Total No. of Questions : 4]

SEAT No. :

P4842

[Total No. of Pages : 2

[5822]-501

T.Y. B.Sc.

MATHEMATICS

DSE - 1A : MT - 351 : Metric Spaces

(CBCS 2019 Pattern) (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.***

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

a) Does $d(x,y)=\sqrt{|x+y|}$, $\forall x, y \in \mathbb{R}$, define a metric on $\mathbb{R}$? Justify.

b) Find the interior of following subsets of $\mathbb{R}$ with usual metric.

i) Q ii) $[0,1)\cup(1,2]$

c) Find the limit points of (0, 1) and [0, 1] in $\mathbb{R}$.

d) Let ($\mathbb{R}$, *d*) be a discrete metric space and $x \in \mathbb{R}$. Find B(*x*, ½) and B (*x*, 3).

e) Show that every Cauchy sequence in a discrete metric space is convergent.

f) Give an example of closed subset of $\mathbb{R}$ with usual metric which is neither compact nor connected.

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

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

i) Prove that arbitary 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, *d*) is a Cauchy sequence.

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

i) Let (X, *d*) be a metric space.

Define $\delta(x,y)=\min\{1, d(x,y)\}, \forall x, y \in X$ b show that δ is a metric on X.

ii) Let X be a metric space, then show that A° is the lergest open set contained in A.

P.T.O.

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

i) Prove that identity function on a metric space (X, *d*) is continuous.

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

b) Attempt any one 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 $g \circ f$ is open.

ii) Let (X, *d*) be metric space and let A, B $\subset$ X be compact subsets of X. Show that $A \cup B$ is compact.

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

i) Show that continuous image of a compact metric space is compact.

ii) Let A and B be two connected subsets of X such that $A \cap B \neq \phi$. Then prove that $A \cup B$ is connected.

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

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

ii) Let (X, *d*) be a compact metric space, show that a closed subset of X is compact.

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Total No. of Questions : 4] **SEAT No. :**

P4843 **[Total No. of Pages :2**

[5822] - 502
T.Y.B.Sc.
MATHEMATICS
DSE-1B, MT - 352 : Real Analysis - I
(2019 CBCS Pattern) (Semester - V) (35112)

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

Instructions to the candidates:

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

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

a) Prove that $A \Rightarrow B$ is logically equivalent to ~(A∧(~B))

b) Show that the function $f(x) = 3x + 2$ is one to one.

c) Define cauchy sequence of real numbers.

d) Find limit superior of $\left\{\sin\left(\frac{n\pi}{2}\right)\right\}_{n=1}^{\infty}$.

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

f) Test the convergence of the series $\sum_{n=1}^{\infty}\frac{n+1}{n+2}$.

g) Show that the sequence $\left\{\frac{1}{n}\right\}_{n=1}^{\infty}$ is an element of class l^2.

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

a) 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) Prove that the collection of all polynomials with integer coefficient is countable.

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

a) If A, B, C are sets then prove that $C \setminus (A \cap B) = (C \setminus A) \cup (C \setminus B)$.

b) Let $\mathbb{Z}$ be set of integers and $\mathbb{N}$ be set of natural numbers. Prove that card $(\mathbb{Z})$ = card $(\mathbb{N})$.

P.T.O.

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

a) If $\{S_n\}$ and $\{t_n\}_{n=1}^{\infty}$ are sequences of real numbers and $\lim_{n\to\infty} s_n = L, \lim_{n\to\infty} t_n = M$ then prove that $\lim_{n\to\infty}(s_n + t_n) = L+M$.

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

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

a) Suppose $\{S_n\}_{n=1}^{\infty}$ is a sequence of positive real numbers and $0 < x < 1$. If $S_{n+1} < xS_n (n \in \mathbb{N})$ then prove that $\lim_{n\to\infty} S_n = 0$.

b) Prove that if $\lim_{n\to\infty} \frac{S_n}{n} = L \neq 0$ then $\{S_n\}_{n=1}^{\infty}$ is not bounded.

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

a) If $\sum_{n=1}^{\infty} a_n$ is a series of nonnegative real numbers which converges to $A \in \mathbb{R}$ and $\sum_{n=1}^{\infty} b_n$ is a rearrangement of $\sum_{n=1}^{\infty} a_n$, then prove that $\sum_{n=1}^{\infty} b_n$ converges to A.

b) State and prove Minkowski inequality.

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

a) Prove that the series $1 + \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \ldots\ldots\ldots$ is convergent.

b) Show that the series

i) $\sum_{n=4}^{\infty} \frac{1}{n \log n}$ is divergent.

ii) $\sum_{n=4}^{\infty} \frac{1}{n(\log n)^2}$ is convergent.

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Total No. of Questions : 4]

SEAT No. :

P4844

[Total No. of Pages : 2

[5822]-503

T.Y. B.Sc.

MATHEMATICS

DSE - 2A : MT - 353 : Group Theory

(CBCS 2019 Pattern) (Semester - V) (35113)

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

Instructions to the candidates:

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

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

a) List all elements of $\mathbb{Z}_2 \times \mathbb{Z}_3$ and state order of each element.

b) Find all subgroups of permutation group S_3.

c) Find the number of elements in the set $\{\sigma \in S_5 \mid \sigma(4) = 4\}$.

d) Find all normal subgroups of $\mathbb{Z}_{12}$.

e) Show by giving an example that a factor group of a non abelian group may be abelian.

f) Show that union of subgroups need not be a subgroup.

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

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

i) State and prove Lagrange's theorem for groups.

ii) Prove that a subgroup of a cyclic group is cyclic.

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

i) Let G be the set of all real numbers except - 1. Define * on G by $a * b = a + b + ab$. Show that $< G, * >$ is a group.

ii) Compute the factor group $\dfrac{\mathbb{Z}_3 \times \mathbb{Z}_6}{\langle (0,3) \rangle}$.

P.T.O.

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

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

ii) Let $\phi : G \to G'$ be a group homomorphism. Show that ϕ is 1-1 if and only if ker $\phi = \{e\}$.

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

i) List all subgroup of $\mathbb{Z}_{45}$ and draw its subgroup diagram.

ii) Let $\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\ 2 & 3 & 4 & 5 & 1 & 7 & 8 & 9 & 10 & 6 \end{pmatrix}$ be a permutation in the group S_{10}.

1) Write σ as a product of disjoint cycles.
2) Find order of σ.
3) Write σ as a product of transpositions.
4) State whether σ is odd or even.
5) Find an inverse of σ.

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

i) State and prove Caycley's theorem.

ii) Show that a factor group of a cyclic group is cyclic.

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

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

ii) Show that $\mathbb{Z}_p$ has no proper nontrivial subgroups if P is a prime number.

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Total No. of Questions : 4]

SEAT No. : ____

P4845

[Total No. of Pages : 2

[5822]-504

T.Y. B.Sc.

MATHEMATICS

DSE - 2B : MT 354 : Ordinary Differential Equations

(2019 CBCS Pattern) (Semester - V) (35114)

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

Instructions to the candidates:

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

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

a) Verify that $y_1 = \cos w\,x$ and $y_2 = \sin w\,x$ are solutions of $y'' + w^2 y = 0$ on $(-\infty, \infty)$.

b) Solve $y'' - y = 0$

c) Solve the initial value problem $y'' + 6y' + 5y = 0$, $y(0) = 3$ and $y'(0) = -1$ having general solution as $y = c_1 e^{-x} + c_2 e^{-5x}$.

d) Find the particular integral of $(D^2 + 4)\,y = \sin 3x$.

e) Classify all the singular points in the finite plane of the differential equation $(x^2 + 4)\,y'' - 6xy' + 3y = 0$.

f) Find a power series solution of the differential equation $y' + y = 0$.

g) Show that $x = e^{-t}$, $y = -e^{-t}$ are solutions of the homogeneous system $\frac{dx}{dt} = x + 2y, \frac{dy}{dt} = 3x + 2y$.

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

i) With usual notation prove that $\frac{1}{f(D)} e^{ax} = \frac{x^r}{r!\phi(a)} e^{ax}$ where $f(D) = (D - a)^r \phi(D)$, $\phi(a) \neq 0$.

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

P.T.O.

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

i) Solve the differential equation $x^2 y'' - 2xy' + 2 = 4x^2$ by using method of reduction of order where $y_1 = x$ is solution of corresponding homogeneous equation.

ii) Obtain general solution of the differential equation $y'' - 3y' - 4y = 6\,e^x$.

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

i) Explain the method of undermined coefficients to solve the equation $F(D)y = R(x)$.

ii) If $\phi(-a^2) \neq 0$ then prove that -

$$\frac{1}{\phi(D^2)}\cos(ax+b) = \frac{1}{\phi(-a^2)}\cos(ax+b)$$

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

i) Find a particular solution of $y'' - y = \sin x$.

ii) Obtain power series solution of the differential equation $(1 - x^2)\,y'' - 4xy' + 2y = 0$ about origin.

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

i) Explain the method of variation of parameters to solve the second order differential equation $\frac{d^2y}{dx^2} + P(x)\frac{dy}{dx} + Q(x)y = R(x)$.

ii) If w(t) is the wronskian of the two solutions of the homogeneous system of differential equation then prove that either $w(t)$ has no zeros in (a, b) or $w \equiv 0$ on (a, b).

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

i) Obtain power series solution of equation $y'' + xy' + 3y = 0$ about point $x = 0$.

ii) Find general solution of the system $\frac{dx}{dt} = x + y, \frac{dy}{dt} = 4x - 2y$.

Total No. of Questions : 4]

SEAT No. : ____

P4846

[Total No. of Pages : 3

[5822]-505
T.Y. B.Sc.
MATHEMATICS
MT - 355 (A) : Operations Research
(CBCS 2019 Pattern) (Semester - V) (35115 A) (Regular)

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

Instructions to the candidates:

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

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

a) Give an example of LPP whose feasible solution contains unique point.

b) Define slack variable and surplus variable.

c) Use graphical method to show that the following LPP has an infeasible solution space.

Max $Z = 3x_1 + 4x_2$

Subject to $x_1 - x_2 \leq -1$

$-x_1 + x_2 \leq 0$

and $x_1, x_2 \geq 0$

d) Obtain the optimal object value of the following problem by observing the dual of the problem

Min $Z = 10x_1 + 4x_2$

Subject to $5x_1 + 4x_2 \geq 50$

$x_1, x_2 \geq 0$

e) What is degeneracy in a transportation problem? How is it resolved?

f) Define unit worth of a resource.

g) What is the purpose of a dummy row or column in an assignment problem?

P.T.O.

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

i) Explain the standard form of linear programming problem.

ii) Explain the canonical form of LPP for maximization.

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

i) Solve the following LPP by the graphical method

Min $Z = 20x_1 + 10x_2$

Subject to $x_1 + 2x_2 \leq 40$

$3x_1 + x_2 \geq 30$

$4x_1 + 3x_2 \geq 60$

$x_1, x_2 \geq 0$

ii) Solve the following LPP by simplex method

Max $Z = 2x_1 + 3x_2$

Subject to $2x_1 + x_2 \leq 4$

$x + 2x_2 \leq 5$

$x_1, x_2 \geq 0$

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

i) Explain the least cost method for binding initial basic feasible solution to transportation problem.

ii) Write down assumptions for assignment problem.

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

i) Check whether the given solution $x_{13}=60$, $x_{21}=50$, $x_{22}=20$, $x_{32}= 60$, $x_{33}= 20$ to the following T.P. is optimal $\begin{bmatrix} 8 & 7 & 3 \\ 3 & 8 & 9 \\ 11 & 3 & 5 \end{bmatrix}$

ii) Find proper assignment schedule of five machines to five jobs that minimizes the total cost associated to the following problem.

		Machines				
		I	II	III	IV	V
Jobs	A	6	12	3	11	15
	B	4	2	7	1	10
	C	8	11	10	7	11
	D	16	19	12	23	21
	E	9	5	7	6	10

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

i) Write mathematical model for transportation problem with m-sources and n-destinations.

ii) Explain maximization case in assignment problem.

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

i) Consider the followig LPP

Min $Z = 2x_1 + 3x_2$

Subject to $x_1 + x_2 \geq 5$

$x_1 + 2x_2 \geq 6$

$x_1, x_2 \geq 0$

The optimal simplex tableau at the end of phase - I B given as

Basic	x_1	x_2	x_3	x_4	R_1	R_2	Solution
r	0	0	0	0	–1	–1	0
x_1	1	0	–2	1	2	–1	4
x_2	0	1	0	–1	–1	1	1

Use phase - II determine the optimum solution of the LPP.

ii) Solve the following assignment problem for maximization profit.

Sales Territories

		I	II	III	IV	V
	A	16	15	17	10	8
	B	16	16	20	15	12
Salesman	C	12	8	10	13	15
	D	18	16	17	12	10

Total No. of Questions : 4]

SEAT No. : ____

P4847

[Total No. of Pages : 2

[5822]-506

T.Y.B.Sc.

MATHEMATICS

DSE - 3A MT355(B) : Differential Geometry

(CBCS 2019 Pattern) (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 parabola $y = x^2$?

b) Define a sucface in $\mathbb{R}^3$.

c) Find parametrisation of the level curve $u^2 - x^2 = 1$.

d) Is the curve $\overline{\gamma}(t) = (\cos^2 t, \sin^2 t)$, $-\infty < t < \infty$ regular? Justfy.

e) State frenet - serret equations

f) State isoperimetric inequality.

g) Find first fundamental form of surface.

$\sigma(u,v) = (u, v, u^2 + v^2)$.

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

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

ii) Prove that transition maps of smooth surface are smooth.

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

i) Find the torsion of the circular helix.

$r(\theta) = (a\cos\theta, a\sin\theta, b\theta)$.

ii) Find arc length along cycloid

$r(t) = a(t - \sin t, 1 - \cos t)$ $0 < t \leq 2\pi$.

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

a) Prove that parametrised curve $r : (a, b) \to \mathbb{R}^n$ is unit speed curve if it is regular.

P.T.O.

b) State and prove Wirtinger's inequality.

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

i) Show that the circular cylinder

$S = \{(x, y, z) \in \mathbb{R}^3 \mid x^2 + y^2 = 1\}$ can be covered by a single surface patch, and so is a surface.

ii) Find the 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 area of a surface patch is unchanged by reparametrisation.

ii) Show that every isometry is a conformal map.

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

i) Datermine the area of part of the parabaloid $z = x^2 + y^2$, $z \leq 1$.

ii) Show that every point on the surface of revolution.

$\sigma(u, v) = f(u)\cos v, f(u) \sin v, g(u)$

is parabalic if and only if σ is part of a circular cylinder or a circular cone.

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Total No. of Questions : 4]

SEAT No. : ____

P4848

[Total No. of Pages : 2

[5822]-507

T.Y. B.Sc.

MATHEMATICS

MT - 355C : C-Programming

(2019 Pattern) (Semester - V) (Paper-I) (35115C)

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

Instructions to the candidates:

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

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

a) Suppose a, b and c are integers variable that have been assigned a = 8, b = 3 and c = –5.
Determine the value of the following airthmetic expression:
(a*c) % b

b) Define variables in C.

c) What is purpose of while loop?

d) Write the syntax of if ..... else loop.

e) A C-program contains the following variable declarations:
int i = 12345, j = 0 xabcdg, k = 077777;
Show the output from the following print f statement.
printf ("%3d, %3*x*, %30", i,j,k);

f) In the given below code, What will be the value of a variable *x*?

```
# include <stdio.h>
  main ()
  {
    inty = 100;
    constint x = y;
    printf ("%d\n", x);
    return 0;
    }
```

g) Indicate what values are assigned to the individual array elements for float C [8] = {2., 5., 3., –4., 12., 0., 8.}

P.T.O.

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

i) What is an operator? Describe several different types of operators that are included with in the C language.

ii) Explain the need and advantages of function.

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

i) Write a C - Program to calculate the factorial of an integer using the function.

ii) Write a C - Program to find the real root of the quadratic equation.

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

i) Write in brief about switch statement. Also write its syntax.

ii) Write in brief about do-while statement. Also write its syntax.

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

i) Write a C - Program to check whether the given number is prime or not.

ii) Write a C - Program to calculate the average of n - numbers.

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

i) What is recursion? Explain how it works?

ii) What is an array variable? How does an array variable differ from an ordinary variable?

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

i) Write a C - Program to find area of triangle.

ii) Write a C - Program to print value of x for $f(x)$. where $f(x) = x^2$, if $x < 0$

$= 25$, if $x = 0$

$= e^x$, if $x > 0$.

Total No. of Questions : 4]

SEAT No. : ____

P4849

[Total No. of Pages : 2

[5822]-509

T.Y. B.Sc.

MATHEMATICS

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

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

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

Instructions to the candidates:

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

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

a) Define greatest common divisor of two integers.

b) Define Euler's theorem.

c) Define de Polignac's Formula.

d) Find the value of $\left(\frac{2}{5}\right)$.

e) Evaluate $\sigma_2(8)$.

f) Find two solutions of $x \equiv 7 \pmod{11}$.

g) Give two examples of Pythagorian triplet.

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

i) Prove that number of primes are infinite.

ii) Let $f(x)$ be a polynomial with integer coefficients, if $a \equiv b \pmod{m}$, then show that $f(a) \equiv f(b) \pmod{m}$.

P.T.O.

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

i) Find the integers x & y such that $43x + 64y = 1$.

ii) Prove that $n^{12} - a^{12}$ is divisible by 13.

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

i) For any positive real number x, show that $[x] + \left[x + \frac{1}{2}\right] = [2x]$.

ii) State and prove Wilson's theorem.

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

i) Find all integers that gives remainder 1, 2, 3 when divided by 3, 4 and 5 respectively.

ii) Find the highest power of 14 dividing 100!.

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

i) For any positive integer n show that $\sigma(n) = \prod_{p^{\alpha} // n} \left(\frac{p^{\alpha+1} - 1}{p - 1}\right)$.

ii) State and prove unique factorization theorem.

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

i) Show that $61! + 1 \equiv 0 \pmod{71}$.

ii) Prove that there are infinitely many pairs x, y such that $x + y = 100$ and $(x, y) = 5$.

Total No. of Questions : 4]

SEAT No. : ____

P4850

[Total No. of Pages : 2

[5822]-510

T.Y. B.Sc.

MATHEMATICS

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

(CBCS - 2019 Pattern) (Semester - V) (DSE - 3B) (35116C)

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

Instructions to the candidates:

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

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

a) Evaluate $\int_{-\pi}^{\pi} \cos 2x \ \sin 3x \ dx$.

b) Find $\mathrm{L}\left[2\sin^2 t\right]$.

c) Evaluate $\int_{0}^{\infty} x^2 e^{-x} \ dx$.

d) Find $\mathrm{L}^{-1}\left\{\frac{1}{s^2-4s+8}\right\}$.

e) Find $\mathrm{F}(t) * \mathrm{G}(t)$, where F($t$) = 2 & G($t$) = e^t.

f) Solve : $y'' + y = 0;\ y(0) = 1$ and $y'(0) = 0$.

g) Solve : $y' - y = e^t;\ y(0) = 0$.

P.T.O.

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

i) If $\mathrm{L}\left[\mathrm{F}(t)\right] = f(s)$, then prove that $\mathrm{L}\left[\mathrm{F}'(t)\right] = sf(s) - \mathrm{F}(0)$.

ii) If $\mathrm{L}\left[\mathrm{F}(t)\right] = f(s)$, then prove that $\mathrm{L}\left[\dfrac{\mathrm{F}(t)}{t}\right] = \int_s^\infty f(s)\ ds$.

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

i) Find $\mathrm{L}\left[t^2 \sin ht\right]$.

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

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

i) If $\mathrm{L}\left[\mathrm{F}(t)\right] = \mathrm{F}(s)$ and is any positive constant, then prove that $\mathrm{L}\left[\mathrm{F}(at)\right] = \dfrac{1}{a}\mathrm{F}\left(\dfrac{s}{a}\right)$.

ii) If $\mathrm{L}^{-1}\left\{\mathrm{F}(s)\right\} = \mathrm{F}(t)$, then prove that $\mathrm{L}^{-1}\left\{\mathrm{F}(s-a)\right\} = e^{at}\ \mathrm{F}(t)$.

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

i) Find $\mathrm{L}^{-1}\left\{\dfrac{3s+1}{s^2+6s+13}\right\}$.

ii) Find $\mathrm{L}^{-1}\left\{\dfrac{1}{2}\log\left(\dfrac{s^2-a^2}{s^2}\right)\right\}$.

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

i) Prove that the inverse Laplace transform is linear operator.

ii) State and prove the convolution theorem.

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

i) Solve : $y'' + 3y' + 2y = t;\ y(0) = 1$ and $y'(0) = -1$.

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

Total No. of Questions : 5]

SEAT No. : ____

P4851

[Total No. of Pages : 2

[5822]-511
T.Y. B.Sc.
PHYSICS
PHY 351 : Mathematical Methods in Physics -II
(2019 Pattern) (Semester - V) (Paper-I) (35121)

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) ***Q.2 to Q5 carry equal marks.***
4) ***Figure 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 orthogonal co-ordinate system.

b) Give the idea of Minkowski's space.

c) A spaceship moving away from earth with a speed o.9c fires a missile in the same direction as its motion with a speed o.9c relative to space ship. what is the missile's speed relative to earth?

d) What do you mean by singular point?

e) Prove that $J'_0(x) = -J_1(x)$

f) Define the term co-ordinate surfaces.

Q2) Answer the following.

a) Obtain the equation for the divergence of vector in orthogonal curvilinear system. **[6]**

b) At what speed the mass of proton become double its rest mass? **[4]**

Q3) Answer the following.

a) Obtain the series solution about $x=0$ of the differential equation $4xy''+2y'+y = 0$ **[6]**

b) Prove that $J_2(x)-J_0(x)=2J''_0(x)$ **[4]**

P.T.O.

Q4) Answer the following.

a) Describe Michelson Morley experiment. **[6]**

b) Find the lements of arc lengths & volume element in spherical polar co-ordinates. **[4]**

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

a) Explain the term metric coeficients and scale factors.

b) Write a short note on generating function for Legendre polynomials.

c) Explain how will you determine the point $x = x_0$ is an ordinary or regular or irregular singular point of the given linear second order homogeneous differential equation.

d) Obtain Laplacian operator in cylindrical co-ordinate system.

e) Describe time dilation on the basis of Lorentz transformation equations.

f) Decide degree & order of differential equation

$$\frac{d^2y}{dx^2} + \sqrt{\frac{dy}{dx}} + y = 0$$

❖ ❖ ❖

Total No. of Questions : 5]

SEAT No. : ____

P4852

[Total No. of Pages :2

[5822] - 512
T.Y.B.Sc.
PHYSICS
PHY - 352 : Electrodynamics
(2019 Pattern) (Semester - V) (2 Credits) (35122)

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

Instructions to the candidates:

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

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

a) What is polar molecule?

b) Give two limitations of Coulomb's law.

c) Define magnetic permeability.

d) What is magnetic flux? Give its S.I. unit.

e) State Faraday's law of electromagnetic induction.

f) Give physical significance of Maxwell's equations.

Q2) Answer the following questions.

a) Discuss in brief types of polarization. **[6]**

OR

Describe the magnetic vectar potential (A).

b) Two point charges in a dielectric medium having K=5.2 interact with a force of 8.6×10^{-3}N. What could be the force if the charges were in free space? **[4]**

Q3) Answer the following questions.

a) State and explain Biot-Savart law. **[6]**

OR

Discuss magnetic induction due to straight current carrying conductor.

b) The average energy per second reaching the earth from the sun is about 1350g/Sec-m^2. Assume this is a single EM wave and calculate the maximum values of E & B fields for sunlight at the earth. **[4]**

P.T.O.

Q4) Answer the following questions.

a) State and prove Poyntings theorem. **[6]**

OR

Give detail explanation of Lenz's law.

b) Show that $\vec{E} \cdot \frac{\partial \vec{D}}{\partial t}$ and $\vec{H} \cdot \frac{\partial \vec{B}}{\partial t}$ respectively denotes the rate of change of energy density stored in electric and magnetic fields. **[4]**

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

a) Electrical Displacement.

b) Surface charge densities.

c) Magnetization matter.

d) Coulomb's Law.

e) Equation of continuity.

f) Electric field and their types.

Total No. of Questions : 5]

SEAT No. :

P4853

[Total No. of Pages : 2

[5822]-513
T.Y.B.Sc. PHYSICS
PHY353: Classical Mechanics
(2019 Pattern) (Semester-V) (Paper-III)(35123)

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

Instructions to the candidates:

1) ***Question1 is compulsory.***
2) ***Solve any three questions from Q 2 to 5.***
3) ***Que.2 to Que.5 carry equal marks.***
4) ***Figures to the right indicates full marks.***
5) ***Use of calculator and Log.table is allowed.***

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

a) Write down the equation of motion of charged particle having charge 'q', mass 'm', moving with velocity $\vec{V}$ in magnetic fileld induction $\vec{B}$.

b) Give the trajectory of charged particle moving in constant magnetic field.

c) What is meant by central force.

d) Find the reduced mass of system of two particles having equal masses.

e) What is meant by elastic collision?

f) What are holonomic constraints?

Q2) Answer the following.

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

OR

Find the relation between the scattering angles in LAB and C.M. system in two body elastic collision. **[6]**

b) Distinguish between elastic and in elastic scattering. **[4]**

Q3) Answer the following.

P.T.O.

a) Explain how a two body problem can be reduced into equivalent one body problem. **[6]**

OR

Define centre of mass. Of system. Obtain velocity and acceleration for the system of particles. **[6]**

b) The distance between sun and earth is suddenly reduced to half of it's present distance. What will be duration of year. **[4]**

Q4) Answer the following.

a) What is meant by inelastic scattering. Obtain Q-value equation in inelastic scattering process. **[6]**

OR

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

b) Obtain Hamiltonion and Hamiltonion equation of motion for simple pendulum from it's Lagrangian. **[4]**

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

a) State and prove Kepler's second law od planetory motion.

b) Show that the kinetic energy od charged particle remains constant during it's motion in constant magnetic Field.

c) what is meant by exoergic and endoergic process.

d) what is meant by non holonomic constraints. Give it's two explampes.

e) Explain cyclic co-ordinates.

