Total No. of Questions : 4]

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PC-1427

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T.Y. B.Sc. (Regular)

MATHEMATICS

DSE-4A MT-361 : Complex Analysis

(2019 Pattern) (CBCS) (Semester - VI) (Paper - I) (36111)

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

Instructions to the candidates :

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

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

a) Is $f(z) = \overline{z}$ an analytic function? Justify.

b) Show that $\log(-1) = \pi i$.

c) State Cauchy - Riemann equations in polar form.

d) Evaluate the integral $\int_0^1 (1+it)dt$.

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

f) Evaluate, $\int_C e^z dz$, where C is the unit circle $|z| = 1$.

g) Write the Maclaurin series expansion of $\dfrac{1}{1-z}, (|z| < 1)$.

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

i) If a function $f(z) = u(x, y) + i\,v(x, y)$ is analytic in a domain D, then prove that its component functins u and v are harmonic in D.

ii) If a function $f(z)$ is continous and nonzero at a point Z_0, then show that $f(z) \neq 0$ throughout some neighbor hood of that point.

P.T.O.

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

i) Show that

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

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

ii) Show that $\lim_{z\to 0}\left(\frac{z}{\bar{z}}\right)^2$ does not exist.

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

i) Let *f* be analytic everywhere inside and on a simple closed contour C taken in positive sense. If Z_0 is any point interior to C, then show that $f(z_0) = \frac{1}{2\pi i}\int_C \frac{f(z)}{z - z_0}dz$.

ii) 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 <u>One</u> of the following :** **[5]**

i) Evaluate $\int_C (y - x - 3x^2 i)dz$, where C is the contour consisting of straight line segments from 0 to *i* and *i* to 1 + *i*.

ii) Let C be the arc of the circle |z| = 2 from *z* = 2 to *z* = 2*i* that lies in the first quadrant, taken in the counter clock-wise direction. Show that $\left|\int_C \frac{z+4}{z^3 - 1}dz\right| \le \frac{6\pi}{7}$.

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

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

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

ii) Explain three types of isolated singularities with illustrations.

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

i) Give two Laurent series expansions in powers of z for the functin $f(z) = \frac{1}{z^2(1-z)}$ and specify the regions in which those expansions are valid.

ii) Using the Cauchy's residue theorem, evaluate the integral of $f(z) = \frac{z+1}{z^2-2z}$ around the circle $|z| = 3$ in the positive sense.

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Total No. of Questions : 4]

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[6327]-302
T.Y. B.Sc.
MATHEMATICS
MT-362 : Real Analysis - II (Paper - II)
(2019 Pattern) (Semester - VI) (36112) (Regular)

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

Instructions to the candidates:

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

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

i) If A = set of integers then show that m(A) = 0.

ii) If m(A) > 0 and B $\subset$ A such that m(A – B) = 0 then show that m(B) cannot be zero.

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

iv) What is the Weierstrass M-test used for?

v) State fundamental theorem of Calculus.

vi) Using p-test, check the convergence of the integral $\int_{1}^{\infty} \frac{1}{\sqrt{x}} dx$

vii) Give an example of sequence of function which is convergent but not uniformely convergent.

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

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

ii) If f is bounded function defined on closed and bounded interval $[a, b]$. Then show that, $f \in R[a, b]$ if and only if for each $\varepsilon > 0$ there exist a subdivision σ of $[a, b]$ such that $U[f ; \sigma] < L[f ; \sigma] + \varepsilon$

P.T.O.

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

i) If $f(x) = x$ defined on [0, 1] and $\sigma=\left\{0, \frac{1}{5}, \frac{2}{5}, \frac{3}{5}, \frac{4}{5}, 1\right\}$ be the subdivision of [0, 1]. Then compute U[f ; σ] and L[f ; σ]

ii) Evaluate the following limit $\lim_{n\to\infty} \frac{1}{n}\left(e^{2/n} + e^{4/n} + ... + e^{2n/n}\right)$

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

i) State and prove second fundamental theorem of Calculus.

ii) State and prove Cauchy Criterian for uniform convergence of real valued functions.

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, ∞] is convergent

ii) Show that $f_n(x) = \frac{x}{n} e^{-x/n}$ defined on [0, 10] is uniformely convergent.

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

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

ii) Prove that of $\int_a^b |f|$ converges absolutely then $\int_a^b f$ is also converges.

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

i) Show that the integral $I = \int_{\pi}^{\infty} \frac{\sin x}{x} dx$ is conditionally convergent.

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

Total No. of Questions : 4]

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T.Y. B.Sc.
MATHEMATICS
MT-363 : Ring Theory (Paper - III)
(2019 Pattern) (CBCS) (Semester VI) (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) Describe all units in the ring $R = \mathbb{Z} \times \mathbb{Z}$.

b) Define ring homomorphism.

c) Find all idempotents in the ring $\mathbb{Z}_6$.

d) Give an example of commutative ring with unity and with zero divisor.

e) Find the isomorphic ring

$$\frac{R}{R} \cong ?, \quad \frac{R}{\langle 0 \rangle} \cong ?$$

f) Find sum and product of the polynomial $f(x) = 4x - 5$, $g(x) = 2x^2 - 4x + 2$ in $\mathbb{Z}_8[x]$.

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

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

i) If R is a ring with additive identity O, then show that for any a, b ∈ R

(1) $O \cdot a = a \cdot O = O$

(2) $a(-b) = (-a)(b) = -(a\ b)$

(3) $(-a)(-b) = ab$

ii) Show that characteristics of an integral domain D must be either 'O' or a prime P.

P.T.O.

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

i) Show that $a^2 - b^2 = (a + b)(a - b)$ for all a and b in the ring R if and only if R is commutative ring.

ii) Determine whether the mapping $\phi : \mathbb{C} \to M_2(\mathbb{R})$ given by,

$$\phi(a+ib)=\begin{pmatrix} a & b \\ -b & a \end{pmatrix}$$ is homomorphism.

if yes, find the kernel ϕ.

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

i) An element 'a' of a ring R is idempotent if $a^2 = a$. Show that a division ring contains exactly two idempotent element.

ii) Show that if D is UFD, then D(x) is a UFD.

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

i) Find the linear factorization of the polynomial $x^3 + 2x^2 + 2x + 1$ in $\mathbb{Z}_7[x]$.

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

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

i) Let D be PID. Show that every element in D neither 'O' nor a unit is product of irreducibles.

ii) Prove that every Euclidean domain is principal ideal domain.

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

i) Show that the polynomial $\phi_p(x)=\frac{x^p-1}{x-1}=x^{p-1}+x^{p-2}+....+x+1$ is irreducible over $\mathbb{Q}$ for any prime P.

ii) Consider $\alpha = 7 + 2i$ and $\beta = 3 - 4i$ in $\mathbb{Z}$ [i] find σ and ρ in $\mathbb{Z}$ [i] such that $\alpha = \beta\sigma + \rho$ with $N(\rho) < N(\beta)$

Total No. of Questions : 4]

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PC1430

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T.Y.B.Sc. (Regular)

MATHEMATICS

MT364 : Partial Differential Equations

(2019 CBCS 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: **[5×1=5]**

a) Write the parametric equations of the spherical surface $x^2 + y^2 + z^2 = a^2$.

b) Classify the differential equation $(n-1)^2 \frac{\partial^2 z}{\partial x^2} - y^{2n} \frac{\partial^2 z}{\partial y^2} = n y^{2n-1} \frac{\partial z}{\partial y}$.

c) State the necessary and sufficient conditions for the integrability of the pfaffian differential equation.

d) Obtain the differential equation by eliminating the constants a and b from the equation $ax^2 + by^2 + z^2 = 1$.

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

f) Explain the classification of second order partial differential equation of the type $Rr + Ss + Tt + f(x, y, z, p, q) = 0$.

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

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

i) State and prove the necessary and sufficient condition for the pfaffian differential equation $x.dr = 0$ should be integrable.

ii) Prove that a necessary and sufficient condition for the existance of a relation $F(u, v) = 0$ between two funcitons $u(x, y)$ and $v(x, y)$ is that $\frac{\partial(u,v)}{\partial(x,y)} = 0$.

P.T.O.

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

i) Find the integral curves of the equations $\frac{dx}{x+z}=\frac{dy}{y}=\frac{dz}{z+y^2}$.

ii) Determine whether the equation $ydx + xdy + 2zdz = 0$ is integrable and find the solution if it exist.

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

i) If $(\beta_r D+\gamma_r)$ is a factor of $F(D,D')$ and $\phi_r(\xi)$ is an arbitrary function of the single variable ξ and $\beta_r \neq 0$ then prove that $u_r = e^{\left(\frac{-\gamma_r y}{\beta_r}\right)}\phi_r(\beta_r x)$ is a solution of $F(D,D')z=0$.

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

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

i) Reduce the equation $\frac{\partial^2 z}{\partial x^2}+2\frac{\partial^2 z}{\partial x \partial y}+\frac{\partial^2 z}{\partial y^2}=0$ to cannonical form and hence solve it.

ii) Solve the equation $\frac{\partial^4 z}{\partial x^4}+\frac{\partial^4 z}{\partial y^4}=2\frac{\partial^4 z}{\partial x^2 \partial y^2}$.

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

i) By using separation of variable method solve $\frac{\partial T}{\partial t}=k\frac{\partial^2 T}{\partial x^2}$.

ii) If the operator $F(D,D')$ is reducible then prove that the order in which the linear factors occur is unimportant.

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

i) 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 $x + y = 0$ $z = 1$.

ii) Find the solution of the equation $\frac{\partial^2 z}{\partial x^2}-\frac{\partial^2 z}{\partial y^2}=x-y$.

Total No. of Questions : 4]

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PC1431

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T.Y.B.Sc. (Regular)

MATHEMATICS

MT-365(A) : Optimization Techniques

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

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

Instructions to the candidates:

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

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

a) Represent a parallel activities situation in the network model.
b) Define total float and free float.
c) What is optimum strategy in two person zero sum game.
d) State "No passing Rule" in the sequencing problem.
e) Write the types of failure.
f) Find the Hessian matrix corresponding to the function $f(x, y) = x^3+y^3$.
g) Explain the term saddle point of game.

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

i) Solve the following game by graphical method.

		Player B		
		B_1	B_2	B_3
Player A	A_1	1	–3	7
	A_2	2	4	–6

ii) A firm is considering replacement of a machine, whose cost price is Rs. 12,200 and the scrap value Rs. 200. The running costs are found from experience to be as follows:

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) Explain the rules for constructing the network model.
ii) Explain Newton-Raphson method for finding the stationary point of the function $f(\bar{x})$.

P.T.O.

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

i) Find the optimal sequence to complete the following task on two machine. Also find total elapsed time and idle time for machine I^{st} and II^{nd}.

Task	A	B	C	D	E	F	G	H	I
Machine I	2	5	4	9	6	8	7	5	4
Machine II	6	8	7	4	3	9	3	8	11

ii) Solve the following game.

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

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

i) Explain the algorithm to find optimum sequence for *n* jobs on 2 machines.

ii) A firm has a machine whose purchase price is Rs. 1,00,000. Its running cost and resale price at the end of different years are as follows:

Year :	1	2	3	4	5	6
Running cost (Rs.):	7,500	8,500	10,000	12,500	17,500	27,500
Resale Price (Rs.):	85,000	76,500	70,000	60,000	40,000	15,000

Obtain the economic life of the machine and the minimum average cost.

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

a) A small project is composed of 7 activities whose time estimate are listed in the following table.

Activity	Estimated duration (days)		
	Optimistic(t_o)	Most likely(t_m)	Pessimistic(t_p)
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

i) Draw the project network.

ii) Find expected duration and variance of each activity.

iii) Find expected project length.

iv) What is the probability that project will be completed at least 4 day earliear expected time.

b) i) Construct a polynomial function $f(x)$ having exactly two extreme points viz. $x = 1$ (minima) & $x = 2$ (maxima).

ii) Two players A & B match a coins. If the coins match then A wins Rs. 2, if the coins not match then B wins Rs. 2.

1) Is it a fair game?

2) What is the value of the game?

3) Find optimum strategies for player A & player B.

Total No. of Questions : 4]

SEAT No. :

PC1432

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T.Y.B.Sc. (Regular)

MATHEMATICS

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

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

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

Instructions to the candidates:

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

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

a) Explain the term generalized velocity with an example.

b) Write one limitation of Netwon's second law of motion for solving dynamical problems.

c) State the Brachistochrone problem.

d) State D' Alembert's principle.

e) Give the transformation equations from cylindrical coordinates to rectangular co-ordinates.

f) Write equations of motion for Atwood's Machine with two masses.

g) Give example on cyclic coordinates.

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

i) Find Lagrange's equations of motion for a simple pendulum.

ii) Show that Hamiltonian of a system represents total Energy of the system if it is conservative.

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

i) State generalized mometa and illustrate it with examples.

ii) For a function $f = f(q_j \dot{g}_j, t)$, find Δf. Where q_j are generalized co-ordinates.

P.T.O.

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

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

ii) Find the Hamiltonian for a charged particle in Electromagnetic field.

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

i) Find Hamilton's equations of motion of a particle moving in central force field.

ii) State D'Alembert's principle of virtual work and derive Lagrange's equations of motion from it.

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

i) If $\sum_j P_j dQ_j - p_j dq_j$ is exact differential then show that the transformation $P_j = P_j(p_j, q_j)$, $Q_j = Q_j(p_j, q_j)$ is cannonical.

ii) Use Lagrange's equations of motion to determine the motion of mass m, sliding without friction down an inclined plane of angle α.

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

i) Using Hamilton's principle, prove that the shortest distance between two points in space is straight line joining them.

ii) Classify all type of constraints and illustrate them by example.

Total No. of Questions : 4]

SEAT No. : ____

PC1433

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T.Y.B.Sc. (Regular)

MATHEMATICS

MT-365(C) : Financial Mathematics

(2019 CBCS Pattern) (Semester- VI) (36115C) (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) Explain the term market equilibrium.

b) State the equation to obtain q_m for optimising the profit for a small efficient firm.

c) State the second principle for economics.

d) Suppose the demand function $q^D(p) = \frac{k}{p^c}$, where *k* and c are positive constants. Find demand of elasticity.

e) Explain the term Excise tax with an example.

f) What is meant by Assets for a matrix of returns?

g) Write the expression for Revenue R(q) for any firm.

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

i) The supply and demand sets for a goods are S = {(q,p):q = bp – a} , D = {(q,p):q = c – dp} where a, b, c, d > 0. Suppose the government wishes to raise the revenue by imposing an excise tax on the good. What should be the value of the excise tax? What is the resulting government revenue?

ii) 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?

P.T.O.

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

i) Show that the present value of an annuity of I for N years, given the fixed rate r, is $P = \frac{I}{1+r} + \frac{I}{(1+r)^2} + ... + \frac{I}{(1+r)^N}$.

ii) What are the maximum and minimum values of the function $f(x) = x^3 - 8x^2 + 16x - 1$ in the interval [0, 2]?

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

i) Determine whether the Cobweb model predicts stable or unstable equilibrium for the market with $q^S(p) = 2p - 3$, $q^D(p) = 18 - p$.

ii) Suppose you own a piece of land whose value $v(t)$ after t years is $v(t) = e^{\sqrt{t}}$. Assuming that interest on a bank deposit will be compounded continuously at the equivalent annual rate of 12.5%, write down an expression for the present value of the amount realised by selling the land after t years, and determine the optimum time to sell.

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

i) Suppose the demand set D = {(q,p):q + 5p = 30}, then show that demand is elastic if $3 < p < 6$ and inelastic if $0 \leq p < 3$.

ii) Consider an efficient small firm with cost function $C(q) = 800 + 70q - 12q^2 + q^3$. Find

1) Fixed cost

2) Variable cost

3) Average variable cost

4) Marginal cost

5) Startup point

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

i) Suppose that you won a competition in a national newspaper and you can choose either to receive a lump sum of 1,00,000 now, or a payment of 20,000 at the end of each year for next seven years. Which prize should you choose, assuming that the highest rate you can obtain is a constant 7% over the seven year period?

ii) Integration Incorporation is a monopoly with cost function $C(q) = 100 + 80q + 50q^2 + 0.5q^3$ and the demand set for its product is $D = \{(q,p): 2p + q^2 - 20q = 100\}$. Sketch the graph of the profit function for $q > 0$. Find the level of production which maximises the firms profit, if the upper limit on its output is

1) 30

2) 50

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

i) Suppose the matrix of returns for the Apathian investor is

$$R = \begin{bmatrix} 1.05 & 0.95 \\ 1.05 & 1.05 \\ 1.37 & 1.42 \end{bmatrix}$$

. Show that the porfolio Y = (500 10,000 1,000) is riskless. Find an arbitrage portfolio. Which election might the investor prefer for portfolio Z = (1,000 –2,000 1,000)?

ii) Prove that, at the breakeven point for an efficient small firm, the derivative of average cost is 0.

Total No. of Questions : 4]

SEAT No. : ____

PC1434

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T.Y.B.Sc. (Regular)

MATHEMATICS

MT-366(B) : Computational Geometry

(2019 CBCS 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) Write the transformation matrix for shearing in x and y directions by 3 and –1 units respectively.

b) A circle with circumference 6π cm is uniformly scaled by 3 units. Find the area of transformed figure.

c) Which transformation is solid body transformation?

d) Define : Parallel projection.

e) Write parametric equation of circle.

f) Write any two properties of Bézier curve.

g) Write parametric equation of Bézier curve.

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

i) Prove that mid point of the line segment AB is transformed to the mid point of segment $A'B'$ under 2×2 transformation matrix [T].

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

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

i) Develop a single transformation matrix for the following sequence of transformations:

1) Reflection through the line $y = -x$.
2) Shearing in x and y directions by 3 and -4.
3) Translate in x and y directions by –1 and 2 units respectively. Apply it on the point P[3,–8].

ii) A line $x + y = 3$ is transformed to another line by using 2×2 transformation matrix $[T]=\begin{bmatrix} 1 & 2 \\ 2 & 5 \end{bmatrix}$. Obtain the equation of resulting line.

P.T.O.

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

i) Write an algorithm to generate uniformly spaced 'n' points on the circle $(x - h)^2 + (y - k)^2 = r^{2.}$

ii) Determine the parametric equation of Bézier curve (only $n = 2$)

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

i) Find the parametric equation of a Bézier curve determined by control points $B_0[2\ 1]$, $B_1[4\ 3]$, $B_2[6\ 0.5]$ and hence find the position vector of the point corresponding to parameter value $t = 0.43$.

ii) Obtain 4 uniformly spaced points in the first quadrant of the unit circle with centre at origin.

Total No. of Questions : 4]

SEAT No. : ____

PC1435

[Total No. of Pages :3

[6327]-309

T.Y.B.Sc. (Regular)

MATHEMATICS

MT-366C : Lebesgue Integration

(2019 CBCS 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) Define length of open subset G of [*a*, *b*].

b) True or false? If F is closed subset of [*a*, *b*] such that |F| = 0 then F = ϕ.

c) If $E \subset [a,b]$ such that $\bar{m}E = 0$, then prove that *m*E = 0.

d) Define measurable function defined on [*a*, *b*].

e) Give an example of a nonmeasurable function on [*a*, *b*].

f) Let $f(x) = x^2, x \in [a,b]$. Evaluate $L\int_a^b f$.

g) Let $f(x) = x^4 - 1, x \in [-2,2]$. Find f^+.

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

i) If $E \subseteq [a,b]$ then show that $\bar{m}E + \underline{m}E' = b - a$.

ii) If $f : [a,b] \to R$ is measurable function then prove that f^2 is measurable function.

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

i) If J_1 and J_2 are intervals of real numbers, and if *f* is measurable function of [*a*, *b*], show that $f^{-1}(J_1 \cup J_2)$ is a measurable subset of [*a*, *b*].

ii) Let $f(x) = \frac{1}{x}; (0 < x < 1)$ and *f* (0) = 5, *f* (1) = 7 then show that *f* is measurable function.

P.T.O.

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

i) Let $f:[a,b]\to \mathrm{R}$ be bounded function and P, Q be measurable partitions of [*a*, *b*] then prove that $\mathrm{L}[f,Q]\le \mathrm{U}[f,P]$.

ii) Let $f:[a,b]\to \mathrm{R}$ be bounded function such that $f \in$ R [*a*, *b*]. Show that $f \in$ L[*a*, *b*].

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

i) Let $f(x) = 2 (0 \le x < 1)$

$= 4 (1 \le x < 2)$

$= 3 (2 \le x < 3)$

$= 2 (3 \le x \le 4)$

Let $E_k = f^{-1}([k,k+1))\ (k = 2,3,4)$ and $\mathrm{P} = \{E_2, E_3, E_4\}$ calculate U[*f* ; *p*] and L[*f* ; *p*].

ii) Let $f(x) = 4, x \in [-8, 8]$ is irrational number

$= -4, x \in [-8, 8]$ is rational number.

Show that $f \notin$ R [–8, 8] but $f \in$ L[–8, 8].

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

i) If E is measurable subset of [*a*,*b*]; *f*, *g* $\in$ L[*a*,*b*] and if $f(x) \le g(x)$ a.e. ($x \in$ E) then show that $\int_E f \le \int_E g$.

ii) Let $f \in L[a,b]$. Then prove that for given $\in > 0$ there exists $\delta > 0$ such that $\left|\int_E f\right| <\in$. Whenever E is measurable subset of [*a*, *b*] with *m*E < δ.

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

i) If $f(x)=\frac{1}{x^p}(0<x\leq 1)$ then prove that $f\in 1[0,1]$ and $\int_0^1 f=\frac{1}{1-p}$ for $p<1$.

ii) Let $f_n(x)=2n\left(\frac{1}{2n}\leq x\leq\frac{1}{n}\right)$,

$$=0,\left[x\in\left(0,\frac{1}{2n}\right)\cup\left(\frac{1}{n},1\right)\right]$$

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

Total No. of Questions : 5]

SEAT No. : ____

PC-1436

[Total No. of Pages : 2

[6327]-310

T.Y. B.Sc. (Regular)

PHYSICS

PHY - 361 : Solid State Physics (Paper - I)

(2019 Pattern) (Semester - VI) (36121)

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

Instructions to the candidates:

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

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

a) Define the fold number with formula.

b) Define the co-ordination number.

c) What is Hall effect?

d) Define the magnetization.

e) Prove that succeptibility of super conductor is - 1.

f) What are the Miller Indices of plane having the intercept $(1,\infty,\infty)$ on three X, Y, and Z axis.

Q2) Solve the following :

a) On the basis of band theory distinguish between insulator, semiconductor and metal **[6]**

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

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

P.T.O.

Q3) Solve the following :

a) Obtain Langevin formula for paramagnetic susceptibility. **[6]**

b) The distance between (1 1 1) plane in face centred cubic crystal is 2Å. Determine the lattice parameter and atomic diameter. **[4]**

Q4) Solve the following :

a) Using Ewarld's construction show that Bragg's diffraction condition is reciprocal lattice is exactly equivalant to condition in direct lattice. **[6]**

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

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

a) State application of X-ray diffraction.

b) Write a note on NEEL Tempreture.

c) Explain Density of crystal.

d) What is symmetry operation?

e) Write a note on diamagnetic material.

f) Give the assumption of classical free electron theory.

Total No. of Questions : 5]

SEAT No. : ____

PC-1437

[Total No. of Pages : 2

[6327]-311

T.Y. B.Sc.

PHYSICS

PHY-362 : Quantum Mechanics

(2019 Pattern) (Semester - VI) (Paper - II) (36122)

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

Instructions to the candidates :

1) ***Que. 1 is compulsory.***
2) ***Solve any three questions form 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) What is wave packet?

b) Define eigen value & eigen function.

c) What is free particle?

d) Show that [A, B] = – [B, A].

e) Find the de-Broglie wavelength for 54 volt.

f) Define parity & parity operator.

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

a) i) What is uncertainty principle? Write different forms of uncertainty relation. **[3]**

ii) Find the lowest energy of an electron confined to move in a potential box of 1Å . **[3]**

(Given : m = 9.11×10^{-31} kg, h = 1.054×10^{-34} Js, 1ev = 1.6×10^{-19}C)

b) Obtain the Schrodinger's time depedent equation. **[4]**

P.T.O.

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

a) With the help of time indepedent Schrodinger's equation, obtain the energy eigen value & eigen function of one dimensional potential well. **[6]**

b) Show that - $[L_x, y] = itz$ **[4]**

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

a) i) Show that the group velocity is equal to the particle velocity? **[3]**

ii) Find the current density if the wave function $\psi(x) = Ae^{ikx}$. **[3]**

b) Normalize the wave function $\psi(x) = e^{-\alpha x^2/2}$

The range of x is from $-\infty$ to ∞. **[4]**

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

a) Photoelectric effect **[2½]**

b) Physical interpretation of the wavefunction. **[2½]**

c) The velocity of ocean wave is $\sqrt{\frac{g\lambda}{2\pi}}$. Find the group velocity. **[2½]**

d) Requirements of wavefunction. **[2½]**

e) Determine the parity for the following functions.

$e^{-\alpha r}$, $\cos\theta e^{-\alpha r}$ and $\cos\theta e^{-\alpha r} e^{i\phi}$. **[2½]**

f) Applications of tunneling effect. **[2½]**

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Total No. of Questions : 5]

SEAT No. :

PC-1438

[Total No. of Pages : 2

[6327]-312
T.Y. B.Sc.
PHYSICS
PHY - 363 : Thermodynamics and Statistical Physics
(2019 Pattern) (Semester - VI) (36123)

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

Instructions to the candidates:

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

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

a) Define mean free path.

b) What is boson?

c) Calculate the probability that a dice shows only even number when it is thrown.

d) Define statistical ensemble.

e) Give one application of quantum statistics.

f) State Cyapelon's latent heat equation.

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

a) State Joul Thomson effect. Explain it in detail with suitable digaram. **[6]**

b) Derive an expression of Fermi-Dirac distribution. **[4]**

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

a) Derive an expression of mean square deviation using binomial distribution function in one-dimenssional random walk problem. **[6]**

b) The energy state of a particle moving in a rigid cubic box is specified by the equation $n_x^2 + n_y^2 + n_z^2 = 14$. List the total accessible microstates to the particle. **[4]**

P.T.O.

