme. **[4]**

P.T.O.

Q3) a) Attempt any two : **[6]**

i) Explain the reaction of amino acid with Ninhydrin reagent.

ii) What are the major functions of lipids?

iii) Define competitive and non-competitive enzyme inihibition.

b) i) Explain reduction reactions of Glycose.

ii) Define the term stereo specifity with example.

[4]

Q4) a) i) Discuss different types of bonds in biomolecules.

ii) Discuss the phenomenon of metarotation. With example.

iii) Write classification of amino acids with detail structure.

b) i) What is Michaelis constant (Km)? Give its significance.

ii) Explain the difference between saturated & unsaturated fats.

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

a) What are the functions of endoplasmic reticulum?

b) Write a note on Glycosides.

c) Explain different types of Rancidity of oils.

d) What is quarternary structure of protein? Explain with example.

e) Explain the industrial applications of enzymer in detail.

f) What are the functions of Hormones?

Total No. of Questions : 5]

SEAT No. :

P-1046

[Total No. of Pages : 3

[6054]-336

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) ***Q.2 to Q.5 carry equal marks.***
3) ***Solve any three questions from Q.2 to Q.5.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat diagrams wherever necessary.***

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

a) What is Medicinal chemistry?

b) What is 'ADME' of drug?

c) Name any two antibacterial agents.

d) Define therapeutic index.

e) Name any two infectious diseases.

f) What is mean by Bactericidal agent.

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

i) Discuss the term pharmacophore with an example.

ii) Draw the structure of penicillin - G and discuss its mode of action.

iii) Define inflammation. What are anti inflammatory agents. How are they classified?

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

i) What is 'SAR'? Explain with an example.

ii) State and explain Lipinski rule.

P.T.O.

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

i) What is drug? Discuss different sources of drugs.

ii) What are macrolides? Give one example. Discuss mode of action of macrolides.

iii) What is mean by antimetabolite? Discuss mechanism of action of sulphonamide.

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

i) What is vaccine? Enlist different vaccines used in covid-19 pendamic.

ii) Define the following terms :

1) Pharmacophore

2) Anti pyretic drugs.

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

i) What are antifungal agents? Discuss mechanism of action of any one antifungal agent.

ii) What are analgesic agents? How are they classified? Give one example of each.

iii) What are tetracyclines? Discuss their 'SAR' and mode of action.

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

i) Draw structure of cisplation. Mention its uses.

ii) What are Sedatives and Hypnotics? Discuss requirements of idial Sedatives and Hypnotics.

Q5) Draw structure, write any two properties and mode of action of any four drugs : **[10]**

a) Chloroamphenicol

b) Amphoterian-B

c) Salvarsan

d) Paracetamol

e) Chlorotetracycline

f) Acyclovir

x x x

Total No. of Questions : 5]

SEAT No. :

P-1047

[Total No. of Pages : 3

[6054]-337

T.Y.BSc

CHEMISTRY

CH - 510B : Polymer Chemistry

(2019 Pattern) (CBCS) (Semester - V) (351310B)

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 equl marks***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat diagrams wherever necessary.***

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

a) Define the term - monomer.

b) Choose the correct alternative in the following :The word 'Macromolecules' was introduced by the chemist ___ .

(Hermann Standinger, J.J.Berzelius)

c) Name any two initiators used in free radical polymerisation.

d) What is meant by polymerisation?

e) Bakelite is the trade name of the polymer _____.

f) Calculate the molecular weight of poly ethylene poymer having Dp 1200.

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

i) Discuss bulk polymerisation in detail. Give its merits.

ii) Write the method of preparation, properties and important uses of polyvinyl alcohol.

iii) Give the full account of anionic polymerisation.

P.T.O.

b) How will you distinguish between the following? **[4]**

i) Natural and synthetic polymers.

ii) Thermoplastic and thermosetting polymers.

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

i) Explain the classification of polymers on the basis of their use and appearance.

ii) Give an account of the end group analysis method used for determination of molecular weight of polymer.

iii) What are polyamides? Draw the structure of nylon 6,6 and give its commercial applications.

b) What is step polymerisation? Give full account of condensation polymerisation with suitable example. **[4]**

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

i) Explain the method of preparation and uses of polyvinyl alcohol.

ii) Give full account of emulsion polymerisation.

iii) Write note on conducting polymers.

b) A certain polymer sample contains fractions A,B and C with their number and molecular weights as shown below.

Fraction A : 60 molecules with molecular weight 12,000 each

Fraction B : 80 molecules with molecular weight 10,000 each

Fraction C : 100 molecules with molecular weight 8,000 each

Calculate the number average molecular weight for the polymer. **[4]**

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

a) High density polyethylene (HDPE).

b) Glass transition temperature.

c) Interfacial polymerisation.

d) Polymethyl methacrylate polymer.

e) Ziegler - Natta catalyst.

f) Polydispersity index.

Total No. of Questions : 5]

SEAT No. :

P-1048

[Total No. of Pages : 2

[6054]-338

T.Y. BSc

CHEMISTRY

CH - 511(A) : Environmental Cemistry

(2019 Pattern) (Semester - V) (CBCS) (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) ***Question 2 to 5 carry equl 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 “Receptor”

b) Define “Condensation”

c) Define “Eutrophication”.

d) What method is used to detection of chloride in water analysis?

e) Define “Sink”

f) Define “Sludge digestion”

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

i) Explain Hydrological cycle.

ii) Explain scope and importance of Environmetal chemistry.

iii) Explain types of Eutrophication.

b) Write short note on **[4]**

i) Chemical oxygen Demand

ii) Biological oxygen demand

P.T.O.

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

i) Explain with diagram the carbon cycle.

ii) Explain Nitrification and De-Nitrification.

iii) How detergents can cause water pollution.

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

Explain electrodialysis method for purification of water.

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

i) Describe activated sludge process.

ii) Explain the determination of Dissolved oxygen by Winklar method.

iii) Explain Biological Nitration fixation.

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

Explain ion exchange method for industrial waste water treatement.

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

a) Function of Atmosphere.

b) Pollutant

c) Effect of Inorganic pollutants.

d) curcumin method.

e) Surfactant.

f) Trickling filter.

Total No. of Questions : 5]

SEAT No. :

P-1049

[Total No. of Pages : 2

[6054]-339
T.Y. B.Sc. (Semester - V)
CHEMISTRY
CH-511B : Chemo Informatics
(2019 Pattern) (CBCS) (351311B)

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

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat diagram whenever necessary.***
6) ***Use of logarithm table and calculator is allowed.***

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

a) What is lead compound?

b) What is drug discovery?

c) Explain the term toxicity.

d) What is SMILE notation?

e) Give application of Marvinsketch.

f) What are algorithms?

Q2) a) Answer the following (any Two). **[6]**

i) With suitable example explain the significance of pharmacophore.

ii) What is QAR?

iii) Describe application of chembl.

b) Answer the following (any one) **[4]**

i) Write a note on molecular modelling

ii) What is Lipniskis rule? Explain with suitable example.

P.T.O.

Q3) a) Answer the following (any Two). **[6]**

i) Write the IUPAC and ROSDAL notation for acetophenone.

ii) Explain any one search engine used in cheminformatics.

iii) What is expert protein analysis system?

b) Answer the following (any one) **[4]**

i) What is linear free energy relationship? How it is applicable in cheminformatics?

ii) Explain the featuristic opportunities of artificial intelligence in chemical science.

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

i) Write a note on online available cheminformatics tool kits?

ii) What is graph theory?

iii) Give the application of Gold software.

b) Answer the following (any one) **[4]**

i) Write a note on machine learning methods in cheminformatics.

ii) Write WLN notations for I) acetone II) alanine

Q5) a) Answer the following (Any Two) : **[6]**

i) How hydrogen bonding can be studied using computational chemistry?

ii) What are different file format for 3D chemical structure determination?

iii) Explain any one predictive method for organic spectral data analysis.

b) Answer the following (any one) **[4]**

i) Write a note on historical development of cheminformatics

ii) Write a note on comparative similarity and diversity search.

Total No. of Questions : 5]

SEAT No. :

P1050

[Total No. of Pages : 2

[6054]-340

T.Y. B.Sc. (Regular)

BOTANY

BO-351 : ALGAE AND 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 5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Figure to the right indicate full marks.***
5) ***Draw neat labelled diagrams wherever necessary.***

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

a) Give role of Algae in industry.

b) Write reserve food material in algae.

c) What are fungi?

d) Define Lichens.

e) Define endomy corrhiza.

f) Name the types of hyphae present in mucor.

Q2) a) Explain thallus structure in Batrachospermum. **[6]**

b) Write general characteristics of fungi. **[4]**

Q3) a) Describe thallus structure in Cercospora. **[6]**

b) Give outline classification of Algae as per G.M. smith 1955. **[4]**

Q4) a) Explain life cycle of Puccinia **[6]**

b) Describe thallus structure in Chara **[4]**

P.T.O.

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

a) Symbiotic association in Lichen.

b) Habit and Habitat of Algae.

c) Thallus structure in sargassum.

d) Uses of mycorrhiza.

e) Nutrition in fungi.

f) Economic importance of algae.

❖ ❖ ❖

Total No. of Questions : 5]

SEAT No. :

P1051

[Total No. of Pages : 2

[6054] - 341

T.Y.B.Sc. (Regular)

BOTANY

BO - 352 : Archegoniate

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

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

Instructions to the candidates:

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

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

a) What are pteridophytes?

b) Which generation is dominant in bryophytes?

c) Write any two similarities between bryophytes and pteridophytes.

d) In which class of bryophytes rhizoids are of two types?

e) What is antheridiophore?

f) What is synangium?

Q2) a) Describe external morphology of Funaria gametophyte. **[6]**

b) Write general characters of class Lycopsida. **[4]**

Q3) a) Comment on Telome theory of evolution of pteridophytes. **[6]**

b) Write anatomical structure of Equisetam stem. **[4]**

P.T.O.

Q4) a) Describe structure of sporophyte in Marchantia. **[6]**

b) Write economic importance of bryophytes. **[4]**

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

a) Sporangiophore of Equisetum.

b) Vegetative reproduction in Funaria.

c) General characters of class Anthocerotae.

d) Difference between bryophytes and pteridophytes.

e) Structure of mature archegonium in Funaria.

f) Economic importance of pteridophytes.

Total No. of Questions : 5] SEAT No. :

P-1052 [Total No. of Pages : 2

[6054]-342
T.Y.B.Sc
BOTANY
BO353 : Spermatophyta and Palaeo Botany
(2019 Pattern) (Semester - V) (Paper-III) (35143)

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) ***Que. 2 to Que. 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 spermatophytes.

b) Mention any one example of family Nymphaeaceae.

c) Write two characters of angiosperms.

d) What is Botanic Garden?

e) Give an example of endemic plant.

f) What is impression?

Q2) a) Give merits and demerits of Aurthor Cronquist's system of classification. **[6]**

b) Explain Taxonomic species concept. **[4]**

Q3) a) Describe male cone of Gnetum. **[6]**

b) Give diagnostic characters and one example of Family Amaranthaceae. **[4]**

P.T.O.

Q4) a) Describe T.S. of Pinus needle. **[6]**

b) Give functions of Herbarium. **[4]**

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

a) Pseudoanthial theory

b) Petrifaction

c) Paleoendemism

d) Systematic position of Cannaceae

e) General Characters of Gymnosperms

f) Seed of Pinus

◆◆◆

Total No. of Questions : 5]

SEAT No. :

P1053

[Total No. of Pages : 2

[6054] - 343

T.Y.B.Sc. (Regular)

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 right indicates full marks.***
5) ***Draw neat labelled diagram wherever necessary.***

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

a) Define carnivores.

b) Full form of EIA.

c) Define Homeostasis.

d) Write full form of ISO.

e) Define synecology.

f) What is Navigation?

Q2) a) Describe stages of ecological impact assessment process. **[6]**

b) Describe terrestrial phosphorus cycle indetails. **[4]**

Q3) a) Describe Ecotone and Edge effect. **[6]**

b) Describe basic principles of remote sensing. **[4]**

P.T.O.

Q4) a) Describe the types of Environmental audit. **[6]**

b) Define speciation, describe any four causes of speciation. **[4]**

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

a) Food chain.

b) Enlist methods for Ecological impact assessment.

c) Allopatric speciation.

d) Enlist applications of remote sensing in ecology.

e) Core principles of Ecological management.

f) Zones of earth based on latitude.

Total No. of Questions : 5]

SEAT No. :

P-1054

[Total No. of Pages : 2

[6054]-344

T.Y. B.Sc.

BOTANY

BO-355: Cell and Molecular Biology

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

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 five of the following : **[5]**

a) Which units can be used to measure size of a cell?

b) Enlist any two functions of peroxisomes.

c) What is constitutive heterochromatin?

d) Define semiconservative DNA replication.

e) What is transcription?

f) Define anticodon.

Q2) a) What is vacuole? Describe its structure, types and functions. **[6]**

b) Define genetic code. Explain in brief properties of genetic code. **[4]**

Q3) a) Explain in brief types of RNA. **[6]**

b) Give detailed account of structure and functions of lampbrush chromosomes. **[4]**

P.T.O.

Q4) a) Give an account of ultrastructure and functions of nucleus. **[6]**

b) Explain the mechanism of initiation of prokaryotic replication. **[4]**

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

a) Different forms of cell signaling.

b) Golgi apparatus.

c) Nucleolus- structure and functions.

d) Inhibitors of DNA replication.

e) Structure of Lac operon.

f) Prokaryotic promoters.

✷ ✷ ✷

Total No. of Questions : 5]

SEAT No. :

P-1055

[Total No. of Pages : 2

[6054]-345

T.Y. B.Sc.

BOTANY

BO-356: Genetics

(2019 Pattern) (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) ***Questions 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat labelled diagrams whrever necessary.***

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

a) Who is called as Father of Genetics?

b) Define Allele.

c) What is Epistasis?

d) Write any two types of Mutations.

e) Write any two examples of Multiple Alleles.

f) What are different types of linkages?

Q2) a) What is crossing over? Explain its types in detail. **[6]**

b) Comment on supplementary gene interaction with suitable example. **[4]**

Q3) a) Explain in detail cytoplasmic Inheritance. **[6]**

b) What is Mutation? Explain the different types of Point Mutations. **[4]**

P.T.O.

Q4) a) What is Self Incompatibility? Explain the Self-Incompatibility in Nicotiana. **[6]**

b) What is Dihybrid cross? Explain Dihybrid Cross ratio with suitable example. **[4]**

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

a) ABO Blood Group in Human.

b) Deletion.

c) Back cross.

d) Two Point Test Cross.

e) Trisomy.

f) T-linked Inheritance.

Total No. of Questions : 5]

SEAT No. :

P-1056

[Total No. of Pages : 2

[6054]-346
T.Y. B.Sc. (Semester - V)
BOTANY
BO-3510 : Medicinal Botany
(2019 Pattern) (CBCS) (Paper - X) (351410)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Attempt any three questions from Q2 to Q5.***
3) ***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) What is Umoor-e-tabiya?

b) Mention the names of any two doshas.

c) Define Ethnoecology.

d) What is Red Dada Book?

e) Define Palaeo - ethnobotany.

f) What is Air Layering?

Q2) a) What is Medicinal Botany? Add a note on the scope and importance of medicinal botany. **[6]**

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

Q3) a) Define Ethnobotany? Mention the brief account of Ethnic communities in India? **[6]**

b) State the locations of sacred Groves in Maharashtra state of India. **[4]**

Q4) a) What is In-Situ conservation? Mention the importance of National parks in In-Situ conservation of plants. **[6]**

b) Mention objectives of Nursery. **[4]**

P.T.O.

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

a) Folk Medicines to cure Jaundice

b) Rasayana

c) Ethnomedicinal Plants Garden

d) AYUSH

e) Siddha system of Medicine

f) Natural products to cure skin diseases.

Total No. of Questions : 5]

SEAT No. :

P-1057

[Total No. of Pages : 2

[6054]-347

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

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

a) What is genetic diversity.

b) Define biodiversity loss.

c) What is biodiversity reserve?

d) Define avenue trees.

e) What is ex-situ conservation?

f) Write names of wild life sanctuiries of India.

Q2) a) Explain avenue trees with suitable examples. **[6]**

b) Explain uses of wood. **[4]**

Q3) a) Explain species richness. **[6]**

b) Describe value of biodiversity. **[4]**

Q4) a) Write a note on world wide fund for nature and natural resources. **[6]**

b) Write a note on ornamental plants. **[4]**

P.T.O.

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

a) Commercial aspects of forestry.

b) Alcoholic beverages through ages.

c) Biodiversity awareness programme.

d) Agrobiodiversity

e) Cultivated plant taxa.

f) Benefits of biodiversity.

⌘⌘⌘

Total No. of Questions : 5]

SEAT No. :

P-1058

[Total No. of Pages : 2

[6054]-348

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 Q. 2 to Q. 5.***
3) ***Questions 2 to 5 carry equal marks.***

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

a) Physical pest control.

b) What is Rodenticides?

c) Define pest.

d) What is crop rotation?

e) Weed killer.

f) Eradication.

Q2) a) What is GMO and Transgenic animal? give its importance in context of pest management. **[6]**

OR

Explain the problems of insecticidal residue in fruits and vegetables.

b) Explain safe handelling of insecticides. **[4]**

Q3) a) Explain in detail Integrated Pest Management (IPM). **[6]**

OR

Explain in detail prevention, suppression and eradication of pests.

b) Describe types of damages caused by pests in plant. **[4]**

P.T.O.

Q4) a) Describe pest managment using biological control. **[6]**

OR

Explain insecticides classification based on mode of entry.

b) Explain types of pest. **[4]**

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

a) Biological pest control

b) Crop rotation

c) Tillage

d) Parasitoides

e) Herbicides

f) Genetic engineering

⌘⌘⌘

Total No. of Questions : 5]

SEAT No. :

P1059

[Total No. of Pages : 2

[6054]-349

T.Y. B.Sc. (Regular)

ZOOLOGY

ZO-352 : Histology

(2019 CBCS Pattern) (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 Q.2 to 5.***
3) ***Questions 2 to 5 carry equal marks.***

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

a) Define-Tissue culture.

b) What is simple epithelium?

c) What is dentine?

d) Define-Nephron.

e) What is Villi?

f) Function of pancreatic juice.

