Total No. of Questions : 4]

SEAT No. : ____

PD752

[Total No. of Pages : 3

[6467]-701
T.Y.B.Sc. (Regular)
MATHEMATICS
DSE-4A: MT-361: Complex Analysis
(CBCS 2019 Pattern) (Semester -VI) (36111)

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

Instructions to the candidates:

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

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

a) Show that $f(z) = |z|^2$ is nowhere analytic

b) State couchy-Riemann equations in polar form

c) Show that Log $(i) = \frac{\Pi}{2} i.$

d) Evaluate the integral $\int_0^1 (t - i)dt.$

e) Give an example of a function having essential singularity.

f) Find the residue at $z = 1$ of the function $f(z) = \frac{1}{(z-1)(z+1)}$

g) Write the maclaurin series expansion of e^z.

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

a) Suppose that $f(z) = u(x, y) + i\, v(x, y)$ and that $f'(z)$ exists at a point $z_0 = x_0 + iy_0$. Then show that the first order partial derivatives of u and v must exist at (x_0, y_0) and they must satisfy the cauchy-Riemann equations $u_x = v_y, u_y = -v_x$, there. Also show that $f'(z_0) = ux + i\, v_x$, where the partial derivatives are to be evaluated at (x_0, y_0).

b) If a function $f(z) = u(x, y) + iv(x, y)$ is analytic in a domain D, then show that u and v are harmonic in D.

P.T.O.

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

a) Show that for all z,

i) $\overline{sinz} = \sin \overline{z}$

ii) $\overline{\cos z} = \cos \overline{z}.$

b) Without evaluating the integral, show that

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

When C is the arc of the circle |*z*|=2 from *z* = 2 to *z* = 2 *i* that lies in the first Quadrant.

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

a) If *f*(*z*) is piecewise continous function on a contour *c*, then prove that $\left| \int_c f(z)dz \right| \leq \text{ML}$, where L= length of C and M is a nonnegative constant such that $|f(z)| \leq \text{M}$ for all points *z* on *c* at which *f*(*z*) is defined.

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

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

a) Let C denote the positively oriented boundary of the square whose sides lie along the lines $x = \pm 2$ and $y = \pm 2$ Evaluate $\int_c \frac{zdz}{2z+1}$

b) Show that

i) $\exp(2 \pm 3\Pi i) = -e^2$

ii) $\exp(z + \Pi i) = -\exp z.$

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

a) If a function *f* is analytic at a given point, then prove that its derivatives of all orders are also analytic functions at that point.

b) Explain three types of isolated singularities with illustrations

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

a) Write the two Laurent series in powers of *z* that represent the function

$$f(z) = \frac{1}{z(1+z^2)}$$

in certain domains, and specify those domains.

b) Find the value of the integral,

$$\int_C \frac{dz}{z^3(z+4)}$$

taken counterclock-wise around the circle c: |*z*|=2

Total No. of Questions : 4]

SEAT No. : ____

PD753

[Total No. of Pages : 2

[6467]-702
T.Y. B.Sc. (Regular)
MATHEMATICS
MT-362: Real Analysis - II
(CBCS 2019 Pattern) (Semester - VI) (Paper - II) (36112)

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

Instructions to the candidates:

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

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

a) Can the measure of set of irrational numbers is zero? Justify.

b) If m(A) > 0 and B ⊂ A such that m(B) = 0 then show that m(A – B) cannot be zero.

c) Using P - test, check the convergence of $\int_1^{\infty} \frac{1}{x^3}\,dx$.

d) Find C.P.V. $\int_{-\infty}^{\infty} x^3\,dx$.

e) Explain, "f is continuous almost everywhere on [a, b]".

f) Explain the difference between uniformely and pointwise convergence of sequence of functions.

g) State Fundamental theorem of calculus.

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

i) Show that every countable subset of $\mathbb{R}'$ has measure zero.

ii) If f ε R[a, b] and α is any real number then show that αf ε R[a, b] and $\int_a^b \alpha f = \alpha \int_a^b f$.

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

i) Let $f(x) = x^2$ defined on [0, 1] and $\sigma = \left\{0, \frac{1}{3}, \frac{2}{3}, 1\right\}$ be the subdivision of [0, 1]. Compute U [f ; σ] and L [f ; σ].

ii) Evaluate the following limit

$$\lim_{n\to\infty} \frac{1}{n}\left[\left(\frac{1}{n}\right)^2 + \left(\frac{2}{n}\right)^2 + - - - + \left(\frac{n}{n}\right)^2\right].$$

P.T.O.

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

i) State and prove second fundamental theorem of calculus.

ii) If the power series $\sum_{k=0}^{\infty} a_k x^k$ converges for $x = x_0$ then show that $\sum_{k=0}^{\infty} a_k x^k$ is convergent uniformely on $[-x_1, x_1]$. Where, x_1 is any number such that $0 < x_1 < |x_0|$.

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

i) Show that the series $\sum_{n=1}^{\infty} \frac{1}{n^2 + x^2}$ defined on $[0, \infty)$ is Convergent.

ii) Show that $f_n(x) = \frac{x^n}{n}$ defined on [0, 1] is uniformely converges to 0, on [0, 1].

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

i) If f is continuous on [a, b] with $f(x) > 0$ on [a, b] and if $f(x) = \int_a^x f(t)\,dt$. Then show that $f(x)$ is strictly increasing on [a, b]. Where, $a \le x \le b$.

ii) Show that the improper integral $\int_1^{\infty} \frac{1}{x}\,dx$ is divergent.

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

i) Show that $\int_0^{\infty} \frac{x}{(1+x)^3}\,dx = \frac{1}{2}\int_0^{\infty} \frac{1}{(1+x)^2}\,dx$.

ii) Show that the series $\sum_{n=0}^{\infty} x(1-x)^n$ does not converges uniformely on [0, 1].

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Total No. of Questions : 4]

SEAT No. :

PD754

[Total No. of Pages : 2

[6467]-703
T.Y. B.Sc. (Regular)
MATHEMATICS
MT - 363 : Ring Theory
(2019 CBCS Pattern) (Semester-VI) (Paper - III) (36113)

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

Instructions to the candidates:

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

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

a) Find all prime and maximal ideal of $\mathbb{Z}_8$.

b) Find zeros of $f(x)=x^2+3x+2$ in $\mathbb{Z}_5$.

c) Give an example of non-commutative ring that has exactly 16 elements.

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

e) Compute the evaluation homomorphism in $\mathrm{F}=\mathrm{E}=\theta$, $\phi_i\left(2x^3-x^2+3x+2\right)$.

f) Give an example to show that a factor ring of an integral domain may have divisors of zero.

g) Let $f(x)=x^2+3x+4,\ g(x)=x+3$ in $\mathbb{Z}_5[x]$ find $f(x)\cdot g(x)$ and $f(x)+g(x)$.

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

i) Show that every finite integral domain is field.

ii) An element $a\in\mathrm{F}$ is zero of $f(x)\in\mathrm{F}[x]$ if and only if $x-a$ is factor of $f(x)$ in $\mathrm{F}(x)$.

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

i) A ring R is called Boolean ring if $a^2=0$ for all $a\in\mathrm{R}$. Show that a Boolean ring R is a commutative ring.

ii) How many polynomials are there of degree ≤ 3 in $\mathbb{Z}_2[x]$. List of all them.

P.T.O.

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

i) Let $\phi : R \to R'$ be a ring homomorphism and let N be an ideal of R,

1) Show that $\phi[N]$ is an ideal of $\phi[R]$.

2) Give an example to show that $\phi[N]$ need not be an ideal of R'.

ii) Let D be Euclidean domain with Euclidean norm *v*. If *a* and *b* are associates in D, then show that $v(a) = v(b)$.

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

i) Obtain quotient and remainder when $f(x) = x^4 - 3x^3 + 2x^2 + 4x - 1$ is divided by $g(x) = x^2 - 2x + 3$ in the ring $\mathbb{Z}_5[x]$.

ii) Prepare addition and multiplication table for $\frac{2\mathbb{Z}}{8\mathbb{Z}}$.

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

i) Show that every Euclidean domain is PID.

ii) An ideal $\langle P \rangle$ is PID is maximal if and only if P is an irreducible.

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

i) Show that 5 is not an irreducible in $\mathbb{Z}[i]$.

ii) Find all C in $\mathbb{Z}_3$ such that $\frac{\mathbb{Z}_3[x]}{\langle x^2 + C \rangle}$ is a field.

Total No. of Questions :4]

SEAT No. : ____

PD755

[Total No. of Pages : 3

[6467]-704
T.Y. B.Sc. (Regular)
MATHEMATICS
DSE-5B:MT-364: Partial Differential Equations
(CBCS 2019 Pattern) (Semester - VI) (Paper - IV) (36114)

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) Classify the differential equation

$$y^2\frac{\partial^2 z}{\partial x^2} - 2xy\frac{\partial^2 z}{\partial x \partial y} + x^2\frac{\partial^2 z}{\partial y^2} = \frac{y^2}{x}\frac{\partial z}{\partial x} + \frac{x^2}{y}\frac{\partial z}{\partial y}.$$

b) What does the parametric equations

$$x = a\frac{1-\mathrm{V}^2}{1+\mathrm{V}^2}\cos u, y = a\frac{1-\mathrm{V}^2}{1+\mathrm{V}^2}\sin u, z = \frac{2a\mathrm{V}}{1+\mathrm{V}^2}$$ yields?

c) What are the direction cosines of the normal to the surface $z = f(x, y)$ at the point (x, y, z).

d) Construct differential equation by eliminating arbitrary constants a and b from the equation $2z = (ax + y)^2 + b$.

e) Verify that the partial differential equation

$$\frac{\partial^2 z}{\partial x^2} - \frac{\partial^2 z}{\partial y^2} = \frac{2z}{x^2}$$

is satisfied by $z = \frac{1}{x}\phi(y - x) + \phi'(y - x)$ where ϕ is arbitrary function.

f) If the operator F (D, D') is reducible, then state whether the order in which linear factors occur is important or not.

g) F (D, D') $\{e^{ax+by}\ \phi(x, y)\}$= .....

P.T.O.

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

i) Prove the statement: A necessary and sufficient condition that the pfaffian differential equation $\mathrm{X}\cdot \mathrm{dr} = 0$ should be integrable is that $\mathrm{X}\cdot \mathrm{curl}\ \mathrm{X} = 0$.

ii) If $u_i\ (x_1, x_2, x_3, \ldots\ldots, x_n, z) = c_i\ (i = 1, 2, \ldots n)$

are independent solutions of the equations

$$\frac{dx_1}{\mathrm{P}_1} = \frac{dx_2}{\mathrm{P}_2} = \ldots\ldots = \frac{dx_n}{\mathrm{P}_n} = \frac{dz}{\mathrm{R}}.$$

then prove that the relation $\phi\ (u_1, u_2, \ldots\ldots\ u_n) = 0$, in which the function ϕ is arbitrary, is a general solution of the linear partial differential equation

$$\mathrm{P}_1 \frac{\partial z}{\partial x_1} + \mathrm{P}_2 \frac{\partial z}{\partial x_2} + \ldots\ldots\ldots + \mathrm{P}_n \frac{\partial z}{\partial x_n} = \mathrm{R}.$$

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

i) Find the integral curves of the equations

$$\frac{dx}{y(x+y)+az} = \frac{dy}{x(x+y)-az} = \frac{dz}{z(x+y)}.$$

ii) Determine whether the equation $ydx + xdy + 2z\,dz = 0$ is integrable and find the solution if it is integrable.

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

i) If $u_1, u_2, \ldots\ldots\ u_n$, are solutions of the homogeneous linear partial differential equation F (D, D') z = 0 then prove that $\sum_{r=1}^{n} c_r u_r$, where c'_rs are arbitrary constants, is also a solution.

ii) If X is a vector such that $\mathrm{X}\cdot \mathrm{curl}\,\mathrm{X} = 0$ and μ is an arbitrary function of x, y, z then prove that $(\mu \mathrm{X})\cdot \mathrm{curl}(\mu \mathrm{X}) = 0$.

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

i) Find particular integral of the equation $(\mathrm{D}^2 - \mathrm{D}^1)\ \mathrm{z} = \mathrm{A}\cos(lx + my)$ where A, l, m are constants.

ii) Reduce the equation $\frac{\partial^2 z}{\partial x^2} + x^2 \frac{\partial^2 z}{\partial y^2} = 0$ to canonical form.

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

i) Prove that F (D, D') e^{ax+by} = F (a, b) e^{ax+by}.

ii) By using separation of variable method solve the one dimensional heat conduction equation $\frac{\partial T}{\partial t} = k\frac{\partial^2 T}{\partial x^2}$.

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

i) A tightly stretched string with fixed end points. $x = 0$ and $x = l$ is initially in a position given by $y = y_0 \sin^3\left(\frac{\pi x}{l}\right)$. It is released from rest from this position. Find the displacement $y(x, t)$.

ii) Find the integral surface of the linear partial differential equation

$$x(y^2 + z)p - y(x^2 + z)q = (x^2 - y^2)z$$

which contains the straight line $x + y = 0$, $z = 1$.

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Total No. of Questions : 4]

SEAT No. : ____

PD756

[Total No. of Pages : 3

[6467]-705
T.Y.B.Sc. (Regular)
MATHEMATICS
DSE-6A-MT-365 (A) : Optimization Techniques
(2019 Pattern) (CBCS) (Semester - VI) (36115 A)

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

Instructions to the candidates:

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

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

a) Define project.

b) Give any two characteristics of a two person-zero sum game.

c) Determine the saddle point of the game whose pay off matrix is,

		Player B			
		B1	B2	B3	B4
Player A	A1	8	6	2	8
	A2	8	9	4	5
	A3	7	5	3	5

d) What is CPM and PERT?

e) State Johson's algorithm condition in three machine sequencing problem.

f) State two different situation, where the replacement of an items are needed.

g) Show that $x = 0$ is an inflection point. for the function $f(x) = x^3$.

P.T.O.

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

a) Write the optimum sequence algorithm for n-jobs on 2-machine.

b) A firm is considering replacement of a machine whose cost price is Rs. 12200 and scrap value Rs. 200, the running cost in Rs. are found from exprience to be as follow:

Year :	1	2	3	4	5	6	7	8
Running cost :	200	500	800	1,200	1,800	2,500	3,200	4,000

When should the machine be replaced?

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

i) Determine the optimal sequence of job that minimizes the total elapsed time based on the following information. (Time is in hrs.)

Job	I	II	III	IV	V	VI	VII
Machine I	3	8	7	4	9	8	7
Machine II	4	3	2	5	1	4	3
Machine III	6	7	5	11	5	6	12

ii) Solve the following game. (The payoff is for player A)

		Player B			
		B1	B2	B3	B4
Player A	A1	25	27	35	–2
	A2	20	6	8	8
	A3	14	12	5	3

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

i) Solve the following game by graphical method.

		Player B	
		B1	B2
Player A	A1	1	–3
	A2	3	5
	A3	–1	6
	A4	4	1
	A5	2	2
	A6	–5	0

ii) If player A and B Play a game, in which each has three coins Rs.5, Rs.10 & Rs.1. Each selects a coin without the knowledge of others choice. If the sum of the coins is an odd numbers then A win's B's coins, if the sum is even then B win's A's coins. Find best strategy for each player and the value of the game.

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

i) Explain red flagging rule for non-critical activity (i,j) in the network model.

ii) Verify that the function.

$f(x_1,x_2,x_3) = 2x_1x_2x_3 - 4x_1x_3 - 2x_2x_3 + x_1^2 + x_2^2 + x_3^2 - 2x_1 - 4x_2 + 4x_3$ has stationary point (0,3,1). Is (0,3,1) an extreme point of $f(x_1, x_2,x_3)$.

Q4) Attempt any one of the following: **[10]**

A) a) A project consists a 9 activities whose time estimate and other characteristic are given below:

Activity	Predessors	Time estimate (weak's)		
		optimistic (to)	Most likely (tm)	Pessimistic (tp)
A	–––	2	4	6
B	–––	6	6	6
C	–––	6	12	24
D	A	2	5	8
E	A	11	14	23
F	B,D	8	10	12
G	B,D	3	6	9
H	C,F	9	15	27
I	E	4	10	16

Draw PERT network for the project.

b) Determine the critical path and expected project complition time.

c) What duration will have 95% confidence for project completion?

B) a) What is failure? Explain the types of failure.

b) Draw a project network for the following data and find critical path.

Activity :	A	B	C	D	E	F	G	H	I
Predecessor :	-	-	-	A	B	C	D,E	B	H,F
Estimated time : (weeks)	3	5	4	2	3	9	8	7	9

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Total No. of Questions : 4]

SEAT No. :

PD757

[Total No. of Pages : 2

[6467]-706
T.Y.B.Sc. (Regular)
MATHEMATICS
MT-365(B) : Calculus of Variation and Classical Mechanics
(2019 CBCS Pattern) (Semester - VI) (36115 B)

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

Instructions to the candidates:

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

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

a) Explain degree of freedom of a mechanical system with an example.

b) Explain the term "Conservative constraints".

c) State the Lagrangian for a mass moving along horizontal axis without friction.

d) Define cyclic co-ordinate.

e) Write the transformation from spherical co-ordinates to rectangular co-ordinates.

f) State Hamilton's equations of motion.

g) Explain the term "Potential energy" of the system.

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

a) Show that the transformation $P = \frac{1}{2}\left(p^2 + q^2\right)$, $Q = \tan^{-1}\left(\frac{q}{p}\right)$ is cannonical.

b) Write difference between Hamilton's equations of motion and Lagrange's equations of motion. Also give advantages of Hamiltonian approach over Lagrangian approach.

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

a) A wire is bent in the form of a parabola $z = ar^2$, and a bead slides on it smoothly. The wire is rotated by means of an external force with a constant acceleration, α find the equations of motion of the bead.

b) Find Lagrange's equations of motion of a projectile.

P.T.O.

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

a) The bob of a simple pendulum moves in a horizontal circle. Find the angular frequency of the circular motion in terms of angle θ, between string and vertical, length l of string.

b) State and prove least action principle.

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

a) Derive Lagrange's equation of motion for Atwood's machine with two masses.

b) Derive Newton's second law of motion from principle of virtual work.

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

a) Obtain the equations of motion for a particle falling under the influence of gravity when frictional forces obtainable from a dissipative function $\frac{1}{2}kv^2$ are present. Show that the maximum possible velocity for fall from rest is $v = \frac{mg}{k}$.

b) If q_j is cyclic co-ordinate then show that the corresponding generalized momentum is constant.

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

a) If constraints are independent of time and holonomic then show that kinetic energy is homogeneous quadratic function of generalized velocities.

b) A bead slides on a wire in the shape of a cycloid $x = a(\theta - \sin\theta)$, $y = a(1 + \cos\theta)$, $0 \leq \theta \leq 2\pi$. Find Lagrangian and Lagrange's equation of motion.

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Total No. of Questions : 4]

SEAT No. : ____

PD758

[Total No. of Pages : 3

[6467]-707
T.Y.B.Sc. (Regular)
MATHEMATICS
MT-365 (C) : Financial Mathematics
(2019 CBCS Pattern) (Semester - VI) (36115 C) (Paper - 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) Attempt any five of the following: **[5]**

a) State the conditions under which elasticity of demand is elastic.

b) Explain the term annuity with an example.

c) State the two equations to obtain recurrence relation for P_t in Cobweb model.

d) What is meant by arbitrage portfolio for a matrix of returns?

e) Suppose the demand set D = $\{(q, p)/q + 5p = 30\}$, then for which values of p, is the demand elastic?

f) What is the relationship between capital growth and present value?

g) State the first basic principle of economics.

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

i) Prove that, at the breakeven point for an efficient small firm, the average cost has derivative equal to zero.

ii) Determine whether the Cobweb model predicts stable or unstable equilibrium point for the market $q^S(p) = 0.05p - 4$, $q^D(p) = 20 - 0.15p$.

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

i) The demand set for a good in D=$\{(q, p): q(1 + p^2) = 100\}$.

1) Determine the elasticity of demand.

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

ii) Find the maximun and minimum values of the function $f(x) = x^3 - 12x^2 + 21x + 100$.

P.T.O.

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

i) Imagine you have 2,00,000 to invest, at a constant rate of 9%, and that you want to withdraw a fixed amount I at the end of each year for the next 20 years. What is the maximum possible value of I for which this is possible?

ii) An amount of Rs. 1000 is invested and attracts interest at a rate equivalent to 10% per annum. Find the total after one year if the interest is compounded

1) monthly
2) quarterly
3) monthly
4) daily

(Assume the year is not a leap year).

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

i) Suppose that a firm has cost function C (q) = 9 + 5q to produce q units of its product and price per unit P(q) = 6-0.01q. Find

1) Revenue function
2) Profit function $\pi(q)$
3) Optimal value q_m

ii) Suppose that the demand and supply sets are as follows: D = {(q, p) : q = 38 – 12p},

S = {(q, p): q = 3p – 7}. Write down the recurrence equations which determine the sequence p_t, of prices, assuming that the suppliers operate according to the Cobweb model. Find explicit solution given that p_o = 4. Write down a formula for q_t, the quantity on the market in year t.

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

i) The monopoly firm manufactures a certain kind of machine tool which can produce upto 100 per weak. The demand set for these items is D = {(q, p)/q + 5p = 850} where p is measured in suitable units. The cost of producing q units per week is C(q) = 300 – 10q + q^2. How many items should be produced each week in order to maximise the profit?

ii) Suppose we invest P, and withdraw an amount at the end of each year N years, at which time the capital is used up. Show that income generated from the principal P is I(P) = $\left(\frac{r(1+r)^N}{(1+r)^N-1}\right)P$.

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

i) Suppose that Silicon limited is an efficient small form with the cost function $C(q) = 800 + 70q - 12q^2 + q^3$ and suppose also that maximum level of weekly production is L= 10. Show that

1) at startup, the marginal cost equals average variable cost

2) At breakeven, the marginal cost equals the average cost.

ii) Suppose that mature of returns for the Apathian investor is R = $\begin{bmatrix} 1.25 & 0.95 \\ 1.05 & 1.05 \\ 0.90 & 1.15 \end{bmatrix}$ the portfolio Y = (5000 – 10,000 5000) is an arbitrage portfolio. Which election might an invertor prefer for portfolio Z = (5000 1000 4000)?

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Total No. of Questions : 4]

SEAT No. :

PD759

[Total No. of Pages : 2

[6467]-708
T.Y. B.Sc. (Regular)
MATHEMATICS
MT - 366(B) : Computational Geometry
(CBCS - 2019 Pattern) (Semester-VI) (Paper - VI) (36116B)

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

Instructions to the candidates:

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

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

a) What is the determinant of the inverse of any pure rotation matrix?

b) Find the angle through which the line $y = -x$ is rotated so that it is coincident with x-axis.

c) Find the point at infinity on the line $2x + 3y = 5$.

d) Write the transformation matrix for scaling in x, y and z coordinates by factor 2, –3 and 4 units respectively.

e) Define : Trimetric projection.

f) Write the Bernstein function or blending function.

g) Write the transformation matrix required to create front view of the object.

Q2) a) Attempt any One of the following : **[1×5=5]**

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

ii) Prove that under any 2 × 2 transformation matrix point of intersection transforms to point of intersection.

b) Attempt any One of the following : **[1×5=5]**

i) Rotate the line segment joining the points A[3, 5], B[4, 1] about the point P(2 1) through an angle 90°. Obtain the transformed line segment.

ii) Find the point of intersection at infinity for the lines $x + y = 1$ and $x + y = 0$.

P.T.O.

Q3) a) Attempt any <u>One</u> of the following : **[1×5=5]**

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

ii) Write an algorithm for reflection through the plane which is parallel to *yz* plane.

b) Attempt any <u>One</u> of the following : **[1×5=5]**

i) Find the concatenated matrix required to make the plane $x + y + z = 0$ coincident with $z = 0$ plane.

ii) Find the concatenated transformation matrix for the following transformations in order,

1) Translate in x, y, z direction by –2, –2, –2 units respectively.

2) Rotate about x-axis by an angle 45°.

3) Reduce to half of its size.

Q4) a) Attempt any <u>One</u> of the following : **[1×5=5]**

i) State general parametric equation of Bézier curve and also obtain matrix representation of Bézier cubic curve.

ii) Derive iterative formula to generate uniformly spaced '*n*' points on the circumference of a circle with centre is origin and radius '*r*'.

b) Attempt any <u>One</u> of the following : **[1×5=5]**

i) Find the first derivative of the curve at $t = 0.3$ if $B_0[2\ 1]$, $B_1[4\ 4]$, $B_2[5\ 3]$, $B_3[5\ 1]$ are vertices of Bézier polygon. Also determine the value at point $t = 0.7$ of the Bézier curve.

ii) The plane $x + 2y + 2z = 0$ is to be rotated so that it coincides with $z = 0$ plane. Determine the required angles of rotations about the x-axis and y-axis.

Total No. of Questions : 4]

SEAT No. :

PD760

[Total No. of Pages : 2

[6467]-709
T.Y. B.Sc. (Regular)
MATHEMATICS
MT - 366(C) : Lebesque Integration
(CBCS - 2019 Pattern) (Semester-VI) (Paper - VI) (36116C)

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

Instructions to the candidates:

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

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

a) Let $A=\left\{\frac{1}{n}\middle/ n\in\mathbb{N}\right\}\subseteq[0,1]$. Find mA.

b) True or false : If G is open subset of $[a, b]$ such that $|G|=0$ then $G=\phi$.

c) Is $f(x)=x^2+e^x$ measurable function on $[a, b]$? Justify.

d) Let $f(x)=x^2-1,\ x\in[-2,2]$. Find f^+.

e) If E is set of rationals in $[0,1]$ then $\underline{m}E=?$

f) If $f(x)=\log\left(\frac{1}{x}\right),\ (0<x\leq 1)$ then find ^2f.

g) If $f(x)=x^2$ on $[0,1]$ then $\int\limits_{Q\cap[0,1]} f=?$

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

i) If E is measurable subset of $[a, b]$ then prove that E' is measurable and $mE'=(b-a)-mE$.

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

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

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

ii) If f, g are measurable functions on $[a, b]$ $\max\{f,g\}$ and $\min\{f,g\}$ are measurable functions.

P.T.O.

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

i) If f is a bounded function in L[a, b] then show that $\lambda f \in \mathrm{L}[a,b]$ and $\mathrm{L}\int_a^b \lambda f = \lambda\left(L\int_a^b f\right), (\lambda \in \mathrm{R})$.

ii) If $f \in \mathrm{L}[a,b]$ is bounded function such that $f(x) \geq 0$ a.e. $(a \leq x \leq b)$ and $\int_a^b f = 0$ then prove that $f(x) = 0$ a.e. $(a \leq x \leq b)$.

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

i) If $f \in \mathrm{L}[a,b]$ is bounded and $\mathrm{E} \subset [a,b]$ is such that $m\mathrm{E} = 0$, then show that $\int_{\mathrm{E}} f = 0$.

ii) If $f \in \mathrm{L}[a,b]$ is bounded and $f(x) \geq 0$ a.e. on $[a,b]$ then show that $\int_{\mathrm{E}} f \leq \int_{\mathrm{F}} f$, where E, F are measurable subsets of $[a,b]$ such that $\mathrm{E} \subseteq \mathrm{F}$.

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

i) If f is a real valued function on $[a,b]$ then show that $f = f^+ - f^-$ and $|f| = f^+ + f^-$.

ii) Let E be measurable subset of $[a,b]$ and $f, g \in \mathrm{L}[a,b]$. Moreover, $f(x) = g(x)$ a.e. $(x \in \mathrm{E})$. Show that $\int_{\mathrm{E}} f = \int_{\mathrm{E}} g$.

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

i) Let $f(x) = \frac{1}{\sqrt[3]{x}}, (0 < x \leq 1)$ and $f(0) = 0$. Show that $f \in \mathrm{L}[0,1]$. Evaluate $\int_0^1 f$.

ii) If $g \in \mathrm{L}[a,b]$ and if f is measurable function on $[a,b]$ such that $|f(x)| \leq |g(x)|, (a \leq x \leq b)$; then show that $f \in \mathrm{L}[a,b]$.

Total No. of Questions : 5]

SEAT No. : ____

PD761

[Total No. of Pages : 2

[6467]-710
T.Y.B.Sc. (Regular)
PHYSICS
PHY-361 Solid State Physics
(2019 Pattern) (Semester -VI) (36121) (Paper-I)

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

Instructions to the candidates:

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

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

a) Define the reciprocal lattice.

b) Why semiconductors are insulator at O°k temperature.

c) What is packing Fraction?

d) Explain the term Ferrites

e) Calculate the distance between two lattice planes which gives first order diffraction at on angle of 26.42° with Molybdenum x-ray of wavelength 0.75Å

f) A distance between planes in face centred cubic is 2Å determine atomic diameter.