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

a) Explain Maxwell probability distribution function for ideal gas molecule. **[6]**

b) Find the mean free path of nitrogen molecule from following data : **[4]**

Coefficient of viscosity (η) = 1.69×10^{-7} N-S/m^2

r.m.s velocity of molecule (c) = 4.5×10^{4} cm/S

Density of nitrogen gas (δ) = 1.25 kg/m^3

number of mole cules (n) = 2.7×10^{25}/m^3

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

a) Explain a symmetric wave function.

b) Write postulates of statistical mechanics.

c) Describe thermal interaction in micro canonical ensemble.

d) Derive Maxwell thermodynamic relation using internal energy.

e) If $p = q = \frac{1}{2}$ and N = 400. Find $\overline{n}_2$ and $\overline{m}$ where $\overline{m}$ is mean displacement.

f) State and explain normalisation condition in Gaussian distribution function.

Total No. of Questions : 5]

SEAT No. :

PC1439

[Total No. of Pages :2

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T.Y.B.Sc. (Regular)

PHYSICS

PHY-364 : Nuclear Physics

(2019 Pattern) (Semester- VI) (36124)

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

Instructions to the candidates:

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

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

a) Define radioactivity.

b) Define effective multiplication factor in nuclear reactor.

c) Define mass defect and Binding energy.

d) What is meant by linear accelerator?

e) Complete the reaction

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

f) What is spectroscopic term for L = 1, S = 1, J = 0?

Q2) Answer the following questions.

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

b) Write the difference between nuclear fusion and nuclear fission. **[4]**

Q3) Answer the following question.

a) What is successive disintegration? Derive an expression for the ratio of activity of daughter to the activity of parent. **[6]**

b) If the frequency of the oscillator potential to the dees of a cyclotron is 8 MH_2, what must be the magnetic flux density B to accelerate alpha particles? Given - mass of α - particle = 6.643×10^{-27} kg **[4]**

e = 1.6×10^{-19} C.

P.T.O.

Q4) Answer the following.

a) Show that the Q value is given by **[6]**

$$Q = \left(1 + \frac{m_4}{m_3}\right) E_4 - \left(1 - \frac{m_1}{m_3}\right) E_1 - \frac{2\sqrt{m_1 m_4 E_1 E_4}}{m_3} \cos\theta$$

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

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

a) Explain the half life of a radioactive element and derive expression for it.

b) Write any three differences between G.M counter and scintillation counter.

c) Write a note on spin-dependance of nuclear forces.

d) Write any three conservation laws in nuclear reaction.

e) Calculate the energy released in the reaction ${}_3Li^7 + {}_0n^1 \rightarrow {}_2He^4 + {}_1H^3$.

Given mass of ${}_3Li^7$ - 6.015126 a.m.u.

mass of ${}_2He^4$ - 4.002603 a.m.u.

mass of ${}_1H^3$ - 3.016049 a.m.u.

mass of ${}_0n^1$ - 1.008665 a.m.u.

1 a.m.u. - 931 MeV.

f) Obtain asymmetric energy for nucleus ${}_{52}Te^{120}$.

Given $a_a = 19.0$ MeV.

Total No. of Questions : 5]

SEAT No. :

PC1440

[Total No. of Pages : 4

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T.Y. B.Sc. (Regular)

PHYSICS

PHY - 365 A : ELECTRONICS - II

(2019 Pattern) (CBCS) (Semester - VI) (36125A)

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

***Instructions to the candidates*:**

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

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

a) Convert 11001 Gray code into Binary number.

b) What is electro luminiscence?

c) Define ripple counter.

d) What is mean by standard SOP expression?

e) What is Phase modulation?

f) Draw 2 Variable k-map.

Q2) Attempt the following questions :

a) Explain classification of amplifiers on the basis of position of operating point in detail. **[6]**

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

Q3) Attempt the following questions :

a) Explain internal Block diagram of IC 555. **[6]**

b) When VGS of a JFET changes from –2.2 V to –2.1 V, the drain current changes from 1.1mA to 1.4 mA. Find the Value of transconductance.**[4]**

P.T.O.

Q4) Attempt the following questions.

a) Explain designing of half adder with help of k-map. **[6]**

b) Compare DeMOSFET and EMOSFET. **[4]**

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

a) What is an opto coupler? Write its applications.

b) Write features of 78xx & 79xx series.

c) With help of diagram and truth table explain working of D Flip/Flop.

d) Define and explain common mode rejection ratio of op - amp. (CMRR)

e) Define and explain modulation on index.

f) Write characteristics of ideal op - amp.

Total No. of Questions : 5]

PC1440

[6327]-314

T.Y. B.Sc. (Regular)

PHYSICS

PHY - 365 B : Advanced Electronics

(2019 Pattern) (Semester - VI) (36125B)

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

Instructions to the candidates:

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

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

a) What is stimulated emission?

b) What is quadratic opproximation of resistance of RTD?

c) What is critical frequency in low pass filter?

d) What is signal conditioning?

e) What is mux?

f) What is accelerometer?

Q2) Answer the following :

a) Draw temperature characteristies of the mister .Explain it's working. **[6]**

OR

explain first - order active low pass filter with diagram.

b) The Wheastone bridge has $R_1 = 1000\ \Omega$, $R_2 = 84_2\ \Omega$ and $R_3 = 500\ \Omega$ Find R_4 in the bridge at null condition. **[4]**

Q3) Answer the followigng :

a) Explain how op - amp is used for differentiation of input signal. **[6]**

OR

Explain 2 to 4 line encoder with diagram.

b) Explain Broadband pyrometer. **[4]**

Q4) Answer the following.

a) Explain In strumentation ampliter as thermocouple Signal conditioning with circuit diagram. **[6]**

OR

What is pyrometer? Explain principle of it .

b) Explain working principle of photoconductive cell. **[4]**

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

a) Population inversion.

b) Band pass filter.

c) Multiplexer.

d) Truth table of priority encoder.

e) Process - LAG.

f) Block diagram of process control loop

■■■■

Total No. of Questions : 5]

SEAT No. :

PC1441

[Total No. of Pages :2

[6327]-315

T.Y.B.Sc. (Regular)

PHYSICS

PHY-366(P) : Medical Electronics

(2019 Pattern) (Semester- VI) (36126P)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any 3 question from question 2 to question 5.***
3) ***Questions 2 to question 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 Nernst equation for bio-potential.

b) What is action potential?

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

d) What is patient safety?

e) What is calorimeter?

f) How to measure cardiac output?

Q2) Answer the following questions.

a) Give the analysis of ECG pattern with a neat diagram. **[6]**

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

Q3) Answer the following questions:

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

b) If the systolic blood pressure of the patient is 155 mm Hg and his diastolic pressure is 95 mm Hg then **[4]**

i) What its pulse pressure?

ii) What its mean aertial pressure?

iii) What its condition?

P.T.O.

Q4) Answer the following questions:

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

b) What do you mean by heart sound? Explain its significance. **[4]**

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

a) Origin of bio-electric signals.

b) Piezoelectric sensor.

c) Cardiac monitor.

d) Differential amplifier.

e) Bomb calorimeter.

f) Ultrasonic blood flow meter.

Total No. of Questions : 5]

SEAT No. : ____

PC1442

[Total No. of Pages :2

[6327]-316

T.Y.B.Sc. (Regular)

PHYSICS

PHY-366(Q) : Physics of Nanomaterials

(2019 Pattern) (Semester- VI) (36126Q)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any 3 questions from question 2 to question 5.***
3) ***Questions 2 to questions 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***

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

a) State the principle of scanning electron microscopy.

b) Write any two applications of x-ray diffraction technique.

c) Write two applications of nanomaterials in electronics and IT.

d) Define nanotechnology.

e) What do you meant by thermal stress?

f) What are the carbon nanotubes?

Q2) Answer the following questions.

a) Describe synthesis of nanomaterials using sol-gel method with suitable diagram. **[6]**

b) Explain Energy Dispersive Spectroscopy (EDS) technique. **[4]**

Q3) Answer the following questions:

a) Explain various challenges of nanotechnology. **[6]**

b) Write the applications of nanomaterials in cosmetic products. **[4]**

P.T.O.

Q4) Answer the following questions:

a) Explain quantum dots with neat diagram. Also explain its various applications. **[6]**

b) What is the significance of nanosize materials? **[4]**

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

a) What are the advantages of electrochemical method?

b) State various applications of carbon nanotubes.

c) Draw schematic diagram of SEM.

d) State Bear - Lambert's law for absorptance, transmittance and relfectance.

e) State any three applications of nanomaterials.

f) Write Bragg's law and Scherer formula.

Total No. of Questions : 5]

SEAT No. : ____

PC-1443

[Total No. of Pages : 2

[6327]-317
T.Y. B.Sc.
PHYSICS
PHY-366 R: Microcontroller
(CBCS) (2019 Pattern) (Semester - VI) (36126 R)

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) ***Use of logtable or electronic calculator is allowed.***

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

a) State the function of SP register of 8051 microcontroller.

b) What is the size of DPTR register of 8051 microcontroller.

c) State the function ALE pin of 8051 microcontroller.

d) Give the meaning of CPLA instruction.

e) Upon power up, which register bank is used by 8051 microcontroller?

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

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

i) Explain the function of serial part of 8051 microcontroller and its pins functions.

ii) Explain any two rotation instructions of 8051 microcontroller.

iii) Explain the meaning of MULAB and DIV AB instructions.

b) Explain with neat diagram, the internal RAM structure of 8051 microcontroller. **[4]**

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

i) Write an 8051 assembly language program to add first twenty integers. Store the result in memory at 51H and 52H.

ii) Define the terms

i) Baud rate ii) Simplex

iii) Full duplex

iii) Explain any three assembler directives of 8051 microcontroller.

b) Explain with suitable examples, any four addressing modes used in 8051 microcontroller assembly language. **[4]**

P.T.O.

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

i) Give the different registers used in Timer section of 8051 microcontroller. Explain their function.

ii) Write an assemble language program using 8051 microcontroller instructions to add two 16 bit numbers, 6437H and 87A2H. Store the result at memory location 41H and 42H.

iii) Draw the block diagram of architecture of 8051 micro-controller.

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

i) DEC R6 ii) ORL A, # 68H

iii) CLR A iv) SWAP A

Q5) **Attempt any <u>Four</u> of the following:** **[4 × 2½ = 10]**

a) Write short note on internal interrupts of 8051 microcontroller.

b) Write short note on I/O ports of 8051 microcontroller.

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

d) Compare the function of JUMP and CALL instructions of 8051 microcontroller.

e) Give any five features of 8051 microcontroller.

Total No. of Questions : 5]

SEAT No. : ____

PC-1444

[Total No. of Pages : 2

[6327]-318
T.Y. B.Sc.
PHYSICS
PHY-366 (S): Lasers (Paper-VI)
(2019 Pattern) (Semester - VI) (36126 S)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Q2 to Q5.***
3) ***Q2 to Q5 carry equal marks.***

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

a) Define Coherence lenght?

b) What is pumping?

c) Define FWHM.

d) Give two applications of gas lasers.

e) Calculate intensity of a He-Ne laser beam having emissive power 1mw and wave length 6328×10^{-10}m.

f) Calculate wave length of CO_2 beam having energy difference between two states as 0.117ev.

Q2) **Attempt the following questions.**

a) i) Write short note on laser beam directionality. **[3]**

ii) Explain various techniques of pumpimg. **[3]**

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

Q3) **Attempt the following questions.**

a) i) Explain Inhomogeneous brodening. **[3]**

ii) Explain working of Ruby Laser. **[3]**

P.T.O.

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

Q4) **Attempt the following questions.**

a) i) Write short note on use of laser in cutting of material. **[3]**

ii) Explain characteristics of laser. **[3]**

b) The half width of gain profile of laser material device is 0.003nm. emitted wavelenght of 6328 $\mathring{A}$. Calculate maximum length of cavity in order to single mode of oscillation having refractive index 1. **[4]**

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

a) Explain critical population inversion.

b) Explain Laser beam intensity.

c) Explain uses He-Ne lasers.

d) Explain collision brodening.

e) Explain How hologrem is generated.

f) Write note on optical resonator.

Total No. of Questions : 5]

SEAT No. : ____

PC-1445

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[6327]-319
T.Y. B.Sc.
PHYSICS
PHY-366T: Astronomy and Astrophysics - II
(2019 Pattern) (Semester - VI) (Elective - II) (36126T)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Q2 to Q5.***
3) ***Q2 to Q5 carry equal marks (10 each).***
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) Name few objects which are used for the estimation of distance.

b) What is corona?

c) What will be time required for photon to travel the distance of 1Mpc?

d) What are objectives of CHANDRA telescope?

e) What do you mean by Astronomical coordinate system?

f) What is Sidereal Day?

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

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

b) Explain, with suitable diagram, Astronomical co-ordinate system. **[4]**

P.T.O.

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

a) Why we need space telescopes? Explain construction, working and limitations of any space telescope. **[6]**

b) Write a note on Hubble's law. **[4]**

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

a) Explain basic structure of the milky way. **[6]**

b) Can we use cepheid variables to estimate distance? If yes, How? **[4]**

Q5) **Answer the following questions. (Any Four)** **[10]**

a) With the help of neat and labelled diagram, explain interior of the sun.

b) What do you mean by Space-Time?

c) Stellar processes. (short note)

d) Active Gactic Nucleus. (short note)

e) What are limitations of optical telescopes?

Total No. of Questions : 5]

SEAT No. : ____

PC-1446

[Total No. of Pages : 2

[6327]-320
T.Y. B.Sc.
PHYSICS
PHY-366(U): Renewable Energy Sources - II
(36126 U) (2019 Pattern) (Semester-VI) (Elective-II)

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

Instructions to the candidates:

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

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

a) What is gasifier?

b) What is meant by anaerobic digestion?

c) How wind is formed?

d) What are the various sources of non-conversion energy?

e) What is energy management system?

f) What do you mean by energy auditor.

Q2) **Answer the following questions.**

a) What are advantages and disadvantages of fixed dome and floating type biogas plant? **[6]**

b) Describe various components of wind energy conversion system. **[4]**

Q3) **Answer the following questions.**

a) Discuss thermocell and its applications. **[6]**

b) Discuss the case studies on audit for household application. **[4]**

P.T.O.

Q4) **Answer the following questions.**

a) Discuss geothermal sources and energy conversion. **[6]**

b) What are the classification of wind machine? Explain HAWT with neat diagram. **[4]**

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

a) Energy from Biomass

b) Construction of biogas plant

c) Wind data

d) Advantages and disadvantages of wind energy

e) Tidal energy

f) Objectives of energy saving

Total No. of Questions : 5]

SEAT No. : ____

PC-1447

[Total No. of Pages : 2

[6327]-321
T.Y. B.Sc.
PHYSICS
PHY-366 V: Acoustics - II (Paper - VI)
(2019 Pattern) (Semester-VI)(Elective-II) (36126 V)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Q2 to Q5.***
3) ***Q2 to Q5 carry equal marks.***
4) ***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 of a condensor microphone.

d) Define Phon.

e) What is a tweeter?

f) What are ultra sound transducers?

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 0.9 kg/s. Its radiation resistance and reactance are 2.1 kg/s each. Determine the mechanical impedance at 300Hz, if the stiffness of the cone system 5.1×10^{3} N/m. **[4]**

P.T.O.

Q3) **Answer the following questions:**

a) i) write a note on A- weighted sound level. **[3]**

ii) Write a note on noise induced hearing losses. **[3]**

b) An infinite exponential horn of length 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) i) With the help of a neat diagram explain working of a bass reflex cabinet. **[3]**

ii) Determine the cut-off frequencey of an exponential horn having a flare constant of 4.9 on being used out doors at a temperature of 40°C. **[3]**

b) Write a note on monophonic sound recording system. **[4]**

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

a) Horn Loudspeaker

b) Graphic Equalizer

c) NDT

d) WAV File format

e) Dolby noise reduction system

f) Ultrasonography

Total No. of Questions : 5]

SEAT No. : ____

PC1448

[Total No. of Pages : 2

[6327]-322
T.Y. B.Sc. (Regular)
PHYSICS
PHY-3610 (W) : Scientific Data Analysis Using Python
(2019 Pattern) (Semester - VI) (361210 W)

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

Instructions to the candidates:

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

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

a) What is data structure.

b) Write down the types of data structure.

c) What is library?

d) What type of data is histograms usually used for?

e) What type of language in python?

f) Which are numeric data types?

Q2) Answer the following questions.

a) Explain the applications of matplotlib and seaborn libraries in python. **[6]**

b) What is the difference between list and truples in python? **[4]**

Q3) Answer the following questions.

a) Write short notes on **[6]**

i) Sets

ii) Dictionaries

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

P.T.O.

Q4) Answer the following questions.

a) Explain the logical operators in python brief with example **[6]**

b) What in formation could you gain from box-plot? **[4]**

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

a) What are the steps involved in a data analysis process?

b) Why is data cleansing important for data visualization?

c) What is an outlier?

d) What are the functions available in pandas library?

e) What are the relational operators used for data extraction?

f) What is significance of scatter plot matrix?

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Total No. of Questions : 5]

SEAT No. : ____

PC1449

[Total No. of Pages : 2

[6327]-323
T.Y.B.Sc. (Regular)
PHYSICS
PHY-3610(X): 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 mean by balancing of PV system.

b) What is pyranometer?

c) Define solar array.

d) Give the formula for solar cell efficiency with JV curve.

e) Define solar constant.

f) What do you mean by diffuse radiations.

Q2) Answer the following questions:

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

b) Why the need of solar radiation measurement is important? **[4]**

Q3) Answer the following questions:

a) Write in detail working of solar cell. State types of solar cell. **[6]**

b) What is mean by bybrid PV system Give its importance. **[4]**

P.T.O.

Q4) Answer the following questions:

a) Explain solar PV module parameters with J-V curve. **[6]**

b) Write a short note on solar PV system components. **[4]**

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

a) Explain the Lux meter in brief.

b) Write applications of solar PV system.

c) What is balancing of PV system? State its importance.

d) Write a note on solar radiation on earth surface.

e) Explain on grid and off grid solar PV system.

f) Write short note on charge controller.

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Total No. of Questions : 5]

SEAT No. :

PC1450

[Total No. of Pages : 2

[6327]-324
T.Y. B.Sc. (Regular)
PHYSICS
PHY-3610 (Y) : Application of Internet of Things
(Skill Enhancement Course - III)
(2019 Pattern) (Semester - VI) (361210 Y)

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

Instructions to the candidates:

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

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

a) Define Internet of Things (IoT).

b) Write the name of high-level language.

c) What is cloud computing?

d) What are different components required for IoT device?

e) What are the features of C # programming language?

f) What is mean by M2M?

Q2) Answer the following questions.

a) Describe the physical design of Internet of Things (IoT) **[6]**

b) Explain the data types used in C #. **[4]**

Q3) Answer the following questions.

a) Explain any two IoT communication (Internet of Things) models in details. **[6]**

b) Distinguish between IoT and M2M **[4]**

P.T.O.

Q4) Answer the following questions.

a) Explain storage classes in C # **[6]**

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

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

a) IoT and SCADA

b) IoT in Indian scenario.

c) Requirement of International standard in IoT.

d) IoT standards in practice.

e) IoT for smart water management.

f) IoT for smart cities.

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Total No. of Questions : 5]

SEAT No. : ____

PC1451

[Total No. of Pages : 2

[6327]-325
T.Y. B.Sc. (Regular)
PHYSICS
PHY-3610 (Z) : Calibration Techniques (Skill Enhancement Course - III)
(2019 Pattern) (Semester - VI) (361210 Z)

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 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) What is calibration range?

b) What are the factors affected on calibration of instruments?

c) State the principle of Manometer Pressure gauge.

d) State the principle of capsule pressure gauge.

e) What is meant by harmonic distortion.

f) What is the difference between NTC and PTC?

Q2) Answer the following questions.

a) Explain principle and working of bimetallic thermometer. Give it's applications. **[6]**

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

Q3) Answer the following questions.

a) With the help suitable diagram explain the working of master gauge. **[6]**

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

P.T.O.

Q4) Answer the following questions.

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

b) What is thermoetectric effect? Explain thermocouple is used as a thermometer. **[4]**

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

a) Classification of Instruments.

b) Piezometer Pressure Gauge.

c) Radiation Pyrometer.

d) Diaphragm pressure Gauge.

e) Resistance Temperature Detector (RTD)

f) CRT

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Total No. of Questions : 5]

SEAT No. :

PC1452

[Total No. of Pages : 2

[6327]-326

T.Y. B.Sc. (Regular)

PHYSICS

PHY - 3611 (AA) : Micro Controller

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

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 logtable or electronic calculator is allowed.***

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

a) What is the size of DPTR register of 8051 microcontroller.

b) State the function of ALE pin of 8051 microcontroller.

c) Which registers are used in the LCD module?

d) How (-39) can be represented as signed number?

e) Give the meaning of instruction (PLA instruction).

f) Define the term 'Baud Rate'.

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

a) What is the use of stack pointer in stack? Explain its use in the execution of PUSH instructions.

b) Explain with neat diagram, interfacing of (4×4) keyboard with 8051 microcontroller.

c) Explain the timer section of 8051 microcontroller in brief.

B) Explain with neat diagram, the internal RAM structure of 8051 microcontroller. **[4]**

P.T.O.

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

a) Write an assembly language program to add two 16 bit numbers 3896 H and 4050 H. store the result carry, higher byte and lower byte.

b) Write an assembly language program to add first ten natural numbers which are stored in consecutive memory locations starts at 40H. Store the result carry in register R4 and sum in Rs.

c) Explain the use of various flags of 8051 microcontroller, along with the format of PSW register.

B) Explain with suitable example, any four addressing modes used in 8051 microcontroller assembly language. **[4]**

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

a) Draw the block diagram 8051 microcontroller.

b) What is subroutine? Explain the different instructions used in subroutines.

c) State any two differences between microprocessor and microcontroller.

B) Explain the meaning of following instructions. **[4]**

a) DEC R7

b) ORL A, @R3

c) CLRA

d) SWAPA

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

a) Compare the function of JUMP and CALL instructions of 8051 microcontroller.

b) Write short note on Internal interrupts of 8051 microcontroller.

c) What is the function of Rs pin and Enable pin in LCD interfacing?

d) Write short note on I/O parts of 8051 microcontroller.

e) Give the features of LM35 Sensor.

Total No. of Questions : 5]

SEAT No. : ____

PC1453

[Total No. of Pages : 2

[6327]-327

T.Y.B.Sc. (Regular)

PHYSICS

PHY-3611(AB): Instrumentation For Agriculture

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

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

Instructions to the candidates:

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

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

a) State any Four advantages of biosensors.

b) What are biological properties of soil?

c) What is permeability of soil?

d) Define sucrose or sacchrose.

e) What are Rain gauge devices?

f) What is Biosensors?

Q2) Answer the following questions.

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

b) Explain requirements of sensors in agriculture? **[4]**

Q3) Answer the following questions.

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

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

P.T.O.

Q4) Answer the following questions.

a) Describe sprinkler irrigation system with its working. **[6]**

b) Define soil respiration. Explain it. **[4]**

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

a) Leaf area index (LAI)

b) Remote sensing in agriculture

c) Upstream and downstream control system

d) Anemometer

e) Lysimeters

f) Upstream and downstream control system

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Total No. of Questions : 5]

SEAT No. :

PC1454

[Total No. of Pages : 2

[6327]-328
T.Y. B.Sc. (Regular)
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 non-ionizing radiations.

b) What is Geiger threshed.

c) Define the radiation unit Bequerel.

d) What is stopping power for radiation?

e) How does time affect on radiation protection?

f) Which type of radiation are used in food preservation?

Q2) a) Describe with neat diagram, the construction and working of Geiger-Muller counter. **[6]**

OR

Describe the following terms in brief : **[6]**

i) Give the Bethe-Bloch formula and draw the plot of Bethe-formula for proton.

ii) Straggling.

b) Which type of radiation has maximum ionizing power than other radiations? Why? **[4]**

P.T.O.

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

i) Sievert

ii) RAD

iii) REM

OR

Explain the following terms in brief : **[6]**

i) Mass absorption

ii) Stopping power

iii) Materials used for shielding of gamma rays and neutrons with its characteristics.

b) How does thermoluminescent dosimeter work. **[4]**

Q4) a) Give the ICRP, NCRP and AERB recommended limits of radiation. **[6]**

OR

Describe any three applications of radiations in medical and agricultural field. **[6]**

b) What are the safety codes of handling radioactive sources. **[4]**

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

a) State the range-energy relation of radiation.

b) Speciality of semiconductor detector.

c) State the biological effective dose of radiation.

d) What are the natural sources of radiation.

e) How time, distance and shielding are effective parameters in radiations.

f) Draw a diagram of photomultiplier tube.

Total No. of Questions : 5]

SEAT No. : ____

PC1455

[Total No. of Pages : 2

[6327]-329

T.Y.B.Sc. (Regular)

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) ***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 calculators and logtables is allowed.***

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

a) Define aperture.

b) What do you mean by focal plane shutter?

c) What is mean by autofocus?

d) What is white balance?

e) List the types of digital camera.

f) What is normal zoom Lens.

Q2) Answer the following questions.

a) Discuss the construction and working of pinhole camera. **[6]**

b) Write advantages of digital camera. **[4]**

Q3) Answer the following questions.

a) Explain the different types of filters used in colour photography. **[6]**

b) Describe limitations of Black & White camera. **[4]**

P.T.O.

Q4) Answer the following questions.

a) i) Draw neat labelled diagram of SLR camera. **[3]**

ii) Write necessities of camera controls. **[3]**

b) Describe colour enlarger in detail. **[4]**

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

a) Write various indoor lighting techniques.

b) Explain working of box camera.

c) Explain idea of exposure meter.

d) Explain Depth of field and Depth of focus inshort.

e) Write important tips for maintenance of camera.

f) Write effects of natural light and tungsten light on photograph.

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Total No. of Questions : 5]

SEAT No. : ____

PC-1456

[Total No. of Pages : 2

[6327]-330

T.Y. B.Sc.

CHEMISTRY

CH - 601 : Physical Chemistry - II

(2019 Pattern) (CBCS) (Semester - VI) (36131)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any 3 questions from 2 to 5.***
3) ***Question 2 to 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 calculators is allowed.***

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

a) What is electrochemical cell?

b) Define reversible cell.

c) What are isotopes?

d) What is crystalline solid?

e) Define reference electrode.

f) What is liquid junction potential?

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

i) What is salt bridge? What are its functions?

ii) Define the following :

I) Isobars

II) Binding energy

III) Mass defect

iii) Derive Bragg's equation.

b) Write conventions to represent electrochemical cell. **[4]**

P.T.O.