Q2) a) With the help of neat labelled diagram describe TS of Duodenum. **[6]**

OR

Describe histology of Liver.

b) Write short note on Juxtra Glomerular apparatus. **[4]**

Q3) a) Explain C.S of ovary **[6]**

OR

Explain C.S of lung

b) Write short note on striated muscle fibres **[4]**

P.T.O.

Q4) a) With the help of neat labelled diagram describe V-S of Skin. **[6]**

OR

Discuss role of Adrenal gland.

b) Write short note on hormones of Adenohyposis. **[4]**

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

a) Importance of hormones of thyroid gland

b) Taste buds

c) Gastric glands

d) Enlist male hormones & give their role

e) Muscle fatigue

f) Fole of Kidney in excretion

❖ ❖ ❖

Total No. of Questions : 5]

SEAT No. :

P1060

[Total No. of Pages : 2

[6054] - 350

T.Y.B.Sc. (Regular)

ZOOLOGY

ZO - 353 : Biological Chemistry

(2019 Pattern) (CBCS) (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) ***Question No's.2 to 5 carry equal marks.***

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

a) Define Biochemistry.

b) State any two examples of carrier proteins.

c) What is pH?

d) Define enzyme.

e) Draw the structure of α-amino acid.

f) State any two functions of lipids.

Q2) a) Explain the effect of substrate concentration on enzyme activity. **[6]**

OR

Give an account on classification of carbohydrates.

b) Describe primary structure of proteins. **[4]**

Q3) a) Give an account on IVB system of enzyme classification. **[6]**

OR

Explain the clinical significance of hypoglycemia and hyperglycemia.

b) Explain the concept of buffer with suitable example. **[4]**

P.T.O.

Q4) a) Describe the types and nomenclature of fatty acids. **[6]**

OR

Explain the irreversible enzyme inhibition.

b) Describe nutritional classification of amino acids. **[4]**

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

a) Cofactor

b) Obesity

c) Ionization of acids and bases

d) Gluconeogenesis

e) Peptide bond

f) AKU

Total No. of Questions : 5]

SEAT No. :

P-1061

[Total No. of Pages : 2

[6054]-351

T.Y.B.Sc

ZOOLOGY

ZO-354 : Genetics

(2019 Pattern) (CBCS) (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 Q.2 to Q.5.***
3) ***Question No. 2 to 5 carry equal marks.***

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

a) Define cistron.

b) Define Rh factor.

c) What is induced mutation?

d) Define gene pool.

e) What is hypertrichosis?

f) Define chromosomal aneuploidy.

Q2) a) Explain the concept of complete dominance and compare it with incomplete dominance. **[6]**

OR

What is point mutation? Explain various types of point mutation.

b) What are alkylating agents? Mention any two examples of these. **[4]**

Q3) a) Describe the structural alterations in chromosome. **[6]**

OR

Explain the genetic basis of klinefelter syndrome and give its diagnostic characteristics.

b) Explain Hardy-Weinberg law and its equilibrium. **[4]**

P.T.O.

Q4) a) Explain the types of lethalgenes using suitable example. **[6]**

OR

Write a note on role of UV radiation and ionising radiation as a mutagenic agent.

b) Explain the concept of gynandromorphs. **[4]**

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

a) Importance of genetic counselling.

b) Haemophilia.

c) Intercalating agent.

d) XX-XO type of sex determination.

e) Edward syndrome.

f) Mendel's law of dominance.

◆ ◆ ◆

Total No. of Questions : 5]

SEAT No. :

P-1062

[Total No. of Pages : 2

[6054]-352

T.Y.B.Sc

ZOOLOGY

ZO-355 : Developmental Biology (35155)

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

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) ***Que. 2 to Que. 5 carry equal marks.***

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

a) Define Growth.

b) What is induction.

c) Cell communication.

d) Define Development biology.

e) What is blastocoel?

f) Vitellogenesis.

Q2) a) Describe the spermatogenesis process in detail with diagrams. **[6]**

OR

Explain process of prevention of polyspermy.

b) Explain penetration of sperm. **[4]**

Q3) a) Explain development of head process and regression of primitive streak in chick embryo. **[6]**

OR

Explain types of eggs on the basis of amount of yolk.

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

P.T.O.

Q4) a) Define cleavage. Describe different plane of cleavage. **[6]**

OR

Describe Fertilizin-Antifertilizin reaction.

b) Describe types of regeneration. **[4]**

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

a) Coeloblastula.

b) Germ plasm theory.

c) Amphimixis.

d) Discoblastula.

e) Egg membrane.

f) Radial cleavage.

Total No. of Questions : 5]

SEAT No. :

P-1063

[Total No. of Pages : 2

[6054]-353
T.Y.B.Sc.
ZOOLOGY
ZO-356 : Parasitology (35156)
(2019 Pattern) (Semester - V) (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 2 to 5 carry equal marks.***

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

a) Define Ectoparasite.

b) What is structural specificity?

c) Explain commensialism.

d) Define medical protozoology.

e) Name the causative organism of ascanasis.

f) Describe habit and habitat of Taenia Solium.

Q2) a) Describe life cycle of Taenia solium in pig. **[6]**

OR

Describe epidemiology pathogenecity & treatment of Ascarislumbricoids.

b) Explain mode of tansmission of E. histolytica. **[4]**

Q3) a) Describe sexual phase of reproduction of P.Vivax. **[6]**

OR

Describe various branches of parasitology.

b) Explain physiological host specificity. **[4]**

P.T.O.

Q4) a) Explain life cycle of Head louse. **[6]**

OR

Describe types of hosts with suitable examples.

b) Comment on precautive measure & control measures of tick. **[4]**

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

a) Paratenic host

b) Pathogenecity of bed bug

c) Treatment of plasmodium vivax.

d) Structural host specificity.

e) Control measure & prevention of E. histolytica.

f) Symptoms of malerial disease.

Total No. of Questions : 5]

SEAT No. :

P-1064

[Total No. of Pages : 2

[6054]-354

T.Y. B.Sc.

ZOOLOGY

ZO-3510: Aquarium Management

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

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 Q.No. 5***
3) ***Q.2 to Q.5 carry equal marks.***

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

a) What is cottage industry?

b) Explain Fish handling.

c) Give example of exotic species of aquarium fish.

d) Explain fish farm.

e) Enlist the techniques of fish preservation.

f) What are the causes of fish mortality.

Q2) a) Explain in detail sexual dimorphism of aquarium fish guppy and molly. **[6]**

OR

Explain budget for setting up an aquarium.

b) Describe fish packing. **[4]**

Q3) a) Describe physical parameters of water for fish culture. **[6]**

OR

Describe types of fish breeding.

b) Explain common disease of aquarium fishes. **[4]**

P.T.O.

Q4) a) Describe endemic species of aquarium fishes. **[6]**

OR

Describe types of fish food.

b) Give the rules of fish breeding. **[4]**

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

a) Nutritional value of fish.

b) Butterfly fish.

c) Live fish feed organism.

d) Scope of aquarium management.

e) Economic importance of fish.

f) Fish forwarding technique.

Total No. of Questions : 5]

SEAT No. :

P-1065

[Total No. of Pages : 2

[6054]-355

T.Y. B.Sc.

ZOOLOGY

ZO - 3511 : Poultry Management

(2019 Pattern) (CBCS) (Semester - V) (Paper - VIII) (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) ***Question 2 to 5 carry equal marks***

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

a) Define Poultry.

b) Give full form of AGMARK.

c) What is Artificial insemination.

d) Define culling.

e) Define Breed selection.

f) What is starter.

Q2) a) Describe femal reproductive system of chicken with suitable and neat labelled diagram. **[6]**

OR

Describe General Aspects of breeding for layer management.

b) Explain lighting schedule for Poultry. **[4]**

P.T.O.

Q3) a) Explain infectious bronchitis and chronic respiratory desease. **[6]**

OR

Explain transport strategy for Poultry Birds in detail.

b) Explain slaughtering of chicken. **[4]**

Q4) a) Explain strains & breeds of broiler chicken. **[6]**

OR

Describe digestive system of chicken with neat labelled diagram.

b) Explain feed ingredient. **[4]**

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

a) Grower.

b) Feed processing.

c) Induced breeding.

d) Egg powder.

e) Feathers and manure

f) Feed conservation ratio.

Total No. of Questions : 5]

SEAT No. :

P1066

[Total No. of Pages : 2

[6054] - 356

T.Y.B.Sc. (Regular)

GEOLOGY

GL - 311 : Geology of India - I

(2019 Pattern) (Semester - V) (Paper - I) (35161)

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 FIVE) One mark each. **[5]**

a) Define a term 'Craton'.

b) What is BIF?

c) Enlist any two physiographic divisions of India.

d) Name the unconformity present between Archean & Proterozoic. Give its age.

e) Which series of rocks are also known as 'Dry Metamorphic'?

f) Give the full form of OMTG.

Q2) Answer the following.

a) Describe the geographical distribution classification, Stratigraphic succession and Lithology of Singhbhum Craton. **[6]**

b) Explain the 'Sauser Group'. **[4]**

P.T.O.

Q3) Answer the following.

a) Explain the boundary conditions, Stratigraphic succession and Lithology of cuddapah Supergroup. **[6]**

b) Bhima Supergroup. **[4]**

Q4) Answer the following.

a) Explain the crustal lineaments in Aravalli Craton. **[6]**

b) Atmospheric changes during 'Proterozoic'. **[4]**

Q5) Write short notes on any Four (2.5 marks each) **[10]**

a) Dharwar Supergroup.

b) Dongargarh Belt.

c) Lower Vindhyan Supergroup.

d) Tectonic dlivisions of Oceans.

e) Life in Kaladgi Supergroup.

f) Pranhita-Godavari Supergroup.

Total No. of Questions :5]

SEAT No. :

P-1067

[Total No. of Pages : 2

[6054]-357

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) ***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) **Answer in 2-3 sentences.(Any Five):** **[5]**

a) Name 2 minerals of hypothermal type.

b) Gangue minerals.

c) Name important ore minerals of Mn.

d) Define Vug.

e) Zone of oxidation.

f) Beach placer deposits.

Q2) **Explain the folowing:**

a) Beach and aeolin deposits. **[6]**

b) Early magmatic concentration deposits. **[4]**

Q3) **Explain the following:**

a) Residual liquid segregation. **[6]**

b) Breccia filling deposits. **[4]**

Q4) **Explain the following:**

a) Describe late magmatic concentration deposits. **[6]**

b) What do you mean by immiscible liquid segregation? **[4]**

P.T.O.

Q5) **Write a short notes (Any five) :** **[10]**

a) Segregation.

b) Metasomatic replacement.

c) Non-metalliferous deposits.

d) Residual concentration.

e) Give the geographical distribution of Gold deposits in India.

f) Residual liquid injection.

◆ ◆ ◆

Total No. of Questions : 5]

SEAT No. :

P-1068

[Total No. of Pages : 2

[6054]-358

T.Y.B.Sc

GEOLOGY

GL-313 : MARINE GEOLOGY (35163)

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

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) ***Que.No. 2 to 5 carry equal marks.***

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

a) How many parts can ocean floor be divided?

b) Enlist the ocean floor rocks of marine sediments.

c) What is explosion Seismology?

d) Give the example of world's deepest parts in Pacific Ocean?

e) What is the EEZ & write down their limit?

f) Explain the Seawage sludge?

Q2) **Answer the following:**

a) Give the details of the major divisions of Ocean floor with neat labeled diagram. **[6]**

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

Q3) **Answer the following:**

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

b) Explain the Basalts of Ocean floor. **[4]**

P.T.O.

Q4) **Answer the following :**

a) Give the detailed classification of Marine Sediments. **[6]**

b) Explain the evolution of Indian Ocean. **[4]**

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

a) Minamata disease.

b) EEZ of India.

c) Biogenous Sediments.

d) Tidal flats.

e) Continental shelres.

f) Ocean floor rocks.

◆ ◆ ◆

Total No. of Questions : 5]

SEAT No. :

P-1069

[Total No. of Pages : 2

[6054]-359

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) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Q2 to Q5 carry equal marks.***
4) ***Neat diagrams must be drawn wherever necessary.***

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

a) Define engineering geology.

b) State qualities of good facing stone.

c) Give examples of building stones.

d) What are the different types of traffic tunnels?

e) Define a spillway.

Q2) Answer the following :

a) Write a note on modulus of elasticity. **[6]**

b) What are the site selection criterias in engineering geology. **[4]**

P.T.O.

Q3) Answer the following :

a) Geological consideration in tunneling. **[6]**

b) Write a note on types of dams, give examples **[4]**

Q4) Answer the following :

a) Write a note on important bridges in India. Write in brief about Mumbai sea link. **[6]**

b) Scope of engineering geology. **[4]**

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

a) Compressive strength.

b) Qualities of aggregates.

c) Absorption value.

d) Foundation rocks for bridges.

e) Silting in reservoir.

f) Hydropower Tunnel.

✷ ✷ ✷

Total No. of Questions : 5]

SEAT No. :

P-1070

[Total No. of Pages : 2

[6054]-360
T.Y.B.Sc.
GEOLOGY
GL - 315 : Hydrogeology (Paper - V)
(2019 Pattern) (Semester - V) (35165)

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

Instructions to the candidates :

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

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

a) What is Lamellar flow?

b) Define storativity.

c) Enlist major cations in groundwater.

d) What is piezometric surface?

e) What is permeameter?

f) What is meant by APT?

Q2) **Answer the following :**

a) What is aquifer? Explain unconfined aquifer. **[6]**

b) Explain saline water intrusion in coastal aquifer. **[4]**

Q3) **Answer the following :**

a) What is Darcy's law? Explain it's validity. **[6]**

b) Explain vertical distribution of ground water. **[4]**

P.T.O.

Q4) **Answer the following :**

a) What is groundwater contamination? Explain geogenic contamination in detail. **[6]**

b) Explain the procedure of well inventory. **[4]**

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

a) Confined aquifer.

b) Soil moisture zone.

c) Perched water table.

d) Tracers in groundwater flow studies.

e) Hydrogeology of Maharashtra.

f) Vadose zone

Total No. of Questions : 5]

SEAT No. :

P-1071

[Total No. of Pages : 2

[6054]-361

T.Y. B.Sc.

GEOLOGY

GL-316 : Applied Geophysics

(2019 Pattern) (Semester - V) (Revised Syllabus) (35166)

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

Instructions to the candidates:

1) ***Question no. 1 is compulsory.***
2) ***Solve any Three question from Q.2 to Q.5.***
3) ***Question No. Q.2 to Q.5 carry equal marks.***

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

a) How seismograph works?

b) Give a formula which relates wavelength & frequency.

c) Define apparent resistivity.

d) How are positive anomalies produced?

e) What is significance of free-Air Borne survey?

f) Explain the seismic exploration.

Q2) Answer the following :

a) Describe the four principle seismic wares pasese of rocks. **[6]**

b) Distinguish between a seismograph & a seismogram. **[4]**

Q3) Answer the following :

a) Brief in detailed of electromagnetic method. **[6]**

b) Explain the Schlumberger method. **[4]**

P.T.O.

Q4) Answer the following :

a) Describe the principle of magnetic method & explain magnetic anomalies. **[6]**

b) Give the field procedure of self - potential method. **[4]**

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

a) Seismic refraction method.

b) Magnetic anomalies.

c) Principle of electrical method.

d) Interpretation of resistivity data.

e) Origin of self potential instrument.

f) Electrolytic method.

⌘⌘⌘

Total No. of Questions : 5]

SEAT No. :

P-1072

[Total No. of Pages : 2

[6054]-362

T.Y. B.Sc.

GEOLOGY

SEC-I : Geotechnology

(2019 Pattern) (Semester - V) (351610)

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 5.***
3) ***Questions 2 to 5 carry equal marks.***

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

a) Enlist the types of drilling.

b) Define the Rock quality designation.

c) Define drilling in geotechnical field.

d) Write any two applications of surveying.

e) Define levelling.

f) Write any two applications of total station.

Q2) Answer the following :

a) Explain Rock Mass Rating (RMR) in details. **[6]**

b) Define foundations and types of foundations in details. **[4]**

Q3) Answer the following :

a) Describe standard penetration test in details and draw neat sketch of split spoon sampler. **[6]**

b) Explain consistancy limits of soils in brief. **[4]**

P.T.O.

Q4) Answer the following :

a) Define levelling principle of levelling and it's objectives. **[6]**

b) Elaborate the Bench marks in brief. **[4]**

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

a) Draw a neat sketch of casagrandes apparatus.

b) Define core logging and its application.

c) Give any two uses of oven.

d) Write a note on uniaxial compressive strength of soil.

e) Give the principle of surveying.

f) Write a note on line of collination.

Total No. of Questions : 5]

SEAT No. :

P-1073

[Total No. of Pages : 2

[6054]-366

T.Y. B.Sc.

GEOLOGY

SEC - II : Gemology and Gem Testing

(2019 Pattern) (Revised) (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 no. 2 to 5 carry equal marks.***

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

a) Define Gemstones.

b) What is refractive index?

c) What is synthetic gemstones?

d) How to identify the natural gemstones?

e) Give the examples of precious stones.

f) What is Chrysoberyl Diamonds?

Q2) Answer the following :

a) Describe the chemical composition, characteristics inclusions & Geographical occurrence of Diamond. **[6]**

b) Write a note on rare gemstones. **[4]**

P.T.O.