Q2) Solve the following

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

b) A paramagnetic substance has 10^{28} atom/m^3. The magnetic moment of each atom is 1.79×10^{-23} A-m^3. Calculate the paramagnetic susceptibility of a material at temperature 320°k. What would be the dipole moment of a rod of this materials 0.1 m long and 1cm^2 cross section placed in a Field of 7×10^4A/m?

Given: $k=1.38\times10^{-23}$J/°k. $\mu_0=4\Pi\times10^{-7}$ wb/A-m. **[4]**

P.T.O.

Q3) Solve the following

a) i) Describe the meissner effect **[3]**

ii) What is the Fermi Energy and Fermi level **[3]**

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

Q4) Solve the following

a) State and explain Wiedemann-Franz Law. **[6]**

b) For certain BCC crystal the (110) plane have separation of 1.181Å. These (110) plane are irradiated with x-ray of wavelength 1.54Å. How many order of Bragg's reflection can be observed? **[4]**

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

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

b) Explain electron mobility and drift velocity.

c) Describe critical magnetic field of superconductor.

d) What are the advantages of powder method?

e) Write note on Ferromagnetism and Ferrimagnetism.

f) Distinguish between crystalline solid and amarphous solid.

Total No. of Questions : 5]

SEAT No. : ____

PD762

[Total No. of Pages : 2

[6467]-711
T.Y. B.Sc. (Regular)
PHYSICS
PHY-362: Quantum Mechanics
(2019 Pattern) (Semester - VI) (Paper - II) (36122)

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 and log table is allowed.***

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

a) What is wave particle duality?

b) State equation of continuity.

c) Show that [A, B] = – [B, A], A and B are operator.

d) Find lowest energy of an electron confined to move in a one dimensional potential box of 1Å

(Given: m = 9.11×10^{-31} kg, $\hbar$ = 1.054 $\times 10^{-34}$ Js, 1eV = 1.6×10^{-19} J).

e) Define parity and parity operator.

f) State Schrodinger's time independent equation.

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

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

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

b) Obtain the schrodinger's time dependent equation in one dimension. **[4]**

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

a) i) Define an operator. State the quantum mechanical operator. **[3]**

ii) Prove that $[x, p^n] = i\hbar np^{n-1}$ by mathematical induction. **[3]**

b) Show that momentum operator $-i\hbar\frac{\partial}{\partial x}$ is Hermitian. **[4]**

P.T.O.

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

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

b) Show that $[x, p_x] = i\hbar$ **[4]**

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

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

b) Give the requirements of the wave function.

c) Write short notes on wave velocity and group velocity.

d) Discuss potential barrier qualitatively for $E<V_0$.

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

f) Show that $V_g = V_p + k\frac{dV_p}{dk}$.

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Total No. of Questions : 5]

SEAT No. :

PD763

[Total No. of Pages : 2

[6467]-712
T.Y. B.Sc. (Regular)
PHYSICS
PHY - 363 : Thermodynamics and Statistical Physics
(2019 Pattern) (CBCS) (Semester-VI) (36123)

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

Instructions to the candidates:

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

Q1) Solve any Five of the following : **[5×1=5]**

a) What is the effect of pressure and temperature on the mean free path of gas molecules?

b) What are Fermions?

c) What is meant by microcanonical ensemble?

d) Define constraint on a system.

e) When we throw a die three times and obtain three numbers, what is the probability that these numbers are 5, 3, 1 precisely in that order?

f) Define Gibbs function in thermodynamics.

Q2) Solve the following :

a) Derive Maxwell's four thermodynamic relations. **[6]**

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

P.T.O.

Q3) Attempt the following :

a) i) Define and explain accessible and inaccessible macrostates with suitable examples. **[3]**

ii) Explain about thermal interaction and mechanical interaction. **[3]**

b) When a particle undergoes total number of steps (N = 3), draw different possibilities of steps. If $p = q = 1/2$, then find the probabilities corresponding to $n_1 = 0, 1, 2$ or 3. **[4]**

Q4) Attempt the following :

a) Using the canonical distribution of the atomic magnetic moments, find the mean component of the magnetic moment interms of magnetic susceptibility of a paramagnetic material. **[6]**

b) Obtain an expression for mean square deviation $\left(\overline{\Delta n_1}\right)^2$ for the random walk problem. **[4]**

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

a) Obtain an expression for dH and dF.

b) Explain dependence of coefficient of viscosity on pressure and temperature.

c) Write a comparison between classical and quantum statistics.

d) An electron gas obeys the Maxwell-Boltzmann statistics. Calculate the average thermal energy (in eV) of an electron in the system at room temperature, i.e. 300 K $\left(K_B = 1.38 \times 10^{-23}\ J/K\right)$.

e) A box contains 9 yellow balls and 7 orange balls. Two balls are drawn at random one after the other. What is the probability that both balls are yellow.

Total No. of Questions : 5]

SEAT No. :

PD764

[Total No. of Pages : 2

[6467]-713
T.Y. B.Sc. (Regular)
PHYSICS
PHY-364: Nuclear Physics
(2019 Pattern) (Semester - VI) (Paper - IV) (36124)

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 carries equal marks.***
4) ***Use of calculator and logtable is allowed.***

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

a) What is isotope? Give examples.

b) What is meant by compound nucleus.

c) What is meant by threshold voltage in G.M. tube?

d) Define Nuclear fission?

e) What are magic numbers?

f) Complete the reaction:

$$_{17}Cl^{35} + ? \rightarrow {}_{16}S^{32} + 2He^{4}.$$

Q2) Attempt the following:

a) Explain secular equilibrium and transient equilibrium. **[6]**

b) Show that the quark structure (uud) gives the correct charge, spin, baryon number and strangeness of a proton. **[4]**

Q3) Attempt the following:

a) Sketch the binding energy curve and outline the features of the curve. **[6]**

b) Obtain an expression for mean life interms of it's decay const. and half-life. **[4]**

P.T.O.

Q4) Attempt the following:

a) Explain sucessive disintegration? Derive an expression for the ration of activity of daughter to activity of parent. **[6]**

b) Calculate the energy released in the reaction **[4]**

$$_3Li^6 + _0n^1 \rightarrow _2He^4 + _1H^3$$

(Mass of Li^6 = 6.015126 a.m.u., mass of $_0n^1$ = 1.008665 a.m.u. Mass of He^4 = 4.002603 a.m.u., mass of $_1H^3$ = 3.016049 a.m.u. 1 a.m.u. = 931 MeV).

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

a) Write any three assumptions of liquid drop model.

b) Write any three essential components of nuclear reactor.

c) Write a note on saturation and short range forces.

d) Write a note on electrical quadrupole moment.

e) Write any three laws of conservation of nuclear reaction.

f) Write a note on packing fraction.

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Total No. of Questions : 5]

SEAT No. : ____

PD765

[Total No. of Pages : 4

[6467]-714
T.Y. B.Sc. (Regular)
PHYSICS
PHY-365 (A) : Electronics - II
(2019 CBCS Pattern) (Semester - VI) (36125 A)

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

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

a) Convert $(10101)_2$ binary number into Gray code.

b) What is electroluminisence?

c) Define synchronous counter.

d) What is mean by Minterm and Maxterm?

e) Define Amplitude Modulation.

f) State various types of FET.

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

a) Explain Drain characteristics of JFET with neat diagram.

b) A counter begins with 00000 state. What will be its state after 64 pulses? **[4]**

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

a) Explain working of IC 555 as Astable Multivibrator with wave form and circuit diagram.

b) Compare FET and BJT. **[4]**

P.T.O.

Q4) Attempt the following questions.

a) Explain working of 3-bit Asynchronous counter with timing diagram. **[6]**

b) Explain working of LED with neat diagram. State the various materials used in LED. **[4]**

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

a) Write applications of JFET and MOSFET.

b) Draw pin diagram of IC 555. What is function of RESET pin?

c) With truth table, explain working of R-S F/F using NAND gates.

d) Write disadvantages of IC.

e) What is trip point in Op-amp Comparator?

f) Write characteristics of ideal Op-amp.

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Total No. of Questions : 5]

PD765

[6467]-714
T.Y. B.Sc. (Regular)
PHYSICS
PHY-365 (B) : Advanced Electronics
(2019 Pattern) (Semester - VI) (Paper - V) (36125 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) ***Q.2 to Q.5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Use of log tables & calculators are allowed.***

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

a) Draw ideal characteristics of low pass filter.

b) What is motion sensor?

c) Which material is used to construct RTD and thermisters?

d) Write any two performance parameters of DAC.

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

f) What is quadratic approximation of resistance temperature detector?

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

a) How instrumentation amplifier has superior performance over ordinary amplifier? Explain how instrumentation amplifier is used for thermocouple signal conditioning.

OR

What is encoder and decoder? Explain priority encoder.

b) The Wheaston bridge has $R_1 = 1000\Omega$, $R_2 = 842\ \Omega$ and $R_3 = 500\Omega$. Find value of R_4 in the bridge at null condition. **[4]**

Q3) Answer the following questions.

a) Explain how Op-amp is used for the differentiation of input signal. What is critical frequency in it? **[6]**

OR

Explain 2 to 4 line encoder with diagram.

b) What is working principle of photoconductive cell? Which material are used in it? **[4]**

Q4) Answer the following questions.

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

OR

Explain broadband pyrometer.

b) What is process control? Explain it with suitable example. **[4]**

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

a) Op-amp as temperature sensor.

b) Process-LAG.

c) Positive feedback in laser generation.

d) Basic elements of process control.

e) Process controller using ON/OFF controller.

f) Optocoupler.

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Total No. of Questions : 5]

SEAT No. : ____

PD766

[Total No. of Pages : 2

[6467]-715
T.Y.B.Sc. (Regular)
PHYSICS
PHY-366(P) : Medical Electronics
(2019 Pattern) (Semester -VI) (Elective-II) (36126P)

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

Instructions to the candidates:

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

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

a) Give any two physiological effects of electricity.

b) What is resting potential?

c) What is the basic function of bio-amplifier?

d) State disadvantages of flame photometer

e) State different types of spectro photometers

f) What is purpose of phonocardiography?

Q2) Answer the following questions.

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

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

Q3) Answer the following questions.

a) Explain an isolation amplifier with block diagram **[6]**

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

P.T.O.

Q4) Answer the following questions.

a) Explain clinical photo Flame photometer. Also give its applications. **[6]**

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

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

a) Analysis of ECG pattern

b) Bio-potential electrodes

c) Cardiac monitor

d) Differential amplifier

e) Bomb calorimeter

f) Ultrasonic blood flow meter

Total No. of Questions : 5]

SEAT No. : ____

PD767

[Total No. of Pages : 2

[6467]-716
T.Y.B.Sc. (Regular)
PHYSICS
PHY-366(Q) : Physics of Nanomaterials
(2019 Pattern) (Semester -VI) (36126 Q) (Elective-II)

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

Instructions to the candidates:

1) ***Que. 1 is Compulsory.***
2) ***Solve any three question from Que. 2 to Que. 5.***
3) ***Que. 2 to Que. 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***

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

a) Give any two advantages of X-ray diffraction technique.

b) Enlist the various fields of applications of nanotechnology.

c) Define carbon nanotubes.

d) State the principle of Transmission electron microscopy.

e) Define the term nanotechnology.

f) What is the main benefit of sol-gel processing?

Q2) Answer the following questions.

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

b) Explain the significance of nanosize materials with examples. **[4]**

Q3) Answer the following questions.

a) Explain any two methods of synthesis of nanomaterials. **[6]**

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

P.T.O.

Q4) Answer the following questions

a) Describe UV-visible spectroscopy technique with neat diagram. Also give its two applications. **[6]**

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

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

a) Challenges in nanotechnology

b) Thermal conductivity

c) Applications of nanomaterials in Cosmetics and Defence

d) Quantum dots

e) Draw the typical diagram of physical vapour deposition

f) Advantages of chemical vapour deposition technique

Total No. of Questions : 5]

SEAT No. : ____

PD-768

[Total No. of Pages : 2

[6467] - 717
T.Y. B.Sc.
PHYSICS
PHY-366 : (R) Microcontrollers
(2019 Pattern) (Semester - VI) (CBCS) (36126R)

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) ***Use of log table or electronic calculator is allowed***

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

a) How (–27) is represented in 8051 microcontroller?

b) What is the function of RST pin of 8051 microcontroller?

c) What is the size of DPTR register of 8051 microcontroller?

d) Find the period of timer clock, if the crystal frequency is 12MHz.

e) Give the two examples of instructions of data transfer group of 8051 microcontroller.

f) Define the term 'Baud rate'.

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

i) Explain the different I/O ports used in 8051 microcontroller.

ii) Explain in brief simplex, Half duplex and full duplex data communication.

iii) What are assembler directives? Explain any two assembler directives of 8051 microcontroller.

b) Draw the PSW register of 8051 microcontroller Explain the RSO and RSI flags of it. **[4]**

P.T.O.

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

i) Write an 8051 microcontroller assembly language program to add two 8 bit numbers and store the result in RAM memory at 51H and 52H location.

ii) Explain the difference between microprocessor and microcontroller.

iii) What are A and B register of 8051 microcontroller? How they are used in multiplication and division operation?

b) What the different addressing modes of 8051 microcontroller? Explain any four with its suitable example. **[4]**

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

i) Write an assembly language program using 8051 instructions to subtract 61H from 94H using 2's complement method.

ii) What are the different internal interrupts of 8051 microcontroller? Give their vector address.

iii) Draw the block diagram of architecture of 8051 microcontroller

b) Explain the meaning of following 8051 microcontroller instructions: **[4]**

i) INC R3 ii) ANL A, R3 iii) SWAP A iv) MOVA,@R4

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

a) Write short note on Interfacing using RS-232 standard.

b) Write short note on Timer/counters of 8051 microcontroller.

c) Give the five features of 8051 microcontroller

d) Explain the difference between JUMP and CALL instructions of 8051 microcontroller.

e) Give the structure of organisation of Internal RAM of 8051 microcontroller.

Total No. of Questions : 5]

SEAT No. :

PD-769

[Total No. of Pages : 2

[6467] - 718
T.Y. B.Sc.
PHYSICS
PHY-366 (S) : Lasers
(2019 Pattern) (Semester - VI) (Paper - VI) (36126S)

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

Instructions to the candidates:

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

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

a) State two types of coherence.

b) Define metastable state in laser

c) State lasing condition under critical population inversion.

d) Give two applications of liquid lasers.

e) Light from sodium lamp has coherence length of 0.3mm and bandwidth of about $6\,\mathring{A}$. Calculate wavelength of sodium lamp.

f) Calculate intensity of ruby laser beam having emissive power 5mw and wavelength 6943×10^{-10}m.

Q2) a) Attempt the following questions : **[6]**

i) Explain spatial coherence **[3]**

ii) Explain four level optical pumping in laser **[3]**

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

P.T.O.

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

i) Explain homogeneous broadening **[3]**

ii) Write short note on tunable dye laser **[3]**

b) Fluorescent tube light emit visiblelight of wavelength in the range of $4000\,\overset{0}{A}$ to $7000\,\overset{0}{A}$ with an average wavelength of $5500\,\overset{0}{A}$, calculate coherence length. **[4]**

Q4) a) Attempt the following questions : **[6]**

i) Write note on use of laser in welding of material. **[3]**

ii) Explain collision brodening. **[3]**

b) Calculate the wavelength of beam at which rate of spontaneous emission is equal to rate of stimulated emission for the temperature of 300 $\overset{0}{K}$ (Given: R=½). **[4]**

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

a) Explain advantages of gas lasers over solid state laser.

b) Explain in brief monochromaticity

c) With the help of figure explain construction of Ruby laser.

d) Obtain condition for light amplification in laser action

e) Explain application of laser in eye surgery

f) Explain in brief characteristics of laser beam.

Total No. of Questions : 5]

SEAT No. : ____

PD-770

[Total No. of Pages : 2

[6467] - 719
T.Y. B.Sc.
PHYSICS
PHY-366 (T) : Astronomy and Astrophysics - II
(2019 Pattern) (Semester - VI) (36126T) (Elective - 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 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Use of log table and calculator is allowed.***

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

a) Calculate the distance covered by light in 6 days.

b) How we can increase resolving power of antenna?

c) What do you mean by interstellar medium?

d) What is solar flare?

e) Can we call milky way as active galaxy? why?

f) What is unit of Hubble's constant?

Q2) Answer the following questions :

a) Write a detailed note on 'sunspots and their cycle'. **[6]**

b) Explain with suitable diagram, 'Astronomical coordinate system'. **[4]**

P.T.O.

Q3) Answer the following questions :

a) Explain: construction and working of Hubble Space Telescope. **[6]**

b) How energy flows from the core of the sun to the surface of the sun? **[4]**

Q4) Answer the following questions :

a) Write a note: 'Active Galaxies and Quasars'. **[6]**

b) What are important sources of X-rays in astronomy? How does X-ray telescopes work? **[4]**

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

a) What is Hubble's Law? Explain its significance in astronomy.

b) Write a note: Sidereal Time and Solar Time.

c) Short note: Gamma Ray Telescopes

d) Photospheric phenomenon (Short note)

e) Interstellar medium (Short note)

f) Fate of universe (Short note)

Total No. of Questions : 5]

SEAT No. :

PD-771

[Total No. of Pages : 2

[6467]-720

T.Y. B.Sc.

PHYSICS

PHY - 366 (U) : Renewable Energy Sources - II

(2019 Pattern) (Semester - VI) (Elective - II) (36126U)

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.***
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 the factors affecting on Bio-digestion.

b) What is thermochemical process?

c) What are advantages of wind energy?

d) How is tidal power generated?

e) What is the benefits of energy efficiency?

f) What are need of energy saving?

Q2) **Answer the following questions :**

a) What is biomass? Explain how energy is obtained by Biomass. **[6]**

b) Explain the basic principle of wind energy conversion system. **[4]**

Q3) **Answer the following questions :**

a) Discuss the case studies on fuel substitution. **[6]**

b) Discuss Drawbacks and challenges of Geothermal Systems. **[4]**

P.T.O.

Q4) **Answer the following questions :**

a) Describe various Tidal Power. **[6]**

b) Describe the Role of Energy Managers. **[4]**

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

a) Distinguish between HAWT and VAWT

b) Thermocell

c) Advantages of Fixed dome type plant.

d) Downdruff gasifier

e) Methods of Utilization of Tidal energy.

f) Strategies of Energy Management.

▽▽▽▽

Total No. of Questions : 5]

SEAT No. : ____

PD-772

[Total No. of Pages : 2

[6467]-721
T.Y. B.Sc.
PHYSICS
PHY - 366 (V) : Acoustics - II
(2019 Pattern) (Semester - VI) (Paper - VI) (36126V)

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

Instructions to the candidates:

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

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

a) Give two characteristics of monophonic SRS.

b) What is volume compressor?

c) Give the expression for sensitivity for a carbon microphone.

d) What do you mean by constant-Q and variable Q graphic equalizers?

e) What is meant by dynamic range?

f) Give significance of the expression

$$Z_m = (R_p + R_m) + j\left(\lambda + \omega_m - \frac{s}{\omega}\right)$$

g) What is meant by directivity index of a microphone?

Q2) **Answer the following questions :**

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

b) A cone speaker has a total mass of 1.1×10^{-2}kg. Its mechanical resistance is 0.9kg/s. Its radiation resistance and reactance are 2.1kg/s each. Determine the mechanical impedance at 300Hz, it the stiffness of the cone system is 5.1×10^{3} N/m. **[4]**

P.T.O.

Q3) **Answer the following questions :**

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

b) An infinite exponential horn of length of 0.75m has radius of 0.02m at the throat and a radius of 0.2m at its mouth. Find the flare constant and cut off frequency. **[4]**

Q4) **Answer the following questions :**

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

b) A condenser microphone constructed with an Aluminium diaphragm of thickness 4×10^{-5} m and having a radius of 10^{-2}m is stretched to a tension 2×10^{4}N/m. If the spacing between diaphragm and backing plate is same as thickness of the diaphragm and polarizing voltage is 300V. Determine the open circuit voltage response and dB response of this microphone. **[4]**

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

a) Volume expander

b) NDT

c) Noise induced hearing loss

d) WAV file format

e) Stereophonic SRS

f) Medical Ultrasound

▽▽▽▽

Total No. of Questions : 5]

SEAT No. :

PD773

[Total No. of Pages : 2

[6467]-722

T.Y. B.Sc. (Regular)

PHYSICS

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

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

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

Instructions to the candidates:

1) ***Que.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 type of language is Python?

b) Write down the types of data structure.

c) What is library?

d) Which are the core python libraries?

e) Which are numeric data types?

f) What are advantages of python?

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

a) What is the difference between a series and data frame in pandas? **[6]**

b) How to normalize the data and why? **[4]**

P.T.O.

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

a) Write short note on : **[6]**

i) List

ii) Tupples

b) Describe modules in Python. **[4]**

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

a) Explain the techniques to find missing values with example. **[6]**

b) Describe the types of Data structures. **[4]**

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

a) What are some applications of Data structures?

b) What are the key features of python?

c) Python an intrepted language. Explain.

d) How to find outliers and why?

e) Give the syntax to find list.

f) Give the syntax to load the dataset.

Total No. of Questions : 5]

SEAT No. :

PD774

[Total No. of Pages : 2

[6467]-723
T.Y. B.Sc. (Regular)
PHYSICS
SEC-3 - PHY - 3610X : Solar PV System : Installation Repairing and Maintenance
(2019 Pattern) (Semester-VI) (361210X)

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

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

a) What is the direct beam radiation?

b) Define the term photovoltaic effect.

c) Give any two name of instruments which are used to measure solar radiations.

d) Define solar constants.

e) State working of charge controllers.

f) Give two applications of off grid PV system.

Q2) Answer the following questions :

a) Explain the terms sunshine and shadow, tracing mechanism and alligning arrays. **[6]**

b) Describe solar radiation at earth surface with diagram. **[4]**

P.T.O.

Q3) Answer the following questions :

a) Write module parameters with J-V curve in detail. **[6]**

b) What is Building integrated photovoltaics? **[4]**

Q4) Answer the following questions :

a) Explain construction and working of pyranometer. **[6]**

b) Explain the applications of PV system. **[4]**

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

a) Explain the importance of system sizing in PV system.

b) Explain DC to AC conversion.

c) Write a note on charge controller.

d) Give principle of sunshine rocorder. Explain.

e) Define the terms fill factor and efficiency.

f) Write notes on types of solar cell in short.

Total No. of Questions : 5]

SEAT No. :

PD775

[Total No. of Pages : 2

[6467]-724
T.Y. B.Sc. (Regular)
PHYSICS
SEC - 3 : PHY - 3610Y : Application of Internet of Things (IoT)
(2019 Pattern) (Semester-VI) (361210Y)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Que. 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) Enlist mostly used sensors types in IoT.

b) What is data in IoT?

c) Write the name of some important IoT hardware.

d) What are the types of IoT?

e) What are the different layers of the IoT protocol?

f) Write some of the most suitable database for IoT.

Q2) Answer the following questions :

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

b) What are the most common IoT application? Explain any one in details. **[4]**

P.T.O.

Q3) Answer the following questions :

a) What are the major features of C# programming? **[6]**

b) What is the difference between M2M and IoT? **[4]**

Q4) Answer the following questions :

a) Explain the data types in C# programming. **[6]**

b) Explain the characteristics of IoT. **[4]**

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

a) Storage classes in C# programming.

b) IoT in Indian Scenario.

c) Functions of C#.

d) Advantages of IoT.

e) Cloud computing.

f) IoT for smart water management.

Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages : 2

[6467] - 725
T.Y. B.Sc.
PHYSICS
PHY-3610(Z): Calibration Techniques
(2019 Pattern) (Semester - VI) (Skill Enhancement Course - III)
(361210Z)

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

Instructions to the candidates:

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

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

a) State any two factors affecting on calibration.

b) Give the classification of Instruments.

c) Write any two disadvantages of pressure comparators.

d) What is fluorescence?

e) What is meant by harmodic distortion?

f) What is seebeck effect?

Q2) Answer the following questions :

a) Describe traceability in calibration **[6]**

b) With the help suitable diagram Explain the working of master gauge. **[4]**

P.T.O.

Q3) Answer the following questions :

a) Explain principle and working of RTD (Restance Temperature Detector) **[6]**

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

Q4) Answer the following questions :

a) Describe the working of signal generator with the block diagram. **[6]**

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

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

a) Bimetallic thermometer.

b) CRT (Cathode Ray Tube)

c) Capsule Pressure Gauge.

d) Piezometer pressure gauge.

e) Application of NTC and PTC

f) Thermoelectric effect.

Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages : 2

[6467]-726
T.Y.B.Sc. (Regular)
PHYSICS
PHY-3611(AA): Microcontroller
(2019 Pattern) (Semester-VI) (361211AA)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Attempt any three questions from Q2 to Q5.***
3) ***Use of logtable or electronic calculator is allowed.***

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

a) How (-19) can be represented as signed number?

b) What is the function of V_{FE} pin of LCD?

c) What is the function of program counter (PC) register.

d) What is the function of $\overline{EA}$ pin of 8051 microcontroller?

e) State the function of RXD and TXD pins of 8051.

f) Find the period of timer clock, if the crystal frequency is 12 MHZ.

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

i) Explain with suitable example, the various addressing modes used in 8051 microcontroller assembly language.

ii) What is stack? Explain with instructions, the operation of the stack in 8051 microcontroller.

iii) Explain with neat diagram, how 8051 microcontroller is interfaced to pc using RS 232 standard.

b) Draw the PSW register of 8051 micro controller . Explain the RSO and RSI flags of it. **[4]**

P.T.O.

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

i) Write an 8051 microcontroller assembly language program to add two 8 bit numbers and store the result in RAM memory at 51H and 52H location.

ii) Explain the difference between micro processor and microcontroller.

iii) What are A and B register of 8051 microcontroller? How they are used in multiplication and division operation?

b) What is the different addresing modes of 8051 microcontroller? Explain any four with its suitable example. **[4]**

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

i) Write an assembly language program using 8051 instructions to subtract 61H form 94H using 2's complement method.

ii) What are the different internal interrupts of 8051 microcontroller? Give their vector address.

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

b) Explain the meaning of following 8051 microcontroller instructions. **[4]**

i) INC R3

ii) ANL A,R3

iii) SWAPA

iv) MOVA, @ R4

Q5) Attempt any four of the following **[4×2.5=10]**

a) Write short note on Interfacing of matrix keyboard.

b) Write short note on timer/counters of 8051 microcontroller.

c) What is the functions of RS pin and enable pin in LCD interfacing.

d) Explain the difference between jump and call instructions of 8051 microcontroller.

e) Give the structure of organisation of internal RAM of 8051 microcontroller.

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Total No. of Questions : 5]

SEAT No. :

PD778

[Total No. of Pages : 1

[6467]-727
T.Y. B.Sc. (Regular)
PHYSICS
PHY-3611(AB): Instrumentation For Agriculture
(Skill Enhancement Course-IV)
(2019 Pattern) (Semester - VI) (361211AB)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Question No. 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 any four advantages of remote sensing.
b) State any three physical properties of soil.
c) Define sucrose or saccharose.
d) What are the basis components of SCADA system?
e) What are rain gauge devices?
f) Why ventilation is important in greenhouse?

Q2) Answer the following questions.

a) What is the role of Instrumentation in modern Agriculture? **[6]**
b) Explain construction and working of hygrometer? **[4]**

Q3) Answer the following questions.

a) Draw flow diagram of dairy industry and explain it. **[6]**
b) What is photosynthesis? How does radiations are affects photosynthesis? **[4]**

Q4) Answer the following questions.

a) What is the principle of water distribution system? Explain its types with diagram. **[6]**
b) What are the advantages and disadvantages of sprinkler irrigation system? **[4]**

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

a) Biosensor and its types.
b) Types of agriculture sensors.
c) Physical properties of soil.
d) Advantages of batch fermentation.
e) Upstream and downstream control system.
f) Lysimeters.

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Total No. of Questions : 5]

SEAT No. :

PD-779

[Total No. of Pages : 2

[6467]-728
T.Y.B.Sc.
PHYSICS
PHY - 3611 (AC) : Radiation Physics
(2019 Pattern) (Semester - VI) (361211AC)

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

Instructions to the candidates :

1) ***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 Ionizing radiations.

b) In Ionization chamber which type of gases are filled?

c) Define the radiation unit-Roentegen.

d) Define Linear absorption coefficient of radiation.

e) What is the role of biological shielding in radiation protection?

f) Which radioactive nuclei are used in medical diagnosis?

Q2) a) Describe with neat diagram the construction and working of ionization chamber. **[6]**

OR

Describe in brief the following terms:

i) Ionizing and non ionizing radiations.

ii) Concept of excitation and ionization.

iii) Radio active losses.

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

P.T.O.

Q3) a) Explain the following terms in brief : **[6]**

i) Absorbed dose

ii) Equivalent dose

iii) Effective dose

OR

What is the basic concept of radiation shielding? How its thickness is based on types of radiation?

b) How personal dosimeter is important? **[4]**

Q4) a) Give any twelve radiation protection and safety rules mentioned in act laid by Government of India. **[6]**

OR

Give three applications each of gamma rays in the field of agricultural and medicine industry.

b) Give the importance of radioactive pharmaceuticals. **[4]**

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

a) Principle of stopping power.

b) Draw block diagram of scintillation counter.

c) Why there is difference between penetrating power of alpha, beta and gamma rays.

d) Why is it important to measure radiation level around open radioactive source.

e) Explain in brief the working of proportional counter in proportional region.

f) Explain the term thermo luminescent dosimeter in brief.