Total No. of Questions : 5]

SEAT No. : ____

P4854

[Total No. of Pages : 2

[5822]-514

T.Y. B.Sc.

PHYSICS

PHY - 354 : Atomic and Molecular Physics

(2019 Pattern) (Semester - V) (35124)

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.***
4) ***Figures to right indicates full marks.***
5) ***Use of calculator and logtable is allowed.***

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

a) Write formula for Balmer series of hydrogen atom.

b) Define interaction energy.

c) What are stoke's and antistoke's lines in Raman spectra?

d) How many subshells are possible in M shell of an atom?

e) What is linear stark effect?

f) In which region of EM Spectrum, the pure rotational spectra lies?

Q2) Attempt the following questions :

a) State and prove Lande's interval rule. Represent it graphically for 3D term. **[6]**

b) Compare Normal and anomalous zeeman effect. **[4]**

P.T.O.

Q3) Attempt the following questions:

a) Explain Paulli's exclusion principle and Hund's rule with suitable examples. **[6]**

b) The ionization energy of sodium is 494.7 $kJmol^{-1}$. Calculate the wavelength for electro magnetic radiation which is just sufficient to ionize sodium? ($NA = 6.02 \times 10^{23}$, $C = 3 \times 10^{8}$ m/s, $h = 6.63 \times 10^{-3}$ Js) **[4]**

Q4) Attempt the following questions:

a) With neat diagram explain experimental arrangement to study Normal zeeman effect. **[6]**

b) A sample was excited by 4358A°. A Raman line was observed at 4447A°. Calculate Raman shift in wave number. **[4]**

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

a) Write electronic configuration of Ge. [Z = 32].

b) What is mean by parahelium and orthohelium.

c) Write features of stark effect.

d) What is a sodium doublet?

e) What is electronic spectra of molecule?

f) An electron collides with hydrogen atom in its ground state and excites it into state of n = 2. How much energy is gained by hydrogen atom in its inelastic collision?

Total No. of Questions : 5]

SEAT No. : ____

P4855

[Total No. of Pages : 2

[5822]-515

T.Y. B.Sc.

PHYSICS

PHY : 355 - Computational Physics

(2019 Pattern) (Semester - V) (Discipline Specific Elective Course) (35125)

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

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three Questions from Q2 to Q.5.***
3) ***Question 2 to 5 carry equal marks.***
4) ***Figures to right indicate full marks.***
5) ***Use of calculator and log table is allowed.***

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

a) Define Keywords.

b) State the basic data types used in 'C'.

c) What are the two ways of passing arguments to the function.

d) What is pixel.

e) State the formula for Trapezoidal rule of integration.

f) In the bisection method, if $f(x) = x^3 - x - 1 = 0$ has real root lies in the interval [1, 2] what is the approximate value of the root i.e. initial guess of the root (x_0)?

Q2) Answer the following questions:

a) What is meant by operators and expressions. Explain any three types of operator used in 'C'. **[6]**

b) Find the real root of the equation $x^3 - 2x - 5 = 0$ using Newton - Raphson method. **[4]**

Q3) Answer the following questions:

a) What do you mean by flowchart? Explain meaning of various symbols used in a flowchart. **[6]**

b) Write a 'C' program to draw line, circle, ellipse and rectangle. **[4]**

P.T.O.

Q4) Answer the following questions:

a) What is recursion? Write a 'C' program to find factorial of a given number using recursion method. **[6]**

b) Evaluate $\int_0^1 x^2 dx$ using Trapezoidal rule, Take step size $h = 0.1$ **[4]**

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

a) State the o/p of following 'C' - program

```
# include <stdio.h>
main ()
{
      int i = 5;
      while (i > = 0) {
            i -- ;
      if (i = = 3) break ;
      printf ("%d", i);
}
}
```

b) Distinguish between scanf () and print f () function.

c) Write a graphics program to draw the line and rectangle.

d) Find the real root of the equation $f(x) = x^3 - 2x - 5 = 0$ lies in which interval.

e) Explain return statement in user defined function.

f)
```
# include <stdio.h>
main ()
{
      int v =3, * pv, u1, u2;
            u1=2* (v + 5);
            pv= & v ;
            u2 = 2 * (*pv + 5);
      printf ("\n u1 = % 2d\n u2 = % 2d", u1 u2);
}
```

What is the output of the program.

Total No. of Questions : 5]

SEAT No. : ____

P4856

[Total No. of Pages : 2

[5822]-516

T.Y. B.Sc.

PHYSICS

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

(CBCS - 2019 Pattern) (Semester - V) (Paper - VI) (35126A)

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

Instructions to the candidates:

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

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

a) What is Chandrasekhar limit?

b) What are advantages of radio telescopes?

c) What is an absolute magnitude of star?

d) Why neutron stars cannot turn into Black holes?

e) What are Meteors and Meteorites?

f) Explain globular cluster.

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

a) i) Draw a neat and labelled 'tuning fork' diagram.

ii) With suitable examples, explain the concept of constellations.

[6]

b) What are cepheid variables? Why these stars pulsates? **[4]**

P.T.O.

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

a) With suitable diagram, explain the working of Newtonian telescope. Also write its advantages and disadvantages. **[6]**

b) Explain the concept of Dark matter. What are evidences of its presence? **[4]**

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

a) With suitable diagram, explain the process of formation of various elements in heavy stars. **[6]**

OR

Explain how Black holes are formed? Also write about the event Horizon and time dilation.

b) Elaborate the concept of steady state universe. **[4]**

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

a) Light gathering power of telescope.

b) Total Solar Eclipse.

c) Celestial Hemisphere.

d) Eclipsing Binary stars.

e) Milky way Galaxy.

f) 'O' type stars.

Total No. of Questions : 5]

SEAT No. : ____

P4857

[Total No. of Pages : 2

[5822]-517

T.Y. B.Sc.

PHYSICS

PHY - 356(B) : Elements of Material Science

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

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

a) Define Hardness of the material.

b) What do you understand by elastic deformation?

c) What are ferrite?

d) What is system of phase diagram?

e) What are smart material?

f) Determine the density of intermetalic compound AlNi having same structure as CsCl. The mass of unit cell is 142.2454×10^{-24} gm and lattice constant is 3.326×10^{-8} cm.

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

i) Write short note on Piezo electric smart material.

ii) Draw and explain in brief the phase diagram of sugar and water.

iii) What is AX structure? Draw crystal structure of NaCl.

b) Explain in brief any four mechanical properties of ceramics. **[4]**

P.T.O.

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

i) Define critical resolved shear stress (CRSS) and obtain Schmid's law.

ii) Explain electrical conductivity of ceramic material.

iii) Explain Eutectic type Pb - Sn (Lead - tin) phase diagram.

b) The resistivity of Aluminium alloy is 2.8×10^{-6} Ω-cm. What would be the resistance of Aluminium wire 100 cm long and 0.01 cm^2 in cross - section. **[4]**

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

i) State and prove Gibb's Phase rule.

ii) Discuss Zn - S type AX structure.

iii) Explain Mechanism of plastic deformation by slip.

b) At atmospheric pressure, a material of unknown composition shows four phases in equilibrium. What is minimum number of components in the system? **[4]**

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

a) State properties of smart material.

b) With the help of figure explain unary phase diagram.

c) What are ceramic phases? Give its three properties.

d) What is deformation? Explain various stages of deformation.

e) Explain Frenkel defects.

f) Explain applications of diffusion.

Total No. of Questions : 5]

SEAT No. : ____

P4858

[Total No. of Pages : 2

[5822]-518

T.Y. B.Sc.

PHYSICS

PHY - 356(C) : Biophysics

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

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

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

a) Define Viscosity.

b) What is oxidation and reduction?

c) What is Gibb's free energy.

d) Define Radioactivity.

e) State the principle of SEM.

f) What is nucleus?

Q2) Answer the following questions:

a) Distinguish between Prokaryotic and Eukaryotic cell. **[6]**

b) Describe the construction and working of Position Emission Tomography (PET). **[4]**

P.T.O.

Q3) Answer the following questions:

a) State Resting potential. Describe in detail resting potential with suitable diagram. **[6]**

b) Describe the construction and working of Transmission Electron Microscope (TEM). **[4]**

Q4) Answer the following questions:

a) Describe the construction and working of Nuclear Magnetic Resonance (NMR). **[6]**

b) Describe in detail Cytoplasm with suitable examples. **[4]**

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

a) What is diffusion and osmosis?

b) What do you mean by Non-Polarizable electrode?

c) Write a short notes on “Bioelectrodes”.

d) What do you mean by “Action Potential”?

e) What do you mean by “Centrifuge measurement”?

f) What is Colorimeter?

Total No. of Questions : 5]

SEAT No. : ____

P4859

[Total No. of Pages : 2

[5822]-519

T.Y. B.Sc.

PHYSICS

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

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

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

Instructions to the candidates:

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

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

a) What are non-conventional energy sources?

b) Define Solar constant.

c) State different types of solar cells.

d) Define an efficiency of 'flat plate collector'.

e) Define Fill Factor.

f) Give limitations of concentraing collectors.

Q2) Answer the following questions:

a) Explain how energy is stored in battery. **[6]**

b) Describe solar concentrating collectors. **[4]**

P.T.O.

Q3) Answer the following questions:

a) Explain use of hydrogen as potential source of energy. **[6]**

b) Explain I-V characteristics of solar cell and explain Fill Factor (FF) and maximum conversion efficiency. **[4]**

Q4) Answer the following questions:

a) Discuss environmental degradation due to use of conventional energy. **[6]**

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

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

a) Solar pond.

b) P-n solar cell.

c) Selective coating.

d) Solar distillation.

e) Super capacitors.

f) Photovoltaic panels.

Total No. of Questions : 5]

SEAT No. : [ ]

P4860

[Total No. of Pages : 2

[5822]-520

T.Y. B.Sc.

PHYSICS

PHY - 356(E) : Applied Optics

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

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

Instructions to the candidates:

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

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

a) What are cardinal points?

b) Define nodal points.

c) What is Fermat principle?

d) Define the term numerical aperture.

e) What are the types of losses in optical fibre?

f) What is diffraction?

Q2) Answer the following questions:

a) Using Fermat's principle, establish the laws of reflection of lights. **[6]**

b) What is zone plate? Derive an-expression for its focal length. **[4]**

P.T.O.

Q3) Answer the following questions:

a) Describe the recording & reconstruction processes in holography with the help of suitable diagrams. **[6]**

b) Find the fractional refractive index and numerical aperture for an optical fibre with refractive indices of core and cladding as 1.50 and 1.49 respectively. **[4]**

Q4) Answer the following questions:

a) Explain the principle, construction and working of Fabry-perot interferometer. **[6]**

b) The focal length of zone plate is 0.2 m. What is the radius of first zone plate for a light of wavelength 5000 Å. **[4]**

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

a) What is an optical fibre? What is the principle involved in it's working?

b) Compare a single mode step index fibre with a multimode step index fibre.

c) Write short note on law of malus.

d) System of two thin lenses - Explanation.

e) State any two applications of fibre optics.

f) Applications of Holography.

Total No. of Questions : 5]

SEAT No. : ____

P4861

[Total No. of Pages : 2

[5822]-521

T.Y. B.Sc.

PHYSICS

PHY - 356(F) : C# Programming

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

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

Instructions to the candidates:

1) ***Question No. 1 is compulsory.***
2) ***Solve any three from Q.2 to 5.***
3) ***Q.2 to 5 carries equal marks.***

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

a) What is boxing in C#?

b) What is unboxing in C#?

c) What are the properties in C#?

d) What are the classes in C#?

e) What is Jugged Arrays?

f) What is the difference between system-array-copy to ( ) and system-array-clone To ( )?

Q2) Describe following:

a) .NET Basic Architecture. **[6]**

b) CLR in C#. **[4]**

P.T.O.

Q3) Explain the following program code:

a) Using system; **[6]**

```
namespace Hellow World
{
Class Program
{
Static void Main (String [ ] args)
{
Console.writeline ("Hellow World!")
}
}
}
```

b) Explain C# & .NET framework. **[4]**

Q4) Discuss the following terms:

a) ADO.NET **[6]**

b) Methods in C# **[4]**

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

a) Methods.

b) Class & Objects.

c) Constants.

d) Variables.

e) Data Fetching from SQL Server database.

f) Array.

Total No. of Questions : 05]

SEAT No. : ____

P4862

[Total No. of Pages : 2

[5822]-522
T.Y. B.Sc.
PHYSICS
PHY-356 (G) Acoustics-I
(2019 Pattern) (Semester-V) (Elective-I) (35126G)

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

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

a) What is optimum reverberation?

b) What does IL stands for?

c) What is tremelo?

d) Define timbre in musical sound.

e) What is difference between headphone and earphone?

f) Define sound absorption?

Q2) Answer the following question.

a) What is working of innear ear? Explain it with the help of neat diagram. **[6]**

b) If reverberation time is of 3.22 sec for a room of volume $1600m^3$ then what will be total sound absorption? **[4]**

Q3) Answer the following questions.

a) What is a Helmholtz's resonater? Deduce an expression for the natural frequency of vibration of a Helmholtz resonater. Write an expression for quality factor of it. **[6]**

b) If intensity level $[I_L]$ is the total noise level obtained by combining n identical pure tones. Each intensity level I_L dB, then show that $(I_L)_t = 10 \log_{10} n + I_L$ dB. **[4]**

P.T.O.

Q4) Answer the following questions.

a) Compare the following sound fields like near field, far field and free field. **[6]**

b) Determine the room modes 800, 302, 122 and 222 for a seminar hall of size 54×36×15 ft. What do you conclude? use C = 1130 ft/sec. **[4]**

Q5) Write a short notes on any four questions. **[10]**

a) Pros and cons of headphones.

b) Sound absorption material.

c) Anechoic chamber.

d) Expansion chamber mufflers.

e) FET analysis.

f) Audiometry.

Total No. of Questions : 5]

SEAT No. :

P4863

[Total No. of Pages : 2

[5822]-523
T.Y.B.Sc
PHYSICS
PHY-3510(H): Python Programming (SEC-I)
(2019 Pattern)(Semester-V)(35210H)

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) ***Que.2 to Que.5 carries equal marks.***
4) ***Use of calculator and logtable is allowed.***

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

a) Draw python prompt Symbol.

b) Express 5.5×10^{-3} in python language.

c) Define 'Indentation'.

d) What is use of Iterative statement.

e) Define recursive function.

f) State extension of file name in python.

Q2) Answer the following questions

a) What are different types of operators in python? Explain exponential operator with example. **[6]**

OR

What is iterative statement? Explain syntax of while loop using flow chart.

b) Explain following program and write output. **[4]**

```
str = 'Hello'
print (str+'4')
print (str*5)
```

Q3) Answer the following questions.

a) Explain if-else statement, write syntax and draw flowchart. **[6]**

OR

P.T.O.

b) Write python programme to calculate area of circle. **[4]**

Q4) Answer the following questions.

a) Define function and give its advantages. What is recursive function and Lambda function? **[6]**

OR

What are packages in python? Compare global and local Variables.

b) Explain the use of return Statement. **[4]**

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

a) Define higher level language and State use of interpreter.

b) State types of logical operators.

c) Draw flow-chart of simple if statement.

d) Define Keyword & write its example.

e) State any two weaknesses of python programming language.

f) What is flow chart?

Total No. of Questions : 5]

SEAT No. : ____

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T.Y. B.Sc.

PHYSICS

PHY- 3510 (I) : Energy Studies (Skill Enhancement Course)

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

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Question No.2 to Question No.5 carry equal marks.***
4) ***Figures to right indicate full marks.***
5) ***Calculator and Log-table is allowed.***

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

a) What are the conventional energy sources?

b) Define solar constant.

c) What are the limitations of fixed dome type biogas plant?

d) Write advantages of electrical vehicles (EV).

e) Write disadvantages of wind energy.

f) Define efficiency of photovoltaic cell.

Q2) Solve the following questions.

a) Explain three energy sources to understand their environmental, production and distribution aspects. **[6]**

b) Describe horizontal axis wind machine with suitable diagram. **[4]**

Q3) Solve the following questions.

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

i) Write limitations to photovoltaic efficiency.

ii) What is biogas? Explain different types of biogas plant.

b) Distinguish between liquid flat plat collector and concentrating collector. **[4]**

P.T.O.

Q4) Solve the following questions.

a) What are electrical vehicles? Explain control and controller of electrical vehicles. **[6]**

b) Write advantages and disadvantages of solar PV system. **[4]**

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

a) What is meant by thermal gasifier.

b) Explain importance of supercapacitors.

c) What are the methods to obtain energy from boimass?

d) Draw schematic diagram of solar dryer.

e) Discuss photovoltaic principle.

f) What is meant by energy audit.

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Total No. of Questions : 5]

SEAT No. : ____

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T.Y. B.Sc.

PHYSICS

(PHY - 3510) SEC (J) : Introduction to Arduino

Skill Enhancement Course - I

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

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

Instructions to the candidates:

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

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

a) On which language typical Arduino code based?

b) What language is the Arduino IDE built on?

c) What functions do Arduino IDE consists of?

d) How IDE differs from compiler?

e) What is full form of EEPROM?

f) The Atmega168 chip consist of how many bits?

Q2) Answer the following.

a) What are the libraries in Arduino? Explain any four of them. **[6]**

OR

Enlist any four advantages of Arduino. In which language Arduino software was written?

b) What are three important parts of Arduino? **[4]**

Q3) Answer the following.

a) Enlist the features of Atmega328p microcontroller. **[6]**

OR

What pins are available on Arduino uno board?

b) Explain the function of SPI. **[4]**

P.T.O.

Q4) Answer the following.

a) Differentiate between microprocessor & microcontroller. **[6]**

OR

Explain software structure functions in detail

b) What is resolution of the in-built ADC of microcontroller328p? **[4]**

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

a) Functions

b) Strings

c) Modules

d) List

e) Arduino

f) Building blocks of program

Total No. of Questions : 5]

SEAT No. : ____

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T.Y. B.Sc.

PHYSICS

PHY- 3510 (k) : Sensors & Transducer

Skill Enhancement Course - I

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

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Question No.2 to Question No.5 carry equal marks.***
4) ***Figures to right indicate full marks.***
5) ***Use of calculator & Log-table is allowed.***

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

a) Define sensor & give one example.

b) What is microphone?

c) State the Hall effect.

d) What are the types of temperature transducer?

e) State the two transducer that could be used to measure pressure.

f) What is the principle of LVDT?

Q2) Answer the following questions.

a) Describe the construction & working of strain gauge? **[6]**

b) What are the advantages & disadvantages of capacitive transducer? **[4]**

Q3) Answer the following questions.

a) Explain the various types of magnetic sensors & its working principle. **[6]**

b) When input voltage of an instrument changes from 10V to 12V, the corresponding output voltage changes from 50V to 60V. What will be the sensitivity of the instrument? **[4]**

P.T.O.

Q4) Answer the following questions.

a) Explain basic structure of LVDT & its operation. **[6]**

b) Calculate the sensitivity of LVDT, if an output voltage of 2mV is produced when the core of LVDT moves through a distance of 0.5mm. **[4]**

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

a) Active & passive transducer.

b) Thomson Effect.

c) A.C. & D.C. Potentiometer.

d) Resistance Temperature detector (RTD)

e) Light Dependent Resistor (LDR)

f) Hall effect sensor.

Total No. of Questions : 5]

SEAT No. : ____

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T.Y.B.Sc.

PHYSICS (Skill Enhancement Course - II)

PHY - 3511(L) Physics Workshop Skill

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

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 carries 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 Q factor of coil.

b) Define loading effect.

c) What is signal generator? State its different types.

d) What is balancing condition of D.C. bridge?

e) State advantages of digital meter or analog meter.

f) Define Resolution.

Q2) Answer the following questions.

a) Draw labeled diagram of cathode ray tube. Explain its construction and working. **[6]**

b) Explain working of A.C. Millivoltmeter with block diagram. **[4]**

Q3) Answer the following questions.

a) Draw a block diagram of LCR meter and explain its working. State the application of LCR meter. **[6]**

b) Write a principle and construction of voltmeter. **[4]**

P.T.O.

Q4) Answer the following questions.

a) Draw a block diagram of digital multimeter and explain its working. **[6]**

b) The expected value of the voltage across a resistor is 80V, However the measurement gives a value of 79V. **[4]**

Calculate -

i) Absolute error

ii) % error

iii) Relative accuracy

iv) % of accuracy

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

a) Explain Q meter.

b) Explain the cause of gross error.

c) Dual trace oscilloscope.

d) Advantage of electronic voltmeter.

e) Function generator.

f) Explain function of focus and intensity control on front pannel of CRO.

Total No. of Questions : 5]

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T.Y.B.Sc.

PHYSICS (Skill Enhancement Course - II)

PHY - 3511(M) : Biomedical Instrumentation

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

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

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

a) What is resting potential?

b) What are different types of electrodes used in ECG recording?

c) What is diastolic pressure.

d) What are the different types of biomedical sensors.

e) Define transducer.

f) What are the different types of bioelectric signals.

Q2) Answer the following questions.

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

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

P.T.O.

Q3) Answer the following questions.

a) Describe in detail the different types of ECG leads with suitable diagram. **[6]**

b) Describe in detail action potential with suitable examples. **[4]**

Q4) Answer the following questions.

a) Describe in detail heart sound with suitable diagram. **[6]**

b) Describe transducer for body temperature measurement. **[4]**

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

a) What is phonocardiography?

b) How to interpret the ECG (Electrocardiography).

c) Write a short note on "Electro – Conduction system of the heart".

d) What are the properties of bioelectrodes?

e) What are the different types of ECG recorders.

f) What is pulse Oximetry?

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Total No. of Questions : 5]

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T.Y.B.Sc

PHYSICS

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

(Skill Enhancement Course - II)

(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 Q2 to Q5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Use of calculator and log - table is allowed.***

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

a) State various factors influencing on the selection of NDT method?

b) Give any two applications of visual inspection method.

c) State the principle of thermography testing method.

d) Give the principle of liquid penetrant method.

e) State the principle of radiography testing method.

f) What are the stages of eddy current testing techique.

Q2) Answer the following questions.

a) What is computed tomography? Explain it with suitable diagram. **[6]**

b) Explain in brief helium leak testing method. **[4]**

Q3) Answer the following questions.

a) Explain in brief the types of developers used in liquid penetrant method. **[6]**

b) Explain how x-ray is useful for non-destructive testing in the field of medicine. **[4]**

P.T.O.

Q4) Answer the following questions.

a) Explain in brief the visual testing method. **[6]**

b) Explain with diagram the procedure of magnetic particle testing method. **[4]**

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

a) Acousting emission testing method.

b) Ultrasonic testing technique.

c) Water - Soluble developer.

d) Distinguish between active and passive approach of thermography testing method.

e) Liquid leak non - destructive testing method.

f) Limitations of visual inspection method.

Total No. of Questions : 5]

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T.Y.B.Sc.

PHYSICS (Skill Enhancement Course - II)

PHY - 3511(O) Acoustics Applications

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

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Use of calculator and log-table is allowed.***

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

a) Define sensitivity of carbon microphone.

b) What is acoustic delay?

c) Explain what is trauma.

d) What is an octave in music?

e) Define the term consonance.

f) Define phon.

Q2) Answer the following questions.

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

b) A direct radiator dynamic loudspeaker has mechanical impedance of 13.2 kg/s. The voice coil is 7.3 m in length and suspended in a magnetic field of 1.2 wb/m^2, find the transformation factor. **[4]**

Q3) Answer the following questions.

a) What are different types of loud speakers? Explain the working of horn loud speaker with the help of a neat diagram. **[6]**

b) A condenser microphone of diaphragm of radius 0.01 m is stretched to a tension of 2×10^4 N/m. If the spacing between the diaphragm and the backing plate is 4×10^{-5}m. Determine the open circuit voltage response for a polarizing voltage of 250V. **[4]**

P.T.O.

Q4) Answer the following questions.

a) i) What is reverberation? Explain reverberation time. State Sabine's formula for determination of reverberation time. **[4]**

ii) If the reverberation time is of 3.22 sec for a room of volume 1600 m3 then what will be total sound absorption. **[2]**

b) What are acoustic mufflers. Explain in detail working of a silencer. **[4]**

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

a) Growth and Decay of sound in live rooms.

b) Musical scales.

c) C-weighted sound level.

d) Musical Instruments Digital Interface (MIDI).

e) Environmental noise.

f) Noise rating.

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Total No. of Questions : 5]

SEAT No. : ____

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T.Y. B.Sc.

CHEMISTRY

CH - 501 : Physical Chemistry - I

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

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

Instructions to the candidates:

1) ***Question 1 is Compulsory.***
2) ***Solve any three question from Q.2 to Q.5***
3) ***Question 2 to 5 carry equal marks.***
4) ***Figure to the right indicate Full marks.***
5) ***Draw neat & labelled diagram whenever necessary.***
6) ***Use of logarithm tables and calculator is allowed.***

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

a) Write the equation for rotational constant.

b) Define frequency of radiation.

c) State Lambert's - Beer's law.

d) Define Degeneracy.

e) What is unit of dipole moment?

f) Why O_2 molecule is Raman active?

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

A) i) What is degeneracy corresponding to $E = \frac{9h^2}{8ma^2}$ for particle in three dimensional box.

ii) Identify the microwave active/inactive molecules.

HI; CO; H-H;

iii) State Grothus Draper law.

B) i) Calculate frequency of U.V. radiation of wavelengtn 3000A°. **[2]**

ii) Write the equation for change of rotational eneray level from $J \rightarrow J+1$

P.T.O.

transition and explain term involve it. **[2]**

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

A) i) Explain vibrational-rotational spectra of diatomic molecule.

ii) State the condition for well behaved wave function.

iii) Write the selection rule for

a) Rotational Spectrum.

b) Rotational-Raman Spectrum

c) Vibrational-Raman Spectrum.