Q3) Answer the following :

a) Discuss about basic properties of gems & their formation. **[6]**

b) Write a note on treatments of gem stones. **[4]**

Q4) Answer the following :

a) What is UV lamp? Write their uses in brief. **[6]**

b) Write short notes on optical phenomenon of gemstone. **[4]**

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

a) Varieties of silica.

b) Total internal reflection.

c) Canada Balsam.

d) Gem variety of Tourmaline.

e) Double refraction.

f) Fluorescent effect.

▽▽▽▽

Total No. of Questions : 4]

SEAT No. :

P-1074

[Total No. of Pages : 2

[6054]-367
T.Y. B.Sc.
STATISTICS
ST - 351 : Distribution Theory - I
(2019 Pattern) (Semester - V) (35171)

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

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Figures to the right indicates full marks.***
3) ***Use of statistical tables and calculator is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following : **[1 each]**

a) In each of the following cases, choose the correct alternative :

i) If $X \to C(\mu = 0, \lambda = 1)$ then distribution of X^2 is _____.

a) $\beta_1(0, 1)$ b) $\beta_2(1/2, 1/2)$
c) $\beta_2(1/2, 1)$ d) $\beta_1(1/2, 1/2)$

ii) Let $X \to \beta_1(3, 12)$ and let $Y = \frac{x}{1-x}$ then the value of E(Y) is ____.

a) 3/11 b) 1/4
c) 4 d) 1

iii) For a population with E(X) = 1 and Var(X) = 4/3, the lower bound for $P\left(|X-1| \le \frac{6}{\sqrt{3}}\right)$ is :

a) 8/9 b) 1/9
c) 2/9 d) 2/3

b) In each of the following, state whether the given statement is true or false : **[1 each]**

i) If $X \to C(\mu, \lambda)$ then the moment generating function of X does not exist.

ii) The distribution function of first order statistics $X_{(1)}$ based on the random sample of size '*n*' with distribution $F(x)$ is $[F(x)]^n$.

P.T.O.

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

a) A symmetric die is thrown 600 times. Find the lower bound for the probability of getting 80 to 120 sixes.

b) If X and Y are independently distributed G(1, 1) variates, then state the distribution of $U = \frac{X}{X+Y}$. Also find $P\left(U \leq \frac{1}{2}\right)$.

c) Let X_1, X_2, X_3 be a random sample taken from U(9, 10) distribution. Then compute the probability that the smallest of (X_1, X_2, X_3) is less than 9.2.

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

a) Let $X \rightarrow C(\mu, \lambda)$ then derive the expression for characteristic function of X.

b) Let X be a random variable with p.d.f. $f(x) = \begin{cases} 2x, & 0 < x < 1 \\ 0, & otherwise \end{cases}$

Using Chebycheve's inequality, compute lower bound for $P\left(\left|X - \frac{2}{3}\right| < 1/3\right)$.

c) If $X \rightarrow \beta_1(m, n)$ with E(X) = ¼ and var(X) = 1/8 then find the values of '*m*' and '*n*'.

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

a) i) Let X and Y be two independent gamma variates with parameters (α, λ_1) and (α, λ_2) repectively. Show that U = X + Y and $V = \frac{X}{X+Y}$ are independently distributed and identify their distributions. **[7]**

ii) Let $X \rightarrow C(0, 1)$ then find $P(X \leq 1)$. **[3]**

b) i) If X_n takes the values 1 and 0 with probabilities P_n and $(1 - P_n)$ respectively then examine whether the Weak Law of Large Numbers can be applied to the sequence $\{X_n\}$, where the variables X_n are independent. **[6]**

ii) Let $X_1, X_2, \ldots\ldots X_n$ are independently and identically distributed U(0, 1) random variates. Obtain distribution of max $(X_1, X_2, \ldots\ldots X_n)$. **[4]**

▽▽▽▽

Total No. of Questions : 4]

SEAT No. :

P-1075

[Total No. of Pages : 3

[6054]-368

T.Y. B.Sc.

STATISTICS

ST-352 : Theory of Estimation

(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 tables and scientific calculator is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following :

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

i) If T is an unbiased estimator of θ then unbiased estimator of $3\theta + 8$ is

A) $3T+4$ B) $3T$

C) $3T+8$ D) $3T-8$

ii) If X_1 and X_2 are random sample from Poisson (λ). If $T_1 = 2X_1$ and $T_2 = 3X_2$ then relative efficiency of T_1 with respect to T_2 is

A) 9/4 B) 4/9

C) 2/3 D) 3/2

iii) A random sample of size n is available from U(0, θ) distribution Maximum likelihood estimator of θ is

A) $\bar{X}$ B) $X_{(1)}$

C) $X_{(n)}$ D) $\frac{X_{(1)} + X_{(n)}}{2}$

P.T.O.

b) State whether **each** of the following statements is true or false. **[1 each]**

i) If T_n is consistent for θ then $\frac{1}{n} + T_n$ is also consistent estimator of θ.

ii) For Bernoulli distribution with parameter p, $T = \sum_{i=1}^{n} X_i$ is sufficient statistic for parameter p.

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

a) Find maximum likelihood estimator for parameter λ of Poisson distribution based on random sample of size n.

b) Explain method of moments to estimate the parameter of the probability distribution. Also find Moment estimator of parameter of exponential distribution.

c) If $X_1, X_2 \ldots\ldots X_n$ is a random sample from Bernoulli distribution with parameter p. Show that $\frac{T(n-T)}{n(n-1)}$ is an unbiased estimator of $p(1-p)$ where $T = \sum_{i=1}^{n} X_i$.

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

a) If there exist two unbiased estimator for the parameter θ then show that there exist infinitely many unbiased estimators for the parameters θ.

b) If $X \sim N(\mu, \sigma^2)$, find the Fisher information function $1(\sigma^2)$ when μ is known.

c) Suppose X_1, X_2, X_3 are independent and identically distributed a random variables from $N(\mu, 1)$. Find the efficiency of $T_1 = \frac{X_1 + X_2 + X_3}{3}$ with respect to $T_2 = \frac{X_1 + 2X_2 + 3X_3}{6}$.

Q4) **Attempt any one of the following :** **[10 each]**

a) i) If $X_1, X_2, \ldots\ldots X_n$ is a random sample of size n from *Poisson* (λ) then show that $T = (\bar{X})^2 - \frac{\bar{X}}{n}$ is an unbiased estimator of λ^2. **[5]**

ii) If $X_1, X_2 \ldots\ldots X_n$ is a random sample of size n from Exponential distribution parameter θ then Find MVBUE of θ. **[5]**

b) i) If $\{T_n, n \geq 1\}$ is a sequence of an unbiased estimators of θ such that $Var(T_n) \to 0$ as $n \to \infty$ then show that T_n is consistent estimator of θ. **[5]**

ii) Show that Minimum variance unbiased estimator (MVBUE) if exist then it is always unique. **[5]**

⌘⌘⌘

Total No. of Questions : 4]

SEAT No. : ____

P1076

[Total No. of Pages : 2

[6054]-369
T.Y.B.Sc. (Regular)
STATISTICS
ST-353 : Design and Analysis Of Experiments
(2019 Pattern) (CBCS) (Semester - V) (Paper-III) (35173)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of Statistical tables and calculator is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following. **[1 each]**

A) In each of the following cases, choose the correct alternative:

a) Using ANOVA for several populations which among the following do we compare

i) Variance ii) Standard Deviation

iii) Mean iv) Median

b) In case of 2^2 factroial experiment the factorial total A is given by

i) [ab] – [b] + [a] – [1] ii) [ab] + [b] – [a] – [1]

iii) [ab] – [b] – [a] + [1] iv) – [ab] + [b] – [a] + [1]

c) The number of parameters involved in the model of Latin Square Design with 4 treatments is

i) 5 ii) 12

iii) 9 iv) 13

B) In each of the following, state whether the given statement is true or false: **[1each]**

a) Principal of local control is used in Completely Randomized Design (CRD)

b) All the main effects in 2^3 factorial experiments are non linear orthogonal contrasts.

P.T.O.

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

a) 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.

b) Give ANOVA table for 2^3 factorial experiment where interaction effect ABC is confounded in all the 4 replicates.

c) Obtain an expression for efficiency of LSD over corresponding CRD.

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

a) Derive an expression for the expectation of sum of squares due to treatment for randomized block design (RBD).

b) Explain the procedure for statistical analysis of 2^2 factorial design.

c) Write a note on uniformity trials.

Q4) Attempt any one of the following.

a) i) Obtain the least squares estimators of parameters involved latin square design (LSD). **[5]**

ii) Define terms **[5]**

1) Experimental Unit.

2) Treatment.

3) Contrast.

4) Linear Treatment Contrasts.

5) Orthogonal Treatment Contrasts.

b) i) Describe the basic principles of design of experiments. **[5]**

ii) Explain Yate's procedure to obtain factorial effect totals in 2^3 factorial experiment. **[5]**

Total No. of Questions : 4]

SEAT No. :

P1077

[Total No. of Pages : 2

[6054]-370
T.Y.B.Sc. (Regular)
STATISTICS
ST - 354 : Statistical Process and Product Control
(2019 Pattern) (CBCS) (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 Statistical tables and calculator is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following. **[1 each]**

A) Choose the correct alternative in each of the following.

a) In acceptance sampling, the consumer's risk is the risk of having a.

i) good lot rejected ii) good lot accepted

iii) bad lot rejected iv) bad lot accepted

b) Which of the following is not one of the seven Process Control (PC) Tools?

i) Check sheet ii) Histogram

iii) Pie diagram iv) Scatter plot

c) The 3-σ limits on $\overline{X}$ bar control charts imply that the type I error probability is.

i) 0.0027 ii) 0.0042

iii) 0.0015 iv) 0.0098

B) In each of the following, State whether the given statement is true or false. **[1 each]**

a) Dispersion of a process is monitored in $\overline{X}$ chart.

b) A c-chart is used for the number of defects.

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

a) Define and compare natural tolerance limits and specification limits.

b) Explain the cause and effect diagram as one of the seven Process Control (PC) tools.

c) 25 samples each of size 4 were inspected for a quantitative characterisitic and $\overline{\overline{X}}$ and $\overline{R}$ were calculated as 0.73 and 0.025 respectively. If the control limits are taken as the specification limits, find and interpret the value of the capability performance index (C_{pk}).

P.T.O.

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

a) Find Consumer's risk for a single sampling plan with N = 5000, n = 65, c=3, LTPD = 10.3%. Interpret the findings.

b) State the different criteria for detecting a lack of control situations with illustrative sketches.

c) Define the following terms with respect to a single Sampling plan:

i) Type II error

ii) Lot Tolerance Fraction Defective

iii) Average Outgoing Quality

iv) Average Sample Number

v) Producer's risk (α)

Q4) Attempt any one of the following.

a) i) Explain the construction and interpretation of $\overline{X}$ and R-chart when standards μ and σ are not known. Explain the method of revision of such a R-charet if a point (i, Ri) falls above Upper Control Limit (UCL). **[7]**

ii) Write a short note on acceptance sampling with rectification. **[3]**

b) i) Control charts for $\overline{X}$ and R are maintained on dissolved sodium content of a certain solution in parts per million (ppm). The data is organized into 25 sub-groups of 5 measurements each. From these data = $\sum \overline{X} = 490.5$ and $\sum R = 90$. Find the values of 3σ control limits for $\overline{X}$ and R-charts, also find the estimate of σ for this process under the assumption that the process is in control. **[5]**

ii) Describe the procedure of drawing OC curve for a double sampling plan. **[5]**

✡ ✡ ✡

Total No. of Questions : 4]

SEAT No. :

P-1078

[Total No. of Pages : 4

[6054]-371

T.Y. B.Sc.

STATISTICS

ST-355: Operations 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 Statistical tables and calculator is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following :

a) In each of the following cases, choose the correct alternative : **[1 each]**

i) The solution to a Transportation Problem (T.P.) with m sources and n destinations is non-degenerate if the number of positive allocations is :

A) $m + n$

B) $m + n - 1$

C) $m \times n$

D) $m + n + 1$

ii) In Program Evaluation and Review Technique (PERT), variance of the project duration is based on :

A) Critical activities B) Non-critical activities

C) Dummy activities D) All activities

iii) In the standard form of Linear Programming Problem (L.P.P.), the right hand side of every constraint must be :

A) Zero B) One

C) Negative D) Non-negative

b) In each of the following, state whether the given statement is true or false: **[1 each]**

i) T.P. is a special case of A.P.

ii) Critical Path Method (C.P.M) is probabilistic in nature.

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

a) Find the Initial Basic Feasible Solution (IBFS) to the following T.P. using the Vogel's Approximation Method (VAM) :

Sources	Destinations			Supply
	A	B	C	
S_1	2	7	14	4
S_2	3	3	1	8
S_3	5	4	7	7
S_4	1	6	2	15
Demand	7	9	18	

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

Maximize $Z = 3x_1 + 2x_2$

Subject to $-x_1 + 2x_2 \leq 4$

$3x_1 + 2x_2 \leq 14$

$x_1 - x_2 \leq 3$

$x_1 \geq 0, x_2 \geq 0$

c) State the formulation of T.P. as L.P.P. When is a T.P. said to be unbalanced? Explain how an unbalanced T.P. is converted into a balanced T.P.

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

a) A project consists of seven activities with the following relevant information.

Activity	A	B	C	D	E	F	G
Immediate Predecessor	---	---	A	A,B	C,D	A,B	E,F
Time Duration	2	1	3	2	1	3	1

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

b) Obtain the dual of the following LPP :

Maximize $Z = 4x_1 + x_2 + 7x_3$

Subject to $x_1 + x_2 + x_3 = 10$

$5x_1 - x_2 + x_3 \geq 12$

$x_1 + 7x_2 - 3x_3 \leq 4$

$x_1, x_2, x_3 \geq 0$

c) Explain the following terms with reference to L.P.P. :

i) Objective function

ii) Constraint

iii) Canonical form

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

a) i) Define the following with reference to C.P.M and PERT : **[5]**

A) Pessimistic time estimate

B) Dummy activity

C) Event/node

D) Expected project duration

E) Burst event

ii) There are four jobs to be assigned to four machines. The times (in minutes) required for each job on each machine are as given in the table below. Determine the optimal assignment and compute total minimum time. **[5]**

	Machine			
Jobs	M_1	M_2	M_3	M_4
J_1	40	50	60	65
J_2	30	38	46	48
J_3	25	33	41	43
J_4	39	45	51	59

b) i) A person requires atleast 10, 12 and 15 units of chemicals A, B and C respectively for his garden. A liquid product contains 5, 2 and 1 units of chemicals A, B and C respectively and a dry product contains 1, 2 and 4 units of chemicals A, B and C respectively. The liquid product is sold for Rs. 30 per jar and the dry product is sold for Rs. 200 per carton. The person has decided to purchase atleast 3 jars of liquid product and 2 cartons of dry product. Formulate a Linear Programming model for the above situation so as to minimize the cost. **[5]**

ii) Explain the Hungarian method of solving Assignment Problem (A.P.). When is A.P. said to be unbalanced? Explain how it is balanced.**[5]**

✷ ✷ ✷

Total No. of Questions : 4]

SEAT No. :

P-1079

[Total No. of Pages : 3

[6054]-372

T.Y. B.Sc.

STATISTICS (Principal)

ST-356 : Regression Analysis (Paper - VI)

(2019 Pattern) (CBCS) (Semester - V) (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 tables and calculator is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following :

a) In each of the following cases, choose the correct alternative :**[1 each]**

i) In simple linear regression model, $100(1-\alpha)\%$ confidence interval for the error variance σ^2 is

a) $\left(\dfrac{(n-2)\text{MS}_{\text{res}}}{X^2_{\frac{\alpha}{2},n-2}}, \dfrac{(n-2)\text{MS}_{\text{res}}}{X^2_{1-\frac{\alpha}{2},n-2}}\right)$

b) $\left(\dfrac{X^2_{\frac{\alpha}{2},n-2}}{(n-2)\text{MS}_{\text{res}}}, \dfrac{X^2_{1-\frac{\alpha}{2},n-2}}{(n-2)\text{MS}_{\text{res}}}\right)$

c) $\left(\dfrac{(n-2)\text{MS}_{\text{res}}}{X^2_{1-\frac{\alpha}{2},n-2}}, \dfrac{(n-2)\text{MS}_{\text{res}}}{X^2_{\frac{\alpha}{2},n-2}}\right)$

d) $\left(\dfrac{X^2_{1-\frac{\alpha}{2},n-2}}{(n-2)\text{MS}_{\text{res}}}, \dfrac{X^2_{\frac{\alpha}{2},n-2}}{(n-2)\text{MS}_{\text{res}}}\right)$

P.T.O.

ii) In assumption of multiple linear regression model, errors follow

a) Binomial distribution

b) Poisson distribution

c) t distribution

d) Normal distribution.

iii) The deviance statistic (D) is depending on

a) likelihood function of fitted model

b) likelihood function of saturated model

c) Both likelihood functions of fitted and saturated models

d) Neither likelihood function of fitted model nor likelihood of saturated model

b) In each of the following, state whether the given statement is true or false : **[1 each]**

i) The sum of residuals weighted by the corresponding value of regressor is always zero.

ii) The value adjusted coefficients (Adj. R^2) of determination is always positive.

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

a) Consider the simple linear regression model, $y = \beta_0 + \beta_1 x + \varepsilon$ with $E(\varepsilon) = 0$, $Var(\varepsilon) = \sigma^2$ and ε_i, i = 1,2,.., n uncorrelated. Show that,

$$Cov(\bar{\beta}_0, \bar{\beta}_1) = \frac{-\bar{x}\sigma^2}{\sum_{i=1}^{n}(x_1 - \bar{x})^2}.$$

b) For a multiple linear regression model, $y = X\beta + \varepsilon$ with $\varepsilon \sim N_p(0, \sigma^2 I)$. Obtain the mean and variance of the least squares estimator of β.

c) Explain the procedure of estimating the parameters in simple logistic regression model.