Total No. of Questions : 5]

SEAT No. : ____

PD-780

[Total No. of Pages : 2

[6467]-729
T.Y.B.Sc.
PHYSICS
PHY - 3611 (AD) : Photography
(2019 Pattern) (Semester - VI) (361211AD)

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

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any three from Q.2 to Q5.***
3) ***Q.2 to Q.5 carry equal marks.***
4) ***Use of calculators and Logtable is allowed.***
5) ***Figures to the right indicate full marks.***

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

a) What do you mean by light ring technique?

b) What is normal zoom lens?

c) Define exposure meter.

d) What do you mean by colour head?

e) List the filters used in colour photography?

f) Define Aperture.

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

a) Explain construction and function of SLR camera. **[6]**

b) What is difference between telephoto and zoom lens? **[4]**

P.T.O.

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

a) Discuss indoor and outdoor lighting techniques in details. **[6]**

b) Explain handling methods of digital camera in details. **[4]**

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

a) i) Draw neat labelled diagram of pin-hole camera. **[3]**

ii) What are the sources of light in camera? **[3]**

b) Write the use of normal, wide angle and telephoto lenses. **[4]**

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

a) Discuss shutter in short. **[2½]**

b) List the types of digital cameras. **[2½]**

c) Explain the limitations of Black and white camera's. **[2½]**

d) Explain handling methods of digital camera. **[2½]**

e) What is white balance? **[2½]**

f) Explain focal plane shutter. **[2½]**

Total No. of Questions : 5]

SEAT No. : ____

PD781

[Total No. of Pages : 2

[6467]-730
T.Y.B.Sc. (Regular)
CHEMISTRY
CH-601: Physical Chemistry-II
(2019 Pattern) (Semester -VI) (36131)

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

Instructions to the candidates:

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

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

a) Define concentration cell.

b) What is emf of cell?

c) Define isobar.

d) What is amorphous solid?

e) If emf of a cell increased by 0.0025 v with fall in temp 5°C. Calculate temperature coefficient

f) What are isotropic substances.

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

a) Write cell reaction for following cell
$Zn|Zn^{+2}|Fe^{+2}, Fe^{+3}|pt$.

b) Define the following

i) Half life period

ii) Average life

iii) Mass defect

c) Derive Bragg equation

B) Discuss advantages and disadvantages of fuel cell. **[4]**

P.T.O.

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

a) What are different types of electrodes? Give one example of atleast three types.

b) Write classification of nuclides on the basis of number of proton and neutron.

c) Determine Miller's indices of planes with weiss indices $\left(1\frac{2}{3}\infty\right), (11\infty)$ and $(1\,2\,2)$.

B) For the cell

$Zn|Zncl_2(aq)$, AgCl(s)|Ag

emf at 25°C is 1.240 volt and at 35°C is 1.260 volt, calculate ΔG and ΔH at 30°C if EMF is 1.25 volt.

(Given F = 96500 c/mol) **[4]**

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

a) Define the following terms

i) Crystallography

ii) Heat of fusion

iii) Anisotropic solids

b) What are the requirements of standard cell

c) What is salt bridge? How it is prepared

B) Calculate pH of cell using following data

calomel $\overset{\ominus}{\text{e}}$lectrode $||H^+$, quinhydrone$|\overset{\oplus}{\text{p}}$t

At 25°C Ecell = 0.1 volt, Eox (cal) = – 0.2415 volt (R = 2 cal, F=96500)

Ered (quinhydrone) = 0.699 **[4]**

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

a) Metal metal ion electrode

b) Glass electrode

c) Types of crystal system

d) Solution pressure and atmosphoric pressure

e) Use of radio-isotope in structure determination

f) Laws of symmetry

Total No. of Questions : 5]

SEAT No. :

PD782

Total No. of Pages : 2

[6467]-731
T.Y. B.Sc.(Regular)
CHEMISTRY
CH-602: Physical Chemistry-III
(2019 Pattern) (CBCS) (Semester - VI) (36132)

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) ***Figuers to the right indicate full marks.***
5) ***Draw neat diagrams wherever necessary.***
6) ***Use of logarithn tables and calculator is allowed.***

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

a) A sample of polyethene has on average molecular weight of 8596 g/mol. Calculate average degree of polymerization. (Given moleculor wt. of ethene=28 g/mol)

b) What are molecular solids?

c) State the units of parabolic rate constant.

d) What are isotonic solutions?

e) Define the term deaquation.

f) List the colligative properties.

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

i) Derive the relation between van't Hoff factor (i) and degree of dissociation (α)

ii) What is weight average molecular weight? derive it's equation.

iii) What are semiconductors? Give two examples.

b) Explain the nature of plot of fraction of reactant reacted (α) versus time 't' based on Avrami Erofeev nucleation model. **[4]**

P.T.O.

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

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

ii) How are polymers classified based on molecular forces? Explain with suitable example.

iii) Why does the electrical conductivity of metals decreases with temperature?

b) Calculate k b for water from the following data. **[4]**

ΔH_v = 2260 J g^{-1}, Tb = 373.2 k, Molecular weight = 18, R = 8.314 J 6 mole – KJ^{-1}

Q4) a) Solve any two. **[6]**

i) How does the polymer molecular weight affect their solution viscosity?

ii) Explain the band structure of sodium (Na)

iii) Derive the Prout-Tompkins equation.

b) 0.440 g of a substance dissolved in 22.2 g of benzene lowered the freezing point of benzene by 0.567ºC calculate the molecular weight of the substance if k7=5.12. **[4]**

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

a) Hartley-Berkeley's method.
b) Linear and cyclic polymers.
c) Condensation polymerization.
d) Photoconductivity.
e) Cohesive energy in metals.
f) Kinetics of two solid reactants.

Total No. of Questions : 5]

SEAT No. :

PD783

[Total No. of Pages : 2

[6467]-732
T.Y. B.Sc. (Regular)
CHEMISTRY
CH - 604 : Inorganic Chemistry - II
(CBCS 2019 Pattern) (Semester-VI) (36134)

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

Instructions to the candidates:

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

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

a) What is gel?

b) Define the term polymer.

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

d) Which protein is responsible for red colour in blood?

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

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

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

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

$$\left[Re_2(CO)_{10}\right]\left[V(CO)_6\right]$$

$$\left[\text{At. No. Re} = 75,\ V = 23\right]$$

b) Distinguish between Hemoglobin and myoglobin.

c) What is homogenous catalysis? Mention the properties of homogenous catalysts.

P.T.O.

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

a) Draw structure of :

i) $Si_3O_9^{6-}$ ii) SiO_4^{4-}

b) Define :

i) Hyderogenation ii) Supported metal catalyst

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

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

b) Explain hydrothermal method for synthesis of inorganic solids.

c) Discuss Heck reaction with the help of catalytic cycle.

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

a) $\left[Re_3(CO)_{12}\right]$ b) $\left[Fe_2(CO)_9\right]$

c) $\left[Mn_2(CO)_{10}\right]$ d) $\left[Cr(CO)_6\right]$

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

i) Discuss biological role of calcium and magnesium.

ii) Explain catalytic cracking using zeolite as a catalyst.

iii) Discuss biodiesel synthesis using heteropolyacids as a catalysts.

b) What is cobalamin and cyanocobalamin? **[4]**

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

a) Zeolites.

b) Friedel craft Akylation of Ferrocene.

c) Applications of ionic liquids.

d) Biological importance of Iron.

e) Properties of efficient catalyst.

f) Applications of silicates.

Total No. of Questions : 5]

SEAT No. : ____

PD784

[Total No. of Pages : 2

[6467]-733
T.Y. B.Sc. (Regular)
CHEMISTRY
CH-605: Inorganic Chemistry - III
(2019 Pattern) (Semester - VI) (36135)

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

Instructions to the candidates:

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

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

a) Which disease is caused due to cd^{2+} ions.

b) What is Voids?

c) What is Lewis acid?

d) What is zeolite?

e) What is meant by cluster?

f) What is HOMO & LUMO?

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

i) Explain with the help of a block diagram metabolism of cadmium.

ii) Explain application of Born - Haber Cycle.

iii) How natural Zeolites are formed?

b) i) Explain Hexagonal close packing with suitable diagram. **[4]**

ii) Why HI is a stronger acid than HF?

P.T.O.

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

i) Explain Lowry - Bronsted theory of acids & bases. What are the advantages of this theory?

ii) Discuss zeolites structure with reference to framework compositions.

iii) What are Limitations of Arrehenius theory?

b) Calculate the lattice energy of NaF from the following data: **[4]**

i) Heat of formation of NaF = Δ HF = – 569 KJ mole^{-1}

ii) Heat of sublimation SNa = + 108.7 KJ mole^{-1}

iii) Heat of ionisation INa = + 493.8 KJ mol^{-1}

iv) Heat of dissociation $\frac{1}{2}DF_2$ = + 153.0 KJ mol^{-1}

v) Electron affinity EA_F = – 332.6 KJ mole^{-1}

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

i) Define acid & Base according to Lewis concept & What are the advantages of this theory?

ii) Explain the role of zeolite in adsorption & separation.

iii) Distinguish between Schottky & Frenkel defect.

b) i) Classify the following species into Arrehenius acid & bases. **[4]**

1) HCl

2) NaOH

3) H_2SO_4

4) Ca $(OH)_2$

ii) Write note on Minamata disease?

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

a) Application of nanoparticles.

b) Cryochemical synthesis for nanoparticles.

c) Concept of conjugate acid & base pair with suitable example.

d) What is Unit cell? Draw the different types of unit cell.

e) Classification of zeolites.

f) Leveling Effect of solvent.

ⓘⓘⓘⓘ

Total No. of Questions : 5]

SEAT No. : ____

PD-785

[Total No. of Pages : 5

[6467]-734

T.Y.B.Sc.

CHEMISTRY

CH - 607 : Organic Chemistry - II

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

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

Instructions to the candidates :

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

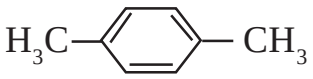
Q1) **Attempt <u>Any five</u> of the following :** **[5]**

a) Define chemical shift.

b) What is spectroscopy?

c) Draw chair conformation of cis-1,3 dimethyl cyclohexane.

d) How many sets of protons present in



e) Define Hypsochromic shift.

f) Calculate the fundamental modes of vibrations for NH_3 molecule.

Q2) **Attempt <u>Any two</u> of the following :** **[6]**

a) i) Discuss different types of coupling in NMR.

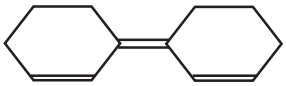
ii) What is bathochromic shift? Trans-stillbene absorb at higher wave- length than Cis-stillbene. Explain.

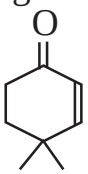
iii) Discuss factors affecting on IR-frequencies.

P.T.O.

b) Solve the following:

Calculate the λ max values for the following compounds. **[4]**

i) 

ii) 

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

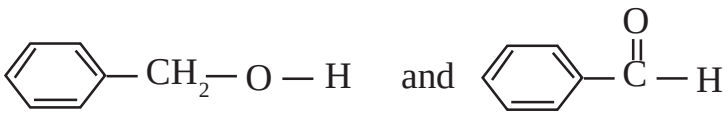
i) Draw chair conformations of cis - 1,4 dimethyl cyclohexane. Comment on their stability.

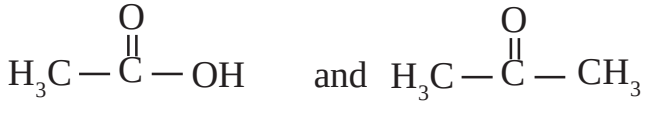
ii) Why TMS is used as internal standard in NMR spectroscopy.

iii) State Hooks law. Explain finger print region in IR spectroscopy.

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

How will your distinguish following pair using IR spectroscopy.

i) 

ii) 

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

i) Molecular formula : $C_7 H_8$

U.V : λ max = 255 nm.

IR : 1500 - 1680 cm^{-1}

PMR : (a) singlet at 2.32 δ (3H)

(b) singlet at 7.17 δ (5H)

ii) Molecular formula :$C_4 H_8 O_2$

U.V : λmax = 280 nm.

I.R : 1740 cm^{-1}

PMR : (a) Triplet at 1.1 δ (3H) or (24 mm)

(b) Singlet at 2.1 δ (3H) or (24 mm)

(c) quartet at 3.4 δ (2H) or (16 mm)

iii) Molecular formula :$C_7 H_8 O$

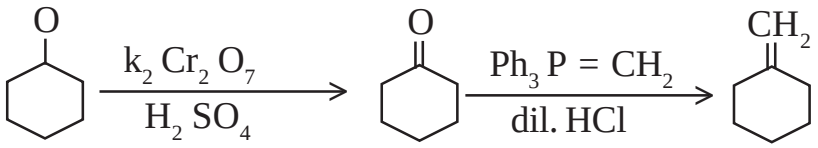
I.R : 1600, 1500, 750, 690 cm^{-1}

PMR : (a) Singlet at 3.8 δ (3H)

(b) Singlet at 7.2 δ (5H)

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

i) How will you follow the following reaction by I.R.



ii) How is IR spectroscopy useful for determination of size of ring ketone.

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

a) Write application of NMR spectroscopy.

b) Write note on Chromophore and Auxochrome.

c) Explain rules of spin-spin coupling.

d) Write short note on types of vibrations.

e) Draw chair conformation of trans - 1,3 dimethyl cyclohexane and comment on their stability.

f) Give applications of IR spectroscopy.

Table 1 : Characteristic Infrared Absorptions of Functional Groups

	Group	Frequency Range cm^{-1}	Intensity
A.	**Alkyl**		
	C–H (stretching)	2853 – 2962	(m – s)
	Isopropyl – $CH(CH_3)_2$	1380 – 1385 and 1365 – 1370	(s)
	tert – Butyl – $C(CH_3)_3$	1385 – 1395 and	(m)
		– 1365	(s)
B.	**Alkenyl**		
	C–H (stretching)	3010 – 3095	(m)
	C = C (stretching)	1620 – 1680	(v)
	R–CH = CH_2	985 – 1000 and 905 – 920	(s)
	$R_2C = CH_2$ (out-of-plane	880 – 900	(s)
	cis – RCH = CHR C–H bendings)	675 – 730	(s)
	trans – RCH = CHR	960 – 975	(s)
C.	**Alkynyl**		
	≡ C – H (stretching)	– 3300	(s)
	C ≡ C (stretching)	2100 – 2260	(v)
D.	**Aromatic**		
	Ar – H (stretching)	– 3030	(v)
	Aromatic substitution type		
	a) Monosubstituted	690 – 710 and 730 – 770	(very s)
	b) o – Disubstituted	735 – 770	(s)
	c) m – Disubstituted	680 – 725 and 750 – 810	(s)
	d) p – Disubstituted	800 – 840	(very s)
E.	**Alcohols, Phenols, Carboxylic Acids**		
	O–H (alcohols, phenols, dilute solutions)	3590 – 3650	(sharp v)
	O–H (alcohols, phenols, hydrogen bonded)	3200 – 3550	(broad s)
	O–H (carboxylic acids, hydrogen bonded)	2500 – 3000	(broad v)
F.	**Aldehydes, Ketones, esters and Carboxylic acids**		
	a) C = O stretch	1630 – 1780	(s)
	b) aldehydes	1690 – 1740	(s)
	c) ketones	1680 – 1750	(s)
	d) esters	1735 – 1750	(s)
	e) carboxylic acids	1710 – 1780	(s)
	f) amides	1630 – 1690	(s)
G.	**Amines**		
	N – H	3300 – 3500	(m)
H.	**Nitriles**		
	C ≡ N	2220 – 2260	(m)
I.	–C–O stretch (alcohol, ether, phenol)	1000 – 1300	(s)
J.	**Nitro – N = O**	1350 – 1550	(s)
K.	**Halides (–X)**	F 1000 – 1400	(s)
		Cl 540 – 750	(s)
		Br < 667	(s)

Table 2 : Approximate Proton Chemical Shifts in NMR

Type of Proton	Chemical Shift, Delta, PPM (δ)	Type of Proton	Chemical Shift, Delta, PPM (δ)
1° Alkyl, RCH_3 (methyl)	0.8 – 1.0	Vinylic, $R_2C=CH_2$	4.6 – 5.0
2° Alkyl, RCH_2R (methylene)	1.2 – 1.4	Vinylic $R_2C=CH-R$	5.2 – 5.7
3° Alkyl R_3CH (methyne)	1.4 – 1.7	Aromatic, ArH	6.0 – 9.5
Allylic $R_2C=\underset{\displaystyle R}{\overset{\displaystyle |}{C}}-CH_3$	1.6 – 1.9	Acetylenic, $RC\equiv CH$	2.5 – 3.1
Benzylic, $ArCH_3$	2.2 – 2.5	Alcohol hydroxyl, R–OH	0.5 – 6.0[a]
Alkyl chloride RCH_2–Cl	3.6 – 3.8	Carboxylic, $R-\overset{\displaystyle O}{\overset{\displaystyle \|\|}{C}}-OH$	10 – 13[a]
Alkyl bromide, RCH_2–Br	3.4 – 3.6	Phenolic, $Ar-O-H$	4.5 – 7.7[a]
Alkyl iodide, RCH_2–I	3.1 – 3.3	Amino $R-NH_2$	1.0 – 5.0
Ether, $ROCH_2R$	3.3 – 3.9		
Alcohol, $HOCH_2R$	3.3 – 4.0		
Ketone, $R-\overset{\displaystyle O}{\overset{\displaystyle \|\|}{C}}-CH_3$	2.1 – 2.6	$R-\overset{\displaystyle O}{\overset{\displaystyle \|\|}{C}}-CH_2-$	2.4
Ester $R-\overset{\displaystyle O}{\overset{\displaystyle \|\|}{C}}-O-CH_2-R$	4.0 – 4.5	$R-\overset{\displaystyle O}{\overset{\displaystyle \|\|}{C}}-\overset{\displaystyle |}{CH}-$	2.5
Aldehyde, $R-\overset{\displaystyle O}{\overset{\displaystyle \|\|}{C}}-H$	9.5 – 9.6		

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

Table 3 : U. V. Absorption rules for Diene chromosphores

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

U.V. Absorption rules for Enone System

1) Parent	→	215 nm (207 nm for aldehyde) (202 for five membered ring)			
2) Each extra conjugation	→	30 nm	6) – Cl	→	α 15 nm
3) Homoannular	→	39 nm	7) – OH, – OR	→	β 12 nm
4) Substituents			8) – SR	→	α 35 nm
a) Alkyl group at α	→	10 nm	9) – NR_2	→	α 30 nm
b) Alkyl group at β	→	12 nm			β 85 nm
c) Alkyl group at γ, δ and higher	→	18 nm			γ 95 nm
5) Exocylic double bond	→	05 nm			

Total No. of Questions : 5]

SEAT No. : ____

PD-786

[Total No. of Pages : 2

[6467]-735

T.Y. B.Sc.

CHEMISTRY

CH - 608 : Organic Chemistry - III

(2019 Pattern) (Semester - VI) (36138) (CBCS)

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

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

a) What is FGI?

b) Define isoprene rule.

c) How LAH is prepared?

d) Give the structure of DDQ.

e) What is Carbocation?

f) What is Wolff rearrangement?

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

i) Write the retrosynthesis and synthesis of Acetophenone.

ii) Explain the Michael reaction with mechanism.

iii) Write a Nagai Synthesis of Ephedrine.

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

i) How will you prove presence of a carbon skeleton in citral.

ii) Write mechanism involved in cis hydroxylation by using O_5O_4.

P.T.O.

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

i) Write the mechanism involved in reduction of aldehyde/ketone by using sodium borohydride.

ii) Write note on Diels-Alder reaction.

iii) What are terpenoids? Give their classification.

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

i) How will you prove the presence of – NH–CH_3 group in Ephedrine.

ii) Give any two methods of generation of carbene.

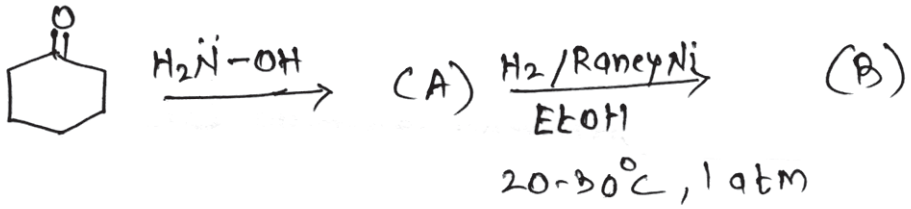
Q4) a) Attempt <u>any two</u> of the following : **[6]**

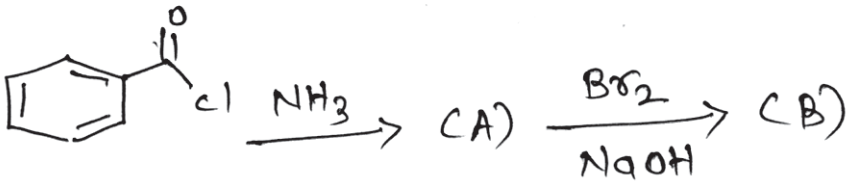
i) What is Oxidation? Give two applications of SeO_2.

ii) Write synthesis of Citral from methyl heptenone.

iii) What is reduction? Give two applications of diisobutylaluminium hydride.

b) Identify product (A) & (B) and rewrite the reaction. **[4]**

i) 

ii) 

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

a) Write retrosynthesis and synthesis of Cyclohexenone

b) Write note on Hoffmann rearrangement.

c) Write mechanism involved in oxidation by Dimethyl sulfoxide with DCC.

d) Write note on Target molecule and disconnection.

e) What is Benzyne? How will you prepare benzyne.

f) Explain Simmon Smith reaction with suitable example.

▽▽▽▽

Total No. of Questions : 5]

SEAT No. : ____

PD-787

[Total No. of Pages : 2

[6467] - 736
T.Y. B.Sc.
CHEMISTRY
CH-610(A): Chemistry of soil & Agrochemicals
(2019 Pattern) (Semester - VI) (CBCS) (361310A)

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

Instructions to the candidates:

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

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

a) What is surface soil

b) What is soil solution

c) Define fumigants

d) What is manure

e) Define night soil

f) Name the materials required for soil sampling

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

i) Explain the methods of applying solid forms liquid form fertilizers.

ii) What are Biofertilizers? Give in detail the classification of biofertilizers.

iii) Explain factors affecting the composition of F.Y.M.

b) What is alkali soil? Explain in brief classification of alkali soil **[4]**

P.T.O.

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

i) Classify nitrogenous fertilizers. Explain the action of urea on soil.

ii) Write advantages & disadvantages of vermicompost.

iii) Explain ion exchange capacity of soil

b) Describe the construction and working of biogas-plant with neat diagram **[4]**

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

i) Write qualities of good fertilizer

ii) State different methods for reclamation of saline soil.

iii) Describe air and oven drying techniques of soil samples.

b) What are mixed fertilizers? Explain advantages & disadvantages of mixed fertilizers. **[4]**

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

a) Importance of soil reaction

b) Green manuring

c) Factors affecting efficiency of fertilizers

d) Small culturing technique of vermiculture.

e) Surface soil and subsoil.

f) Soil structure.

Total No. of Questions : 5]

SEAT No. :

PD-788

[Total No. of Pages : 2

[6467] - 737
T.Y. B.Sc.
CHEMISTRY
CH-610(B): Introduction of Forensic Chemistry
(2019 Pattern) (Semester - VI) (CBCS) (361310B)

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

Instructions to the candidates:

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

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

a) Give statement of principle of exchange

b) Define Hallucinogens.

c) Write long form of ND,PS,CS.

d) Explain law of progressive change

e) Define stimulants

f) Write long form of NDTL.

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

i) Explain searching a suspect in NDPS act.

ii) What are Hallucinogen Designer Drugs.

iii) Explain need of forensic science

P.T.O.

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

i) Write statement of law of individuality

ii) Give some examples of Hallucinogens

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

i) Explain the term drug withdrawal

ii) Define Depressants Drugs. Write symptoms of use of them.

iii) Explain scope of forensic science

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

i) How GC-MS used in NDPS analysis

ii) Explain Drug of Abuse.

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

i) Explain microcrystalline testing of drug of Abuse

ii) Explain code of conduct for forensic scientist

iii) Write symptom of use of narcotics drugs

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

i) Explain searching of dwelling as per NDPS act.

ii) Explain Locard's exchange principle in forensic investigation.

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

a) Post mortem sample

b) Scope of forensic science

c) Clandestine Drug laboratories

d) Historical development of forensic science

e) Dope Test

f) Narcotics

Total No. of Questions : 5]

SEAT No. : ____

PD-789

[Total No. of Pages : 2

[6467] - 738
T.Y. B.Sc.
CHEMISTRY
CH-611(A): Analytical Chemistry- II
(2019 Pattern) (Semester - VI) (CBCS) (361311A)

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

Instructions to the candidates:

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

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

a) Define void volume

b) State any one application of flame photometry.

c) Define reverse phase chromatography

d) Calculate distribution ratio if concentration of solute in organic phase is 0.25M and in aqueous phase its 0.30M.

e) HETP stands for.

f) What is a role of photomultiplier tube in AAS.

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

i) What are the advantages and disadvantages flame photometry

ii) Explain derivatization in gas chromatography.

iii) Define distribution coefficient, list some limitations of distribution coefficient.

P.T.O.

b) If a distribution ratio is 10, calculate % extraction for _____ **[4]**

i) $V_a / V_0 = 1$ and ii) $V_a / V_0 = 20$

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

i) Draw neat and labelled diagram of flame photometer

ii) Explain sample injection system in Gas chromatography

iii) Define sensitivity and detection limit of an AAS.

b) A Retention time of a certain analysis is 8.68min and a baseline width is 0.29min. Calculate the number of therotical plates in this separation also calculate the height of therotical plate when the coloumn length is 2.0 meters. **[4]**

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

i) With schematic diagram explain the components in HPLC.

ii) Explain Retention factor, Efficiency and Resolution in chromatography

iii) What are the various steps involved in flame photometry

b) A compound was extracted to the extent of 80% when equal volumes of aqueous and organic layers were shaken together what will be the % extraction if the volume of the organic phase is doubled? **[4]**

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

i) Give applications of solvent extractions.

ii) Explain the plate theory in chromatography

iii) Explain the working of Electron capture detector

iv) What are the advantages and disadvantages of premixed and total consumption burner.

v) Why hollow cathode lamp used in AAS?

vi) Explain the principle, construction and working of refractive index detector.

Total No. of Questions : 5]

SEAT No. :

PD-790

[Total No. of Pages : 2

[6467] - 739
T.Y. B.Sc.
CHEMISTRY
CH-611(B): Chemistry of Cosmetics and Perfumes
(2019 Pattern) (Semester - VI) (CBCS) (361311B)

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

Instructions to the candidates:

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

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

a) Write any two methods of manufacture of pure water.

b) Define surfactants.

c) What is the purpose of use of perfumes and fragrances in cosmetic products.

d) Draw the structure of eugenol

e) Under which act, the manufacture of cosmetic is regulated.

f) What is the responsibility of authorised agent in cosmetic industry.

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

i) What are humectants. Give their type and respective examples.

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

iii) Write the functions of CDSCO.

P.T.O.

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

i) Write note on sunscreen lotion

ii) What is import registration certificate.

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

i) Classify cosmetics according to their physical nature.

ii) What decides notes in perfume and give different types of notes in perfume with suitable example.

iii) Write the amendments of cosmetic rules 2020 with respect to registration and import of cosmetic products.

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

i) What are functional raw materials and how they contribute towards functional property.

ii) Write any four uses of 2-phenyl ethyl alcohol.

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

i) Define colours used in cosmetics, give their classification and one example of each.

ii) Give details of sources of fragrances.

iii) Give an account of dossiers required for registration of importing cosmetics for sale.

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

i) Give details of Sandal wood oil

ii) Write a note on special label requirement for hair dyes containing dyes, colours and pigments.

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

i) Vanishing cream

ii) Role of natural products in cosmetics

iii) What is Form cos-1 and Form cos-2. Give their controlling authority

iv) Hair colourants

v) Rose oil

vi) Post approval changes for which the firm can apply online on SUGAM portal of CDSCO.

Total No. of Questions : 5]

SEAT No. : ____

PD791

[Total No. of Pages : 2

[6467]-740
T.Y.B.Sc. (Regular)
BOTANY
BO-361 : Plant Physiology and Metabolism
(CBCS 2019 Pattern) (Semester - VI) (Paper - I) (36141)

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

Instructions to the candidates:

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

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

a) What is mineral nutrition?

b) What is grana?

c) Define respiration.

d) What is photobiology?

e) Define girdling.

f) Give any two functions of PGR.