B) Calculate the wave number of the first line in the Balmer Series. **[4]**

Q4) Answer <u>any two</u> of the follwoing. **[6]**

A) i) Define the following terms

a) Transmittance.

b) Optical density.

c) Radient Power.

ii) What is dipole moment? How it is useful in identification of linear geomentry of CO_2 molecule.

iii) Define the following terms.

a) Polar molecule.

b) Dipole moment.

c) Specific Refraction.

B) Calculate the reduced mass of ^{12}C ^{16}O. molecule.

[$N = 6.023 \times 10^{23}$] **[4]**

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

a) Chemiluminscence.

b) Chemical Actinometer.

c) de-Broglie's wavelength.

d) Merits and Demerits of microwave rotational spectroscopy.

e) Polarizability of molecule.

f) Significance of ψ and ψ^2.

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Total No. of Questions : 5]

SEAT No. :

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T.Y.B.Sc.
CHEMISTRY
CH - 502 : Analytical Chemistry - I
(CBCS 2019 Pattern) (Semester - V) (Paper - II) (35132)

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

Instructions to the candidates:

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

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

a) Define the term Gravimetric Analysis.

b) What is anion?

c) Give the long form of DTG.

d) Define the term matrix.

e) Calculate absorbance of a solution if transmittance is 0.35.

f) Calculate molar absorptivity of 0.05 M solution, when placed in 2 cm path length cell whose absorbance is 0.2.

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

a) What is post precipitation? Explain post precipitation with suitable example.

b) What is common ion effect? How it is used in dissociation of NH_4OH in HCl.

c) What is TGA? Describe decomposition of hydrated copper sulphate.

B) What is developing a procedure in analysis? Explain the parameter standerdising method. **[4]**

P.T.O.

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

a) Explain the term precipitation from homogeneous solution with suitable example.

b) What are interfering radicals in detection of cations? Explain removal of Borate.

c) Draw typical TG curve. Explain features of it.

B) A solution of absorbing material having conc. 1.8×10^{-5} moles, shows absorbance of 1.1. Calculate conc. of unknown solution of same species having absorbance 0.71 in the same cuvette. **[4]**

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

a) What is digestion? Explain any two advantages of it.

b) Write a short note on photomultiplier tube.

c) What is monochromator? Explain diffraction gratings as a monochromator.

B) Solubility product of AgCl is 1.2×10^{-10}. What is the solubility of AgCl in H_2O. **[4]**

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

a) Explain the role of organic precipitants in gravimetric analysis. Give any two structure of it.

b) Calculate gravimetric factor for following stoichiometric conversions?

Analyte	Molar Mass	Precipitate	Molar Mass
Ni	58.71	$Ni(DMG)_2$	288.7

c) What is accuracy? How it is expressed?

d) What is group reagent? Explain the case of NaOH in separation of group II cations.

e) Calculate the % loss for the following reaction.

$$Ca(OH)_{2(s)} \xrightarrow{D} CaO_{(s)} + H_2O \uparrow$$

[At. wt. of Ca : 40, 0: 16, H:1]

f) Draw schematic representation of single beam photoelectric colorimeter.

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Total No. of Questions : 5]

SEAT No. : ____

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T.Y.B.Sc.

CHEMISTRY

CH-504 : Inorganic Chemistry-I

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

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

Instructions to the candidates:

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

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

a) What is symmetry symbol for Porbital?

b) What do you mean by stability constant?

c) Calculate the magnetic moment for Cr^{3+} ion by using spin only formula (Cr at. no.24)

d) Write IUPAC name of element having atomic number 111.

e) Define semiconductor.

f) Arrange the following metals according to their decreasing order of electrical conductivity Na, Al, Mg.

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

i) Explain chelate effect.

ii) Discuss about variable oxidation state shown by transition elements.

iii) Write assumptions of [illegible].

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

i) Distinguish between inert and labile complexes.

ii) Explain Non-Stoichiometry with suitable example.

P.T.O.

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

i) Explain the use of heavy ion for bombardment in the preparation of trans uranic elements.

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

iii) What do you mean by associative mechanism? Explain it with the help of reaction profile.

b) Discuss the process for sepration of Lanthanides. **[4]**

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

i) Why $CuSO_4$ is blue while $ZnSO_4$ white?

ii) What is lanthanide contraction? Discuss the effect of Lanthanide contraction.

iii) Define super conductivity. Draw the structure of $\gamma Ba_2\ Cu_3\ O_7$-δ

b) Draw and explain the molecular orbital energy level diagram for $[Ni(NH_3)_6]^{2+}$ without π-bonding. **[4]**

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

a) Spectrochemical series.

b) Charge transfer spectra.

c) Oxidation state of d-block elements.

d) Misch metal.

e) Effect of temperature on conductivity of metal

f) N(E) Curve

Total No. of Questions : 5]

SEAT No. : ____

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T.Y. B.Sc.

CHEMISTRY

CH - 505 : Industrial Chemistry

(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 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 unit operation?

b) Define the term selectivity.

c) Write any two uses of nitric acid.

d) Explain the term molasses.

e) What are surfactants?

f) Define the term auxochrome.

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

i) Explain the physicochemical principle involved in manufacture of sulphuric acid.

ii) Discuss conditions favourable for fermentation.

iii) What are the properties and uses of white lead.

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

i) Copyright

ii) Detergent builders

P.T.O.

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

i) Give the importance of fermentation industry.

ii) Distinguish between soap and detergent.

iii) Write the synthesis and uses of phenolphthalein.

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

i) Discuss the functions of HR.

ii) Write a note on cleaning action of detergent.

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

i) SO_3 cannot be absorbed in water. Explain.

ii) Write the synthesis and use of aniline yellow.

iii) Give the synthesis and uses of fluorescein.

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

i) Explain the term quality control.

ii) Define the terms conversion and yield.

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

a) Write a short note on sulphuric acid fog.

b) Explain the physicochemical principles involved in manufacture of ammonia.

c) Discuss the uses of molasses.

d) What are basic requirements for fermentation.

e) Explain the cationic and anionic surfactants.

f) Discuss the raw material required for manufacture of soap.

Total No. of Questions : 5]

SEAT No. : ____

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T.Y. B.Sc.

CHEMISTRY

CH : 507 - Organic Chemistry - I

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

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

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q2 to Q.5.***
3) ***Question 2 to 5 carry equal marks.***
4) ***Figures to right indicate full marks.***

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

a) Write synthesis of furan from, 4-diketone.

b) How is diethylmalonate prepared?

c) Why furan is aromatic in nature?

d) Name any two rearrangonent reaction which takes place under thermal conditions.

e) State Hoffman elimination.

f) What is E1cB elimination?

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

i) Describe electrophilic substitution reactions of Naphthalene.

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

iii) Kinetic Isotopic effect is not observed in E_1 mechanism. Justify?

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

i) 2-Bromopentane on heating with NaOME gives 70% 2-pentene. Explain.

ii) Explain McLafferty rearrangement.

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

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

ii) Explain the reaction & mechanism of Favorski reacrrangement with suitable example.

iii) Explain orientation & reactivity in E_2 elimination reaction.

P.T.O.

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

i) $$2HC \equiv CH \xrightarrow[\Delta]{HCN} A \xrightarrow[Na/\ C_2H_5OH]{3H_2} B$$

ii) $$H_3C-\overset{O}{\overset{\|}{C}}-CH_2-\overset{O}{\overset{\|}{C}}-O\varepsilon t \xrightarrow[② CH_3CH_2-Br]{① NaO\varepsilon t} A \xrightarrow[\Delta,-CO_2]{H_2O/H^+} B$$

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

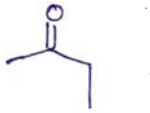
i) Explain Claisen rearrangement reaction takes place at ortho and para position.

ii) What is the reaction of following reagents with Pyrrole?

1) Cold H_2SO_4.
2) $CH_3COC1/A1C1_3$, Benzene.
3) Phenyl Diazorium slat.

iii) Explain the formation and stability of carbocation.

b) Identify the products 'A' & 'B' in the following reactions: **[4]**

i)  $\xrightarrow{\text{m-CPBA}} A + B$

ii) $$H_3C-CH_2-\underset{\underset{\oplus}{N}(CH_3)_3\ I^{\ominus}}{\underset{|}{CH}}-CH_3 \xrightarrow[\Delta]{Moist\ Ag_2O} A \xrightarrow{H_2/Ni} B$$

Q5) Write short notes on (any four). **[10]**

a) Schmidt Rearrangement.
b) Haworth synthesis of Anthracene.
c) Beckmann Rearrangement.
d) Evidences of E_1 mechanism.
e) Pinacol-Pinacolone rearrangement.
f) Nucleophilic substitution Reactions of Pyridine.

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Total No. of Questions : 5]

SEAT No. : ____

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[5822]-536
T.Y. B.Sc.
CHEMISTRY
CH-508: Chemistry of Biomolecules
(2019 CBCS Pattern) (Semester-V) (35138)

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

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Figure to right indicate full marks.***
5) ***Draw neat diagrams whenever necessary.***
6) ***Use of logarithm lables and calculations is allowed.***

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

i) Give any three functions of Endoplasmic Reticulum.

ii) Draw structure of maltose.

iii) Define peptide bond.

iv) What are the types of Blood Group?

v) Give two examples of oxidoreductase Enzyme.

vi) What are Group I hormones?

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

i) What are carbohydrates? What is the action of following on Glucose?

1) Br_2/ water

2) H_2 / Ni

ii) What are amino acids? Fxplain the reaction of amino acid with

1) Sanger's reagent

2) Dansyl chloride

iii) What are Hormones? Describe the classification of Hormones.

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

i) What is saponification number? Write its significance.

ii) What are the uses of enzymes in chemical industry?

P.T.O.

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

i) What are Eukaryotes? Explain in detail.

ii) What is rancidity? Write different types of rancidity.

iii) What are enzymes? Describe the classification of enzymes.

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

i) Write notes on classification of carbohydrates.

ii) Explain the following terms

1) Ampholytes

2) Zwitter ion

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

i) What are monosaccharides? Explain the reaction of following with D-Glucose

1) Dil HNO_3

2) $NaBH_4$

ii) What is a polypeptide? Give features of peptide bond.

iii) Write short notes on Hormones of Gonad.

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

i) What is iodine number? What are its significance?

ii) Explain the different types of Specificity of enzymes.

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

i) Give the function of cell wall & cell membrane in detail.

ii) What are polysaccharides? Give a brief account of Amylose & Cellulose.

iii) What are waxes? Give importance of waxes.

iv) What are proteins? Discuss α-helical structure with neat labelled diagram.

v) Define active site of enzyme. Discuss the effect of substrate concentration on rate of enzyme catalysed reaction.

vi) What is endocrine gland? Explain the functions of Hormones.

Total No. of Questions : 5]

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T.Y. B.Sc.

CHEMISTRY

CH - 510(A) : Introduction of Medicinal Chemistry

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

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any 3 questions from Q.2 to Q.5.***
3) ***Q.2 to Q.5 Carry equal Marks.***
4) ***Figures to the right indicates full marks.***
5) ***Draw neat diagrams whereer necessary.***
6) ***Use of logarithm tables & Calculators is allowed.***

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

a) What is a drug?

b) What is 'ADME' of a drug?

c) Name any two non infections diseases.

d) What are polyene antibiotics?

e) What is selective toxicity?

f) Draw the general structure of sulphonamides.

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

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

ii) What are antiinflammatory agent? Explain its two types with an example each.

iii) Give a brief over view of antiviral agents.

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

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

ii) Discuss classification of drugs on the basis of sources.

P.T.O.

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

i) What is cis platin? Give its mode of action. And also give any 2 side effects of it.

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

iii) Explain following terms with an example of each.

a) Serendipity

b) Sedatives

c) Antacids

b) Discuss importance of various physical properties of drugs in designing. What type of reactions drug can undergo in body? **[4]**

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

i) Discuss fungal infections and antifungal agents.

ii) What are tetracyclins? Discuss their SAR and mode of action.

iii) Discuss Covid-19 vaccines.

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

i) What is Therapeutic Index.

ii) Explain Lipinski Rule of five.

Q5) Draw structure write any 2 properties and mode of action of any 4 drugs. **[10]**

a) Ibuprofen

b) Aspirin

c) Acyclovir

d) Chloramphenicol

e) Ampnotrecin-B

f) Benzodiazepine

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Total No. of Questions : 5]

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T.Y. B.Sc.

CHEMISTRY

CH- 510B : Polymer Chemistry

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

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

Instructions to the candidates:

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

Q1) Attempt the following (any five) **[5]**

a) Define the term-polymerisation.

b) Terylene is the trade name of _____ polymer.

c) Name any two initiators used in anionic polymerisation.

d) In which polymerisation technique the polymerisation proceeds at the interface between an aqueous and organic medium?

e) Calculate the molecular weight of polyethylene polymer whose degree of polymerisation is 1800.

f) PMMA is the abbreviation used for _____ polymer.

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

i) Give the full account of cationic polymerisation.

ii) What are surfactants? Explain the micelle formation in emulsion polymerisation.

iii) Write the synthesis, properties and uses of polystyrene.

b) Distinguish between the following. **[4]**

i) Homopolymer and Copolymer.

ii) Linear and crosslinked polymer.

P.T.O.

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

i) What is glass transition temperature (Tg)? Comment on the Tg value of polyvinyl carbazole.

ii) Give a brief account of practical significance of molecular weight of polymers.

iii) What is bakelite? Give its commercial applications and draw the structure of bakelite.

b) What is meant by addition polymerisation? Give full account of free radical polymerisation with suitable example. **[4]**

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

i) Give advantages and disadvantages of suspension polymerisation.

ii) Discuss the methods of preparation of the monomer and polymer 'polyvinyl chloride'.

iii) Describe the important properties and applications of silicone polymer.

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

Fraction A : 110 molecules with molecular weight 11,000.

Fraction B : 130 molecules with molecular weight 12,000.

Fraction C : 160 molecules with molecular weight 15,000.

Calculate the number average molecular weight $\left(\bar{M}n\right)$ for the polymer. **[4]**

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

a) Molecular forces and bonding in polymers.

b) Ziegler Natta Catalysts.

c) Interfacial polymerisation.

d) Viscometric method for molecular weight determination.

e) Polyisoprene polymers.

f) Polyesters.

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Total No. of Questions : 5]

SEAT No. : ____

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T.Y.B.Sc.

CHEMISTRY

CH-511(A) : Environmental Chemistry

(CBCS - 2019 Pattern) (Semester - V) (351311A)

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

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

a) Define receptor.

b) Define pH.

c) What is water pollution?

d) What is Humic acid?

e) List the trace elements present in water.

f) What is microstraining?

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

i) Write a note on Chemical Oxygen Demant (C.O.D.).

ii) What is pesticides? Give classification of pesticides.

iii) Discuss Ion Exchange method for purification of waste water.

b) Explain the term “pathway of pollutant”. Give example. **[4]**

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

i) Explain sampling of water.

ii) Explain the carbon cycle.

iii) Write note on - Treatment of drinking water supply.

b) Comment on the sampling, preservation and treatment methods for any of the water quality determinations. **[4]**

P.T.O.

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

i) Explain sawage treatment.

ii) Write a note on minimata disease.

iii) Discuss the water quality w.r.t. pH and pE.

b) List different alkyl lead compounds. How TEL is decomposed. **[4]**

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

a) Write a note on oxidation pond.

b) What is meant by primary treatment of waste water?

c) What is meant by effluent?

d) Explain oil and marine pollution.

e) What is denitrification.

f) Write a note on Hydrosphere.

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Total No. of Questions : 5]

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T.Y.B.Sc.

CHEMISTRY

CH-511(B) : Cheminformatics

(CBCS - 2019 Pattern) (Semester - V) (351311B)

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

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

a) What is in silico methods?

b) What is pharmacogenomics?

c) What is lead compound?

d) Give any two applications of discovery studio in cheminformatics.

e) What is full structure search method?

f) What are the applications of schrodinger software.

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

i) Explain the assumptions of SMILE notations.

ii) Describe adjacency metric method.

iii) Explain the term SMILES, WLN and ROSDAL.

b) Calculate log p for drug whose concentration is 0.02121 in octanol and 0.04242M in water and comment. What does p stands for? Explain its significance briefly. **[4]**

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

i) Explain the terms cheminformatic and Bioinformatics.

ii) What is drug bank. Explain in brief.

iii) Explain the role of modelling toxicity in drug designing.

b) Explain the predictive methods for organic spectral data simulation. **[4]**

P.T.O.

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

i) Explain 3D search methods.

ii) Explain the significance of molecular docking.

iii) Explain zinc chemical library.

b) What is machine learning and its application in artificial intelligence. **[4]**

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

a) Marvin sketch software.

b) Sub structure search.

c) Molecular properties calculation.

d) Pubchem library.

e) Expert protein analysis system (Expasy).

f) GOLD software.

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Total No. of Questions : 5]

SEAT No. : ____

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T.Y. B.Sc.

BOTANY

BO-351 : Cryptogamic Botany (Algae & Fungi)

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

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

Instructions to the candidates:

1) ***Question 1 is Compulsory.***
2) ***Attempt any three questions from Q.2 to Q.5.***
3) ***Question 3 to 5 carry equal marks.***
4) ***Figure to the right indicate Full marks.***
5) ***Draw neat & labelled diagram whenever necessary.***

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

a) Define Fungi

b) What are heterocysts

c) What are endospore in Nostoc

d) Give occurrence of Chara

e) Define lichen

f) Enlist the name of host of Puccinia

Q2) a) Explain thallus structure of Batrachospermum **[6]**

b) Comment on asexual reproduction in Nostoc **[4]**

Q3) a) Comment on thallus structure and spore stages of Puccinia on wheat. **[6]**

b) Explain thallus structure of Mucor. **[4]**

Q4) a) Write economic importance of Lichens **[6]**

b) Describe asexual reproduction in Cercospora **[4]**

P.T.O.

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

a) Ectomycorrbizae

b) Vegetative structure of Cercospora

c) Occurrence of Penicillium

d) Zoospore in Oedogonium

e) Globule in Chara

f) Thallus in Sargassum

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Total No. of Questions : 5]

SEAT No. : ____

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[5822] - 542
T.Y.B.Sc.
BOTANY - II
BO - 352 : Archegoniate
(CBCS 2019 Pattern) (Semester - V) (Paper - II) (35142)

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

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Attempt any three questions from Q.2 to Q.5.***
3) ***Que. No. 2 to Que. No. 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) Give any two general characters of Bryophytes.

b) Write ports of typical sporophyte of Bryophytes.

c) Give taxonomic position of Marchantia.

d) Name the spore producing organ of Psilotum.

e) Write any two similarity between algae & bryophytes.

f) What is siphonostele?

Q2) a) Describe external structure of Marchantia thallus. **[6]**

b) Write characters of class Psilopsida. **[4]**

Q3) a) Describe internal structure of Anthoceros thallus. **[6]**

b) Explain the structure of synangium of Psilotum. **[4]**

Q4) a) Describe Progressive Evolution theory of evolution of Bryophytes. **[6]**

b) Give general characters of class Hepaticae. **[4]**

P.T.O.

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

a) Economic importance of Bryophytes.

b) Origin of Bryophytes from pteridophytes.

c) Structure of capsule in Funaria.

d) Ecological importance of Bryophytes.

e) Diversity and distribution of pteridophytes.

f) Sporangiophore of Equisetum.

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Total No. of Questions : 5]

SEAT No. : ____

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T.Y.B.Sc.

BOTANY-III

BO 353 : Spermatophyta and Paleobotany

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

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

Instructions to the candidates:

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

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

a) Define palaeobotany.

b) What is endemism?

c) Write an order of family oleaceae.

d) Mention any two botanical gardens.

e) Give any two characters of gymnosperms.

f) Mention the era of origin of Angiosperms.

Q2) a) Define species. Explain biological species concept. **[6]**

b) Explain the functions of Herbarium. **[4]**

Q3) a) What is APG IV system of classification? Give its merits and demerits. **[6]**

b) Comment on compression. **[4]**

P.T.O.

Q4) a) Describe female cone of Gnetum. **[6]**

b) Explain seed structure of Pinus. **[4]**

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

a) Economic importance of Gymnosperms.

b) Paleoendemizm.

c) Internal Structure Pinus root.

d) Features of Pseudoanthial theory.

e) Parapatric speciation.

f) Economic importance of Amaranthaceae.

Total No. of Questions : 5]

SEAT No. : ____

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T.Y. B.Sc.

BOTANY

BO - 354 : Plant Ecology

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

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

Instructions to the candidates:

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

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

a) Define homeostasis.

b) What is certification?

c) What is strategic environmental assessment (SEA)?

d) What is Natality?

e) What is ecology.

f) Define sensing.

Q2) a) Describe components of ecosystem. **[6]**

b) What is speciation? Describe any two types of speciation. **[4]**

P.T.O.

Q3) a) Describe community ecology. **[6]**

b) Describe carbon cycle. **[4]**

Q4) a) Describe audit processess of environmental audit. **[6]**

b) Describe the ‘r’ and ‘k’ selection of population ecology. **[4]**

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

a) ‘J’ shaped growth curve in population growth.

b) GPS.

c) Food Web.

d) Limitations of Environmental impact statement.

e) Pyramid of energy.

f) Advantages of remote sensing.

Total No. of Questions : 5]

SEAT No. : ____

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[5822]-545
T.Y. B.Sc.
BOTANY
BO-355 : Cell and Molecular Biology
(CBCS 2019 Pattern) (Semester - V) (Paper-V) (35145)

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

Instructions to the candidates:

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

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

a) Define Cell Biology.

b) Name the cell organelle(s) having their own genetic material.

c) Differentiate between euchromatin and heterochromatin.

d) Enlist enzymes required for prokaryotic DNA replication.

e) State the role of t-RNA in protein synthesis.

f) Define operon.

Q2) a) Explain ultrastructure and functions of a cell wall. **[6]**

b) Give brief account of prokaryotic promoters. **[4]**

Q3) a) Discuss a brief account of positive regulation of lac operon. **[6]**

b) Describe the structure of nuclear pore complex. **[4]**

Q4) a) Give a detailed account of initiation of DNA replication in prokaryotes. **[6]**

b) Explain types of cell surface receptors. **[4]**

P.T.O.

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

a) Griffith's transformation experiment.

b) Lampbrush chromosomes.

c) Structure and functions of peroxisomes.

d) Initiation of translation.

e) Types of DNA replication.

f) Plasmodesmata

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Total No. of Questions : 5]

SEAT No. :

P4886

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[5822]-546
T.Y. B.Sc.
BOTANY
BO - 356 : Genetics
(CBCS 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 Q2. to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Figures to right indicates full marks.***
5) ***Draw neat labelled diagrams wherever necessary.***

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

a) What is heredity?

b) Give any two branches of genetics.

c) What is mutation?

d) Define multiple alleles.

e) Which type of antigen and antibody found in blood group 'A'?

f) What is mean by polyploidy?

Q2) a) What is linkage? Describe three point test cross with suitable example. **[6]**

b) Comment on cob length in Maize. **[4]**

Q3) a) What is autopolyploidy? Explain the role of the autopolyploidy in crop improvement. **[6]**

b) Describe masking gene action (12:3:1) with suitable example. **[4]**

P.T.O.

Q4) a) What is sex - linked inheritance? Explain with suitable example. **[6]**

b) Comment on characteristics of crossing over. **[4]**

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

a) Backcross with suitable example.

b) Heteromorphic system of self-incompatibility.

c) Composition of chromosome

d) Translocation of chromosomes

e) Type of mutations

f) Incomplete dominance

Total No. of Questions : 5]

SEAT No. : ____

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[5822]-547

T.Y. B.Sc.

BOTANY

BO - 3510 : Medicinal Botany

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

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

Instructions to the candidates:

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

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

a) Define Endemic plants.

b) What is Air layering?

c) What are Indigenous systems of medicine?

d) Define Folk medicines.

e) What is umoor-e-tabiya?

f) Define Ethnoecology.

Q2) a) What is In-Situ conservation? Explain the importance of National parks in In-Situ conservation. **[6]**

b) Explain the objectives of Nursery. **[4]**

Q3) a) What is Grafting? Explain in brief Approach Grafting. **[6]**

b) Mention the applications of Folk medicines to cure diabetes. **[4]**

P.T.O.

Q4) a) What is Tridosha? Explain in brief concept of Tridosha. **[6]**

b) Describe medicinal plants used in Ayurveda with applications. **[4]**

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

a) Methods to study Ethnobotany.

b) Natural Products to cure Jaundice.

c) Advantages of Green House Technology.

d) Rasayana.

e) Ethnomedicinal Plants Garden.

f) Sunken Bed.

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Total No. of Questions : 5]

SEAT No. :

P4888

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[5822]-548
T.Y.B.Sc.
BOTANY
BO 3511: Plant Diversity and Human Health
(CBCS 2019 Pattern) (Semester-V) (351411)

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

Instructions to the candidates :

1) ***Q1 is compulsory.***
2) ***Attempt any three questions from Que. No.2 to Que. No.5.***
3) ***Que. No.2 to Que. No.5 carry equal marks.***
4) ***Figures to right indicate full marks.***
5) ***Draw neat labelled diagrams wherever necessary.***

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

a) Give any one importance of diversity.

b) Define genetic variability.

c) What is inbreeding depression?

d) What is the role of IUCN?

e) Define alpha diversity.

f) What is CBD?

Q2) a) Explain the scope of plant diversity. **[6]**

b) Write different roles of agrobiodiversity. **[4]**

Q3) a) Give details of forest utilization. **[6]**

b) Explain National Legal frame work on biodiversity. **[4]**

Q4) a) Give values and uses of biodiversity. **[6]**

b) Explain different diversity indices based on species. **[4]**

P.T.O.

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

a) Artificial ecosystem.

b) Wild taxa relatives of cultivated plants.

c) Loss of ecosystem.

d) Role of WWF.

e) Medicinal plant species.

f) The plants grown as an ornamentals in India.

Total No. of Questions : 5]

SEAT No. :

P4889

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T.Y. B.Sc.