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

a) Consider the simple linear regression model, $y = \beta_0 + \beta_1 x + \varepsilon$, find the least squares estimator of β_0 and β_1.

b) Explain how residual plots are useful in verifying the assumptions in linear regression model.

c) The table below show the output produced by *glm* command in R.

Call :

glm (formula=y–x, family="binomial")

Deviance Residuals :

Min	1Q	Median	3Q	Max
–2.0620	–0.4868	0.3915	0.5476	2.1682
Coefficients:	Estimate	Std. Error	Z value	Pr(>|z|)
(Intercept)	6.070884	2.108996	2.879	0.00399**
x	–0.017705	0.006076	–2.914	0.00357**

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Null deviance: 34.617 on 24 degrees of freedom

Residual deviance: 20.364 on 23 degrees of freedom

AIC: 24.364

Using above information,

i) Write a logistic regression model to the response variable y.

ii) Does the model deviance indicate that logistic regression model is adequate?

iii) Provide an interpretation of the parameter β_1 in the model.

Q4) Attempt any one of the following :

a) i) Write a note on normal probability plot. **[5]**

ii) In a simple linear regression problem with sample size 100, the slope was found to be 4.5 and standard error estimate $(\hat{\sigma})$ is equal to 15.20. The quantity $\sum_{i=1}^{50} X_1^2 - n\bar{x}^2 = 400$. Compute the standard error of the regression slope coefficient (β_1). Test whether the regression coefficient is different from zero at a 5% level of significance. **[5]**

b) i) Write a note on transformations of the response variable. **[5]**

ii) Write a note on model deviance. **[5]**

⌘⌘⌘

Total No. of Questions: 5]

SEAT No. : ____

P1080

[Total No. of Pages : 2

[6054]-373
T.Y.B.Sc. (Regular)
GEOGRAPHY
Gg-351 : Regional Geography of India - I
(2019 Pattern) (CBCS) (Semester-V) (35181)

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

Instructions to the candidates:

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

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

a) Define perennial river

b) Write any two species of conifer Forest

c) Where does Ganga river originate

d) Mention the latitude and longitude of india

e) Write any two names of himalayah peaks

f) Write how many states are in india

Q2) a) Describe thermal mechanism of monsoon **[6]**

OR

Explain the characteristics of Laterite soil

b) Explain the Godavari river system **[4]**

Q3) a) Describe the significance of coastal plains **[6]**

OR

Explain in detail physical divisions of india

b) Explain the Ganga river System **[4]**

P.T.O.

Q4) a) Describe the economical importance of forest **[6]**

OR

Explain the effects of soil degradation

b) Explain the historical background of india **[4]**

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

a) Krishna river System
b) Glaciers of India
c) Mangrove Forest
d) West Flowing River
e) Characteristics of Rainy season
f) India's frontiers

Total No. of Questions : 5]

SEAT No. :

P1081

[Total No. of Pages : 2

[6054]-374

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

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

a) What is resource?

b) In which types of resources?

c) In which physical factor effect on economic activities.

d) What is economic activities?

e) What is primary economic activities

f) Give the two types of secondary economic activities.

Q2) a) Describe the classification of resources **[6]**

OR

Describe the classification of economic activities

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

Q3) a) Explain post Industrialization development of economic activities. **[6]**

OR

Explain the water resource planning policy of Government of India.

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

P.T.O.

Q4) a) Discuss the indices network analysis. **[6]**

OR

Discuss the weber's model of industrial location.

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

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

a) Non-renewable resources.

b) Metalic resources.

c) Quinary economic activities.

d) Global energy crisis

e) Human resources

f) Tertiary economic activities

❖ ❖ ❖

Total No. of Questions : 5]

SEAT No. :

P-1082

[Total No. of Pages : 2

[6054]-375

T.Y.B.Sc.

GEOGRAPHY

GG-353:Fundamentals of Tourism

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

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 leisure?

b) What is tourist?

c) Define Religious tourism.

d) What is eco-tourism?

e) What is recreation?

f) Give the full form of M.T.D.C.

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

OR

Describe the concept of cultural tourism in India.

b) What is difference between tourism and travel. **[4]**

Q3) a) Explain the Natural diversity of India. **[6]**

OR

Explain the role of MICE in tourism development.

b) Explain the negative impact of environment on tourism. **[4]**

P.T.O.

Q4) a) Discuss the concept of Sustainable tourism. **[6]**

OR

Discuss the concept of agro-tourism.

b) Explain the Medical tourism in India. **[4]**

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

a) Natural tourism.

b) Negative impact of economy on tourism.

c) Positive impact of society on tourism.

d) Heritage tourism.

e) Geo-tourism.

f) Adventure tourism.

Total No. of Questions : 5]

SEAT No. :

P-1083

[Total No. of Pages : 2

[6054]-376
T.Y.B.Sc.
GEOGRAPHY
GG-354 : Geography of Soil - I
(2019 Pattern) (Semester - V) (CBCS) (35184)

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 calcification.

b) Define porosity.

c) Mention any two chemical properties of the soil.

d) Define soil.

e) Mention the approaches to study the soil geography.

f) Write any two features of A Horizon of the soil profile.

Q2) a) Describe the laterisation process of soil formation. **[6]**

OR

Explain the type of physical weathering.

b) Explain the nature of soil geography. **[4]**

Q3) a) Describe the importance of soil studies in geography. **[6]**

OR

Explain the approaches to study the soil geography.

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

P.T.O.

Q4) a) Explain in detail about soil water. **[6]**

OR

Describe the factor affected on soil moisture.

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

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

a) Irrigation efficiency of soil.

b) Soil pH

c) Soil Humus

d) Soil structure

e) O Horizon of soil profile.

f) Parent rock as a soil forming factor.

Total No. of Questions : 5]

SEAT No. :

P-1084

[Total No. of Pages : 2

[6054]-377
T.Y.B.Sc.
GEOGRAPHY
GG-355 : Management of Natural Disasters
(2019 Pattern) (Semester - V) (CBCS) (35185)

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) ***Questions 2 to 5 carry equal marks.***

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

a) What is vulnerability?

b) Define the term natural hazard.

c) Write the names of any two cyclones of bay of bengal.

d) What is medicinal kit?

e) Mention the states affected by Tsunami in India.

f) What is Geo-physical disaster?

Q2) a) Describe the classification of natural disaster. **[6]**

OR

Explain the concepts of disaster management in detail.

b) Write a brief note on distribution of Flood in india. **[4]**

Q3) a) Explain the causes and impact of Tsunami in India. **[6]**

OR

Explain the causes and impact of drought in India.

b) Write a brief note on causes of landslides. **[4]**

P.T.O.

Q4) a) Explain the concept of response and mitigation to natural disaster. **[6]**

OR

Describe the Geo-physical disaster mapping in India.

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

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

a) Applications of GIS in disaster management.

b) Earthquakes in India.

c) Mitigation

d) Survival kit

e) Preventions during and post disaster.

f) Responsibilities of NGO's in disaster risk reduction.

Total No. of Questions : 5]

SEAT No. :

P-1085

[Total No. of Pages : 2

[6054]-378

T.Y. B.Sc.

GEOGRAPHY

GG-356: Geoinformatics - I

(2019 Pattern) (CBCS) (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 Q.2 to Q.5 carry equal marks.***

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

a) Define the term GIS.

b) What are aerial photographs?

c) What is topological errors?

d) Define the term buffer analysis.

e) What do you understand by the term dissolve in GIS?

f) List any two entities of GIS.

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

OR

Explain the functions of GIS.

b) Write in brief about spatial data types in GIS **[4]**

P.T.O.

Q3) a) Explain the raster data and write its characteristics. **[6]**

OR

Describe in detail the data sources in GIS.

b) Write in brief about the components of GIS. **[4]**

Q4) a) Discuss the relationship entities and attribute data linking. **[6]**

OR

Explain various errors in GIS data editing.

b) Write in brief about topographic analysis. **[4]**

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

a) TIN.

b) Satellite images.

c) Edge matching.

d) Data Management.

e) Spatiotemporal.

f) Surveying.

Total No. of Questions : 5]

SEAT No. :

P-1086

[Total No. of Pages : 2

[6054]-379

T.Y. BSc.

GEOGRAPHY

GG - 3510 : Research Methodology - I

(351810) (2019 Pattern) (CBCS) (Semester - V)

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

Instructions to the candidates:

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

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

a) What is research method?

b) Write any two objectives of research.

c) What is research.

d) What is research problem?

e) What is research design?

f) What is conceptual research?

Q2) a) Describe applied and fundamental research. **[6]**

OR

Describe the purpose of research design.

b) Write a short note on characteristics of research. **[4]**

P.T.O.

Q3) a) Describe various steps in research process. **[6]**

OR

Describe the importance of research design.

b) Write in short on research design. **[4]**

Q4) a) Explain the technique involved in defining a research problem. **[6]**

OR

Describe the sources of the research problem.

b) Write in brief on formulating research problem. **[4]**

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

a) Empirical research.

b) Meaning and definition of research.

c) Objectives of research.

d) Research methodology.

e) Hypothesis formulation.

f) Research process.

Total No. of Questions : 5]

SEAT No. :

P-1087

[Total No. of Pages : 2

[6054]-380

T.Y. B.Sc.

GEOGRAPHY

GG - 3511 : Elementary Surveying

(2019 Pattern) (Semester - V) (CBCS) (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) ***Question 2 to 5 carry equal marks.***

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

a) Define surveying.

b) Define EDM.

c) State any two advantages of theodolite surveying.

d) Mention any two features of prismatic surveying.

e) Write any two sources of errors in plane table surveying.

f) Write the methods of dumpy level surveying.

Q2) a) Describe the various parts of total station. **[6]**

OR

Explain the setting up of total station.

b) Write the different parts of theodolite instrument. **[4]**

Q3) a) Discuss the functions & methods of plane table surveying. **[6]**

OR

Explain the merits & demerits of DGPS surveying.

b) Write about the geodetic surveying. **[4]**

P.T.O.

Q4) a) Explain the various methods of total station surveying. **[6]**

OR

Describe the demerits of total station surveying.

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

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

a) Merits of drone surveying.

b) Rise & fall method.

c) Merits of prismatic compass surveying.

d) Importance of surveying.

e) Theodolite instrument.

f) Angle measurement in total station.

▽▽▽▽

Total No. of Questions: 5]

SEAT No. :

P1088

[Total No. of Pages : 2

[6054]-381
T.Y.B.Sc. (Regular)
MICROBIOLOGY
MB-351 : Medical Microbiology - I
(CBCS 2019 Pattern) (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) ***Question 2 to Q.5 carry equal marks.***

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

a) What is Randomized control trials

b) Which Selective media used for clostridium tetani

c) State : True or false : middle ear infection is called as otitis media

d) Which is the causative agent for spotled fever

e) _____is a sexually transmitted diseases

f) Define cystitis

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

i) Laboratory diagnosis of Tuberculosis

ii) Clinical symptoms of Pseudomonas aerauginosa infection in burn wound

iii) Bacterial diseases of female genital system with causative agent

b) Draw neat and labelled diagram of human respiratory system **[4]**

P.T.O.

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

i) Methods of diagnosis of typhoid fever

ii) Modes of transmission of disease

iii) Virulence factors and pathogenesis of Neisseria gonorrhoeae

b) Draw neat labelled diagram of human respiratory system **[4]**

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

i) Disease prevention and control

ii) Principles of clinical trials of the vaccine

iii) Pathogenicity of Streptococcus pneumoniae

b) Draw neat labelled diagram of Gastroinstinal system **[4]**

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

a) Randomized control trials

b) Non-vaccine-preventable bacterial diseases

c) Symptoms of Meningitis

d) Cultnation of Rickettsid

e) Cross-over trials

f) Laboratory diagnosis of salmonella

Total No. of Questions : 5]

SEAT No. :

P1089

[Total No. of Pages : 2

[6054]-382
T.Y. B.Sc. (Regular)
MICROBIOLOGY
MB-352 : Immunology-I
(CBCS 2019 Pattern) (Semester-V) (35192)

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

Instructions to the candidates:

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

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

a) Define autograft.

b) Enlist 2 methods for MHC typing.

c) Write any 2 examples of PAMP.

d) Enlist any 2 examples of adjuvants.

e) Define hapten.

f) What is radial immunodiffusion?

Q2) a) Describe the following (any 2). **[6]**

i) Properties of T cell epitope.

ii) Spleen.

iii) Ochterlony technique.

b) Explain the respiratory burst in macrophages. **[4]**

Q3) a) Diagrammatically represent (any 2) **[6]**

i) RIA

ii) MHC-II

iii) ELISA

b) Describe kappa chain gene rearrangement. **[4]**

P.T.O.

Q4) a) Explain the following (any 2) **[6]**

i) Applications of monoclonal antibody.

ii) Factors affecting immunogenecity.

iii) Types of antigens.

b) Explain the alternative pathway of complement activation. **[4]**

Q5) Write short notes (any 4) **[10]**

a) Agglutination

b) HAT medium

c) Antibody affinity and avidity

d) Prevention of graft rejection

e) FACS

f) Lymph node

❖ ❖ ❖

Total No. of Questions : 5]

SEAT No. :

P-1090

[Total No. of Pages : 2

[6054]-383

T.Y. B.Sc.

MICROBIOLOGY

MB - 353 : Enzymology

(2019 Pattern) (CBCS) (Semester - V) (35193)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Questions 2 to 5 carry equal marks.***

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

a) Define specific activity.

b) Enlist any two materials used in column of Ion. Exchange chromatography.

c) Name the active form of Vitamin D.

d) Glycogen phosphorylase 'a' is active form of enzyme. State True or False.

e) Enlist any two commonly occurring amino acids at active site of enzyme.

f) Dialysis is not a method of purification of enzymes. State true or false.

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

i) What is the significance of V_{max}.

ii) Derive Lineweaver Burk equation.

iii) Enlist enzymes present in pyruvate dehydrogenate complex.

b) Diagrammatically represent molecular exclusion chromatography. **[4]**

P.T.O.

Q3) a) Explain the following (any 2) : **[6]**

i) Radioisotope assay.

ii) Solvent precipitation.

iii) Properties of Allosteric enzymes.

b) Describe affinity chromatography for purification of enzymes. **[4]**

Q4) a) Discuss the following (any 2) : **[6]**

i) Spectro photometric assay.

ii) State M.M. equation & its graphical representation.

iii) Zymogens.

b) Explain isoelectric focusing with suitable examples. **[4]**

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

a) Feed back inhibition with suitable example.

b) Applications of Immobilized enzymes.

c) KM.

d) Biochemical function of thiamine.

e) Physical methods of cell disruption.

f) X-ray crystallography.

Total No. of Questions : 5]

SEAT No. :

P-1091

[Total No. of Pages : 2

[6054]-384

T.Y. B.Sc.

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 2-5 carry equal marks.***

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

a) What is abortive transduction?

b) What is role of F (F prime)?

c) Write the formula to calculate recombination frequency in gene mapping.

d) State the role of helicase and ligase in Replication.

e) Define operator.

f) What is the nucleotide sequence of acceptor arm of tRNA?

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

i) Role of 3 different types of RNA polymerase present in Eukaryotes.

ii) Role of σ (sigma) and rho factors in transcription.

iii) Role of TUS proteins in termination of DNA Replication.

b) Describe Gene mapping in bacteria using co-transformation. **[4]**

P.T.O.

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

i) Explain catabolite repression.

ii) Describe various mating types of E.Coil.

iii) Explain Non homologous recombination.

b) Diagrammatically explain the role of aminoacyl tRNA in prokaryotic translation. **[4]**

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

i) Interrupted mating experiment.

ii) Competence and transformation in streptococcus pneumoniae.

iii) Phage mediated generalised transduction.

b) Explain different modes of Eukaryotic Replication. **[4]**

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

a) Splicing

b) Co-transduction

c) Shine - Dalgarno sequence

d) Lac operons.

e) Homologous recombination.

f) Formation of HFr strain.

Total No. of Questions : 5]

SEAT No. :

P-1092

[Total No. of Pages : 2

[6054]-385
T.Y. B.Sc. (Semester - V)
MICROBIOLOGY
MB355 : Fermentation Technology - I
(2019 Pattern) (CBCS) (Paper - V) (35195)

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

Instructions to the candidates:

1) ***Q1 is compulsory.***
2) ***Solve any three from Q2 to Q5.***
3) ***Questions 2 to 5 carry equal marks.***

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

a) Enlist any 3 scales of fermentation process.

b) Name any 2 methods of media optimization.

c) Define Del factor.

d) Carcinogenecity of fermentation products is tested by _____ test.

e) State True or False :
Distillation is used in product recovery.

f) Name any 2 types of IPR.

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

i) Method of isolation of auxotrophs.

ii) Endotoxin testing of fermentation products.

iii) Patents

b) Explain any 2 methods of quantification of fermentation products. **[4]**

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

i) Freeze drying

ii) Bioburden test

iii) Distillation

b) Explain product recovery by liquid - liquid extraction. **[4]**

P.T.O.

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

i) Validation of fermentation process.

ii) Batch sterilization

iii) Recurring expenditure

b) Explain the process & principle of Ion-exchange chromatography. **[4]**

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

a) Filtration method for sterilization

b) Pyrogen test

c) Cell disruption methods

d) Newtonian Fluids

e) Scale - up

f) Gradient plate technique

Total No. of Questions : 5]

SEAT No. :

P-1093

[Total No. of Pages : 2

[6054]-386

T.Y. B.Sc.

MICROBIOLOGY (Paper - VI)

MB - 356 : Agricultural Microbiology

(2019 Pattern) (Semester - V) (CBCS) (35196)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Questions 2 to 5 carry equal marks.***

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

a) What is plant breeding?

b) State true or false :

Downy mildew is caused by Oomycete fungi.

c) What are monocyclic diseases.

d) Diazotrophy includes _____.

i) CO_2 fixation

ii) Carbon assimilation

iii) N_2 fixation

iv) Phosphate solubilization

e) _____ employs natural enemies of pests or pathogens to control their population.

f) What is integrated pest management?