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

i) How are electrochemical cells classified?

ii) Give general characteristics of radioactive decay.

iii) Determine miller indices of planes with weiss indices

(1 1 ∞) (⅓ ⅔ 1) (1 2 2)

b) The temperature coefficient cell is 6.48×10^{-4}v/deg for cell $^{\ominus}Cd \mid Cd^{+2} \parallel Ni^{+2} \mid Ni^{\oplus}$. Calculate ΔG and ΔH at 15ºC and emf of cell is 0.6848V. **[4]**

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

i) Write notes on miller and weiss indices.

ii) Explain construction and working of standard hydrogen electrode.

iii) Calculate interplanar spacing at set of planes if angles for First order diffraction is 22.5º when x-rays of wavelength 1.53Aº are used.

b) Write cell reaction and calculate cell emf of following cell. **[4]**

$^{\ominus}$ Cd | $Cd^{+2}_{(a=1)}$ || $Cu^{+2}_{(a=1)}$ | $Cu^{\oplus}$

E(Oxi)Cd | Cd^{+2} = 0.4030V

E(Oxi) Cu | Cu^{+2} = (–0.3370V)

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

a) Metal-metal ion electrode

b) Daniell cell

c) Geiger muller counter

d) Amalgam electrode

e) Laue's method

f) Fuel cell

▽▽▽▽

Total No. of Questions : 5]

SEAT No. : ____

PC-1457

[Total No. of Pages : 2

[6327]-331

T.Y. B.Sc.

CHEMISTRY

CH - 602 : Physical Chemistry - III

(2019 Pattern) (CBCS) (Semester - VI) (36132)

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

Instructions to the candidates:

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

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

a) Define colligative property.

b) Define the rate of reaction in Parabolic rate law.

c) What is degree of Polymerization?

d) What are ionic solids?

e) Define polymerization.

f) What is mean by abnormal molecular weight?

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

i) Derive the relation between van't Hoff factor & degree of dissociation.

ii) Derive the integrated equation for the First order.

iii) How are polymers classified on the basis of their structure? Explain each class with suitable example.

b) Explain the bond structures of Na, Ca & dimond. **[4]**

P.T.O.

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

i) Determination of exact molecular weight of polymers is not possible. Explain this statement.

ii) Derive the Prout - Tompkins equation.

iii) Explain the phenomenon of photoconductivity.

b) Calculate K_b for water from the following data

$\Delta Hv = 2260\ J g^{-1}$, $T_b = 373.2$ K, mol. wt. = 18

$R = 8.314$ J (Mole K)$^{-1}$

Compare this value with the one calculated from the following data. Boiling point of 2.5 molar solution of glucose (mol.wt.180) is 101.3^0c, boiling point of water being 100^0c. **[4]**

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

i) Explain the Arrami-Erofeer rate law based on nucleation model with one example.

ii) What is the effect of temperature on the electrical conductivity of the material?

iii) Describe Beckmann's method to determine the molecular weight of the solid.

b) A polymer sample containing one carboxylic acid group. It was titrated with standard NaOH solution (0.0001M) to obtain the titration reading 7.1 ml for 100 ml Polymer solution. calculate the number average molecular weight of the polymer if the solution was prepared by dissolving 1g polymer in 1L of the solvent. **[4]**

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

a) Landsberger's method

b) The contracting Area rate law

c) The Deaquation-Anation

d) n-type semiconductors

e) Cohesive energy in metals

f) Preparation of polymers

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Total No. of Questions : 5]

SEAT No. : ____

PC-1458

[Total No. of Pages : 2

[6327]-332
T.Y. B.Sc.
CHEMISTRY
CH 604 : Inorganic Chemistry - II
(2019 Pattern) (CBCS) (Semester - VI) (36134)

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

Instructions to the candidates:

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

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

a) Draw b.c.c. structure of α - AgI

b) What is the oxidation state of Fe in haemoglobin?

c) Define the term - 'polymer'.

d) Define, 'Ionic liquid'.

e) How many bridging carbonyls are there in $[C_r(CO)_6]$?

f) Give formula of wilkinson's catalyst used for hydrongenation of Olefins.

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

i) Describe in brief the biological role of sodium and pottasium.

ii) Write important properties of heterogeneous catalyst?

iii) Count the total no. of electrons in the following metal carbonyls and state whether they obey 18 $\bar{e}$ rule or not.

A) $[V(CO)_6]$ B) $[Fe_3(CO)_{12}]$

[At. No. of V = 23, Fe = 26]

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

i) What are Siloxanes? Give its uses.

ii) What is hydroformylation? Name the catalyst used in hydroformylation reaction.

P.T.O.

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

i) Explain hydrothermal method for synthesis of Inorganic solids.

ii) Distinguish between organic and Inorganic polymers.

iii) Discuss the Heck reaction with its mechanism.

b) What is ferrocene? Discuss nitration and halogenation reaction of ferrocene. **[4]**

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

i) Describe working of catalytic convertor.

ii) Discuss various methods for synthesis of metal carbonyls.

iii) Describe the role of transferrin in biological Process.

b) What is bio-inorganic chemistry? Mention the essential, trace and ultratrace elements necessary for healthy human life. Give their composition. **[4]**

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

a) Vitamin B-12

b) Promoters and poisons in catalysis

c) Applications of silicates

d) Applications of ionic liquids

e) Physical properites of ferrocene

f) Supported metal catalyst

♦ ♦ ♦

Total No. of Questions : 5]

SEAT No. : ____

PC1459

[Total No. of Pages : 2

[6327]-333

T.Y.B.Sc. (Regular)

CHEMISTRY

CH - 605 : Inorganic Chemistry - III

(2019 Pattern) (CBCS) (Semester - VI) (36135)

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

Instructions to the candidates:

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

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

a) Define acid and base according to Bronsted - Lowry concept.

b) Define unit cell.

c) What are zeolites?

d) Define the term nanomaterials.

e) What is 'Itai - Itai' disease?

f) Define void in closest packed structure.

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

i) Explain gel preparation and crystallisation.

ii) What are Born - Lande equation for calculation of lattice energy? Give its conclusion.

iii) Explain the impact of toxic chemicals on enzymes with suitable example.

b) i) Why NF_3 is weaker base than NH_3?

ii) Give the assumptions of pauling's in calculating univalent radii.

[2×2=4]

P.T.O.

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

i) What is oxyacids? Discuss the strength of oxyacids of chlorine.

ii) Give difference between Schottky and Frenkel defect.

iii) Explain combustion chemical method for the synthesis of TiO_2 nanoparticles.

b) i) Give the application of zeolite.

ii) Application of nanoparticles.

[2×2=4]

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

i) Explain zeolite as heterogeneous catalyst.

ii) What is radius ratio? Calculate the limiting radius ratio for triangular compound.

iii) Explain the concept of conjugate acid and base pair with suitable examples.

b) i) What is mean by Minamata disease?

ii) What are hydracid? Discuss the trends in strength of hydracids.

[2×2=4]

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

a) Plasma gel synthesis.

b) Zeolite for fine chemistry.

c) Born - Haber cycle.

d) Pauling's crystal radii.

e) Levelling effect.

f) Biochemical effect of lead.

Total No. of Questions : 5]

SEAT No. :

PC1460

[Total No. of Pages :5

[6327]-334

T.Y.B.Sc. (Regular)

CHEMISTRY

CH-607 : Organic Chemistry - II

(2019 CBCS Pattern) (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) ***Question 2 to Question 5 carry equal marks.***
4) ***Figure to the right indicate full marks.***
5) ***Draw neat diagram wherever necessary.***

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

a) Draw chair conformation of transdecalin.

b) What is coupling constant?

c) Define chromophore.

d) How many sets of protons are present in $CH_3 - O - CH_2 - CH_3$.

e) Calculate the fundamental modes of vibrations in C_2H_5OH.

f) Define wavelength.

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

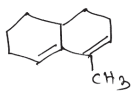
i) What is bathochromic shift? p-nitrophenol shows red shift in alkaline medium, explain.

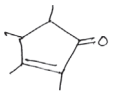
ii) Discuss types of vibrations in 1R spectroscopy.

iii) Explain shielding and deshielding with suitable examples.

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

Calculate the λ max values for the following compounds.

i) 

ii) 

P.T.O.

Q3) a) Attempt Any Two of the following. **[6]**

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

ii) Give applications of PMR spectroscopy.

iii) How 1R spectroscopy is useful for determination of hydrogen bonding in molecules.

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

How will you distinguish following pair using 1R spectroscopy.

i) 

ii) 

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

i) Molecular Formula - C_8H_9Br

PMR : 1) Doublet at 2.0 δ (3H)

2) Quartet at 5.15 δ (1H)

3) Singlet at 7.3 δ (5H)

ii) Molecular formula - C_7H_8

I.R. - 1500 – 1680 cm^{-1}

PMR : 1) Singlet at 2.32 δ (3H)

2) Singlet at 7.17 δ (5H)

iii) Molecular formula - $C_4H_8O_2$

1R : 1740 cm^{-1}

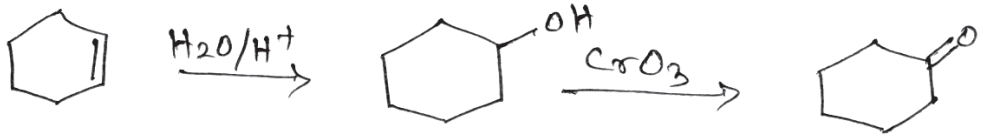
PMR : 1) Triplet at 1.1 δ (3H)

2) Quartet at 2.3 δ (2H)

3) Singlet at 3.6 δ (3H)

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

i) How will you follow the following reaction by 1R?



ii) How is 1R spectroscopy useful for determination of size of ring ketone.

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

a) Disucss the various regions of IR spectroscopy.

b) Write any four advantages of TMS.

c) Write note on different types of coupling in NMR.

d) Draw chair conformation of cis - 1 ,4 dimethyl cyclohexane and comment on their stability.

e) Write applications of UV spectroscopy.

f) How inductive and resonance effects affect IR frequencies.

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.	$-\overset{|}{\underset{|}{C}}-O$ 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. :

PC-1461

[Total No. of Pages : 2

[6327]-335
T.Y.B.Sc.
CHEMISTRY
CH-608 : Organic Chemistry - III
(2019 Pattern) (CBCS) (Semester - VI) (36138)

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

Instructions to the candidates :

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

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

a) What is carbanion?

b) Define Target molecule.

c) State special isoprene rule.

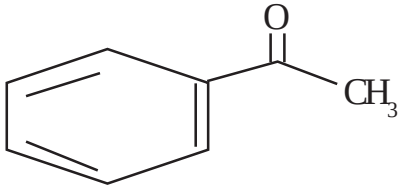
d) How LAH is prepared?

e) Give structure of DDQ.

f) What is Diels Alder reaction?

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

i) Write the reterosynthesis & synthesis of



ii) Explain Hoffmann rearrangement with suitable example.

iii) Give the synthesis of Ephedrine from benzaldehyde.

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

i) Write applications of sodium borohydride.

ii) Give general properties of Alkaloids.

P.T.O.

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

i) Write mechanism involved in cis-hydroxylation reaction of alkene.

ii) Explain Michael reaction with mechanism.

iii) What are terpenoids? Give their classification.

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

i) Write the reactions to explain the presence of aldehyde group in citral?

ii) Give the methods of generation of carbocations.

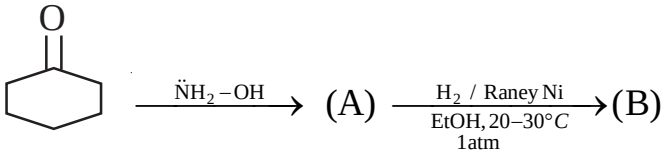
Q4) a) **Attempt any two of the following:** **[6]**

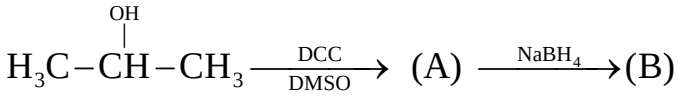
i) What is reduction? Give any two applications of Raney Ni.

ii) Write synthesis of Citral from methyl heptenone.

iii) What is oxidation? Give any two applications of Dichloro-dicyano-benzoquinone (DDQ).

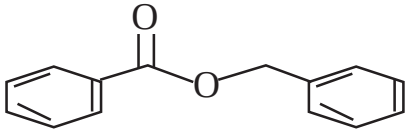
b) Identify the product (A) and (B) and rewrite the reaction. **[4]**

i) 

ii) 

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

a) Write disconnection approach and synthesis of



b) Write note on wittig reaction?

c) Write note on synthon and functional group interconversion.

d) Explain the significance of Simmon-Smith reaction with suitable example.

e) Give the structure and application of DIBAL-H.

f) What is Carbene? Give two methods of generation of carbene.

Total No. of Questions : 5]

SEAT No. : ____

PC1462

[Total No. of Pages : 2

[6327]-336
T.Y.B.Sc. (Regular)
CHEMISTRY
CH-610(A): Chemistry of Soil & Agrochemicals
(2019 Pattern) (Semester - VI) (361310A)

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) ***Draw neat diagrams wherever necessary.***
6) ***Use of logarithm tables & calculator is allowed.***

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

a) Define soil solution.

b) Define Insecticides.

c) What is FYM?

d) Explain soil testing.

e) What is sub soil?

f) Explain the role of soil organism.

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

i) What are herbicides? Give classification of herbicides on the basic of mode of action.

ii) Give the brief explanation on classification of soil structure.

iii) What are manures? Explain different types of manure (bulky manure).

b) Describe the methods of applying solid form & liquid form fertilizers.**[4]**

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

i) Explain the advantages of nano-pesticides.

ii) What are organochlorine insecticides? Give their classification.

iii) Explain surface soil & sub soil.

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

P.T.O.

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

i) Describe physical functions of soil.

ii) What is acid soil? Explain its effects on plant growth.

iii) What is humus? Explain its functions.

b) Describe the Construction &Working of biogas-plant with neat diagram. **[4]**

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

a) Qualities of good fertilizer.

b) Factors affecting soil temperature.

c) Brucine method for estimation of nitrogen from soil sample.

d) Importance of soil reactions.

e) Biofertilizers.

f) Sampling tools & sampling depth.

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Total No. of Questions : 5]

SEAT No. :

PC1463

[Total No. of Pages : 2

[6327]-337

T.Y. B.Sc. (Regular)

CHEMISTRY

CH - 610 (B) : Introduction to Forensic Chemistry

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

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

Instructions to the candidates:

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

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

a) Write full form of CBI.

b) Define drug of Abuse.

c) Define Psychoactive drugs.

d) Write full form of WADA.

e) How will you prepare acidified iodoplatinate reagent.

f) Define clandestine laboratory.

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

i) Explain functions of forensic science.

ii) What are stimulants.

iii) Explain NDPS drugs analysed by HPLC.

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

i) State and explain law of progressive change.

ii) Explain use of presumptive test in NDPS analysis.

P.T.O.

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

i) Explain code of conduct of forensic scientist.

ii) What are cathinone designer drugs.

iii) Explain NDPS blood analysis.

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

i) What is drug withdrawal.

ii) Explain use of spot test in NDPS analysis.

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

i) Explain necessity of forensic science.

ii) What are cannabinoid designer drugs.

iii) Explain violation of WADA code by sport person.

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

i) What are symptoms of depressents.

ii) What are objectives of post - mortem toxicological study.

Q5) Write notes on. (Any Five) **[10]**

a) Historical development of forensic science.

b) NDPS act.

c) Drug tolerance

d) Crime scene managment.

e) Dope test.

f) Testing of narcotic drugs.

■■■■

Total No. of Questions : 5]

SEAT No. :

PC1464

[Total No. of Pages : 2

[6327]-338

T.Y. B.Sc. (Regular)

CHEMISTRY

CH - 611 (A) : Analytical Chemistry - II

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

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

Instructions to the candidates:

1) ***Q.No.1 is compulsory.***
2) ***Attempt any three questions from Q.2 to Q.5***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat, labelled diagrams wherever necessary.***
6) ***Use of logtable and calculators is allowed.***

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

a) Define retention volume?

b) Write role of photomultiplier tube in flame Emission spectroscopy.

c) What is isocratic illusion?

d) Calculate distribution ratio, if concentration of solute in organic phase was 0.3m and concentration of solute in aqnous phase is 0.4m?

e) Write full form of HETP?

f) Write role of flame in Atomic Albsorption spectroscopy?

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

a) What is principle of Atomic Absorption, Spectroscopy?

b) Explain different types of columns used in Gas chromatography?

c) Write features of solvent extraction?

B) If distribution ratio is 20, calculate percent extracted for a volume ratio $\frac{V_a}{V_o}$ of

a) 1

b) 20

P.T.O.

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

a) Write note on total consumption burner?

b) Draw labelled schematic diagram of Gas chromatography?

c) Write note on hallow cathod lamp?

B) Substance A and B have retention time of 14 and 15.5 minutes respectively. The peak with of base for A and B are 0.9 and 0.95 minutes respectively. Calculate column resolution. **[4]**

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

a) Write principle of HPLC? Write classification of HPLC based on type of stationary phase?

b) Define distribution coefficient? Give relation between distribution coefficient and distribution ratio?

c) What principle used in flame emission spectroscopy? Write block diagram with lable of equipments used in flame emission spectroscopy.

B) A metal chelate was extracted to extent of 60% When equal volumes of aquous and organic phase were shaken together. What will be the % extracted if volume of organic phase is doubled. **[4]**

Q5) Write Short Notes on any Four of the following. **[10]**

a) What are applications of technique of solvent extraction?

b) Write note on column efficiency?

c) Write note on thermal conductivity detector?

d) Draw labled schematic diagram of HPLC?

e) What is interference in flame emission spectroscopy?

f) Write note on diffraction grating?

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Total No. of Questions : 5]

SEAT No. :

PC1465

[Total No. of Pages : 2

[6327]-339

T.Y. B.Sc. (Regular)

CHEMISTRY

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

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

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

Instructions to the candidates:

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

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

a) Write two sources of oils, fats and waxes.

b) Define preservatives.

c) What do you understand by the word 'Fragrance'.

d) Draw the structure of geraniol.

e) What is the full from of CDSCO.

f) Write the functions of regulation named 'Guidelines on registration of import of Cosmetics'.

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

a) Classify cosmetics according to their use.

b) Classify perfumes on the basis of concentration of Fragrances and duration of lasting.

c) Write the steps for online application for registration of cosmetics.

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

a) What are hair grooming aids. Give types of such aids.

b) Write any four uses of civetone.

P.T.O.

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

a) Define surfactants. Give their types and respective examples.

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

c) Write the required documents in Maharashtra State for application to get license for manufacture of cosmetics.

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

a) Write the conditions during onsite examination after acceptance of application by state drug control department for manufacture of cosmetics.

b) Write note on Face powder.

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

a) What are epilatories and depilatories. Explain with suitable examples.

b) Give details of sources of Fragrances.

c) Give an account of labels for registered imported cosmetics.

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

a) Write a note on eucalyptus.

b) What is the purpose of regulating import of cosmetics in India?

Q5) Write Short Notes. (any four) **[10]**

a) Hand and body cream.

b) Methods of isolation of essential oils.

c) Requirements for import of cosmetics into India.

d) Preparations used before shaving.

e) Euginol.

f) Categories of cosmetics, for which import registration certificate is not required.

■■■■

Total No. of Questions : 5]

SEAT No. : ____

PC-1466

[Total No. of Pages : 2

[6327] - 340
T.Y. B.Sc.
BOTANY
BO-361: Plant Physiology & Metabolism
(CBCS) (2019 Pattern) (Semester - VI) (Paper- I) (36141)

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

Instructions to the candidates:

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

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

a) Define micronutrient?

b) What is photophosphorylation?

c) Define glycolysis?

d) What is stomata?

e) Define girdling

f) Write about PGR?

Q2) a) Give Practical applications of abscisic acid. **[6]**

b) Explain the role of calcium **[4]**

P.T.O.

Q3) a) Explain CAM cycle **[6]**

b) Describe the composition of phloem sap **[4]**

Q4) a) Describe the non - cyclic photophosphorylation **[6]**

b) Commenton red light response of stomata **[4]**

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

a) Functions of phytochromes

b) Role of Gibberellins

c) Photobiology

d) Anaerobic respiration

e) Phycobillins

f) Functions of channel proteins

Total No. of Questions : 5]

SEAT No. : ____

PC-1467

[Total No. of Pages : 2

[6327]-341
T.Y. B.Sc.
BOTANY
BO - 362 : Biochemistry (Paper - II)
(2019 Pattern) (CBCS) (Semester - VI) (36142) (Regular)

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

Instructions to the candidates :

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

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

a) Define biomolecules.

b) Write two sources of Vitamin C.

c) What are transferases?

d) Define biochemistry.

e) What is holoenzyme?

f) Write two examples of reducing sugars.

Q2) a) Describe Commercial applications of carbohydrates **[6]**

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

Q3) a) Describe commercial applications of proteins. **[6]**

b) Explain fat soluble vitamins. **[4]**

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

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

P.T.O.

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

a) Oligosaccharides
b) Structure of water molecule
c) Unsaturated fatty acids.
d) Induced fit model
e) Effect of temperature on enzyme activity
f) Functional groups of biomolecules.

♦ ♦ ♦

Total No. of Questions : 5]

SEAT No. :

PC-1468

[Total No. of Pages : 2

[6327]-342
T.Y.B.Sc
BOTANY
BO-363 : Plant Pathology (Paper - III)
(2019 Pattern) (CBCS) (Semester - VI) (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) ***Q.2 to Q.5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat labelled diagrams wherever necessary.***

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

a) Define Pathogen.

b) What is full form of IARI.

c) What is inoculation?

d) What is defense mechanism?

e) What is culture medium?

f) Give the basic concept of eradication

Q2) a) Write note on contribution of Prof. B.B. Mundkur. **[6]**

b) Describe the induced defense mechanism in plants. **[4]**

Q3) a) Describe macroscopic methods of studying plant diseases. **[6]**

b) Describe causal organism, symptoms and disease management of Tikka disease of Groundnut. **[4]**

P.T.O.

Q4) a) Explain Quarantine with examples. **[6]**

b) Give an account of non-parasite diseases. **[4]**

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

a) Microbial pesticides

b) Management of Root knot diseases

c) Prepenetration

d) Symptoms of Citrus Canker

e) Give any two examples of viral diseases

f) Streak Plate method

Total No. of Questions : 5]

SEAT No. : ____

PC1469

[Total No. of Pages : 2

[6327]-343

T.Y.B.Sc. (Regular)

BOTANY

BO 364 : Evolution and Population Genetics

(CBCS 2019 Pattern) (Semester - VI) (36144)

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

Instructions to the candidates:

1) ***Question No. 1 is compulsory.***
2) ***Attempt any three questions from Q.2 to Q.5.***
3) ***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) Define lethal genes.

b) What is index fossil?

c) Define allele frequency.

d) What is geological time scale?

e) Define organic evolution.

f) What is mendelian population?

Q2) a) What is evolution? Describe in detail the theory of natural selection. **[6]**

b) Explain dating of fossils with uranium lead method. **[4]**

Q3) a) Explain how Hardy - Weinberg law of gene frequencies is applicable to a population? **[6]**

b) Define speciation? Give in brief sympatric speciation. **[4]**

P.T.O.

Q4) a) Explain evidences of evolution from biogeographical relations. **[6]**

b) Give in brief pre - zygotic isolation mechanism. **[4]**

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

a) Primordial soup.

b) Homology

c) Permineralization

d) Ecological isolation

e) Protobiont

f) Modern Synthetic theory

Total No. of Questions : 5]

SEAT No. :

PC1470

[Total No. of Pages : 2

[6327]-344

T.Y. B.Sc. (Regular)

BOTANY

BO - 365 : Advanced Plant Biotechnology

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

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

Instructions to the candidates:

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

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

a) Define medical biotechnology

b) What is dedifferentiation?

c) What is fermentation?

d) Enlist types of restriction endonucleases.

e) Define superbug.

f) What are nanofertilizers?

Q2) a) Define plant growth regulators. Explain functions fo any two growth regulators is plant tissue culture. **[6]**

b) Explain the concept of gene bank. **[4]**

Q3) a) Give a detailed account of beer production. **[6]**

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

Q4) a) Discuss steps in PCR method. **[6]**

b) Explain use of transgenic plants as protein factories. **[4]**

P.T.O.

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

a) Hardening in banana

b) YAC

c) Biotechnology and IPR

d) Polynucleotide kinases

e) Nanobiotechnology

f) Role of Biotechnology in agriculture

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Total No. of Questions : 5]

SEAT No. :

PC-1471

[Total No. of Pages : 2

[6327]-345
T.Y. B.Sc.
BOTANY
BO-366: Plant Breeding and Seed Technology
(36146) (CBCS) (2019 Pattern) (Semester-VI) (Paper - VI)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Attempt any Three questions from Q2 to Q5.***
3) ***Q2 to Q5 carry equal marks.***
4) ***Figures to right indicate full marks.***
5) ***Draw neat labelled diagrams wherever necessary.***

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

a) Give any two scopes of plant breeding.

b) Define hybridization.

c) Give any two achievements of selection breeding.

d) Write full form of NSC.

e) What is nucleus seed.

f) Give any two clauses of seed Act 1966.

Q2) a) Explain in details the steps involved in hybridisation. **[6]**

b) What is selection? Write about pureline selection method. **[4]**

Q3) a) Define mutation. Give applications of mutation breeding. **[6]**

b) Write in detail the general procedure of seed production. **[4]**

Q4) a) Write in details about seedling evaluation. **[6]**

b) Define plant introduction. Write procedure of plant introduction. **[4]**

P.T.O.

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

a) Applications of plant tissue culture.

b) Field inspection.

c) Influence of seed borne pathogens on seed production.

d) Sanitization.

e) Precautions to be taken during hybridization.

f) Physical purity analysis.

Total No. of Questions : 5]

SEAT No. :

PC1472

[Total No. of Pages : 2

[6327]-346

T.Y. B.Sc. (Regular)

BOTANY

BO - 3610 : NURSERY AND GARDENING MANAGEMENT

(2019 Pattern) (CBCS) (Semester - VI) (361410)

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

Instructions to the candidates:

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

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

a) Define Nursery.

b) What is raphe?

c) What is plant hardening?

d) Define Sexual Reproduction.

e) Define texture of garden.

f) What is nutritional value of carrot?