Q2) a) Give practical applications of Auxins. **[6]**

b) Explain the role of nitrogen. **[4]**

Q3) a) Give an outline of C_4 cycle. **[6]**

b) Explain brief account of pressure flow model **[4]**

P.T.O.

Q4) a) Describe the cyclic photophosporylation. **[6]**

b) Write the characteristics of photophysiology. **[4]**

Q5) Write short notes on any 4 of the following. **[10]**

a) Structure of phytochrome.

b) Physiological role of ethylene.

c) Green light response.

d) Aerobic respiration.

e) Ultra structure of chlroplast.

f) Ionophores.

* * *

Total No. of Questions : 5]

SEAT No. :

PD792

[Total No. of Pages : 1

[6467]-741
T.Y. B.Sc.(Regular)
BOTANY
BO-362: Biochemistry
(CBCS 2019 Pattern) (Semester - VI) (36142) (Paper-II)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Attempt any three questions from Q2 to Q5.***
3) ***Question 2 to 5 carry equal marks.***
4) ***Figures to the night indicate full marks.***
5) ***Draw neat labeled diagrams whenever necessary.***

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

a) Define enzyme.
b) Write two properties of water.
c) What is Polypeptide chain?
d) Write two functional groups of biomolecules.
e) Define amino acid.
f) write two functions of vitamins.

Q2) a) Describe classification of enzymes. **[6]**
b) Explain water soluble vitamins. **[4]**

Q3) a) Describe commercial application of carbohydrates. **[6]**
b) Explain chemical properties of lipids. **[4]**

Q4) a) Describe various factors affecting on enzyme activities. **[6]**
b) Explain functions of lipids. **[4]**

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

a) Induced fit model.
b) Secondary structure of protein.
c) Importance of biomolecules.
d) Polarity of water molecules.
e) Conformation.
f) Interaction of water molecule with other molecules.

✠ ✠ ✠

Total No. of Questions : 5]

SEAT No. :

PD793

[Total No. of Pages : 2

[6467]-742

T.Y. B.Sc. (Regular)

BOTANY

BO - 363 : Plant Pathology

(CBCS 2019 Pattern) (Semester-VI) (Paper - III) (36143)

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

Instructions to the candidates:

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

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

a) What are symptoms?

b) Give full form of ICRISAT.

c) What is dissemination?

d) Give any two types of defense mechanism.

e) What is quarantine?

f) Mention any two abiotic causes of non parasitic diseases.

Q2) a) Explain the concept of disease cycle. **[6]**

b) Describe the contribution of Anton De Bary. **[4]**

P.T.O.

Q3) a) Describe types of culture techniques. **[6]**

b) Describe the causal organism, symptoms and disease management Black arm of cotton. **[4]**

Q4) a) Describe chemical control of plant diseases. **[6]**

b) Give an account of nemotodes as plant diseases. **[4]**

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

a) Papaya Mosaic disease.

b) Eradication.

c) Exponential model.

d) Biochemical defense.

e) Downy mildew of grapes.

f) Mycoplasma disease management.

Total No. of Questions : 5]

SEAT No. : ____

PD794

[Total No. of Pages : 1

[6467]-743
T.Y. B.Sc.(Regular)
BOTANY
BO-364: Evolution and Population Genetics
(CBCS 2019 Pattern) (Semester - VI) (Paper-IV) (36144)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Attempt any three questions from Q2 to Q5.***
3) ***Question 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat labeled diagrams whenever necessary.***

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

a) Define gene pool.
b) What is Mendelian population?
c) Define epoch.
d) What is mass extinction?
e) Define coacervates.
f) What is genetic drift.

Q2) a) What is evolution? Describe in detail the modern synthetic theory. **[6]**

b) Explain dating of fossils with radio carbon method. **[4]**

Q3) a) State and explain the equation of Hardy-Weinberg law of gene frequencies. **[6]**

b) Define Speciation? Give in brief allopatric speciation. **[4]**

Q4) a) Explain evidences of evolution from fossil records. **[6]**

b) Give in brief Post-Zygotic isolation mechanism. **[4]**

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

a) Theory of panspermia.
b) Analogy.
c) Compaction fossil.
d) Seasonal isolation.
e) Chemical synthesis of life.
f) Lamarkism theory.

✠ ✠ ✠

Total No. of Questions : 5]

SEAT No. : ____

PD-795

[Total No. of Pages : 2

[6467]-744

T.Y.B.Sc.

BOTANY

BO 365 : Advanced Plant Biotechnology

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

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

Instructions to the candidates :

1) ***Question No. 1 is compulsory.***
2) ***Attempt any three questions from Q.2 to Q5.***
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 <u>five</u> of the following.** **[5×1=5]**

a) What do you mean by marine biotechnology?

b) Define explant.

c) Enlist types of fermentations.

d) What is genetically modified food?

e) Define DNA modifying enzymes.

f) What are nanopesticides?

Q2) a) Define organogenesis. Add a note on indirect organogenesis. **[6]**

b) Explain the concept of pollen bank. **[4]**

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

b) Describe in detail, the process of microinjection. **[4]**

P.T.O.

Q4) a) Give an overview of PCR method. **[6]**

b) Discuss transgenic plants for production of therapeutic protiens. **[4]**

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

a) Selection of explant.

b) Cosmids

c) Advantages of nanobiotechnology.

d) Role of Biotechnology in environment.

e) Alkaline phosphatases.

f) Patenting of biotechnological inventions.

Total No. of Questions : 5]

SEAT No. :

PD-796

[Total No. of Pages : 2

[6467]-745
T.Y. B.Sc.
BOTANY
BO - 366 : Plant Breeding and Seed Technology
(2019 Pattern) (CBCS) (Semester - VI) (Paper - VI) (36146)

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 Q.2 to Q. 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 plant breeding.

b) What is intervarietal hybridization?

c) Define acclimatization.

d) What is full form of SSCA?

e) Define seed Technology.

f) Give any two importance of seed legislation.

Q2) a) What is hybridization? Explain procedure of bulk method of hybridization. **[6]**

b) What is selection? Write in detail about clonal selection method. **[4]**

Q3) a) Describe in detail about National seed corporation. **[6]**

b) Define mutation. Give types of mutations. **[4]**

Q4) a) What is germination testing? Give its method. **[6]**

b) What is plant introduction? Give its merits and demerits. **[4]**

P.T.O.

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

a) Methods of moisture testing.

b) Phases of seed certification.

c) Seed borne fungi.

d) Fumigation.

e) Steps involved in hybridization.

f) Physical purity analysis.

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Total No. of Questions : 5]

SEAT No. :

PD-797

[Total No. of Pages : 2

[6467]-746
T.Y.B.Sc.
BOTANY
BO-3610 : Nursery and Gardening Management
(CBCS) (2019 Pattern) (Semester - VI) (361410)

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

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

a) What is plant Nursery?

b) What is seed?

c) What is vegetative propagation?

d) Explain term layering.

e) Define Gardening.

f) What is Nursery Bed?

Q2) a) What is cutting? Comment on different methods of cutting. **[6]**

b) Give objectives and importance of Nursery. **[4]**

Q3) a) Write different aspects of park and its components. **[6]**

b) Write methods of seed dormancy. **[4]**

P.T.O.

Q4) a) Give botanical names, methods of cultivation, pest and disease management of cabbage. **[6]**

b) Comment on methods of natural vegetative propagation. **[4]**

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

a) Write a note on Home gardening.

b) Write note on Air layering.

c) Comment on seed storage and factors affecting it.

d) Write note on Disease and pests of brinjal.

e) Write scope and objective of gardening.

f) Explain method of storage and marketing of vegetables.

Total No. of Questions : 5]

SEAT No. : ____

PD-798

[Total No. of Pages : 2

[6467]-747
T.Y. B .Sc.
BOTANY
BO - 3611 : Biofertilizers
(2019 Pattern) (CBCS) (Semester - VI) (Paper - XI)(361411)

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 indicate full marks.***
5) ***Draw neat labelled diagrams wherever necessary.***

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

a) Define Biofertilizers.

b) What is Compost.

c) Name the bacteria use for biofertilizers production.

d) What is BGA.

e) Give any two applications of mycorrhiza.

f) What are green manures.

Q2) a) Give general account of the microbes used as Biofertilizers. **[6]**

b) Explain the method of isolation of Anabena from Azolla **[4]**

Q3) a) Comment on carrier based inoculants. **[6]**

b) Write applications of Azospirillum **[4]**

Q4) a) Comment on mycorrhizal applications. **[6]**

b) Explain the process of mass multiplication of Anabena. **[4]**

P.T.O.

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

a) Vermicomposting

b) Organic farming

c) Symbiotic nitrogen fixation

d) Endo mycorrhizae.

e) Phosphate solubilizing bacteria

f) Applications of organic manures

Total No. of Questions : 5]

SEAT No. : ____

PD799

[Total No. of Pages : 2

[6467]-748
T.Y.B.Sc. (Regular)
ZOOLOGY
ZO-361 : Medical & Forensic Zoology
(2019 Pattern) (Semester - VI) (Paper - I) (36151)

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 hypertension?

b) Define Forensic Zoology.

c) What is Hepatitis?

d) What is renal failure?

e) What is radioactive person?

f) What is DNA finger printing?

Q2) a) What is autopsy? Describe the types of autopsy. **[6]**

OR

Describe biological examination of hair found at crime scene.

b) Describe Livor mortis. **[4]**

Q3) a) Describe external examination of deceased body. **[6]**

OR

Discuss the complications & preventions in hypertension.

b) Discuss the symptoms of type 2 Diabetes. **[4]**

P.T.O.

Q4) a) Describe the significance & applications of forensic zoology. **[6]**

OR

Give an account of forensic laboratories in India.

b) Describe the types of kidney stones. **[4]**

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

a) Causes of hypotension.

b) Importance of forensic entomology.

c) Physical examination of urine.

d) Food poisoning.

e) Clinical significance of death.

f) Prevention of Atherosclerosis.

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Total No. of Questions : 5]

SEAT No. :

PD-800

Total No. of Pages : 2

[6467]-749
T.Y. B.Sc. (Regular)
ZOOLOGY
ZO-362 : Animal Physiology
(2019 Pattern) (Paper-II) (Semester - VI) (36152)

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

Instructions to the candidates:

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

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

a) What is nutrition?
b) Mention function of RBCs
c) Name male sex hormone
d) What is BMR?
e) What is sarcoplasm?
f) What is systole?

Q2) a) Describe various types of leucocytes and mention their functions. **[6]**

OR

Describe mechanism of transport of gases.

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

Q3) a) Explain fat soulble vitamins & deficiency diseases caused by them **[6]**

OR

Explain physiology of urine formation.

b) Write short note Respiratory Quotient. **[4]**

Q4) a) What is menstrual cycle? Give an account of various stages of menstrual cycle. **[6]**

OR

Describe structure of thyroid gland and Discuss hormones secreated by thyroid gland & mention their role.

b) ultrastructure of muscle fibre. **[4]**

P.T.O.

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

a) Myogenic heart
b) Angiography
c) Summation
d) Role of parathormones
e) Cardiac cycle
f) Extracellular digestion

Total No. of Questions : 5]

SEAT No. :

PD801

[Total No. of Pages : 2

[6467]-750

T.Y. B.Sc. (Regular)

ZOOLOGY

ZO - 363 : Molecular Biology

(2019 Pattern) (Semester-VI) (Paper - III) (36153)

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

Instructions to the candidates:

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

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

a) Enlist the major types of RNA.

b) What is translation?

c) What is the lagging strand?

d) What does the non-coding (antisense) strand mean?

e) Define Linker DNA.

f) Define splicing.

Q2) a) Explain in detail Hershey and Chase's bacteriophage experiment. **[6]**

OR

Enlist the different enzymes along with their role involved in prokaryotic DNA replication.

b) Explain the steps involved in polymerase chain Reaction (PCR) and add a note on it's application. **[4]**

P.T.O.

Q3) a) Describe the transcription factors with their function involved in the initiation of eukaryotic transcription. **[6]**

OR

Explain in detail the mechanism of photo repair system.

b) What is capping? Explain the process of capping of mRNA. **[4]**

Q4) a) Write a note on the prokaryotic and eukaryotic mRNA. **[6]**

OR

With the help of a diagram, describe the organization of lac operon.

b) Describe the structure of nucleosome. **[4]**

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

a) Difference between euchromatin and heterochromatin.

b) Role of DNA polymerase I and DNA ligase.

c) Charging of t-RNA.

d) Non-coding RNA.

e) Central dogma of molecular biology.

f) Applications of DNA fingerprinting.

Total No. of Questions : 5]

SEAT No. :

PD802

Total No. of Pages : 2

[6467]-751
T.Y. B.Sc. (Regular)
ZOOLOGY
ZO-364 : Entomology
(2019 Pattern) (Paper-IV) (Semester - VI) (36154)

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 No 2 to 5 carry equal marks.***

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

a) Define medical Entomology.
b) Explain halter.
c) Define Hemimetabolous.
d) Explain structure of antenna.
e) Function of compound Eye.
f) Explain chitineous exoskeleton.

Q2) a) Describe classification of class Insecta. **[6]**

OR

Describe Insect integument and its derivetives.

b) Explain biting & chewing mouth part with suitable diagram. **[4]**

Q3) a) Describe Reproductive system of Insect. **[6]**

OR

Describe Insect thorax and its appendages.

b) Explain general characteristic of Insecta. **[4]**

Q4) a) Describe Insect head add a note on orientation and articulation of head. **[6]**

OR

Define Insect ecology and add a note on abiotic factor for Insect population.

b) Explain social organization in Insect with reference to Termites. **[4]**

P.T.O.

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

a) Insect in medicines and cosmatic.
b) Insect metamorphosis & its types.
c) Mimicry Insect with suitable example.
d) Insect wing modification.
e) Distinguish between intra and inter specific interactions.
f) Hibernation and diapause in Insect.

Total No. of Questions : 5]

SEAT No. : ____

PD-803

[Total No. of Pages : 2

[6467]-752

T.Y.B.Sc.

ZOOLOGY

ZO 365 : Techniques in Biology

(CBCS) (2019 Pattern) (Semester - VI) (Paper V) (36155)

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

Instructions to the candidates :

1) ***Question 1 is compulsory.***
2) ***Solve any three question from Q.2 to Q5.***
3) ***Q.2 to Q.5 carry equal marks.***

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

a) Define Resolving power.

b) What is Embedding?

c) What is sample size?

d) Define Affinity.

e) What is Bleeding Time?

f) What is DNA Barcoding?

Q2) a) Explain Applications, Advantages & Limitations of Phase Contrast Microscopy. **[6]**

OR

Explain the steps and precautions involved in section cutting.

b) Describe types of ELISA. **[4]**

P.T.O.

Q3) a) What is the principle of PCR? Describe the procedure and application of PCR. **[6]**

OR

Describe in detail digital camera features.

b) Describe Quadrate sampling and transect sampling. **[4]**

Q4) a) Describe bleeding time and clotting time test and give its significance. **[6]**

OR

Describe different components of phone camera.

b) Describe Shannon Index. **[4]**

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

a) Limitation of Fluorescence Microscope.

b) Rotary microtome.

c) Clinical uses of monoclonal Anti bodies.

d) Application of barcoding.

e) Species richness.

f) Light Trapping.

Total No. of Questions : 5]

SEAT No. :

PD-804

[Total No. of Pages : 2

[6467]-753
T.Y. B.Sc.
ZOOLOGY
ZO - 366 : Evolutionary Biology
(2019 Pattern) (CBCS) (Semester - VI) (Paper - VI) (36156)

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

Instructions to the candidates :

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

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

a) Define analogy.

b) Define Directional selection.

c) What is gene frequency?

d) What is speciation?

e) Define isolation.

f) What is abiogenesis?

Q2) a) Describe origin of eukaryotic cells. **[6]**

OR

Describe homologous organ as evolutionary evidence.

b) Lamarckism. **[4]**

Q3) a) Explain pre-zygotic isolation. **[6]**

OR

Explain mechanism of speciation.

b) Justify hybridization as source of variation. **[4]**

P.T.O.

Q4) a) Discuss characteristics of Neanderthal man. **[6]**

OR

Discuss Australian realm with reference to Fauna.

b) Give causes of extinction. **[4]**

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

a) Gene flow.

b) Gene Mutation.

c) Founder principle.

d) Types of Natural selection.

e) Distinguishing features of Homo erectus.

f) Connecting links.

♦ ♦ ♦

Total No. of Questions : 5]

SEAT No. : ____

PD-805

[Total No. of Pages : 2

[6467]-754

T.Y.B.Sc.

ZOOLOGY

ZO - 3610 : Environmental Impact Assessment

(2019 Pattern) (CBCS) (Paper - VII) (Semester - VI) (361510)

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 is pollutant.

b) Define EIA.

c) Define water pollution.

d) What is Natural resources?

e) What is Biodiversity?

f) Define FAA.

Q2) a) What is sustainable development? Describe pillars of sustainability. **[6]**

OR

Describe types of EIA.

b) What is Air pollution? Describe Air pollution Act, 1981. **[4]**

P.T.O.

Q3) a) What are the steps of EIA process? **[6]**

OR

Describe National Green Tribunal act - 2010.

b) Describe Importance of EIA. **[4]**

Q4) a) Describe Environment protection act 1986. **[6]**

OR

Describe role of MPCB.

b) Write a note on Rapid EIA. **[4]**

Q5) **Write short note on any Four** **[10]**

a) What is carrying capacity?

b) Explain comprehensive EIA.

c) Importance of Environment

d) What is NABET.

e) Life cycle assessment.

f) Types of pollution.

Total No. of Questions : 5]

SEAT No. : [ ]

PD806

[Total No. of Pages : 2

[6467]-755
T.Y.B.Sc. (Regular)
GEOLOGY
GL-321 : Geology of India - II
(2019 Pattern) (Semester - VI) (36161)

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

a) Name two paleozoic orogenies.

b) Give type locality of Permian system.

c) Give lithology of Lameta beds.

d) Name two palaeozoic orogenies.

e) What is the age of Siwaliks?

f) Give the subdivisions of Jurassic of Kutch.

Q2) Write notes on:

a) Tertiary of Assam. **[6]**

b) Economic importance of Gondwana Supergroup. **[4]**

Q3) Answer the following.

a) Mass extinctions. **[6]**

b) Laterite. **[4]**

P.T.O.

Q4) Write notes on:

a) Bagh beds. **[6]**

b) Classification and age of Deccan Traps. **[4]**

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

a) Geographical distribution of Karewas of Kashmir.

b) What are Barren measures?

c) Characteristics of marine transgression.

d) Age of Reptiles.

e) Fauna & Flora of Siwaliks.

f) Carboniferous of Spiti.

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Total No. of Questions : 5]

SEAT No. : ____

PD-807

[Total No. of Pages : 1

[6467]-756
T.Y. B.Sc. (Regular)
GEOLOGY
GL-322: Mining and Mineral Exploration
(2019 Pattern) (Semester - VI) (36162)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Attempt any three questions from Q2 to Q5.***
3) ***Question 2 to 5 carry equal marks.***

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

a) Define ore mineral.
b) Define pathfinder elements.
c) Define gangue.
d) What is Elemental dispersion?
e) Geobotanical guides.
f) Physiographic guides.

Q2) Explain the following.

a) Explain gravimeter method of mineral prospecting. **[6]**
b) Objectives of National Mineral Policy. **[4]**

Q3) Answer the following.

a) Electromagnetic (Loop) method of prospecting. **[6]**
b) Channel Sampling. **[4]**

Q4) Answer the following.

a) Gossans as guides for mineral Exploration. **[6]**
b) Geochemical Prospecting. **[4]**

Q5) Explain the following. (Any five) **[10]**

a) Structural guides in mineral prospecting.
b) Basic principals of ore reserve estimation.
c) What is Pitting in mining?
d) Stratigraphic and lithological guides.
e) What are magnetometers or magnetic variometers?
f) Geophysical prospecting.

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Total No. of Questions : 5]

SEAT No. :

PD808

[Total No. of Pages : 2

[6467]-757

T.Y. B.Sc. (Regular)

GEOLOGY

GL - 323 : Oceanography

(2019 Pattern) (Semester-VI) (Paper - III) (Revised Syllabus) (36163)

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

Instructions to the candidates:

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

Q1) Answer Any Five of the following questions in 2-3 lines : **[5]**

a) Define La-Nina.

b) Draw a neat labeled figure showing major dissolved components in sea water.

c) Define Agulhas current.

d) Define Backshore & foreshore.

e) Define Sea arch.

f) Enlist the causes of coastal erosion.

Q2) Answer the following :

a) Write a note on salinity & give the major constituents with concentration in sea water. **[6]**

b) Explain the various beach terminologies. **[4]**

P.T.O.

Q3) Answer the following :

a) Describe the various effects/impacts of sea level rise. **[6]**

b) Write a note on pressure & temperature of sea water. **[4]**

Q4) Answer the following :

a) Give the detailed classification of Coastal Regulation Zones (CRZ). **[6]**

b) Explain Origin of Surface Currents. **[4]**

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

a) Interdisciplinary nature of Oceanography.

b) Equitorial Counter Currents & Subpolar gyres.

c) Surface salinity variation.

d) Sea Caves.

e) Changes to sea level during Ice Ages.

f) Isostatic adjustment responsible for changes in sea-level.

Total No. of Questions : 5]

SEAT No. : ____

PD809

[Total No. of Pages : 1

[6467]-758
T.Y. B.Sc. (Regular)
GEOLOGY
GL-324: Petroleum Geology
(2019 Pattern) (Semester - VI) (Revised) (Paper-IV) (36164)

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

Instructions to the candidates:

1) ***Question no. 1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Question no 2 to 5 carry equal marks.***

Q1) Answer ANY FIVE of the following question in 2-3 line **[5]**

a) What is primary migration?
b) What is composition of petroleum?
c) Enlist different trap rocks.
d) Enlist 'Petroliferous basins of india.
e) What is 'edge water'?
f) What is 'source rock'?

Q2) Answer the following.

a) What is hydrocarbon trap? Explain any one structural trap. **[6]**
b) Explain in detail 'Oil pool' and 'Oil province' **[4]**

Q3) Answer the following.

a) Explain transformation of organic matter to petroleum. **[6]**
b) What is migration of Hydrocarbon? Explain primary migration. **[4]**

Q4) Answer the following.

a) Describe in detail 'Krishna-Godavari' Basin. **[6]**
b) What is nature gas? Explain impurities in natural gas. **[4]**

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

a) Reservoir water.
b) Recycled oil.
c) Kerogen.
d) Secondary migration
e) Hydrofracturing.
f) Salt dome as trap.

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Total No. of Questions : 5]

SEAT No. :

PD-810

[Total No. of Pages : 2

[6467]-759
T.Y. B.Sc.
GEOLOGY
GL 325 : Climate Change : Past, Present and Future
(2019 Pattern) (Semester - VI) (36165)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Question No.2 to Question No.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Neat diagrams must be drawn wherever necessary.***

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

a) What are different atmospheric hazards associated with the climate change?

b) What is a cyclone?

c) What are climate proxies?

d) What is Troposphere?

e) Define Monsoon.

f) What is a Milonkovitch cycle?

Q2) **Answer the following :**

a) Explain the composition and structure of the atmosphere. **[6]**

b) Explain the concept of EI-Nino. **[4]**

Q3) **Answer the following :**

a) Explain the seasonal characteristics of Indian Monsoon. **[6]**

b) Write a short note on climate and landscape evolution. **[4]**

P.T.O.

Q4) **Answer the following :**

a) What is a agro-climatic zone? Enlist agro-climatic divisions of extra peninsular India. **[6]**

b) What are Milankovitch cycles? And how they control earth's climate? **[4]**

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

a) Ocean circulation

b) La-Nina

c) Climate proxies

d) Droughts

e) Climate change models

f) Stratosphere.

Total No. of Questions : 5]

SEAT No. : ____

PD-811

[Total No. of Pages : 2

[6467]-760
T.Y. B.Sc.
GEOLOGY
GL - 326 : Geological Field Methods and Mapping
(2019 Pattern) (Semester - VI) (36166)

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) ***Neat diagrams must be drawn wherever necessary.***

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

a) What is a planimetric map?

b) Explain the use and application of Brunton Compass.

c) What are foliations?

d) What is attitude of the beds?

e) Enumerate different field equipments.

f) What is navigation?

Q2) **Answer the following :**

a) What is a toposheet and add a note on reading of a toposheet. **[6]**

b) Explain front & back bearing. **[4]**

Q3) **Answer the following :**

a) Write a note on field correlation. **[6]**

b) Write a note on reconnaissance study of sedimentary rocks in field. **[4]**

Q4) **Answer the following :**

a) Note on preparation of geological report. **[6]**

b) Write a note on field safety. **[4]**

P.T.O.

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

a) Traverse mapping.

b) Lattitude and Longitude.

c) Outcrop

d) Conventional signs on toposheet

e) Base map

f) Geological surveying

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Total No. of Questions : 5]

SEAT No. :

PD-812

[Total No. of Pages : 2

[6467]-761
T.Y.B.Sc.
GEOLOGY
SEC III : Applications of Remote Sensing in Geosciences
(2019 Pattern) (Semester - VI) (361610)

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

Instructions to the candidates :

1) ***Question no.1 is compulsory.***
2) ***Solve any 3 questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Neat diagram must be drown wherever necessory.***

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

a) What is black body?

b) Define Remote Sensing.

c) What is low sun angle photograph?

d) LIDAR

e) Uses of aerial photography.

f) Give two applications of Remote Sensing in Ground water.

Q2) **Answer the following:**

a) Explain photogeologic characters for igneous intrusive and extrusive rocks. **[6]**

b) Give advantages and limitations of photogeology. **[4]**

P.T.O.

Q3) **Answer the following:**

a) Explain **[6]**

i) Tilt

ii) Tip

iii) Drift

iv) Crab

b) Define aerial photography and give classification based on camera axis. **[4]**

Q4) **Answer the following:**

a) Enlist various photo recognation elements used while interpreting the aerial photograph. Explain any two of them. **[6]**

b) Explain types of remote sensing satellites with respect to orbit characteristics. **[4]**

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

a) Hyper spectral scanner.

b) What is overlap and side lap.

c) Scale of aerial photograph.

d) Inter-pretation of fractures in aerial photo.

e) Cartosat.

f) Stefan Boltzman law.

Total No. of Questions : 5]

SEAT No. : ____

PD-813

[Total No. of Pages : 2

[6467]-762

T.Y. B .Sc.

GEOLOGY

SEC IV : Oil Field Services

(2019 Pattern) (Semester - VI) (Paper - VIII)(361611)

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

Instructions to the candidates :

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

Q1) **Answer Any Five of the following question in 2-3 line :** **[5]**

a) What is Caliper log.

b) What is GTO

c) What are 'rotary tool drilling'?

d) What is LWD

e) State different types of drilling rigs.

f) What is 'exploratory well'?

Q2) **Answer the following :**

a) What are types of oil well? Explain geotechnical order. **[6]**

b) Explain method of controlled directional rotary drilling. **[4]**

Q3) **Answer the following :**

a) What are drilling fluids? Explain its uses. **[6]**

b) What is 'Core'? Explain core drilling method. **[4]**

P.T.O.

Q4) **Answer the following :**

a) What is formation evaluation? Explain temperature logs. **[6]**

b) What is mud logging? Explain techniques of mud logging. **[4]**

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

a) Oil wells

b) Formation testing

c) Cable tool drilling

d) properties of drilling mud

e) SP logs

f) Caliper logs

Total No. of Questions : 5]

SEAT No. : ____

PD814

[Total No. of Pages : 2

[6467]-763
T.Y.B.Sc. (Regular)
GEOLOGY
SEC-V : Watershed Development
(2019 Pattern) (Semester -VI) (Revised Syllabus) (361612)

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

Instructions to the candidates:

1) ***Que. 1 is Compulsory.***
2) ***Solve any three questions from Que. 2 to Que. 5.***
3) ***Question No s 2 to 5 carry equal marks.***

Q1) Anwer Any five of the following questions in 2-3 lines **[5]**

a) What is run off?

b) What are stream bunds?

c) What are Percolation tanks?

d) Write any two principles of watershed management

e) Write any two importance of conjunctive use of surface and ground water

f) What is rain water Harvesting?

Q2) Answer the following questions.

a) Describe the role of NGO's and State government in watershed development **[6]**

b) Explain the concept of watershed management **[4]**

Q3) Answer the following.

a) Applications of Remote sensing and GIS in Watershed management. **[6]**

b) Explain in detail importance of water resources in watershed **[4]**

P.T.O.