P.T.O.

Q2) a) Describe the following (any two) **[6]**

i) Plant growth improvement with respect to disease resistance.

ii) RNAi technology.

iii) Role of microorganisms in soil health.

b) Explain plant disease triangle & disease forecasting. **[4]**

Q3) a) Describe the following (any two) **[6]**

i) Herbicide resistance.

ii) Plant microbe interaction in biofilm.

iii) Genetic engineering for disease resistance plants.

b) Describe phosphate solubilization. **[4]**

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

i) Eradication method used for plant disease control.

ii) Polyetic diseases with example

iii) Importance of shuttle vectors in plant genetic engineering.

b) Explain classification of plant diseases based on symptoms. **[4]**

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

a) Edible vaccines.

b) Microorganism in sustainable development.

c) Plant viruses in genetic engineering.

d) Micronutrient availability.

e) Colonization stage in development of plant diseases.

f) Biofilm in rhizosphere.

x x x

Total No. of Questions : 5]

SEAT No. :

P-1094

[Total No. of Pages : 2

[6054]-387

T.Y. B.Sc.

MICROBIOLOGY

MB-3510 : Marine Microbiology

(Skill Based Elective)

(2019 Pattern) (CBCS) (Semester - V) (351910)

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

Instructions to the candidates :

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

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

a) What are marine habitats?

b) Define barophiles.

c) What are salt marshes?

d) What is DOM in marine loop?

e) Enlist different types of coral reefs.

f) Define bioremediation.

Q2) a) Describe the following (any 2) : **[6]**

i) Applications of extremophiles

ii) Culturing of mats from vents

iii) Estuaries

b) Explain sediment sampling using Box corer. **[4]**

Q3) a) Explain the following (any 2) : **[6]**

i) Artic polar habitat

ii) Role of thermophiles in bioremediation

iii) Coastal ecosystem

b) Explain bioremediation of heavy metals. **[4]**

P.T.O.

Q4) a) Describe the following (any 2) : **[6]**

i) Hydrothermal vents

ii) Types of marine fungi

iii) Bioremediation of oil spills

b) Explain adaptations of marine archaebacteria. **[4]**

Q5) Write short notes (any 4) : **[10]**

a) Coral reefs

b) VBNC

c) Halophiles

d) Bioremediation of tar balls

e) Marine mangroves

f) Stress response in archaebacteria

□□□

Total No. of Questions : 5]

SEAT No. :

P-1095

[Total No. of Pages : 2

[6054]-388
T.Y. B.Sc.
MICROBIOLOGY
(Skill Based Elective)
MB - 3511 : Dairy Microbiology
(2019 Pattern) (Semester - V) (CBCS) (351911)

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

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any 3 from Q2 to Q5.***
3) ***Questions 2 to 5 carry equal marks.***

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

a) Define bactofugation.

b) Write the composition of milk.

c) _____is the preservative in milk.

i) Casein ii) Lactose

iii) Riboflavin iv) Lactoferrin

d) What are bacteriocins?

e) Define toned milk.

f) Enlist any 2 sources of contamation of milk.

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

i) Types of pasteurization

ii) Color defects in Milk

iii) Succession of microorganisms in milk spoilage

b) Describe the standard operating procedures followed in assuring sanitation in dairy. **[4]**

Q3) a) Explain any two. **[6]**

i) What is colustrum? Give its composition

ii) Flavour defects in milk.

iii) HACCP

b) Describe the process of sterilization of milk. **[4]**

P.T.O.

Q4) a) Describe any two. **[6]**

i) Biofilm formation & control of biofilm on dairy equipment.

ii) Stormy fermentation.

iii) What is the difference in skimmed milk and toned milk.

b) Explain the good manufacturing practices for maintaining quality of milk products. **[4]**

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

a) Thermisation

b) Role of phosphatase test in pasteurization

c) Food grade biopreservatives.

d) Contamination of milk during storage.

e) Quality assuarance of dairy

f) Milk microflora.

Total No. of Questions: 5]

SEAT No. :

P1096

[Total No. of Pages : 2

[6054]-389
T.Y.B.Sc. (Regular)
NANOSCIENCE AND NANOTECHNOLOGY
NS-351 : Polymer & Composites
(2019 Pattern) (Semester-V) (Paper-I) (35261)

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) ***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 Exfoliation method.

b) Write two application of composites.

c) Define fatigue creep and fracture behaviour.

d) Define nucleating effect.

e) Define melt mixing.

f) What is particulate fiber.

Q2) A) Attempt any one of the following **[6]**

a) Explain dispersion & nucleating effect.

b) Give Advantages of composite material and CNT'S.

B) Explain in detail tribology characteristics. **[4]**

Q3) A) Attempt any one of the following. **[6]**

a) Explain in detail nucleating effect.

b) Explain the terms short fibers and long fibers.

B) Explain Lotex stage mixing and melt mixing. **[4]**

P.T.O.

Q4) A) Attempt any one of the following. **[6]**

a) Explain reinforced rubber.

b) Distinguish between Ex-situ and In-situ Polymerisation.

B) Explain Application of composite. **[4]**

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

a) MWCNT'S.

b) Arc-discharge method.

c) Nucleating effect.

d) Laset ablation method.

e) Composite material rheology.

f) CNT'S.

Total No. of Questions : 5]

SEAT No. :

P1097

[Total No. of Pages : 2

[6054]-390

T.Y. B.Sc. (Regular)

NANOSCIENCE AND NANOTECHNOLOY

NS-352 : Nanophysics

(2019 Pattern) (Semester-V) (Paper-II) (35262)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q.2 to 5.***
3) ***Draw the neat and labelled diagram wherever necessary.***
4) ***Figures to the right indicates full marks.***

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

a) Define microcanonical Ensemble?

b) Define grand canonical ensemble?

c) Define canonical ensemble?

d) Write the properties of Nanocluster?

e) Draw the diagram for x-ray absorptionfine structure.

f) Write Application of x-ray absorption fine structure.

Q2) a) Attempt any one of the following. **[6]**

i) Explain Insulator and semiconductor.

ii) Explain Lioville's Theorem.

b) Explain quantum size effect. **[4]**

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

i) Explain Instrumentation of ESR spectroscopy.

ii) Explain working principle and experimental setup of x-ray photoelectron spectroscopy.

b) Explain working principle and experimental setup of NMR spectroscopy. **[4]**

P.T.O.

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

i) Explain working principle and experimental setup for EMR Technique.

ii) Explain poisson's distribution.

b) Explain dynamic light scattering Technique. **[4]**

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

a) Explain quantum distribution function.

b) Explain Fermi-Dirac statistics.

c) Write uses of nanocluster.

d) Draw block diagram of ESR spectroscopy.

e) Draw the diagram of quantum well.

f) Draw the diagram of quantum dot's.

❖ ❖ ❖

Total No. of Questions : 5]

SEAT No. :

P-1098

[Total No. Of Pages : 2

[6054]-391
T.Y.B.Sc.
(Nanoscience and Nano-Technology)
N.S. 353: Nano Biotechnology
(Semester-V) (2019 Pattern) (Paper-III) (35263)

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 Q. No.5.***
3) ***Question No. 2 to question No. 5 carry equal marks.***
4) ***Draw neat labelled diagram wherever necessary.***
5) ***Figures on right hand side indicate full marks.***

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

a) What are amino aids?

b) Why glucose is essential to the body?

c) Define the term carbohydrates?

d) Write any two applications of Nano-wires.

e) What are hetero-polysaccharides?

f) What are exosomes?

Q2) **a) Attempt any One of the following:** **[6]**

i) With the help of examples classify Nanomaterials.

ii) Draw a flow chart explaining the classification of monosaccharides.

b) Write a short note on lipoproteins. **[4]**

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

i) What are lipids? Write short note on simple lipids

ii) What are quantum dots? Now they are synthesis

b) Write a short note on coenzymes **[4]**

P. T. O

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

i) With the help of diagram explain the mechanism of enzyme action.

ii) Explain in detail Lytic cycle.

b) Write a short note on Bacteriophage. **[4]**

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

a) Ferritin

b) Myosin

c) Bocterio-rhodopsin

d) Cosmids

e) Disaccharides

Total No. of Questions : 5]

SEAT No. :

P-1099

[Total No. of Pages : 2

[6054]-392

T.Y. B.Sc.

NANOSCIENCE & NANOTECHNOLOGY

N.S - 354 : Carbon Based Nanomaterials

(2019 Pattern) (Paper - IV) (Semester - V) (35264)

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) ***Draw neat and labelled diagram wherever necessary.***
5) ***Figures to the right indicate full marks.***

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

a) Give the names of mechanical properties of carbon nanotubes.

b) Why diamond is bad conductor of electricity?

c) Give the examples of allotropes of carbon.

d) What is pyrrolytic technique.

e) Give the reagents in cutting of carbon nanotubes.

f) What is called as carbon?

Q2) a) Attempt any ONE of the following : **[6]**

i) Explain Arc - discharge method.

ii) Explain in detail CVD method.

b) Explain the term super capacitor. **[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) Give the detail thermal properties of graphite. **[4]**

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

i) Explain Biological applications of carbon based nanomaterials.

ii) Explain catalytic applications of nanoforms of carbon.

b) Explain in detail diamond synthesis route. **[4]**

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

a) Single walled and multiwalled carbon nanotubes.

b) Intercalation.

c) Particulate Fillers.

d) Ther moplast rubber.

e) Nucleating fibers.

f) Composite material obelogy.

x x x

Total No. of Questions : 5]

SEAT No. :

P-1100

[Total No. of Pages : 2

[6054]-393

T.Y. B.Sc.

DEPARTMENT OF NANOSCIENCE AND 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) ***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 indicate full marks.***

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

a) What is dye-sensitized solar cell?

b) What is Perovskite solar cell.

c) Write equation of Fill Factor.

d) Define Photovoltaic solar cell.

e) What is energy of light with a wavelength of 662 nm?

f) Define kinetics?

Q2) a) Attempt any one of the following : **[6]**

i) Explain introduction and construction of dye-sensitized solar cell.

ii) Explain properties of working photoelectrode.

b) Explain and design Thin Film Solar Cell. **[4]**

P.T.O.

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

i) Explain photophysics of various Pervoskite material.

ii) Explain mechanism of photon absorption and power generation.

b) Explain the mechanism of Excitons in polymer. **[4]**

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

i) Explain the minority carrier lifetime and diffusion length measurement.

ii) Explain the mechanism of DSSCS

b) Explain the greenhouse effect. **[4]**

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

a) Write properties of dyes?

b) Explain History of Perovskite Solar Cell.

c) Write properties of Sunlight.

d) Explain planer heterojunction solar cell.

e) Drapw the labelled diagram for donor and accepter polymer.

f) What is wavelength of light with energy 3×10^{-19}J?

Total No. of Questions : 5]

SEAT No. :

P-1101

[Total No. of Pages : 2

[6054]-394
T.Y. B.Sc. (Semester - V)
NANOSCIENCE
N.S.356 : Environmental Nanotechnology and Applications
(2019 Pattern) (35266) (Elective - I) (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) ***Questions 2 to 5 carry equal marks.***
4) ***Draw neat & labelled diagram wherever necessary.***
5) ***Figures to the right indicate full marks.***

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

a) Why there is need for water management.

b) Define 'Absorption in air'.

c) Define mesoponus material.

d) What is seive effect.

e) List the control devices for particulate contaminants.

f) Define water pollution.

Q2) a) Attempt any ONE of the following. **[6]**

i) Give the detail properties of sensors.

ii) Explain mesoporus silica and its application to the absorption of toxic onion.

b) Give the uses of Graphen based sensors. **[4]**

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

i) Explain synthesis and characterisation of Tin oxide.

ii) Explain toxicity due to air bom nanomaterial.

b) Explain elimination of dust deposited in the lungs. **[4]**

P.T.O.

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

i) Explain pollution in the atmosphere.

ii) Explain waste water treatment for Sugar Industry.

b) Write note on activated sludge. **[4]**

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

a) Air pollution

b) Oxidation ponds

c) Gaseous contaminats

d) Anaerobic filters

e) Cyclone separator

f) Oxidation ditches.

Total No. of Questions : 5]

SEAT No. :

P-1102

[Total No. of Pages : 2

[6054]-395

T.Y. B.Sc.

DEPARTMENT OF NANOSCIENCE AND NANOTECHNOLOGY

NS - 3510 : Basic Instrumentation Skills

(2019 Pattern) (Semester - V) (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 the neat and labelled diagram wherever necessary.***
4) ***Figures to the right indicate full marks.***

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

a) Define Accuracy?
b) Define Precision?
c) Define Resolution?
d) Define CRO?
e) What is Signal generators?
f) What is Q-meter?

Q2) a) Attempt any One of the following : **[6]**

i) What is Error? Explain it's different types.
ii) What is digital instruments? Explain the construction of digital instrument.

b) Explain the specification of digital maltimeter. **[4]**

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

i) Explain construction and working of digital storage oscilloscope.
ii) Explain Basic controls of CRO.

b) Explain the screen phosphor of CRT. **[4]**

P.T.O.

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

i) Explain construction and working of function generator.

ii) Write down measurement of distortion.

b) Explain working of basis of LCR meter. **[4]**

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

a) Explain the measurement of Q-meter.

b) Write down characteristics and terminology of pulse?

c) Write difference between square wave and pulse?

d) Write down Applications of DSO?

e) Write down characteristics of digital Instrument?

f) Write down Basics of Pulse generator?

▽▽▽▽

Total No. of Questions : 5]

SEAT No. :

P-1103

[Total No. of Pages : 2

[6054]-396
T.Y. B.Sc. (Semester - V)
NANOSCIENCE AND NANOTECHNOLOGY
NS3511 : C - Programming
(2019 Pattern) (352611)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Attempt any three from Q.2 to Q.5.***
3) ***Figures to the right indicate full marks.***

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

a) What is flowchart?

b) What is variable in C?

c) State different types of programming language.

d) Write syntax to draw circle.

e) What is pixels?

f) What is constant in C?

Q2) a) Explain different input function use in C? **[6]**

OR

Explain top tested loop and bottom tested loop.

b) Write flowchart to find factorial of given number. **[4]**

Q3) a) Write C-Program to draw circle, line, rectangle, arc, ellipse. **[6]**

OR

What are data types used in C? Explain in details.

b) Explain #include <stdio.h>

#include < conio.h> **[4]**

P.T.O.

Q4) a) Evaluate $\int_4^{5.2} \ln x\,dx$ using trapezoidal rule. **[6]**

OR

Find Integration of an equation $\int_0^6 \frac{1}{1+x}dx$ by using simpson's $\frac{1}{3}rd$ method dividing it into 10 subintervals.

b) Write C-program to print even number from 1 to 100. **[4]**

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

a) While loop.

b) Relational operators

c) Closegraph( )

d) Two dimensional array

e) For loop

Total No. of Questions: 5]

SEAT No. :

P1104

[Total No. of Pages : 2

[6054]-397
T.Y.B.Sc. (Regular)
ELECTRONIC SCIENCE
EL-351 : Digital Design Using Verilog
(2019 Pattern) (CBCS) (Semester-V) (Paper-I) (35221)

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) List any two bitwise operator in verilog

b) What is RTL in logic synthesis?

c) Define whitespaces is verilog

d) What is SPLD's?

e) If A = 4'b0100 what will be the output of Y= {A{3}}

f) What is mean by data flow modeling

Q2) Attempt the following.

a) i) Explain Nets data types in verilog **[2]**

ii) What are the advantages of logic synthesis **[4]**

b) Write a note on programability of PLD's **[4]**

Q3) Attempt the following

a) i) Explain size number specification in verilog **[2]**

ii) Write a note on HDL **[4]**

b) What is mean by blocking & Non-blocking assigment **[4]**

P.T.O.

Q4) Attempt the following

a) i) Explain the syntax of for loop. **[2]**

ii) Write a verilog code for 1:4 Demux **[4]**

b) Explain the various component of verilog module with suitable examples **[4]**

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

a) Write a verilog code for Half Adder

b) Write a note on wire data type

c) What is FPGA

d) List various modeling styles available in verilog

e) Draw a PAL diagram for

$\bar{A}BC+ABC+AB\bar{C}+A\bar{B}\bar{C}$

f) What is mean logic Synthesis

Total No. of Questions : 5]

SEAT No. :

P1105

[Total No. of Pages : 2

[6054]-398

T.Y. B.Sc. (Regular)

ELECTRONIC SCIENCE

EL-352 : MICROCONTROLLER ARCHITECTURE AND PROGRAMMING

(2019 Pattern) (CBCS-2Credits) (Semester-V) (Paper-II) (35222)

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

Instructions to the candidates:

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

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

a) What is Von-Neumann architectur?

b) What do you mean by '-delay-us (200);'?

c) Define algorithm.

d) Write the role of PORTB register.

e) What is high level language?

f) State the role of Rw Pin in LCD

Q2) Attempt the following.

a) i) Write a short note on 'flash' memory of AVR ATmega 16. **[2]**

ii) Explain any four assignment operators with example in C. **[4]**

b) Draw the interfacing diagram for LED and switch connected at pin PA2 and PB1 respectively. Write AVR C program to make LED on if switch is closed and off, otherwize. **[4]**

Q3) Attempt the following.

a) i) Define variable and array. **[2]**

ii) Write AVR C program to display character 'M' on LCD. **[4]**

b) Explain data types for AVR with size and range. **[4]**

P.T.O.

Q4) Attempt the following.

a) i) Draw the interfacing diagram of stepper motor with AVR ATmega 16. **[2]**

ii) Explain ADmux register in detail. **[4]**

b) Give name and role of any four library functions in C. **[4]**

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

a) Give any three features of AVR ATMega 16.

b) Write an example of if-else' statement.

c) Give any five applications of microcontroller.

d) Draw the block diagram of Timer O programming.

e) Write the AVR 'C' Program for logic AND operation. between two numbers and store the result to PORTC.