Q2) a) Define layering. Explain air layering in detail. **[6]**

b) Write characteristics of Nursery. **[4]**

Q3) a) Give detail account on different aspects of landscape gardening. **[6]**

b) Write structure and types of seeds. **[4]**

Q4) a) Give detail account on method of cultivation, diseases , pests and their management of tomato. **[6]**

b) Write method of selection of cutting. Add a note on rooting in cuttings. **[4]**

P.T.O.

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

a) Criteria for selection of plants for gardening.

b) Write advantages of layering.

c) Comment on seed cultivation.

d) Write advantages of cutting.

e) Give application of CAD in landscape gardening.

f) Comment on Diseases and pests of cabbage.

Total No. of Questions : 5]

SEAT No. :

PC1473

[Total No. of Pages : 2

[6327]-347

T.Y. B.Sc. (Regular)

BOTANY

BO - 3611 : Biofertilizers

(2019 Pattern) (Semester - VI) (Paper -XI) (361411)

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

Instructions to the candidates:

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

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

a) Define algal biofertilizers.

b) What is Biological Nitrogen fixation.

c) Enlist the types of mycorrhiza.

d) What is biocomposting?

e) Give the name of bacteria used for biofertilizers production.

f) What is green manures?

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

b) Describe the types of mycorrhiza. **[4]**

Q3) a) Comment of Azolla - Anabena relationship. **[6]**

b) Write applications of BGA. **[4]**

Q4) a) Explain the process of mass multiplication of Rhizobium. **[6]**

b) Describe the applications of Azospirillum. **[4]**

P.T.O.

Q5) Write Short Note on Four of the following : **[10]**

a) Carrier based Inoculants.

b) Phosphate solubilizing bacteria.

c) Composting method of biodegradable waste.

d) Benefits of vermi composting.

e) Organic farming.

f) Importance of Biofertilizers.

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Total No. of Questions : 5]

SEAT No. : ____

PC-1474

[Total No. of Pages : 2

[6327] - 348
T.Y. B.Sc. (Regular)
ZOOLOGY
ZO 361: Medical & Forensic Zoology
(2019 Pattern) (CBCS) (Semester - VI) (Paper- I) (36151)

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

Instructions to the candidates:

1) ***Q. 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 Diabetes?

b) Define medical zoology

c) What is Tuberculosis?

d) What is Urine?

e) What is Poison?

f) What is medical jurisprudence.

Q2) a) What is death? Discuss its causes. **[6]**

OR

What is forensic analysis? Mention the steps for conducting forensic analysis.

b) Describe algor mortis **[4]**

P.T.O.

Q3) a) Describe the documentary pre-requisites for medico-legal autopsy. **[6]**

OR

Discuss the causes & symptoms of diabetes type 2.

b) Discuss the complications of obesity **[4]**

Q4) a) Describe the applications of forensic zoology. **[6]**

OR

Describe the medical evidence documentation in sexual abuse case.

b) Give the divisions of forensic medicine. **[4]**

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

a) Causes of hypertension

b) Forensic serology

c) Symptoms of Hepatitis

d) Renal calculi

e) Myocardial infarction

f) Radioactive poisons.

Total No. of Questions : 5]

SEAT No. : ____

PC-1475

[Total No. of Pages : 2

[6327] - 349
T.Y. B.Sc.
ZOOLOGY
ZO 362: Animal Physiology
(2019 Pattern) (CBCS) (36152) (Semester - VI) (Paper - II)

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

Instructions to the candidates:

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

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

a) What is ECG?

b) What is Sarcomere?

c) Write name of female sex hormones

d) What is Peristalsis

e) Name any one respiratory pigment.

f) Any two functions of blood.

Q2) a) What is cardiac cycle. Describe various events occur in cardiac cycle. **[6]**

OR

Describe the process of inspiration and expiration.

b) Sketch & label L.S of Mammalian Kidney. **[4]**

P.T.O.

Q3) a) What is Nutrition? Explain various components of balanced diet **[6]**

OR

Explain process of urine formation.

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

Q4) a) Discuss testicular hormones and Their functions **[6]**

OR

Discuss hormones secreted by adenohypophysis & mention their role.

b) Isotonic and Isometric muscle contraction **[4]**

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

a) Intracellular digestion

b) Muscle fatigue

c) Haemoglobin

d) Neurogenic heart

e) Role of thyroxin hormone

f) Pace maker

Total No. of Questions : 5]

SEAT No. :

PC-1476

[Total No. of Pages : 2

[6327]-350

T.Y.B.Sc.

ZOOLOGY

ZO-363: MOLECULAR BIOLOGY

(CBCS) (2019 Pattern) (Paper-III) (Semester - VI) (36153)

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

Instructions to the candidates :

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

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

a) What is a nucleotide?

b) Define transcription.

c) What is the leading strand?

d) What does the coding (sense) strand mean?

e) Mention the role of t-RNA in translation.

f) Define recombinant DNA.

Q2) a) Explain in detail Avery's transformation experiment. **[6]**

OR

Describe the process of termination of DNA replication in prokaryotes.

b) Write a brief note on restriction endonucleases. **[4]**

P.T.O.

Q3) a) Describe the various subunits of prokaryotic RNA polymerase (Major polymerase) along with their function involved in transcription. **[6]**

OR

Explain the mechanism of base excision repair system.

b) What is polyadenylation? Explain the process of polyadenylation. **[4]**

Q4) a) Write a brief note on prokaryotic and eukaryotic ribosomes. **[6]**

OR

With the help of a diagram, describe the organization of lac operon.

b) Describe the Watson and Crick's model of DNA. **[4]**

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

a) Heterochromatin.

b) Okazaki fragments.

c) Difference between DNA and RNA.

d) Start and Stop codon.

e) Role of telomerase in eukaryotic DNA replication.

f) Define promoter and give its significance in transcription.

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Total No. of Questions : 5]

SEAT No. :

PC1477

[Total No. of Pages : 2

[6327]-351

T.Y.B.Sc. (Regular)

ZOOLOGY

ZO 364 : Entomology

(2019 Pattern) (Semester - VI) (36154)

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

Instructions to the candidates:

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

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

a) Define role of forensic entomologist.

b) Define pterygotes.

c) Enlist Five order of class Insecta.

d) Define diurnal insect.

e) Define polymorphism.

f) Insect as a vector.

Q2) a) What is morphology of insect? Describe external morphology of Insect. **[6]**

OR

Describe social organization of class insecta and polymorphism in insect with example.

b) Describe insect head & its orientation and articulation. **[4]**

Q3) a) Describe tracheal system in insect add a note on physiology of respiration. **[6]**

OR

Describe insect integuments and its derivatives.

b) Explain biotic factors controlling insect population. **[4]**

P.T.O.

Q4) a) Explain reproductive caste in termites and their role in colony multiplication. **[6]**

OR

Describe structure, function & modification of insect antenna.

b) Describe Hormonal control in metamorphosis. **[4]**

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

a) Insect moulting

b) Eusociality and its significance

c) Insect in cosmatic

d) Parasitism host intraction

e) Effect of biotic factor in insect population.

f) Abdominal appendages

Total No. of Questions : 5]

SEAT No. : ____

PC1478

[Total No. of Pages : 2

[6327]-352

T.Y. B.Sc. (Regular)

ZOOLOGY

ZO - 365 : Techniques in Biology

(2019 Pattern) (Semester - VI) (36155)

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

Instructions to the candidates:

1) ***Q.1. is compulsory.***
2) ***Solve any three questions from Q2. to Q5.***
3) ***Questions 2 to 5 carry equal marks.***

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

a) What is Dealcoholization?

b) What is Affixation?

c) Define Impregnation.

d) What is clotting time?

e) Write long form of CCD camera.

f) What is Camera Lens?

Q2) a) Explain in detail compound microscope. **[6]**

OR

Give an account of detail processing of paraffin section.

b) Merits of ideal fixative. **[4]**

Q3) a) Describe Principle, Procedure and Advantages of ELISA. **[6]**

OR

Describe the DNA Barcoding.

b) Explain types of clearing agents. **[4]**

P.T.O.

Q4) a) Describe the method of total erythrocyte count by haemocytometry. **[6]**

OR

Explain in detail types of samples.

b) Explain in detail GPS. **[4]**

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

a) Compound Fixative.

b) Mega Fixel.

c) Advantages of Dissecting microscopes.

d) Types of microtome knives.

e) Processing of paraffin section.

f) Antigen - antibody interactions.

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Total No. of Questions : 5]

SEAT No. : ____

PC-1479

[Total No. of Pages : 2

[6327]-353
T.Y. B.Sc.
ZOOLOGY
ZO-366: Evolutionary Biology
(CBCS) (2019 Pattern) (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 Q2 to Q5.***
3) ***Q2 to Q5 carry equal marks.***

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

a) Define organic evolution.

b) Hardy-Weinberg law.

c) What is Allopatric speciation?

d) Define palaeontology.

e) What is gene pool.

f) Define Favourable variations.

Q2) a) Describe origin of plastid as symbionts in eukaryotic cells. **[6]**

OR

Describe Homologous organs as an evolutionary evidance.

b) Explain struggle for existance. **[4]**

Q3) a) Explain post-zygotic isolation. **[6]**

OR

Explain patterns of speciation.

b) Describe Re-combinations as source of variations. **[4]**

P.T.O.

Q4) a) Discuss the characters of cro-magnan man. **[6]**

OR

Discuss the oriental realm with reference to fauna.

b) Give significance of extinction. **[4]**

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

a) Gene frequnecy.

b) Chromosomal mutation.

c) Analogous organ.

d) Kenyapithecus.

e) Hybrid sterility.

f) Genetic drift.

Total No. of Questions : 5]

SEAT No. :

PC1480

[Total No. of Pages : 2

[6327]-354

T.Y. B.Sc. (Regular)

ZOOLOGY

ZO - 3610 : ENVIRONMENTAL IMPACT ASSESSMENT

(2019 Pattern) (Semester - VI) (361510)

Time : 2 Hours] [Max. Marks : 35

Instructions to the candidates:

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

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

a) Define Environment.

b) What is carrying capacity?

c) What is FAA?

d) Define NABET.

e) What is Pollution?

f) Define Biological diversity.

Q2) a) Describe any two Types of EIA. **[6]**

OR

Describe role of CPCB.

b) Describe prevention of Air pollution "Act 1981". **[4]**

Q3) a) Describe in brief EIA process. **[6]**

OR

Describe Environment protection Act 1986.

b) Write a note on Evolution of EIA. **[4]**

P.T.O.

Q4) a) Describe UN - 17 sustainable Development Goals. **[6]**

OR

Describe exploitation of Natural resources.

b) Write a note on Comprehensive EIA. **[4]**

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

a) Role of MPCB.

b) Regional EIA.

c) Need of Sustainable development.

d) Impact of pollution on wild life.

e) Role of EIA co-ordinator.

f) Effects of water pollution.

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Total No. of Questions : 5]

SEAT No. :

PC-1481

[Total No. of Pages : 2

[6327]-355
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) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Q 2 to Q 5.***
3) ***Question Nos. 2 to 5 carry equal marks.***

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

a) Give the type locality of Permian system.

b) Give index fossil of Ordovician system.

c) What are intertrappean beds?

d) Name the oil bearing formation of tertiary of Assam.

e) What are intertrappean? Give an example.

f) Name important fossils of Mesozoic era.

Q2) Write notes on:

a) Lithostratigraphic classification of Tertiary of Assam. **[6]**

b) Bagh beds. **[4]**

Q3) Write notes on:

a) Causes of mass extinctions. **[6]**

b) Lithostratigraphic classification of Jurassic of Kachchh. **[4]**

P.T.O.

Q4) Write notes on:

a) Geographical distribution and classification of Deccan Traps. **[6]**

b) Geographical distribution of Gondwana Supergroup. **[4]**

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

a) Characteristics of marine transgression.

b) Origin of Laterites.

c) Age of Reptiles.

d) Fauna & Flora of Siwaliks.

e) What are Barren measures?

f) Geographical distribution of Karewas of Kashmir.

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Total No. of Questions : 5]

SEAT No. :

PC-1482

[Total No. of Pages : 2

[6327]-356
T.Y. B.Sc.
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) ***Solve any Three questions from Q 2 to Q 5.***
3) ***Question Nos. 2 to 5 carry equal marks.***

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

a) What is prospecting?

b) What is channel sampling?

c) What are Stratigraphic guides?

d) What are Grab samples?

e) Geobotanical guides.

f) Hypogene type of Wall rock alteration.

Q2) Explain the following.

a) Describe open cast mining. **[6]**

b) Rationale of National Mineral Policy. **[4]**

Q3) Explain.

a) Magnetic method of prospecting. **[6]**

b) Geobotanical Prospecting. **[4]**

P.T.O.

Q4) Answer the following.

a) Gophering method of underground mining. **[6]**

b) Trigonal method of ore reserve estimation. **[4]**

Q5) Explain the following. (Any five) **[10]**

a) Applications of Electrical Methods of Prospecting.

b) Ore samples.

c) What is Trenching in mining?

d) Mineralogical guides.

e) What is Pitting in mining?

f) What are magnetometers or magnetic variometers?

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Total No. of Questions : 5]

SEAT No. :

PC-1483

[Total No. of Pages : 2

[6327]-357
T.Y. B.Sc.
GEOLOGY
GL - 323 : Oceanography
(2019 Pattern) (Semester - VI) (Paper - III) (36163)
(Regular) (Revised Syllabus)

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 question in 2-3 lines : **[5]**

a) Define EI-Nino.

b) Draw a diagram showing sea surface salinity & temperature variation with Latitude.

c) How evaporation affects the seawater salinity?

d) Define Bay barrier.

e) Enlist any two effects of sea-level rise.

f) Enlist the soft structural options for coastal conservation method.

Q2) Answer the following.

a) Explain the processes affecting sea level. **[6]**

b) Explain surface salinity variation. **[4]**

Q3) Answer the following.

a) What is Oceanography? Draw a Venn diagram showing the interdisciplinary nature of Oceanography. Give the main disciplines of Oceanography. **[6]**

b) Explain the Isostatic adjustment with neat labeled diagram for changes in sea level. **[4]**

P.T.O.

Q4) Answer the following.

a) Explain the EI-Nino-La Nina effect relation between climate & ocean in the Indian Context. **[6]**

b) Write a note on Indian Ocean Circulation. **[4]**

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

a) Density of seawater.

b) Processes that increase seawater salinity.

c) Subtropical gyres.

d) Sea level changes during late Holocene.

e) Causes of Coastal erosion.

f) Prohibited activities with in CRZ.

▽▽▽▽

Total No. of Questions : 5]

SEAT No. : ____

PC1484

[Total No. of Pages : 2

[6327]-358

T.Y.B.Sc. (Regular)

GEOLOGY

GL 324 : Petroleum Geology

(2019 Pattern) (Semester - VI) (36164)

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

Instructions to the candidates:

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

Q1) Answer any five of the following questions in 2-3 line. **[5]**

a) What is primary migration?

b) What is composition of petroleum?

c) What is source rock?

d) Enlist physical properties of crude oil.

e) What is 'Edge Water'?

f) Enlist different reservoir fluids.

Q2) Answer the following.

a) Explain transformation of organic matter to petroleum. **[6]**

b) Explain primary migration of hydrocarbon. **[4]**

Q3) Answer the following.

a) Describe in detail Krishna - Godavari Basin. **[6]**

b) Explain impurities in Natural Gas. **[4]**

P.T.O.

Q4) Answer the following.

a) What is hydrocarbon trap? Explain any one structural trap. **[6]**

b) What are oil field brines? Explain its origin. **[4]**

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

a) Kerogen shale

b) Recycled oil

c) Reservoir fluids.

d) Hydrofracturing

e) Secondary migration

f) Salt dome as trap

Total No. of Questions : 5]

SEAT No. :

PC1485

[Total No. of Pages : 2

[6327]-359

T.Y. B.Sc. (Regular)

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) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Neat diagrams must be drawn wherever necessary.***

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

a) What are the different anthropogenic factors which affects the earth's climate.

b) What are the different layers of atmosphere.

c) What are the main elements fo Milankovitch Cycles and how they control the Earth's climate?

d) What are green house gases?

e) What is E1 - Nino.

f) What is cyclone.

Q2) Answer the follwing.

a) What are Milankovitch Cycles. How they control the Earth's Climate? **[6]**

b) What is climate model? What are different types of climate models? **[4]**

P.T.O.

Q3) Answer the following.

a) What is the role of climate in landscape evolution? **[6]**

b) Write a note on flood and drought hazards in India. **[4]**

Q4) Answer the following.

a) Explain the use of climate proxies in paleo-climatology. **[6]**

b) What is agro climatic zone? Enlist agro-climatic divisions of peninsular India. **[4]**

Q5) Write a Note on any FOUR of the following. **[10]**

a) Indian monsoon.

b) Troposphere.

c) Ocean circulation.

d) Floods.

e) Climate Indicators.

f) La - Nina.

Total No. of Questions : 5]

SEAT No. :

PC-1486

[Total No. of Pages : 2

[6327]-360
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) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Q2 to Q5.***
3) ***Q2 to Q5 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 Navigation.

b) Use and application of GPS in fieldwork.

c) What are the basic steps of geological mapping?

d) What is a attitude of a bed?

e) What is a topographic map?

f) What is a bearing?

Q2) **Answer the following.**

a) Explain the uses of geological mapping and mapping techniques in preparation of a base maps. **[6]**

b) Write a note on field safety. **[4]**

Q3) **Answer the following.**

a) Write a note on orientation of topographic sheet in field and marking location on toposheet. **[6]**

b) Write a note on preparation of geological report. **[4]**

P.T.O.

Q4) **Answer the following.**

a) Write a note on reconnaissunce and study of igneous an metamorphic rocks. **[6]**

b) Explain front and back bearing. **[4]**

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

a) Labelling and Sampling of rocks in field.

b) Reconaissance study of area having sedimentory rock's.

c) Structural features in the field.

d) Lithological symbols.

e) Different types of contacts.

f) Field notes.

Total No. of Questions : 5]

SEAT No. :

PC1487

[Total No. of Pages : 2

[6327]-361

T.Y. B.Sc. (Regular)

GEOLOGY

SEC III : Applications of Remote Sensing in Geo Sciences

(2019 Pattern) (Semester - VI) (361610)

Time : 2 Hours] [Max. Marks : 35

Instructions to the candidates:

1) ***Q.No.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Neat diagrams must be drawn wherever necessary.***

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

a) What is IRS?

b) What is aerial Photography?

c) What is Mirror Stereoscope?

d) What is vertical exaggeration.

e) Atmospheric window.

f) Give two applications of Remote sensing in mineral resources.

Q2) Answer the following.

a) Explain photorecognation elements. **[6]**

i) Pattern

ii) Shadow

b) Describe stefan Boltzman law. **[4]**

Q3) Answer the following.

a) Define electromagnetic spectram and explain spectral reflectance of water. **[6]**

b) Explain interpretation of faults on aerial photo. **[4]**

P.T.O.

Q4) Answer the following.

a) Explain orbit characteristics and sensors of landsat-7. **[6]**

b) Explain active remote sensing system. **[4]**

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

a) Photographic characteristics of flood basalts.

b) What is tilt and tip.

c) Spectral responce of vegetation.

d) Aerial photographs based on lens system.

e) Advantages of aerial photo.

f) Emissivity.

Total No. of Questions : 5]

SEAT No. : ____

PC1488

[Total No. of Pages : 2

[6327]-362

T.Y.B.Sc. (Regular)

GEOLOGY

SEC IV : Oil Field Services

(2019 Pattern) (Semester - VI) (361611)

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) Answr any five of the following questions in 2-3 line. **[5]**

a) What is 'LWD'?

b) What is 'exploratory well'?

c) Why directional drilling is important?

d) Give composition of drilling mud.

e) State different types of 'drilling rigs'

f) What is GTO?

Q2) Answer the following.

a) What is formation evaluation? Explain temperature logs. **[6]**

b) What is mud logging? Explain techniques of mud logging. **[4]**

Q3) Answer the following.

a) What are type of oil wells? Explain Geotechnical order. **[6]**

b) Explain components of rotary drilling. **[4]**

P.T.O.

Q4) Answer the following.

a) What is drilling fluid? Explain its uses. **[6]**

b) Explain directional rotary drilling. **[4]**

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

a) SP logs

b) Caliper logs

c) Cable tool drilling

d) Oil wells

e) Properties of drilling mud

f) Wire line logging

Total No. of Questions : 5]

SEAT No. : ____

PC1489

[Total No. of Pages : 2

[6327]-363

T.Y.B.Sc. (Regular)

GEOLOGY

GL - SEC - V : Watershed Development

(2019 Pattern) (Semester - VI) (361612)

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

Instructions to the candidates:

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

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

a) What is rainwater Harvesting?

b) What is watershed planning?

c) Define contour bunding?

d) What is dry - land farming?

e) Define soil conservation?

f) What is check dam?

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

a) What are objective of watershed development? **[6]**

b) Explain the basic concept of watershed development? **[4]**

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

a) Explain in basic concept of watershed management? **[6]**

b) What is watershed modelling? **[4]**

P.T.O.

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

a) Explain the waste water treatment process with neat labelled diagram. **[6]**

b) Explain soil as resources? **[4]**

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

a) Rainwater Assessment

b) Aforestation

c) Draught management

d) Rainwater Harvesting

e) Soil erosion

f) Water conservation

Total No. of Questions : 4]

SEAT No. : ____

PC-1490

[Total No. of Pages : 2

[6327]-364

T.Y. B.Sc.

STATISTICS (Principal) (Regular)

ST - 361 : Distribution Theory - II

(2019 Pattern) (CBCS) (Semester - VI) (Paper - I) (36171)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of calculator and statistical table is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt **each** of the following :

A) Choose the correct alternative in each of the following : **[1 each]**

i) If X_1, X_2, X_3, X_4 are i.i.d. Lognormal $(0, \mu, \sigma^2)$, then the distribution of $Z = \frac{X_1 X_2}{X_3 X_4}$ is

a) Lognormal b) Exponential

c) Normal d) Pareto

ii) If (X, Y) ~ BN (3.4, 0.5, 8, 11, 0.9), then the marginal distribution of X is

a) Exponential b) Normal

c) Gamma d) Beta

iii) If X ~ L (3, 4), then the quartile deviation is

a) 0.3294 b) 0.1733

c) 0.9635 d) 0.6767

B) State whether <u>each</u> of the following statements is ture or false : **[1 each]**

i) Mean of Lognormal distribution is less than median for $LN(0, \mu, \sigma^2)$.

ii) Weibul distribution is a symmetric distribution.

P.T.O.

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

a) State the probability density function of normal distribution truncated above 'b'. Hence, derive its mean.

b) If X ~ W (α, β), find the distribution function of X and hence find its second quartile.

c) If X ~ LN (0, μ, σ^2), obtain the distribution of Y = X^{α} using moment generating function. Hence, find the distribution of X^2.

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

a) If X ~ W (α, β), then show that Y = αX ~ W (α^2, β).

b) Let (X, Y) ~ BN $(\mu_1, 2, \sigma_1^2, 16, 0.5)$. If E (Y|X=2) = 1.56 and V(X|Y=3) = 6, then find μ_1 and σ_1^2.

c) If X ~ L(μ, λ), find second raw moment using moment generating function.

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

a) i) If (X, Y) ~ BN $(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$, then show that (aX+bY+c) follows normal distribution. **[5]**

ii) Let X follows Pareto (λ) distribution. Derive its variance (if exists). **[5]**

b) i) Let X ~ L(μ, λ), then show that all odd ordered central moments are zero. **[5]**

ii) If (X, Y) ~ BN $(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$, show that X and Y are uncorrelated iff they are independent. **[5]**

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Total No. of Questions : 5]

SEAT No. :

PC-1491

[Total No. of Pages : 3

[6327]-365

T.Y. B.Sc. (Regular)

STATISTICS (Principal)

ST-362: Testing of Hypotheses

(2019 Pattern) (CBCS) (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]**

i) Rejecting the null hypothesis when it is true is called as

A) Type I error B) Type II error

C) Size of the test D) Power of the test

ii) Based on the sample $x_1, x_2, \ldots\ldots\ldots x_n$ from $N(\mu, 10)$ distribution, the best critical region for testing $H_0 : \mu = \mu_0$ against $H_1 : \mu = \mu_0 + 4$ will be of the type

A) $\Sigma x_i < c$ B) $\Sigma x_i > c$

C) $\Sigma x_i^2 < c$ D) $\Sigma x_i^2 > c$

iii) Which of the following test is not distribution free test.

A) sign test B) run test

C) mann whitney test D) Z test

P.T.O.

b) State whether each of the following statement is true of false : **[1 each]**

i) Sign test is used for testing the randomness of data.

ii) Likelihood ratio test is used for testing composite null hypothesis.

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

a) Define the following terms.

i) Best critical region

ii) Run

iii) Size of the test

iv) Distribution free test

v) Power of the test

b) Construct likelihood ratio test for testing $H_0 : \theta = 4$ against $H_1 : \theta \neq 4$ based on the sample of size *n* from exponential distribution with mean θ.

c) Test the randomness of the following sequence of D : defective, N : Non-defective item for 14 consecutive shifts. Use 5% level of significance NNNDDNDNDNDDDN.

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

a) Write a note on empirical distribution function. Also explain how it is used in kolmogorov-smirnov 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 $N(\theta, \sigma^2)$ distribution where σ^2 is unknown.

c) Find the best critical region for testing $H_0 : \theta = \theta_0$ againt $H_1 : \theta = \theta_1$ based on sample of size from population with probability distribution $f(x) = \theta(1 - x)^{\theta-1}$, $0 < x < 1$, $\theta > 0$.