ZOOLOGY

ZO : 351 - Pest Management

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

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

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three Questions From Q2 to Q.5.***
3) ***Q.2 to Q.5 carry equal marks.***

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

a) Eradication of pest.

b) Hormonal control.

c) Weed killers.

d) Chemical control.

e) Insecticide laws.

f) Cultural control.

Q2) a) Define ecology and its importance in pest management. **[6]**

OR

What are the different forms of pesticides.

b) Distinguish between intercroping and trap crop. **[4]**

Q3) a) What is pheromonal control? Describe it? **[6]**

OR

What is contanct poision? Describe it?

b) Crop rotation. **[4]**

P.T.O.

Q4) a) Describe the formulation of insecticides and their uses. **[6]**

OR

Biological control of weed.

b) Describe forest pest any two. **[4]**

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

a) Parasitoids.

b) Structural pest.

c) Conventional biotechnology.

d) Transgenic plant.

e) Microbial agent.

f) Principles and components of IPM.

Total No. of Questions : 5]

SEAT No. :

P4890

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[5822] - 550
T.Y.B.Sc.
ZOOLOGY
ZO - 352 : Histology
(2019 CBCS Pattern) (Semester - V) (Paper - II) (35152)

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

Instructions to the candidates:

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

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

a) What is tissue?

b) Define Sarcolemma.

c) Define enamel.

d) Oxyntic cells.

e) What is nephron?

f) Beta cells.

Q2) a) With neat labelled diagram describe V.S. of skin. **[6]**

OR

Describe histology of mammalian stomach with special reference to gastric epithelium.

b) Write short note on structure of skeletal muscle. **[4]**

Q3) a) Explain T.S of Liver. **[6]**

OR

Explain T.S of Testis.

b) Describe Juxta Glomerular complex. **[4]**

P.T.O.

Q4) a) Discuss histological structure of Anterior pituitary. **[6]**

OR

Discuss histological structure of Islet's of Langerhan's and give its functions.

b) Sketch and label V.S. of Tooth. **[4]**

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

a) Adipose connective tissue.

b) Goblet cells.

c) Taste buds.

d) Role of microvilli in intestine.

e) Sharpey's fibres.

f) Name the hormones of Adrenal medulla.

♦ ♦ ♦

Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages : 2

[5822]-551
T.Y.B.Sc.
ZOOLOGY
ZO 353 : Biological Chemistry
(CBCS 2019 Pattern) (Semester-V) (Paper-III) (35153)

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

Instructions to the candidates:

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

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

a) Define p^H

b) State any two examples of Monosaccharides.

c) Define non-essential amino acid.

d) What is Km?

e) What is Glycogenesis?

f) What are fatty acids?

Q2) a) Give an account on isomerism in carbohydrates. **[6]**

OR

Explain competitive and non-competitive enzyme inhibition.

b) Describe primary structure of protein with suitable example. **[4]**

Q3) a) Describe the effect of substrate concentration on enzyme activity. **[6]**

OR

What are carbohydrates? Give the biolgoical importance of carbohydrates. **[4]**

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

P.T.O.

Q4) a) Give an account on IUB system of enzyme classification. **[6]**

OR

Describe the biological importance of proteins

b) What is allosteric inhibition of enzyme. **[4]**

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

a) Importance of Biochemistry in Life science.

b) State H-H equation and give its application.

c) PKU

d) Disaccharides

e) Co enzymes

f) α-Helix

Total No. of Questions : 5]

SEAT No. :

P4892

[Total No. of Pages : 2

[5822]-552

T.Y. B.Sc.

ZOOLOGY

ZO - 354 : Genetics

(CBCS 2019 Pattern) (Semester - V) (Paper IV) (35154)

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 Muton.

b) What is Somatic mutation?

c) Explain Monohybrid Cross.

d) Define Genepool.

e) What is karyotype?

f) Define phenotype.

Q2) a) Describe the characteristics and importance of multiple alleles with suitable example. **[6]**

OR

Describe UV radiation as mutagenic agent.

b) Write note on Genetic counceling. **[4]**

Q3) a) Explain the Hardy-Weinberg law. **[6]**

OR

Explain any two types of sex determination methods in animal.

b) Write note on Haemophilia. **[4]**

P.T.O.

Q4) a) Discuss the Mendel law of Independent assortment. **[6]**

OR

Discuss Rh-blood group system.

b) Down syndrome. **[4]**

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

a) Classical concept of gene.

b) Lethal allele.

c) Alkylating agent.

d) Panmictic mating.

e) Gynandromorphism.

f) Gene Mutation.

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Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages : 2

[5822]-553

T.Y. B.Sc.

ZOOLOGY

ZO : 355 - Developmental Biology

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

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

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three Questions From Q2 to Q.5.***
3) ***Question No. 2 to 5 carry equal marks.***

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

a) Define developmental biology.
b) Explain cell communication.
c) What is morphogenesis?
d) Define gametogenesis.
e) Explain alecithal egg.
f) What is amphimixis?

Q2) a) Describe the process of spermatogenesis. **[6]**

OR

Describe the theory of preformation.

b) Explain penetration of sperm. **[4]**

Q3) a) Describe different planes of cleavage. **[6]**

OR

What is blastulation? Describe blastulation in Amphioxus.

b) Describe epiboly. **[4]**

Q4) a) Describe formation of primitive streak in chick. **[6]**

OR

Describe invagination, involution & ingression in Frog.

b) Describe structure of Hen's egg. **[4]**

P.T.O.

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

a) Axial gradient theory.
b) Significance of fertilization.
c) Discoblastula.
d) Chemotaxis.
e) Types of fertilization.
f) Dedifferentiation.

Total No. of Questions : 5]

SEAT No. :

P4894

[Total No. of Pages : 2

[5822]-554
T.Y. B.Sc.
ZOOLOGY
ZO - 356 : Parasitology
(CBCS 2019 Pattern) (Semester - V) (Paper - VI) (35156)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q2. to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***

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

a) Define commensalism.

b) What is Endoparasite?

c) What is Host parasite relationship?

d) Define Intermediate Host.

e) Define Mutualism.

f) Define Reservior Host.

Q2) a) Describe Life cycle of Entamoeba histolytica & add a note on control measures **[6]**

OR

Describe Epidemiology, Pathogenicity & prophylaxis, treatment of Taenia solium.

b) Describe mode of infection of Rat flea. **[4]**

P.T.O.

Q3) a) What is Host specificity? Explain types of Host specificity. **[6]**

OR

Describe morphology, pathogenicity and control measures of Bed bug.

b) Describe erythrocytic schizogony of P. vivax. **[4]**

Q4) a) Explain in brief types of parasites with examples. **[6]**

OR

Describe Life cycle of plasmodium vivax.

b) Write mode of infection of Entamoeba histolytica. **[4]**

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

a) Morphology of T. solium.

b) Control measures of Head louse.

c) Disease caused by E. histolytica.

d) Encystment in P. vivax.

e) Parasitic adaptation in Tick.

f) Parasitic modification in Head louse.

Total No. of Questions : 5]

SEAT No. : ____

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T.Y. B.Sc.

ZOOLOGY

ZO- 3510 : Aquarium Management

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

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

Instructions to the candidates:

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

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

a) Nutritional value of fishes.

b) Induced fish breeding

c) Guppy fish

d) Fish handling.

e) Cottage industry.

f) Fish mortality

Q2) a) Describe endemic species for aquarium. **[6]**

OR

Describe composition of fish feeds.

b) What are rules and regulations of fish rearing. **[4]**

Q3) a) Describe physical parameters of water for fish culture. **[6]**

OR

Describe fish preservation techniques.

b) Describe natural breeding. **[4]**

P.T.O.

Q4) a) Describe exotic species for fish culture in aquarium. **[6]**

OR

Describe live fish feed organims.

b) Live fish transport. **[4]**

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

a) Fish farm

b) Sexual dimorphism in swordtail and gold fish.

c) Chemical properties of water for aquarium.

d) Scope of aquarium

e) Butterfly fish

f) Benefits of aquarium.

Total No. of Questions : 5]

SEAT No. :

P4896

[Total No. of Pages : 2

[5822]-556
T.Y.B.Sc.
ZOOLOGY
ZO-3511: Poultry Management
(CBCS 2019 Pattern) (Semester-V) (351511)

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

Instructions to the candidates:

1) ***Q1 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) Explain breeding in birds.

b) What is indigenous species.

c) What are feed ingredients.

d) Define candling of eggs.

e) Explain poultry manure.

f) What is Ranikhet disease.

Q2) a) Describe general aspects of breeding for body weight gain of chickens. **[6]**

OR

Describe Commercial poultry farm.

b) Explain importance of poultry farming in India. **[4]**

Q3) a) What is formulation of feed for starter, finisher, and breeder. **[6]**

OR

Explain infectious bronchitis and chronic respiratory disease.

b) Describe in short the vaccination schedule for poultry birds. **[4]**

P.T.O.

Q4) a) Describe incubation and hatching of eggs. **[6]**

OR

Describe internal and external parasites of poultry birds.

b) Explain any one type of poultry farm? **[4]**

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

a) Transport strategy of poultry birds.

b) Feed conservation ratio.

c) Induced breeding.

d) Artificial insemination.

e) AGMARK standard of egg.

f) Chicken pox.

Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages : 2

[5822]-557

T.Y. B.Sc.

GEOLOGY

GL : 311 - Geology of India - I

(2019 Pattern) (Semester - V) (Revised Syllabus) (Paper - I) (35161)

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

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three Questions From Q2 to Q.5.***
3) ***Question No.5 2 to 5 carry equal marks.***

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

a) Define Craton.

b) Give the economic importance of Vindhyan Supergroup.

c) Give the lithology of Eastern Ghat Mobile belt.

d) Define shield.

e) On which Craton Bababudan Group is present?

f) Kheinjua Formation is present in which supergroup?

Q2) Answer the following (short notes).

a) Lower Vindhyan Supergroup. **[6]**

b) Stratigraphy of Cuddapah Supergroup. **[4]**

Q3) Write note on.

a) Kaladagi Group. **[6]**

b) Bundelkhand craton. **[4]**

P.T.O.

Q4) Answer the following.

a) Give the geographical location, classification. succession and lithology of SINGHBHUM CRATON. **[6]**

b) Stratigraphy of Aravalli Craton. **[4]**

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

a) Name Granites from Singhbhum Craton.

b) What is trend and importance of Dharwar Supergroup.

c) What is mineral composition of 'Khondalita' .

d) Name all 'Purana' Basins present in India.

e) What is mineral composition of Charnokite?

f) Write three divisions of upper Vindhyans.

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Total No. of Questions : 5]

SEAT No. :

P4898

[Total No. of Pages : 2

[5822] - 558
T.Y. B.Sc.
GEOLOGY
GL 312 : Mineral Resources
(2019 Pattern) (Semester - V)

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

Instructions to the candidates:

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

Q1) Answer the following in 2-3 sentences (Any 5) **[5]**

a) Define syngenetic deposits.

b) Define Tenor of ore.

c) Hypopothermal Epithermal & Mesothermal deposits.

d) Elluvial placer deposits.

e) Uses of chromite.

f) Gossans.

Q2) Answer the following.

a) Explain immiscible liquid segregation. **[6]**

b) Give the uses of Uranium & Thorium. **[4]**

Q3) Answer the following.

a) Describe the criteria for metasomatic replacement. **[6]**

b) Give the geographical distribution of Lead-Zinc deposits in India. **[4]**

P.T.O.

Q4) Answer the following.

a) Explain magmatic segregation deposits. **[6]**

b) Describe the solution cavity filling deposits. **[4]**

Q5) Write short notes on (any four) **[10]**

a) Classification of metalliferous deposits

b) Fissure vein and its types

c) Breccia filling deposits

d) Zone of oxidation

e) Geographical distribution of Iron ores in India.

Total No. of Questions : 5]

SEAT No. :

P4899

[Total No. of Pages : 2

[5822]-559
T.Y.B.Sc.
GEOLOGY
GL-313 : Marine Geology
(2019 Pattern) (Semester-V) (Paper-III) (Revised) (35163)

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

Instructions to the candidates:

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

Q1) Answer the following questions in 2-3 lines? **[5]**

a) Enlist the mineral resources of continental shelves.

b) Define Harzburgite.

c) Name the two trenches present in the Indian Ocean.

d) Name the two common chemical compounds in biogenous sediment.

e) Where does the mercury in the Ocean come from?

f) Give any two importance of EEZ.

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

a) Explain the major divisions of Ocean floor with neat labeled diagram. **[6]**

b) Explain the Basalts of Ocean floor. **[4]**

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

a) Give the detailed classification of Marine sediments. **[6]**

b) Explain the evolution of Indian Ocean. **[4]**

P.T.O.

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

a) Define Exclusive Economic Zone (EEZ). Explain the origin and disputes of EEZ. **[6]**

b) Explain the marine environmental problems associated with petroleum industry. **[4]**

Q5) Write short notes on ANY FOUR of the following. **[10]**

a) Write a short note on Deep sea plain or Abyssal plain.

b) Oceanic Crust.

c) Explosion Seismology.

d) Sewage sludge.

e) Distribution of Lithogenous sediments.

f) Origin of Hydrogenous Sediments.

Total No. of Questions : 5]

SEAT No. :

P4900

[Total No. of Pages : 2

[5822]-560

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) ***Questions 2 to 5 carry equal marks.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) Attempt the following in 2-3 lines. (any five) **[5]**

a) Define Engineering Geology.

b) Name two Gravity Dams in India.

c) Porosity of rock.

d) Give types of Tunnels.

e) What is grouting?

f) Uniaxial compressive strensth.

Q2) a) Enlist factors controlling Engineering properties of rock. Explain any two of them. **[6]**

b) Define aggregates and explain the types. **[4]**

Q3) a) Explain the site selection of Dam & Reservoir construction. **[6]**

b) Enlist types of tunnels and mention name and location of any 5 tunnels in India. **[4]**

P.T.O.

Q4) a) Write a note on significance of Geology in Engineering and Environmental projects. **[4]**

b) Tunneling in folded and bedded rocks.

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

a) Building stone.

b) Physical properties of aggregates,

c) Mumbai Sea link,

d) Types of Dam.

e) Foundation rock for reservoir.

f) Role of groundwater in tunneling.

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Total No. of Questions : 5]

SEAT No. : ____

P4901

[Total No. of Pages : 2

[5822]-561

T.Y.B.Sc.

GEOLOGY

GL -315 : Hydrogeology

(2019 Pattern) (Semester - V) (35165)

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

Instructions to the candidates:

1) ***Question no. 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 lines (Any 5) **[5]**

a) Define Hydrogeology.

b) Define specific yield.

c) What is unit of transmissivity?

d) Define aquifer with example.

e) Statement : Darcy's law.

f) What is hydraulic head.

Q2) Answer the following:

a) Explain validity of Darcy's law. **[6]**

b) What is hydraulic conductivity. **[4]**

Q3) Answer the following:

a) Explain well inventory procedure. **[6]**

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

Q4) Answer the following:

a) WHO standards for drinking water. **[6]**

b) Explain anthropogenic groundwater contamination. **[4]**

P.T.O.

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

a) Hydrogeology in Maharashtra.

b) Geogenic contamination.

c) Storativity and transmissivity.

d) Tracers in ground water flow studies.

e) Irrigation water standards.

f) Theim's equilibrium method.

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Total No. of Questions : 5]

SEAT No. : ____

P4902

[Total No. of Pages : 2

[5822]-562
T.Y.B.Sc.
GEOLOGY
GL-316 : Applied Geophysics
(35166) (2019 Pattern) (Semester-V) (Revised Syllabus)

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

Instructions to the candidates:

1) ***Question no. 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 lines (any 5) **[5]**

a) Define self potential.

b) What is electrolytic polarization.

c) What is Anamoly is geophysical studies?

d) Air borne surveys

e) What is magnetometer?

f) What is Gravimeter?

Q2) Answer the following.

a) Explain seismic reflection method. **[6]**

b) Processing in Magnetic method. **[4]**

Q3) Answer the following.

a) Explain Air Borne Gravity survey. **[6]**

b) Types of magnetometer. **[4]**

P.T.O.

Q4) Answer the following.

a) Gravity method in mineral exploration. **[6]**

b) What is Bouguer Anamoly? **[4]**

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

a) Magnetic anamolies

b) Seismic refraction method.

c) Resistivity meter

d) Principles of resistivity method.

e) Magnetometer

f) Air borne magnetic surveys.

Total No. of Questions : 5]

SEAT No. : ____

P4903

[Total No. of Pages : 2

[5822]-563

T.Y. B.Sc.

GEOLOGY

SEC - 1 : Geotechnology

(2019 Pattern) (Semester - V) (Paper - I) (351610) (Revised Syllabus)

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) Answer the following questions in 2-3 lines (Any Five). **[5]**

a) Enlist the drilling equipments.

b) Define Core logging.

c) Enlist the parameters considered for calculations of Rock mass rating (RMR) Any two.

d) Define Bench Marks.

e) Enlist the types of foundations.

f) Define line of collimation.

Q2) Answer the following.

a) Define leveling staff, its types and uses of levelling staff in details. **[6]**

b) Enlist the objectives of levelling and surveying and uses in brief. **[4]**

Q3) Answer the following.

a) Explain standard penetration test with neat labelled diagram (S.P.T). **[6]**

b) Draw a neat lebelled diagram of Theodolite and explain steps involved in levelling using theodolite. **[4]**

P.T.O.

Q4) Answer the following.

a) Describe the methods of computation of Reduced level, explain collimation system in detail. **[6]**

b) Explain the determination of specific gravity of soil using pyenometer. **[4]**

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

a) What is fundamental difference between surveying & levelling.

b) Direct shear test.

c) Define plastic limits.

d) Rotary drilling and it's application.

e) General principle of levelling.

f) permanat Bench marks.

Total No. of Questions : 5]

SEAT No. :

P4904

[Total No. of Pages : 2

[5822]-564
T.Y.B.Sc.
GEOLOGY
SEC II: Gemology and Gem Testing
(2019 Pattern) (Semester-V) (Regular) (351611)

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

Instructions to the candidates:

1) ***Question1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Neat diagrams must be drawn wherever necessary.***

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

a) Name opaque gem varieties.

b) Name gem varieties of garnet.

c) Define Gemology.

d) How to measure the R.I. of gemstone.

e) What are synthetic gemstones.

f) Use of handlense in gem identification.

Q2) Answer the following :

a) Describe different varieties of silica w.r.t. their properties and occurences. **[6]**

b) Write note on diamond. **[4]**

Q3) Answer the following :

a) Write uses of UV lamp. **[6]**

b) Write a note on optical phenomenon(sheen) of a gemstone. **[4]**

P.T.O.

Q4) Answer the following :

a) Enumerate different physical properties of gemstone. **[6]**

b) How to study optic sign of a gemstone? **[4]**

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

a) Give classification of gemstones w.r.t. colours.

b) Write note on impurities in gemstones.

c) Define total internal reflection.

d) Role of surface water in gem formation.

e) Write about chatoyancy effect.

f) Write a note on Coral.

Total No. of Questions : 4]

SEAT No. : ____

P4905

[Total No. of Pages : 2

[5822]-565

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) ***Figure to the right indicate full marks.***
3) ***Use of statistical tables and calculator is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following. **[1 each]**

a) In each of the following cases, choose the correct alternative:

i) if $X \rightarrow C$ (μ=0, λ=1)then distribution of X^2 is_____

a) $\beta_1(0.1)$ b) $\beta_1(1/2, 1/2)$

c) $\beta_2(1/2,1)$ d) $\beta_2(1/2, 1/2)$

ii) Let $X \rightarrow \beta_1(3,12)$ and let $Y = \frac{1-X}{X}$ then the distribution of Y is_____

a) $\beta_1(3,12)$ b) $\beta_2(12,3)$

c) $\beta_2(3,12)$ d) $\beta_1\left(\frac{1}{3},\frac{1}{12}\right)$

iii) A sequence of random variables $X_1, X_2, ..., X_n$ is said to convergence in probability to α is for any $\varepsilon > 0$, then $\lim_{n\to\infty} P(|Xn-\alpha|>\varepsilon)$=_____

a) 1 b) 0

c) ½ d) ⅔

b) In each of the following, state whether the given statement is true or false: **[1 each]**

i) If $X \rightarrow C(\mu,\lambda)$ 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 $P(U \le \frac{1}{2})$.

c) Let X_1, X_2, X_3 be a random sample taken from U (9,10) distribution. The compute the probability that the min $\{X_1,X_2,X_3\}$ is less than 9.5

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 Chebychev's inequality, compute lower bound for $\left(|X-\frac{2}{3}|<1/3\right)$

c) If $X \rightarrow \beta_1$ (m,n) with $E(X)=\frac{1}{4}$ and $Var(X)=\frac{1}{8}$ 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) respectively. then show that U=X+Y and $V=\frac{X}{Y}$ are independently distribution random variable and identify their distributions. **[7]**

ii) Let $X \rightarrow C(0,1)$ then find $P(X \le 1)$ **[3]**

b) i) If $\{X_n, n \ge 1\}$ be a sequence of 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 $X_1, X_2, ...X_n$ are independently and identically distributed U(0,1) random variates. Obtain distribution of max $\{X_1,X_2,.....X_n\}$ **[4]**

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Total No. of Questions : 4]

SEAT No. : ____

P4906

[Total No. of Pages : 2

[5822] - 566
T.Y. B.Sc.
STATISTICS
ST 352 : Theory of Estimation
(2019 Pattern) (Semester - V) (35172)

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 calculators is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following: **[1each]**

a) In each of the following cases, choose the correct alternative:

i) If $X \sim N(\mu, \sigma^2)$, σ^2 is known then the information function $I(\mu)$ is

a) μ/σ^2 b) $\frac{1}{\sigma}$

c) $1/\sigma^2$ d) σ

ii) If X_1, X_2 are independent and identically distributed Poisson (λ) variables and $T_1 = \frac{X_1 + 2X_2}{3}, T_2 = \frac{X_1 + X_2}{2}$ Then relative efficiency of T_1 with respect to T_2 is

a) $\frac{9}{10}$ b) $\frac{10}{9}$

c) $\frac{5}{3}$ d) $\frac{3}{5}$

iii) If $X_1, X_2, \ldots \ldots \ldots .., X_n$ is a random sample from a probability distribution having pmf $P(X = x) = p^x (1-p)^{1-x}$ *for* $x = 0,1$ *and* $0 < p < 1$, then the sufficient statistic for p is

a) $\sum_{i=1}^{n} x_i$ b) $\prod_{i=1}^{n} x_i$

c) $\sum_{i=1}^{n} x_i^2$ d) $\prod_{i=1}^{n} x_i^2$

P.T.O.

b) In each of the following, state whether the given statement is true or false: **[1 each]**

i) Unbiased estimator is unique

ii) If T_1 and T_2 are two independent unbiased estimators of θ with equal variance then $\frac{(T_1+T_2)}{2}$ is more efficient than T_1 and T_2.

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

a) Let $X_1, X_2, \ldots\ \ldots\ \ldots\ .., X_n$ is a random sample from Bernoulli distribution with parameter p. Show that $\frac{T(T-1)}{n(n-1)}$ is an unbiased estimator of p^2 where $T = \sum_{i=1}^{n} x_i$.

b) Let $X_1, X_2, \ldots\ \ldots\ \ldots\ .., X_n$ is a random sample from Poisson distribution parameter λ then Show that $T = \sum_{i=1}^{n} X_i$ is a sufficient statistic for λ.

c) If $X_1, X_2, \ldots\ \ldots\ \ldots\ .., X_n$ is a random sample from $N(\mu, \sigma^2)$ when μ is known find the maximum likelihood estimator of σ^2.

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

a) Define Fisher Information Function. Also Find the Fisher information function $I(\lambda)$ for *Poisson* (λ).

b) Describe method of moments to estimate the parameter. Also find Moment estimator of p for Bernoulli (p).

c) If $X_1, X_2, \ldots\ \ldots\ \ldots\ .., X_n$ is a random sample from $N(\mu, \sigma^2)$ then show that $T = \frac{1}{(n-1)} \sum_{i=1}^{n} (X_i - \bar{X})^2$ is a consistent estimator of σ^2.

Q4) Attempt any one of the following.

a) i) State and Prove Cramer-Rao inequality. **[6]**

ii) If $X_1, X_2, \ldots \ldots \ldots \ldots, X_n$ is a random sample from exponential distribution with mean θ then find minimum variance bound unbiased estimator of θ. **[4]**

b) i) 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 $T_2 = \frac{x_1+2x_2+3x_3}{6}$. **[5]**

ii) Show that sample moment of order r is an unbiased estimator of population moment of order r. **[5]**

Total No. of Questions : 4]

SEAT No. : ____

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[Total No. of Pages : 2

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T.Y.B.Sc.

STATISTICS (Principal)

ST-353 : Design & 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.***

Q1) Attempt each of the following. **[1 each]**

A) In each of the following cases, choose the correct alternative:

i) In case of Latin Square Design, the number of components into which total sum of squares in split into is

a) 2 b) 5

c) 4 d) 3

ii) Consider an experiment with two fertilizers. Potash (K) with p different varieties and Nitrogen (N) with q different varieties. To test the effectiveness of different varieties of these two fertilizers which among the following experimental design should be used.

a) Latin Square Design

b) Factorial Design

c) Completely Randomized Design

d) Randomized Block design

iii) Which of the following diagram can be used to compared the treatment means

a) Normal Probability plot b) Histogram

c) Box plot d) Q-Q plot

B) In each of the following. state whether the given statement is true or false: **[1 each]**

i) A 2^3 factorial experiment has 3 factors each at two levels.

ii) In case of partial confounding same factorial effect is confounded in each replicate.

P.T.O.

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

a) Show that mean sum of squares due to error is unbiased estimator of error variance σ^2 in RBD.

b) Explain Yate's procedure to obtain factorial effect totals in 2^3 factorial experiment.

c) State one real life situation where followings designs can be used

i) Completely Randomized Design (CRD).

ii) Randomized Block Design (RBD).

iii) Latin Square Design (LSD).