Q4) Answer the following

a) Explain water Conservation structures in detail **[6]**

b) What is watershed modelling **[4]**

Q5) Answer Any four of the following **[10]**

a) Significance of Geology in watershed

b) Environmental Impact Assessment

c) Write a short Note on subsurface dam

d) What is Integrated watershed Development plan?

e) Write a short Note on Water budget

f) Significance of Watershed Management

Total No. of Questions : 4]

SEAT No. :

PD815

[Total No. of Pages : 2

[6467]-764

T.Y.B.Sc.(Regular)

STATISTICS (Principal)

ST-361 : Distribution Theory-II

(2019 Pattern) (CBCS) (Semester-VI) (36171)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of calculator and statistical table is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following:

A) Choose the correct alternative in each of the following: **[1 each]**

a) If $X \sim W(\alpha,\beta)$, then the distribution of $\left(\frac{x}{\alpha}\right)$ is

i) $W(\alpha,\beta)$ ii) $W(\alpha,1)$

iii) $W(1,\beta)$ iv) $W(0,1)$

b) If $(X,Y) \sim BN(7.97, 5.78, 56.7, 41.8, 0.87)$, then the marginal mean of X is

i) 7.97 ii) 41.8

iii) 5.19 iv) 56.7

c) If X follows Laplace distribution with (2,4), find the third quartile.

i) 1.32 ii) 9.7

iii) 2.17 iv) 5.87

B) State whether each of the following statements is true or false: **[1 each]**

a) Laplace distribution is a symmetric distribution.

b) Mean of Lognormal distribution is always equal to its mode.

P.T.O.

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

a) Let $X \sim LN(0, \mu, \sigma^2)$, obtain the distribution function and hence find the first quartile.

b) Let $(X,Y) \sim BN(9,7,16,25,0.25)$, find the conditional variance of $(Y|X=6)$ and the conditional variance of $(X|Y=8)$.

c) If $X \sim W(\alpha,\beta)$, then show that $Y = \alpha X \sim W(\alpha^2, \beta)$.

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

a) State probability distribution function (p.d.f.) of Pareto distribution with parameter λ. Hence, derive its mean (if exists).

b) If $X \sim W(\alpha,\beta)$, obtain the distribution function of X and hence obtain third quartile.

c) Let $(X,Y) \sim BN\left(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho\right)$. State its moment generating function and hence obtain the marginal mean and variance of Y.

Q4) Attempt any one of the following:

a) i) If $X \sim LN(a, \mu, \sigma^2)$, then find the distribution of $Y = \log_e (X-a)$ **[4]**

ii) Let $(X,Y) \sim BN(\mu_1, 4, \sigma_1^2, 16, 0.75)$. If $E(Y|X=2) = 4.19$ and $V(X|Y=4) = 2.4$, then find μ_1 and σ_1^2 **[6]**

b) i) Let $X_1, X_2, ..., X_n$ be independently and identically distributed $LN(0, \mu, \sigma^2)$ random variables. Find the distribution of $Y = \prod_{i=1}^{n} X_i$. **[5]**

ii) State the p.d.f. of normal distribution truncated below 'a'. Hence, derive its mean. **[5]**

Total No. of Questions : 4]

SEAT No. : ____

PD816

[Total No. of Pages : 2

[6467]-765
T.Y. B.Sc. (Regular)
STATISTICS (Principal)
ST-362: Testing of Hypothesis
(CBCS 2019 Pattern) (Semester - VI) (Paper - II) (36172)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of calculator and statistical table is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following.

A) Choose the correct alternative in each of the following: **[1 each]**

a) Accepting the null hypothesis when it is false is called as.

i) Size of the test ii) type I error

iii) type II error iv) Power of the test

b) Based on the sample of size n from $N(0, \sigma^2)$ the best critical region for testing $H_0 : \sigma^2 = 1$ against $H_1 : \sigma^2 = 2$. Will be of the type.

i) $\sum X_i > C$ ii) $\sum X_i^2 > C$

iii) $\sum X_i < C$ iv) $\sum X_i^2 < C$

c) "Goodness of fitting" of distribution is tested using.

i) Kolmagorov smirnov test

ii) run test

iii) sign test

iv) Wilcoxon signed rank test

B) State whether each of the following statement is true or false: **[1 each]**

a) Graph of empirical distribution function is straight line.

b) Power function of the test is always decreasing function of parameter (to be tested)

P.T.O.

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

a) Define the following terms.
   i) Empirical distribution function
   ii) Power function
   iii) P - value
   iv) Composite hypothesis
   v) Level of significance

b) Construct likelihood ratio test for testing $H_0 : \theta = \frac{1}{2}$ against $H_1 : \theta \neq \frac{1}{2}$ based on the sample of size n from normal distribution with parameter θ and σ^2 (unknown).

c) Test whether the following random sample
   60, 90, 95, 75, 65, 70
   Can be regarded as drawn from U (50,100). Use 5% level of significane.

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

a) To test the hypothesis $H_0 : \theta = 1$ against $H_1 : \theta = 1.5$ a single observation is selected from the population following U (0, θ) distribution. Find the critical value 'C' if it is decided to reject null hypothesis if $X > C$. With level of significance 2%. Also find β and θ. Power of the test.

b) Construct likelihood ratio test for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta \neq \theta_0$ based on sample of size n from exponential distribution with mean θ.

c) Describe Mann-Whitney U test based on two samples.

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

a) i) Let $X_1, X_2 \ldots X_{100}$ be a random sample from P (λ) distribution. Construct uniformly most powerful test for testing $H_0 : \lambda = 2$ against $H_1 : \lambda < 2$ at 1% l.o.s. Find power of the test for $\lambda = 1.8$, $\lambda = 1.9$ using normal approximation. **[6]**

   ii) Write a note on Wilcoxon signed rank test. **[4]**

b) i) Differentiate between parametric test and nonparametric test. **[3]**

   ii) Let X be a random variable having probability mass function F_0 and F_1 under null hypothesis and alternative hypothesis respectively. Where **[7]**

$$f_0 = \frac{5_{C_x} \quad 47_{C_{5-x}}}{52_{C_5}}, \; x = 0,1,2,3,4,5$$

$$f_1 = \frac{6_{C_x} \quad 46_{C_{5-x}}}{52_{C_5}}, \; x = 0,1,2,3,4,5$$

   Find α, β, power of the test if critical region is $X \geq 4$.

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Total No. of Questions : 4]

SEAT No. :

PD817

[Total No. of Pages : 3

[6467]-766
T.Y. B.Sc. (Regular)
STATISTICS (Principal)
ST - 363 : Sampling Theory
(2019 Pattern) (CBCS) (Semester-VI) (Paper - III) (36173)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of calculator and statistical table is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following :

A) Choose the correct alternative in each of the following : **[1 each]**

a) In case of simple random sampling without replacement (SRSWOR), the probability that particular random sample of size 3 drawn from population of size 15 is

i) $\frac{1}{15}$ ii) $\frac{1}{5}$

iii) $\frac{1}{\binom{15}{3}}$ iv) $\frac{1}{3}$

b) The ratio estimator of the population mean $\bar{Y}_N$ is

i) $\frac{\bar{y}}{\bar{x}}\bar{X}_N$ ii) $\frac{\bar{y}}{\bar{x}}\bar{y}_n$

iii) $\frac{\bar{x}}{\bar{y}}\bar{X}_N$ iv) $\frac{\bar{y}}{\bar{x}}\bar{X}_n$

P.T.O.

c) Increasing the sample size has the following effect on the sampling error

i) It increases the sampling error

ii) It reduces the sampling error

iii) No effect on the sampling error

iv) All of the above

B) State whether each of the following statement is true or false : **[1 each]**

a) In stratified sampling method sample mean is an unbiased estimator of population mean.

b) Systematic sampling is always better than Simple Random Sampling (SRS).

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

a) Derive an expression for standard error of an unbiased estimator of population mean in case of SRSWOR.

b) For a population with linear trend $Y_i = a + bi$ for $i = 1, 2, 3, ..., N$. Obtain the expression for variance of the estimator of the population mean when systematic sampling is used.

c) Derive the expression for variance of an unbiased estimator of population mean in stratified random sampling with proportional allocation.

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

a) Prove that in case of simple random sampling with replacement (SRSWR), sample mean square is an unbiased estimator of population variance.

b) Explain the regression method of estimation of population mean. Show that the regression estimator of population mean is an unbiased estimator. State its standard error.

c) A population of size 1,000 is divided into strata with sizes and standard deviations as follows :

Stratum No.	Stratum Size (N_i)	Standard Deviation (S_i)
1	300	6
2	200	4
3	500	9

Determine the sample sizes under proportional allocation and Neyman's allocation if the total sample size is 150.

Q4) Attempt <u>any one</u> of the following :

a) i) In case of stratified random sampling, cost function is $C = C_0 + \sum C_i n_i$. Determine the values of n_i's so that variance of an unbiased estimator of population mean is minimum for fixed cost C. **[6]**

ii) Derive the expression for standard error of estimator of population proportion under SRSWOR. **[4]**

b) i) In a population of 10,000 units the population mean is 1,200 and the population variance is 1,000. What should be the size of the sample to be drawn by SRSWOR so that in 95% of the cases, sample mean may differ from population mean by not more than 2%? **[5]**

ii) Write a note on Cronbach's coefficient. **[5]**

Total No. of Questions : 4]

SEAT No. :

PD818

[Total No. of Pages : 3

[6467]-767

T.Y. B.Sc. (Regular)

STATISTICS (Principal)

ST - 364 : Introduction to Survival Analysis

(2019 Pattern) (CBCS) (Semester-VI) (Paper - IV) (36174)

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

Instructions to the candidates:

1) ***All the questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of statistical tables and scientific calculator is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following :

A) Choose the correct alternative in each of the following : **[1 each]**

a) If T has Weibull distribution with scale parameter 2 and shape parameter 2.5, then Weibull distribution is member of

i) No-ageing class

ii) Positive ageing class

iii) Negative ageing class

iv) Both positive and negative ageing class

b) Censoring is the technique to reduce

i) Time of the experimentation

ii) Efficiency of the experiment

iii) Cost of the experiment

iv) Both (i) and (ii)

P.T.O.

c) If $X_1, X_2, ..., X_n$ are independent random variables having hazard rate $\lambda_1, \lambda_2, ..., \lambda_n$ respectively then $Z = \min\{X_1, X_2, ..., X_n\}$ has hazard rate

i) $\sum_{i=1}^{n} \lambda_i$ ii) $\prod_{i=1}^{n} \lambda_i$

iii) $\min\{\lambda_1, \lambda_2, ..., \lambda_n\}$ iv) $\max\{\lambda_1, \lambda_2, ..., \lambda_n\}$

B) State whether <u>each</u> of the following statement is true or false : **[1 each]**

a) Empirical survival function is consistent estimator of survival function.

b) For IFR class of life distribution hazard rate is decreasing function.

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

a) State and prove Cauchy functional equation.

b) Prove the implications $\text{IFR} \Rightarrow \text{IFRA}$ and $\text{IFR} \Rightarrow \text{DMRL}$.

c) Describe Type I and Type II censoring with an illustration.

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

a) Explain the concept of no-ageing. Define mean residual life function and show that no-ageing is characterize by constant mean residual life function.

b) If $T_1, T_2, ..., T_n$ are independent and identically distributed exponential random variable with parameter λ then prove that $2\lambda \sum_{i=1}^{n} T_i$ has chi-square distribution with $2n$ degrees of freedom.

c) Prove that hazard rate is constant if and only if underlying distribution is exponential distribution.

Q4) Attempt <u>any one</u> of the following :

a) i) Let $T_1, T_2, ..., T_n$ is random sample of size n from the exponential distribution with parameter λ and in order to reduce the time of the experiment experimenter decided to terminate the experiment as soon predetermined time t_0 occurs. Find the maximum likelihood estimator of parameter of exponential distribution. Also, find the fisher information for the parameter. **[5]**

ii) Obtain confidence band for the survival function. **[5]**

b) i) Following table shows the annual failure and removals (censored) of fleet of 200 single engine aircraft. **[6]**

Year	No. of failures	No. of removals
1981	5	0
1982	10	1
1983	12	5
1984	8	2
1985	10	0
1986	15	6

Obtain actuarial Estimator of survival function.

ii) Derive the hazard rate function for linear hazard rate family and Mahekam family. **[4]**

Total No. of Questions : 4]

SEAT No. :

PD-819

[Total No. of Pages : 3

[6467]-768
T.Y. B.Sc.
STATISTICS : (Principal)
ST-365 (A) : Actuarial Statistics
(2019 Pattern) (Semester - VI) (Paper V) (CBCS) (36175)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of calculator and Statistical table is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following: **[1 Each]**

a) Choose the correct alternative in each of the following.

i) The present value of annuity certain immediate at the rate of 1 unit per annum for n years is given by

A) $\frac{1-v^n}{d}$

B) $\frac{1-v^n}{i}$

C) $\frac{1+v^n}{d}$

D) $\frac{1-v^n}{\delta}$

ii) The insurance company is known as

A) Insurer
B) Insured
C) Policyholder
D) Beneficiary

iii) What will be the value of v if $i = 0.06$

A) 0.0566
B) 0.9434
C) 1.06
D) 0.0638

b) State whether each of the following statements is true or false:**[1 Each]**

i) An annuity which provides periodic benefit payments until the end of a specified number of years or until the death of the annuitant, whichever occurs first is deferred annuity.

ii) For life insurance, the expectation of the present value random variable Z is called net single premium.

Q2) Attempt any two of the following : **[5 Each]**

a) If effective rate of interest is 5% per annum, then obtain Accumulated value of 5,000 at the end of 10^{th} year,

b) State properties of survival function S(x). Derive the expression for S(x) in terms of force of mortallity $\mu(x)$.

c) Explain the concept of utility functions $U(w)$. If G is one time premium and X is loss random variable with $E(X) = \mu$, then prove that $G \geq \mu$.

Q3) Attempt any two of the following: **[5 Each]**

a) On the basis of information $A^{1}_{60:\overline{1}|} = 0.9506$ $A_{60} = 0.58896$, $A_{61} = 0.60122$, calculate q_{60}

b) Define curtate future lifetime random variable $K(x)$ and find its probability mass function.

c) Derive the expression of actuarial present value of one unit benefit in a whole life annuity immediate.

Q4) Attempt any one of the following :

a) i) On 5^{th} June 2000, (60) bought a Rs. 1,00,000 whole life insurance policy with death benefit payable at the end of year of death. The policy is purchased by means of annual premiums, payable at the start of each year policy remains in force.The policy holder died on 10^{th} August 2007 and the loss to the insurer was 45,000. If i = 0.06, what was the annual premium paid? **[5]**

ii) Derive an expression for the net single premium for whole life insurance. Also state the recursion relation. **[5]**

b) i) For a certain insect population, the probability q_x obtained for 7 weeks are given below: **[6]**

x	0	1	2	3	4	5	6
q_x	0.1	0.2	0.3	0.4	0.6	0.8	1.0

Taking cohort of 1,000, construct the life table with value for l_x, d_x, L_x.

ii) Explain each of the following terms: **[4]**

A) $A^{1}_{x:\overline{n}|}$

B) A_x

C) $A_{x:\overline{n}|}^{1}$

D) $\ddot{A}_{x:\overline{n}|}$

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Total No. of Questions : 4]

SEAT No. : ____

PD-820

[Total No. of Pages : 3

[6467]-769
T.Y. B.Sc. (Regular)
STATISTICS : (Principal)
ST-365 (B) : Operations Research - II
(2019 Pattern) (Semester - VI) (CBCS) (Paper - V) (36176)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of calculator and Statistical table is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) **Attempt <u>each</u> of the following:**

a) **Choose the correct alternative in each of the following. [1 Each]**

i) The sudden failure among items is seen as _____.

A) Progressive B) retrogressive

C) gradual D) random

ii) The parts that are used in production process but do not become part of the product are called as _____.

A) raw parts B) essential parts

C) spare parts D) slow parts

iii) If the lower and upper values of the game are equal and both equal to zero then game is _____.

A) pure game B) mixed game

C) fair game D) unfair game

b) **State whether <u>each</u> of the following statements is true or false.[1 Each]**

i) The time taken by the job in moving from one machine to another machine is significant.

ii) The payoff values are always conditional values because of unknown states of nature.

P.T.O.

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

a) What is decision making? Write the process of the decision making.

b) Derive an expression for economic lot size with uniform rate of demand, finite replenishment with no shortages.

c) A driving school owner finds from his past experience that the running cost and resale value per year of an auto whose purchase price is Rs. 60,000 is as given below:

Year	1	2	3	4	5	6	7	8
Running cost(Rs.)	10,000	12,000	14,000	18,000	23,000	28,000	34,000	40,000
Resale Value (Rs.)	30,000	15,000	7,500	3,750	2,000	2,000	2,000	2,000

Determine at what age is its replacement value?

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

a) Define sequencing problem and write any five assumptions of it.

b) Explain the concept of dominance used in solving the problem of game theory.

c) In a car manufacturing company, the product acceptance probabilities are not known but the following data is known:

Product Acceptance	Product line		
	Full	Partial	Minimal
Good	8	70	50
Fair	50	45	40
Poor	–25	–10	0

Determine the optimal decision under A) Minimax regret,B) Maximax criterion

Q4) **Attempt <u>any one</u> of the following :** **[6]**

a) i) Solve the following payoff matrix by matrix method.

Competitor A	**Competitor B**		
	No Advertising	**Medium Advertising**	**Heavy Adevertising**
No Advertising	10	5	–2
Medium Advertising	13	12	13
Heavy Adevertising	16	14	10

ii) Define the following terms **[4]**

A) Idle time on a machine.

B) Progressive failure.

C) Carrying cost.

D) State of nature.

b) i) A company that operates for 50 weeks in a year is concern about its stock of aluminum cable which costs Rs. 240 a meter and there is a demand for 8,000 meters a week. Each replacement costs Rs. 1,050 for administration and Rs. 1,650 for delivery, holding costs are estimated at 25% of value held a year. Assuming no shortages are allowed, what is the optimal inventory policy for the company? **[6]**

ii) Explian the procedure of coefficient of optimism criterion. **[4]**

Total No. of Questions : 4]

SEAT No. : ____

PD-821

[Total No. of Pages : 3

[6467]-770
T.Y. B.Sc.
STATISTICS (Principal)
ST-366 (A) : Stochastic Processes
(36177) (2019 Pattern) (Semester - VI) (Paper - VI) (CBCS)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of calculator and Statistical table is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt **each** of the following:

a) Choose the correct alternative in each of the following. **[1 each]**

i) Let X_t be the number of incoming calls at a switchboard in an interval (0,t). Then the state space of a stochastic process $\{X_t, t \in T\}$ is

A) {0,1,2.....,t} B) [0,t]

C) {0,1,2.....,} D) (0,t)

ii) A Markov chain is aperiodic if its every state is

A) periodic B) aperiodic

C) absorbing D) persistent

iii) A persistent state j is null persistent of mean recurrence time (μ_{jj}) is

A) 0 B) 0.5

C) 0 or 1 D) ∞

b) State whether **each** of the following statements is true or false: **[1 each]**

i) The sum of elements in each row of one step transition probability matrix is always 1.

ii) Finite irreducible, aperiodic Markov chain has stationary probability distribution.

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

a) State and prove additive property of Poisson process.

b) Let $\{X_n, n \geq 0\}$ be a Markov chain having state space S = {0,1,2,3} and one step transition probability matrix P as

$$P = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 \\ \frac{1}{3} & 0 & \frac{2}{3} & 0 \end{bmatrix}$$

i) Obtain diagraph for given transition probability matrix P.

ii) Check whether state '0' is periodic or aperiodic.

c) Let $\{X_n, n \geq 0\}$ be a Markov chain with three states 1,2,3 and one step transition probability matrix P as

$$P = \begin{bmatrix} 0.75 & 0.15 & 0.10 \\ 0.25 & 0.45 & 0.30 \\ 0.15 & 0.45 & 0.40 \end{bmatrix}$$

With initial probability distribution, (0.7,0.2,0.1).

Compute :

i) $P(X_2 = 2, X_1 = 1 \mid X_0 = 2)$

ii) $P(X_3 = 1, X_2 = 2, X_1 = 3, X_0 = 1)$

iii) $P(X_2 = 2 \mid X_1 = 3)$

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

a) State and prove Chapman-Kolmogorov equation for Markov chain.

b) Suppose that the probability of a dry day (state 0) following a rainy day (state 1) is $\frac{1}{3}$ and that the probability of a rainy day following a dry day is $\frac{1}{2}$. Let X_n be the n^{th} day is dry or rainy. Obtain one step transition probability matrix of the Markov chain $\{X_n\}$. Also find the probability that May 3 is a dry given that May 1 is a dry day.

c) Define the following terms :

i) Markov chain.

ii) Reducible and irreducible Markov chain.

iii) Stationary Probability Distribution of Markov chain.

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

a) i) Given that a person last cola purchase was COKE, there is 90% chance that his next cola purchase will be also be COKE. If a person last cola purchase was PEPSI, there is 80% chance that his next cola purchase will also be PEPSI. The present market share of the COKE and PEPSI is 55% and 45% respectively. Construct transition probability matrix. In the long run, what is the market share of such cola. **[6]**

ii) Explain Poisson process with suitable illustration. Also state the three postulates of Poisson process. **[4]**

b) i) Explain different types of stochastic processes with illustrations. **[5]**

ii) Let $\{Xn, n \geq 0\}$ be a Markov chain having state space $S=\{0,1,2\}$ and one step transition probability matrix P as

$$P=\begin{bmatrix} \frac{1}{2} & \frac{1}{2} & 0 \\ \frac{3}{4} & 0 & \frac{1}{4} \\ 0 & 1 & 0 \end{bmatrix}$$

Show that state '0' is aperiodic and persistent. **[5]**

Total No. of Questions : 4]

SEAT No. : ____

PD-822

[Total No. of Pages : 3

[6467]-771

T.Y. B.Sc.

STATISTICS (Principal)

ST-366 (B) : Reliability Theory and Applications

(2019 Pattern) (Semester - VI) (Paper - VI) (36178)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of Statistical table and scientific calculator is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) **Attempt <u>each</u> of the following:**

a) **Choose the correct alternative in each of the following. [1 Each]**

i) The number of irrelevant component in series system is

A) n B) 0

C) 1 D) n−1

ii) For Gamma family of lifetime distributions with y > 1

A) $r(t) \uparrow t$ B) $r(t)$ is constant

C) $r(t) \downarrow t$ D) $r(t) = t$

iii) Which of the following statement is incorrect for exponential distribution?

A) Lack of memory property hold.

B) Constant failure rate function.

C) Mean residual life depends on t.

D) $\bar{F}(x+t) = \bar{F}(t) \cdot \bar{F}(x); t, x > 0$ where $\bar{F}(\cdot)$ is a survival function.

b) **State whether <u>each</u> of the following statements is true or false:[1 Each]**

i) One parameter Pareto family belongs to increasing Failure Rate (IFR) class of life distributions.

ii) The reliability of parallel system increases as the number of components in the system inereases.

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

a) Find the reliability of 2-out-of-3 system using path vector and cut vector methods of reliability, given that components are independent and identically distributed Bernoulli random variables each with reliability p.

b) Show that dual of k-out-of-n system is n-k+ I-out-of-n system. Hence show that dual of a series system is a parallel system.

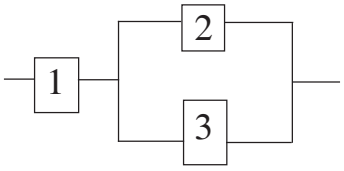
c) Define Increasing Failure Rate Average (IFRA) class of the life distributions. Show that F belongs to IFR class then F belongs to IFRA class.

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

a) i) Suppose in a system the components each having reliability at t = 50 is 0.9 with independent life distributions are connected in parallel. Find the minimum number of components to be connected in parallel so that the reliability of system will be more than 0.9999 at time 50 units.

ii) Show that, $E(T) = \int_0^\infty R(t)dt$, where, T is a lifetime and $R(t)$ is a reliability function of a component.

b) Consider the system with following reliability block diagram (RBD).



Find

i) structure function

ii) minimal path sets and minimal cut sets.

c) Let $h(\underline{p})$ be the reliability function of a coherent structure then show that $h(\underline{p})$ is strictly increasing function in each p_i for $0 < p_i < 1$, $i = 1{:}n$.

Q4) **Attempt <u>any one</u> of the following :**

a) i) Discuss general models for reliability data, repairable and non-repairable systems with illustration. **[4]**

ii) Consider the failure rate function : **[6]**

$$r(t)=\begin{cases}\frac{1}{2} & 0<t<4\\ 2 & 4\le t<6\\ (t-6)+2 & t\ge 6\end{cases}$$

A) Sketch the graph of $r(t)$ against t.

B) Find cumulative hazard function.

C) Find survival function $\bar{F}(t)$.

b) i) Define the terms : **[5]**

A) Coherent system

B) Structure function of the system

C) Relevant component

D) Pivotal decomposition

E) Reliability of a system.

ii) Let T_1, T_2,....., T_n is random sample of size n from exponential distribution with parameter λ. Find the MLE of λ for complete data. Also, construct the confidence interval for λ. **[5]**

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Total No. of Questions : 4]

SEAT No. : ____

PD-823

[Total No. of Pages : 2

[6467]-772

T.Y. B.Sc.

STATISTICS (Principal)

ST-366 (C) : Medical Statistics and Clinical Trials

(2019 Pattern) (CBCS) (Semester - VI) (Paper - VI) (36179)

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

Instructions to the candidates:

1) ***All questions are compulsory***
2) ***Figures to the right indicate full marks.***
3) ***Use of calculator and Statistical table is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) **Attempt <u>each</u> of the following:**

a) **Choose the correct alternative for each of the following. [1 Each]**

i) Which among the following is a common medication for Asthma

A) Penicillin B) DDT

C) Bronchodilator D) Hydroxi chloroquine

ii) In epidemiology, logit function of probability π is given by

A) $ln\left[\frac{1-\pi}{\pi}\right]$ B) $ln\left[\frac{\pi}{1-\pi}\right]$

C) $ln[(1-\pi)\pi]$ D) $ln\left[\frac{\pi}{1+\pi}\right]$

iii) The relative risk of an event is always

A) Positive

B) Zero

C) Negative

D) A number between zero and one.

P.T.O.

b) **In each of the following, state whether the given statement is true or false:** **[1 Each]**

i) Prevalence is a measure that is more relevant to a disease that is of the short duration.

ii) Precision is inversely proportional to random error.

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

a) Write a note on Bioequivalence.

b) Discuss the importance of epidemiology giving suitable illustrations.

c) Explain in brief Phase II study in clinical trials.

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

a) Explain McNemar's test for testing the hypothesis of symmetry of 2×2 contingency table with an illustration.

b) Discuss in brief about various drug regularity bodies in clinical trial.

c) Write a short note on Parallel group design.

Q4) **Attempt <u>any one</u> of the following :**

a) i) Define following terms **[5]**

I) Incidence

II) Prevalence

III) Epidemiology

IV) Precision

V) Bias

ii) Write a note on linear growth model. **[5]**

b) i) Discuss in brief about the drug discovery of disease Rabies. **[5]**

ii) A patient of high blood pressure is given intravenous injection of 160mg of beta-blocker. Blood samples are taken for 8 hours and concentration values are recorded. Results are given below. Estimate C_{max}, T_{max}. Also calculate $AUC_{(0,480)}$. **[5]**

Time(min)	30	60	120	150	240	360	480
Concentration(meg/ml)	700	620	400	300	150	50	25

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Total No. of Questions : 5]

SEAT No. :

PD824

[Total No. of Pages : 2

[6467]-773

T.Y.B.Sc. (Regular)

GEOGRAPHY

GG-361 : Regional Geography of India-II

(2019 Pattern) (Semester - VI) (36181)

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

Instructions to the candidates:

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

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

a) What is Hematite?

b) What is Hydroelectricity?

c) Name any two coal producing state in India.

d) Write a names of major IT clusters in India.

e) What is population Density?

f) Define Nucleated settlement.

Q2) a) Describe the distribution and production of iron ore in India. **[6]**

OR

Write in brief on Automobile industry in India.

b) Explain the role of Roadways in India's Development. **[4]**

Q3) a) Explain the importance of agriculture in Indian economy. **[6]**

OR

Describe the types of settlement.

b) Explain the sugarcane distribution in India. **[4]**

P.T.O.

Q4) a) Describe the population distribution in India. **[6]**

OR

Describe the modes of transportation in India.

b) Explain the role of Hydroelectricity in India. **[4]**

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

a) Commercial farming

b) Satellite communication

c) Automobile Hubs in India

d) Major types of mineral

e) Population growth in India

f) Compact settlement

Total No. of Questions : 5]

SEAT No. :

PD825

Total No. of Pages : 2

[6467]-774
T.Y. B.Sc.(Regular)
GEOGRAPHY
G G-362: Geography of Economic Activities-II
(CBCS) (2019 Pattern) (Semester - VI) (36182)

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.***

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

a) Name any two Fertilizer producing countries in the world.
b) Write two advantages of Industrial fishing
c) What is siderite?
d) Name any two mineral oil producing countries in the world.
e) Write any two names Auto cluster in india.
f) List any two name of agro based industries in india.