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

a) i) Let $x_1, x_2 \ldots\ldots\ldots x_{10}$, be a random sample from $N(0, \sigma^2)$ distribution. Construct uniformly most powerful test of level of significance 5% to test $H_0 : \sigma^2 = 2$ against $H_1 : \sigma^2 > 2$. Find power of the test for $\sigma^2 = 2.1$ & $\sigma^2 = 2.2$. **[6]**

ii) Differentiate between parametric and nonparametric test. State the necessity of nonparametric test. **[4]**

b) i) State the relation between $\wedge(x)$ (ratio used in likelihood ratio test) and sufficient statistic. Verify the relation for sample of size n selected from $N(0, \sigma^2)$ for testing $H_0 : \sigma^2 = \sigma_0^2$ against $H_1 : \sigma^2 \neq \sigma_0^2$. **[4]**

ii) Let X be a random variable with probability mass function f_0 under null hypothesis and f_1 under alternative hypotnesis

where $f_0 = {}^4C_x \left(\frac{1}{2}\right)^4, x = 0,1,2,3,4,$

$$f_1 = {}^4C_x \left(\frac{1}{4}\right)^x \left(\frac{3}{4}\right)^{4-x}, x = 0,1,2,3,4$$

Find α, β power of the test if the critical region is $X = \{0, 1\}$ **[6]**

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Total No. of Questions : 4]

SEAT No. : ____

PC-1492

[Total No. of Pages : 3

[6327]-366

T.Y. B.Sc.

STATISTICS (Principal)

ST-363 : Sampling Theory (Paper - III)

(2019 Pattern) (CBCS) (Semester - VI) (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 abbrevialions have their usual meaning.***

Q1) **Attempt each of the following :**

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

i) Probability that a unit is included in a sample of size n from a population of size N under simple random sampling without replacement (SRSWOR) is.

A) $\frac{1}{N}$ B) $\frac{1}{n}$

C) $\frac{1}{\binom{N}{n}}$ D) $\frac{n}{N}$

ii) In stratified sampling with Neyman allocation _____.

A) $n_i \propto N_i$ B) $n_i \propto N_i S_i$

C) $n_i \propto \frac{N_i S_i}{C_i}$ D) $n_i \propto \frac{N_i S_i}{\sqrt{C_i}}$

P.T.O.

iii) The estimator of population total (Y_T) in case of systematic sampling is given by

A) $\bar{y}_{sys}$ B) $N\bar{y}_{sys}$

C) $\frac{N-1}{N}\bar{y}_{sys}$ D) $\frac{N}{N-1}\bar{y}_{sys}$

b) State whether each of the following statement is true of false : **[1 each]**

i) $\bar{Y}_{lr} = \bar{y} + \beta(X - \bar{x})$ is not an unbiased estimator of population mean in regression method of estimation.

ii) A list of all elements of the population is called as sampling frame.

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

a) In SRSWOR show that sample mean square(s^2) is an unbiased estimator of population mean square(S^2).

b) A simple random sample without replacement is drawn from population of 8502 workers. It is observed that out of 170 workers in the sample, 19 had defective eye-sight. Estimate the proportion of workers having defective eye-sight in the population. Estimate the standard error of this estimator.

c) Explain the regression method of estimation of population mean. Mention two practical situations where it can be used.

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

a) Obtain an unbiased estimator of population mean under systematic sampling. Also obtain variance of this estimator.

b) Obtain the formula for sample size in SRSWR method, so as to achieve the predetermined precision in the estimation of population mean with given confidence coefficient.

c) Derive the expression for standard error of estimator of population total in stratified random sampling method.

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

a) Describe the stratified random sampling method. Obtain an expression for variance of unbiased estimator of population mean under Proportional allocation and Neyman allocation. **[10]**

b) i) In usual notation show that $\text{var}(\bar{y}_{sys}) = \frac{N-1}{N}S^2 - \frac{k(n-1)}{N}S^2_{wsy}$. **[4]**

ii) Write a note on sampling error and non sampling error. **[4]**

iii) State ratio estimator of population mean and population total. **[2]**

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Total No. of Questions : 4]

SEAT No. :

PC1493

[Total No. of Pages : 3

[6327]-367

T.Y.B.Sc. (Regular)

STATISTICS (Principal)

ST-364 : Introduction to Survival Analysis

(CBCS 2019 Pattern) (Semester-VI) (36174)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of statistical tables and calculator is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following:

A) Choose the correct alternative in each of the following: **[1 each]**

a) In random censoring the number of uncensored observations and time for which study last are,

i) both are fixed

ii) both are random variable

iii) number of complete observations is a random variable but not time for which study last

iv) number of complete observations is not a random variable but time for which study last is a random variable

b) Let a component has failure rate r(t)=8, then survival function of the component is,

i) exp(8t) ii) exp(-t/8)

iii) exp(4t) iv) exp(-8t)

c) Let a component has failure rate r(t)=8, then cumulative hazard rate of the component is,

i) 8t ii) t/8

iii) 4t iv) $8t^2$

P.T.O.

B) In each of the following cases state whether the given statement is true or false: **[1 each]**

a) Hazard rate is the instantaneous rate of failure at time 't' given that an item is survived till age 't'.

b) The successive difference in order statistics is called as spacings.

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

a) Explain in brief the actuarial estimator of survival function.

b) Show that, if a lifetime distribution F(t) belongs to Decreasing Failure Rate Average (DFRA) class of lifetime distributions then it belongs to New Worse Than Used (NWU) class of lifetime distributions i.e., DFRA$\Rightarrow$NWU.

c) Let the lifetimes of an individuals are:32.7, 36.7, 40.2, 30.5, 26.9, 26.3, 38.8, 43.5, 30.8, 45.2, 45.5, 44.4.Using this information obtain 95% confidence band of $\overline{F}_{40}(t)$.

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

a) A certain study among the cancer patients is carried out in a city government hospital and lifetimes of patients are recorded. The lifetimes (in years) (T) of patients are:

55.3, 30.1+, 34.7, 39.2+, 13.5, 53.4+, 22.7+, 53.7, 25.1, 55.1, 17.4+, 13.4 where + indicates the censored observation. Find Kaplan-Meier estimate of survival function.

b) With usual notations, derive the Greenwoods formula for variance of an actuarial estimator.

c) Prove that, if T is a continuous non-negative random variable with cumulative hazard rate R(t) then R(t) is exponential random variable with parameter 1.

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

a) i) State probability density function of Makeham family of life distribution. Hence, find its failure rate. Also state its ageing class. **[3]**

ii) Explain the concept of spacing and normalized spacing. Hence obtain the probability distribution of spacing and normalized spacing. **[7]**

b) i) The survival function of turbine blade is $\overline{F}(t) = e^{\sqrt{0.001t}}$, for t > 0. Show that hazard rate is decreasing. Also sketch hazard rate for t=0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4. **[6]**

ii) Prove that, if T follows the Weibull distribution with parameter λ and γ then T^{γ} has exponential distribution with parameter λ. **[4]**

Total No. of Questions : 4]

SEAT No. : ____

PC1494

[Total No. of Pages : 3

[6327]-368
T.Y.B.Sc. (Regular)
STATISTICS (Principal)
ST-365 (A) : Actuarial Statistics
(CBCS Pattern 2019) (Semester - VI) (36175)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicates full marks.***
3) ***Use of Calculator and Statistical table is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following :

A) Choose the correct alternative in each of the following. **[1Each]**

a) People, who wish to be insured against certain types of losses, receives a contract' called as

i) Premium ii) Benefit

iii) Claim iv) Policy

b) The relationship between Tx and Lx is

i) $T_x = L_x + L_{x+1}$ ii) $T_x = L_x - L_{x+1}$

iii) $T_x = L_x + T_{x+1}$ iv) $T_x = L_x - T_{x+1}$

c) An annuity which is payable for a stated period of time that is regardless of whether an individual lives or dies is

i) temporary life annuity ii) life annuity

iii) annuity certain iv) deferred annuity

B) State whether each of the following statements is true or false : **[1Each]**

a) An annuity that provides periodic benefit payments for the lifetime of an individualis called as life annuity.

b) l_x denotes the expected number of survivors of age x.

P.T.O.

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

a) Explain the concept of utility function $U(w)$. If G is one time premium and X is loss random variable with $E(X) = \mu$, then prove that $G \geq \mu$.

b) Assume that mortality is described by $l_x = 100 - x$, for $0 \leq x \leq 100$ and that the force of interest is $\delta = 0.05$. Calculate net single premium for 25 year term insurance for the individual having (40).

c) For a certain insect population, the probability q_x obtained for 7 weeks are given below :

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

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

a) On 5th 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 10th August 2007 and the loss to the insurer was 45,000. If i = 0.06, what was the annual premium paid?

b) Define curtate future lifetime random variable $K(x)$ and find its probability mass function.

c) Derive an expression for the net single premium for whole life insurance. Also state the recursion relation,

Q4) Attempt any one of the following.

A) a) Define the following terms : **[5]**

i) Annuity.

ii) Life annuity.

iii) Temporary life annuity.

b) If z is a present value random variable for a discrete one - year term insurance of 1000 issued to *(x)* . It is given that **[5]**

$E(z) = 19$ and $V(z) = 17689$ Calculate i.

B) a) L is the loss at issue random variable for fully discrete whole life insurance of 1 on (49) . You are given. **[5]**

$A_{49} = 0.23882$, $\ddot{a}_{49} = 13.4475$, $2A_{49} = 0.08873$,

$i = 0.06$, Var $(L) = 0.10$

Calculate P and $E(L)$

b) In annuity certain, the payments are made regularly at the beginning of the year then show that. **[5]**

$$\ddot{s}_{\overline{n}|} = (1+i)^n \ddot{a}_{\overline{n}|}$$

■■■■

Total No. of Questions : 4]

SEAT No. :

PC1495

[Total No. of Pages : 3

[6327]-369

T.Y.B.Sc. (Regular)

STATISTICS

ST-365 B : Operations Research - II

(2019 CBCS Pattern) (Semester-VI) (36176)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of calculator and statistical table is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following.

A) Choose the correct alternative in each of the following. **[1 each]**

a) If one players loss is equal to the gain of other player then the game is called as _____ game.

i) pure ii) no-sum

iii) zero-sum iv) no-value

b) If the total investment in stock is limited then the best order quantity for each item will be _____.

i) equal to the economic order quantity (EOQ)

ii) greater than EOQ

iii) less than EOQ

iv) inverse of EOQ

c) Which of the following criterion is not used for decision-making under uncertainty?

i) Maximin ii) Expected monetary value

iii) Laplace iv) Regret

P.T.O.

B) State whether each of the following statement is true or false **[1 each]**

a) As the life of an increases its resale value decreases.

b) Strategies are the future conditions which are not under the control of decision maker.

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

a) Write a procedure of drawing a decision tree in decision theory.

b) A manufacturing company requires 4000 kg of raw material for manufacturing a particular item per year. The estimated cost of carrying inventory is 20% of the investment of price 10 Rs. in the inventory and cost of placing an order is R. 40. Find the optimal lot size and minimum yearly variable inventory cost.

c) The data on the running costs per year and resale price of equipment A, whose purchase price is Rs. 2,00,000 are as follows:

Year	1	2	3	4	5	6
Running cost (Rs.)	7,500	8,500	10,000	12,500	17,500	27,500
Resale Price (Rs.)	85,000	76,500	70,000	60 000	40 000	15,000

Find the economic life of the machine and the minimum average cost.

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

a) Derive an expression for economic lot size with uniform rate of demand, finite replenishment with no shortages.

b) Write a note on processing of n jobs through three machines.

c) For a game. the pay-off matrix is

Player A	Player B	
	B1	B2
A1	1	7
A2	6	2

Determine the best strategies for both the players and value of the game by algebraic method.

Q4) Attempt any one of the following.

a) i) A retail store manager has to order new stock with three ranges: luxury, middle of the range and inexpensive. The strategic decision on which range to buy depends on the economic outlook for the season, but the economic forecasts are uncertain. Historical data shows that the expected profits are:

Range	Economic outlook for the season		
	Good	Average	Bad
Luxury	1,00,000	40,000	–80,000
Middle	70,750	60,000	–30,200
Inexpensive	–20,200	50,500	50,000

Use the Laplace criterion to find the optimal strategy. **[6]**

ii) Write a note on ABC analysis of inventory theory. **[4]**

b) i) Explain the term pure strategy. Also write the rules to determine saddle point. **[6]**

ii) A company has five jobs, each of which must be processed on the two machines A and B in the order AB. Processing time in hours are given as: **[4]**

Job	1	2	3	4	5
Machine A	5	1	9	3	10
Machine B	2	6	7	8	4

Find optimal sequence.

Total No. of Questions : 4]

SEAT No. : ____

PC-1496

[Total No. of Pages : 3

[6327]-370
T.Y. B.Sc.
STATISTICS (Principal)
ST-366A : Stochastic Processes
(2019 Pattern) (CBCS) (Semester - VI) (36177)

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

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of calculator and statistical table is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) **Attempt each of the following :**

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

i) If X_n is the total number of sixes appearing in the first n throws of a die, then the state space of a stochastic process $\{X_n, n \geq 1\}$ is

a) { 0, 1,2,.. .,n} b) { l,2,...,}
c) { 0,1,2,..., } d) { l,2,...,n }

ii) A state j is said to be absorbing iff

a) pjj = 0, pjk = 1, j ≠ k b) pjj = 1 , pjk = 0 , J ≠ k
c) pjj = 0, pjk = 0 , j ≠ k d) Pjj = 1 , pjk = 1 , j ≠ k

iii) Let {N(t), t ≥ 0} be a Poisson process with parameter λ, mean number of occurrences in an interval of length t is

a) λt b) $\frac{1}{\lambda t}$

c) $\lambda^2 t$ d) $\frac{1}{\lambda}$

P.T.O.

b) State whether **each** of the following statements is true or false : **[1 each]**

i) In an irreducible Markov chain every state can be reached from every other state.

ii) The sum of elements in each column of one step transition probability matrix is always 1.

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

a) Discuss Gambler's ruin problem.

b) If $\{N_1(t), t \geq 0\}$ and $\{N_2(t), t \geq 0\}$ are two independent Poisson processes with parameter λ_1 and λ_2 respectively, then show that

$$P[N_1(t) = k \mid (N_1(t) + N_2(t) = n)] = \binom{n}{k} p^k q^{n-k}$$

where $p = \frac{\lambda_1}{\lambda_1 + \lambda_2}$ and $q = \frac{\lambda_2}{\lambda_1 + \lambda_2}$.

c) Let $\{X_n, n \geq 0\}$ be a Markov chain with three states 0,1,2 and one step transition probability matrix P as

$$p = \begin{bmatrix} \frac{3}{4} & \frac{1}{4} & 0 \\ \frac{1}{4} & \frac{1}{2} & \frac{1}{4} \\ 0 & \frac{3}{4} & \frac{1}{4} \end{bmatrix}$$

Initial probability distribution, $P(X_0 = i) = \frac{1}{3}$, $i = 0, 1, 2$.

Compute:

i) $P(X_2 = 2, X_1 = 1 \mid X_0 = 2)$

ii) $P(X_3 = 1, X_2 = 2, X_1 = 1, X_0 = 2)$

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

a) State and prove Chapman-Kolmogorov equation for Markov chain.

b) A particle performs a random walk with absorbing barriers 0 and 4. Whenever it is any position r ($0 < r < 4$), it moves to r +1 with probability p or to (r – 1) with probability q, $p + q = 1$.But as soon as it reaches 0 or 4 it remains there itself. Let X_n be position of the particle after n moves. The different states of X_n are the different positions of the particle. Obtain one step transition probability matrix of the Markov chain $\{X_n\}$. Also find $P[X_2 = 3 \mid X_1 = 1]$.

c) Let $\{X_n, n \geq 0\}$ be a Markov chain with three states 0,1,2 and one step transition probability matrix P as

$$p = \begin{bmatrix} 0 & 1 & 0 \\ \frac{1}{2} & 0 & \frac{1}{2} \\ 0 & 1 & 0 \end{bmatrix}$$

Show that all states of Markov chain $\{X_n, n \geq 0\}$ are periodic and non-null persistent.

Q4) **Attempt <u>any one</u> of the following :**

a) i) A professor tried not to be late for class too often. If he is late one day, he is 90% sure to be on time next time. If he is on time, then the next time there is 30% chance of his being late. In the long run, how often is he late for class? **[6]**

ii) Define a state space of a stochastic process and explain different types of state spaces with suitable illustrations. **[4]**

b) i) Let $\{X_n, n \geq 0\}$ be a Markov chain having state space S ={1, 2, 3, 4} and one step transition probability matrix P as

$$p = \begin{bmatrix} \frac{1}{3} & \frac{2}{3} & 0 & 0 \\ 1 & 0 & 0 & 0 \\ \frac{1}{2} & 0 & \frac{1}{2} & 0 \\ 0 & 0 & \frac{1}{2} & \frac{1}{2} \end{bmatrix}$$

Show that state '1' is ergodic. **[6]**

ii) Explain Poisson process with suitable illustration. Also explain the three postulates of Poisson process. **[4]**

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Total No. of Questions : 4]

SEAT No. : ____

PC-1497

[Total No. of Pages : 2

[6327]-371

T.Y. B.Sc.

STATISTICS (Principal)

ST - 366 B : Reliability Theory and Applications

(2019 Pattern) (CBCS) (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 tables and scientific calculator is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt **each** of the following :

a) Choose the correct alternative in each of the following. **[1 each]**

i) If component has no ageing effect then for all x and $t > 0$, $R(t + x)$ is

A) $R(x)$ B) $R(t)$

C) $R(x)R(t)$ D) $\frac{R(x)}{R(t)}$

ii) Reliability of system is always lies between

A) 0 and 1 B) –1 and 1

C) 0 and ∞ D) $-\infty$ and ∞

iii) For a parallel system of two independent components having reliability of each component is 0.7, the reliability of the system is

A) 0.51 B) 0.49

C) 0.91 D) 0.09

b) State whether **each** of the following statements is true or false. **[1 each]**

i) In case of *Weibull* (λ, γ), if shape parameter $\gamma > 1$ then it belongs to DFR class.

ii) If a system is composed a single component, system reliability will be equal to the component's reliability.

P.T.O.

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

a) Show that dual of k-out-of-n system is n-k+1-out-of-n system. Hence show that dual of a series system is a parallel system.

b) At every corner of recreation hall a system of four halogen bulbs is located. Reliability of each component is 0.9. What would be the reliability of the system if the bulbs are connected in

i) Series system

ii) Parallel system

c) Compute the hazard function for Weibull distribution. Also comment on its ageing class.

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

a) i) Show that, $E(T) = \int_0^\infty S(t)\,dt$, where, T is a lifetime and S(t) is a survival function of a component. **[3]**

ii) Explain general models for reliability data. **[2]**

b) Show that $r(t) = \frac{f(t)}{\bar{F}(t)}$, provided F($t$) < 1, where $r(t)$ is hazard rate function.

c) Derive the reliability of 3-out-of-4 system. Hence or otherwise find reliability of 3-out-of-4 system, if the reliability of each component is 0.7.

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

a) i) Draw the reliability block diagram for 2-out-of-3 system and find its reliability using path vector and cut vector methods of reliability, given that components are independent and identically distributed Bernoulli random variables each with reliability p. **[7]**

ii) Discuss the repairable system and non-repairable system in reliability data. **[3]**

b) i) Let T_1, T_2, ..., T_n is random sample of size n from exponential distribution with parameter λ. Find the exact confidence interval for λ using likelihood estimation technique. **[5]**

ii) Define Increasing Failure Rate Average (IFRA) class of the life distributions. Show that F belongs to IFR class then F belongs to IFRA class. **[5]**

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Total No. of Questions : 4]

SEAT No. :

PC-1498

[Total No. of Pages : 2

[6327]-372

T.Y.B.Sc.

STATISTICS (Principal)

ST-366 (C) : Medical Statistics and Clinical Trials

(CBCS) (2019 Pattern) (Paper - VI) (Semester - VI) (36179)

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

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of Statistical tables and calculator is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following: **[1 each]**

a) Choose the correct alternative for each of the following:

i) The graph drawn by Dr. John Snow could find the cause of

A) Malaria B) Scurvy

C) Puerperal Fever D) Cholera.

ii) A study that begins with test on animals is called as

A) Pre-Clinical B) Phase-I

C) Phase-II D) Phase -III

iii) Pharmaco-kinetics (Pk) is the study of time course of

A) Absorption

B) Distribution

C) Metabolism and Excretion

D) All of the above

b) In each of the following, state whether the given statement is true or false: **[1 each]**

i) Incidence of a disease in a community is the ratio of total number of cases to the size of the community.

ii) Shortness of breathing is one of the symptom of Asthma.

P.T.O.

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

a) Write a short note on Cross-Over Design.

b) Explain the importance of epidemiology giving illustration.

c) Explain in brief Phase III study in clinical trials.

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

a) Explain Bowker's test with the help of an illustration.

b) Discuss in brief about the Statistical Analysis Plan in clinical trial.

c) Write a short note on Bioavailability.

Q4) Attempt any one of the following:

a) i) Define following terms **[5]**

I) Crude Birh Rate

II) Crude Death Rate

III) Population

IV) Census

V) Age Specific Birth Rate

ii) Write a note on exponential growth model. **[5]**

b) i) Discuss in brief about the drug discovery of disease Malaria. **[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 (mcg/ ml)	400	620	350	300	150	50	25

Total No. of Questions : 5]

SEAT No. : ____

PC-1499

[Total No. of Pages : 2

[6327] - 373
T.Y. B.Sc.
GEOGRAPHY
GG 361: Regional Geography of India - II
(2019 Pattern) (Semester - VI) (36181)

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

Instructions to the candidates:

1) ***Q. 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 Magnetite?

b) State the components required for Hydropower generation.

c) Name any two iron ore producing states in India.

d) Write any two name of major auto cluster in India.

e) Define dispersed settlement.

f) What is Birth rate?

Q2) a) Elaborate the importance of communication system in India. **[6]**

OR

Discuss the developement of IT Industry in India.

b) Explain the role of Railways in the Developement of India. **[4]**

Q3) a) Explain the major types of agriculture. **[6]**

OR

Explain factors affecting population growth in India.

b) Discuss about cotton textile industry in India. **[4]**

Q4) a) Explain the Bauxite distribution in India. **[6]**

OR

Explain the factors affecting location of human settlements.

b) Discuss about coal production of India. **[4]**

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

a) Shifting cultivation.

b) Communication system in India.

c) Iron and steel industry.

d) Types of minerals.

e) Rectangular pattern of settlement.

f) Population Density.

Total No. of Questions : 5]

SEAT No. :

PC-1500

[Total No. of Pages : 2

[6327]-374
T.Y.B.Sc
GEOGRAPHY
G.G. 362 Geography of Economic Activities II
(2019 Pattern) (CBCS) (Semester - VI) (36182)

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

Instructions to the candidates:

1) ***Question 1 is compuslory.***
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) Name any two copper producing state in India.

b) Name any two iron ore producing countries in the world.

c) What is Limonite?

d) Write two advantages of Dairy farming.

e) Write two Disadvantages of Industrialisation in India.

f) Define commercial Fishing.

Q2) a) Describe the characteristic of plantation Agriculture. **[6]**

OR

Discuss about silicon valley of USA.

b) Explain the major IT park in India. **[4]**

Q3) a) Explain the web based economic activities in India. **[6]**

OR

Explain the use of GIS in economic activities.

b) Describe global distribution of copper ore. **[4]**

P.T.O.

Q4) a) Describe in detail iron ore production in India. **[6]**

OR

Explain the factors of automobile developed in India.

b) Discuss the web based platform in Tourism. **[4]**

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

a) Web based platform

b) Commercial grain farming

c) Twechnology based economic activities

d) E-commerce

e) Types of Agriculture

f) Distribution of mineral oil

Total No. of Questions : 5]

SEAT No. : ____

PC-1501

[Total No. of Pages : 2

[6327]-375

T.Y. B.Sc.

GEOGRAPHY

GG 363 : Tourism Activities and Management

(2019 Pattern) (Semester - VI) (36183)

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

Instructions to the candidates:

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

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

a) What is resort?

b) What is Motel?

c) What is fullform of M.T.D.C.?

d) Write any two role of tourist guide in tourism

e) In which state 'Ajanta Caves' located?

f) In which state 'Jaisalmer' located?

Q2) a) Describe the educational tour planning. **[6]**

OR

Describe the significance of tourism mapping.

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

Q3) a) Explain the role of MTDC in tourism development of Maharastra. **[6]**

OR

Explain tourism infrastructure development in India.

b) Define tourism as an economic activities. **[4]**

P.T.O.

Q4) a) Discuss the importance of tourism planning and management. **[6]**

OR

"Jaisalmer is the prime destination in tourism in India". Discuss.

b) Describe the role of travel agency in tourism. **[4]**

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

a) Promotion of tourism

b) Potential for local tourism development

c) Mode's of transfortation in tourism

d) Type's of Hotel

e) Employment generation in tourism

f) Tour plan

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Total No. of Questions : 5]

SEAT No. : ____

PC1502

[Total No. of Pages : 2

[6327]-376

T.Y.B.Sc. (Regular)

GEOGRAPHY

GG 364 : Geography of Soil - II

(2019 Pattern) (Semester - VI) (36184)

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

Instructions to the candidates:

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

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

a) Define Alfisol.

b) What is humus?

c) Define Organic matter.

d) What do you mean by soil conservation?

e) Write any two measures of soil degradation.

f) Mention any two features of Alluvial soil.

Q2) a) Describe the methods of soil conservation. **[6]**

OR

Discuss the need of soil conservation.

b) Write about the C:N Ratio. **[4]**

Q3) a) Explain the decomposition of soil organic matter. **[6]**

OR

Discuss the factor affecting on soil organic matter.

b) Write about the effects of soil degradation. **[4]**

P.T.O.

Q4) a) Discuss the types of soil in India. **[6]**

OR

Explain the basis of soil classification.

b) Write the types of soil degradation. **[4]**

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

a) Soil dynamics

b) Zonal soil

c) Black soil

d) Measures of soil conservation.

e) Factors affect on soil erosion.

f) Soil resource management in India.

Total No. of Questions : 5]

SEAT No. :

PC1503

[Total No. of Pages : 2

[6327]-377

T.Y. B.Sc. (Regular)

GEOGRAPHY

GG - 365 : Management of Man Made Disasters

(2019 Pattern) (Semester - VI) (36185)

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

Instructions to the candidates:

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

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

a) Write any two factors contributing to man - made disaster.

b) What is water pollution?

c) Define the term disaster.

d) Give any two examples of man - made disaster.

e) Define the term soil degradation.

f) What do you understand by the term pandemic disease.

Q2) a) Explain Man-made disaster with examples. **[6]**

OR

Describe a case study of Bhopal gas tragedy.

b) Write the causes of biological hazards in brief. **[4]**

Q3) a) Describe the Causes, effect and Management of Soil erosion. **[6]**

OR

Write in detail about effect and Management of desertification.

b) Explain in brief the causes of landslide in himalayan region. **[4]**

P.T.O.