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. :

P-1106

[Total No. of Pages : 2

[6054]-399

T.Y.B.Sc.

ELECTRONIC SCIENCE

EL353 : Analog Circuit Design and Applications

(2019 Pattern) (Semester - V) (CBCS) (Paper - III) (35223)

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

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Question 2 to question 5 carry equal marks.***

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

a) Define the term input offset voltage.

b) State the formula for hysteresis in case of inverting Schmitt trigger.

c) Which semiconductor component is used as a log element in log amplifier?

d) In case of IC 8038 what is the condition required to produce a square wave of exactly 50% duty cycle?

e) What is the principle of which Quartz crystal works?

f) State any two advantages of three terminal IC regulator.

Q2) Attempt the following:

a) i) In a monostable multivibrator using IC 741. Calculate the time for quasi-stable state. Given R_1=1kΩ, R_2=9kΩ, C = 0.1μf & R=2.2kΩ. **[2]**

ii) Draw the circuit diagram of offset nullifying circuit, used for op-amp as inverting amplifier and explain. **[4]**

b) Draw the block diagram of PLL and explain the operating principles. **[4]**

P.T.O.

Q3) Attempt the following:

a) i) Determine the frequency of oscillation of Wien bridge oscillator circuit having resistor of 10kΩ and capacitance of 1nF. **[2]**

ii) With proper circuit diagram explain the working of peak-detector using op-amp. **[4]**

b) Draw and explain the circuit diagram of dual power supply using bridge rectifier and voltage regulator IC LM 340 and LM 320. **[4]**

Q4) Attempt the following:

a) i) Define the term load regulation in percentage and state the ideal value of it. **[2]**

ii) Draw the block diagram of function generator IC 8038 and write formula for output frequency of square wave for 50% duty cycle.**[4]**

b) Design an adjustable voltage regulator IC LM317 for out put voltage 5 to 12 volts. Given R_1=240Ω. **[4]**

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

a) What precausion are taken to minimize electromagnetic noise catched by input pins of op-amp.

b) Draw the circuit for positive small - signal half wave rectifier with input and output waveforms.

c) Draw the equivalent circuit of crystal and write the formulae for series and parallel resonating frequency.

d) Draw the circuit diagram of square wave generator using the op-amp and write the formula for output frequency of square wave.

e) Draw the circuit diagram of –5V constant DC voltage regulated power supply using bridge rectifier.

f) Explain the concept of earth loop and draw the circuit diagram of op-amp in which earth loop is used to minimize the noise.

❍❍❍❍

Total No. of Questions : 5]

SEAT No. :

P-1107

[Total No. of Pages : 2

[6054]-400

T.Y. B.Sc.

ELECTRONIC SCIENCE

EL - 354 : Nanoelectronics

(2019 Pattern) (Paper - IV) (Semester - V) (35224) (CBCS)

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

Instructions to the candidates:

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

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

a) What is nanoparticle?

b) What is quantum well.

c) What is TEM.

d) Which common instrument is used for recording of diffraction pattern.

e) What is graphene.

f) What is inorganic semiconductor.

Q2) **Attempt the following :**

a) i) State basic characteristics of flash memory. **[2]**

ii) State four important features of nanoelectronics over microelectronics. **[4]**

b) Explain electron transport in quantum dot. **[4]**

P.T.O.

Q3) **Attempt the following :**

a) i) What is density of states? State nature of density of states in 2-Diamensions. **[2]**

ii) Explain working principle of UV-vis spectroscopy. **[4]**

b) Explain working principle of AFM. **[4]**

Q4) **Attempt the following :**

a) i) How does scanning electron microscope differs from transmission electron microscope. **[2]**

ii) Write brief note on working and characteristics of carbon nanotube based field effect transistor (FET). **[4]**

b) Explain SQW Lasers? State its applications. **[4]**

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

a) Compare AFM with STM.

b) What is role of XRD in characterization of material? State its applications.

c) What is coulomb blockade effect.

d) What is semiconductor nanowires? State its applications.

e) What is dh lasers? State its applications?

f) What is single electron transistor? State its applications.

Total No. of Questions : 5]

SEAT No. :

P-1108

[Total No. of Pages : 2

[6054]-401

T.Y. B.Sc. (Semester - V)

ELECTRONIC SCIENCE

EL-355 : Signals and Systems

(2019 Pattern) (CBCS) (Paper - V) (35225)

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

Instructions to the candidates :

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

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

a) State the condition for periodicity of DT signal.

b) State Nyquist rate for sampling of a signal.

c) Define Laplace transform of a function.

d) Define CT static system.

e) What is a quantization error?

f) Give examples of DT system.

Q2) Attempt the following :

a) i) Define Nyquist frequency in sampling of a signal. **[2]**

ii) State and prove first shifting property of a Laplace transform. **[4]**

b) Find $L^{-1}\left\{\frac{6s-4}{s^2-4s+20}\right\}$ **[4]**

P.T.O.

Q3) Attempt the following :

a) i) Find Laplace transform of sin2t. **[2]**

ii) Define even and odd CT type signals and draw their waveforms. **[4]**

b) Using Laplace transform, solve the following equation $y' - 2y = e^{3x}$, $y(0) = -5$. **[4]**

Q4) Attempt the following :

a) i) What is aliasing effect in sampling of signal? **[2]**

ii) Explain CT static and dynamic systems. **[4]**

b) Check whether the following continuous-time system is time invariant or time variant. **[4]**

$y(t) = \cos x(t)$

Q5) Attempt any FOUR of the following : **[10]**

a) Draw a block diagram of DSP system.

b) What is the role of anti-aliasing filter in sampling process.

c) What is a non-linear DT system? State the condition for a DT system to be a non-linear.

d) Define DT static and dynamic systems.

e) Find Laplace transform of t.

f) If $L\{\sin 2t\} = \frac{2}{s^2+4}$, Find $L\{e^{4t}.\sin 2t\}$.

Total No. of Questions : 5]

SEAT No. :

P-1109

[Total No. of Pages : 2

[6054]-402

T.Y. B.Sc.

MATHEMATICS (Paper-IV(A))

EL-356(A) : Optics and Fiber Optic Communication

(2019 Pattern) (CBCS) (Semester - V) (35226A)

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

Instructions to the candidates:

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

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

a) State any two applications of SONET.

b) List any two advantages of LASER.

c) What are the types of structures of LED?

d) Define the term critical angle.

e) What are applications of optical fiber communication system?

f) State the types of losses in optical fiber.

Q2) Attempt the following :

a) i) What is the need for OTN? **[2]**

ii) Explain absorption loss in optical fiber. **[4]**

b) Write a note on 'Fiber Connectors'. **[4]**

Q3) Attempt the following :

a) i) What is star topology? **[2]**

ii) List the elements of optical fiber communication system and explain function of it. State its adventages. **[4]**

b) What do you mean byu quantum efficiency? Explain working p[rinciple of P-N photodiode with suitable diagram. **[4]**

P.T.O.

Q4) Attempt the following :

a) i) 'Step index single mode optical fiber is used for long distance communication', comment. **[2]**

ii) What is attenuation in optical fiber? Explain method for measurement of attenuation in optical fiber. **[4]**

b) Explain the terms obsorption, spontmenous emission and stimulateded emission in case of LASER with suitable diagram. **[4]**

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

a) Explain concept of bus topology with suitable diagram.

b) What is SDH? State its applications.

c) Explain waveguide dispersion in optical fiber.

d) State total internal reflection phenomena.

e) Define responsivity in optical detector.

f) Calculate acceptance angle of optiacl fiber if NA value is 0.30 in air.

⌘⌘⌘

Total No. of Questions : 5]

SEAT No. :

P-1110

[Total No. of Pages : 2

[6054]-403

T.Y. B.Sc.

ELECTRONIC SCIENCE

EL-356 (B) : Electronic Product Design and Entrepreneurship

(2019 Pattern) (CBCS) (Semester - V) (Paper - VI) (35226B)

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

Instructions to the candidates :

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

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

a) What is electromagnetic compliance process?

b) Give the meaning of MTTF.

c) What do you mean by brochure?

d) What is technical presentation?

e) Define entrepreneurship development.

f) What is product prototyping?

Q2) Attempt the following :

a) i) Comment on "documentation is integral to any product". **[2]**

ii) Explain the term : Product integration. **[4]**

b) Explain the importance of bill of material. **[4]**

Q3) Attempt the following :

a) i) Mention the purpose of troubleshooting in product development. **[2]**

ii) Explain any four functions of entrepreneur. **[4]**

b) Write any four steps in electronic product development. **[4]**

P.T.O.

Q4) Attempt the following :

a) i) Explain the term proposal writing. **[2]**

ii) Explain techno-commercial feasibility of a product. **[4]**

b) Mention the different forms of product development. Explain any one. **[4]**

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

a) Explain the use of logic analyzer during product testing.

b) Enlist five applications of ergonomics.

c) Write techno-commercial feasibility of product.

d) With the help of suitable diagram explain bath-tub curve.

e) Explain use of DSO in hardware testing.

f) Explain : Simulation in software designing technology.

□□□

Total No. of Questions : 5]

SEAT No. :

P-1111

[Total No. of Pages : 2

[6054]-404

T.Y. BSc. (Electronic Science)

ELSEC 351 : ELECTRONIC DESIGN AUTOMATION TOOLS

(2019 Pattern) (CBCS) (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) ***Question 2 to 5 carry equl marks***

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

a) In which EDA tool virutual instrument is available?

b) Why simulation is needed?

c) What is transient analysis?

d) What is full form of LTSPICE?

e) What do you mean by circuit simulation?

f) What is netlist file?

Q2) Attempt the following :

a) i) What is the purpose of coire tool is simulation software? **[2]**

ii) Explain different types of analysis present in LTSPICE/PSPICE. **[4]**

b) Write steps of simulation using proteus/ORCAD. **[4]**

P.T.O.

Q3) Attempt the following :

a) i) What is PRC. **[2]**

ii) What are steps of circuit simulation using multisim for bridge rectifier? **[4]**

b) Explain circuit drawing steps for clipper circuit using LTSPICE draw input output waveform for the same. **[4]**

Q4) Attempt the following :

a) i) What are the features of LTSPICE? **[2]**

ii) Explain the features and advantages of proteus/ORCAD. **[4]**

b) Compare LTSPICE, multisim & proteus. Which one is better between them? **[4]**

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

a) What is AC analysis? When it is preferred?

b) Explain the History of LTSPICE/PSPICE.

c) How to draw schematic using LTSPICE/PSPICE?

d) What is multisim? Explain the process of component placement in it.

e) How you can observed various simulation result in proteus.

f) Which kind of analysis needs to be done for following circuit

i) Clipper/clamper

ii) Filter circuits

iii) Transister biasing

Total No. of Questions : 5]

SEAT No. :

P-1112

[Total No. of Pages : 2

[6054]-405

T.Y. B.Sc.

ELECTRONIC SCIENCE

ELSEC-352 : Internet of Things & Applications

(2019 Pattern) (CBCS) (Semester - V) (Paper - XI) (352211)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Three question from question No. 2 to question No. 5.***
3) ***Question No. 2 to question No. 5 carry equal marks.***

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

a) What is smart city in IoT?

b) Which are the IOT devices used for weather monitoring?

c) State dynamic characteristics of IoT?

d) What is mean by HTTP?

e) How does IOT work in the smart forming?

f) What is the use of GPIO pins?

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

a) i) What are the Features of Raspberry Pi? **[2]**

ii) Describe an example of IOT service that uses publish subscribe communication model. **[4]**

b) Write the difference between Machine to Machine (M2M) & IoT. **[4]**

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

a) i) Explain MQTT. **[2]**

ii) Write a program to interface LED on/off from python. **[4]**

b) Draw & explain generic block diagram of an IOT Device. **[4]**

P.T.O.

Q4) Attempt the following. **[10]**

a) i) What are the key components of Machine to Machine system? **[2]**

ii) Which are the building block of an IoT device? Explain it in details. **[4]**

b) Explain how the IoT Technology is impacting the health care sector? **[4]**

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

a) Write the IoT protocols.

b) Write advantages of IoT.

c) Which are the components of a M2M system?

d) Write the applications used in IoT smart homes?

e) What are the examples of IoT?

f) Why there is a need for an IoT management?

⌘⌘⌘

Total No. of Questions : 5]

SEAT No. :

P1113

[Total No. of Pages : 2

[6054]-406

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) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q.2 to 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 operant conditioning affect learning behaviour?

b) Critically evaluate the information processing perspective of cognitive.**[4]**

Q3) a) Explore the practical applications of cognitive psychology. **[6]**

OR

Describe the various causes of forgetting.

b) Evaluate the laws of trail 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 behavior.

b) Illustrate the proceases involved in sensation attention speraption. **[4]**

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

a) Thinking-Cognitive Process.

b) Nature of cognitive psychology

c) Color constacy

d) Internal determinants of attention

e) Types of attention.

f) Episodic memory

❖ ❖ ❖

Total No. of Questions : 5]

SEAT No. :

P1114

[Total No. of Pages : 2

[6054]-407

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

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

a) What is Alzheimer?

b) Define schizophrenia.

c) What is psychodynamic?

d) What is Delirium?

e) State the full form of DSM.

f) State the full form of OCD.

Q2) a) Discuss the causes of abnormal behaviour. **[6]**

OR

Explain the biological model of abnormality.

b) Discuss the treatment of mood disorder. **[4]**

Q3) a) Discuss the clinical sign of brain damage. **[6]**

OR

Explain the DSM 5 based clasification of mental disorder.

b) Discuss the humanistic model of abnormality. **[4]**

P.T.O.

Q4) a) Explain the characteristics of OCD and generalized anxiety disorder. **[6]**

OR

Discuss the disorder involving brain injury.

b) Explain the criteria of abnormal behaviour. **[4]**

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

a) Delirium

b) Cognitive disorder

c) Panic disorder

d) Psychodynamic

e) Interventions for anxiety

f) Symptoms of schizophrenia.

Total No. of Questions : 5]

SEAT No. :

P-1115

[Total No. of Pages : 2

[6054]-408

T.Y. B.Sc.

PSYCHOLOGY

Statistical Methods (Paper - III)

(2019 Pattern) (Semester - V) (35203)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three Questions from Q2 to Q5.***
3) ***Questions from 2 to 5 carry equal marks.***

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

a) Define Bar graph.

b) What is Mode?

c) What is graph.

d) Define variable.

e) Define percentile rank.

f) Who introduced the product moment method at correlation?

Q2) a) What are Pictograms? How can statistical data be represented through such diagrams? Illustrate with 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	04	04	03	00	03	03	01

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	09	07	06
Rating By second	15	16	14	13	09	10	08	07	11	06

b) Evaluate the types of measurement of variability. **[4]**

Q4) a) Enumerate the needs and advantages of statistics in the field of Psychology. **[6]**

OR

Compute the median from the following data.

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 = (25)

b) Evaluate the application of normal distribution curve. **[4]**

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

a) Product moment correction.

b) Application of central tendency.

c) Basics of graph.

d) Application of range.

e) Characteristics of normal probability.

f) Ratio scale.

Total No. of Questions : 5]

SEAT No. :

P1116

[Total No. of Pages : 2

[6054]-409

T.Y. B.Sc.

PSYCHOLOGY (Paper - IV)

Organizational Behaviour

(2019 Pattern) (35204) (Semester - V) (35204)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Questions from 2 to 5 carry equal marks.***

Q1) **Solve <u>any five</u> of the following :** **[5]**

a) What is organizational planning?

b) Define emotional intelligence.

c) Define Conflict.

d) What is time management?

e) Define leader.

f) Define stress.

Q2) a) Which are the various challenges of Organizational Behaviour. **[6]**

OR

Critically evaluate Maslow theory of motivation.

b) Explain the process of motivation. **[4]**

Q3) a) Explain the flexi time, flexi plan in organizational planning. **[6]**

OR

Discuss the characteristics of successful leader.

b) Discuss the behaviour approach to leadership. **[4]**

P.T.O.

Q4) a) Discuss the management Grid. **[6]**

OR

Explain the consequences of work stress.

b) Explain the application of emotional intelligence in organization. **[4]**

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

a) Types of leadership.

b) Conflict Resolution.

c) Trait approach to leadership.

d) Job enrichment.

e) Group Dynamics.

f) Job stress.

x x x

Total No. of Questions : 5]

SEAT No. :

P-1117

[Total No. of Pages : 2

[6054]-410
T.Y. B.Sc.
PSYCHOLOGY
Positive Psychology
(2019 Pattern) (Semester - V) (35205) (Paper - V)

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

Instructions to the candidates :

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

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

a) Define developmental psychology.

b) State the types of happiness.

c) Name the components of wellbeing.

d) State the basic types of emotion.

e) Define trait.

f) Founder of positive psychology.

Q2) a) Differentiate between hedonic and endamimonic happiness **[6]**

OR

Explain the process of cultivating positive emotions.

b) Critically differentiate between traditional and positive psychology. **[4]**

Q3) a) Explain the applications of positive psychology in different areas **[6]**

OR

Describe the developmental and dinical perespectives of verilience.

b) Analyze the three aspects of wellbeing. **[4]**

P.T.O.

Q4) a) Describe how does positive emotion affect wellbeing. **[6]**

OR

Explain the factors affect resilience and techniques to improve resilience.

b) Analyse the relationship between wellbeing & happiness. **[4]**

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

a) Classifications of human virtues

b) Health psychology & positive psychology

c) Challenges of positive psychology

d) Advantages of self reatization

e) Components of happiness

f) Health resources

Total No. of Questions : 5]

SEAT No. :

P1118

[Total No. of Pages : 2

[6054]-411

T.Y. B.Sc.

PSYCHOLOGY (Paper - VI)

Counselling Psychology

(2019 Pattern) (Semester - V) (35206)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Questions from 2 to 5 carry equal marks.***

Q1) **Solve <u>any five</u> of the following :** **[5]**

a) Define empathy.

b) Define concreteness

c) What is directive counselling?

d) Define psychological test.

e) Define Humanistic approach.

f) Define counselling.