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

a) State the model for CRD with assumptions. Obtain the least squares estimators of parameters involved in this model.

b) Obtain the formula of efficiency of RBD over corresponding CRD.

c) Explain the concept of confounding in factorial experiments by differentiating between total and partial confounding.

Q4) Attempt any one of the following. **[10]**

a) i) Explain the procedure for testing for equality of two specified treatment effects using critical difference method in case of LSD.

ii) Explain the basic principles of design of experiments.

b) i) Compute the relative efficiency of LSD with respect of RBD by using.

1) Rows as blocks

2) Columns as blocks

based on the following information:

Treatment Sum of Squares = 140.5.Raw Sum of Squares = 120.3.

Column Sum of Squares = 195.7, Total Sum of Squares = 570.2, Number of Rows = 4

ii) Define factorial experiments. Provide analysis of variance (ANOVA) table for 2^3 factorial experiments.

Total No. of Questions : 4]

SEAT No. :

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[Total No. of Pages : 3

[5822]-568
T.Y. B.Sc.
STATISTICS
ST - 354 : Statistical Process and Product Control
(2019 Pattern) (Semester - V) (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) ***Symblos and abbreviations have their usual meaning.***

Q1) Attempt each of the following: **[3×1=3]**

(A) In each of the following cases, choose the correct alternative:

a) Which of the following indicates that the spread of the specification limits is greater than the spread of the process?

i) $C_p = 1$ ii) $C_p = 0$

iii) $C_p < 1$ iv) $C_p > 1$

b) Which of the following control chart types is applicable to monitor the number of errors per page in a printed document?

i) $\bar{X}$ chart ii) R chart

iii) C chart iv) X-MR chart

c) In case of the p chart for unequal sample sizes and no standards specified, which of the following is the correct expression for the upper control limit corresponding to an i^{th} sample?

i) $p_i + 3\sqrt{\frac{p_i q_i}{n_i}}$ ii) $\bar{p} + 3\sqrt{\frac{\bar{p}\bar{q}}{n_i}}$

iii) $\bar{p} + 3\sqrt{\frac{p_i q_i}{n_i}}$ iv) $p_i + 3\sqrt{\frac{pq}{n_i}}$

P.T.O.

(B) In each of the following, state whether the given statement is true or false: **[2×1=2]**

a) A histogram as a process control tool helps to study the nature of underlying probability distribution of the variable of interest.

b) Natural tolerance limits are specified for averages and not individual observations, and hence are plotted on control charts.

Q2) Attempt any two of the following: **[2×5=10]**

a) Explain the working of a Double Sampling Plan. Also state the expression for evaluating the probability that a lot will be accepted under a Double Sampling Plan.

b) For a continuous production process, it is given that $\bar{R} = 34.28, \bar{\bar{X}} = 223, n = 5.$ If the upper and lower specification limits are 255 and 185 respectively, calculate the percentage of non-conformities.

c) Explain the construction and working of p - chart for process fraction defective not specified and unequal subgroup sizes.

Q3) Attempt any two of the following: **[2×5=10]**

a) What are the three criteria for detecting lack of control situations with respect to control charts? Illustrate these criteria through sketches.

b) Explain chance causes and assignable causes of variation. Classify each of the following as chance or assignable cause:

i) Machine operator falling asleep.

ii) Slight vibration in machine being used.

c) The following information is given for a continuous production process:

$\sum_{i=i}^{30} R_i = 300, \sum_{i=1}^{30} \bar{X}_i = 18000, n = 5, k = 30.$ From the given information, calculate the following:

i) Estimates of process average and process standard deviation

ii) Control limits for R chart

iii) Control limits for $\bar{X}$ chart

Q4) Attempt any one of the following:

a) i) A Single Sampling Plan operates on lots of sizes 50000. A sample of size 40 is taken, and if the number of defectives in the sample is 3 or less, the lot is accepted. Calculate producer's risk if AQL = 0.03 and consumer's risk if LTFD = 0.10. **[6]**

ii) Explain what are specification limits and tolerance limits, along with the comparison between them. **[4]**

b) i) Explain the construction of OC curve for a Single Sampling Plan. **[3]**

ii) What is quality? Explain in brief the dimensions of quality. Aslo Explain in brief the following process control (PC) tools:

A) Scatter plot

B) Check sheet

C) Pareto diagram

[7]

Total No. of Questions : 4]

SEAT No. : ____

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[Total No. of Pages : 3

[5822]-569

T.Y.B.Sc.

STATISTICS

ST-355: Operations Research-I

(2019 CBCS 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 Scientific calculator and statistical table is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following.

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

i) If primal Linear Programming Problem (LPP) is of maximization type then dual problem is of

A) maximization type B) minimization type

C) equality type D) inequality type

ii) A solution which optimizes the objective function in linear programming problem is called as

A) Optimal solution B) Feasible solution

C) Solution D) Basic solution

iii) In a Transportation Problem (TP) the least cost method is used

A) to remove degeneracy

B) to find optimum solution

C) to find alternate solution

D) to find initial basic feasible solution

b) In each of the following, state whether the given statement is true or false. **[1 each]**

i) Assignment problem can be treated as a particular case of transportation problem.

ii) Critical path method is probabilistic in nature.

P.T.O.

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

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

Maximize $Z=10x_1+6x_2+6x_3$

Subject to $3x_1+2x_2+2x_3 \leq 240$

$2x_1+3x_2+3x_3 \leq 270$

$x_1 \leq 60$

$x_1 \geq 0,\ x_2 \geq 0,\ x_3 \geq 0$

b) Define the following terms used in LPP.

i) alternate solution.

ii) feasible solution.

iii) basic solution.

iv) degenerate solution.

v) unbounded solution.

c) Describe a TP. What do you mean by an unbalanced TP? Explain how to convert an unbalanced TP into a balanced TP with the help of one illustration.

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

a) i) What is key row, key column and key element in simplex method? **[3]**

ii) What are the advantages of operations research? **[2]**

b) Obtain the dual of the following LPP:

Maximize $Z=5x_1+3x_2$

Subject *to* $3x_1+2x_2 \leq 6$

$3x_1+x_2=4$

$x_1, x_2 \geq 0$

c) A furniture dealer deals in only two items-tables and chairs. He has Rs.50,000 to invest and has storage space of at most 60 pieces. A table costs Rs.2,500 and a chair Rs.500. He estimates that from the sale of one table, he can make a profit of Rs. 250 and that from the sale of one chair a profit of Rs 75. He wants to know how many tables and chairs he should buy from the available money so as to maximize his total profit, assuming that he can sell all the items which he buys. Formulate the given LPP.

Q4) Attempt any one of the following: **[10 each]**

a) i) Describe Hungarian method of solving assignment problem (minimization case). **[5]**

ii) Find an initial basic feasible solution of the following T.P. by Vogel's approximation method. **[5]**

Destination / Source	D_1	D_2	D_3	D_4	Supply
S_1	19	30	50	10	7
S_2	70	30	40	60	9
S_3	40	8	70	20	18
Demand	5	8	7	14	

b) i) A project consists of seven activities with the following relevant information.

Activity	Immediate Predecessor	Time Estimates		
		Optimistic	Most likely	Pessimistic
A	---	2	5	8
B	A	6	9	12
C	A	5	14	17
D	B	5	8	11
E	C,D	3	6	9
F	---	3	12	21
G	E,F	1	4	7

Using the information given, construct the project network diagram. Find the expected time estimates and variance of each activity. **[5]**

ii) Explain the following terms as regard to Critical Path Method (CPM): **[5]**

1) earliest start time
2) earliest finish time
3) latest start time
4) latest finish time
5) critical path.

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Total No. of Questions : 4]

SEAT No. :

P4910

[Total No. of Pages : 3

[5822]-570

T.Y. B.Sc.

STATISTICS (Principal)

ST - 356 : Regression Analysis

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of Statistical tables and 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) If all observations of response variable are located on a straight line passing through origin, then the co-efficient of determination is

A) 0 B) 0.25

C) 0.5 D) 1

ii) A large absolute value of studentized residual indicates

A) outliers

B) observation are very close

C) coefficient of determination is negative

D) model is good

P.T.O.

iii) Which of the following method is used to estimate parameters of logistic regression model?

A) least square method

B) maximum likelihood method

C) minimum chi-square method

D) variance stabilizing transformation method

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 fitted value is always zero.

ii) The covariance matrix of residual vector (e) is given by $\sigma^2 (X'X)^{-1}$.

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 $E(MS_R) = \sigma^2 + \beta_1^2 \sum_{i=1}^{n} (x_i - \bar{x})^2$.

b) For a multiple linear regression model, $Y = X\beta + \varepsilon$ construct $100(1 - \alpha)\%$ confidence interval for the regression coefficient β_j, $j = 0,1,2,..., k$.

c) Explain the concept of multiple logistic regression.

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

a) Consider the simple linear regression model, $Y = \beta_0 + \beta_1 x + \varepsilon$ where the intercept β_0 is known. Find the least squares estimator $\hat{\beta}_1$ of β_1. Also, find the variance of $\hat{\beta}_1$.

b) Describe the procedure of testing significance of individual regressors in multiple linear regression model.

c) Explain in brief model deviance and LR test. Also, interpret the parameters in a logistic regression model.

Q4) Attempt any one of the following.

a) i) Explain how residual plots are useful in verifying the assumptions in linear regression model. **[5]**

ii) In a simple linear regression problem with sample size 20, the slope was found to be 2.5 and standard error estimate $(\hat{\sigma})$ is equal to 10.15. The quantity $\sum_{i=1}^{20} x_i^2 - n\bar{x}^2 = 400$. 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) Show that, for the multiple linear regression model with *k* regressors,

$$F = \frac{R^2(n-k-1)}{k(1-R^2)}.$$ **[5]**

ii) State the formulae for standardized residual and studentised residual for linear regression model. Also, state the difference between them. **[5]**

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Total No. of Questions : 5]

SEAT No. : ____

P4911

[Total No. of Pages : 2

[5822]-571

T.Y.B.Sc.

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

a) List the names of countries sharing land border with India.

b) Name the passes in the high Himalayas.

c) Name the boundary between India and Pakistan.

d) Name the place of origin of the Brahmaputra River.

e) State the names of tributaries of the Godavari River.

f) State various seasons of India.

Q2) a) Describe the political divisions of India. **[6]**

OR

Describe the location and extent of India.

b) Write short note on Alluvial Soils. **[4]**

Q3) a) Describe the northern plain region of India. **[6]**

OR

Describe the Kaveri River system.

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

P.T.O.

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

OR

Describe the coastal plains of India.

b) Explain the types of dry tropical forests in short. **[4]**

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

a) Andaman & Nicobar Islands.

b) The Purvanchal.

c) The Mahanadi River system.

d) Characteristics of Monsoon rainfall.

e) Contour ploughing.

f) Tropical wet evergreen forests.

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Total No. of Questions : 5]

SEAT No. :

P4912

[Total No. of Pages : 2

[5822]-572
T.Y.B.Sc.
GEOGRAPHY
GG-352: Geography of Economic Activities-I
(2019 CBCS Pattern) (Semester-V)(35182)

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

Instructions to the candidates:

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

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

a) What is Resource?

b) What is secondary economic activities?

c) Which economical factors affect on ecnomic activities?

d) What are Natural Resources?

e) What are Manmade Resources?

f) What are tertiary economic activities?

Q2) a) Describe the types of economic activities. **[6]**

OR

Describe the effect of physical factors on economic activities.

b) Explain pre industrilization development of economic activities. **[4]**

Q3) a) Explain significance of land and capital resources in economic activities. **[6]**

OR

Explain importance of resources in economic development.

b) Discuss the effect of Globle energy crises. **[4]**

P.T.O.

Q4) a) Describe Christaller's central place theory. **[6]**

OR

Explain indices of network analysis.

b) Describe the importance of economic factors on economic activities. **[4]**

Q5) write short note on <u>any four</u> of the following. **[10]**

a) Geography and Economic activities.

b) Importance of Resources.

c) Qunternary economic activities.

d) Natural Resources.

e) Renewable resources.

f) Significance of labour in economic activities.

Total No. of Questions : 5]

SEAT No. : ____

P4913

[Total No. of Pages : 2

[5822]-573
T.Y.B.Sc.
GEOGRAPHY
GG - 353 : Fundamentals of Tourism
(2019 CBCS Pattern) (Semester-V) (35183)

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

Instructions to the candidates:

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

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

a) State any two environmental impact of Tourism.

b) What is Tourism?

c) What is Tourist?

d) Define the term agro-tourism?

e) Define the term sustainable tourism?

f) Name any two places of agro tourism in india.

Q2) a) Explain the Economic impact of tourism. **[6]**

OR

Explain the concept of Pilgrimage tourism and its significance in India.

b) Giving suitable examples, state the impact of tourism on local culture.**[4]**

Q3) a) Explain the role of geography in tourism. **[6]**

OR

Explain the concept of medical tourism and its significance in India.

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

P.T.O.

Q4) a) Describe the nature & scope of tourism geography. **[6]**

OR

Describe the changing nature of international tourism in pendemic periods.

b) Explain the negative impact of social factor on tourism. **[4]**

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

a) Elements of tourism.

b) Concept of Recreation.

c) Characteristics of cultural tourism.

d) Positive impact of cultural factors on tourism.

e) Importance of exhibitions in tourism.

f) Eco-tourism.

Total No. of Questions : 5]

SEAT No. :

P4914

[Total No. of Pages : 2

[5822]-574
T.Y. B.Sc.
GEOGRAPHY
GG - 354 : Geography of Soil - I
(CBCS 2019 Pattern) (Semester - 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) ***Questions 2 to 5 carry equal marks.***

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

a) Mention the size of clay and silt particals.

b) What is soil salinity?

c) Mention the types of soil structure.

d) Define soil compaction.

e) Mention the positive charge ions in the soil.

f) What is porosity?

Q2) a) Describe the pedogenetic process of soil formation. **[6]**

OR

Explain the biological factors of soil formation.

b) Write the nature of soil geography. **[4]**

Q3) a) Explain the chemical properties of soil. **[6]**

OR

Explain the biological properties of the soil.

b) Write the relationship between soil water and soil air. **[4]**

P.T.O.

Q4) a) Discuss the importance of soil studies in soil geography. **[6]**

OR

Discuss the scope of soil geography.

b) Write about importance of soil moisture. **[4]**

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

a) Pedology

b) Humification

c) Soil temperature

d) B Horizon of soil profile.

e) Component of the soil.

f) Soil organic matter.

Total No. of Questions : 5]

SEAT No. : ____

P4915

[Total No. of Pages : 2

[5822]-575

T.Y.B.Sc.

GEOGRAPHY

GG-355: Management of Natural Disasters

(CBCS 2019 Pattern) (Semester - V) (35185)

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

Instructions to the candidates:

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

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

a) Define the term natural disaster.

b) What do you understand by the term vulnerability?

c) Name any two landslides prone region in India.

d) Name any two cyclone occured in Arabian sea.

e) Write any two impact of tsunami.

f) Define the term geo-physical disaster.

Q2) a) Describe the concepts of natural hazards and disaster. **[6]**

OR

Write in detail about classification of natural disaster.

b) Write the distribution of Geo-physical disaster in India. **[4]**

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

OR

Describe the causes and impact of cyclone in India.

b) Discuss the role of NGO's in mitigation to disaster. **[4]**

P.T.O.

Q4) a) Describe Geo-physical disaster mapping In India. **[6]**

OR

Write in brief community based disaster management for risk reduction.

b) Write the role of GlS in disaster planning and management. **[4]**

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

a) Landslides.

b) Tsunami.

c) Cyclone.

d) Responsibility of government in disaster risk reduction.

e) Response and mitigation to disasters.

f) Do’s and Don’ts during post disaster.

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Total No. of Questions : 5]

SEAT No. :

P4916

[Total No. of Pages : 2

[5822]-576
T.Y.B.Sc.
GEOGRAPHY
GG-356: Geoinformatics-I
(CBCS -2019 Pattern) (Semester-V) (35186)

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

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Question 2 to 5 carry equal marks.***

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

a) What do you understand by the term 'Manipulation' in GIS?

b) What is query analysis?

c) Define Spatial data.

d) Define the term attribute.

e) What is Surveying?

f) What do you understand by the term dissolve in GIS?

Q2) a) Explain various types of analysis based on spatial and non-spatial data. **[6]**

OR

Describe GIS task in detail.

b) Discuss the concept of topological building in GIS. **[4]**

Q3) a) Explain raster data and give it's characteristics. **[6]**

OR

Explain in detail about topographic analysis in GIS.

b) Discuss in brief about history of GIS. **[4]**

P.T.O.

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

OR

Explain spatial data with suitable example.

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

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

a) Scope of GIS.

b) Satellite images.

c) TIN spatial analysis.

d) Components of GIS.

e) Toposheets.

f) DTM.

Total No. of Questions : 5]

SEAT No. : ____

P4917

[Total No. of Pages : 2

[5822]-577

T.Y. B.Sc.

GEOGRAPHY

GG 3510 : Research Methodology - I

(Skill Enhancement Course)

(CBCS 2019 Pattern) (Semester - V) (351810)

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

Instructions to the candidates:

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

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

a) Define research methodology.

b) What is research method?

c) What is hypothesis?

d) Define research design?

e) What is conceptual research?

f) Define research problem.

Q2) a) Describe various steps in research process. **[6]**

OR

Describe applied and fundamental research.

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

Q3) a) What are the characteristics of a good research design? **[6]**

OR

Describe the purpose of research design.

b) Write in short on importance of research design. **[4]**

P.T.O.

Q4) a) Explain the techniques involved in defining a research problem. **[6]**

OR

Describe sources of the research problem.

b) Which are the steps involved in formulating research problem? **[4]**

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

a) Meaning of research

b) Objectives of research

c) Descriptive research

d) Research process

e) Research problem

f) Objectives of assumptions about the problem.

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Total No. of Questions : 5]

SEAT No. :

P4918

[Total No. of Pages : 2

[5822]-578
T.Y.B.Sc.
GEOGRAPHY
GG-3511: Elementary Surveying (Skill Enhancement Course)
(351811)(CBCS-2019 Pattern) (Semester-V)

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

Instructions :

1) *Q1 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 Surveying.

b) Mention any two features of plane table surveying.

c) Define prismatic surveying.

d) Mention the methods of theodolite surveying.

e) What do you understand about Reduce level?

f) What is total station?

Q2) a) Describe the types of surveying. **[6]**

OR

Describe the instuments used in surveying.

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

Q3) a) Explain the setting up of dumpy level instrument. **[6]**

OR

Explain in detail about methods of dumpy level.

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

P.T.O.

Q4) a) Discuss the importance of surveying. **[6]**

OR

Explain the various parts of total station.

b) Write the advantages of drone surveying. **[4]**

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

a) Merits of plane table surveying.

b) Collimation level.

c) Geodetic surveying.

d) DGPS surveying.

e) Methods of prismatic surveying.

f) Demerits of total station.

Total No. of Questions : 5]

SEAT No. : ____

P4919

[Total No. of Pages : 2

[5822]-579

T.Y.B.Sc.

MICROBIOLOGY

MB-351: MEDICAL MICROBIOLOGY-I

(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) ***Q.2 to Q.5 carry equal marks.***

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

a) Define nephritis.

b) Name any two bacterial respiratory disease.

c) Blue pus is caused by.....bacteria.

d) Define cystitis.

e) Define Hematuria.

f) Tuberculin test is used for diagnosis of_____.

Q2) A) Describe the following any three. **[6]**

i) State the common symtoms of gastro intestinal diseases.

ii) Concurrent parallel trials.

iii) Enlist the selective media for laboratory diagnosis of vibrio.

iv) Biochemical characterization of Salmonella.

B) Diagrammatically represent respiratory system and enlist the patho gons of respiratory system. **[4]**

Q3) A) Explain the following any three. **[6]**

i) Sources of infection.

ii) Laboratory diagnosis of syghilis.

iii) Enlist the toxins produced by clostridium tetani.

iv) What is acid fast bacteria give its example.

B) Describe biochemical character of Nisseria meningitids. **[4]**

P.T.O.

Q4) A) Discuss the following any three. **[6]**

i) Name of disease caused by Nisseria gonorrhoeae.

ii) Laboratory diagnosis of mycobacterim leprae.

iii) Symptoms of enteric fever.

iv) Enlist the name of media for laboratory diagnosis of leptospira.

B) What is the use of case control method in epidemiology. **[4]**

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

a) Diagnosis of Rickettsia

b) Antigenic structure of strepto coccus pyogenes

c) Laboratory diagnosis of treponema pallidum.

d) Biochemical characters of strepto coccus pneumoniae.

e) Widal test.

f) Spotted fever.

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Total No. of Questions : 5]

SEAT No. : ____

P4920

[Total No. of Pages : 2

[5822] - 580
T.Y. B.Sc.
MICROBIOLOGY
MB - 352 : Immunology
(2019 CBCS Pattern) (Semester - V)

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

Instructions to the candidates:

1) ***Question No.1 is compulsory.***
2) ***Solve any three Questions from Q.No. 02 to Q.No. 05.***
3) ***Question No. 2 to 5 carry equal marks.***

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

a) Name the lumphoid organ where all blood cells including lymphocytes are produced.

b) What are defensins?

c) Enlist the cardinal signs of Inflammation.

d) MHC of humans is referred to as _____.

e) Define antibody affinity.

f) Define allografts and give examples.

Q2) A) Describe (Any three) **[6]**

a) Function of lymphatic system.

b) Lattice hypothesis.

c) Any two applications of monoclonal antibodies.

d) Structure and function of dendritic cell.

B) Explain graft rejection mechanisms. **[4]**

P.T.O.

Q3) A) Answer (Any Three) **[6]**

a) Discuss positive selection of thymocytes.

b) Draw a neat labelled diagram of gene organization of human MHC.

c) Enlist different types of grafts.

d) Write the functions of light and heavy chain domains of antibodies.

B) With neat labelled diagram explain immunoflourescence technique. **[4]**

Q4) A) Explain (Any Three) **[6]**

a) Role of Toll Like receptors.

b) Haptens with examples.

c) HAT selection technique.

d) Principle of agglutination reaction.

B) Explain any two mechanisms of antibody diversity. **[4]**

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

a) Factors affecting immunogenecity.

b) Phagocytosis.

c) Indirect ELISA.

d) Structure of class I MHC.

e) Structure of Thymus.

f) T I antigens.

Total No. of Questions : 5]

SEAT No. : ____

P4921

[Total No. of Pages : 2

[5822]-581
T.Y.B.Sc.
MICROBIOLOGY
DSEC - MB 353 : Enzymology
(CBCS) (2019 Pattern) (Semester-V) (35193)

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

Instructions to the candidates:

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

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

a) Active form of vitamin D is _____.

b) Define specific activity of an anzyme.

c) State true or false: Allosteric enzymes show hyperbolic graph for its activity.

d) Enlist various isotopes used for biological enzyme assay.

e) Km is independent of substrate concentration. state true or false.

Q2) a) Describe the following (any Three.) **[6]**

i) Adsorption chromatography.

ii) Properties of allosteric enzymes.

iii) State Michaelis-menton equation & its graphical representation.

iv) Feed back repression in enzyme regulation.

b) What is salting in & salting out? Describe how it is used for enzyme purification. **[4]**

P.T.O.

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

i) Biochemical function of Thiamine pyrophosphate.

ii) Enlist various chemical methods of determination of aminoacids at active site of enzyme.

iii) Enlist principles & significance of enzyme assays

iv) Ion exchange chromatography in enzyme purification.

b) What are isozymes? Describe with suitable example. **[4]**

Q4) a) Describe any three of the following. **[6]**

i) Enlist methods of immobilization of enzymes. Describe any one in detail.

ii) Spectrophotometric assays for enzyme.

iii) Enlist various sources of Vit D.

iv) How will you obtain intracellular enzyme for purification.

b) Derive Brigg's Haldane equation for determination of initial velocity of an enzyme. **[4]**

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

a) Multienzyme complex.

b) Vmax

c) X-ray crystallography.

d) Lineweaver. Burk plot.

e) Enzyme compartmentation in enzyme activity vegulation.

f) Koshland model for allosteric enzyme.

Total No. of Questions : 5]

SEAT No. :

P4922

[Total No. of Pages : 2

[5822]-582
T.Y. B.Sc.
MICROBIOLOGY
MB - 354 : Genetics
(2019 CBCS Pattern) (Semester - V) (35194) (Paper -IV)

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

a) Name the enzyme involved in primer replacement during DNA replication in E.Coli.

b) State the role of enhancers in eukaryotic transcription.

c) Which are the structural genes in lac operon?

d) Name the components of 30s subunit of prokaryotic ribosome.

e) State $S \rightarrow R$ variation in Pneumococci observed by F. Griffith.

f) What are F' strains of E.Coli?

Q2) A) Attempt any three of the following. **[6]**

a) State the role of DNA polymerase III and DNA ligase in DNA replication.

b) What is the role of rho (ρ) factor in termination of prokaryotic transcription.

c) State the function of tRNA in translation.

d) What is homologous recombination?

B) With suitable diagram explain initiation of transcription in eukaryotes. **[4]**

P.T.O.

Q3) A) Attempt any three of the following. **[6]**

a) What is the role of A, P and E sites on ribosomes during translation?

b) What is catabolite repression in lac operon?

c) How eukaryotic mRNA is modified at S' end?

d) What is the role of SSB proteins in initiation of DNA replication?

B) Explain gene mapping in bacteria using cotransduction. **[4]**

Q4) A) Attempt any three of the following. **[6]**

a) Explain the process of conjugation in E.Coli.

b) Explain semi discontinuous DNA replication.

c) State termination codons with their role in termination of translation.

d) Name the specific sites on bacterial and phage DNA involved in restricted transduction.

B) With suitable diagram explain transformation in pneumococci. **[4]**

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

a) Recombination frequency and mapping.

b) Role of helper phage in restricted transduction.

c) Merozygote.

d) Role of int and *x* is proteins in restricted transduction.

e) Structure of prokaryotic RNA polymerase.

f) Rho (ρ) independent terminator.