Q4) a) Describe in detail the causes and effects of biological hazards. **[6]**

OR

Discuss a case study of Chernobyl nuclear disaster.

b) Write in brief about the Physical hazards. **[4]**

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

a) Eutrophication.

b) Forest fires.

c) Management of Chemical hazards.

d) Effects of biological hazards.

e) Covid - 19.

f) Nuclear hazards.

Total No. of Questions : 5]

SEAT No. : ____

PC-1504

[Total No. of Pages : 2

[6327]-378
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 Q2 to Q5.***
3) ***Questions 2 to 5 carry equal marks.***

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

a) What is electromagnetic spectrum?

b) What do you understand by the term remote sensing?

c) Define the term flying height.

d) What do you mean by transmission?

e) Mention the names of any two sensors used for remote sensing.

f) What is IR scanners?

Q2) a) Discuss remote sensing as a tool for resource survey applications. **[6]**

OR

Describe division of spectrum in various spectral region.

b) Write in brief about terrestrial aerial photographs. **[4]**

Q3) a) Explain the concept of electromagnetic radiation in detail. **[6]**

OR

What is Geostationary satellite? Explain it with example.

b) Write in brief about optical mechanical scanner. **[4]**

P.T.O.

Q4) a) Describe in detail the central perspective projection of aerial photograph. **[6]**

OR

Write in detail about element of interpretation of satellite image.

b) Write in detail about aerial cameras used for remote sensing. **[4]**

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

a) LANDSAT

b) Passive sensor

c) Vertical photographs

d) SPOT

e) IRS

f) Interpretation Key

Total No. of Questions : 5]

SEAT No. : ____

PC1505

[Total No. of Pages : 2

[6327]-379

T.Y.B.Sc. (Regular)

GEOGRAPHY

GG 3610: Research Methodology - II

(2019 Pattern) (Semester - VI) (361810)

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

Instructions to the candidates:

1) ***Q1 is compulsory.***
2) ***solve any three questions from Q2 to Q5.***
3) ***Questions 2 to 5 carry equal marks.***

Q1) Solve any five of the following.

a) Define research methodology. **[5]**

b) What is secondary data?

c) Write any two merits of questionnaire method.

d) What is research report?

e) Write any two modes of research communication.

f) Write any two types of research report.

Q2) a) Describe the characteristics of a good questionnaire. **[6]**

OR

Explain the various sources of secondary data collection.

b) Write a short note on demerits of questionnaire method. **[4]**

Q3) a) Describe the characteristics of good research report writing. **[6]**

OR

Describe basic components of a research report.

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

P.T.O.

Q4) a) Explain the case study method in detailed. **[6]**

OR

Explain the structure and organization of research reports.

b) Write in short on Abstract. **[4]**

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

a) Questionnaire method

b) Dissertation

c) Research Paper

d) Keywords

e) Bibliography

f) Preliminary Page of report.

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Total No. of Questions : 5]

SEAT No. : ____

PC1506

[Total No. of Pages : 2

[6327]-380

T.Y.B.Sc. (Regular)

GEOGRAPHY

SEC - GG - 3611 : Total Station Surveying

(2019 Pattern) (Semester - VI) (361811)

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

Instructions to the candidates:

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

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

a) Write the angles measured in total station.

b) What is the least count in total station.

c) Define centering.

d) Define total station.

e) Write the formula for distance measurement in total station.

f) What is the elaboration for EDM in surveying.

Q2) a) Explain the measurement of cross profile with the help of total station. **[6]**

OR

Describe the procedure for measurement of agriculture farm with total station.

b) What are the merits of total station. **[4]**

Q3) a) Explain the repetation angle measurement in total station. **[6]**

OR

Discuss the various parameters of total station.

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

P.T.O.

Q4) a) Explain the procedure for measurement of college campus with total station. **[6]**

OR

Describe the various applications of total station.

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

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

a) Setting height of instrument of total station.

b) Demerits of total stations.

c) Parts of total station.

d) Offset measurement in total station.

e) Setting up of coordinate value for occupied point.

f) Prism and non prism mode in total station.

Total No. of Questions :5

SEAT No. : ____

PC-1507

[Total No. of Pages : 2

[6327]-381
T.Y. B.Sc. (Regular)
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 <u>THREE</u> 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 true or false : <u>Rota</u> <u>virus</u> is responsible for gastrointestinal disease.

b) _____ is β lactam antibiotic.

i. Trimethoprim ii. Tazobactum

iii. Rifamycin iv. oseltamivir

c) Name any two protein synthesis inhibiting drugs.

d) Define parenteral route of drug administration.

e) Write viral pathogen affecting domestic animals.

f) Write an inhibitor of penicillinase enzyme.

Q2) a) Describe the following any 2. **[6]**

i. Any one mechanism of drug resistance.

ii. Pathogenesis of corona virus.

iii. Mode of action of amphoterecin B.

b) Describe mechanism of action of acyclovir. **[4]**

P.T.O.

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

i. Mode of action of trimethoprim.

ii. Symptoms of cryptococcus neoformans.

iii. Mode of action of chloroquine.

b) Write pathogenesis of plasmodium. **[4]**

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

i. Cultivation of virus.

ii. Lab diagnosis of Entamoeba.

iii. Active efflux of drug.

b) Pathogenesis of Dengue **[4]**

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

i. Inactivation of drug.

ii. Pathogenesis of Rinderpest virus.

iii. Role of fluoroquinolones in chemotherapy.

iv. Pathogenesis of Histoplasma capsulatum.

v. Hepatitis A virus.

vi. Mode of action of Rifamycin _____.

Total No. of Questions : 5]

SEAT No. : ____

PC-1508

[Total No. of Pages : 2

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T.Y. B.Sc.
MICROBIOLOGY
MB 362: Immunology - II
(Regular) (2019 Pattern) (CBCS) (Semester - VI) (36192)

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

Instructions to the candidates:

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

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

a) Secondary immune response is characterized by production of large amount of _ _ _ _ _ antibody.

b) Name any two cytokines involved in T-cell activation and differentiation.

c) HDN is example of _ _ _ _ _ type of hypersensitive reaction.

d) State True or False : Complement deficiency is primary form of immunodeficiency.

e) Define : Immunological tolerance

f) Define : Interferons

Q2) Answer any two of the following

a) i) Describe types of autoimmune diseases with examples. **[6]**

ii) Enlist any three biological functions of cytokines

iii) Describe in detail any two consequences or examples of type IV hypersensitivity reaction.

b) Describe in detail mechanism of type III hypersensitivity reaction. **[4]**

Q3) Answer any two of the following

a) i) Explain diagnosis & treatment of rheumatoid arthritis. **[6]**

ii) Describe any two immunopathological mechanisms of autoimmunity.

iii) Write a note on atopic dermatitis.

b) Explain in detail the significance of cell mediated immune response **[4]**

Q4) Answer any two of the following

a) i) Explain T-cell response to superantigen **[6]**

ii) Describe CVID

iii) Diagrammatically represent role of cytokines in B - cell activation and differentiation.

b) Describe the MHC - II restriction pathway of antigen processing with the help of neat labelled diagram. **[4]**

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

a) Acquired immunodeficiency

b) Mediators of type I hypersensitive reaction

c) ADCC

d) Primary immune response

e) Immunosuppression

f) Principles of hypersensitivity reactions.

Total No. of Questions : 5]

SEAT No. :

PC-1509

[Total No. of Pages : 2

[6327]-383
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 Q2 to Q5.***
3) ***Question 2 to 5 carry equal marks.***

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

a) Define Active transport.

b) Name the multienzyme complex used in fatty acid synthesis.

c) _____ produced in liver cells is converted to urea in the urea cycle.

i) Glucose ii) Bile

iii) Ammonia iv) Albumin

d) State first law of thermodynamics.

e) Give one example of iron oxidising bacteria.

f) List any two components of mitochondrial ETC.

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

i) Describe Facilitated diffusion.

ii) Explain Arrangement of components of ETC.

iii) Enlist the steps in starch synthesis.

b) Diagrammatically represent non-cyclic photophosphorylation. **[4]**

P.T.O.

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

i) Structure of ATP synthatase

ii) Ionophores

iii) Steps in beta oxidation of fatty acids

b) Describe the concept of high energy compounds. Give one example of enolic phosphates as high energy compound. **[4]**

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

i) Entropy

ii) Passive transport

iii) Carbon dioxide fixation reaction in calvin cycle

b) Describe with structures, urea cycle. **[4]**

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

a) Phosphotransferase system

b) Energetics of mitochondrial ETC

c) Cyanobacteria

d) Peptidoglycan synthesis

e) Free energy

f) Starch degradation

Total No. of Questions : 5]

SEAT No. : [ ]

PC1510

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T.Y.B.Sc. (Regular)

MICROBIOLOGY

MB - 364 : Molecular Biology

(2019 Pattern) (Semester - VI) (36194)

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

Instructions to the candidates:

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

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

a) Which enzyme is called as molecular scissors.

b) What is cDNA Library?

c) What is meiosis?

d) State Mendel's law of segregation.

e) Which enzyme repairs the single strand break in DNA?

f) Name the model organism to show genetic mapping by tetrad Analysis.

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

i) Monohybrid cross with suitable example.

ii) Permissible and restrictive hosts.

iii) Base pair excision repair mechanism (BER).

b) Diagramatically explain southern blotting. **[4]**

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

i) What are vectors? State the characters of ideal vector.

ii) Diagramatically illustrate cis - trans test of genetic complementation.

iii) State the significance of meiosis.

b) Define Recombinant DNA technology, Explain the various steps involved in it. **[4]**

P.T.O.

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

i) Explain different types of λ vector with one example of each.

ii) What are the problems associated with linkers and how it is over come by using adaptors.

iii) Differentiate between Nitrocellulose and Nylon membrane used in blotting tech.

b) With neat labelled diagram, explain the action of RUV ABC system in double strand break repair in eukaryotic chromosome. **[4]**

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

a) Different stages involve in eukaryotic cell cycle.

b) Advantages of Lysogeny over Lytic cycle.

c) Effect of x-ray radiations on DNA.

d) Effect of intercalating agents on DNA molecule.

e) T4 DNA ligase.

f) Agarose gel electrophoresis.

Total No. of Questions : 5]

SEAT No. : ____

PC1511

[Total No. of Pages : 2

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T.Y. B.Sc. (Regular)

MICROBIOLOGY

MB - 365: Fermentation Technology - II

(2019 Pattern) (Semester - VI) (36195)

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 the following (Any five): **[5]**

a) State different types of wines.

b) What is lagering?

c) Name any two organisms used for citric acid production.

d) Cobalt chloride is added as a precursor. for large scale production of ____.

e) What is solid state fermentation?

f) Name the organism used for lactic acid production.

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

i) Production of Penicillin.

ii) Vitamin B12 production.

iii) Rabies vaccine.

b) With the help of flowsheet describe the process of set type yoghurt. **[4]**

P.T.O.

Q3) a) Explain the following (Any two): **[6]**

i) Use of hop flowers.

ii) Semi synthetic penicillins.

iii) Steroid transformation.

b) Describe the process of beer making. **[4]**

Q4) a) Describe the following (Any two): **[6]**

i) Malo-lactic fermentation.

ii) Polio vaccine.

iii) Aging of wine

b) Explain different stages in streptomycin production. **[4]**

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

a) Cheese ripening.

b) Immune sera.

c) Baker's yeast.

d) Biosurfactant.

e) Tetanus toxoid.

f) Probiotics.

Total No. of Questions : 5]

SEAT No. : ☐

[Total No. of Pages : 2

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T.Y. B.Sc.
MICROBIOLOGY
MB-366: Food Microbiology
(CBCS) (2019 Pattern) (Semester - VI) (36196)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Q2 to Q5.***
3) ***Q2 to Q5 carry equal marks.***

Q1) **Attempt any <u>Five</u> of the following.** **[5]**

a) Define perishable foods.

b) Define food.

c) Mention role of ISO in food industry.

d) Enlist any two intrinsic factors.

e) Define probiotics.

f) What is 'F' value.

Q2) **Explain any <u>Two</u> of the following:** **[6]**

a) i) Tetra pack technology

ii) Contamination and spoilage of canned foods

iii) TDP & TDT

b) Explain food poisoning of <u>Clostridium botulinum</u>. **[4]**

P.T.O.

Q3) **Describe any Two of the following:**

a) i) Organoleptic properties of food **[6]**

ii) Use of low temperature for food preservation

iii) Flavour changes in food.

b) Explain food infection of Salmonella typhimurium. **[4]**

Q4) **Explain any Two of the following:**

a) i) Fermented foods-health benefits **[6]**

ii) Canning

iii) Aflatoxin food poisoning

b) Explain the use of chemicals in food preservation. **[4]**

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

a) Relative humidity

b) Texture changes

c) Dehydration

d) Food grade biopreservatives

e) Inhibitory substances in food

f) Contamination of eggs

Total No. of Questions : 5]

SEAT No. :

PC1513

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T.Y. B.Sc. (Regular)

MICROBIOLOGY

MB - 3610 : Waste Management

(2019 Pattern) (Semester - VI) (361910) (Skilled Based Elective)

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 COD

b) What is total volatile Solids?

c) Give importance of Grit chamber

d) What is vermicomposting?

e) What is suspended growth?

f) Enlist types of biomedical wastes.

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

i) Anaerobic digestion processes.

ii) Processing of biomedical wastes.

iii) Characterization of dairy wastes.

b) Explain general characteristics of liquid waste water. **[4]**

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

i) Need for wastewater treatment.

ii) Enumeration of different types of microorganisms.

iii) Importance of pathogen removal from wastewater.

b) Describe rotating biological contactors. **[4]**

P.T.O.

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

i) Activated sludge process.

ii) Characterization of e - waste.

iii) Steps in biogas production

b) Explain leachate refused - derived fuel (RDF). **[4]**

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

a) BOD

b) Aerated lagoon

c) Biomedical wastes

d) Composting

e) Municipal solid waste treatment

f) Fluidized bed reactor

Total No. of Questions : 5]

SEAT No. : ____

PC1514

[Total No. of Pages : 2

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T.Y.B.Sc. (Regular)

MICROBIOLOGY

MB - 3611 : Nano - Biotechnology

(Skill Based Elective)

(2019 Pattern) (Semester - VI) (361911)

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

Instructions to the candidates:

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

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

a) Define Nanoscale.

b) What are peptide nanoparticles.

c) Write two names of metallic nanoparticles.

d) Write two names of microbes used for nanoparticles synthesis.

e) What is use of DLS?

f) Give importance of gold nanoparticles.

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

i) Microbial mediated gold nanoparticles synthesis.

ii) Applications of nanoparticles in animal industry.

iii) Importance of TEM for characterization of nanoparticles.

b) Explain biomedical applications of bioassemblies. **[4]**

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

i) Sulfide nanoparticles synthesis by microbes.

ii) SEM for nanoparticles characterization.

iii) Nanoscale bioassemblies.

b) Describe antimicrobial applications of nanoparticles. **[4]**

P.T.O.

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

i) Au - Ag alloy nanoparticles synthesis by microbes.

ii) FTIR technique.

iii) Applications of nanoparticles in wastewater treatment.

b) Explain characterization of nanoparticles by XRD technique. **[4]**

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

a) Nanotubes

b) Liposomes

c) Oxide nanoparticle synthesis

d) Nanoparticles as 'antimicrobial agent'

e) TEM for nanoparticles characterization

f) Magnetic nanoparticle synthesis

Total No. of Questions :5

SEAT No. :

PC-1515

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T.Y. B.Sc.
NANOSCIENCE AND NANOTECHNOLOGY
NS-361: Polymer Hetero Strucutre and Their Applications
(2019 Pattern) (Paper - I) (Semester - VI) (36261)

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

Instructions to the candidates:

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

Q1) Attempt any FIVE of the following: **[10]**

a) Give full form of P3HT.

b) Give the name of method using metal-oxide.

c) What is n-n or p-p hetero junctions.

d) Define photo-integrated circuits.

e) Which metal oxide are used for filling MWCNT's.

f) Define Ex-Situ polymerisation.

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

i) Write a note on Hust-polymer characterisation.

ii) Explain in detail applications of Hetero structure.

b) Explain synthesis of Hetero structures by In-situ polymerisation using metals. **[4]**

P.T.O.

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

i) Explain in detail p-p and n-n Hetero junction.

ii) Distinguish between Ex-situ polymerization and In-situ polymer polymerisation

b) Explain synthesis of Hetero structure by In-situ polymerisation using metals. **[4]**

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

i) Explain organic solar cell and types of junctions.

ii) Explain differential scanning analysis.

b) Write note on pickering Emulsion. **[4]**

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

a) Laser diode applications.

b) Uses of transistors.

c) Applications of red laser pointer.

d) Organic photovoltaic cell.

e) P-N Heterojunction.

f) Laser.

Total No. of Questions : 5]

SEAT No. : ____

PC-1516

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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 diagram wherever necessary.***
4) ***Figures to the right indicate full marks.***

Q1) Answer the following questions. **[5]**

a) Define Nanocrystals?

b) Define Exciton?

c) Draw the diagram for one-dimensional oxide nanostructure.

d) Write down the formula for Porosity.

e) Define metal organic frameworks?

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

i) Explain the synthesis of semiconductor nanocrystals in organic solvents.

ii) Explain the shape and composition control of semiconductor nanocrystals.

b) Explain the LBL assembly with semiconductor nanoparticals and Nanowires. **[4]**

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

i) Explain the optical properties of Titania nanotubes arrays.

ii) Explain the synthesis methods of Boron-Nitride Nanotubes.

b) Explain the four synthesis generation. **[4]**

P.T.O.

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

i) Explain the Nanofiber yarns preparations.

ii) Explain the nonofabric production.

b) Explain the Electrospinning Process. **[4]**

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

a) Write short note on Laser.

b) Explain Aqueous synthesis of Semiconductor nanocrystals.

c) Explain Ball-Milling and Anneling.

d) Explain Laser-Assisted method.

e) Explain key processing parameter.

f) Explain properties of MOF's.

▽▽▽▽

Total No. of Questions : 5]

SEAT No. : ____

PC-1517

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T.Y.B.Sc.

NANO SCIENCE AND NANO TECHNOLOGY

NS-363: Applications Of Nano Biotechnology

(2019 Pattern) (Semester - VI) (36263) (Paper - III)

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

Instructions to the candidates :

1) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Q 2 to Q 5.***
3) ***Question Nos. 2 to 5 carry equal marks.***
4) ***Draw neat and labelled/ diagram wherever necessary.***
5) ***Fugures to the right indicate full marks.***

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

a) What is self- assembly?

b) What is a function of gap Junction.

c) Write the size of carbon nanotubes.

d) What are Biofilms used in structured microbial communities.

e) Define the term dendrimer.

f) Define the term Liposomes.

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

i) What are micelles? With the help of diagram describe its use in hypertension drug.

ii) What is Biomaterial? Write the types of Biomaterial with applications.

b) Write a note on various uses of nanoparticles. **[4]**

P.T.O.

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

i) What is drug delivery patches? With the help of diagram describe its mechanism.

ii) Draw a neat labelled diagram showing various uses of GNP in broad spectrum of therapies.

b) Write the principle of optical Transducer. **[4]**

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

i) What are Biomolecular motors? Draw neat labelled diagram of ATP synthetase and explain.

ii) With the help of diagram explain flagellar motors.

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

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

a) Microcapsules.

b) Hepatitis and its types

c) Various applications of - carbon nano tubes.

d) Nano- emusions.

e) Ion channels.

f) Use of nano medicine in Tuberculosis (TB).

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Total No. of Questions : 5]

SEAT No. : [ ]

PC1518

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T.Y.B.Sc. (Regular)

NANOSCIENCE & NANOTECHNOLOGY

NS 364 : Nanoelectronics

(2019 Pattern) (Semester - VI) (Paper - IV) (36264)

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) ***Draw neat and labelled diagram whenever necessary.***
5) ***Figures to the right indicate full marks.***

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

a) State moores law.

b) Enlist the differant lithography techniques.

c) What is mean by epitaxial growth?

d) Define optoelectronic devices.

e) Give classification on CND techniques by physical characteristics of vapour.

f) What is mean by Photomask?

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

i) With neat labelled diagram explain multilevel metalization process.

ii) Explain high-k & low-k dielectrics for VLSI.

b) What is lithography? Explain E-beam lithography technique. **[4]**

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

i) Explain kinetics of silicon dioxide growth for thin & ultra thin films.

ii) Write a note on molecular interconnects.

b) Give the difference between thermal evaporation and sputtering method.**[4]**

P.T.O.

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

i) Explain kinetics of silicon dioxide growth for thin & Ultra thin films.

ii) Explain the roadmap of semiconductor characteristics.

b) Give the applications of single electron transistors. **[4]**

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

a) Vertical MOSFET'S

b) Solid state diffusion

c) Molecular electronics

d) Staircase transport of electron

e) ITRS

f) Scanning probe lithography

Total No. of Questions : 5]

SEAT No. :

PC1519

[Total No. of Pages : 2

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T.Y. B.Sc. (Regular)

NANOSCIENCE AND NANOTECHNOLOGY

NS - 365 : Energy Storage Devices and applications

(2019 Pattern) (Semester - VI) (Paper - V) (36265)

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

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Draw neat and lablled diagram wherever necessary.***
4) ***Figure to the right indicates full marks.***

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

a) What is Accumulator?

b) What is Fusion?

c) Define cell Voltage.

d) Define container.

e) What is Supercapacitor?

f) What is solar pond?

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

a) i) What is Energy storage? Write down the need of Energy storage?

ii) What is Renewable resources? Explain it's different types.

b) Write short note on Fossile Fuel? **[4]**

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

a) i) Explain the construction of Battery.

ii) Explain the types of Primary Battery.

b) Explain design and working of Electrode. **[4]**

P.T.O.

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

a) i) What is Supercapacitor? Explain construction of Supercapacitor.

ii) Explain the different types of Supercapacitor.

b) Explain the cycling characteristics of Supercapacitor. **[4]**

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

a) Explain Thermal Energy storage.

b) Explain Electrical Energy Storage.

c) Explain the form of storage in fuel.

d) Explain the Nuclear Energy.

e) Explain the Nuclear fusion.

f) Explain applications of mercury battery.

Total No. of Questions : 5]

SEAT No. : ____

PC-4813

[Total No. of Pages : 2

[6327]-394R

T.Y. B.Sc.

NANOSCIENCE AND NANOTECHNOLOGY

NS-366: Photocatalysis for Environmental Pollution Control

(Elective - II) (2019 Pattern) (Semester - VI) (Paper - VI) (36266)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Q2 to Q5.***
3) ***Q2 to Q5 carry equal marks.***
4) ***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 'Kotal'.

b) Define 'TOF'.

c) Give the photophysical process in electronical excited state.

d) What is p-type semiconductor.

e) Explain 2nd law of photochemistry.

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

i) Explain photo catalysts surface and active species.

ii) Write short note on 'Environmental Remediation'.

b) Explain principle of light over solid. **[4]**

P.T.O.

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

i) Explain Jablonski diagram and photophysical process in electronically excited state.

ii) Write a note on solar spectrum analysis.

b) Explain principle of semiconductor. **[4]**

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

i) What is Adsorption isotherm. Explain any two adsorption isotherm.

ii) Explain Transistor as an amplifire. **[4]**

b) State and explain inhibition.

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

a) Tyndall effect

b) Catalytic Reactions

c) Laser

d) Red-Laser pointer

e) Optoelectronic applications

f) Inhibition

Total No. of Questions : 5]

SEAT No. : ____

PC1521

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T.Y.B.Sc. (Regular)
NANOSCIENCE & NANOTECHNOLOGY
NS-3610: Data Analytics and Computer Applications
(2019 Pattern) (Semester - VI) (362610)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***

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

a) What is mean by qualitative data?

b) Which function is used in MS-Excel to find variance?

c) Define the term 'correlation'.

d) Write PMF of Binomial distribution.

e) What is mean by Parameter?

f) Write formula for computing mean of individual observations.

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

i) Find variance and standard deviation of the following data.

Marks	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
No. of Students	1	5	4	6	9

ii) Find covariance between X and Y.

X	6	9	10	12	15
Y	3	8	11	16	14

b) Write a short note on Measures of central tendency. **[4]**

P.T.O.

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

i) Find Geometric mean & Harmonic mean for the data; 11, 15, 21, 25, 29, 30.

ii) Fit the regression line Y on X.

X	2	4	6	8
Y	10	20	25	30

b) Let X ~ N (5, 4) then find **[4]**

i) P (X > 4.5)

ii) P (X < 10)

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

i) Explain the procedure to find the mode both manually and using MS-Excel for the frequency distribution.

ii) Find mean and median for the following data.

Class	2 – 4	4 – 6	6 – 8	8 – 10
Frequency	20	15	5	10

b) Explain the term correlation and give its types. **[4]**

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

a) If X ~ B (15, 0. 5) then find P(X = 11).

b) What is use of scatter diagram?

c) Give example of Normal distribution.

d) Which function is used to find mean of individual observations?

e) Write the sample space for

i) Tossing the two coins.

ii) Rolling a die.

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Total No. of Questions : 5]

SEAT No. : ____

PC1522

[Total No. of Pages : 2

[6327]-396

T.Y.B.Sc. (Regular)

NANOSCIENCE AND NANOTECHNOLOGY

NS - 3611 : Renewable Energy and Energy Harvesting

(2019 Pattern) (Semester - VI) (362611)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from question No. 2 question No. 5.***
3) ***Draw the neat labelled diagram wherever necessary.***
4) ***Figure to the right indicate full marks.***

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

a) Define solar energy.

b) Define solar panel.

c) Define hydropower.

d) What is solar cooker?

e) Define stalling.

f) Define wind.

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

i) Explain the basic photovoltaic system for power generation.

ii) Explain description of a basin - type solar still.

b) Explain description and working of convecting solar pond. **[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) Explain the principle of photovoltaic solar cell. **[4]**

P.T.O.

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

i) Explain open cycle OTEC system.

ii) Explain closed cycle OTEC system.

b) Explain mechanical equipment of hydropower plant. **[4]**

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

a) Explain Bio - fouling.

b) Explain I-V characteritics of solar cell.

c) Explain the classification of WECS.

d) Explain forebay.

e) Explain Box - type solar cooker.

f) Explain power coefficient.