Q2) a) Describe the care conditions of counselling. **[6]**

OR

Explain ethics in counselling.

b) Critically evaluate the goals of counselling. **[4]**

Q3) a) Discuss the various areas of cunselling. **[6]**

OR

Explore the various types of psychological tests use in counselling.

b) Analyze the qualities of an effective counselor. **[4]**

P.T.O.

Q4) a) Describe the behaviouristic approach of counselling. **[6]**

OR

Explain the stages of counselling process.

b) List the various usages of psychological tests in counselling. **[4]**

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

a) Scope of counselling

b) Non directive Psychology.

c) Challenges in building rapport.

d) Communication skills of counselor.

e) Limitation of Psychological tests.

f) Nature of good Psychological tests.

x x x

Total No. of Questions : 5]

SEAT No. :

P-1119

[Total No. of Pages : 2

[6054]-412

T.Y. B.Sc. (Semester - V)

PSYCHOLOGY

SEC-I : Basic Counselling Skills

(2019 Pattern) (352010)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Questions 2 to 5 carry equal marks.***

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

a) What is active listening?

b) Define counselling.

c) What is body language in counselling?

d) What is open ended question?

e) Define empathy.

f) Define concreteness.

Q2) a) Describe the role of body posture and eye contact in counselling. **[6]**

OR

Discuss confrontation and self disclosure in counselling.

b) Explain various communication skills of a counsellor. **[4]**

Q3) a) Elaborate upon the stages of counselling. **[6]**

OR

Explain the concept of positive regard in detail.

b) What are the goals of counselling? **[4]**

P.T.O.

Q4) a) Discuss the types of questions used in counselling. **[6]**

OR

Discuss the role of additive empathy.

b) Analyze the importance of clothing and grooming of a counsellor.**[4]**

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

a) Purpose of counselling

b) Good gestures.

c) Facial expression in counselling

d) Immediary

e) Nature of counselling

f) Genuineness

Total No. of Questions : 5]

SEAT No. :

P-1120

[Total No. of Pages : 2

[6054]-413

T.Y. B.Sc.

PSYCHOLOGY

SEC-II : Personality Development

(2019 Pattern) (Semester - V) (352011)

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

a) What is Manner?

b) Define career.

c) State the full form of SWOT.

d) Define team.

e) What is non verbal communication?

f) Define introversion.

Q2) a) Explain the various types of written communication. **[6]**

OR

Discuss the role of team workers.

b) Analyze the SWOT analysis in personality development. **[4]**

Q3) a) A Explain the challenges and advantages of self assessment. **[6]**

OR

Explore the tips 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

b) Explain the e-mail etiquettes and techniques of email etiquettes. **[4]**

Q5) Write Short Notes on any Four of the following : **[10]**

a) Skills in team workers

b) Office Etiquettes

c) Characteristics of Ambivert Personality

d) Types of Layouts

e) Building interpersonal Relations

f) Types of interview questions

Total No. of Questions : 5]

SEAT No. :

P1121

[Total No. of Pages : 2

[6054]-414

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

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

a) Define the term : Biogeographic region.

b) Give any two examples of Terrestrial communities.

c) Write examples of carbon sink.

d) Define sustainable utilisation of ecosystem.

e) Define : Ammensalism.

f) Write any two effects of forest fire.

Q2) a) Describe belt transect method of vegetation sampling. **[6]**

b) Discuss in detail the concept of keystone species. **[4]**

Q3) a) Describe carbon sequestration potential of terrestrial ecosystems. **[6]**

b) Write in brief about Desert biome. **[4]**

Q4) a) Discuss how remote sensing technique helps in terrestrial ecosystem management. **[6]**

b) Explain the importance of Western Ghats. **[4]**

P.T.O.

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

a) Explain various ways for management of forest fires.

b) Enumerate various ecosystem services.

c) Write the effects of depletion of terrestrial ecosystem resources.

d) Write in brief about community forest management.

e) Explain any one method for sustainable management of terrestrial ecosystems.

f) Write any one case study of forest fire.

❖ ❖ ❖

Total No. of Questions : 5]

SEAT No. :

P1122

[Total No. of Pages : 1

[6054]-415
T.Y.B.Sc. (Regular)
ENVIRONMENTAL SCIENCE
EVS - 352 : Wildlife Biology and Management
(2019 Pattern) (Semester - V) (Paper - II) (35242)

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

Instructions to the candidates:

1) *Question 1 is compulsory.*
2) *Solve any Three questions from Question No. 2 to Question No. 5.*
3) *Question No. 2 to Question No. 5 carry equal marks.*

Q1) Attempt any FIVE of the following.

a) What are Bryophytes? **[1]**

b) What is pugmark? **[1]**

c) What are Reptiles? **[1]**

d) What is mean by Angiosperms? **[1]**

e) What is Artificial stocking in wildlife management techniques? **[1]**

f) What is mean by pteridophytes? **[1]**

Q2) Answer the following.

a) Explain pellet count in wildlife population assessment techniques. **[6]**

b) Write note on wildlife Biology. **[4]**

Q3) Answer the following.

a) Explain aquatic habitat with reference to marine habitat. **[6]**

b) Write note on Silent valley movement. **[4]**

Q4) Answer the following.

a) Write detail note on Deforestation. **[6]**

b) Write a note on Eco-tourism. **[4]**

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

a) Appiko movement. **[2½]**

b) Terrestrial Habitat. **[2½]**

c) Arthropods. **[2½]**

d) Chipko Movement. **[2½]**

e) Grass land Habitat. **[2½]**

f) Crymnosperms. **[2½]**

✡ ✡ ✡

Total No. of Questions : 5]

SEAT No. :

P-1123

[Total No. of Pages : 2

[6054]-416

T.Y. B.Sc.

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) ***Question 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) Enlist any 2 uses of water Resources.

b) Define the term water Inventory.

c) Give example of any 2 water borne diseases.

d) Define the term water quality standards.

e) What is meant by Soil Toxicology?

f) Enlist any 2 micro-nutrients found in soil.

Q2) a) Write a short note on various soil conservation techniques. **[6]**

b) Explain Tertiary treatment of waste water. **[4]**

Q3) a) Explain the causes and effects of soil sickness and soil toxicology. **[6]**

b) Write a short note on characteristics of sewage. **[4]**

P.T.O.

Q4) a) Explain water pollution with respect to Indian Rivers. **[6]**

b) Write a short note on application of GIS and Remote sensing for management of soil resources. **[4]**

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

a) Ganga Action Plan (GAP).

b) Water Stress Index.

c) Soil Horizon.

d) Composition of soil.

e) Eutrophication.

f) Distribution of water resources.

Total No. of Questions : 5]

SEAT No. :

P-1124

[Total No. of Pages : 2

[6054]-417

T.Y. B.Sc.

ENVIRONMENTAL SCIENCE (Paper - IV)

EVS - 354 : Atmospheric and Global Climate Change

(2019 Pattern) (Semester - V) (35244)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three Question from Q2 to Q5.***
3) ***Questions from 2 to 5 carry equal marks.***

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

a) Define Et-Nino. **[1]**

b) Where the global conveyor belt located? **[1]**

c) Where is the Asian brown cloud occur. **[1]**

d) Enlist any two indicators of global warming. **[1]**

e) What is meant by atmospheric stability. **[1]**

f) When did India accept Kyoto protocol. **[1]**

Q2) **Answer the following :**

a) What is composition and structure of atmosphere. **[6]**

b) What are three types of tropical cyclone. **[4]**

Q3) **Answer the following :**

a) What are the features and advantages of Gaussian plume model. **[6]**

b) What are the 6 major GHG emission? **[4]**

P.T.O.

Q4) **Answer the following :**

a) What are the main objectives of clean development mechanism. **[6]**

b) Write 3 methods of heat transfer. **[4]**

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

a) Plume behaviour.

b) Carbon credit.

c) Earth radiation budget.

d) Climate change and agriculture.

e) Indian monsoon.

f) Southern oscillation.

x x x

Total No. of Questions : 5]

SEAT No. :

P-1125

[Total No. of Pages : 2

[6054]-418

T.Y. B.Sc.

ENVIRONMENTAL SCIENCE

EVS - 355 : Environmental Legislation & Policy

(2019 Pattern) (Paper - V) (Semester - V) (35245)

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

Instructions to the candidates:

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

Q1) **Attempt any Five of the following :**

a) Write the correct tittle of **[1]**

i) Air Act

ii) Noise pollution rule

b) Write the aim of Montreal protocol 1987. **[1]**

c) What is the statement of Article 48A? **[1]**

d) Define Environmental Ethics. **[1]**

e) Write any 2 Roles of SPCB **[1]**

f) What do you mean by policy? **[1]**

Q2) **Answer the following :**

a) Define pollution according to water Act. Also explain the penalties & offenses for company in the Act. **[6]**

b) Define Environmental Governance. What is the importance of Environmental Governance. **[4]**

Q3) **Answer the following :**

a) What are the salient feature of stockholm conference 1992. **[6]**

b) What is the role of CPCB in Air act. **[4]**

P.T.O.

Q4) **Answer the following :**

a) What is the main role of Public Liability Act in Indian Legislation. **[6]**

b) What is Hunting. What are the rules & regulation for Hunting & Poaching under wildlife Act. **[4]**

Q5) **Write a short note on Any four of the following :**

a) Development of Environmental Ethics. **[2½]**

b) Types of Hazardous waste. **[2½]**

c) Motor vehicle Act, 1988. **[2½]**

d) Types of forest under forest Act. **[2½]**

e) Ramsar convention. **[2½]**

f) Kyoto protocol. **[2½]**

x x x

Total No. of Questions : 5]

SEAT No. :

P-1126

[Total No. of Pages : 2

[6054]-419

T.Y. B.Sc.

ENVIRONMENTAL SCIENCE

EVS - 356 : Environmental Biotechnology - I

(2019 Pattern) (Semester - V) (Paper - VI) (35246)

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

Instructions to the candidates:

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

Q1) **Attempt any Five of the following :**

a) Does compost have any value as a fertilizer? **[1]**

b) What are the uses of environmental biotechnology? **[1]**

c) What are genetically modified (GM) organisms and GM foods? **[1]**

d) When did the Biosafety protocol enter into force? **[1]**

e) What is the relationship of microbial biotechnology to environmental health? **[1]**

f) What are two characteristics of microbes? **[1]**

Q2) **Answer the following :**

a) What are the uses of micropropogation in environmental Biotechnology? **[6]**

b) What different types of composting systems have municipalities implemented. **[4]**

P.T.O.

Q3) **Answer the following :**

a) Which of the following is an important factor in composting process? **[6]**

b) Are GM foods assessed differently from traditional Foods? **[4]**

Q4) **Answer the following :**

a) What are the 4 types of microbes? Explain in detail with diagramatically. **[6]**

b) What are biofertilizers in environmental biotechnology? **[4]**

Q5) **Write a short note on Any four of the following :**

a) Nutritional types. **[2½]**

b) Objectives of environmental biotechnology. **[2½]**

c) Nutrient content of rermicompost. **[2½]**

d) What is the objective of the cartagena protocol. **[2½]**

e) Micro-organisms is used to produce biofertilizers. **[2½]**

f) Three types of bacteria. **[2½]**

Total No. of Questions : 5]

SEAT No. :

P-1127

[Total No. of Pages : 2

[6054]-420

B.Sc.

ENVIRONMENTAL SCIENCE

EVS-3511 : Remote Sensing, GIS and Modelling

(2019 Pattern) (Semester - V) (Paper - X) (352410)

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 5.***
3) ***Question No. 2 to Question No. 5 carry equal marks.***

Q1) **Attempt any five of the following :**

a) What is longest electromagnetic wave? **[1]**

b) What is function of sensors? **[1]**

c) What do you meant by multi spectral scanning? **[1]**

d) What are different types of scattering mechanism? **[1]**

e) What are advantages of aerial photography? **[1]**

f) What is vector data? **[1]**

Q2) **Attempt the following :**

a) How does the atmosphere affects EMR? **[6]**

b) What are the 7 types of electromagnetic spectrum? **[4]**

Q3) **Attempt the following :**

a) Briefly explain the role of GIS in agriculture. **[6]**

b) What are 4 uses of satellite images? **[4]**

P.T.O.

Q4) **Attempt the following :**

a) How GIS can be used in urban planning? **[6]**

b) What are the uses of GPS? **[4]**

Q5) **Write a short note on Any Four of the following :** **[4 × 2½ = 10]**

a) Atmospheric window

b) Releigh scatterning

c) Cartosat

d) Types of Sensor

e) Overlapping and flight in aerial photography

f) Geostationary and polar orbit.

⌘⌘⌘

Total No. of Questions : 5]

SEAT No. :

P-1128

[Total No. of Pages : 2

[6054]-421

T.Y. B.Sc.

ENVIRONMENTAL SCIENCE

EVS - 3512 : Soil Health Management

(2019 Pattern) (Semester - V) (Paper - X) (352411)

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

Instructions to the candidates:

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

Q1) Attempt any Five of the following :

a) What is meant by contour bunds. **[1]**

b) What is objective of percolation pond. **[1]**

c) What is objective of windbreaks. **[1]**

d) What are the types of strip cropping. **[1]**

e) What are the mechanical properties of soil. **[1]**

f) What is bench terrace farming. **[1]**

Q2) Answer the following :

a) What are the four types of soil conservation. **[6]**

b) What are the micro and macro nutrients with examples. **[4]**

Q3) Answer the following :

a) What are the adverse effect of Chemical Fertilizers. **[6]**

b) What are the benefits of agroforestry. **[4]**

P.T.O.

Q4) Answer the following :

a) Explain the importance of rain water harvesting. **[6]**

b) What are 4 Ps of fertilizers. **[4]**

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

a) Soil health card. **[2½]**

b) Gabbion bund. **[2½]**

c) Continuous Contour Trenches (CCT). **[2½]**

d) Types of biofertilizers. **[2½]**

e) Bench terracing. **[2½]**

f) Soil moisture conservation. **[2½]**

▽▽▽▽

Total No. of Questions : 4]

SEAT No. :

P-1129

[Total No. Of Pages : 1

[6054]-422
T.Y.B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS 501: Study of Disaster
(Semester-V) (2019 Pattern) (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 Climate?

Q2) **Write short notes on (any Two):** **[10]**

a) Cataclysm

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) What are early warning systems for natural disasters?

b) Describe in detail Historic Development of Flood Management.

Total No. of Questions : 4]

SEAT No. :

P-1130

[Total No. of Pages : 1

[6054]-423

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS502 : United Nations 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 the meaning of global peace?
b) The United Nations came into existence from which date?
c) What is the Security council?
d) What is the simple definition of justice?
e) How many countries are members of the United Nations?

Q2) Write short notes on (any two) : **[10]**

a) Secretariat
b) UN Charter
c) FAO

Q3) Attempt the following questions (any two) : **[10]**

a) Explain the Meaning and Concept of the UN.
b) What are the aims of the United Nations?
c) State the role of the Security council.

Q4) Answer in details (any one) : **[10]**

a) Describe in detail the role of the International Court of Justice in Global Peace and Security.
b) Write the role of the United Nations educational, Scientific and Cultural Organization.

Total No. of Questions : 5]

SEAT No. :

P-1131

[Total No. of Pages : 2

[6054]-424

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS-503: International Relations Part - 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) Define Political Geography.

b) What is the concept of realism?

c) What is a simple definition of idealism?

d) What is International Relations?

e) Define the term FDI.

Q2) Write short notes on (any two) : **[10]**

a) Global Politics.

b) Decision making Theories.

c) Unipolar.

P.T.O.

Q3) Attempt the following questions (any two) : **[10]**

a) What is the purpose of international relations?

b) State the importance of the Study of Theories of International Relation.

c) How did nationalism affect the Austrian Empire.

Q4) Answer in details (any one) : **[10]**

a) What is the idealist theory of international relations?

b) Write the role of International Relations Theories in global issues?

✷ ✷ ✷

Total No. of Questions : 4]

SEAT No. :

P-1132

[Total No. of Pages : 2

[6054]-425

T.Y. B.Sc.

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 the types of Terrorism?

b) Write the objectives of the national development plan.

c) Define Right Wing Terrorism.

d) What is the main objective of terrorism?

e) What is Religious Extremist Terrorism?

Q2) Write short notes on (any two) : **[10]**

a) Economical Impact of Terrorism on National Development.

b) Due process and the right to a fair trial.

c) State the Social Impact of Terrorism on National Development.

P.T.O.

Q3) Attempt the following questions (any two) : **[10]**

a) State the Challenges to the absolute prohibition against torture.

b) Explain Left Wing Terrorism.

c) State the Insurgency in North East India.

Q4) Answer in details (any one) : **[10]**

a) Explain the Transfer of individuals suspected of terrorist activity.

b) State the Economical Impact of Terrorism on National Development.

c) State the problem of Naxalism-Maoism.

✷ ✷ ✷

Total No. of Questions : 4]

SEAT No. :

P-1133

[Total No. of Pages : 1

[6054]-426

T.Y. B.Sc.

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 the meaning of social research?

b) What is a research title?

c) What is the main purpose of social research?

d) Define Research Formulation.

e) Define Research problems.

Q2) **Write short notes on (any two)** **[10]**

a) Social research

b) Scope of research

c) Research

Q3) **Attempt the following questions (any two)** **[10]**

a) Explain theTypes of Research Questions.

b) State the Helping Factor to Determine a Research problem.

c) Explain the process of problem formulation.

Q4) **Answer in details (any one)** **[10]**

a) Describe in detail significance and characteristics of research.

b) Explain the How can I use new information in my writing?

Total No. of Questions : 4]

SEAT No. :

P-1134

[Total No. of Pages : 2

[6054]-427
T.Y.B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS506(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 was the cause of World War II?
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 location of Kashmir?