Total No. of Questions : 5]

SEAT No. : ____

P4923

[Total No. of Pages : 2

[5822]-583

T.Y.B.Sc.

MICROBIOLOGY

DSEC-MB-355 : Fermentation Technology-I

(CBCS) (2019 Partern) (Semester - V) (35195)

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

a) State the objectives of strain improvement.

b) Enlist any 2 methods of media optimization.

c) What is del factor?

d) Write the use of Ames test.

e) What is RSM?

f) What is co-current extraction?

Q2) a) Describe the following any three: **[6]**

i) Any one method for isolation of auxotrophic mutants.

ii) Objectives of scale-up.

iii) Toxicity testing of fermentation product.

iv) Any one enzymatic method for quantification of fermentation product.

b) Explain sterility testing by membrane filtration method. **[4]**

Q3) a) Explain the following any three: **[6]**

i) Use of r DNA technology in strain improvement.

ii) Spray drying.

iii) Bioburden test.

iv) Patents.

b) Explain different methods of liquid-liquid extraction. **[4]**

P.T.O.

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

i) Concept of validation.

ii) Any 4 rules of Placket-Burman design.

iii) Direct method of continous sterilization.

iv) Non-recurring expenditure in fermentation idustry.

b) Explain rotary vacuum fitration. **[4]**

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

a) Distillation.

b) Pyrogen testing.

c) Cell disroption methods.

d) Broth rheology.

e) Scale-up of aeration with respect to kLA.

f) Revertant mutants in strain improvement.

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Total No. of Questions : 5]

SEAT No. : ____

P4924

[Total No. of Pages :2

[5822] - 584
T.Y.B.Sc.
MICROBIOLOGY
DSEC MB - 356 : Agricultural Microbiology
(2019 CBCS Pattern) (Semester - V) (Paper - II) (35196)

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) Colonisation.

b) Causative agent of 'downy mildews'.

c) What are GM crops?

d) Define rhizosphere?

e) Any 2 plant viruses in genetic engineering.

f) What is diazotrophy?

Q2) a) Describe the following (any three) **[6]**

i) Transmission of plant disease.

ii) Symptoms of canker.

iii) Polyetic diseases with examples.

iv) Applications of plant biofilms.

b) Describe plant disease epidemeology. **[4]**

Q3) a) Explain the following (any three). **[6]**

i) Chemical control Vs biological control.

ii) Mechanism of phosphate solubilization by soil microorganisms.

iii) GM crops.

iv) Plant disease triangle.

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

P.T.O.

Q4) a) Discuss the following. (any three) **[6]**

i) Insecticide resistance.

ii) Role of microbiome in soil health.

iii) Applications and examples (one each) of shuttle vectors.

iv) Use of RNAi technology.

b) Schematically represent the technology of BT crops. **[4]**

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

a) Methods of plant invasion.

b) Integrated pest management.

c) Methods of genetic engineering in plant disease resistance.

d) Classification of plant diseases based on symptoms.

e) Role of microorganisms in soil phytonutrient availability.

f) Edible vaccines.

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Total No. of Questions : 5]

SEAT No. : ____

P4925

[Total No. of Pages : 2

[5822]-585

T.Y. B.Sc.

MICROBIOLOGY

Skill Based Elective Course

MB 3510 : Marine Microbiology

(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 Question No.2 to Question No.5***
3) ***Question No.2 to Question No.5 carry equal marks.***

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

a) What are mangroves?

b) Coastal ecosystems - Marine habitat - Justify

c) What are biofilms?

d) What are halophiles?

e) State the use of Grab sampler.

f) What is bioremediation?

Q2) a) Describe the following. (Any three) **[6]**

i) What are marine fungi?

ii) How is Niskin sampler used?

iii) VBNC marine microorganisms

iv) Marine microbial biodiversity

b) Explain the culturing methods of extremophiles **[4]**

Q3) a) Explain the following. (Any three) **[6]**

i) Estuarine marine habitat

ii) Bioremediation of oil spills in oceans

iii) Archaebacteria in marine ecosystem

iv) Applications of marine biofilms

b) What are the sampling methods used in marine microbiology? **[4]**

P.T.O.

Q4) a) Discuss the following. Any three. **[6]**

i) Marine snow as econiche

ii) Role of marine fungi in biogeochemical cycles

iii) Marine loops are habitat of extremophiles

iv) Bioprospecting of marine fungi

b) Explain the applications of marine microbiology w.r.t. industry, medicine, geomineral cycling. **[4]**

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

a) Stress responses in archaebacteria

b) Bioremediation of hydrocarbon pollutants in marine habitat

c) Marine biodiversity.

d) Marine habitat distribution

e) Adaptations in extremophiles.

f) Marine microorganisms - role in tar balls bioremediation.

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Total No. of Questions : 5]

SEAT No. :

P4926

[Total No. of Pages : 2

[5822]-586
T.Y.B.Sc.
MICROBIOLOGY (Skill Based Elective)
MB 3511: Dairy Microbiology
(CBCS 2019 Pattern) (Semester-V) (351911) (Regular)

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

Instructions :

1) ***Q.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 thermisation.

b) What is the composition of milk.

c) Lactoferrin is _____ in milk.

i) Vitamin

ii) Naturally Occuring preservative

iii) Aminoacid

iv) Calcium and iron source

d) Enlist chemicals used for preservation of dairy products.

e) Define homogenized milk.

f) Enlist organism responsible for ropiness of milk.

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

i) Enlist sources of microorganisms for contamination of milk duing collection & storage.

ii) Enlist various time temp. relationship used in pasteurization.

iii) Enlist various flavour defects in milk.

iv) Enlist any four sanitary standard operating procedures in quality assurance of milk.

b) Describe stormy fermantation of milk with organisms involved in it. **[4]**

P.T.O.

Q3) a) Solve any three of the following **[6]**

i) What is colostrum? Give its composition.

ii) Describe color defects in milk w.r.t. organisms responsible for it.

iii) What is the role of bacteriocins of LAB?

iv) What do you mean by HACCP?

b) Describe the process of spoilage of milk & microorganisms involved in it. **[4]**

Q4) a) Atempt any three of the following **[6]**

i) How will you control on biofilm on various equipments for safety concern of milk.

ii) What do you mean by sweet curdling of milk?

iii) Enlist physicochecimical properties of milk of buffalo.

iv) What is the difference between skimmed and dehydrated milk.

b) Enlist good manufacturing practices for a quality of milk products. **[4]**

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

a) Sweet curdling of milk.

b) Food grade biopreservatives.

c) Microflora of milk.

d) Efficiency of pasteurization.

e) Quality assvanrance in daily industry.

f) Contamination of milk during transport of milk.

Total No. of Questions : 5]

SEAT No. : ____

P4927

[Total No. of Pages : 2

[5822]-587

T.Y. B.Sc.

DEPARTMENT OF NANOSCIENCE AND NANOTECHNOLOGY

NS - 351 : Polymer & Nanocomposites

(2019 Pattern) (Semester - V) (Paper-I) (35261)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Three of questions from Q.2 to Q.5.***
3) ***Question 2 to 5 carry equal marks***
4) ***Draw neat and labelled diagrma wherever necessary.***
5) ***Figures to rigth indicate full marks.***

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

a) Define the term exfoliation.

b) Give the benefites of composites.

c) Define thermosetting matrices.

d) Define short fiber and long fiber reinforcement.

e) Define reinforced rubber

f) Define latex stage mixing.

Q2) A) Attempt any one of the following. **[6]**

a) Explain reinforced rubber.

b) Explain the term-particulate fillers.

B) Give the benefites of composites and disadvantages of composites. **[4]**

Q3) A) Attempt any one of the following. **[6]**

a) Explain the methods of preparation of composites (any two) methods.

b) Explain thermoplastic rubber.

B) Explain composite material rheology. **[4]**

P.T.O.

Q4) A) Attempt any one of the following **[6]**

a) Explain the term - dispersion

b) Explain the term - nucleation effect

B) Explain the number of applications of nanocomposites **[4]**

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

a) Melt-mixing

b) Tribology characteristics

c) Reinforced rubber

d) Laser abiation method

e) Functionalisation of carbon based nanotubes

f) Explain Fatigue creep

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Total No. of Questions : 5]

SEAT No. : ____

P4928

[Total No. of Pages : 2

[5822] - 588
T.Y. B.Sc.
NANOSCIENCE AND NANOTECHNOLOGY
NS - 352 : Nano Physics
(2019 Pattern) (Semester - V) (Paper - II)

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

Instructions to the candidates:

1) ***Question No.1 is compulsory.***
2) ***Solve any three Questions from Q.No. 2 to 5.***
3) ***Draw the neat and labelled diagram wherever necessary.***
4) ***Figures to the right indicates full marks.***

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

a) What is probability density?

b) Define metal.

c) Draw diagram of photoluminescences.

d) Define nanoparticles.

e) Write equation of Gibb's canonical distribution.

f) What is continuous variable probability?

Q2) a) Write down any one of the following. **[6]**

i) Define Binomial distribution and Explain expression of Binomial distribution.

ii) Explain optical absorption spectroscopy.

b) Consider binomial distribution for system for which $P = \frac{1}{3},\ q = \frac{2}{3},\ N = 6$ determine standard deviation and find probability that is n is in range $< n > -\sigma$ to $< n > + \sigma$. **[4]**

P.T.O.

Q3) a) Write down any one of the following. **[6]**

i) Explain Bose-Einstein (B-E) statistics.

ii) Explain Maxwell - boltzmann statistics.

b) Explain the quantum size effect. **[4]**

Q4) a) Write down any one of the following. **[6]**

i) Explain Insulator and semiconductor.

ii) Explain energy bandgap structure with suitable diagram.

b) Vessel of volume 'V' is mentally divided into two equal parts. The vessel contains 6 molecules. Calculate probability distribution using binomial and Gaussian distribution in to passes graphically. **[4]**

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

a) Explain thermoluminescence.

b) Explain photoluminescence.

c) Write the uses of nanocluster.

d) Explain fermi-dirac statistics (F-D statistics)

e) Explain quantum distribution function.

f) Write application of x-ray absorption fine structure.

Total No. of Questions : 5]

SEAT No. :

P4929

[Total No. of Pages :2

[5822] - 589
T.Y.B.Sc.
NANOSCIENCE AND NANOTECHNOLOGY
NS - 353 : Nanobiotechnology
(2019 Pattern) (Semester - V) (Paper - III) (35263)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Question 2 to 5.***
3) ***Question 2 to 5 carry equal marks.***
4) ***Draw neat labelled diagram wherever necessary.***
5) ***Figure to the eight hand side indicate full marks.***

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

a) Write the function of cilia.

b) What is a significance of Flagella.

c) What is importance of DNA.

d) Write the function of mRNA.

e) Difine the ferm Lipids.

f) What is a function of plasmid.

Q2) A) Attempt any one of the following. **[6]**

a) Define the term carbohydrates with its classification.

b) How DNA is classified as A, B and Z types.

B) What are the significances of lipids. **[4]**

Q3) A) Attempt any one of the following. **[6]**

a) Define the RNA. Write short account an tRNA.

b) What are biological motors? With the help of diagram explain flagella motor.

B) Write the functions of Haemoglobin in the body. **[4]**

P.T.O.

Q4) A) Attempt any one of the following. **[6]**

a) Describe the classification of simple lipids with examples.

b) What are proteins? Explain secondary structure of protein.

B) Write short account on ferritin. **[4]**

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

a) Properties of amino acids.

b) Polysacchrides.

c) Globular protein.

d) Tertiary structure of protein.

e) Properties of carbohydrate.

f) Importances of RNA-RNA.

Total No. of Questions : 5]

SEAT No. :

P4930

[Total No. of Pages : 2

[5822]-590
T.Y. B.Sc.
NANO SCIENCE AND NANO TECHNOLOGY
NS - 354 : Carbon Based Nanomaterials
(2019 Pattern) (Semester - V) (Paper - IV) (35264)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Some any three question from Q. 2 to Q. 5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Draw neat and labelled diagram whenever necessary.***
5) ***Figures to the right indicate full marks.***

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

a) Define the term catalysis.

b) What is flow sensors?

c) What is Ballistic transport in CNT's?

d) Give the names of optical properties of CNT's.

e) What is pyrrolytic, technique?

f) What is dielectric constant? Give its value for diamond.

Q2) a) Attempt any ONE of the following. **[6]**

i) Explain catalytic applications of nanoforms of carbon.

ii) Explain purification and separation of carbon nanotubes.

b) Explain preparation of nanodiamond by detonation method. **[4]**

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

i) Explain in detail Laser ablation method.

ii) Explain the electrical properties of fullerence.

b) Explain in detail diamond synthesis route. **[4]**

P.T.O.

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

i) Give in detail mechanical properties of CNT's.

ii) Explain the Battery applications in carbon Based Nanomaterials.

b) Explain in detail preparation of Nanodiomond by shock synthesis. **[4]**

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

i) Laser ablation method.

ii) Properties of diamond.

iii) Types of catalyst.

iv) Classification of Biosensors.

v) Solar cell

vi) CVD method (Chemical Vapour Deposition)

Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages : 2

[5822]-591

T.Y. B.Sc.

DEPARTMENT OF NANOSCIENCE AND NANOTECHNOLOGY

NS - 355 : Energy Conversion Devices and Applications

(2019 Pattern) (Semester - V) (Paper - V) (Regular) (35265) (CBCS)

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 kinetics.

b) Define photovoltaic solar cell.

c) Write equation of photon energy.

d) Write equation of fill factor.

e) Define artificial photosynthesis.

f) What is energy of light with a wavelength of 662 nm?

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

i) Explain introduction and construction of dye-sensitized solar cell.

ii) Explain design and working of Porovskite solar cell.

b) Explain and design Thin film solar cell. **[4]**

P.T.O.

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

i) Explain mechanism of photon absorption and power generation.

ii) Explain bulk heterojunction solar cell.

b) Explain properties of working photoelectrode. **[4]**

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

i) Explain construction and working of P3HT : PCBM solar cell.

ii) Explain Greenhouse effect.

b) A certain source emit radiation of wavelength 500 nm, what is energy in KJ of 1 Mole of photon of these radiation. (Given : Avagadro's number = 6.022×10^{23}/Mole) **[4]**

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

a) Explain properties of dyes.

b) Explain planer heterojunction solar cell.

c) Explain properties of sunlight.

d) Explain Hybrid solar cell.

e) Explain History of Perovskite Solar cell.

f) Explain losses of solar cell.

Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages :2

[5822] - 592
T.Y.B.Sc.
NANOSCIENCE AND NANOTECHNOLOGY
NS - 356 : Environmental Nanotechnology and Applications
(35266) (2019 Pattern) (Semester - V) (Paper - VI) (Elective - I)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q. 2 to Q. 5.***
3) ***Questions 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 mesoporous material.

b) What is seive effect?

c) List the control devices for particulate contaminants.

d) Define 'Absorption in air'.

e) Define 'Domestic water'.

f) Why there is need for water management?

Q2) A) Attempt any one of the following. **[6]**

a) Explain in breif methods for waste water treatment.

b) Explain methods for the measurement of air pollution and its control.

B) Explain 'Air pollution'. **[4]**

Q3) A) Attempt any one of the following. **[6]**

a) Explain 'pollution control equipment' in detail.

b) State and explain 'The clean air act and Nanotechnology'.

B) Explain 'Hierarchy of solid structure' and adsorption. **[4]**

P.T.O.

Q4) A) Attempt any one of the following. **[6]**

a) Explain nanocomposites for environmental applications.

b) Write detail on mesoporous materials as adsorbents.

B) Explain in detail Advantages of Nanomaterial. **[4]**

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

a) Anaerobic filters.

b) Water pollution.

c) Oxidation ditches.

d) Waste water collection.

e) Air pollution.

f) Cyclone separator.

Total No. of Questions : 5]

SEAT No. : [ ]

P4933

[Total No. of Pages : 2

[5822]-593

T.Y. B.Sc.

NANOSCIENCE AND NANOTECHNOLOGY

NS 3510 : Basic Instrumentation Skills

(2019 Pattern CBCS) (Semester - V) (352610)

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 5.***
3) ***Draw the neat and labelled diagram wherever necessary.***
4) ***Figures to the right indicates full marks.***

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

a) What is Error?

b) Define range?

c) Define Accuracy?

d) Define CRO?

e) Define Sensitivity?

f) What is Q-meter?

Q2) A) Attempt any one of the following. **[6]**

i) Explain the Block diagram and working of digital multimeter.

ii) What is Error measurement? Explain its different types.

B) Write down the characteristics of digital instrument? **[4]**

Q3) A) Attempt any one of the following. **[6]**

i) Explain basic controls of CRO.

ii) Explain construction and working of DC bridges.

B) Explain the screen phosphor of CRT. **[4]**

Q4) A) Attempt any one of the following. **[6]**

i) Write down measurement of distortion?

ii) Explain chemical composition of CRO.

B) Explain specifications of function generator. **[4]**

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

a) Explain the measurement of Q-Meter.

b) Write down Applications of DSO?

c) Explain different types of pulse generation.

d) Write down difference between square wave and pulse?

e) Write short note on multimeter?

f) Write down difference between analog instruments and digital instruments?

Total No. of Questions : 5]

SEAT No. :

P4934

[Total No. of Pages : 2

[5822]-594
T.Y.B.Sc.
NANOSCIENCE AND NANOTECHNOLOGY
NS-3511: C-Programming
(CBCS 2019 Pattern) (Semester-V) (Regular) (352611)

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.***

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

a) What is constant in C?

b) What is Algorithm?

c) Write syntax for printf function.

d) What is use of initgraph in graphics program?

e) Write syntax to draw line?

f) What is use of "%d" in control settings?

Q2) a) Explain different output functions used in C. **[6]**

OR

State and explain different data type in C.

b) With two examples explain one dimensional array. **[4]**

Q3) a) Explain Arthematic operator & relational operator use in C-Language. **[6]**

OR

What do you mean by Algorithm? Write advantage and limitations for algorithm.

b) What is two dimensional array? Give its example. **[4]**

P.T.O.

Q4) a) Write C-program to print 0 to 100 using while and do ... while loop. **[6]**

OR

Explain different type constant used in C.

b) Write C-program to draw circle, line, arc, ellipse, rectangle using graphics programming. **[4]**

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

a) Draw a flowchart to generates even number between 1 and 50 and then print.

b) Break Statement.

c) Explain bgi and closegraph(); used in C.

d) Assignment operators.

e) What is differnce between low level and high level programming language.

f) Program to find area of circle.

Total No. of Questions : 5]

SEAT No. : ____

P4935

[Total No. of Pages : 2

[5822]-595

T.Y. B.Sc.

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 questions from Q.2 to Q.5.***
3) ***Q.2 to Q.5 carry equal marks.***

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

a) What is verilog?

b) List various operators used in data flow modeling.

c) Which step is followed by logic optimization?

d) Design of which circuit is useful with verilog HDL?

e) What is RTL in logic synthesis?

f) If A = 5, B = 7 After A < B evaluation will be 0/1?

Q2) Attempt the following:

a) i) What are the different types of operators in verilog? **[2]**

ii) Write a short note on keywords in verilog. List various keywords in verilog. **[4]**

b) What is concantentation operators? Explain with suitable example. **[4]**

P.T.O.

Q3) Attempt the following:

a) i) Compair VHDL and Verilog. **[2]**

ii) What are net and reg data types explain with suitable example. **[4]**

b) Draw the blocks in logic synthesis tools. **[4]**

Q4) Attempt the following:

a) i) B = 2'b00, C = 3'b010 after evaluation of following what is answer. **[2]**

1) y = {B, C} 2) y = {2{B}}

ii) Draw block diagram for logic synthesis flow from RTL to Gates. **[4]**

b) Explain in brief programmable logic array suitable example. **[4]**

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

a) Define long form of following:

i) PLD

ii) PAL

iii) PLA

iv) GAL

v) FPGA

b) What are the design constraints in logic synthesis?

c) What is module in case of verilog? What it consist of it?

d) What are the different types of operaters used in verilog? Explain four different types of it using suitable example.

e) Write down 2 : 1 multiplexer description for verilog construct using if else statement.

f) With the help of PAL explain XOR gate implemention.

Total No. of Questions : 5]

SEAT No. :

P4936

[Total No. of Pages : 2

[5822] - 596
T.Y. B.Sc.
ELECTRONIC SCIENCE
EL 352 : Micro Controller Architecture & Programming
(2019 Pattern) (Semester - V) (CBCS) (Paper - II) (2 Credits) (35222)

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

Instructions to the candidates:

1) ***Question No.1 is compulsory.***
2) ***Solve any three Questions from Q.No. 02 to Q.No. 05.***
3) ***Q2 to Q5 carry equal marks.***

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

a) What is Von-neumann architecture?

b) Define linker.

c) What is the use of hex file?

d) Write the role of PINA register.

e) What do you mean by '___ delay_us (200);'?

f) State the role of 'en' pin in LCD.

Q2) Attempt the following.

a) i) Write short note on 'Flash' memory of AVR ATmega l6. **[2]**

ii) Explain any four assignment operators with example in C. **[4]**

b) Draw the interfacing diagram for LED and switch connected at pin PB1 & pin PC7 respectively. Write AVR C program to make LED ON, if switch is closed and OFF otherwise. **[4]**

Q3) Attempt the following.

a) i) What is function? Give the use of return in the function. **[2]**

ii) Write AVR 'C' program to generate triangular wave using DAC. **[4]**

b) Explain 8 bit format of TCCRO register. **[4]**

P.T.O.

Q4) Attempt the following.

a) i) Draw the interfacting diagram of stepper motor with AVR AT mega l6. **[2]**

ii) Explain ADMUX register in detail. **[4]**

b) Draw the functional block diagram of AVR architecture. **[4]**

Q5) Attempt the following. **[10]**

a) Give any three features of AVR AT megal 6.

b) Write the syntax of 'white' loop.

c) Give an example of 'if' statement.

d) What is the role of DDRB register? Give an example.

e) Draw the block diagram of Timer 0 programming.

f) Write AVR C program to read the value of PORTD and give it to PORTA, continuously.

Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages :2

[5822] - 597
T.Y.B.Sc.
ELECTRONIC SCIENCE
EL - 353 : Analog Circuit Design and Applications
(2019 CBCS Pattern) (Semester - V) (Paper - III)

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

Instructions to the candidates:

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

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

a) Which parameter of the Op-amp is taken into consideration for fast varying signal?

b) Which semiconductor component is used as a log element in log amplifier?

c) In case of open loop comparator if $V_{inv} > V_{non\text{-}inv}$ in the case V_{out} of Op-amp is?

d) State the formula for frequency of Twin-T oscillator.

e) State the name of function generator IC.

f) What is the number of voltage regulating IC which provides + 9V at output?

Q2) Attempt the following.

a) i) Draw the circuit diagram of Op-amp for nullifying output offset voltage using pin number 1 and 5. **[2]**

ii) Draw the circuit diagram and explain the working of monostable multivibrator using Op-amp. **[4]**

b) Draw the circuit diagram of Twin - Toscillator and explain its working.**[4]**

P.T.O.

Q3) Attempt the following.

a) i) What precausions are taken tominimize electromagnetic noise catched by input pins of Op-amp? **[2]**

ii) Define the terms of sample and hold circuit **[4]**

1) Hold period
2) Samplying period
3) Acquisition time and
4) Aperture time

b) Draw the block diagram of phase Locked Loop and explain each block in details. **[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 analog multiplier and write the equation at the output of each block. **[4]**

b) Draw the circuit diagram of variable voltage regulator using IC LM 317 and explain its working. **[4]**

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

a) State any five parameters of Op-amp.

b) Define the term input offset voltage of Op-amp and state its ideal and practical values.

c) Draw the block diagram of SMPS and explain its working.

d) Write the equation for Tcharge, Tdischarge and frequency of square wave incase of astable multi vibrator using IC 741.

e) Write the equation for the centre frequency and lock frequency at the output of PLL.

f) State positive and negative voltage regulating IC's (Minimum 3 each)

♦ ♦ ♦

Total No. of Questions : 5]

SEAT No. :

P4938

[Total No. of Pages : 2

[5822]-598
T.Y. B.Sc.
ELECTRONIC SCIENCE
EL - 354 : NANOELECTRONICS
(CBCS 2019 Pattern) (Semester - V) (Paper - IV) (35224)

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

Instructions to the candidates:

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

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

a) Define nanoparticle.

b) What is RTD.

c) What is function of photodetector.

d) List applications of XRD.

e) What is graphene.

f) Who discovered Fullerene.

Q2) Attempt of the following.

a) i) State applications of nanoelectronics. **[2]**

ii) Write short note on flash memory. **[4]**

b) Explain electron transport in quantum well. **[4]**

Q3) Attempt the following.

a) i) State two applications of Resonant tunneling diode. **[2]**

ii) Write short nute on transmission electron microscope. **[4]**

b) Explain working principles of Atomic Force Microscope. **[4]**

P.T.O.

Q4) Attempt the following.

a) i) What are limitations of light microscope. **[2]**

ii) Explain device structure and working of DH Laser. **[4]**

b) What makes nanowire interesting? What are their applications. **[4]**

Q5) Write any FOUR of the following. **[10]**

a) What is back scattered electron in SEM.

b) Why electrons are used in imaging? Why not photons?

c) State basic characteristics of 2D Lasers.

d) What is MOSFET? State its types?

e) Explain CNT transistor.

f) What is inorganic semiconductor? List its applications.

Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages : 2

[5822]-599

T.Y. B.Sc.

ELECTRONIC SCIENCE

EL - 355 : Signals and Systems

(CBCS 2019 Pattern) (Semester - V) (Paper - V) (35225)

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

Instructions to the candidates:

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

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

a) Define a signal.

b) State Shannon's Sampling theorem.

c) Define a system.

d) State the condition of periodicity of CT signal.

e) Define Laplace transform of a function.

f) Define CT unit-step signal.

Q2) Attempt the following:

a) i) Find Laplace transform of sinat. **[2]**

ii) Give the classification of signals and describe CT and DT signals. **[4]**

b) Check whether following CT system is linear or non-linear $y(t) = t \cdot x(t)$. **[4]**

P.T.O.