Total No. of Questions :5

SEAT No. : ____

PC-1523

[Total No. of Pages : 2

[6327]-397
T.Y. B.Sc.
ELECTRONIC SCIENCE
EL-361: MODERN COMMUNICATION SYSTEMS
(2019 Pattern) (CBCS) (Paper -I) (Semester - VI) (36221)

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

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Attempt any <u>THREE</u> questions from Q2 to Q5***
3) ***Question 2 to 5 carry equal marks.***

Q1) Attempt any <u>FIVE</u> of the following: **[5]**

a) List the steps in PCM generation.

b) What do you mean by sampling of a signal?

c) State the frequency band assigned to domestic satellites.

d) What is a cellular phone?

e) Define a quantization noise.

f) State Shannon's sampling theorem.

Q2) a) Attempt the following:

i) State the modulation techniques used in modem. **[2]**

ii) Draw a block diagram of satellite uplink model and explain function of each block. **[4]**

b) Draw a block diagram of cellular phone system and explain it in brief. **[4]**

Q3) a) Attempt the following:

i) Draw a block diagram of ASK generator. **[2]**

ii) State the advantages and disadvantages of FSK. **[4]**

b) Compare GSM and CDMA systems. **[4]**

P.T.O.

Q4) a) Attempt the following:

i) State the advantages of PCM. **[2]**

ii) Compare FDM and TDM systems. **[4]**

b) Draw a block diagram of satellite transponder and explain its working. **[4]**

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

a) Describe in brief the satellite system parameter Equivalent Noise Temperature.

b) List any three parameters of a satellite system.

c) Explian in brief the role of modem in data communication.

d) What do you mean by segmentation and dualization in cellular phone system?

e) Determine the channel capacity for a cellular phone area comprised of seven macrocells with 10 channels per cell.

f) State advantages and disadvantages of FDM.

Total No. of Questions : 5]

SEAT No. :

PC-1524

[Total No. of Pages : 2

[6327]-398

T.Y. B.Sc.

ELECTRONIC SCIENCE

EL - 362 : Embedded System Design Using Microcontrollers

(2019 Pattern) (Semester - VI) (36222) (Paper - II) (Regular)

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

Instructions to the candidates:

1) ***Q. No. 1 is compulsory.***
2) ***Attempt any three questions from Q. No. 2 to Q. No. 5***
3) ***Q. No. 2 to Q. No. 5 carry equal marks.***

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

a) Write any two advantages of embedded systems.

b) Give the instructions for addition and subtraction between w register and file register.

c) What is the use of 'MOVLW' instruction?

d) Write the full form of PIC.

e) What is the use of PINSEL 1 register?

f) Write any two sensors used in washing machine.

Q2) Attempt the following :

a) i) State the functions of any two GPIO port registers of ARM. **[2]**

ii) Explain in brief the elements of embedded system. **[4]**

b) Explain the functional block diagram of washing machine. **[4]**

Q3) Attempt the following :

a) i) Which segments of seven segment display should be on to display '3' and '7' digits. **[2]**

ii) Write any four features of PIC 16F887. **[4]**

b) Explain the working of solid state relay. **[4]**

P.T.O.

Q4) Attempt the following :

a) i) Which register is used to initialise ARM port as an output? How it configures port as an output? **[2]**

ii) Explain the types of memory in ARM. **[4]**

b) Explain any two elements of ARM architecture in detail. **[4]**

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

a) What is an embedded system? Give any two examples of it?

b) Write any two difference between embedded system versus general computing system.

c) List the various blocks of digital camera.

d) Give the names of any five special function Registers of PIC 16F887.

e) Write PIC C program to On - OFF LED continuously.

f) Write instructions used for logical AND and OR operations between W register and file register with example.

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Total No. of Questions : 5]

SEAT No. : ____

PC-1525

[Total No. of Pages : 2

[6327]-399

T.Y. B.Sc. (Regular)

ELECTRONIC SCIENCE

EL - 363 : Industrial Electronics

(2019 Pattern) (CBCS) (Semester - VI) (Paper - III) (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) ***Q.2 to Q.5 carry equal marks.***

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

a) State different types of Power Diode.
b) Write any two applications of TRIAC.
c) State names of components use in SMPS.
d) What do you mean by cycloconverter?
e) Write the basic elements use in electric Vehicle.
f) Write the disadvantages of hybrid Vehicle.

Q2) Attempt the following.

a) i) What is the purpose of dv/dt protection? **[2]**
   ii) Explain the working of AC moter with suitable diagram. **[4]**
b) What do you mean by Trickle charging? State types at batteries use in electric vehicle. **[4]**

Q3) a) Attempt the following.

   i) Draw the circuit diagram to control the armature current in DC motor. **[2]**
   ii) Explain the working of half wave controlled rectifier with resistive load. Draw the wave froms at input, output and across SCR for firing angle of go degree. **[4]**

b) What do you mean by electric vehicle and hybrid vehicle. State advantage of electric vehicle over fuelvehicle. **[4]**

P.T.O.

Q4) Attempt the following.

a) i) What do you mean by Trickle charging? **[2]**

ii) With the help of two transistor analogy explain the working of SCR. Draw its I.V Characteristics **[4]**

b) Draw the circuit diagram of single phase cycloconverter and explain its working. **[4]**

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

a) Draw the construction diagram of DIAC and its I-V characteristics.

b) Draw the circuit diagram of PUT as relaxation oscillator with output waveform.

c) State any two differences between single phase and three phase power supply.

d) Write a short note on Dielectric heating.

e) State the names of parts use in DC motor.

f) What do you mean by MMF in AC motor and what is its importance.

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Total No. of Questions : 5]

SEAT No. : ____

PC1526

[Total No. of Pages : 2

[6327]-400

T.Y.B.Sc. (Regular)

ELECTRONIC SCIENCE

EL - 364 : Manufacturing Process for Electronics

(2019 Pattern) (Semester - VI) (Paper - IV) (36224)

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) State the material used in manufacturing of wire wound resister.

b) Why are solder fluxes needed?

c) State examples of active components.

d) What do you mean by silk mask screen.

e) What is lithography.

f) What is etching

Q2) Attempt the following.

a) i) What is relay. State its applications. **[2]**

ii) Describe in brief the fabrication of carbon composition resister. **[4]**

b) Sketch and indicate important element of multilayer PCB **[4]**

Q3) Attempt the following.

a) i) Draw the layout for double layer PCB and explain. **[2]**

ii) List some conventional and modern techniques of soldering components on PCBs. **[4]**

b) Write short note on wave soldering. **[4]**

P.T.O.

Q4) Attempt the following.

a) i) Define **[2]**

1) Ion Implantation

2) Oxidation

ii) Explain MOSFET IC fabrication technology with neat diagram. **[4]**

b) State fabrication steps for semiconductor devices. **[4]**

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

a) Explain air core indector with neat diagram.

b) State various types & switches? State its advantages.

c) What are various laminates used in PCB bases?

d) State various steps in component placement process.

e) List various defects in solder printing explain any one.

f) List various steps used in IC fabrication.

Total No. of Questions : 5]

SEAT No. :

PC1527

[Total No. of Pages : 2

[6327]-401

T.Y. B.Sc. (Regular)

ELECTRONIC SCIENCE

EL - 365 : Process Control Systems

(2019 Pattern) (Revised) (Semester - VI) (Paper -V) (36225)

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

a) What is meant by Instrument.

b) What is meant by Multichannel Data Acquisition System?

c) Define Control System.

d) Define on/off controller.

e) What is an order of a system?

f) What are different types of controller.

Q2) Attempt the following.

a) i) List the Functional elements of the measurement system. **[2]**

ii) Distinguish between open loop & closed loop system. **[4]**

b) With a neat graph of error & controller output, discuss working of integral control mode. **[4]**

Q3) Attempt the following.

a) i) Which Factors are specifying the dynamic response in control system. Explain it. **[2]**

ii) Draw & explain process control block diagram. **[4]**

b) Explain proportional Integral (PI) Controller. **[4]**

P.T.O.

Q4) Attempt the following.

a) i) State the characteristics of the derivative control mode. **[2]**

ii) What are the two methods for measurement ? Explain it. **[4]**

b) Explain Zero order system? Give its example. **[4]**

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

a) Enlist the methods of correction for interfering & modifying inputs.

b) Write the draw backs with respect to proportional controller over proportional Integral controller.

c) What are the elements of data acquisition system? Explain it.

d) Define the following terms.

i) Plant

ii) Compensator

iii) Sensor

iv) Actuators

v) Feedback loop.

e) Enlist the static characteristics.

f) Differentiate between Single Channel & Multichannel Data Acquisition System.

Total No. of Questions : 5]

SEAT No. : ____

PC-1528

[Total No. of Pages : 2

[6327]-402
T.Y.B.Sc.
ELECTRONIC SCIENCE
EL 366(A) : PLC & SCADA
(2019 Pattern) (CBCS) (Semester - VI) (Paper-VI) (36226A)

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

Instructions to the candidates :

1) ***Q1 is compulsory.***
2) ***Solve any Three questions from Q2 to Q5, which carries equal marks.***

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

a) Draw Ladder Diagram symbol for "No Relay Contact" and "Nc Relay Contact".

b) What is full form of SCADA?

c) What is full form of PLC?

d) What is full form of DCS?

e) What is full form of RTV?

f) Name any two components of PLC.

Q2) a) i) Give any two advantage of PLC. **[2]**

ii) Write a note on PLC Ladder diagram. **[4]**

b) i) Compare DCS Vs PLC (two points). **[2]**

ii) Give any two reasons why SCADA system is use in Industry at learge. **[2]**

Q3) a) i) What is Typical system components and it's application? **[2]**

ii) Write a note on Fundamentals of SCADA system. **[4]**

b) Explain Ladder Program excution sequence in your own words. **[4]**

P.T.O.

Q4) a) i) What is single cycle circuit and combined circuit in PLC? **[2]**

ii) Give any real life example you have seen for SCADA system and PLC system in your own words. **[4]**

b) Give at least four point comparision between SCADA and DCS. **[4]**

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

a) SCADA security

b) Limitations of SCADA

c) Machine control Terminology

d) DNP3 Protocol

e) Digital Logic Gare use in Ladder Logic

f) Applications of SCADA & PLC systems

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Total No. of Questions : 5]

SEAT No. :

PC-1529

[Total No. of Pages : 2

[6327]-403

T.Y.B.Sc.

ELECTRONIC SCIENCS

EL-366(B) : Sensors and Systems

(2019 Pattern) CBCS) (Semester - VI) (36226 B) (Paper - VI B)

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 Nos. 2 to 5 carry equal marks.***

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

a) State the names of light sensors.

b) Write the value of sensitivity of LM-35, temperature sensor.

c) State the advantages of instrumentation amplifier over conventional amplifier.

d) State the name of signal conditioner circuit use for PT -100 temperature sensor.

e) List the various examples of actuators.

f) Write the names of sensors used in Home security system.

Q2) a) Attempt the following.

i) Why platinum is preferred to the other material for making RTD's? **[2]**

ii) Write a note on gas sensor. **[4]**

b) Draw the block diagram of multichannel data acquisition system and explain it. **[4]**

P.T.O.

Q3) a) Attempt the following.

i) Draw the circuit diagram of bridge amplifier using RTD as on arm and write the equation for output voltage. **[2]**

ii) State any four parameters of precision operational Amplifier. **[4]**

b) With neat diagram explain the working principal of Dc Motor? **[4]**

Q4) a) Attempt the following.

i) State the advantages of stepper motor over AC motor. **[2]**

ii) Explain the working of electromagnetic relay with transistor as Relay driver. **[4]**

b) Draw the block diagram of home security system and explain it. **[4]**

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

a) State seeback and peltier effect

b) Draw black diagram of smart sensor.

c) Draw the circuit diagram of RTD as one arm of Budge circuit along with OP-AMP as differential amplifier connected at out put

d) State the differences between regulated and unregulated power supply.

e) List the applications of servomotor.

f) State the Names of different types of sensors used in marine, military and space aplications.

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Total No. of Questions : 5]

SEAT No. : ____

PC1530

[Total No. of Pages : 2

[6327]-404
T.Y.B.Sc. (Regular)
ELECTRONIC SCIENCE
ELSEC-361-SEC-1: Design and Fabrication of Printed Circuit Boards
(2019 Pattern) (Semester - VI) (Paper - X) (362210)

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

Instructions to the candidates:

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

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

a) What is gerber file?

b) What is THT?

c) Give the use of tracks on PCB.

d) What is the meaning of routing?

e) What is Pad stack?

f) What is full form of DRC?

Q2) Attempt the following:

a) i) Mention two physical properties of Laminates. **[2]**

ii) Explain multilayer PCB. **[4]**

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

Q3) Attempt the following.

a) i) What is etching and drilling technique in PCB? **[2]**

ii) Why some PCB's are blue? Justify. **[4]**

b) Mention any two advantages and disadvantages of PCB. **[4]**

P.T.O.

Q4) Attempt the following.

a) i) Give the formula used in calculation of PCB tracksize. **[2]**

ii) Write a short note on flexible boards. **[4]**

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

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

a) Explain in short printing technology in PCB.

b) Write a short note on types of laminates.

c) Write a short note on schematic entry.

d) Explain the procedure of gerber file generation.

e) Write a short note on mechanical layers used in PCB.

f) Describe the procedure of placing and mounting of components.

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Total No. of Questions : 5]

SEAT No. :

PC1531

[Total No. of Pages : 2

[6327]-405
T.Y. B.Sc. (Regular)
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 carries equal marks and solve any three.***

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

a) What is use of "Android Emulator"?

b) Name the operatings system which is currently widely used for Mobile Phones.

c) What is full form of AVD?

d) What is Android version number for "Honey Comb"?

e) Which file defines the user interface for activity?

f) What is full form of SDK?

Q2) a) i) Explain ADT. **[2]**

ii) Compare "android : version Code" Vs "android : version Name attributes in the Android Manifest.xml file? **[4]**

b) List the four main layers of Android operating system. **[4]**

P.T.O.

Q3) a) i) If you have many activities with the same intent filter action name, what will be the output seen on screen? **[2]**

ii) What is purpose of using different colors and different images are always use in Mobile Application Development (MAD) on display screen for button? **[4]**

b) Why "Scroll View" and "Screen Orientation" are important while Mobile Application Development (MAD)? **[4]**

Q4) a) i) Give any four purposes where mobile app helps in real life. **[2]**

ii) Write a note on five components of layouts. **[4]**

b) Write a note on Mobile Application Interface Designing. **[4]**

Q5) Write any four short notes : **[10]**

a) Features of Android OS

b) Various buttons

c) Various views

d) ADT

e) SDK

f) Development of Android Application to print "Hello World".

Total No. of Questions :5

SEAT No. : ____

PC-1532

[Total No. of Pages : 2

[6327]-406
T.Y. B.Sc. (Regular)
PSYCHOLOGY
Personality Theories
(2019 - Pattern) (Paper - I) (Semester - VI) (36201)

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

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any <u>THREE</u> questions from Q2 to Q5.***
3) ***Questions 2 to 5 carry equal marks.***

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

a) What is Cardinal trait?

b) Define Collective consciousness.

c) Who proposed Social Congnitive learning theory?

d) Define Personality.

e) What is defense mechanism?

f) Define trait.

Q2) a) Discuss Freud's Psychoanalytical approach of personality. **[6]**

OR

Evaluate the role of birth order order in personality development.

b) Explain Rogers personality theory of self development. **[4]**

Q3) a) What are the types of personality theory? **[6]**

OR

Critically evaluate Maolow's need theory of self actualization.

b) Explain Bandura's approach of personality development. **[4]**

P.T.O.

Q4) a) Discuss eysenck's hierarchical model of personality. **[6]**

OR

Explain Kelly's personal construct theory of personality.

b) Compare humanistic and behavioral theories of personality. **[4]**

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

a) Cognitive style.

b) Ego crisis.

c) Personal dispositions.

d) Determinants of personality.

e) Identity formation.

f) Becoming one's self.

Total No. of Questions : 5]

SEAT No. :

PC-1533

[Total No. of Pages : 2

[6327]-407
T.Y.B.Sc.
PSYCHOLOGY
PsychoPathology-II
(2019 Pattern) (36202) (Semester - VI) (Paper - II)

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

Instructions to the candidates:

1) ***Questions 1 is compulsory.***
2) ***Solve any three questions from Q2 or Q5.***
3) ***Questions from 2 or 5 carry equal marks.***

Q1) Solve any Five of the following. **[05]**

a) What is ADHD?

b) Define personality disorder.

c) What is Bulimia?

d) Define Insomnia.

e) What is OCD ?

f) What is Alcohol abuse ?

Q2) a) Explain in detail Autism spectrum disorder with symptoms & causes. **[6]**

OR

Explain types and causes of communication disorder.

b) Differentiate between Binge eating and Pica disorder. **[4]**

Q3) a) Explain nature, Symptoms and causes of Narcolepsy & breathing related disorder. **[6]**

OR

Explain personality disorder avoidant and dependent in detail.

b) What is the difference between drug abuse and drug dependence. **[4]**

P.T.O.

Q4) a) Discuss the causal factors and types of Learning disorder. **[5]**

OR

Discuss Cluster C personality disorders in details.

b) Explain the treatment for eating disorders. **[5]**

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

a) Paranoid personality disorder

b) Types of Psychoactive drugs.

c) Dyslexia

d) Insomina causes.

e) Narcissistic personality disorder.

f) Anorexia Nervosa.

Total No. of Questions : 5]

SEAT No. : ____

PC-1534

[Total No. of Pages : 2

[6327]-408

T.Y. B.Sc.

PSYCHOLOGY

EDUCATIONAL PSYCHOLOGY

(2019 Pattern) (Semester - VI) (Paper - III) (36203)

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

Instructions to the candidates:

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

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

a) Define learning.

b) What is cognition?

c) Define educational psychology.

d) Who proposed the theory of cognitive psychology?

e) What is participative teaching method?

f) Where was the first experimental psychology lab set up?

Q2) a) Throw light upon the scope of educational psychology. **[6]**

OR

Describe in detail about physical enviorment of the claes.

b) Justify how the knowledge of educational psychology helps to the learner and learning process. **[4]**

Q3) a) Explain the information processing approach. **[6]**

OR

Explain the importance of behaviourestic approach.

b) Illustrate the role of motivation in learning and teaching. **[4]**

P.T.O.

Q4) a) Explain the meaning and nature of individual differences. **[6]**

OR

Explain general principles and its importance in education.

b) Compare cognitive and constructivistic views of learning. **[4]**

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

a) Functions of Educational psychology

b) Classroom Asssessment

c) Experenitail learning

d) Learner centred teaching methods

e) Nature of educational psychology

f) Less on planning

Total No. of Questions : 5]

SEAT No. : ____

PC1535

[Total No. of Pages : 2

[6327]-409

T.Y.B.Sc. (Regular)

PSYCHOLOGY

Human Resource Management

(2019 Pattern) (Semester - VI) (Paper - IV) (36204)

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

Instructions to the candidates:

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

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

a) Define HRM

b) State the functions of HRM

c) What is job evaluation?

d) Define remuneration

e) Define training

f) What is incentive?

Q2) a) Evaluate the challenges and principles of HRM. **[6]**

OR

Explain the employee selection methods.

b) Examine the challenges of performance appraisal method. **[4]**

Q3) a) Decribe the various types of training methods. **[6]**

OR

Illustrate the HRM model.

b) Analyze the usages of token economy. **[4]**

P.T.O.

Q4) a) Discuss the various types of incentive payment methods. **[6]**

OR

Explain the usages of psychological tests in employee selection process.

b) Evaluate the goals of training programs. **[4]**

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

a) Assessment centre

b) Employee benefits.

c) Job analysis

d) Employee welfare

e) Objectives of HRM

f) Components of remuneration

Total No. of Questions : 5]

SEAT No. :

PC1536

[Total No. of Pages : 2

[6327]-410

T.Y. B.Sc. (Regular)

PSYCHOLOGY

Rehabilitation Psychology

(2019 Pattern) (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) ***Question 2 to 5 carry equal marks.***

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

a) Define Coping.

b) What is Stigma?

c) State the types of approaches in rehabilitation programmes.

d) Name the types of counselling.

e) Define Psychotherapy.

f) What is community?

Q2) a) Explain the impact of disability on individual and family. **[6]**

OR

Describe rehabilitation programmes in vocational training units.

b) Differentiate the intervention for family burden and work performance.**[4]**

Q3) a) Elaborate the historical perspective of rehabilitation. **[6]**

OR

Explain the Community based programmes in rehab.

b) Analyse the advantages of hostel & day care rehabilitation programmes.**[4]**

P.T.O.

Q4) a) Describe the advantages and disadvantages of hospital. **[6]**

OR

Presidential rehab programmes effect.

b) Investigate the effects of Industrial and group counselling for individuals. **[4]**

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

a) Psychiatric disorder.

b) Goals of rehabilitation.

c) Assessment of disability.

d) Halfway home rehabilitation.

e) Objectives of rehab.

f) Roles of eclectic.

■■■■

Total No. of Questions : 5]

SEAT No. : ____

PC-1537

[Total No. of Pages : 2

[6327]-411
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 Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***

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

a) Define Psychotherapy.
b) Who was the Founder of Psychoanalytic therapy?
c) State the full form of CBT.
d) What is mindfulness?
e) State the full form of REBT.
f) Define aversive conditioning.

Q2) a) Elaborate the various types of psychotherapies **[6]**

OR

Describe the elements and steps of systematic desensitization.

b) Analyze the ego states of in TA. **[4]**

Q3) a) Explain the objectives, benefits and process of Psychotherapy. **[6]**

OR

Describe the key components and process of cognitive therapy.

b) Justify the effectiveness of play therapy. **[4]**

Q4) a) Explain the components and process of REBT. **[6]**

OR

Discuss the techniques and barriers of assertiveness training.

b) Analyze the benefits & types of family therapy. **[4]**

P.T.O.

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

a) Therapeutic relationship.

b) Critics on Psychoanalytic therapy.

c) Steps of mindfullness training.

d) Application of token economy.

e) Advantages of dance therapy.

f) Usages of aversive therapy.

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Total No. of Questions : 5]

SEAT No. : ____

PC1538

[Total No. of Pages : 2

[6327]-412
T.Y.B.Sc. (Regular)
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) ***Question from 2 to 5 carry equal marks.***

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

a) State any two objectives of Psychotherapy.

b) State the types of communication.

c) Name the types of empathy.

d) What is active listening?

e) State the types of thinking.

f) Define concretness.

Q2) a) Explain the effective listening skills of therapist. **[6]**

OR

Describe the importance of critical thinking in Psychotherapists.

b) What are the concerns related to the therapist client relationship. **[4]**

Q3) a) Explain the techniques and factors influence on psychotherapy. **[6]**

OR

Describe the importance of genuiness skills among therapists.

b) Differentiate between reflecting & paraphrasing in counselling. **[4]**

P.T.O.

Q4) a) Explain the process & components of building rapport with clients. **[6]**

OR

Describe the various key elements in interpretation skills of therapists.

b) Examine the challenges for setting boundaries in counselling. **[4]**

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

a) Therapeutic skills.

b) Components of empathy

c) Clarifying question skills.

d) Advantages of Psychotherapy.

e) Communication skills.

f) Immediacy

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Total No. of Questions : 5]

SEAT No. : ____

PC1539

[Total No. of Pages : 2

[6327]-413

T.Y.B.Sc. (Regular)

PSYCHOLOGY

SEC - II : Soft Skills

(2019 Pattern) (Semester - VI) (362011)

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

Instructions to the candidates:

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

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

a) Define soft skills.

b) Define communication.

c) State the need of goal setting.

d) Define etiquettes

e) State the types of communication

f) State the steps of time management.

Q2) a) Explain the various barriers in communication. **[6]**

OR

Describe the process of goal setting.

b) Differentiate soft & hard skills. **[4]**

Q3) a) Describe the nature & types of soft skills. **[6]**

OR

Discuss the telephone etiquetts.

b) Critically evaluate the factors that hamper listening. **[4]**

P.T.O.

Q4) a) Explain the importance of soft skills. **[6]**

OR

Describe the types of non - verbal communication.

b) Investigate the email etiquettes. **[4]**

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

a) Steps in career planning.

b) Components of etiquettes.

c) Types of hard skills

d) Sense of time management.

e) Social etiquetts

f) Types of goal setting

Total No. of Questions :5

SEAT No. :

PC-1540

[Total No. of Pages : 2

[6327]-414
T.Y. B.Sc. (Regular)
ENVIRONMENTAL SCIENCE
EVS-361: Aquatic Ecosystem and Management
(2019 Pattern) (Paper -I) (Semester - VI) (36241)

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

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any <u>THREE</u> questions from Q2 to Q5.***
3) ***Question from 2 to 5 carries equal marks.***

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

a) Define the term Aquatic Ecosystem.

b) Explain the ecological significance of Estuary.

c) Enlist Ramsar sites in India.

d) Explain various aquatic ecosystem sampling techniques.

e) Enlist flora and fauna found in freshwater body.

f) Locations where are mangroves found in India.

Q2) a) Explain ecological significance of Wetlands and its conservation. **[6]**

b) Write short note on communities found in Marine Environment. **[4]**

Q3) a) Write short note on Sustainable management of Aquatic Ecosystem. **[6]**

b) Explain ecological classification of freshwater organisms. **[4]**

P.T.O.

Q4) a) Write short note on Role of Goverment and people in conservation of Aquatic ecosystem. **[6]**

b) Explain Eco-tourism in Aquatic ecosystem with a case study. **[4]**

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

a) Importance of Coral reefs.

b) Threats & Wetlands.

c) Lotic water communities.

d) Application of GIS and Remote sensing in Aquatic Ecosystem Management.

e) Classification of Aquatic ecosystem.

f) Energy flow in aquatic ecosystem.

Total No. of Questions : 5]

SEAT No. : ____

PC-1541

[Total No. of Pages : 2

[6327]-415

T.Y. B.Sc. (Regular)

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 Questins 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 Nature conservation? **[1]**

b) Write the meaning of Gene sanctuary. **[1]**

c) IUCN stand for? **[1]**

d) What is seed bank? **[1]**

e) Which animal is the state animal of Maharashtra? **[1]**

f) In which year corcodile project started in India? **[1]**

Q2) **Answer the following :**

a) Describe the functions of CPCB. **[6]**

b) Describe any four major notes of NGO_5 in conservation of Nature. **[4]**

Q3) **Answer the following :**

a) Role of IUCN in nature conservation. **[6]**

b) Write note on seed banks. **[4]**

P.T.O.