Q2) a) Describe E-commerce platform. **[6]**

OR

Explain Global distribution of Iron ore.

b) Explain the characteristic of commercial grain farming. **[4]**

Q3) a) Describe the characteristic of dairy industry. **[6]**

OR

Explain the advantages of plantation agriculture.

b) Discuss about IT industry in india. **[4]**

Q4) a) Describe role of web based platform in tourism sectore. **[6]**

OR

Explain global distribution of mineral oil.

b) Discuss about silicon valley of USA. **[4]**

P.T.O.

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

a) uses of web based platform.
b) Dairy industry.
c) Technology based economic activities.
d) Electronic goods.
e) Industrial hub
f) Service industry.

Total No. of Questions : 5]

SEAT No. :

PD826

[Total No. of Pages : 2

[6467]-775

T.Y. B.Sc. (Regular)

GEOGRAPHY

GG - 363 : Tourism Activities and Management

(2019 Pattern) (Semester-VI) (36183)

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

Instructions to the candidates:

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

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

a) What is tourism?

b) In which state 'Ajanta Cave' is located?

c) In which state 'Shimla' is located?

d) Write the types of hotel?

e) Give any two aim & object of M.T.D.C.

f) What is full form of I.T.D.C.?

Q2) a) Describe the potential for local tourism development in India. **[6]**

OR

Describe the importance of mode of transportation in India.

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

P.T.O.

Q3) a) Explain the importance of tourism planning and management. **[6]**

OR

Explain the role of I.T.D.C. in tourism development in India.

b) Explain 'Tourism as an economic activities'. **[4]**

Q4) a) "Shimla is the Prime destination in tourism in India". Discuss. **[6]**

OR

Discuss the process of educational tour planning.

b) Describe the importance of tourism mapping. **[4]**

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

a) Tour plan.

b) Goa is Prime destination in tourism in India.

c) Online booking process in tourism.

d) Promotion of tourism.

e) Employment generation by tourism.

f) Role of tourist guide in tourism.

Total No. of Questions : 5]

SEAT No. :

PD827

Total No. of Pages : 2

[6467]-776
T.Y. B.Sc.(Regular)
GEOGRAPHY
G G-364: Geography of Soil-II
(2019 Pattern) (Semester - VI) 36184

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 any two features of red soil.
b) Write the general types of humuns formation.
c) Define resource management.
d) Write any two measures of soil conservation.
e) What is soil decomposition?
f) What do you understand by contour farming.

Q2) a) Explain in detail about causes of soil degradation. **[6]**

OR

Discuss the measures of soil degradation.

b) Write the carbon cycle in soil. **[4]**

Q3) a) Describe the soil types in india. **[6]**

OR

Explain the various sources of organic matter in soil.

b) Write the features of Alluvial soil. **[4]**

Q4) a) Discuss the soil resource management in india. **[6]**

OR

Explain the methods of soil conservation.

b) Write the effects of soil degradation. **[4]**

P.T.O.

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

a) Organic colloids.
b) Soil erosion.
c) Alfisols.
d) C:N Ratio in soil.
e) Soil conservation.
f) Decomposition of organic matter.

Total No. of Questions : 5]

SEAT No. :

PD-828

[Total No. of Pages : 2

[6467]-777
T.Y. B.Sc.
GEOGRAPHY
GG - 365 : Management of Man-Made Disasters
(2019 Pattern) (CBCS) (Semester - VI) (36185)

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

Instructions to the candidates:

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

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

a) Define the term man-made disaster.

b) What is pollution?

c) What do you understand by the term desertification?

d) Define chemical hazards.

e) What is Eutrophication?

f) Write any two causes of soil erosion.

Q2) a) Explain the factors contribution to Man-made disaster. **[6]**

OR

Describe the classification of man-made disaster.

b) Write in brief about man induced landslide. **[4]**

Q3) a) Describe a case study of Australian forest fires. **[6]**

OR

Describe in brief causes, effects and management of forest fire.

b) Write in brief about arsenic contamination of ground water. **[4]**

P.T.O.

Q4) a) Explain causes and effects of industrial chemical accidents. **[6]**

OR

Describe a case study of Chernobyl nuclear disaster.

b) Write in brief about biological hazards. **[4]**

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

a) Locust Swarms

b) Covid - 19

c) Oil Spills

d) Chemical hazards

e) Man-made disasters

f) Nuclear hazards

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Total No. of Questions : 5]

SEAT No. : ____

PD-829

[Total No. of Pages : 2

[6467]-778

T.Y. B.Sc.

GEOGRAPHY

Gg-366 : Geoinformatics - II

(2019 Pattern) (CBCS) (Semester - VI) (36186)

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

Instructions to the candidates:

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

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

a) Define the term frequency.

b) What is atmospheric interaction?

c) Define the term platform.

d) What do you understand by the term transmission?

e) What is electromagnetic radiation?

f) Give the name of any two sensors used in satellite?

Q2) a) Explain the properties of electromagnetic waves in detail. **[6]**

OR

Describe in detail the history of remote sensing development.

b) Write in brief about vertical aerial photographs. **[4]**

Q3) a) Describe in brief about geostationary satellite. **[6]**

OR

Discuss in detail about the types of aerial cameras.

b) Explain optical mechanical scanner in brief. **[4]**

P.T.O.

Q4) a) Describe in detail the element of interpretation of aerial photographs. **[6]**

OR

Write in detail about the central perspective projection of aerial photograph.

b) Write in brief about normal color photos. **[4]**

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

a) ERTS

b) INSAT

c) Swing and fitts

d) Photo Nadir

e) Satellite imaging

f) Sensors

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Total No. of Questions : 5]

SEAT No. :

PD-830

[Total No. of Pages : 2

[6467]-779
T.Y. B.Sc.
GEOGRAPHY
GG - 3610 : Research Methodology - II
(2019 Pattern) (CBCS) (Semester - VI) (361810)

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 data?

b) What is primary data?

c) Define questionnaire.

d) What is research report?

e) Write any two types of research report.

f) Write various parts of research report.

Q2) a) Explain various sources of secondary data. **[6]**

OR

Explain the questionnaire method in detailed.

b) Write in brief characteristics of a good questionnaire. **[4]**

Q3) a) Describe about dissertation and thesis. **[6]**

OR

Describe research paper and review article.

b) Write in brief characteristics of good research report writing. **[4]**

P.T.O.

Q4) a) Explain the structure and organization of research reports. **[6]**

OR

Describe the precautions should take while writing a research report.

b) Write in short on concept of case study. **[4]**

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

a) Definition and meaning of secondary data

b) Research methodology

c) Keywords

d) Research journals

e) The Footnotes

f) Bibliography

Total No. of Questions : 5]

SEAT No. : ____

PD-831

[Total No. of Pages : 2

[6467]-780

T.Y. B .Sc.

GEOGRAPHY

GG - 3611 : Total Station Surveying (SEC)

(2019 Pattern) (CBCS) (Semester - VI)(361811)

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 prism mode in total station surveying.

b) Write the types of distance measurement by total station.

c) Define total station.

d) Mention the name of Angle measurements in total station.

e) What is height of instrument.

f) Write the formula of distance measurement in total station.

Q2) a) Explain the crossprofile measurement process using by total station. **[6]**

OR

Describe the procedure of preparation of college campus map by using total station.

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

P.T.O.

Q3) a) Explain the repetition angle measurement of total station. **[6]**

OR

Discuss the functions of total station.

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

Q4) a) Explain the things which taken into grant before distance measurement by total station. **[6]**

OR

Discuss the applications of total station.

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

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

a) Setting height of torget in total station.

b) Prism mode in total station.

c) Procedure of agriculture farm map using by total station.

d) Relationship of angle and distance in total station.

e) Measurement of vertical angle in total station.

f) Atmospheric corrections in total station.

Total No. of Questions : 5]

SEAT No. : ____

PD-832

[Total No. of Pages : 2

[6467]-781

T.Y.B.Sc.

MICROBIOLOGY

MB-361 : Medical Microbiology - II

(2019 Pattern) (CBCS) (Semester - VI) (36191)

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) Which of the following is the cell membrane acting antibiotic?

A) Chloroquine

B) Acyclovir

C) Amphoterecin - B

D) Polymyxin

b) Name the pathogen responsible for wart?

c) Name any two routes of drug administration.

d) State true or False: Plasmodium is causative agent of malaria.

e) Name any two antifungal agents.

f) Define hepatitis.

P.T.O.

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

i) Active efflux of drug

ii) State mode of action of any one enzyme inhibitor

iii) Symptoms of Influenza

b) Mode of action of β lactum **[4]**

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

i) Routes of drug administration

ii) FMD virus

iii) Role of remdesivir

b) Pathogenesis of rotavirus. **[4]**

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

i) Enlist antiprotozoal agents & describe any one.

ii) Lab diagnosis of Hepatitis.

iii) Cell membrane acting antibiotic.

b) Describe with diagram life cycle of Entamoeba. **[4]**

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

a) Limiting uptake of drug.

b) Prevention of Japanese Enciphalitis virus.

c) Mode of action of any one anti fungal agent.

d) Pathogenesis of Rinderpest virus.

e) Role of streptomycin.

f) Describe any one method of virus cultivation.

Total No. of Questions : 5]

SEAT No. : ____

PD-833

[Total No. of Pages : 2

[6467]-782
T.Y. B.Sc.
MICROBIOLOGY
MB-362: Immunology - II
(2019 Pattern) (CBCS) (Semester - VI) (36192)

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

Instructions to the candidates:

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

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

a) Define cytokines.

b) State True or False:

Superantigen activates very large number of T - cells.

c) Write the long form of ADCC.

d) Enlist types of autoimmune diseases with one example of each.

e) Define immunodeficiency.

f) Name the antibody mediating Type I hypersensitivity reaction.

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

i) Describe diagnosis and treatment of Myesthenia gravis.

ii) Describe role of cell adhesion molecule in T - cell activation.

iii) Describe immune response against tumor and transplanted tissue.

b) Describe in detail primary and secondary immune response. **[4]**

Q3) a) Explain (Any Two) of the following : **[6]**

i) Properties of cytokines.

ii) Mechanism of type III hypersensitivity reaction.

iii) Significance of CMI.

b) In tubular form compare Immediate and Delayed hypersensitivity.**[4]**

P.T.O.

Q4) a) Describe (Any Two) of the following : **[6]**

i) Factors contributing to autoimmune diseases.

ii) Mechanism of type II hypersensitive reaction.

iii) Role of secondary lymphoid organs to antigen.

b) Explain the mechanism of CTL mediated cytotoxicity. **[4]**

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

a) Symptoms of CVID.

b) Role of cytokines in B cell activation & differentiation.

c) Immunological tolerance.

d) Biological functions of cytokines.

e) Significance of immune response in vaccination program.

f) Complement immunodeficiency.

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Total No. of Questions : 5]

SEAT No. : ____

PD-834

[Total No. of Pages : 2

[6467]-783
T.Y. B.Sc.
MICROBIOLOGY
MB-363: Metabolism
(2019 Pattern) (CBCS) (Semester - VI) (36193)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q5.***
3) ***Question 2 to 5 carry equal marks.***

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

a) Define Ionophores.

b) Name the starting molecule in fatty acid synthesis.

c) Proteins are degraded by _____

i) Urea cycle

ii) TCA cycle

iii) beta oxidation

iv) alpha oxidation

d) State second law of thermodynamics.

e) Give one example of Cyanobacteria.

f) State any two uncouplers of oxidative phosphorylation.

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

i) Describe Diffusion

ii) Explain concept of entropy

iii) Enlist the steps in peptidoglycan synthesis

b) Diagrammatically represent cyclic photophosphorylation in purple bacteria. **[4]**

P.T.O.

Q3) a) Explain the following (Any Two): **[6]**

i) Free energy

ii) Facilitated diffusion

iii) Steps in starch synthesis

b) Describe the concept of high energy compounds. Give one example of acyl phosphates as high energy compound. **[4]**

Q4) a) Describe the following (Any Two) : **[6]**

i) Function of ATP synthatase.

ii) Active transport.

iii) Reduction reaction in Calvin cycle.

b) Describe with structures, beta oxidation of fatty acids. **[4]**

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

a) Energetics of mitochendrial ETC

b) Steps in triglyceride synthesis

c) First law of thermodynamics

d) Urea cycle

e) Arrangement of components of ETC

f) Purple bacteria.

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Total No. of Questions : 5]

SEAT No. : ____

PD-835

[Total No. of Pages : 2

[6467] - 784
T.Y. B.Sc.
MICROBIOLOGY
MB-364: Molecular Biology
(2019 Pattern) (Semester - VI) (CBCS) (36194)

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) State Mendel's law of independant assortment

b) Define complementation

c) State the role of MUT S in mismatch repair.

d) Write the function of DNA ligase in rDNA technology.

e) Which type of paper is used for blot transfer in southern blot?

f) Define cosmid.

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

i) Define rDNA tech, and Explain various steps involve in it.

ii) Explain DNA damage by base analogue.

iii) Distinguish between southern and western blot techniques.

b) Diagrammatically explain blue white selection method of screening of rDNA. **[4]**

P.T.O.

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

i) State the significance of Meiosis

ii) What are different stages of lytic cycle.

iii) Elaborate on nomenclature of restriction enzyme.

b) Write a note on excision DNA repair mechanism. **[4]**

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

i) With the help of flowchart explain southern blot technique.

ii) Explain the role of deletion mutants in mapping of phage DNA.

iii) State the applications of parasexual cycle.

b) Diagrammatically explain the different stages of mitosis. **[4]**

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

a) Complementation

b) Difference between T(even) and T(odd) phages of T series.

c) Plasmids as cloning vector.

d) Mismatch Repair Mechanism (MMR)

e) Isolation of genomic DNA.

f) Dihybrid cross.

Total No. of Questions : 5]

SEAT No. : ____

PD-836

[Total No. of Pages : 2

[6467]-785
T.Y. B.Sc.
MICROBIOLOGY
MB-365 : Fermentation Technology - II
(2019 Pattern) (CBCS) (Semester - VI) (36195)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q2 to Q5.***
3) ***Questions 2 to 5 carry equal marks.***

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

a) What is solid state fermentation?

b) The Industrial strain used for large scale production of Vitamin B_{12} is _____.

c) State whether True or False.

Koji fermentation process is related to the large scale production of citric acid.

d) The production of glutamic acid is controlled by critial levels of _____.

e) State any 2 examples of biosurfactant producers.

f) Name the cell lines used for virus cultivation.

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

i) How sheet far streptomycin fermentation.

ii) Citric acid recovery.

iii) Production of esterases.

b) Explain glutamic acid fermentation with respect to strain, process and recovery. **[4]**

P.T.O.

Q3) a) Explain the following (Any two) : **[6]**

i) Malting

ii) Steroid transformation

iii) Semi synthetic penicillin

b) Explain the large scale production of lysine using dual fermentation. **[4]**

Q4) a) Describe the following (Any two) **[6]**

i) Amylase fermentation.

ii) Baker's yeast

iii) Bioethanol

b) Explain the process for production of fruit yoghurt. **[4]**

Q5) Write short notes (Any four) **[10]**

a) Rabies vaccine

b) Types of beer

c) ATS

d) Bioemulsifier

e) Byproducts of ethanol

f) Polio vaccine

Total No. of Questions : 5]

SEAT No. :

PD-837

[Total No. of Pages : 2

[6467]-786

T.Y. B.Sc.

MICROBIOLOGY

MB-366 : Food Microbiology

(2019 Pattern) (CBCS) (Semester - VI) (36196)

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) Define non-perishable foods.

b) Mention the role of FDA in food industry.

c) Enlist any two extrinsic factors.

d) Define prebiotics.

e) Define 'Z' value.

f) Define food.

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

i) Use of radiation in food preservation.

ii) Contamination of cereals & their spoilage

iii) TDT & TDP

b) Explain the food involved in clostridium botulinum food poisoning & describe the manifestation. **[4]**

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

i) Use of high temperature in food industry.

ii) Food & its organoleptic properties.

iii) Texture changes in food.

b) Explain food infection by Vibrio parahemoly ticus. **[4]**

P.T.O.

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

i) Tetra pack technology in foods.

ii) Food poisoning by Aspergillus Flavus.

iii) Fermented foods.

b) Explain food infection caused by Salmonella-typhimurium. **[4]**

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

a) Water activity

b) Flavor defects in food

c) Risks of probiotics

d) Food grade biopreservatives

e) Use of antibiotics in food preservation

f) Canning

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Total No. of Questions : 5]

SEAT No. :

PD-838

[Total No. of Pages : 2

[6467]-787
T.Y. B.Sc.
MICROBIOLOGY
MB - 3610 : Waste Management
(Skill Based Elective)
(2019 Pattern) (CBCS) (Semester - VI) (361910)

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) ***Draw neat and labelled diagrams wherever necessary.***

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

a) Define COD.

b) What is total suspended solids?

c) Enlist microorganisms in aerobic waste water treatment.

d) What is biomedical waste?

e) Give importance of Grit chamber.

f) What is biogas?

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

i) Anaerobic digestion process.

ii) Sewarage system of sewage collection.

iii) Characteristics of dairy waste.

b) Explain general characteristics of liquid waste water. **[4]**

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

i) Working of rotating biological contractor.

ii) Draw diagramme of Trickling filter.

iii) Activated sludge process.

b) Describe the by products of municipal solid waste treatment. **[4]**

P.T.O.

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

i) Vermicomposting

ii) e-waste

iii) Compost

b) Describe aerobic digestion process of waste water. **[4]**

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

a) pH and electrical conductivity of waste water.

b) Aerated lagoons.

c) Leachate and refused derived fuel.

d) Municipal solid waste management.

e) Fluidized bed reactors.

f) Screen chambers.

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Total No. of Questions : 5]

SEAT No. : ____

PD-839

[Total No. of Pages : 2

[6467] - 788
T.Y. B.Sc.
MICROBIOLOGY
MB-3611: Nanobiotechnology
(2019 Pattern) (Semester - VI) (CBCS) (361911)

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

Instructions to the candidates:

1) ***Q. 1 is compulsory.***
2) ***Solve any three questions from Q. 2 to Q. 5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Draw neat & labelled diagrams wherever necessary***

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

a) Define Nanotechnology

b) Range of size of nanomaterial

c) What is nanoassembly?

d) Define "Biosensor"

e) Enlist metal nanoparticles

f) Write examples of nanostructures use in cell targeting.

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

i) Microbial mediated sulfide nanoparticle synthesis

ii) Nanoparticle in drug delivery with example

iii) Characterization technique UV visual spectroscopy for nanomaterials

b) Draw DNA origami nanostructure & its use in drug delivery **[4]**

P.T.O.

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

i) Nanoparticls use as antibacterial agent

ii) Metal nanoparticles use in its application

iii) Polysaccharide nanoparticles

b) Write a note on different protein nanostructures **[4]**

Q4) a) Explain in detail (any two) : **[6]**

i) Liposome and its applications

ii) Protocol for oxide nanoparticle synthesis

iii) Dynamic light scattering (DLS) characterization technique for nanoparticle.

b) Write in detail about use of nanotechnology in wastewater treatment **[4]**

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

a) Nanoparticles in animal industry

b) Biomedical applications of bioassemblies

c) Cell forgetting

d) Viruses as nanomaterial

e) Nanoparticles in vaccine development

f) Nanotubes and nanofibers

Total No. of Questions : 5]

SEAT No. :

PD-840

[Total No. of Pages : 2

[6467]-789
T.Y. B.Sc.
NANOSCIENCE AND NANOTECHNOLOGY
N.S. 361 : Polymer Heterostructure and Their Applications
(2019 Pattern) (Semester - VI) (Paper - I) (36261)

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

Instructions to the candidates :

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

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

a) Define Heterojunction.

b) Which reagent is used in pickring emulsion as 'pickring agents'?

c) Define Heterojunction.

d) Define Ex-situ polymerisation.

e) Give role of triton x-100 and cyclohexane.

f) Define Ex-situ polymerisation.

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

i) Write a note on Host - polymer characterisation.

ii) Explain organic solar cell and types of junction.

b) Explain synthesis of Heterostructures by In-situ polymerisation using metals. **[4]**

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

i) Applications of Lasers.

ii) Explain the term p-p Heterojunction.

b) Write note on picking Emulsion. **[4]**

P.T.O.

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

i) Write a note on uses of transistor.

ii) Explain opto electronic applications of Heterostructure.

b) Explain in detail P-N Heterojunction. **[4]**

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

a) Applications of Red Laser pointer.

b) Chemisorption.

c) Organic photo voltaic cell.

d) Characterisation technique.

e) 'Anderson's affinity rule'.

f) Homojunction.

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Total No. of Questions : 5]

SEAT No. : ____

PD-841

[Total No. of Pages : 2

[6467]-790
T.Y. B .Sc.
NANOSCIENCE AND NANOTECHNOLOGY
NS - 362 : Functional Nanomaterials
(2019 Pattern) (Semester - VI) (Paper - II) (36262)

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

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Draw neat and labelled daigram wherever necessary.***
4) ***Figure to the right indicate full marks.***

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

a) Define nanoparticals?

b) Define Exciton?

c) Write down the formula of porosity?

d) What is Taylor cone?

e) Define metal organic frame works?

f) Draw the diagram of one-dimensional oxide nanostructures?

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

a) i) Explain the shape and composition control of semiconductor nanocrystals.

ii) Explain the synthesis of inorganic semiconductor nanocrystals.

b) Explain the structure of Boron-Nitride nanotubes. **[4]**

Q3) **Attempt Any One of the following :** **[6]**

a) i) Explain the aqueous synthesis of semiconductor nanocrystals.

ii) Explain the optical properties of titamia nanotubes Arrays.

b) Explain the four synthesis generations. **[4]**

P.T.O.

Q4) **Attempt Any one of the following :** **[6]**

a) i) Explain the electrospinning process.

ii) Explain the nanocomposite fiber and their structural applications.

b) Explain the nanofabric production. **[4]**

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

a) Explain the LBL assembly with semiconductor nanoparticles.

b) Explain the Ball Milling and Anneling.

c) Explain the Laser-Assisted method.

d) Explain the synthesis methods of Boron-Nitride nanoparticles.

e) Explain synthesis of metal oxide frame works.

f) Explain the nanofiber yarns preparation.

Total No. of Questions : 4]

SEAT No. :

PD-842

[Total No. of Pages : 2

[6467]-791
T.Y. B.Sc.
NANOSCIENCE AND NANOTECHNOLOGY
NS - 363 : Applications of Nanobiotechnology
(2019 Pattern) (Semester - VI) (36263)

Time : 2 Hours] *[Max. Marks : 40*

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Figures to right indicate the full marks.***
3) ***Draw diagram wherever necessary.***

Q1) **Answer the following questions :** **[6 × 2 = 12]**

a) Define the term cancer.

b) What are protein array?

c) Write the uses of Nano-patches.

d) What is woobling gel.

e) Define the term Flagella.

f) Write the important function of protein micro array?

Q2) **Answer the following any Two :** **[2 × 4 = 8]**

a) i) What are various applications and uses of quantum dots?

ii) What are carcinogens? Enlist various carcinogens.

b) Define Nanofluidic? Explain properties of Nanofluidics.

Q3) **Attempt the following questions any Two :** **[2 × 4 = 8]**

a) i) Explain ATP synthase complex.

ii) With the help of diagram Explian properties of cancer cells.

b) What are Magnetic Transduce? Write its uses.

P.T.O.

Q4) **Solve any Two of the following :** **[2 × 6 = 12]**

a) Write the use of nanomedicine for accurate cancer imaging.

b) What is Bio-material? Expalin applications.

c) Write short note on graphene.

Total No. of Questions : 5]

SEAT No. :

PD-843

[Total No. of Pages : 2

[6467]-792
T.Y. B .Sc.
NANOSCIENCE AND NANOTECHNOLOGY
NS - 364 : Nanoelectronics
(2019 Pattern) (Semester - VI) (Paper - IV) (36264)

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

Instructions to the candidates :

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

Q1) **Attempt Any <u>FIVE</u> of the following:** **[5]**

a) What is plasma enhanced vapour deposition method?

b) What is mean by etching process?

c) State Moore's first law.

d) Define Lithography.

e) Define opto electronic devices.

f) What is mean by photomask?

Q2) **Attempt Any <u>ONE</u> of the following :** **[6]**

a) i) Explain kinetics of silicon dioxide growth for thin & ultrathin film.

ii) Explain epitaxial growth of silicon by vapour phase.

b) What is spintronic devices? Also explain any two types of spintronic devices. **[4]**

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

a) i) Explain the roadmap of semicondutor characteristics.

ii) Explain photolithography technique in detail.

b) Give the difference between thermal evaporation & sputtering method.**[4]**

P.T.O.

Q4) **Attempt Any <u>ONE</u> of the following :** **[6]**

a) i) Explain high-K & low-K dielectrics for ULSI.

ii) Explain vertical MOSFET's.

b) Explain atoms-up approach. **[4]**

Q5) **Write short note on Any <u>FOUR</u> of the following :** **[10]**

a) Applications of single electron transistors.

b) Plasma enhanced vapour deposition method.

c) Multiphoton lithography.

d) ITRS

e) Vertical MOSFET's

f) Stencil lithography.

Total No. of Questions : 5]

SEAT No. : ____

PD-844

[Total No. of Pages : 2

[6467]-793
T.Y. B.Sc.
NANOSCIENCE AND NANOTECHNOLOGY
NS-365 : Energy Storage Devices and Applications
(2019 Pattern) (Paper-V) (Semester - VI) (36265)

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

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions of the Q.2 to Q.5.***
3) ***Draw the neat and labelled diagram wherever necessary.***
4) ***Figures to the right indicate full marks.***

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

a) Define supercapacitor?

b) Define primary battery?

c) Define separator?

d) Define cell voltage?

e) Define container?

f) What is fusion?

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

i) What is renewable resources? Explain it's different types.

ii) What is non-renewable resources? Explain it's different types.

b) Explain the need of the Energy storage. **[4]**

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

i) Explain the construction of Battery.

ii) Explain the working of Battery.

b) Design and working of Electrode of Battery. **[4]**

P.T.O.

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

i) Explain the latent heat storage.

ii) Explain the different types of supercapacitor.

b) Explain the sensible heat storage. **[4]**

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

a) Explain the term Nuclear energy.

b) Explain the term Nuclear fusion.

c) Explain the Electrochemical pseudocapacitor.

d) Explain Hybrid capacitor.

e) Explain Thermal energy storage.

f) Explain electrical energy storage.

Total No. of Questions : 5]

SEAT No. :

PD-845

[Total No. of Pages : 2

[6467]-794

T.Y. B.Sc.

NANO SCIENCE AND NANO TECHNOLOGY

NS-366 : Photo Catalysis for Environmental Pollution Control

(2019 Pattern) (Semester - VI) (Paper - VI) (36266) (Elective - II)

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

Instructions to the candidates:

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

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

a) State law of mass action. **[1]**

b) Define photo catalysis. **[1]**

c) What is P-type semiconductor? **[1]**

d) Define Black Body radiations. **[1]**

e) Define Adsorption isotherm. **[1]**

f) What are the uses of p-type semiconductor? **[1]**

Q2) **Answer the following :**

a) i) Explain photo catalyst surface and active spries. **[6]**

OR

ii) Write short note on Environmental remediation.

b) Explain Lock & Key model. **[4]**

Q3) **Answer the following :**

a) i) Explain Jabionski diagram and photo physical process in electronical exited state. **[6]**

OR

ii) Write in detail catalytic efficiency & turnover frequency.

b) Explain properties of good photo catalyst. **[4]**

P.T.O.

Q4) **Answer the following :**

a) i) Write in detail purification of water & air. **[6]**

OR

ii) Explain term photo catalysis and give its applications.

b) Write short note on factors affecting catalyst on kinetics of reaction. **[4]**

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

a) Laser diode **[2½]**

b) Auto catalysis **[2½]**

c) Intrinsic & Extrinsic semiconductor **[2½]**

d) Red - Laser pointer **[2½]**

e) Optoelectronic applications **[2½]**

f) Photo catalysis **[2½]**

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Total No. of Questions : 5]

SEAT No. :

PD-846

[Total No. of Pages : 2

[6467]-795
T.Y. B.Sc.
NANOSCIENCE AND NANOTECHNOLOGY
NS - 3610 : Data Analysis and Computer Applications
(2019 Pattern) (CBCS) (Semester - VI) (362610)

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

Instructions to the candidates :

1) ***Q. 1 is compulsory.***
2) ***Solve any Three questions from Q.2 to Q.5.***

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

a) Write the probability mass function of binomial distribution.

b) What is mean by parameter?

c) Define the term 'statistics'.

d) Which function is used in MS-Excel to find mean?

e) Explain the term 'qualitative data'.

f) Which function is used to find median in MS-Excel?

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

i) Find convariance between X and Y

X : 6 9 10 12 15

Y : 3 8 11 16 14

ii) Find measures of central tendeney for following data.

Age	20-30	30-40	40-50	50-60
No. of individuals	10	20	15	5

b) Write short note on measures of dispersion. **[4]**

P.T.O.

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

i) Find variance and standard deviation for data.