Q3) Attempt the following:

a) i) Draw a block diagram of digital signal processing system. **[2]**

ii) Find $L^{-1}\left\{\frac{s+1}{s^2+4}\right\}$. **[4]**

b) Determine the coefficient a_0 of the Fourier series. **[4]**

Q4) Attempt the following:

a) i) What is aliasing effect in sampling of a signal? How can it be eliminated? **[2]**

ii) State and prove the first shifting property of Laplace transform. **[4]**

b) Explain the role of anti-aliasing filter in sampling process. **[4]**

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

a) Define CT and DT static systems.

b) Find LT of 1.

c) State Nyquist's rate for sampling of a signal.

d) Define CT and DT dynamic systems.

e) State the convolution theorem in Laplace transform.

f) Define a quantization error. How can it be reduced?

Total No. of Questions : 5]

SEAT No. :

P4940

[Total No. of Pages : 2

[5822] - 600
T.Y. B.Sc.
ELECTRONIC SCIENCE
EL - 356(A) : Optics and Fiber Optic Communication
(2019 Pattern) (Semester - V) (CBCS) (Paper - VI(A)) (35226A)

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

Instructions to the candidates:

1) ***Question No.1 is compulsory.***
2) ***Solve any three Questions from Q.No. 02 to Q.No. 05.***
3) ***Q2 to Q5 carry equal marks.***

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

a) What do you mean by splicing of fiber optic cable.

b) State the condition required for Total Internal Reflection (TIR).

c) Define the term attenuation in fiber optic cable.

d) State different types of losses in fiber optic cable.

e) List the various types of optical detectors use in fiber optic communication.

f) State the names of Network topology.

Q2) Attempt the following.

a) i) Draw the block diagram of fiber optic communication. **[2]**

ii) Draw the setup diagram for the measurement of attenuation in fiber optic cable and explain it in detail. **[4]**

b) Write any four differences between single mode step Index fiber and Multimode step Index fiber. **[4]**

Q3) Attempt the following.

a) i) State advantages of semiconductor LASER Diode in fiber optic communication. **[2]**

ii) Derive the equation of Numerical Aperture (N A) using diagram of Total Internal Reflection (TIR). **[4]**

b) Explain the working principle of semiconductor LASER diode with suitable diagram. **[4]**

P.T.O.

Q4) Attempt the following.

a) i) Draw the setup diagram of Dual Ring Topology and state one advantage. **[2]**

ii) State any four differences between PIN Diode and Avalanche photo diode. **[4]**

b) With the help of Snell's law explain the total internal reflection (TIR) and critical angle (θ_C). **[4]**

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

a) Calculate the critical angle (θ_C). Given RI of core n_1=1.5 and RI of cladding n_2=1.25.

b) Write a short note on dispersion compensated and dispersion shifted fiber optic cable.

c) Write a short note on dispersion in fiber optic cable.

d) Define the term responsivity of photo detecter and write its equation.

e) Draw the block diagram of Synchronous Optical Networking (SONET)

f) State advantages and disadvantages of "Tree Topology".

Total No. of Questions : 5]

SEAT No. :

P4941

[Total No. of Pages : 2

[5822]-601

T.Y. B.Sc.

ELECTRONIC SCIENCE

EL 356 (B) : Electronic Product Design & Entrepreneurship (2019 Pattern) (CBCS) (Semester - V) (35226) (Paper - VI B)

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

Instructions to the candidates:

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

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

a) Define reliability.

b) What is EMI?

c) Give the meaning of prototype.

d) What is ergonomics?

e) What is the meaning of architectural documentation?

f) Define entrepreneurship development.

Q2) Attempt the following :

a) i) What is pilot production batch? Give the purpose of it. **[2]**

ii) What is environmental testing in electronic product design? Explain dry heat test. **[4]**

b) Write a short note on In-circuit emulator. **[4]**

P.T.O.

Q3) Attempt the following :

a) i) What is proposal? Mention the main intention of writing proposal. **[2]**

ii) Describe the bottom-up approach with the help of block diagram. **[4]**

b) Explain the role of inspection in quality control. **[4]**

Q4) Attempt the following :

a) i) Write down the two objectives of ergonomics. **[2]**

ii) Explain failure rate Vs time curve with neat labelled diagram. **[4]**

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

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

a) Explain any five functions of entrepreneur.

d) Explain steps in electronic product design by giving block diagram.

c) Write a short note on manual.

d) What is line drawing?

e) Describe engineering notebook in documentation.

f) Write product integration steps in product development.

❄ ❄ ❄

Total No. of Questions : 5]

SEAT No. :

P4942

[Total No. of Pages : 2

[5822]-602

T.Y. B.Sc.

ELECTRONIC SCIENCE

ELSEC 351 - : Electronic Design Automation Tools

(CBCS) (2019 Pattern) (Paper - X) (Semester - V) (352210)

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

Instructions to the candidates:

1) ***Q. No. 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) Define simulation.

b) Who developed LTSPICE software?

c) What is DC analysis in PSPICE?

d) Define multisim.

e) In which EDA tool virtual instrument is available?

f) What is netlist file?

Q2) Attempt the following

a) i) What is the purpose of wire tool and place tool in PSPICE? **[2]**

ii) Which files are needed for circuit-simulation? Describe each one in detail. **[4]**

b) Write a note on waveform data files used in simulation software. **[4]**

Q3) Attempt the following

a) i) What are the features of LTSPICE simulator. **[2]**

ii) State any four advantages of circuit simulation. **[4]**

P.T.O.

b) Write a note on multisim and explain the steps involved in it for circuit simulation. **[4]**

Q4) Attempt the following

a) i) What is the role of simulate button in multisim and which kind of simulation multisim supports? **[2]**

ii) Write a note on Orcad. Which types of analysis are performed by using Orcad. **[4]**

b) What is netlist detail and DRC in circuit simulation. **[4]**

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

a) Write a note on PSPICE.

b) Explain stimulus editor used in PSPICE.

c) What is the role of create and edit component tool used in circuit simulation software?

d) What is schematic capture in multisim?

e) Write a short note on Proteus software.

f) Write a short note on ARES in Proteus.

Total No. of Questions : 5]

SEAT No. :

P4943

[Total No. of Pages : 2

[5822]-603

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) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Q.2 to Q5 carry equal marks.***

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

a) What is the full form of IoT & IIoT?

b) What is meant by TCP?

c) How IoT system is useful in weather monitoring?

d) What is meaning of DSI & CSI?

e) What is smart city in IoTs?

f) How IoT use in water management?

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

a) i) What do you mean by BLE? **[2]**

ii) What is the role of Things & Internet in IoT? **[4]**

b) Determine the IoT-levels for designing structural health monitoring system. **[4]**

Q3) Attempt the following. **[10]**

a) i) What is smart mobility in smart city? **[2]**

ii) What are different communication model in IoT? **[4]**

b) Which are the building blocks of an IoT device? Explain it. **[4]**

P.T.O.

Q4) Attempt the following. **[10]**

a) i) What are the different types of sensor in IoT? **[2]**

ii) Difference between Arduino & Raspberry Pi. **[4]**

b) Explain any one IoT Enabling technology. **[4]**

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

a) State characteristics of IoT.

b) What are the different components of IoT.

c) Write applications of IoT.

d) What are challenges of risk associated with IoT.

e) What is the architecture constraints of RESET based communication API?

f) State the difference between IOT & M2M.

Total No. of Questions : 5]

SEAT No. :

P4944

[Total No. of Pages : 2

[5822]-604
T.Y. B.Sc.
PSYCHOLOGY
Cognitive Psychology
(2019 Pattern) (New) (Paper - I) (Semester - V) (35201)

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

Instructions to the candidates:

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

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

a) Who gave the Sociocultural theory of cognitive Psychology.

b) Define attention.

c) Define perceptual Constancy.

d) State the types of long term memory.

e) Founder of insightful learning.

f) Define forgetting.

Q2) a) Explain the divided, attention, selective attention sustained attention. **[6]**

OR

How does operant conditioning effect learning behavior?

b) Critically evaluate the information processing perspective of cognitive psychology. **[4]**

Q3) a) Explore the practical applications of cognitive Psychology. **[6]**

OR

Describe the various causes of forgetting.

b) Evalute the laws of trial and error method of learning. **[4]**

P.T.O.

Q4) a) Explain the insightful learning method with the help of experiment. **[6]**

OR

Describe the factors affecting problem solving behavior.

b) Illustrate the processes involved in sensation, attention & perception.**[4]**

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

a) Thinking - Cognitive process

b) Nature of cognitive psychology

c) Internal determinants of attention

d) Color constacy

e) Types of attention

f) Episodic memory

Total No. of Questions : 5]

SEAT No. :

P4945

[Total No. of Pages : 2

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T.Y.B.Sc.

PSYCHOLOGY

Psychopathology - I

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

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

Instructions to the candidates:

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

Q1) Answer the following in one or two sentences (Any Five) **[5]**

a) What is DSM - 5?

b) Define stress.

c) What is phobic disorder?

d) What is Alzheimer?

e) Define Anxiety.

f) What is a congestive disorder.

Q2) a) Discuss the criteria of abnormal behaviour. **[6]**

OR

a) Explain the Behavoristic model of abnormality.

b) Evaluate various treatments for OCD. **[4]**

Q3) a) Discuss the various treatments for anxiety. **[6]**

OR

a) Explain Amnestic syndrome in detail.

b) Critically evaluate psychodynamic model of abnormality. **[4]**

Q4) a) Explain various types of Intellectual disability. **[6]**

OR

a) Discuss pre DSM classification of mental disorders.

b) Critically comment on Diathesis stress model of abnormality. **[4]**

P.T.O.

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

a) Panic disorder

b) Delirium.

c) Mania

d) Depression

e) OCD

f) Brain injury and disorder.

Total No. of Questions : 5]

SEAT No. : ____

P4946

[Total No. of Pages : 2

[5822]-606

T.Y. B.Sc.

PSYCHOLOGY

Statistical Methods

(2019 Pattern) (New) (Semester - V) (Paper - III) (35203)

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

Instructions to the candidates:

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

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

a) Define variable.

b) Define percentile rank.

c) What is bar graph?

d) What is mode?

e) Who introduced the product moment method of correlation?

f) What is graph?

Q2) a) What are Pictogram? How can statistical data be represented through such diagrams? Illustrate with an example. **[6]**

OR

Compute average deviation from the following data.

Scores	80-84	85-89	90-94	95-99	100-104	105-109	110-114
Frequency	4	4	3	0	3	3	1

b) Evaluate the inferential statistics. **[4]**

P.T.O.

Q3) a) Explain the various types of scales of measurement. **[6]**

OR

Find the rank order correlation coefficient from the following data.

Individuals	A	B	C	D	E	F	G	H	I	J
Rating by one	18	14	15	17	12	13	10	9	7	6
Rating by Second	15	16	14	13	9	10	8	7	11	6

b) Evaluate the types of measures of variability. **[4]**

Q4) a) Enumerate the needs and Advantages of statistics in the field of Psychology. **[6]**

OR

Compute the median from the achievement scores of the 25 students as given in the following :

72, 75, 77, 67, 72, 81, 78, 65, 86, 83, 67, 82, 76, 76, 69, 70, 83, 71, 62, 72, 72, 61, 67, 68, 64

b) Evaluate the application of normal distribution curve. **[4]**

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

a) Characteristics of normal probability.

b) Application of range.

c) Product moment correlation.

d) Application of central tendency.

e) Ratio Scale.

f) Basics of graph.

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

P4947 **[Total No. of Pages : 2**

[5822]-607

T.Y. B.Sc. (Semester - V)

PSYCHOLOGY

Organizational Behaviour (Paper - IV)

(2019 Pattern) (35204)

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) Answer the following in one or two sentences (Any Five) : **[5]**

a) What is organizational planning?

b) Define Emotional Intelligence.

c) Define stress.

d) Define a leader.

e) What is time management?

f) Define conflict.

Q2) a) What are various challenges for Organizational Behaviour. **[6]**

OR

b) Explain extrinsic and Intrinsic motivation at work place. **[6]**

c) Explain the process of motivation with suitable example. **[4]**

Q3) a) Discuss the consequences of work stress. **[6]**

OR

b) Discuss various coping strategies of stress. **[6]**

c) Evaluate Behavioural approach of leadership. **[4]**

P.T.O.

Q4) a) Explain various factors affecting job satisfaction. **[6]**

OR

Discuss any two theories of work motivation. **[6]**

b) Discuss Management Grid. **[4]**

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

a) Flexi plan.

b) Group dynamics.

c) Power in leadership

d) Sources of stress

e) Types of leaders.

f) Job Enrichment.

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

P4948 **[Total No. of Pages : 2**

[5822]-608

T.Y.B.Sc.

PSYCHOLOGY

Paper - V : Positive Psychology

(35205) (2019 Pattern) (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) ***Questions from 2 to 5 carry equal marks.***

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

a) Define positive psychology.

b) Define happiness

c) Define well being.

d) What is emotion.

e) Define self-realization

f) Define resilience.

Q2) a) Explain the hedonic basis of happiness. **[6]**

OR

Describe the relationship between positive emotion and well-being.

b) Evaluate the goals of positive psychology. **[4]**

Q3) a) Elaborate the importance and significance of positive psychology as newly emerging branch of psychology. **[6]**

OR

Explore in details the 7'C of resilience.

b) Analyze the relationship between positive emotion and health. **[4]**

P.T.O.

Q4) a) Explain the relationship of positive psychology with health, clinicals development psychology. **[6]**

OR

Compare the hedonic & eudaimonic happiness.

b) Relate the positive traits and virtues in happiness. **[4]**

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

a) Assumptions of positive psychology.

b) Types of positive emotions

c) Subjective wellbeing & happiness

d) Component of wellbeing.

e) Trauma & resilience.

f) Human virtues

Total No. of Questions : 5]

SEAT No. : ____

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T.Y. B.Sc.

PSYCHOLOGY

Counseling Psychology (Paper - VI)

(2019 Pattern) (Semester - V) (35206)

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

Instructions to the candidates:

1) ***Q. 1 is compulsory.***
2) ***Solve any <u>THREE</u> questions from Q.2 to Q.5.***
3) ***Questions from 2 to 5 carry equal marks.***

Q1) Solve any <u>Five</u> of the following : **[5 × 1 = 5]**

a) Define Counseling.

b) What is group counseling.

c) Define non directive counseling.

d) Define psychological test.

e) State the psychometric properties of Psychological tests.

f) What is concreteness?

Q2) a) Explain the any six areas of counseling with their application. **[6]**

OR

Explore the various ethics in counseling.

b) Critically evaluate the humanistic approach of counseling. **[4]**

Q3) a) Explore the stages of counseling process. **[6]**

OR

Describe the coreconditions of counseling.

b) Analyze the various limitations of psychological tests in counseling. **[4]**

P.T.O.

Q4) a) Discuss the types of psychological tests use in counseling. **[6]**

OR

Explain the existential approach of counseling.

b) Critically analyze the qualities of effective counselors. **[4]**

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

a) Empathy.

d) Listening skill of counselor.

c) Challenges in demonstrating empathy.

d) Limitations of diagnosis in counseling.

e) Advantages of psychological tests in counseling.

f) Eclectic approach.

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Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages : 2

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T.Y. B.Sc.

PSYCHOLOGY

SEC - I : Basic Counseling Skills

(2019 Pattern) (Semseter - V) (352010)

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

Instructions to the candidates:

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

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

a) What is non-directive counseling?

b) State the types of Listening.

c) Why is eye contact important in counseling.

d) Define paraphrasing.

e) Define self disclosure.

f) Define concreteness.

Q2) a) Explain the importance and tips of active listening in counseling. **[6]**

OR

Describe the types of questions ask by counselor in counseling.

b) Analyze the purpose of counseling. **[4]**

Q3) a) Justify which type of counseling is more effective. **[6]**

OR

Describe the various relationship skills among counselors.

b) Critically evaluate the important components of communication skills in counseling. **[4]**

P.T.O.

Q4) a) Explain the major steps of confrontation in counseling. **[6]**

OR

Describe the types of empathy.

b) Analyze the different signs of showing attention & interest to the clients.**[4]**

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

a) Goals of counseling.

b) Humanistic counseling.

c) Immediacy.

d) good gestures

e) Personal space.

f) Signs of positive regard.

Total No. of Questions : 5]

SEAT No. :

P4951

[Total No. of Pages : 2

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T.Y. B.Sc.
PSYCHOLOGY
SEC-II : Personality Development
(2019 Pattern) (New) (Semester - V) (352011)

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 Personality.

b) Define Communication.

c) Define Goal setting.

d) What is team building?

e) State the types of written communication.

f) Define etiquettes.

Q2) a) Explain the barriers of communication. **[6]**

OR

Describe the different skills required in team work.

b) Analyze the various determinants of personality development. **[4]**

Q3) a) Explain the types of Personality with their characteristics. **[6]**

OR

Describe the various types of interview.

b) Analyse the various characteristics of effective team. **[4]**

P.T.O.

Q4) a) Explain the various self assessment techniques and challenges in self-assessment. **[6]**

OR

Discuss the various types of non verbal communication.

b) Compare the etiquettes in social and official settings. **[4]**

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

a) Telephone etiquettes.

b) Importance of career planning.

c) SWOT analysis.

d) Interview mistakes.

e) Need of goal setting.

f) Process of communication.

Total No. of Questions : 5]

SEAT No. : ____

P4952

[Total No. of Pages : 2

[5822]-612

T.Y. B.Sc.

ENVIRONMENTAL SCIENCE

EVS - 301 : Terrestrial Ecosystem and Management

(2019 Pattern) (Semester - V) (Paper - I) (35241)

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

Instructions to the candidates:

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

Q1) Solve FIVE of the following : **[5 × 1 = 5]**

a) Define : Terrestrial Ecosystem management.

b) Enlist the Biodiversity hotspots of India.

c) What are keystone species?

d) Differentiate between Tourism and Ecotourism.

e) Define the term: Remote Sensing.

Q2) a) Write in brief about Tropical evergreen forest biome. **[6]**

b) Explain the Quadrate method of vegetation sampling. **[4]**

Q3) a) Explain the effects of forest fire on natural environment. **[6]**

b) Justify : GIS as a tool for Terrestrial ecosystem Management. **[4]**

Q4) a) Describe about various terrestrial ecosystem services. **[6]**

b) Discuss the merits and demerits of Eco-tourism. **[4]**

P.T.O.

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

a) Community based terrestrial ecosystem Management.

b) Eastern Himalayas as one of the hotspots of India's Biodiversity.

c) Reasons of forest fires.

d) Interspecies relationships.

e) Exploitation of terrestrial ecosystems.

f) Biogeographic regions of India.

Total No. of Questions : 5]

SEAT No. : ____

P4953

[Total No. of Pages : 2

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T.Y. B.Sc.

ENVIRONMENTAL SCIENCE

EVS - 302 : Wildlife Biology and Management

(2019 Pattern) (Semester - V) (35242)

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

Instructions to the candidates:

1) ***Q. 1 is compulsory.***
2) ***Solve any <u>THREE</u> questions from Q.2 to Q.5.***
3) ***Q.2 to Q.5 carry equal marks.***

Q1) Solve any <u>Five</u> of the following : **[5 × 1 = 5]**

a) Define wildlife Biology.

b) What is Algae?

c) Explain Bryophytes.

d) What is gymnosperms?

e) What does mean by poaching?

f) What is Angiosperms?

Q2) a) Describe urbanization. **[6]**

b) Write short note on Bio-telemetry. **[4]**

Q3) a) Explain aquatic habital with suitable example. **[6]**

b) Write note on Block count technique. **[4]**

Q4) a) Explain marking wildlife with suitable example. **[6]**

b) Describe chipko movement. **[4]**

P.T.O.

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

a) Explain HEP.

d) Explain HIS.

c) Describe Arthropods with example.

d) Explain the concept of Deforestation.

e) Briefly describe ecotourism.

f) Write note on pellet count technique.

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

P4954 **[Total No. of Pages : 2**

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T.Y.B.Sc.

ENVIRONMENTAL SCIENCE

EVS 303 : Water and Soil Quality

(2019 Pattern) (Semester - V) (35243) (Paper-II)

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

Instructions to the candidates:

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

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

a) Explain different uses of water Resources.

b) What is meant by water inventory.

c) Explain the term water stress Index.

d) What is meant by soil Fertility.

e) Enlist the causes of soil Sickness

f) Enlist various factors influencing the soil.

Q2) a) Write a short note on soil conservation Technique. **[6]**

b) Explain in detail Tertiary treatment of waste water. **[4]**

Q3) a) Write a short note on-Remediation of Contaminated site. **[6]**

b) Write short note on - Ganga Action Plan (GAP). **[4]**

Q4) a) Explain various soil types fund in India. **[6]**

b) Write short note on - Eutrophication process with a case study. **[4]**

P.T.O.

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

a) Water cycle

b) River water pollution.

c) Soil Horizons

d) Role of National and International Agencies in water health and Sanitation.

e) Soil as waste disposal.

f) Application of GIS and Remote sensing in management of water Resources.

Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages : 2

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T.Y. B.Sc.

ENVIRONMENTAL SCIENCE

EVS - 304 : Atmospheric and Global Climate Change

(2019 Pattern) (Paper - I) (Semseter - V) (35244)

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) ***All questions are compulsory.***
4) ***Right figures indicate full marks.***

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

a) What are the 4 main green house gases.

b) When was the climate change convention signed.

c) How many countries signed kyoto protocol.

d) What do you meant by carbon credit.

e) How is energy transferred to earth.

f) Where the asian brown cloud is mostly located.

Q2) Attempt the following :

a) What is El-Nino and La-nina. How it impact on Indian monsoon. **[6]**

b) How do you determined atmospheric stability. **[4]**

Q3) Attempt the following :

a) Why the Montreal protocol was sucessful than kyoto protocol. **[6]**

b) How does global climate change affect agriculture environment. **[4]**

P.T.O.

Q4) Attempt the following :

a) How does the global conveyor belt affect climate. **[6]**

b) What are the causes of Asian brown cloud. **[4]**

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

a) Earth radiation budget

b) Southern oscillation

c) Temperature inversion

d) Clean development mechanism

e) Types of energy transfer

Total No. of Questions : 5]

SEAT No. :

P4956

[Total No. of Pages : 2

[5822]-616

T.Y. B.Sc.

35245 : ENVIRONMENTAL SCIENCE

EVS - 305 : Environment Legislation and Policy

(2019 Pattern) (Paper - V) (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) ***Questions No. 2 to Q. No. 5 carry equal marks.***

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

a) Define: Environmental Governance

b) What is the legal definition of Sustainable Development?

c) Write the full form of CPCB?

d) In which year Montreal Protocol was made?

e) Define: Environmental Ethics

f) What is Ramsar Convention made for?

Q2) Answer the following

a) What is Environment (Protection) Act 1986? Discuss the Salient features of the act in detail. **[6]**

b) Mention the objectives of National Forest Policy. **[4]**

Q3) Answer the following

a) Write in detail about Rio Summit 1992. **[6]**

b) Explain the Role of National Green Tribunal. **[4]**

P.T.O.

Q4) Answer the following

a) what is Environmental Governance? Write objectives, attributes and elements of Governance. **[6]**

b) Discuss the outcomes of Public Liability Insurance Act 1991. **[4]**

Q5) Write a short note on **Any Five** of the following : **[5 × 2 = 10]**

a) Powers of Central Pollution Control Board under Air Act 1981.

b) Objectives of National Forest Policy.

c) Principles of Stockholm declaration.

d) Article 48-A.

e) Pairs Summit

f) The Water (Prevention and Control of Pollution) Act 1974.

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

P4957 **[Total No. of Pages : 2**

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T.Y. B.Sc. (Semester - V)

ENVIRONMENTAL SCIENCE

EVS - 356 : Environmental Biotechnology - I

(2019 Pattern) (35246)

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

Instructions to the candidates:

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

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

a) What are objectives of Environmental Biotechnology?

b) Which virus is used as biopesticide?

c) What is another name for bioleaching?

d) What are the names of biofuels?

e) Who started GMO foods?

f) What is the main source of biogas?

Q2) a) What is the role of biofertilizers in agriculture? **[6]**

b) How does environmental biotechnology help the environment? **[4]**

Q3) a) Why tissue culture is called micro-propagation? **[6]**

b) How do GMO's benefit society? **[4]**

Q4) a) Which method of composting has the faster conversion rate. **[6]**

b) What is LMO in Cartagena Protocol? **[4]**

P.T.O.

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

a) Recovery of metals from polluted environment.

b) Draw a neat labeled diagram of vermicomposting technology.

c) How does oxygen affect compost?

d) Principles of GMO's.

e) GMO Risk.

f) RNAi-based Biopesticides.

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Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages : 2

[5822]-618

T.Y. B.Sc.

ENVIRONMENTAL SCIENCE

EVS 3011 : Remote Sensing, GIS and Modelling

(2019 Pattern) (Semester - V) (352410)

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

Instructions to the candidates:

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

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

a) Define Geographical Information System.

b) Name any two software used for GIS.

c) Difference between Raster and Vector Data.

d) Formula for covariance [Co-efficient of Variance]

e) Full form of :

i) DBMS

ii) ANOVA

f) Give any two types of scattering

Q2) a) Explain Electromagnetic spectrum with neat labelled diagram. **[6]**

b) Define Arithmetic Mean. Calculate the Arithmetic mean of following Data, **[4]**

Data : (16, 17, 10, 13, 20, 18, 13, 14, 18)

P.T.O.

Q3) a) Explain any six Elements of Photo Interpretation for visual interpretation. **[6]**

b) Calculate scale, if the focal length is 6 inch and flying height is 1000 feet. **[4]**

Q4) a) Write in detail about Energy response mechanism with Earth surface and Atmosphere. **[6]**

b) Application of Remote sensing and GIS in Land use and Land cover mapping. **[4]**

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

a) Principle of Remote sensing

b) Flight planning

c) Sunsynchronous orbit

d) Minimum mapping unit

e) Parametric Tests

f) Curve fitting

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Total No. of Questions : 5]

SEAT No. : ____

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[5822]-619
T.Y. B.Sc.
ENVIRONMENTAL SCIENCE
EVS - 3012 : Soil Health Management
(2019 Pattern) (Semseter - V) (352411)

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

Instructions to the candidates:

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

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

a) Give 4 examples of Biofertilizer.

b) What are two classification of fertilizers?

c) What are the benefits of strip cropping?

d) What are farm ponds?

e) What are types of drainage system?

f) What is broad bed furrows?