Q4) **Answer the following :**

a) Write detail note on Biodiversity Hotspots. **[6]**

b) Role of BNHS in nature consenvaton. **[4]**

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

a) Why dwareness is important in nature conservation? **[2½]**

b) What do you mean by Biosphere reserve. **[2½]**

c) What is project Tiger Scheme? **[2½]**

d) What is National park? **[2½]**

e) What is community reserve? **[2½]**

f) What is whaling mission? **[2½]**

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

PC-1542 **[Total No. of Pages : 2**

[6327]-416
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 5 carry equal marks.***

Q1) Attempt any FIVE of the following :

a) Define the term Meteorology. **[1]**

b) Write the full forms of AQI & APTI. **[1]**

c) Mention any two effects of air pollution on materials. **[1]**

d) What is Noise indice? **[1]**

e) Differentiate between point & line source of noise pollution. **[1]**

f) Write any two effects of smog. **[1]**

Q2) **Answer the following :**

a) Discuss the causes responsible for ozone hole. Add a note on its effects. **[6]**

b) Explain the impacts of vehicular pollution. **[4]**

Q3) **Answer the following :**

a) Write in detail about photochemical reactions in atmosphere. **[6]**

b) Explain the function of web scrubbers in control of air pollution. **[4]**

P.T.O.

Q4) **Answer the following :**

a) Explain E1 Nino phenomenon. **[6]**

b) Write the reasons and effects of acid rain. **[4]**

Q5) Write a short notes on any Four of the following.

a) Current composition of Atmosphere. **[2½]**

b) Indoor air pollution sources and effects. **[2½]**

c) Settling chamber with diagram. **[2½]**

d) Effects of air pollution on plants. **[2½]**

e) Effects of noise pollution on health. **[2½]**

f) Impacts of global warming. **[2½]**

Total No. of Questions : 5]

SEAT No. : ____

PC1543

[Total No. of Pages : 2

[6327]-417

T.Y.B.Sc. (Regular)

ENVIRONMENTAL SCIENCE

EVS 364 : Issues in Environmental Science

(2019 Pattern) (Semester - VI) (36244)

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) In which atmospheric layer ozone layer present. **[1]**

b) Who is founder of Green revolution in Inida. **[1]**

c) Define pastoralism. **[1]**

d) Define population explosion. **[1]**

e) Who started the Appiko movement. **[1]**

f) Define Eutrophication. **[1]**

Q2) Answer the following.

a) Briefly explain the non - conventional energy resources. **[6]**

b) What are the methods of 'Usar' land reclamations. **[4]**

Q3) Answer the following.

a) What is reclamation process. Add note on advantages and disadvantages of waste land reclamation. **[6]**

b) What are the 3 key issues to sustainable development. **[4]**

P.T.O.

Q4) Answer the following.

a) How international trade and economic reforms impact environment. **[6]**

b) What are different methods of rain water harvesting. **[4]**

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

a) Fluorosis

b) Silent valley project

c) Biodiversity hotspot

d) Population explosion

e) Landfill treatment for MSW

f) Green revolution - benefits.

Total No. of Questions : 5]

SEAT No. :

PC1544

[Total No. of Pages : 2

[6327]-418

T.Y. B.Sc. (Regular)

ENVIRONMENTAL SCIENCE

EVS - 365 : Environmental Governance : EMS, EIA & ISO14000

(2019 Pattern) (Semester - VI) (36245)

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

Instructions to the candidates:

1) ***Questions 1 is compulsory***
2) ***Slove 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 elements of Governance. **[1]**

b) What are ISO/207 TC function. **[1]**

c) Definition : Environmental Audit. **[1]**

d) Full form of EIA. **[1]**

e) Write any two Goals of EIA. **[1]**

f) Environment Management System is classified under which ISO? **[1]**

Q2) Answer the following.

a) Write the flow chart of EIA Process and Define each important Step. **[6]**

b) Explain Cost-Benefit Analysis. **[4]**

Q3) Answer the following.

a) Explain any two methods of Baseline data collection. **[6]**

b) Explain in detail the types of Audit. **[4]**

P.T.O.

Q4) Answer the following.

a) What are the Process of Life Cycle Assessment. **[6]**

b) What are the Issues and challenges of Environmental Governance. **[4]**

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

a) Public Participation. **[2½]**

b) EIA Notification, 2006. **[2½]**

c) Advantages of EIA. **[2½]**

d) Planning of Resource management. **[2½]**

e) Scope of ISO 14000. **[2½]**

f) Attribute of Environmental Governance. **[2½]**

Total No. of Questions : 5]

SEAT No. :

PC-1545

[Total No. of Pages : 2

[6327]-419
T.Y.B.Sc.
ENVIRONMENTAL SCIENCE
EVS366 : Environmental Biotechnology - II
(2019 Pattern) (36246) (Semester - VI) (Paper-VI)

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 No5 carry equal marks.***

Q1) Attempt any FIVE of the following:

a) What is the role of bacteria in bioremediation? **[1]**

b) How do plants remove contaminants from water? **[1]**

c) What is the best management of solid waste? **[1]**

d) Define biopolymer. **[1]**

e) Why technology is important in waste water management. **[1]**

f) Which factor are affecting on phytoremediation? **[1]**

Q2) Answer the following

a) How is biotechnology used in waste management? **[6]**

b) What are the two types of remediation? **[4]**

Q3) Answer the following

a) Explain in detail Biosensor and their applications. **[6]**

b) What is the purpose of biofiltration? **[4]**

P.T.O.

Q4) Answer the following

a) Explain in detail bioindicator with example. **[6]**

b) Which plant is used to treat wastewater? **[4]**

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

a) Types of Bioremediation **[2½]**

b) Advantages of bioleaching **[2½]**

c) Factor affecting on biomethanation process **[2½]**

d) Biomethanation for MSW **[2½]**

e) VASB **[2½]**

f) Types of biopolymer **[2½]**

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Total No. of Questions : 5]

SEAT No. :

PC1546

[Total No. of Pages : 2

[6327]-420
T.Y.B.Sc. (Regular)
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 Q.2 to Q.5.***
3) ***Q.2 to Q.5 carry equal marks.***

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

a) Define Integrated waste management?

b) What is meant by anaerobic digestion?

c) Define Pyrolysis?

d) What is stack emission monitoring?

e) What is land degradation?

f) Define hazardous waste?

Q2) Answer the following.

a) What is Waste-to-Energy processes for solid waste management? Explain different waste to energy processes? **[6]**

b) What are the effects of industrial effluent discharge on water quality and aquatic life? **[4]**

Q3) Answer the following.

a) Explain green techniques for solid waste treatment? **[6]**

b) How mining activities lead to soil degradation? **[4]**

P.T.O.

Q4) Answer the following.

a) Explain sewage treatment plant with the help of diagrammatical representation? **[6]**

b) Describe techniques used in collection, storage and transportation of solid waste? **[4]**

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

a) Land fill gas recovery.

b) Reductive dehalogenation.

c) Sources of solid waste.

d) Biomedical waste.

e) Waste management hierarchy.

f) 4R strategies for solid waste management.

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Total No. of Questions : 5]

SEAT No. :

PC1547

[Total No. of Pages : 2

[6327]-421

T.Y.B.Sc. (Regular)

ENVIRONMENTAL SCIENCE

SEC - 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 question No. 5.***
3) ***Question No. 2 to question No. 5 carry equal marks.***

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

a) Is nature a commodity?

b) Which is the most polluted city in India?

c) Why source segregation is important in waste disposal?

d) What is sustainable urban future?

e) What is the purpose of Green belts in cities?

f) Enlist any two advantages of smart cities.

Q2) Answer the following.

a) Define urban pollution? What are the sources and effects of air pollution? **[6]**

b) What is urban transformation? Why it is necessary for environmental perspectives? **[4]**

Q3) Answer the following.

a) What is solid waste? Give its characteristics and add a note on how to improve solid waste collection efficiency of smart cities. **[6]**

b) What are the reasons of increasing slums in urban areas. **[4]**

P.T.O.

Q4) Answer the following.

a) What are urban dwellers? Give a brief context of poverty in urban areas? **[6]**

b) What are green spaces? Give details of green spaces present in cities. **[4]**

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

a) Urban Sprawl

b) Town planning

c) Urban settings

d) Public spaces

e) Threats of nature of cities

f) Challenges of smart cities

Total No. of Questions : 4]

SEAT No. :

PC-1548

[Total No. of Pages : 2

[6327]-422

T.Y.B.Sc.

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 main purpose of national security?

b) Who is the local civil authority?

c) State the Meaning of Disaster Management.

d) What is the meaning of Local Civil Administration?

e) State the role of the Armed Forces in Rescue Operations.

Q2) Write short notes on (any two): **[10]**

a) Disaster

b) Armed Forces

c) Relief Camps

Q3) Attempt the following questions (any two): **[10]**

a) What is NDRF and its role?

b) Explain the Conceptual framework of India's National security.

c) State the role of civil society in Tackling security challenges on Disaster.

P.T.O.

Q4) Answer in details (any one): **[10]**

a) How can we manage disasters?

b) Explain the role of Armed Forces in training the Volunteer Organizations to manage the Disasters.

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Total No. of Questions : 4]

SEAT No. :

PC-1549

[Total No. of Pages : 2

[6327]-423

T.Y.B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 602 : United Nation Organization Part - II

(2019 Pattern) (Semester - VI) (36232) (Regular)

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

Instructions to the candidates :

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

Q1) Define the following questions. **[5]**

a) What is peacekeeping? and where the UN is currently doing?

b) Define 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

Q3) Attempt the following questions (any two): **[10]**

a) Which country has the largest UN peacekeeping force?

b) Role of the UN for maintaining peace.

c) State the Future Threats in Globalization.

P.T.O.

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. : [ ]

PC-1550

[Total No. of Pages : 2

[6327]-424

T.Y. B.Sc. (Regular)

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) What is the true meaning of realism?

b) What is a simple definition of idealism?

c) Define Nation.

d) State the meaning of International relation.

e) State the Function of Nonalignment.

Q2) Write short notes on (any two): **[10]**

a) State

b) Liberalisms

c) Normative Approaches

Q3) Attempt the following questions (any two): **[10]**

a) What is the main idea of realism?

b) Explain the Scientific Approaches in International Relations.

c) What are the examples of idealism?

P.T.O.

Q4) Answer in details (any one): **[10]**

a) Explain the Traditional Approaches in International Relations.

b) What are the characteristics of realism?

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Total No. of Questions : 4]

SEAT No. :

PC1551

[Total No. of Pages : 2

[6327]-425

T.Y.B.Sc. (Regular)

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. **[5×1=5]**

a) What is the definition of counter terrorism.

b) Why is it called a paramilitary?

c) What is the simple definition of terrorism?

d) State the role of media in counter Terrorism.

e) State the role of law enforcement mechanisms.

Q2) Write short notes on (any two) **[10]**

a) Counter Terrorism

b) International Community

c) India's Security Policy

P.T.O.

Q3) Attempt the following questions (any two) **[10]**

a) Explain the Counter Terrorism in North East India.

b) What is the difference between military and paramilitary?

c) State the Role of paramilitary in Counter Terrorism.

Q4) Answer in details (any one) **[10]**

a) Explain the Role of Military in Counter Terrorism.

b) What is terrorism and what are its causes?

Total No. of Questions : 4]

SEAT No. : ____

PC-1552

[Total No. of Pages : 4

[6327]-426
T.Y.B.Sc
DEFENCE AND STRATEGIC STUDIES
DS 606(A) Major Global Conflict - II
(2019 Pattern) (Semester - VI) (36236A)

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

Instructions to the candidates:

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

Q1) Define the following questions: **[5 × 1 = 5]**

a) Why does China grow faster than India?

b) How are Environmental issues defined and by whom?

c) Define Nuclaer Deal.

d) Define Defence.

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.

Q3) Attempt the following questions (any two) **[10]**

a) State the Iran USA Conflict Present Status?

b) Explan the Role of the UN in Environmental Issue.

c) When did the India China border disputer start?

P.T.O.

Q4) Answer in details (any two) **[10]**

a) What are the main environmental issues?

b) Describe the Chines Maritime disputes with Japan.

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Total No. of Questions : 4]

PC-1552

[6327]-426
T.Y.B.Sc
DEFENCE AND STRATEGIC STUDIES
DS 606(B) Regional Security System- II
(2019 Pattern) (Semester - VI) (36236B)

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

Instructions to the candidates:

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

Q1) Define the following questions: **[1 × 5 = 5]**

a) Define SCO

b) What is regional security ?

c) Define 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 two) **[10]**

a) State the Origin and Development of BIMSTEC.

b) Explain the structure, Objectives of QUAD.

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Total No. of Questions : 4]

SEAT No. : [ ]

PC-1553

[Total No. of Pages : 4

[6327]-427

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS 607(A) India's Maritime Security - II

(2019 Pattern) (Semester-VI) (36237A)

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

Instructions to the candidates:

1) ***All Questions are cumpulsory.***
2) ***Figures to the right indicate full marks.***

Q1) **Define the following questions** **[5 × 1 = 5]**

a) 'What is 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.

P.T.O.

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.

Total No. of Questions : 4]

PC-1553

[6327]-427
T.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS 607(B) Peace and Conflict Studies - II
(2019 Pattern) (CBCS) (Semester-VI) (36237B)

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 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 three) :** **[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. : ____

PC1554

[Total No. of Pages : 2

[6327]-428
T.Y.B.Sc. (Regular)
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) Define 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.

Q3) Attempt the following questions. (any two) **[10]**

a) What caused the Indo-Pakistani war of 1947?

b) What caused the India-China war of 1962?

c) Explain the Causes of 1965 Indo-Pak war.

Q4) Answer in details (any one) **[10]**

a) What were the effects of the India- China war in 1962?

b) Explain in detail the Effect of the 1971 war.

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P.T.O.

Total No. of Questions : 4]

PC1554

[6327]-428
T.Y.B.Sc. (Regular)
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) Define 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 two) **[10]**

a) Which was the first revolutionary movement in India?

b) Explain the Causes of the 1857 Revolt.

c) 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?

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Total No. of Questions : 4]

SEAT No. : [ ]

PC1555

[Total No. of Pages : 2

[6327]-429

T.Y.B.Sc. (Regular)

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) Define 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

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.

[10]

Q4) Answer in details (any one)

a) How did the Cold War develop between 1945 and 1953?

b) Explain in detail the Third Phase of the Cold War 1963-1989.

P.T.O.

Total No. of Questions : 4]

PC1555

[6327]-429

T.Y.B.Sc. (Regular)

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) Define 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 any 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.

[10]

Q4) Answer in details (any one)

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. :

PC1556

[Total No. of Pages : 1

[6327]-430

T.Y.B.Sc. (Regular)

DEFENCE AND STRATEGIC STUDIES

DS-610: Introduction to Cyber Security / Information Security

(2019 Pattern) (Semester-VI) (362310)

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

Instructions to the candidates:

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

Q1) Define the following questions. **[5×1=5]**

a) What is transmission media?

b) Define military.

c) Which transmission media is best?

d) State the concept of networking.

e) What is the purpose of networking?

Q2) Write short notes on (any two) **[10]**

a) Password

b) Basic communication systems

c) Information security

Q3) Attempt the following questions (any two) **[10]**

a) What is the importance of transmission media?

b) Explain the meaning and concept of information security.

c) What is information security?

d) Describe basic communication systems.

Q4) Answer in details (any one) **[10]**

a) Explain in detail how to identify threats.

b) What is the main advantage of networking?

Total No. of Questions : 4]

SEAT No. : ____

PC-1557

[Total No. of Pages : 2

[6327]-431
T.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
362311DS 611: HUMAN RIGHTS AND INDIA
(2019 Pattern) (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:** **[1 × 5 = 5]**

a) Define Human Rights.

b) Who is the current National Commission for Women?

c) State the fundamental rights.

d) Explain the role of the national human right commission.

e) Who gives the concept of Sarvodaya?

Q2) **Write short notes on (any two):** **[10]**

a) Human rights.

b) National human rights commission.

c) National commission for schedule caste and schedule tribes.

Q3) **Attempt the following questions (any two):** **[10]**

a) Explain a brief look at various aspects of human rights in India.

b) What are the basic principles of human rights?

c) Explain in detail judicial organs on an international level.

P.T.O.

Q4) **Answer in details (any one)** **[10]**

a) Explain the National Human Rights Commission of India.

b) Explain in detail Maharashtra State Commission for Protection of Child Rights.

Total No. of Questions : 5]

SEAT No. : [ ]

[Total No. of Pages : 2

PC-1558 **[6327]-432**

T.Y. B.Sc. (Vocational) (Biotechnology)

VBT-321: Biotechnology in Agriculture and Environment

(2019 Pattern) (CBCS) (Semester - VI) (36571) (Paper - V)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Q2 to Q5.***
3) ***Q2 to Q5 carry equal marks.***

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

a) Enlist any two types of biosensors.

b) What do you understand by phytoremediation?

c) Define the term biofuels.

d) What is meant by recalcitrant?

e) Enlist any one selective media used for culturing Azatobacter.

f) What do you understand by bioremediation?

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

i) Write any three advantages of biopesticides.

ii) Define herbicide. Explain the process of biodegradation of 2, 4 - D.

iii) Write any three applications of biosensors.

Q2) **b)** Write short note on "Phosphate Solubilizers". **[4]**

OR

Write short note on "Golden rice". **[4]**

Q3) **a)** Write short notes on the following: **[6]**

i) Process of biogas production.

OR

ii) Phytovolatilization.

P.T.O.

b) Enlist the two important types of bioremediation. Explain bioventing method of bioremediation in detail. **[4]**

OR

Give any 4 features of Azolla. **[4]**

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

i) What do you understand by biosensors? Describe the components of biosensors.

ii) Explain the composting method of bioremediation.

iii) What do you understand by gasohol and bioethanol? Enlist any two micro-organisms involved in the production of bioethanol.

b) Write any three features of Rhizobium. Give any two advantages of Rhizobium as biofertilizer. **[4]**

OR

Write any four applications of phytoremediation. **[4]**

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

a) Features of Flavr-Savr tomato.

b) Applications of bioremediation.

c) Nitrogenase enzyme.

d) PNP.

e) Properties of an ideal biopesticide.

f) Nitrogen fixation.

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

PC-1559 **[Total No. of Pages : 2**

[6327]-433

T.Y. B.Sc. (Vocational) (Biotechnology)

VBT-322: Bio-Entrepreneurship and Biotechnology for Health Care

(CBCS) (2019 Pattern) (Semester - VI) (36572) (Paper - VI)

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

Instructions to the candidates:

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

Q1) Answer the following. **[5]**

a) Give full form of FDA.

b) What is enzyme therapy.

c) Define Nanomedicine.

d) What is bioentrepreneurship?

e) Define Biotechnology.

f) What is Regenerative medicine?

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

i) Give brief introduction on generic and personalized medicine.

ii) Comment your views on Enzyme as Therapeutics.

iii) What are Nanobiochemical devices? Give its applications.

b) Answer Any One of the following: **[4]**

i) Discuss in detail advantages and disadvantages of Nanomedicine.

ii) What are ethical issues encountered in Nanomedicine.

P.T.O.

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

i) What is IAEC? Give its composition and role of IAEC.

ii) How market survey is explored as tool in business development.

iii) Comment on NCIC as business promoting organisation.

b) Answer Any One of the following: **[4]**

i) Discuss in detail stem cell therapy in Healthcare.

ii) How identification of opportunities is done by an entrepreneur.

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

i) Enlist and explain different types of entrepreneurs.

ii) Comment on different types of business organisations.

iii) Give the role of Small Industries service institute.

b) Answer Any One of the following: **[4]**

i) Explain in detail project report and project formulation.

ii) Comment on advancements made in therapy and intervention in Healthcare biotechnology.

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

a) Importance of entrepreneurship.

b) MIDC.

c) Sole Proprietorship.

d) Incubators for novel Ideas.

e) Joint Stock companies.

Total No. of Questions : 5]

SEAT No. : ____

PC-1560

[Total No. of Pages : 2

[6327] - 434
T.Y.B.Sc (Vocational)
SEED TECHNOLOGY (Paper - V)
ST 3.4: Seed Farm Management, Processing and Storage
(36891) (2019 Pattern) (Semester - VI) (CBCS) (2 Credits)

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 kinds of seed treatment.

b) What is conditioning?

c) Define seed grading.

d) What is agricultural economics?

e) Write any one use of farm management.

f) What is seed drying?

Q2) a) What is seed marketing? Explain major component of seed marketing. **[6]**

b) What is farm management? Write its scope. **[4]**

Q3) a) What is seed storage? Write basic requirements of seed storage. **[6]**

b) Comment on farm business. **[4]**

P.T.O.

Q4) a) Define seed processing. Give basic flow pattern in seed processing plant. **[6]**

b) What is seed treatment? Comment on seed treating equipments. **[4]**

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

a) Agricultural economics

b) Bagging and its methods

c) Methods of seed treatment

d) Seed separation and grading

e) Changes during seed storage

f) Seed cleaning

Total No. of Questions : 5]

SEAT No. :

PC-1561

[Total No. of Pages : 2

[6327]-435
T.Y. B.Sc. (Vocational)
SEED TECHNOLOGY
ST 3.5: Biotechnology and Intellectual Property Rights (Paper - VI)
(CBCS) (2019 Pattern) (Semester-VI) (2 Credits) (36892)

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

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Q2 to Q5.***
3) ***Q2 to Q5 carry equal marks.***

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

a) Define Biotechnology.

b) Give full form of PCR.

c) What is Totipotency?

d) What is patent?

e) What is artificial seed?

f) Define Inoculation.

Q2) a) Explain Embryogenesis. **[6]**

b) Give applications of Biotechnology. **[4]**

Q3) a) Explain caulogenesis. **[6]**

b) Give details of plant tissue culture medium. **[4]**

P.T.O.

Q4) a) Explain details of PCR technique. **[6]**

b) Give applications of plant tissue culture. **[4]**

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

a) Applications of Transqenics.

b) Benifits of synthetic seeds.

c) Need of Intellectual Property Rights.

d) Western Blotting.

e) Artificial seed.

f) Branches of Biotechnology.

Total No. of Questions : 5]

SEAT No. : ____

PC-1562

[Total No. of Pages : 2

[6327] - 436
T.Y.B.Sc. (Vocational)
INDUSTRIAL MICROBIOLOGY
IMB 365: Bioentrepreneurship and IPR
(2019 Pattern) (Semester - VI) (CBCS) (36825) (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 5 carry equal marks.***

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

a) What is a private limited company?

b) Where is the headquater of WIPO situated?

c) What is the impact of entrepreneurship on Socio - economic level in our country?

d) What is a medium - scale company?

e) What is the need of marketing?

f) What are trademarks?

Q2) a) Solve any two **[6]**

i) Define entrepreneur what are types of entrepreneur?

ii) Explain the concept of marketing channels.

iii) Explain different sources of raising finance for starting as enterprise

b) Give a brief account on market segmentation. **[4]**

P.T.O.

Q3) a) Solve any two **[6]**

i) Give a brief account on patents and their types

ii) What is a joint stock company?

iii) Why do business need finance?

b) Explain entrepreneurship development program. **[4]**

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

i) Explain the concept of market mix.

ii) What is cash flow?

iii) Write a short note on ‘business opportunity?

b) Give a brief account on business plan. **[4]**

Q5) Solve any four **[10]**

a) SIDBI

b) WIPO

c) Geographical Indication

d) Start - up

e) DIC’s

f) Characteristics of entrepreneurs

Total No. of Questions : 5]

SEAT No. :

PC-1563

[Total No. of Pages : 2

[6327]-437
T.Y. B.Sc. (Vocational)
INDUSTRIAL MICROBIOLOGY
IMB 366 : Recombinant DNA Technology
(CBCS) (2019 Pattern) (Semester-VI) (Paper - VI) (36826)

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

Instructions to the candidates:

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

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

a) Which chemical reagents are used to shear DNA during? Maxam & Gilbert sequencing?

b) Draw Vector map for PUC18.

c) What is IPTG?

d) State applications of replica plate technique.

e) What is Human Genome project?

f) State the importance of DNA Polymorphism in RDT?

Q2) a) **Solve the following (Any Two) :** **[6]**

i) Explain Real time PCR.

ii) Explain Pyrosequencing.

iii) Explain alpha-complementation.

b) Explain protein engineering and its application. **[4]**

P.T.O.

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

i) Describe the concept of Metagenomics.

ii) Draw vector map for YAC and explain it's clonning stratergy.

iii) Compare and contrast plasmids & phage vectors.

b) Describe the process of site-directed mutagenesis & list applications. **[4]**

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

i) Discuss impact of RDT on detection and diagnosis of pathogens and genetic diseases.

ii) Discuss impact of DNA fingerprinting on modern day forensic science.

iii) Discuss application of RDT.

b) Discuss the process of Microarray. Mention advantages and disadvantages of same. **[4]**

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

a) Construction of cDNA library.

b) Humulin development.

c) Action of Restriction endonuclease.

d) Transcriptome analysis.

e) Aminocentesis.

f) Application of metagenomics.

Total No. of Questions : 5]

SEAT No. : ____

PC1564

[Total No. of Pages : 2

[6327]-438

T.Y.B.Sc. (Regular)

INDUSTRIAL MICROBIOLOGY

IMB 3610 : Introduction to Bioinformatics

(2019 Pattern) (Semester - VI) (Vocational Paper-V) (368210)

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

Instructions to the candidates:

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

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

a) Write the full form of NCBI.

b) Give an example of a search engine used in bioinformatics.

c) What is sequence alignment?

d) Give an example of structure database.

e) Define phylogenetic tree.

f) What are orthologous sequences?

Q2) a) Solve any two **[6]**

i) Describe types & importance of databases used in bioinformatics.

ii) Enlist types of sequence alignments. Describe any one type.

iii) What is Motif database? State example.

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

P.T.O.

Q3) a) Solve any two **[6]**

i) Enlist applications of bioinformatics.

ii) Explain the process of building a phylogenetic tree.

iii) Write a brief account on scoring matrices used for alignment.

b) What is swissprot? State importance and purpose. **[4]**

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

i) Discuss impact of bioinformatics on modern day science.

ii) Discuss the role of bioinformatician in culture independent approach.

iii) Write a brief account on EMBL.

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

Q5) Solve any four **[10]**

a) BLAST

b) FASTA

c) MEGA

d) CLUSTAL

e) Primary databases and information they provide

f) Homologous DNA sequences

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