Xi :	10	11	12	13	14
fi :	3	4	9	10	6

ii) Find Geometric mean and Harmonic mean for the data;

11, 15, 21, 25, 29, 30

b) Write a short note on merits and demerits of scatter diagram. **[4]**

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

i) Fit the regression line X on Y

X :	92	120	98	117	104
Y :	1.3	1.9	1.5	1.7	1.6

ii) Find mean and median for the following data..

Class	2-4	4-6	6-8	8-10
Frequency	20	15	5	10

b) Let X ~ B (20, 0.8) then find **[4]**

i) $p(x < 1)$

ii) $p(x = 10)$

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

a) Write sample space for

i) tossing the two coins

ii) Rolling a die

b) Give real life example of Normal distribution

c) If X ~ N (105, 25) then find $P(x > 95)$.

d) If correlation coefficient between X and Y is 1 then what can be interpreted?

e) Define the term Range. Write the function which is used to find range in MS-Excel.

♦ ♦ ♦

Total No. of Questions : 5]

SEAT No. : ____

PD-847

[Total No. of Pages : 2

[6467]-796
T.Y. B.Sc.
NANOSCIENCE AND NANOTECHNOLOGY
NS - 3611 : Renewable Energy and Energy Harvesting
(2019 Pattern) (Semester - VI) (362611)

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

Instructions to the candidates :

1) ***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 Accumulator?

b) What is Energy storage?

c) Define solar pond?

d) Define solar distillation?

e) Define wind?

f) Define Hydropower?

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

i) Explain construction and working of salt gradient solar ponds.

ii) Explain description of a basin type solar still.

b) Explain the principle of photovoltaic solar cell. **[4]**

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

i) Explain construction and working of Horizontal axis wind turbines.

ii) Explain wind energy conversion.

b) Write down advantages and disadvantages of vertical axis wind turbines? **[4]**

P.T.O.

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

i) Explain open cycle ocean thermal Electric conversion system.

ii) Explain Hybrid cycle ocean thermal electric conversion system.

b) Explain the mechanical equipment of hydropower plant. **[4]**

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

a) Explain I-V characteristics of solar cell.

b) What is photovoltaic effect?

c) Define power coefficient?

d) Explain Thwaits slot.

e) Explain Bio-Fouling.

f) Explain power channel.

Total No. of Questions : 5]

SEAT No. : ____

PD-849

[Total No. of Pages : 2

[6467]-798

T.Y. B .Sc.

ELECTRONIC SCIENCE

EL - 362 : Embedded System Design Using Microcontrollers (CBCS) (2 Credits) (Revised 2019) (Semester - VI) (Paper - II) (36222)

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

Instructions to the candidates :

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

Q1) **Attempt <u>any Five</u> of the following:** **[5]**

a) What is an Embedded System?

b) How many ports PIC16F887 has?

c) What is the use of TRISA register?

d) How many banks the data memory of PIC16F887 has?

e) Write the full form of ARM.

f) Give any two applications of smart card technology.

Q2) **Attempt the following :**

a) i) Give the 32-bit format of status register of ARM. **[2]**

ii) State difference between embedded system and general computer system. **[4]**

b) Explain the working of digital camera using block diagram. **[4]**

Q3) **Attempt the following :**

a) i) What is the size of program memory and SRAM in PIC16F887? **[2]**

ii) Write PIC C program to display character 'γ' on LCD. **[4]**

b) Write PIC C Program to toggle pin RB7 of PIC16F887, 100 times. **[4]**

P.T.O.

Q4) **Attempt the following :**

a) i) What is the use of registers R13 and R15 in ARM register? **[2]**

ii) Write short note on ARM architecture. **[4]**

b) Write a note on memory of ARM microcontroller. **[4]**

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

a) What are the various blocks in digital camera.

b) Give the classification of embedded system based on complexity and performance.

c) Give any five examples of automotive embedded system.

d) Draw the interfacing diagarm of 4 × 4 keyboard matrix with PIC16F887.

e) Draw interfacing diagram of DC moter with PIC16F887.

f) Write PIC C program to generate sawtooth wave usign DAC.

g) Draw interfacing diagram of common cathode seven segment display.

Total No. of Questions : 5]

SEAT No. :

PD-850

[Total No. of Pages : 2

[6467]-799

T.Y. B .Sc.

ELECTRONIC SCIENCE

EL - 363 : Industrial Electronics

(CBCS) (2019 Pattern) (Semester - VI) (Paper - II) (36223)

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 carries equal marks.***

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

a) Write any two applications of SCR.

b) Draw the circuit symbol of DIAC & TRIAC.

c) What do you mean by SMPS.

d) State the name of switches use in UPS.

e) What do you mean by electric vehicle.

f) Which type of battery is widely use in electric vehicle.

Q2) **Attempt the following :**

a) i) List different methods use to turn on SCR. **[2]**

ii) Explain the working of single phase first quadrant drive of DC motor using SCR. **[4]**

b) State any four differences between hybrid electric vehicle and electric vehicle. **[4]**

Q3) **Attempt the following :**

a) i) State the working principle of AC motor. **[2]**

ii) Draw the circuit diagram of half bridge invertor with resistive load and explain its working with output wave forms across the load resistor. **[4]**

b) What is the Trickle charging? How electric vehicle battery works on regnerative breaking mode. **[4]**

P.T.O.

Q4) **Attempt the following :**

a) i) What do you mean by PHEV? State its advantages. **[2]**

ii) With the help of two transistor analogy explain the working of SCR. Draw I-V characteristics of SCR. **[4]**

b) Draw the Block diagram of off-line UPS and explain each block in detail. **[4]**

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

a) Explain dv/dt protection of SCR by using snubber circuit.

b) Draw the construction diagram of DIAC and its I-V characteristics.

c) Draw the circuit diagram of SMPS and role of PWM use in this circuit.

d) Write a short note on AC motor.

e) Explian the dielectric heating in detail and its applications.

f) State any two differences between single phase and three phase power supply.

Total No. of Questions : 5]

SEAT No. :

PD-851

[Total No. of Pages : 2

[6467]-800

T.Y. B .Sc.

ELECTRONIC SCIENCE

EL - 364 : Manufacturing Processes for Electronics

(Rev. 2019 Pattern) (Semester - VI) (Paper - IV) (36224)

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 passive component.

b) What is purpose of solder mask?

c) State types of PCB based on their layer.

d) What is THT?

e) What is diffusion?

f) What is purpose of oxidation in IC fabrication technology?

Q2) **Attempt the following :**

a) i) State various types of cables and connectors used in electronic devices. **[2]**

ii) State classifications of transformers on basis of their electronic applications and on their operating frequencies. **[4]**

b) Describe various steps used in PCB manufacturing process. **[4]**

Q3) **Attempt the following :**

a) i) State advantages of PCB over bread-board. **[2]**

ii) Explain etching process and materials used for etching in PCB manufacturing process. **[4]**

b) List various techniques of testing of SMT assembled board. Describe any one in brief. **[4]**

P.T.O.

Q4) **Attempt the following :**

a) i) Why encapulation of electronic component is necessary. **[2]**

ii) Explain BJT IC fabrication technology with neat diagram. **[4]**

b) Write short note on electrical testing and packaging. **[4]**

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

a) Explain co-axial cable with diagram.

b) What is Relay? State its appliacations.

c) Explain double layer PCB.

d) What is photoresist? State its type & importance in IC fabrication technology.

e) Compare MOS technology with bipolar technology.

f) Explain in brief vision guided assembly.

Total No. of Questions : 5]

SEAT No. :

PD-852

[Total No. of Pages : 2

[6467]-801
T.Y. B.Sc.
ELECTRONIC SCIENCE
EL - 365 : Process Control Systems
(36225) (Revised 2019) (CBCS) (Semester - VI) (Paper - V)

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

Instructions to the candidates :

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

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

a) Define instrument.

b) What is mean by Data Acquisition system.

c) What are the two major type of control system.

d) Define error.

e) Define Dead Time Element.

f) What is the need for a controller.

Q2) **Attempt the following :**

a) i) State disadvantages of null method over to deflection method. **[2]**

ii) Explain process control principle. **[4]**

b) Write the applications of proportional control mode. **[4]**

Q3) **Attempt the following :**

a) i) What is Transfer function representation. **[2]**

ii) Explain discrete state process control. **[4]**

b) Explain derivative control mode. **[4]**

P.T.O.

Q4) **Attempt the following :**

a) i) What is the effect of Proportional Derivative (PD) & Proportional Integral controller on the system performance. **[2]**

ii) Describe the functional element of an instrument with block diagram. **[4]**

b) Draw & explain general data acquisition system. **[4]**

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

a) State dynamic characteristics.

b) Write application of on-off controller mode.

c) Define sinusoidal transfer function with eq^{n}.

d) Define the following terms.

i) Process Equation

ii) Process load

iii) Dead time

iv) Process lag

v) Self regulation

e) When combined analog|digital systems are used, what are the limitations associated with it.

f) Explain signal conditioning.

Total No. of Questions : 5]

SEAT No. : ____

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[6467]-802
T.Y.B.Sc.
ELECTRONIC SCIENCE
EL - 366 (A) : PLC & SCADA
(CBCS) (2019 Pattern) (Semester - VI) (Paper -VI)
(2 Credits) (36226A)

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

Instructions to the candidates :

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q5.***
3) ***Q.2 to Q.5 carry equal marks.***

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

a) What is full form of PLC?

b) Name any two components of PLC.

c) Draw Ladder Diagram symbol for “No Relay Contact” and “NC Relay contact”.

d) Draw Ladder Diagram Symbol for “PID controller” and “Equal to”.

e) What is full form of SCADA?

f) What is full form of RTU?

Q2) a) i) Give any Two applications of PLC. **[2]**

ii) Write a note on PLC wiring Techniques. **[4]**

b) i) Compare SCADA Hard ware Vs SCADA software. **[2]**

ii) Give any two Advantages of SCADA system. **[2]**

P.T.O.

Q3) a) i) Define system block diagram. **[1]**

ii) Where system block diagram is use? **[1]**

iii) Compare SCADA Vs PLC. **[2]**

iv) Draw only Block diagram of SCADA system with label it's Basic Six components. **[2]**

b) i) Compare physical components Vs program components. **[2]**

ii) What is Mnemonic programming. **[2]**

Q4) a) i) What is Boolean and relay Logic? **[2]**

ii) Explain how will you use PLC and SCADA system for any industrial or other application in real life. **[4]**

b) Give at least four point comparison between DCS and PLC. **[4]**

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

a) SCADA key features.

b) Typical requirements of RTV.

c) SCADA and LAN.

d) SCADA system with Hardware and software.

e) Ladder diagrams in PLC.

f) PLC Basic components and their symbols.

Total No. of Questions : 5]

SEAT No. : ____

PD-854

[Total No. of Pages : 2

[6467]-803

T.Y.B.Sc.

ELECTRONIC SCIENCE

EL - 366 (B) : Sensors and Systems

(CBCS) (2019 Pattern) (Semester - VI) (Paper - VI(B)) (36226B)

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

Instructions to the candidates :

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q5.***
3) ***Q.2 to Q.5 carry equal marks.***

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

a) State the names of light sensors.

b) State the name of signal conditioner circuit used for thermocouple as temperature sensor.

c) Write the advantages of instrumentation amplifier over conventional Amplifier .

d) Define Actuator.

e) List the names of sensors used in home security.

f) Write the names of sensors used in green house for growth at plant.

Q2) **Attempt the following :**

a) i) Why platinum is preferred over other material for making RTD's. **[2]**

ii) Explain the working of electromagnetic relay with transister as relay driver. **[4]**

b) Draw the block diagram at green house to control the temperature, Humidity and Moister and explain it. **[4]**

P.T.O.

Q3) **Attempt the following :**

a) i) Draw the block diagram of single channel data aquisition system. **[2]**

ii) State any four parameters of precision Op-Amp with Ideal value. **[4]**

b) With the neat diagram explain the working of stepper motor. **[4]**

Q4) **Attempt the following :**

a) i) State the advantages of AC motor over DC motor. **[2]**

ii) Explain the working of DC motor. **[4]**

b) Draw the block diagram at green house to control the temperature, Humidity and Moister and explain it. **[4]**

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

a) Define the term Gauge Factor (GF) and write the equation for photon energy.

b) State seeback and peltier effect.

c) Draw the circuit diagram of RTD as one arm of bridge circuit along with op-amp as voltage subtracter at final out put.

d) State the names of signal conditioning circuits used for LM-35, thermocouple and PT-100.

e) State applications of Servomotor.

f) State the names of power control components use in various applications of measurement system.

Total No. of Questions : 5]

SEAT No. : ____

PD-855

[Total No. of Pages : 2

[6467]-804

T.Y. B.Sc.

ELECTRONIC SCIENCE

ELSEC - 361 : Design and Fabrication of Printed Circuit Board

(2019 Pattern) (CBCS) (Semester - VI) (362210) (Paper - X)

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) Which software is commonly used for PCB design?

b) What is the main advantages of using a PCB over a breadboard?

c) Define foot print.

d) What does FR4 stands for in PCB manufacturing?

e) What is the function of copper traces in a PCB?

f) Define Printed Circuit Boards?

Q2) **Attempt the following :**

a) i) What is Netlist? **[2]**

ii) Describe the layer of PCB. **[4]**

b) Explain interconnection technique in multilayer PCB. **[4]**

Q3) **Attempt the following :**

a) i) Explain the meaning of schematic capture. **[2]**

ii) Mention four types of PCB, Explain any one. **[4]**

b) Differentiate between single-layer double layer and multilayer PCB with example. **[4]**

P.T.O.

Q4) **Attempt the following :**

a) i) What is placing and mounting of components? **[2]**

ii) Explain in short tetra functional FR-4 PCB material. **[4]**

b) Give the physical properties of laminates. **[4]**

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

a) Explain THM and SMT

b) Write the advantages of use of heat sink with IC?

c) Write various tools used in PCB designing.

d) Explain process of etching.

e) Explain Design For Manufacturing (DFM).

f) Explain need of PCB.

▽▽▽▽

Total No. of Questions : 5]

SEAT No. :

PD-856

[Total No. of Pages : 2

[6467]-805
T.Y. B.Sc.
ELECTRONIC SCIENCE
ELSEC - 362 : Mobile Application Development
(2019 Pattern) (CBCS) (Semester - VI) (Paper - XI) (362211)

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

Instructions to the candidates :

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

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

a) What is android?

b) What is the fullform of ADT?

c) What is the role of SDK?

d) Write methods to develop an Android application.

e) What is the role of Emulator?

f) Give the name of any two android devices.

Q2) a) Answer the following :

i) Wirte any two features of Android. **[2]**

ii) Explain Anatomy of Android. **[4]**

b) Explain animation and media as managing resources. **[4]**

Q3) a) Answer the following :

i) What is 'services' in android? **[2]**

ii) Write a note on activity and fragment. **[4]**

b) Explain android user interface design essentials. **[4]**

P.T.O.

Q4) a) Answer the following :

i) Write short note on AVD. **[2]**

ii) Explain linear and frame layout. **[4]**

b) Explain Android terminologies. **[4]**

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

a) What is the use of picker in android?

b) List any five button used in android.

c) Write a short note on APK.

d) Give the five names of different android applications.

e) What is the role of grid view?

f) Write a short note on zoom control.

Total No. of Questions : 5]

SEAT No. : ____

PD-858

[Total No. of Pages : 2

[6467]-807
T.Y. B.Sc.
PSYCHOLOGY
Psychopathology - II
(2019 Pattern) (Semester - VI) (36202) (Paper - II)

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) State the full form of ADHD.

b) What is OCD?

c) State the types of communication disorder.

d) What is anorexia nervosa?

e) Define personality disorder.

f) State any four psychoactive drug.

Q2) a) Explain in detail Binge eating disorder and pica disorder. **[6]**

OR

Explain in detail sleep wake, hyper somnolence disorder with symptoms and causes.

b) What is the difference between alcohol abus and alcohol dependence. **[4]**

Q3) a) Discuss in detail cluster C personality disorder. **[6]**

OR

Explain in detail substance abus and substance dependence.

b) What is the best treatment for Autism. **[4]**

P.T.O.

Q4) a) Discuss in detail cluster A personality disorders. **[6]**

OR

Explain symptoms, types and causes of communication disorder.

b) Explain the cause of abnormal behaviour. **[4]**

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

a) Bullemia

b) Narsissistic personality disorder

c) Circadian rhythm sleep-wake

d) Learning disability

e) Tolerance dependence addiction

f) Schicotypal personality disorder.

▽▽▽▽

Total No. of Questions : 5]

SEAT No. :

PD-859

[Total No. of Pages : 2

[6467]-808

T.Y. B.Sc.

PSYCHOLOGY

Paper - III : Educational Psychology

(2019 Pattern)(Semester - VI) (36203)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Question from 2 to 6 carry equal marks.***
3) ***Solve any three questions from Q.2 to Q.5.***

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

a) What is Cognition?

b) Define educational Psychology.

c) What is participative teaching method?

d) Where was the first experimental Psychology lab set up?

e) Who proposed the cognitive development theory?

f) Define learning.

Q2) a) Justify how the knowledge of educational psychology helps the learner and learning process. **[6]**

OR

Throw light upon the scope of educational Psychology.

b) Describe in detail about Physical environment of the class and creating a good environment. **[4]**

Q3) a) Explain the complex learning processes. **[6]**

OR

Explain the role of culture, community and gender in students development.

b) Explain the meaning and nature of individual differences. **[4]**

P.T.O.

Q4) a) Illustrate the importance of social, personal and emotional development. **[6]**

OR

Explain the Pigetb theory of cognitive development.

b) Explain the process of language development. **[4]**

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

a) Effective teaching methods.

b) Classroom assessment

c) Instructional processes

d) Learning processes.

e) Diversity in students.

f) Role of brain in learning

▽▽▽▽

Total No. of Questions : 5]

SEAT No. :

PD-860

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[6467]-809
T.Y. B.Sc.
PSYCHOLOGY
Human Resource Management
(2019 Pattern) (Semester - VI) (36204) (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 Q5.***
3) ***Question 2 to 5 carry equal marks.***

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

a) Name the policies of HRM.

b) State the types of interview.

c) What is appraisal?

d) What is employee training?

e) Define remuneration.

f) Name any two theories of employee remuneration.

Q2) a) Explain in detail job evaluation method. **[6]**

OR

Describe the needs of assessment centres in employer training and development.

b) Critically evaluate the scope of training program. **[4]**

Q3) a) Discuss the functions of HRM. **[6]**

OR

Explain the importance of token economy as a method of incentives.

b) Elaborate the various skills required in human resource management.**[4]**

P.T.O.

Q4) a) Describe the various usages of training and development programs. **[6]**

OR

Explain the one theory of employee remuneration.

b) Analyze the employee selections & evaluation process. **[4]**

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

a) Biographical information.

b) Techniques in human resource planing.

c) Process of training & development.

d) Letter of recommendation.

e) Types of incentive

f) Objectives of HRM.

Total No. of Questions : 5]

SEAT No. :

PD-861

[Total No. of Pages : 2

[6467]-810
T.Y. B .Sc.
PSYCHOLOGY
Rehabilitation Psychology
(2019 Pattern) (New) (Semester - VI) (Paper - V) (36205)

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

Instructions to the candidates :

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

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

a) What is impairment?

b) Define rehabilitation.

c) State the stages of behavioural rehab program.

d) State the full form of TA.

e) What is stigma?

f) Define Psychotherapy.

Q2) a) Describe the principles & assessment of rehabilitation. **[6]**

OR

Explain the goals & objectives of rehabilitation.

b) Differentiate the individual & group counselling. **[4]**

Q3) a) Discuss the non-residential rehabilitation programmes. **[6]**

OR

Describe the assessment and evaluation of quality of life.

b) Analyze the transactional analysis approach in rehabilitation program. **[4]**

P.T.O.

Q4) a) Explain the community based rehabilitation program. **[6]**

OR

Describe the role of discrimination & cultural factors in mental illness.

b) Analyze the effectiveness of hospital based rehabilitation. **[4]**

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

a) Roles of eclectic.

b) Sheltered workshop.

c) Impact of disability on community.

d) Psychiatric disorders.

e) Therapeutic communities.

f) Vocational training units.

Total No. of Questions : 5]

SEAT No. :

PD-862

[Total No. of Pages : 2

[6467]-811

T.Y. B.Sc.

PSYCHOLOGY

Psychotherapies

(2019 Pattern) (Semester - VI) (Paper - VI) (36206)

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 questions:** **[5]**

a) Define Mindfulness.

b) What is irrational thinking?

c) Define TA.

d) What is aversive therapy?

e) Define multicultural psychotherapy.

f) Who introduced the psycho analytical therapy?

Q2) a) Explain the techniques and barriers of assertiveness training. **[6]**

OR

Describe the components and problems with using token economy.

b) Distinguish between CBT & REBT. **[4]**

P.T.O.

Q3) a) Differentiate between humanistic and existential psychotherapies. **[6]**

OR

Explain the basic ideas behind psychoanalytic therapy.

b) Justify the effectiveness of aversion therapy. **[4]**

Q4) a) Describe the techniques and benefits of family therapy. **[6]**

OR

Explain the process of mindfulness and what are the challenges in practicing mindfulness.

b) Evaluate the therapeutic relationship. **[4]**

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

a) Application of psychotherapy.

b) Steps in assertiveness training.

c) Advantages of music therapy.

d) Advantages of group therapy.

e) Application of TA.

f) Cognitive therapy.

Total No. of Questions : 5]

SEAT No. :

PD-863

[Total No. of Pages : 2

[6467]-812

T.Y. B.Sc.

PSYCHOLOGY

SEC - I : Basic Therapeutic Skills

(2019 Pattern) (Semester - VI) (362010)

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

Instructions to the candidates:

1) ***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 Empathy.

b) What is termination?

c) State the benefits of Psychotherapy.

d) Define Psychotherapy.

e) State the types of Communication.

f) What is positive regards?

Q2) a) Discuss the various factors influencing on Psychotherapy effects. **[6]**

OR

Distinguish between reflecting and Paraphrasing in counseling.

b) Critically analyze the impact of termination on Client. **[4]**

Q3) a) Explain the objectives and process of Psychotherapy. **[6]**

OR

Describe the components and advantages of empathy.

b) Justify the role of effective listening skills among therapist. **[4]**

P.T.O.

Q4) a) Explain the key elements of Immediacy & genuineness skills of therapists. **[6]**

OR

Investigate the challenges for setting boundaries in therapeutic relationship.

b) Analyze the comport of building rapport with client. **[4]**

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

a) Therapeutic Relationships

b) Social skills of therapists

c) Use of questions

d) Concreteness

e) Critical Thinking

f) Types of Counselling

▽▽▽▽

Total No. of Questions : 5]

SEAT No. :

PD-864

[Total No. of Pages : 2

[6467]-813
T.Y. B.Sc.
PSYCHOLOGY
SEC - II : Soft Skills
(2019 Pattern) (Semester - VI) (362011)

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

Instructions to the candidates :

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

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

a) Define hard skills.

b) Define non verbal communiction.

c) State the effective time management techniques.

d) Define manner.

e) What is formal communication.

f) Name the types of etiquettes.

Q2) a) Explain the benefits of active listening. **[6]**

OR

Describe the various obstacks in time management.

b) Justify the relationship between soft skills & success. **[4]**

Q3) a) Illustrate the different types of soft skills. **[6]**

OR

Differentiate between social & official etiquettes.

b) Elaborate the process of goal setting. **[4]**

P.T.O.

Q4) a) Describe the various components/types of interview etiquettes. **[6]**

OR

Distinguish between formal & informal communication.

b) Examine the effective time management scheduling. **[4]**

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

a) Importance of soft skills.

b) Benefits of goal setting.

c) Body language.

d) Nature of soft skills.

e) Process of communication.

f) Telephone etiquettes.

Total No. of Questions : 5]

SEAT No. :

PD-865

[Total No. of Pages : 2

[6467]-814

T.Y. B.Sc.

ENVIRONMENTAL SCIENCE

EVS-361 : Aquatic Ecosystem and Management

(2019 Pattern) (Semester - VI) (Paper - I) (36241)

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

Instructions to the candidates:

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

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

a) What is meant by Aquatic Biota?

b) Explain the ecological significance of estuary.

c) What are the limiting factors in freshwater body.

d) Enlist Ramsar sites in India.

e) Explain various methods of aquatic ecosystem sampling.

f) Difference between Lotic and Lentic aquatic water body.

Q2) a) Explain the concept of Eco-tourism with a case study. **[6]**

b) Write short note on zonation of marine ecosystem. **[4]**

Q3) a) Write short note on Sustainable Management of wetlands. **[6]**

b) Explain the importance of Mangrove vegetation. **[4]**

Q4) a) Explain the impact of climate change on aquatic Ecosystem. **[6]**

b) Explain about Ramsar convention on wetlands. **[4]**

P.T.O.

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

a) Limiting factors in aquatic ecosystem.

b) Significance of coral reef.

c) Marine Biota - Fauna and Flora.

d) Application of Remote sensing and GIS in aquatic ecosystem management.

e) Sustainable management of Aquatic Ecosystem.

f) Energy flow in aquatic ecosystem.

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Total No. of Questions : 5]

SEAT No. : ____

PD-866

[Total No. of Pages : 2

[6467]-815

T.Y. B.Sc.

ENVIRONMENTAL SCIENCE

EVS - 362 : Nature Conservation

(2019 Pattern) (Semester - VI) (Paper - II) (36242)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Question No. 2 to Question No. 5.***
3) ***Question No. 2 to Question No. 5 carry equal marks.***

Q1) **Attempt any Five of the following :**

a) What is Biosphere Reserve? **[1]**

b) What is Field gene bank? **[1]**

c) BNHS stands for? **[1]**

d) What is ex-situ conservation? **[1]**

e) What is IUCN? **[1]**

f) Define Nature Conservation. **[1]**

Q2) **Answer the following :**

a) Describe the functions of MoEFCC. **[6]**

b) What are the merits & Demerits of ex-situ conservation? **[4]**

Q3) **Answer the following :**

a) Write note on Biodiversity Hotspots. **[6]**

b) Write in brief of wildlife sanctuaries. **[4]**

P.T.O.

Q4) **Answer the following :**

a) Nature conservation - write note in detail. **[6]**

b) Describe principles of In-situ conservation. **[4]**

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

a) Importance of NGOs in Nature Conservation. **[2½]**

b) Write brief note on Project Tiger. **[2½]**

c) What is Cryopreservation? **[2½]**

d) Importance of public awareness in nature conservation. **[2½]**

e) Write in short about WWF. **[2½]**

f) What is Community Reserve? **[2½]**

▽▽▽▽

Total No. of Questions : 5]

SEAT No. :

PD-867

[Total No. of Pages : 2

[6467]-816

T.Y. B.Sc.

ENVIRONMENTAL SCIENCE

EVS - 363 : Air and Noise Quality

(2019 Pattern) (Semester - VI) (Paper - III) (36243)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Question No. 2 to Question No. 5.***
3) ***Question No. 2 to Question No. 5 carry equal marks.***

Q1) **Attempt any Five of the following :**

a) Mention the Sources of noise pollution. **[1]**

b) Write any two examples of major air pollutants. **[1]**

c) Write any two effects of noise pollution on material. **[1]**

d) Mention the permissible limit of noise for residential area. **[1]**

e) Define : Vehicular pollution. **[1]**

f) Write the examples of gaseous pollutants. **[1]**

Q2) **Answer the following :**

a) Describe the causes and effects of global warming. **[6]**

b) Discuss the impacts of indoor air pollution. **[4]**

Q3) **Answer the following :**

a) Explain the transport of pollution in atmosphere & its resultant impacts. **[6]**

b) Draw the diagram of cyclone-air pollution control equipment and explain it. **[4]**

P.T.O.

Q4) **Answer the following :**

a) Explain the sources and effects of ozone hole. **[6]**

b) Describe the effects of human activities on meteorology. **[4]**

Q5) **Write a short note on any Four of the following :**

a) Acid rain. **[2½]**

b) Control measures for air pollution. **[2½]**

c) Labelled diagram of Electrostatic precipitator. **[2½]**

d) Indoor air pollution. **[2½]**

e) Noise pollution control at source. **[2½]**

f) Emission standards for Air quality. **[2½]**

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Total No. of Questions : 5]

SEAT No. :

PD-868

[Total No. of Pages : 2

[6467]-817
T.Y. B.Sc.
ENVIRONMENTAL SCIENCE
EVS - 364 : Issues in Environmental Science
(2019 Pattern) (Semester - VI) (Paper - IV) (36244)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Question No.2 to Question No5.***
3) ***Question 2 to 5 carry equal marks.***

Q1) **Attempt any FIVE of the following :**

a) Who is the leader of 'Narmada Bacho Andolan'. **[1]**

b) How many biogeographic zones in India. **[1]**

c) For what purpose silent valley movement started. **[1]**

d) Define wet land. **[1]**

e) Define AQI. (air quality Index) **[1]**

f) Which is biggest freshwater lake in India. **[1]**

Q2) **Answer the following :**

a) Explain various types of biodiversity with examples. **[6]**

b) Briefly explain the various methods used for waste disposal. **[4]**

Q3) **Answer the following :**

a) What are the causes of soil erosion. Add a note on soil conservation method. **[6]**

b) Explain the problem and causes of eutrophication. **[4]**

P.T.O.