Q2) Attempt of the following : **[10]**

a) Draw soil profile and explain about macro nutrients and micro nutrients found in soil. **[6]**

b) With excessive use of pesticides, what type of negative impacts are observed on soil? **[4]**

Q3) Attempt of the following : **[10]**

a) What are three types of drainage system used in Agriculture irrigation.**[6]**

b) What is shifting cultivation? What are the disadvantage of shifting cultivation. **[4]**

P.T.O.

Q4) Attempt of the following : **[10]**

a) Explain mechanical measure used on hill slopes for water conservation. **[6]**

b) Write a brief note on Integrated Pest Management. **[4]**

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

a) Rain water harvesting

b) Soil Moisture conservation

c) Agro foresting

d) Percolation Pond

e) Energy crop

f) Classification of Plant Disease

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Total No. of Questions : 4]

SEAT No. :

P4960

[Total No. of Pages : 2

[5822]-620

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS 501 : Study of Disaster

(2019 Pattern) (Semester - V) (35231)

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

Instructions to the candidates:

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

Q1) Define the following questions : **[5]**

a) Define Earthquake.

b) Define Cataclysm.

c) What is a natural disaster?

d) What is a man-made disaster?

e) Define Tsunami.

Q2) Write short notes on (any two) : **[10]**

a) Cataclysm

b) Tsunami

c) Earthquake

Q3) Attempt the following questions (any two) : **[10]**

a) Explain the Meaning and Concept Disaster.

b) State the role of Information in Disaster Preparedness.

c) Explain the Disaster Management Cycle.

P.T.O.

Q4) Answer in details (any one) : **[10]**

a) Describe in detail Early Warnings and Safety Majors of Disaster.

b) Describe in detail Meaning, Concept, Nature and Scope Disaster Management.

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Total No. of Questions : 4]

SEAT No. :

P4961

[Total No. of Pages : 1

[5822]-621

T.Y. B.Sc. (Semester - V)

DEFENCE AND STRATEGIC STUDIES

DS - 502 : United Nations Organization Part - I

(2019 Pattern) (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) Define Global Peace.
b) Define Security.
c) Security council.
d) Define Justice.
e) Who is the Secretary-General of the UN.

Q2) Write short notes on (any two) : **[10]**

a) Secretariat
b) UN Charter
c) UDHR

Q3) Attempt the following questions (any two) : **[10]**

a) Explain the Meaning and Concept of the UN.
b) State the role of the General Assembly.
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) Describe in detail the role of the Security Council in Global Peace and Security.

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Total No. of Questions : 4]

SEAT No. : ____

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[5822]-622

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS 503 : International Relation 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 Relation.
b) Define Realism.
c) Define Idealism.
d) What is Development?
e) What is International Relations?

Q2) Write short notes on (any two) : **[10]**

a) Game Theory
b) Decision making Theories
c) Unipolar

Q3) Attempt the following questions (any two) **:** **[10]**

a) Explain the Meaning and Concept of International Relations.
b) State the importance of the Study of Theories of International Relation.
c) Explain the Bipolar.

Q4) Answer in details (any one) : **[10]**

a) Describe in detail Idealism Theories.
b) Describe in detail Realism Theories.

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Total No. of Questions : 4]

SEAT No. :

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[Total No. of Pages : 1

[5822]-623

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) Define Terrorism.

b) What are the Causes of Terrorism.

c) What is National Security?

d) Define Left Wing Terrorism.

e) What are the Problems of Naxalism-Maoism?

Q2) Write short notes on (any two) : **[10]**

a) Religious Extremist Terrorism.

b) Cross Border Terrorism.

c) Terrorism as a threat to National Security.

Q3) Attempt the following questions (any two) : **[10]**

a) State the Economical Impact of Terrorism on National Development.

b) Explain the Right Wing Terrorism.

c) State the Social Impact of Terrorism on National Development.

Q4) Answer in details (any one) : **[10]**

a) Explain the Types of Terrorism.

b) State the Impact of Terrorism on National development.

Total No. of Questions : 4] **SEAT No. :**

P4964 **[Total No. of Pages : 2**

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T.Y. B.Sc. (Semester - V)

DEFENCE AND STRATEGIC STUDIES

DS - 506(A) : Major Global Conflict - I

(35236A) (2019 Pattern)

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

Instructions to the candidates:

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

Q1) Define the following questions. **[5]**

a) What is the conflict of oil?
b) What is the matter between Israel and Palestine?
c) What is the question of Palestine?
d) What caused the Afghanistan issue?
e) What is the location of Kashmir?

Q2) Write short notes on (any two) : **[10]**

a) Oil
b) Kashmir
c) Current Status Afghanistan Issue

Q3) Attempt the following questions (any two) : **[10]**

a) Describe the Kashmir Issue Present Status of the Issue.
b) Explain the Religious Conflict.
c) Explain the Israel Palestine Historical Background.

Q4) Answer in details (any one) : **[10]**

a) State the Oil-Source of Conflict.
b) State the Afghanistan Issue Brief historical account of wars.

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Total No. of Questions : 4]

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[5822]-624

T.Y. B.Sc. (Semester - V)

DEFENCE AND STRATEGIC STUDIES

DS - 506(B) : Regional Security System - I

(2019 Pattern) (35236B)

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

Instructions to the candidates:

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

Q1) Define the following questions. **[5]**

a) Which of the following SAARC members has the highest population?
b) Where is the headquarters of NATO situated?
c) Which country is Warsaw?
d) Why did Pakistan join CENTO?
e) When was ASEAN established?

Q2) Write short notes on (any two) : **[10]**

a) WARSAW
b) SAARC
c) ASEAN

Q3) Attempt the following questions (any two) : **[10]**

a) State the Aims of the World Trade Organization.
b) State the Structure of ASEAN.
c) Explain the Origin and Development.

Q4) Answer in details (any one) : **[10]**

a) State the Objective World Trade Organization.
b) Explain the Origin and Development ASEAN.

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Total No. of Questions : 4]

SEAT No. : ____

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[5822]-625
T.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS 507(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) Define Maritime.

b) Define Boundaries.

c) Define Coastal Boundaries.

d) Define Maritime Boundaries.

e) Define Maritime Security.

Q2) Write short notes on (any two) : **[10]**

a) Territorial Waters

b) Exclusive Economic zone

c) Coast Guards

Q3) Attempt the following questions (any two) : **[10]**

a) State the Strategic Importance of India's Maritime Boundaries.

b) State the Human and Drugs Trafficking, Piracy of India.

c) Explain the Continental Shelf.

Q4) Answer in details (any one) : **[10]**

a) Explain the Duties, Responsibilities and Limitations of Indian Coast Guards.

b) State the Strategic influence of China's 'String of Pearls' in the Indian Ocean.

P.T.O.

Total No. of Questions : 4]

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[5822]-625
T.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS 507(B) : Peace and Conflict Studies - I
(2019 Pattern) (Semester - V) (35237B)

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

Instructions to the candidates:

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

Q1) Define the following questions : **[5]**

a) Define the Cold War.

b) Define Regionalism.

c) Define Classical Approach.

d) What is a classical approach?

e) What is the purpose of diplomacy

Q2) Write short notes on (any two) : **[10]**

a) Cold War

b) Confidence Building Measures

c) Regionalism

Q3) Attempt the following questions (any two) : **[10]**

a) State the Nature and Forms of Conflict.

b) Explain the Post Cold War.

c) Explain the Conceptual analysis of conflict and peace.

Q4) Answer in details (any one) : **[10]**

a) Explain the Peace Research and Peace Movements.

b) Describe the Success of Disarmament and Arms Control in today's War Scenario.

Total No. of Questions : 4]

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T.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS 508(A) : Chatrapati Shivaji Maharaj Military System
(2019 Pattern) (Semester - V) (35238A)

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

Instructions to the candidates:

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

Q1) Define the following questions : **[5]**

a) Define Swarajya.

b) Define Maratha.

c) Define Military discipline.

d) Define Hindvi Swarajya

e) Define clever.

Q2) Write short notes on (any two) : **[10]**

a) Dadoji Kondev

b) Chatrapati Shivaji Maharaj

c) Adil Shahi

Q3) Attempt the following questions (any two) : **[10]**

a) State the Economic State of during Ch Shivaji's time.

b) Explain the Battle of Pratapgad.

c) Explain the Battle of Kolhapure.

Q4) Answer in details (any one) : **[10]**

a) Explain in detail the Campaign of Mirza Raje Jay Singh and Treaty of Purandar.

b) Explain in detail the Political and cultural state of Maharashtra during Ch Shivaji's time.

P.T.O.

Total No. of Questions : 4]

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T.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS 508(B) : Chatrapati Shivaji Maharaj as Strategic Thinker
(2019 Pattern) (Semester - V) (35238B)

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

Instructions to the candidates:

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

Q1) Define the following questions : **[5]**

a) Define Forts.

b) Define Ship building.

c) Define Guerilla Leader.

d) Define Foresight.

e) Define Organization.

Q2) Write short notes on (any two) : **[10]**

a) Chatrapati Shivaji Maharaj

b) Strategic Thinker

c) Guerilla Leader

Q3) Attempt the following questions (any two) : **[10]**

a) State the Structure of Maratha Army.

b) Explain the Ch. Shivaji as a Military Leader.

c) Explain the Leader of Guerrilla Warfare.

Q4) Answer in details (any one) : **[10]**

a) Explain the detail the Principles and Characteristics of Guerrilla Warfare.

b) Explain in detail about Ch Shivaji's foresight for developing the Navy.

Total No. of Questions : 4]

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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) Define War.

b) Define World War.

c) Define Balkan War.

d) Define Defence.

e) Define Security.

Q2) Write short notes on (any two) : **[10]**

a) World War I

b) World War II

c) Cold war

Q3) Attempt the following questions (any two) : **[10]**

a) Explain the Causes of War of World War I.

b) Explain the Causes of War of World War II.

c) Explain the Causes of the Cold war.

P.T.O.

Q4) Answer in details (any one) : **[10]**

a) Explain in detail the Peace Programme of Widrow Wilson.

b) Explain in detail theTechnology used in World War I.

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Total No. of Questions : 4]

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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) Define Policy.

b) Define Foreign Policy.

c) Define India's Foreign Policy.

d) Define Neighborhood.

e) Define Diplomacy.

Q2) Write short notes on (any two) : **[10]**

a) Foreign Policy

b) India's Foreign Policy

c) Look East Policy

Q3) Attempt the following questions (any two) : **[10]**

a) Explain the Elements of Foreign Policy.

b) State the Meaning and Concept Foreign Policy.

c) Explain the Principles of Foreign Policy.

Q4) Answer in details (any one) : **[10]**

a) Explain in detail the India's Neighborhood First Policy.

b) Explain in detail the India’s Act East Policy.

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Total No. of Questions : 4]

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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) Define Human rights.

b) Define Values.

c) Define Justice.

d) Define Dignity.

e) Define Liberty.

Q2) Write short notes on (any two) : **[10]**

a) Human rights

b) Minorities

c) Tribes

Q3) Attempt the following questions (any two) : **[10]**

a) Explain the Meaning and concept of Human rights.

b) State the Significance of Value - Human Values.

c) Explain the Human Rights and Gender Issues.

P.T.O.

Q4) Answer in details (any one) : **[10]**

a) Explain in detail the Significance of Human Rights Education.

b) Explain in detail the Human Rights and Child Labour.

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Total No. of Questions : 4]

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T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 511 : Human Rights and UN

(2019 Pattern) (Semseter - V) (352311)

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 Human Rights.

b) Define the UN.

c) Define preamble.

d) Define mission.

e) Define liberty.

Q2) Write short notes on (any two) : **[10]**

a) Human Rights

b) UN

c) Liberty

Q3) Attempt the following questions (any two) : **[10]**

a) Explain the Provisions in the United Nations Charter on Human Rights.

b) State the Historical background of the Universal Declaration of Human Rights.

c) Explain the Importance of the Universal Declaration of Human Rights.

P.T.O.

Q4) Answer in details (any one) : **[10]**

a) Explain in detail the Freedom and equal dignity and rights of Human Rights.

b) Explain in detail the Prevention of discrimination.

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Total No. of Questions : 5]

SEAT No. :

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[Total No. of Pages : 2

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T.Y. B.Sc.

VOCATIONAL BIOTECHNOLOGY

VBt - 311 : Animal & Plant Tissue Culture

(2019 Pattern) (CBCS) (Semester - V) (35571)

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

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any 3 from Q.2 to Q.5.***
3) ***Q.2 to Q.5 carry equal marks.***
4) ***Draw neat labelled diagrams wherever necessary.***

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

a) In Culture media which indicator is used.

b) Give any one example of breast cancer cell line.

c) What is concentration used in CO_2 incubator.

d) Define cell fusion.

e) Name any two physical methods of gene transfer in plants.

f) Define primary culture.

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

i) Write detail note on common cell culture contaminants and methods to eliminate them.

ii) What is Transfection? Explain in detail method of Transfection in Animal tissue culture.

iii) Comment on basic Lab design for Animal Tissue Culture Lab.

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

i) What is organogenesis. Explain indirect organogenesis in detail.

ii) Comment on methodology of Embryoculture.

P.T.O.

Q3) a) Answer the following (Any two) : **[6]**

i) Give applications of Embryo Culture.

ii) Explain in detail Rhizogenesis with proper flow chart.

iii) Distinguish between primary and secondary culture.

b) Answer the following (Any one) : **[4]**

i) Explain in detail method of selection of somaclones.

ii) How artifical seed production in done by somatic embryogenesis.

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

i) Comment on Hairy Root culture and give its application.

ii) Distinguish between Direct and Indirect organogenesis.

iii) Discuss how evolution of cell line occurs in tissue culture.

b) Answer the following (Any one) : **[4]**

i) Explain in detail History of Animal cell culture.

ii) How induction of somatic embryos done. Explain with help of flowchart.

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

a) Invitro Fertilization.

b) Interferon as secondary metabolite

c) Caulogenesis

d) Secondary culture.

e) Hormones used in PTC.

Total No. of Questions : 5]

SEAT No. : ____

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T.Y. B.Sc. (Vocational)

BIOTECHNOLOGY (Paper - VI)

VBt - 312 : Industrial Biotechnology

(2019 Pattern) (CBCS) (Semester - V) (35572)

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

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Q.2 to Q.5. carry equal marks.***
4) ***Draw neat labelled diagrams wherever necessary.***

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

a) Define fermentation.

b) What is the role of baffle in a fermenter?

c) Why is hops used during production of beer?

d) Define fermentation medium.

e) Name any one method used to measure temperature during fermentation process.

f) In which phase of growth are primary metabolites produced?

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

a) i) Give any three applications of industrial biotechnology.

ii) Describe secondary metabolites in detail.

iii) Distinguish between crude media and synthetic media.

b) Describe in detail the component parts of a typical fermentation process. **[4]**

P.T.O.

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

a) i) Discuss the use of r-DNA technology for strain improvement.

ii) Explain the technique of sporulation on solid media used for inoculum development in fungi.

iii) Give any two examples of antifoaming agents. Add a note on important properties of antifoaming agents.

b) Answer **any one** of the following : **[4]**

i) Describe the process of secondary screening in detail.

ii) What is downstream processing? Explain any one step involved in downstream processing.

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

a) i) Describe fed-batch fermenter in detail.

ii) Explain the process of production of citric acid.

b) With the help of neat labelled diagram, explain the working of galvanic electrode. Add a note on its advantages and disadvantages. **[4]**

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

a) Role of inducers in fermentation media.

b) Role of chromophores for standardization of electrodes used in measuring dissolved oxygen in fermenter.

c) Applications of air-lift fermenters.

d) Top-fermenting yeast and bottom - fermenting yeast used for production of beer.

e) Types of chromatography used in downstream processing.

f) Objectives of inoculum development.

Total No. of Questions : 5]

SEAT No. : ____

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T.Y. B.Sc. (Vocational) (P-V)

SEED TECHNOLOGY

ST - 3.1 : Seed Pathology and Entomology

(2019 Pattern) (CBCS) (2 Credits) (Semester - V) (35891)

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

Instructions to the candidates:

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

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

a) Define seed pathology.

b) Define storage fungi.

c) Give any two names of storage pest.

d) What is Dehumidification?

e) What is sanitation?

f) Give any two names of insert pest.

Q2) Attempt the following questions :

a) Comment on seed borne nematodes. **[6]**

b) Write the objectives of seed health testing? **[4]**

Q3) Attempt the following questions :

a) Explain the seed transmitted pathogens. **[6]**

b) Give the importance of seed testing? **[4]**

P.T.O.

Q4) Attempt the following questions :

a) Explain the characters of order Hemiptera. **[6]**

b) What are seed borne pathogens? **[4]**

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

a) Seed entomology.

b) Economic importance of seed pathology in seed industry.

c) Structures for seed storage.

d) Influence of environmental factors on seed borne disease.

e) Seed treatment.

f) Air conditioning.

g) Washing test.

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Total No. of Questions : 5]

SEAT No. : ____

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T.Y. B.Sc.

VOCATIONAL (SEED TECHNOLOGY)

ST - 3.2 : Entrepreneurship Development

(CBCS) (2019 Pattern) (2 Credits) (Semester - V) (35892)

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 entrepreneur.

b) What is Joint Stock Company?

c) What is partnership.

d) Full form of MSSIDC

e) Full form of SIDBI

f) What is VAT?

Q2) Attempt the following questions :

a) Give socio economic origins of Entrepreneurship. **[6]**

b) Give role of commercial funding agency. **[4]**

Q3) Attempt the following questions :

a) Describe Entrepreneurial process. **[6]**

b) Give characteristics of Entrepreneur. **[4]**

P.T.O.

Q4) Attempt the following questions :

a) Explain on commercial and cooperative bank **[6]**

b) Give relative merits of partnership. **[4]**

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

a) Marketing strategy

b) Web browsing

c) Marketing mix and its effect

d) PMYR-Loans,

e) Criteria for selection of new product or service

f) Ideas to start new business

Total No. of Questions : 5]

SEAT No. : ____

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T.Y. B.Sc. (Vocational)

35825 : INDUSTRIAL MICROBIOLOGY

IMB 355 : Applications of Microbial Systems

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

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

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Q.2 to Q.5 solve any 3.***
3) ***Q.2 to Q.5 carry equal marks.***

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

a) What are bar screens?

b) Name two chemical disinfectants.

c) What is Insitu Bioremediation?

d) What is nutrient cycling?

e) What are functional foods?

f) State example of Prebiotic.

Q2) Solve the following :

a) Explain removal of nitrogen using biological method. **[6]**

OR

Explain therapeutic use of fermented foods.

b) Write note on trickling filter. **[4]**

Q3) Solve the following :

a) Describe working of any one anaerobic treatment method. **[6]**

OR

Write note on Biofuels.

b) Give descriptive account of fermented foods. **[4]**

P.T.O.

Q4) Solve the following :

a) Write note on sewage treatment plant. **[6]**

OR

Write note on production of bio pesticides.

b) Write note on Nutrient cycling. **[4]**

Q5) Write notes on solve any 4. **[10]**

a) Refractory organics.

b) Dissolved Air flotation.

c) Working of up flow Bioreactor.

d) Bio pesticides.

e) Probiotics and Prebiotics.

f) Functional Dairy foods.

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Total No. of Questions : 5]

SEAT No. :

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T.Y. B.Sc. (Vocational)

INDUSTRIAL MICROBIOLOGY

IMB - 356 : Cell Culture Technology

(2019 Pattern) (CBCS) (Semester - V) (Paper - VI) (35826)

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

a) State the importance of serum in maintenance of animal cells.

b) State an example of fibroblast cell line.

c) State the function of phenol red in ATC media.

d) Which type of microscope can be used to visualize animal cell lines?

e) What is the role of Aminoterin in somatic hybridization technique?

f) State an example of mAb used in therapy.

Q2) Solve the following :

a) Describe the types of fermenters used for large scale culture of animal cells. **[6]**

OR

Describe the process of transgenesis.

b) Explain the concept, type and application of stem cells. **[4]**

P.T.O.

Q3) Solve the following :

a) Explain the structure, function and application of Hollow fibre Reactor. **[6]**

OR

Explain the process of establishing organ culture.

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

Q4) Solve the following :

a) Discuss the concept of animal cell culture. **[6]**

OR

Discuss the impact of development of hybridoma technology.

b) Write a short note on application of organ culture. **[4]**

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

a) Types of animal cell culture based on morphology.

b) Role of Serum in ATC medium.

c) ATCC

d) Different methods for disaggregation of animal cells from tissue.

e) Characterization of cell lines.

f) Difference between normal and transformed cells.

Total No. of Questions : 5]

SEAT No. : ____

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T.Y. B.Sc. (Semester - V)

INDUSTRIAL MICROBIOLOGY

IMB3510 : Plant Tissue Culture

(2019 CBCS Pattern) (358210)

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

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Q2 to Q5 carry equal marks.***

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

a) State importance of plant tissue culture.

b) Give an example of trans genic plant.

c) What is meant by protoplast fusion?

d) Optimal pH for PTC is _____.

e) What are virus free plants?

f) Surface sterilization of plants is carried out by using _____.

Q2) Solve the following :

a) Describe the types of different plant Tissue culture. **[6]**

OR

Describe different advantages of plant tissue culture over conventional farming.

b) Write short note on Trans genic plants. **[4]**

P.T.O.

Q3) Solve the following :

a) Explain Gene gun method of transformation. **[6]**

OR

Explain the process of micropropogation in detail.

b) Enlist and describe atleast two types of trans genic plants with examples. **[4]**

Q4) Solve the following :

a) Discuss the protocol for setting callus culture from Datura plant. **[6]**

OR

Explain the shortcomings of plant tissue culture.

b) Write short note on Syn - Seeds **[4]**

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

a) Haploid Plants

b) MS Medium

c) Bt crops

d) Ti plasmid

e) Transformation of plant cells

f) Somatic embryos

Total No. of Questions : 5]

SEAT No. :

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T.Y. B.Sc. (Vocational)

ELECTRONIC EQUIPMENT MAINTENANCE

VOC-EEM-355 : Trouble Shooting & Repair of Audio and Video Equipments

(CBCS) (2019 Pattern) (Paper - V) (Semester - 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 Q. No. 5 carry euqal marks.***

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

a) One can build his own Satellite receiver. Comment.

b) What is If frequency in AM radio receiver?

c) What is digital TV?

d) What kind of modulation is used in TV?

e) Which loudspeaker is normally used in PA system?

f) Which battery type is used in Laptap?

Q2) a) i) Explain in brief the working principle of plasma T.V. **[3]**

ii) Explain in brief the fault diagnosis of CRT monitor. **[3]**

b) Give in detail troubleshooting steps of VCD player. **[4]**

Q3) a) i) Give at least two faults with blue ray disc. Also give remedies for them. **[3]**

ii) Give at least two faults with Laptap. Also suggest remedies for them. **[3]**

b) Explain in brief working principle of inkjet printer. **[4]**

P.T.O.

Q4) a) i) Give two common faults with ACD player. Also give remedies for them. **[3]**

ii) Describe in brief the troubleshooting of FM receiver. **[3]**

b) Draw the block diagram of PA system. Also explain in brief the procedure of troubleshooting. **[4]**

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

a) Write in brief about the types of catridges used in different printers.

b) Compare dot matrix printer with laser printer.

c) Explain in brief the working principle of laser printer.

d) What is set top box? Give its two performance parameters.

e) Differentiate between audio CD & Video CD.

f) Give at least one performance parameters of home theatre. How to improve it?

Total No. of Questions : 5]

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T.Y. B.Sc. (Voc.)

ELECTRONIC EQUIPMENT MAINTENANCE

VOC-EEM-356 : Electronic Instrumentation

(2019 Pattern) (CBCS) (Semester - V) (Paper - VI) (35812)

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) ***Questions No. 2 to 5 carry equal marks.***

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

a) Define accuracy.

b) How to measure impedance?

c) What is sensor?

d) What is ladder diagram?

e) What is real time analysis?

f) What is PLC?

Q2) a) Solve the following :

i) Give at least one example of instrumentation system in electronic industry. Give it's application. **[3]**

ii) What is error? How to obtain it from accuracy? **[3]**

b) Draw the block diagram of general instrumentation system in electronic industry. Give its application. **[4]**

P.T.O.

Q3) a) Answer the following. **[6]**

i) What is logic analyser? Give its one application.

ii) What is distortion analyser? Give it's one applications.

b) Draw the block diagram of DSP. Give its one application. **[4]**

Q4) a) Solve the following. **[6]**

i) What is ATE? Where it is used?

ii) What is distortion? How to analyser it?

b) Write a detailed note on PLC. **[4]**

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

a) What is tracability?

b) What is difference between force sensor & pressure sensor?

c) Give example of temperature sensor. Give it's applications.

d) Differentiate between data processing and acquisition.

e) What is simulation? How to use it in PLC?

f) Write a note on DVM.

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Total No. of Questions : 4]

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T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

35235 : Research Methodology

(2019 Pattern) (Semester - V)

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]**

i) Define Research Methodology.

ii) Define Methodology.

iii) Define Research Formulation.

iv) Define Research problems.

v) What is Research Formulation?

Q2) Write short notes on (any two) **[10]**

i) Research Report

ii) Research Design

iii) Research

Q3) Attempt the following questions (any two) **[10]**

i) Explain the Meaning and Concept of Research.

ii) State the Aims and objectives of research.

iii) State the Process of Problem Formulation.

P.T.O.

Q4) Answer in details (any one) **[10]**

i) Describe in detail significance and characteristics of research.

ii) Describe in detail Objectives of Research Design.