Q2) Write short notes on (any two) **[10]**

a) Importance of crude oil
b) Importance of Jammu and kashmir location
c) Current Status Of Afghanistan Issue

Q3) Attempt the following questions (any two) **[10]**

a) Describe the current situation of the Kashmir issue.
b) Explain the best solution to conflict?
c) Explain the Israel Palestine Historical Background.

Q4) Answer in details (any one) **[10]**

a) Explain how we can prevent conflict in society?
b) What were the main provisions of the Treaty of Versailles?

❍❍❍❍

P.T.O.

Total No. of Questions : 4]

P-1134

[6054]-427
T.Y.B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS506(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) Full form of NATO.
b) What is the old name of CENTO?
c) Full form of SAARC.
d) Who was the founder of CENTO?
e) Define SAARC.

Q2) Write short notes on (any two) **[10]**

a) SAARC
b) WARSAW
c) ASEAN

Q3) Attempt the following questions (any two) **[10]**

a) Explain the Origin and Development of ASEAN.
b) Write the WTO objectives and functions.
c) State the Structure of ASEAN.

Q4) Answer in details (any one) **[10]**

a) Explain the Origin and Development of SAARC.
b) State the Aims of the World Trade Organization.

Total No. of Questions : 4]

SEAT No. :

P-1135

[Total No. of Pages : 2

[6054]-428
T.Y.B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS507(A) : 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) Who set the maritime security level in India?
b) Write the definition of Boundaries.
c) What is the meaning of coastal boundaries?
d) Who is responsible for maritime security?
e) Define Maritime Security.

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 are the maritime security challenges in India?
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) What are the common security issues in the maritime industry?

❍❍❍❍

P.T.O.

Total No. of Questions : 4]

P-1135

[6054]-428
T.Y.B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS507(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 Post-Cold War?
b) Define classical approach.
c) What is regionalism?
d) Define functional approach.
e) What is Diplomacy?

Q2) Write short notes on (any two) : **[10]**

a) Regionalism
b) Cold War
c) Confidence Building Measures

Q3) Attempt the following questions (any two) : **[10]**

a) Explain the Conceptual analysis of conflict and peace.
b) What is realism in international relations?
c) What is regionalism how it effects on country?

Q4) Answer in details (any one) : **[10]**

a) What is the classical approach in international relations?
b) What is the realistic approach in international relations?

Total No. of Questions : 4]

SEAT No. :

P-1137

[Total No. of Pages : 4

[6054]-430

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS-509(A): World Military History (1900 - 1945)

(2019 Pattern) (Semester - V) (35239A)

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) Define World War.

c) Define Balkan War.

d) What is Conflict?

e) What is Security?

Q2) Write short notes on (any two) : **[10]**

a) Treaty of Versailles.

b) World War II.

c) The Rise of Hitler.

P.T.O.

Q3) Attempt the following questions (any two) : **[10]**

a) Explain the Effect 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 Short History of World War-II.

b) Explain in detail the Technology used in World War-I.

✷ ✷ ✷

Total No. of Questions : 4]

P-1137

[6054]-430
T.Y. B.Sc.
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 Diploma?

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. :

P-1138

[Total No. of Pages : 1

[6054]-431

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 510 : Introduction to Human Rights and Duties

(2019 Pattern) (Semester - V) (352310)

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) Who wrote the doctrine of natural rights?
c) Define Justice.
d) What is Dignity?
e) When was the Human Rights Council established?

Q2) Write short notes on (any two) : **[10]**

a) Human rights
b) Minorities
c) Women

Q3) Attempt the following questions (any two) : **[10]**

a) How did the War Measures Act affect human rights?
b) What is the significance of moral values in human society?
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) Are human rights legal rights? Explain in detail.

▽▽▽▽

Total No. of Questions : 4]

SEAT No. :

P-1139

[Total No. Of Pages : 1

[6054]-432
T.Y.B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS 511: Human Rights and UN
(2019 Pattern) (Semester-V) (352311)

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

Instructions to the candidates :

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

Q1) **Define the following questions :** **[5]**

a) What is Human Rights?

b) Do all countries have human rights?

c) What is the preamble?

d) Define mission.

e) Define liberty.

Q2) **Write short notes on (any Two)** **[10]**

a) Human Rights

b) Human Rights Council

c) UDHR

Q3) **Attempt the following questions (any Two) :** **[10]**

a) How did human rights start?

b) State the Historical background of the Universal Declaration of Human Rights.

c) What is the most important Universal Declaration of Human Rights?

Q4) **Answer in details (any One) :** **[10]**

a) How does slavery violate human rights?

b) Explain in detail the Prevention of discrimination

Total No. of Questions : 5]

SEAT No. :

P-1140

[Total No. of Pages : 2

[6054]-433

T.Y. B.Sc. (Vocational)

BIOTECHNOLOGY

VBT - 311 : Animal and Plant Tissue Culture

(2019 Pattern) (Semester - V) (CBCS) (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) ***Q2 to Q5 carry equal marks.***

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

a) Give name of media used in PTC.

b) Name any one breast cancer cell line.

c) Which indicator is used in ATC media.

d) Name any two hormones used in PTC.

e) How much % of CO_2 is required for cell line growth.

f) Define organogenesis.

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

i) Explain in detail Hairy root culture.

ii) Enlist and explain two physical methods of gene transfer.

iii) Write a note on Artificial seed production. Give its significance.

b) Answer any one of the following : **[4]**

i) Connect on Evolution of cell line.

ii) Name any two contaminants in Animal Tissue Culture. Give methods to eradicate contaminants in Tissue culture.

P.T.O.

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

i) What is induction of somatic entryo. 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) Explain characterization of cell lines. Give its importance.

ii) Distinguish between primary and secondary cultures with examples.

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

i) Comment on Basic design of Animal Tissue Culture Lab.

ii) What are cell fusion studies. Give one example.

iii) What is Rhizogenesis? Give diagrammatic representation of rhizogenesis.

b) Answer any one of the following : **[4]**

i) Give Flowchart for process of IVF.

ii) Comment an advantages and disadvantages of somaclenal varieties

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

a) Primary metabolites.

b) Primary nutrients in PTC media.

c) Advantages of Animal Tissues Culture.

d) Culture conditions in ATC.

e) Indirect organogenesis.

x x x

Total No. of Questions : 5]

SEAT No. :

P-1141

[Total No. of Pages : 2

[6054]-434

T.Y. B.Sc.

VOCATIANAL BIOTECHNOLOGY

VBT - 312 : Industrial Biotechnology

(2019 Pattern) (CBCS) (Semester - V) (35572)

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) Name the phase of growth in which secondary metabolites are produced.

b) Enlist any one application of citric acid.

c) Name any two parameters that must be measured and controlled during fermentation process.

d) Enlist any two nitrogen sources used in the fermentation media.

e) Why is agitation necessary in a fermenter?

f) What do you understand by industrial biotechnology?

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

i) What is meant by fermentation? Add a note on its historical development.

ii) Enlist any two minor components used in fermentation media. Add a note on "Synthetic media".

iii) Compare and contrast secondary metabolites and primary metabolites.

b) With the help of neat labelled diagram, describe the parts and components of a typical fermentation process. **[4]**

OR

Write a short note on "Primary Screening method".

P.T.O.

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

i) Define screening. What are the differences between primary screening and secondary screening?

ii) Define major mutations. How are they useful in strain improvement?

iii) Write a short note on "Sporulation in submerged media used for inoculum development in fungi".

b) Define antifoaming agents. Give any three approaches to solve the problem of foaming. **[4]**

OR

Write a short note on "inoculum development in bacteria".

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

i) Describe in detail the process of production of amylase.

ii) Explain the parts and companents of continuous fermenter. Add a note on its applications.

b) Explain any two methods involved in downstream processing. **[4]**

OR

Name the methods used to measure temperature during the fermentation process. Add a note on "mercury in glass thermometer".

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

a) Flocculation step of downstream processing.

b) Objectives of inoculum development.

c) Control of pH during fermentation process.

d) Role of precursors in fermentation media.

e) Advantages of air lift fermenters.

f) Types of beer.

▽▽▽▽

Total No. of Questions : 5]

SEAT No. :

P-1142

[Total No. of Pages : 2

[6054]-435

T.Y. B.Sc. (Vocational)

SEED TECHNOLOGY

ST - 3.1 : Seed Pathology and Entomology

(2019 Pattern) (CBCS) (Semester - 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) ***Q2 to Q5 carry equal marks.***

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

a) What is pest?

b) Define Entomology.

c) Define disease

d) What is seedling symptom testing

e) What is plant quarantine?

f) Give any two names of storage fungi.

Q2) Attempt the following questions.

a) Explain the seed transmitted pathogens influence on seed production. **[6]**

b) Comment on blotter paper technique w.r.t. seed health testing. **[4]**

Q3) Attempt the following questions.

a) Explain impact of seed borne viruses on seed. **[6]**

b) Comment on impact of seed borne bacteria. **[4]**

P.T.O.

Q4) Attempt the following questions.

a) Give difference between seed borne and storage fungi. **[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) Stages of seed storage

d) Fiber crop insect pest

e) Relation of insect and plants

f) Incubation method

x x x

Total No. of Questions : 4]

SEAT No. :

P-1143

[Total No. of Pages : 2

[6054]-436
T.Y.B.Sc. (Vocational)
SEED TECHNOLOGY
ST-3.2 : Entrepreneurship Development
(2019 Pattern) (Semester - V) (35892) (CBCS) (2 Credits)

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

Instructions to the candidates :

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

Q1) Solve any five of the following. **[3]**

a) What is Entrepreneurial Skill?

b) Enlist any two roles of Income Tax.

c) What is IDBI?

d) What is SISI?

e) Enlist any two Sources of finance.

f) Enlist any two modes of employment.

Q2) Attempt the following questions.

a) Explain in detail the Role of DIC. **[6]**

b) What is Debt Finance? **[4]**

Q3) Attempt the following questions.

a) Explain in detail Digital Marketing with a suitable example. **[6]**

b) Explain the soft skills for Entrepreneurship. **[4]**

P.T.O.

Q4) Attempt the following questions.

a) Write the difference between Commercial & Co-operative banks. **[6]**

b) Explain in detail Entrepreneurial Skills. **[4]**

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

a) Venture Capital

b) Role of NEDB

c) Small Skill Industries

d) Service Tax

e) Role of SMS Campaign in Marketing

f) Project Finance.

Total No. of Questions : 5]

SEAT No. :

P-1144

[Total No. of Pages : 2

[6054]-437

T.Y. B.Sc.

INDUSTRIAL MICROBIOLOGY

IMB - 355 : Applications of Microbial Systems

(2019 Pattern) (Semester - V) (CBCS) (35825)

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

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Q2 to Q5 carry equal marks.***

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

a) What is microbial consortium of dairy products?

b) What are fermented milk products?

c) What is meaning of therapeutic application of dairy products?

d) Mention any one health benefit of yoghurt.

e) What is whey.

f) 'Kefir is functional fermented product' state true or false.

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

i) Write short note on EIA with respect to waste management.

ii) Enlist steps in physical methods of waste water treatment.

iii) Write short note on waste water analysis.

b) Describe chemical treatment of waste water. **[4]**

P.T.O.

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

i) Write note on waste water analysis.

ii) Describe ROC in waste water treatment.

iii) Explain in short tertiary waste water treatment.

b) Write a note on in situ Bio-remediation. **[4]**

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

i) Write note on starter cultures in dairy microbiology.

ii) Justify importance of microorganisms in daily products.

iii) Define prebiotics. Give two examples of prebiotic organisms.

b) Elaborate significance of functional dairy products. **[4]**

Q5) In short describe any four : **[10]**

a) Benefits of soil bacteria.

b) Nutrient recycling by microbes in soil.

c) Agro-waste and microbes.

d) Biofertilizers in Agriculture.

e) Biopesticides.

f) Biofuels.

Total No. of Questions : 5]

SEAT No. :

P-1145

[Total No. of Pages : 2

[6054]-438
T.Y.B.Sc.
INDUSTRIAL MICROBIOLOGY
IMB-356 : Cell Culture Technology
(2019 Pattern) (CBCS) (Semester - V) (35826)

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

Instructions to the candidates :

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Q2 to Q5 carry equal marks.***

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

a) State contribution of Alexis Carrel in ATC.

b) What is the source of HeLa?

c) What is the role of Glutamate in ATC media?

d) State importance of organ culture over cell culture?

e) State role of phenol red in animal cell culture media.

f) What is molecular pharming?

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

i) Draw a flowchart to explain the process of primary cell culture.

ii) Describe the process of transfection of ES cells.

iii) Write a short note on ECM.

b) Discuss different animal cell types based on their morphology with suitable examples. **[4]**

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

i) Discuss impact of transgenic animals on development of science.

ii) What is Roller bottle culture?

iii) Write a short note on Plasma clot.

b) Explain concept and types of stem cells. **[4]**

P.T.O.

Q4) a) Sole <u>any two</u> of the following: **[6]**

i) Explain process of IVF.

ii) Write a short note on potency of animal cell.

iii) Draw a flow chart for production of mAbs.

b) Discuss applications of ATC. **[4]**

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

a) Hollow Fibre reactor.

b) Serum used for Animal cell culture.

c) Difference in growth & metabolism of cells in-vitro & in-vivo.

d) Characterization of cell lines.

e) Difference between normal & transformed cells.

f) Embryo biopsy.

Total No. of Questions : 5]

SEAT No. :

P-1146

[Total No. of Pages : 2

[6054]-439

T.Y. B.Sc.

INDUSTRIAL MICROBIOLOY

IMB-3510: Plant Tissue Culture (Vocational Paper - V)

(2019 Pattern) (CBCS) (Semester - V) (358210)

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

Instructions to the candidates :

1) ***Q1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Q2 to Q5 carry equal marks.***

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

a) What is Totipotency?

b) What are B+ crops?

c) What is 'Hardening' in micropropogation?

d) Name any one medium used for PTC.

e) What are Syn-seeds?

f) Who is the father of PTC?`

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

i) Enlist all steps involved in micropropogation.

ii) What are Edible vaccines?

iii) Discuss advantages of PTC over conventional farming.

b) Write a short note on Protoplast fusion. **[4]**

P.T.O.

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

i) What is Genegun method of transformation of plant cells?

ii) Explain with diagram types of fermenters used for large scale culture of plant cells.

iii) Explain the process of Agrobacterium tumifaciens mediated transformation of plant cell.

b) Describe the developmental stages in Callus formation. **[4]**

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

i) What are Haploid plants?

ii) Write a short note on Herbicide resistant crops.

iii) State a few applications of plant tissue culture.

b) Write a short note on Virus Free plants. **[4]**

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

a) Meristem culture.

b) Growth conditions for plant tissue culture.

c) Aseptic techniques during PTC.

d) Ri plasmid.

e) Auxin and Cytokinin in PTC.

f) Embryoids.

Total No. of Questions : 5]

SEAT No. :

P-1147

[Total No. of Pages : 2

[6054]-440

T.Y. B.Sc. (Vocational)

VOC-EEM : 355 : TROUBLE SHOOTING & REPAIR OF AUDIO & VIDEO EQUIPMENTS

(2019 Pattern) (Semester - V) (CBCS) (Paper - V) (35811)

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.No. 2 to 5 carry equal marks.***

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

a) What is IF frequency in FM radio receiver?

b) One can build his own satellite receiver. Comment.

c) Which loudspeaker is normally used in PA system?

d) Which kind of modulation in used in TV?

e) What should be used to clean Laptop display?

f) How to express the speed of dot-matrix printer?

Q2) a) Answer the following : **[6]**

i) Describe in brief the troubleshooting with FM receiver.

ii) Explain in brief the replay mechanism of DVD player.

b) Draw the block diagram of PA system, Also explain in brief the procedure of troubleshooting it. **[4]**

P.T.O.

Q3) a) Answer the following : **[6]**

i) Explain in brief the working principle of plasma TV.

ii) Explain in brief the fault diagnosis of CRT monitor.

b) Explain in details the working principle of inkjet printer. **[4]**

Q4) a) Answer the following : **[6]**

i) Give two common faults with ACD player. Also give remedies for them.

ii) Give at least two faults with DVD player. Also give remedies for them.

b) Give in details the troubleshooting and fault diagnosis with VCD player. **[4]**

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

a) Differentiate between audio CD and Video CD.

b) Compare the performance of Blue-ray disc with DVD.

c) Give at least one performance parameter of PA System. How to improve it?

d) Differentiate between Analog TV and Digital TV.

e) Explain in brief the working principles of Laser printer.

f) Compare dot matrix printer with loser printer.

Total No. of Questions : 5]

SEAT No. :

P-1148

[Total No. of Pages : 2

[6054]-441

T.Y.B.Sc. (Vocational)

VOC - EEM - 356 : ELECTRONIC INSTRUMENTATION

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

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

Instructions to the candidates :

1) ***Q. 1 is compulsory.***
2) ***Solve any three questions from Q.No.2 to Q5.***
3) ***Q.No.2 to Q5 carry equal marks.***

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

a) What is instrumentation system?

b) What is sensor?

c) Define accuracy.

d) What is impedence?

e) What is real time analysis?

f) What is ladder diagram?

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

i) Give at least one example of instrumentation system in electronic industry. Give its application.

ii) How displacement sensor works? Give its one application.

b) Draw the block diagram of general instrumentation system. Explain its working in brief. **[4]**

Q3) a) Answer the following. **[6]**

i) What is distartion analysis? Give its one application.

ii) What is logic analyser? Where it is used?

b) Draw the block diagram of DVM. Explain its working. **[4]**

P.T.O.

Q4) a) Answer the following. **[6]**

i) Give one example of sensor used for detecting motion. Also explain its working.

ii) What is ATE? Where it is used.

b) Write a detailed note on PLC. **[4]**

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

a) What is tracability?

b) Give at least one parameter of displacement sensor. Explain its significance.

c) Give example of temperature sensor. Give its applications.

d) What is debugging? How to use it for PLC?

e) What is simulation? How to use it in PLC?

f) Draw a ladder diagram for any PLC system that you know.