Q4) **Answer the following :**

a) What are the causes of desertification. Explain its control measures. **[6]**

b) What are the importance of wet lands in biodoversity conservation. **[4]**

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

a) Bhopal Gas tragedy. **[2½]**

b) Corona pandemic. **[2½]**

c) Sustainable development. **[2½]**

d) Appiko movement. **[2½]**

e) pastoralism **[2½]**

f) Consumptive value of Biodiversity **[2½]**

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Total No. of Questions : 5]

SEAT No. :

PD-869

[Total No. of Pages : 2

[6467]-818

T.Y. B .Sc.

ENVIRONMENTAL SCIENCE

EVS - 365 : Environmental Governance : EMS, EIA & ISO 14000

(2019 Pattern) (Semester - VI) (Paper - V) (36245)

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

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***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) Write one role of public participation in EIA Process.

b) Write any two advantages of EIA.

c) What is scope of ISO 14000.

d) Enlist the Attributes of environmental governance.

e) When did EIA Notification Enacted.

f) Full form of : 1) EMS

2) EMP

Q2) **Answer the following :**

a) Explain in detail the process of LCA. **[6]**

b) What type of Issues and challenges are faced by Environmental Governance. **[4]**

Q3) **Answer the following :**

a) Write note on elements of Environmental Governance. **[6]**

b) What are sustainability aspects of Environmental Management. **[4]**

P.T.O.

Q4) **Answer the following :**

a) Explain process of EIA. **[6]**

b) Write in detail Needs & Goals of EIA. **[4]**

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

a) Use of GIS in environmental impact assessment.

b) ISO/207 TC function.

c) Environment Management System.

d) Cost Benefit Analysis.

e) Types of Audit.

f) Baseline Data Collection.

Total No. of Questions : 5]

SEAT No. :

PD-870

[Total No. of Pages : 2

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T.Y. B.Sc.

ENVIRONMENTAL SCIENCE

EVS - 366 : Environmental Biotechnology - II

(2019 Pattern) (Semester - VI) (Paper - VI) (36246)

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

Instructions to the candidates :

1) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Question No. 2 to Question No.5.***
3) ***Question No. 2 to Question No.5 carry equal marks.***

Q1) **Attempt any FIVE of the following.**

a) What are three major routes of bioremediation? **[1]**

b) What is Rhizofiltration in phytoremediation? **[1]**

c) What is the function of UASB reactor? **[1]**

d) What are the three types of biosensor? **[1]**

e) Define potable water. **[1]**

f) What is the purpose of bioindicators? **[1]**

Q2) **Answer the following.**

a) Explain in detail concept and types of phytoremediation. **[6]**

b) What is mean by biomass gassification? **[4]**

Q3) **Answer the following.**

a) What is the difference between filtration and bio filtration? **[6]**

b) How do aquatic plants improve water quality? **[4]**

P.T.O.

Q4) **Answer the following.**

a) Explain in detail process of Biosorption of metal. **[6]**

b) What is the difference between aerobic and anaerobic bioremediation. **[4]**

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

a) Biostimulation. **[2½]**

b) Microbes used for bioteaching. **[2½]**

c) Activated sludge. **[2½]**

d) Microbes for pollution a batement. **[2½]**

e) Oxic and anoxic degradation of Xenobiotics. **[2½]**

f) Design of digester biomethanation. **[2½]**

Total No. of Questions : 5]

SEAT No. : ____

PD-871

[Total No. of Pages : 2

[6467]-820

T.Y. B.Sc.

ENVIRONMENTAL SCIENCE

EVS - 3613 - Solid Waste Management

(2019 Pattern) (Semester - VI) (362410)

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

Instructions to the candidates:

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

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

a) What is meant by solid waste?

b) What is landfill leachate?

c) What is industrial waste?

d) Define Biomedical Waste?

e) What is 4 R strategies?

f) What is RDF?

Q2) Answer the following :

a) Write types of solid waste and it's effects on environment plant and human health? **[6]**

b) Explain thermal treatment for solid waste? **[4]**

Q3) Answer the following :

a) Describe different techniques used for disposal of solid waste? **[6]**

b) What are drawbacks in solid waste management techniques? **[4]**

P.T.O.

Q4) Answer the following :

a) Discuss energy recovery from solid waste? **[6]**

b) Explain integrated waste management? **[4]**

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

a) Hazardous Waste.

b) Composting

c) Effluent treatment plant

d) Sanitary landfill

e) Mining Waste

f) Sources of solid waste

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Total No. of Questions : 5]

SEAT No. :

PD-872

[Total No. of Pages : 2

[6467]-821
T.Y. B.Sc.
ENVIRONMENTAL SCIENCE
EVS 3614 : Urban Ecosystem
(2019 Pattern) (Semester - VI) (362411)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Question No.2 to Question No.5.***
3) ***Question No.2 to Question No.5 carry equal marks.***

Q1) **Attempt any FIVE of the following :**

a) Enlist Four major problem associated with Urbanisation. **[1]**

b) How Urban lifestyle affects Resourse consumption. **[1]**

c) Which year Town planning act came into force? **[1]**

d) What do you meant by urban sustainability? **[1]**

e) What are the natural spaces in the cities? **[1]**

f) Enlist any two spart cities of Maharashtra. **[1]**

Q2) **Answer the following :**

a) What are the causes of urbanisation? With Example explain urban ecosystem. **[6]**

b) What is urban infrastructure? Why it is important? **[4]**

Q3) **Answer the following :**

a) What is scope, importance and threats to nature in city areas? **[6]**

b) What are reasons of urban sprawling? **[4]**

P.T.O.

Q4) **Answer the following :**

a) What is Urban Environmental Governance? How good Governance protects the environment? **[6]**

b) Give brief account on energy consumption scenario of urban areas. **[4]**

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

a) Urban planning **[2½]**

b) Waste disposal problem **[2½]**

c) Urban future **[2½]**

d) Green lungs of city **[2½]**

e) Benefits of Environmental Management. **[2½]**

f) Town planning Act **[2½]**

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Total No. of Questions : 4]

SEAT No. :

PD-873

[Total No. of Pages : 1

[6467]-822

T.Y. B.Sc. (Regulor)

DEFENCE AND STRATEGIC STUDIES

DS 601 : Armed Forces and Disaster Management

(2019 Pattern) (Semester - VI) (36231)

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

Instructions to the candidates :

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

Q1) **Define the following questions** **[5]**

a) What is the concept of disaster risk?
b) Define Biological Disaster.
c) State the Meaning of Meteorological Disaster.
d) Define Industrial Disaster.
e) What is the concept of disaster management?

Q2) **Write short notes on (any two) :** **[10]**

a) Disaster Management Plan
b) Disaster Mitigation
c) Disaster Recovery

Q3) **Attempt the following questions (any two) :** **[10]**

a) What are the main types of disasters?
b) Explain the Importance of Team-Building in Disaster Management.
c) State the Emerging Trends in Disaster mitigation.

Q4) **Answer in details (any one) :** **[10]**

a) Explain the public health system's role in disaster management prevention.
b) How many types of disasters are classified?

Total No. of Questions : 4]

SEAT No. : ____

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[Total No. of Pages : 2

[6467]-823

T.Y. B.Sc. (Regular)

DEFENCE AND STRATEGIC STUDIES

DS 602 : United Nation Organization Part - II

(2019 Pattern) (Semester - VI) (36232)

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

Instructions to the candidates:

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

Q1) **Define the following questions.** **[5]**

a) What is peacekeeping? and where the UN is currently doing?

b) What is International law?

c) What do you mean by sustainable development?

d) State the Function of the UN.

e) What do you mean by arms control?

Q2) **Write short notes on (any two) :** **[10]**

a) Member state

b) Main Bodies

c) UDHR

P.T.O.

Q3) **Attempt the following questions (any two) :** **[10]**

a) Explain the role of the UN peacekeeping force?

b) Role of the UN for maintaining peace.

c) State the Future Threats in Globalization.

Q4) **Answer in details (any one) :** **[10]**

a) What is the main goal of arm control?

b) What is the main goal of sustainable development?

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Total No. of Questions : 4]

SEAT No. : ____

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[Total No. of Pages : 2

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T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 603 : International Relation (Part - II)

(2019 Pattern) (Semester - VI) (36233)

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

Instructions to the candidates:

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

Q1) **Define the following questions:** **[5]**

a) Define state.

b) Define Nation State.

c) Write the best definition of Nation?

d) Define Sovereignty.

e) State the Function of Nonalignment.

Q2) **Write short notes on (any two) :** **[10]**

a) Liberalisms

b) Normative Approaches

c) Feminist Theories

P.T.O.

Q3) **Attempt the following questions (any two) :** **[10]**

a) State the importance of international relations?

b) Explain the Traditional Approaches in International Relations.

c) Scientific Approaches in International Relations.

Q4) **Answer in details (any one) :** **[10]**

a) Explain the role of the Economic and Social Council.

b) What are the types of international relations?

▽▽▽▽

Total No. of Questions : 4]

SEAT No. :

PD-876

[Total No. of Pages : 1

[6467]-825

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS 604 : Counter Terrorism

(2019 Pattern) (Semester - VI) (36234)

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

Instructions to the candidates :

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

Q1) **Define the following questions** **[5]**

a) Define Relations.
b) What's the definition for military?
c) Define Cross border terrorism.
d) State the role of law enforcement mechanism of India.
e) Define counter Terrorism.

Q2) **Write short notes on (any two) :** **[10]**

a) Counter Terrorism
b) International Community
c) Terrorism

Q3) **Attempt the following questions (any two) :** **[10]**

a) What is the role of the international community?
b) Explain the History of conflicts in north east India.
c) State the Role of Paramilitary in Counter Terrorism.

Q4) **Answer in details (any one) :** **[10]**

a) Explain the terrorist groups role in Jammu and Kashmir.
b) Explain the insurgent groups role in the North east?

Total No. of Questions : 4]

SEAT No. : ____

PD-877

[Total No. of Pages : 4

[6467]-826

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS 606 (A) Major Global Conflict - II

(2019 Pattern) (Semester-VI) (36236A)

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

Instructions to the candidates:

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

Q1) **Define the following questions** **[5 × 1 = 5]**

a) Why does China grow faster than India?

b) Define global environmental issues.

c) What is the Nuclear Deal?

d) Define Global Warming.

e) What is the issue with the US and Iran?

Q2) **Write short notes on (any two) :** **[10]**

a) Doklam Issue

b) Nuclear Deal

c) Galwan Valley Conflict

P.T.O.

Q3) **Attempt the following questions (any two) :** **[10]**

a) State the Iran USA Conflict Present Status.

b) Explain the Role of the UN in Environmental Issues.

c) When did the India China border dispute start?

Q4) **Answer in details (any one) :** **[10]**

a) What arc the main environmental issues?

b) Describe the Chinese Maritime disputes with Japan.

Total No. of Questions : 4]

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[6467]-826

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS 606 (B) Regional Security System - II

(2019 Pattern) (Semester-VI) (36236B)

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

Instructions to the candidates:

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

Q1) **Define the following questions** **[5 × 1 = 5]**

a) Define SCO

b) What is regional security?

c) What is Security?

d) How many countries are in Quad?

e) Define BRICS.

Q2) **Write short notes on (any two) :** **[10]**

a) BIMSTEC

b) SCO

c) BRICS

Q3) **Attempt the following questions (any two) :** **[10]**

a) What is the purpose of regional security alliances?

b) State the Development of BIMSTEC.

c) Explain the Role of BRICS.

Q4) **Answer in details (any one) :** **[10]**

a) State the Origin and Development of BIMSTEC.

b) Explain the structure, Objectives of QUAD.

Total No. of Questions : 4]

SEAT No. : ____

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[Total No. of Pages : 2

[6467]-827
T.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS607(A) : India's Maritime Security - II
(2019 Pattern) (36237A) (Semester - VI)

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

Instructions to the candidates:

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

Q1) Define the following questions. **[5 × 1 = 5]**

a) Define maritime security.

b) What do you mean by security?

c) What is the purpose of security?

d) Define Environment.

e) Define Naval Strategies.

Q2) Write short notes on (any two) : **[10]**

a) Maritime Security

b) Maritime Strategy

c) Indian Ocean

Q3) Attempt the following questions (any two) : **[10]**

a) What are some examples of maritime Security?

b) Explain the Maritime Security Strategy under British-Indian Era.

c) Explain the Naval Strategy of the USA.

Q4) Answer in details (any one) : **[10]**

a) Which country has the best maritime security?

b) Describe in detail the Strategic Culture of the Indian Ocean.

P.T.O.

Total No. of Questions : 4]

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[6467]-827
T.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS607(B) : Peace and Conflict Studies - II
(2019 Pattern) (36237B) (Semester - VI)

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

Instructions to the candidates:

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

Q1) Define the following questions. **[5 × 1 = 5]**

a) What is peace?

b) Define conflict.

c) What is positive peace building?

d) Why is Defence important?

e) Define Conflict Studies.

Q2) Write short notes on (any two) : **[10]**

a) Cultural Identity

b) Conflicts

c) Conflict Resolution

Q3) Attempt the following questions (any two) : **[10]**

a) How can we improve our defence?

b) State the Conflicts within States: Nation-State (Nationalism).

c) What are the pillars of peace building?

Q4) Answer in details (any one) : **[10]**

a) Explain the U.N. System; Peacekeeping and Peacemaking Missions.

b) What are the main challenges to peace building?

Total No. of Questions : 4]

SEAT No. : ____

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[Total No. of Pages : 4

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T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS 608 (A) : Indian Military History (1947 - 2020)

(2019 Pattern) (Semester-VI) (36238A)

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

Instructions to the candidates:

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

Q1) **Define the following questions:** **[5 × 1 = 5]**

a) What does military mean?

b) Define History.

c) What is Military History?

d) What are the types of military?

e) Who runs the military?

Q2) **Write short notes on (any two) :** **[10]**

a) Indo-Pak War of 1947.

b) India-China war of 1962.

c) Indo-Pak war of 1965.

P.T.O.

Q3) **Attempt the following questions (any two) :** **[10]**

a) Write the causes of the Indo-Pakistani war of 1947?

b) Write the causes of the India-China war of 1962?

c) Explain the Causes of 1965 Indo-Pak war.

Q4) **Answer in details (any one) :** **[10]**

a) Explain the effects of the India- China war in 1962.

b) Explain in detail the Effect of the 1971 war.

Total No. of Questions : 4]

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[6467]-828

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS 608 (B) : British Indian Military History

(2019 Pattern) (Semester-VI) (36238B)

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

Instructions to the candidates:

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

Q1) **Define the following questions:** **[5 × 1 = 5]**

a) What do you mean by military history?

b) What do you mean by nationalism?

c) Define Swadeshi Movements.

d) What is Revolt?

e) Define Gandhian Nationalism.

Q2) **Write short notes on (any two) :** **[10]**

a) British Indian Military History

b) Modern India

c) Characteristics of nationalism?

Q3) **Attempt the following questions (any three) :** **[10]**

a) Which was the first revolutionary movement in India?

c) Explain the Causes of the 1857 Revolt.

d) What is the main idea of nationalism?

Q4) **Answer in details (any one) :** **[10]**

a) What are the types of revolutionary movements?

b) What are the sources of military history?

Total No. of Questions : 4]

SEAT No. : ____

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[6467]-829

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS 609 (A) : Cold War and Post Cold War (1945-1991)

(2019 Pattern) (Semester-VI) (36239A)

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

Instructions to the candidates:

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

Q1) **Define the following questions :** **[5 × 1 = 5]**

a) Define War.

b) What is the Cold War?

c) Define Post Cold War.

d) What is defence?give an example?

e) What do you mean by security?

Q2) **Write short notes on (any two) :** **[10]**

a) War

b) Cold War

c) Post Cold War

P.T.O.

Q3) **Attempt the following questions (any two) :** **[10]**

a) Explain the Meaning and Concept of the Cold war.

b) What really caused the Cold War?

c) State the Economic Impact of the Cold War.

Q4) **Answer in details (any one) :** **[10]**

a) How did the Cold War develop between 1945 and 1953?

b) Explain in detail the Third Phase of the Cold War 1963-1989.

Total No. of Questions : 4]

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[6467]-829

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS 609 (B) : India's Defence Policy

(2019 Pattern) (Semester-VI) (36239B)

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

Instructions to the candidates:

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

Q1) **Define the following questions :** **[5 × 1 = 5]**

a) What do you mean by policy?

b) What is Defence Policy?

c) Define Defence Collaboration.

d) Can a policy be changed?

e) Define Security.

Q2) **Write short notes on (any two) :** **[10]**

a) Types of policy

b) Defence Collaboration

c) Make In India

Q3) **Attempt the following questions (any two) :** **[10]**

a) Explain the Objectives of Defence Policy.

b) What causes Defence policy to change?

c) State the Principles of Defence Policy.

Q4) **Answer in details (any one) :** **[10]**

a) Explain in detail India's Characteristics of Defence Policy.

b) Explain in detail India's Defence Policy from 1962-1999.

Total No. of Questions : 4]

SEAT No. :

PD-881

[Total No. of Pages : 2

[6467]-830

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS-610 : Introduction to Cyber Security / Information Security

(2019 Pattern) (Semester - VI) (362310)

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

Instructions to the candidates:

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

Q1) **Define the following questions :** **[5 × 1 = 5]**

a) What is media?

b) Define cyber.

c) What is the best definition of information?

d) What does vulnerability mean?

e) Define threat modeling.

Q2) **Write short notes on (any two) :** **[10]**

a) Security Password

b) Cyber security

c) Transmission media

Q3) **Attempt the following questions (any two) :** **[10]**

a) Explain the types of networking.

b) What is meant by a secure network?

c) Describe basic communication systems.

P.T.O.

Q4) **Answer in details (any one) :** **[10]**

a) What are cyber threats explained with examples?

b) Explain in detail Basics of threat and vulnerability.

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Total No. of Questions : 4]

SEAT No. :

PD882

[Total No. of Pages : 1

[6467]-831
T.Y. B.Sc. (Regular)
DEFENCE AND STRATEGIC STUDIES
DS - 611 : Human Rights and India
(2019 Pattern) (Semester-VI) (362311)

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

Instructions to the candidates:

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

Q1) Define the following questions : **[5×1=5]**

a) What is the meaning of human rights?

b) Who gives the concept of Sarvodaya?

c) Write the importance of human rights.

d) State the role of the national human right commission.

e) Who is the current National Commission for Women?

Q2) Write short notes on (any two) : **[10]**

a) Charter of Indian Rights.

b) National Commission for Women.

c) National Minorities Commission.

Q3) Attempt the following questions (any two) : **[10]**

a) What are the basic principles of human rights?

b) State the role of Maharashtra State human right commission.

c) State the role of national commission for scheduled caste and scheduled tribes.

Q4) Answer in details (any one) : **[10]**

a) Explain the concept and meaning of Sarvodaya.

b) Explain in detail the judicial organs of India.

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Total No. of Questions : 5]

SEAT No. :

PD883

[Total No. of Pages : 2

[6467]-832
T.Y. B.Sc. (Regular) (Vocational)
BIOTECHNOLOGY
VBt - 321 : Biotechnology in Agriculture and Environment
(CBCS 2019 Pattern) (Semester-VI) (Paper - V) (36571)

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

Instructions to the candidates:

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

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

a) Give any one application of phytoremediation.

b) Name any two micro-organisms involved in microbial hydrogen gas production.

c) Enlist any two ex-situ methods of bioremediation.

d) Name any two bacteria involved in nitrogen fixation.

e) What are recalcitrants?

f) Name any two types of biosensors.

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

i) Give any three applications of biosensors.

ii) Describe the process of biodegradation of atrazine.

iii) Write a short note on golden rice.

b) Write a short note on Azolla-Anabaena as biofertilizers. **[4]**

OR

Enlist the advantages of biopesticides.

P.T.O.

Q3) a) Write short notes on the following : **[6]**

i) Phyto Volatilization.

OR

ii) Process of biogas production.

b) Write a short note on biopile process of bioremediation. **[4]**

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

i) Enlist any two methods of in-situ bioremediation. Give the applications of bioremediation.

ii) Explain any two important classes of enzymes involved in phytodegradation.

iii) Define the term gasohol. Name any two micro-organisms involved in bioethanol production.

iv) What do you understand by biosensors? Explain any two components of biosensors along with their functions.

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

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

a) Properties of an ideal biopesticide.

b) Nitrogen fixation.

c) PNP.

d) Nitrogenase enzyme.

e) Antisense RNA technology.

f) Applications of phytoremediation.

Total No. of Questions : 5]

SEAT No. :

PD884

[Total No. of Pages : 2

[6467]-833
T.Y. B.Sc. (Regular) (Vocational)
BIOTECHNOLOGY
VBt-322-SEC-I: Bioentrepreneurship SEC-II Biotechnology for Health
(2019 CBCS Pattern) (Semester - VI) (Paper - VI) (36572)

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) Give any two functions of IBC.

b) What are biosensors?

c) Give functions of theraputic enzymes.

d) Define nanoparticles.

e) Give any two functions of FDA.

f) What is Healthcare Biotechnology.

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

i) What is IAEC? Give its composition.

ii) What is enzyme therapy? Explain any one example of enzyme therapy.

iii) What is tissue engineering. Discussing role of tissue engineering in biotechnology.

b) Answer any one of the following: **[4]**

i) Discuss Identification of opportunities in different business development.

ii) Explain in detail any two types of business attributes.

P.T.O.

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

i) What are biomedical devices? Give their applications.

ii) Explain the concept of stencells. Give any four properties of stencells.

iii) What is the role of DIC in promoting business?

b) Answer any one of the following: **[4]**

i) Comment your views on Genomic & personalized medicines.

ii) Give brief introduction to IBSC. Discuss its role in detail.

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

i) Explain in detail project report and project formulations.

ii) Comment on FDA as Government regulatory authority.

iii) What are business organisations? Explain there role in business development.

b) Answer any one of the following: **[4]**

i) Explain concept and role of Genomic medicine in biotechnology.

ii) What is market survey? Give its significance.

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

a) Partnership Development in business.

b) NCIC role.

c) Alginate hyase in enzyme therapy.

d) Biosensors.

e) Skills of entrepreneurs.

f) Sole Proprietorship.

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Total No. of Questions : 5]

SEAT No. :

PD885

[Total No. of Pages : 2

[6467]-834

T.Y. B.Sc. (Regular) (Vocational)

SEED TECHNOLOGY

ST - 3.4 : Seed Farm Management, Processing and Storage

(2019 Pattern) (Semester-VI) (2 Credits) (36891) (Paper-V)

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

Instructions to the candidates:

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

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

a) What is grading?

b) What is chemical seed treatment?

c) What is agricultural economics?

d) What do you mean by seed marking?

e) Define seed.

f) What is seed conditioning?

Q2) a) Define seed storage. Write in detail methods of seed storage. **[6]**

b) What is seed treatment? Describe in detail methods of seed treatment. **[4]**

P.T.O.

Q3) a) What is seed processing? Draw the layout of seed processing plant. **[6]**

b) Write difference between farm management and agricultural economics. **[4]**

Q4) a) Comment on seed organization in seed marketing. **[6]**

b) What is farm business? Write comparison of general and specialized farming. **[4]**

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

a) Grading.

b) Seed treating equipments.

c) Bagging and its methods.

d) Seed drying and cleaning.

e) Seed marketing and its components.

f) Maintenance and management of seed processing plant.

Total No. of Questions : 5]

SEAT No. : ____

PD886

[Total No. of Pages : 2

[6467]-835
T.Y. B.Sc. (Regular) (Vocational)
SEED TECHNOLOGY
ST-3.5: Biotechnology and Intellectual Property Rights
(2019 Pattern) (Semester - VI) (Paper - VI) (36892)

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) Give two applications of plant tissue culture.

b) What is a Recombinant DNA technique?

c) Which medium is used for Banana culture.

d) What is Transgenics.

e) Which chemicals are used in production of Artificial seed?

f) Enlist the branches of Biotechnology.

Q2) a) Explain Embryogenesis. **[6]**

b) Give scope of Biotechnology. **[4]**

Q3) a) Explain caulogenesis. **[6]**

b) Give details of plant tissue culture medium. **[4]**

Q4) a) Explain tissue culture techniques in Banana. **[6]**

b) Give details of PCR technique. **[4]**

P.T.O.

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

a) Artificial seed.

b) Sterilization techniques.

c) Need of intellectual property Right.

d) Southern Blotting.

e) Right of patentee.

f) Benifits of synthetic seeds.

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Total No. of Questions : 5]

SEAT No. :

PD887

[Total No. of Pages : 2

[6467]-836

T.Y. B.Sc. (Regular) (Vocational)

INDUSTRIAL MICROBIOLOGY

IMB - 365 : Bioentrepreneurship and IPR

(CBCS 2019 Pattern) (Semester-VI) (Paper-V) (36825)

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

Instructions to the candidates:

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

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

a) Define sole proprietership.

b) What is WIPO?

c) State role of entrepreneurship in market.

d) What is small-scale industry?

e) State importance of marketing.

f) What are Patents?

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

i) Enlist six characteristics of entrepreneur.

ii) Explain the concept of marketing mix.

iii) How can one obtain funds for a start-up?

b) Explain Trade marks and Trade secrets. **[4]**

P.T.O.

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

i) Explain Geographical Indications.

ii) What is a Limited Company?

iii) Why do business need finance?

b) Enlist and explain types of entrepreneurs. **[4]**

Q4) a) Solve any two : **[6]**

i) Write a brief account on market segmentation.

ii) Explain 'Cashflow'.

iii) Discuss Business Plan - it's construction and enlist important points.

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

Q5) Solve any Four : **[10]**

a) Commercialization of IP (Intellectual Property).

b) Government funding organisations.

c) LLP.

d) Business oppourtunity.

e) Co-operative society.

f) SIDBI.

Total No. of Questions : 5]

SEAT No. : [ ]

PD888

[Total No. of Pages : 2

[6467]-837
T.Y. B.Sc. (Regular)
INDUSTRIAL MICROBIOLOGY
IMB-366: Recombinant DNA Technology
(2019 Pattern) (Semester - VI) (36826) (Vocational) (Paper - VI)

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

Instructions to the candidates:

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

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

a) Define Electroporation.

b) Who invented PCR.

c) Write recognition sequence for Ban HI.

d) State importance of lambda M13 vector.

e) State importance of phosphatase enzyme in molecular cloning.

f) Which sequencing technique involves use of luciferase enzyme?

Q2) a) Solve any two. **[6]**

i) Explain Polymerase Chain reaction diagrammatically.

ii) Explain Maxam & Gilbert sequencing.

iii) Describe the process of molecular cloning diagrammatically.

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

Q3) a) Solve any two. **[6]**

i) Explain Reverse transcriptase PCR.

ii) What is site - directed mutagenesis? Discuss advantages & applications.

iii) Explain process of cloning strategy in BAC vector.

b) Write short note on Replica plate technique. **[4]**

P.T.O.

Q4) a) Solve any two. **[6]**

i) Write a short account on different types of enzymes used in RDT.

ii) Discuss impact of DNA fingerprinting on modern day forensic science.

iii) Write a short note on Human Genome Project.

b) Give a brief account on screening & selection of transformants in cloning. **[4]**

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

a) Fetal DNA Analysis.

b) Generation of different biomolecules using RDT.

c) Metagenomics.

d) Restriction digestion.

e) Plasmids.

f) Primers used in Polymerase Chain Reaction.

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Total No. of Questions : 5]

SEAT No. :

PD-889

[Total No. of Pages : 2

[6467]-838

T.Y. B.Sc. (Vocational)

INDUSTRIAL MICROBIOLOGY

IMB-3610 SEC : Introduction to Bioinformatics

(2019 Pattern) (CBCS) (Semester - VI) (368210) (Paper - V)

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

Instructions to the candidates:

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

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

a) Write full form of BLAST.

b) Give an example of a search engine used in bioinformatics.

c) What is sequence alignment?

d) State an example of genomic database.

e) What is a phylogenetic tree?

f) What are homologous DNA sequences?

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

i) Describe types and importance of sequence alignment.

ii) Describe different types of databases used in bioinformatics.

iii) What is Global alignment? Explain.

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

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

i) Enlist different applications of Bioinformatics.

ii) Write a short note on importance and built-up of phylogenetic tree.

iii) Explain shortcomings of bioinformatics.

b) Enlist and describe different data submission tools. **[4]**

P.T.O.

Q4) a) Solve any two : **[6]**

i) Discuss impact of bioinformatics on modern day science.

ii) Discuss role of bioinformatics in culture independent approach.

iii) Write a short note on scoring matrices used in bioinformatics.

b) What is MEGA? State importance & applications of the software. **[4]**

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

a) Pair-wise alignment

b) Motifs

c) KEGG

d) Multiple sequence alignment

e) Structure database

f) Gen bank

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