[5017]-301

T.Y.B.Sc.

MATHEMATICS

MT - 331 : Set Theory and Logic

(2008 Pattern) (Semester - III) (Paper - I)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

   1)   *All questions are compulsory.*

   2)   *Figures to the right indicate full marks.*

Q1) Attempt any FIVE of the following.   **[10]**

   a)   State the negation laws for logical operators $\vee$ and $\wedge$.

   b)   Find negations of the following statements

        i) $\forall x (x^3 > x)$

        ii) $\exists x (x^2 = -1)$

        where the domain of discourse for x is the set $\mathbb{R}$ of real numbers.

   c)   Show that the set $\mathbb{Z}$ of integers is similar to 10 $\mathbb{Z}$.

   d)   Define the order pair $\langle x, y \rangle$ as a doubleton set.

   e)   Let $R(x, y, z)$ be the statement "$x + y = z$" where the domain of discourse for x, y and z is the set of all real numbers. What are truth values of R (1, 2, 3) and R(0,0,1)?

   f)   Find   i) $\phi \cap \{\phi\}$

                   ii) $\{\phi, \{\phi\}\} - \{\phi\}$

   g)   What is converse and inverse of the following conditional statement?

        "If n is perfect square, then $n^2 + 100$ is perfect square".

   h)   State the intuitive principle of extension.

Q2) Attempt any TWO of the following: **[10]**

    a)   If $f : X \to Y$ is one - to - one correspondence from X to Y, show that $f^{-1}\text{o}f = i_x$ and $f\text{o}\,f^{-1} = i_y$. (i_x and i_y denote identity functions on X and Y respectively).

    b)   Define contraposition of the conditional statement $p \to q$. Give an indirect proof of "If $3n + 2$ is odd, then n is odd".

    c)   Let τ be a partition of X and define $\sim$ as

$$\sim = \{\langle x, y\rangle / \langle x, y\rangle \in C \times C \quad \text{for some C in } \tau\}.$$ Show that $\sim$ is an equivalence relation on X.

Q3) Attempt any TWO of the following: **[10]**

    a)   Without constructing truth table, show that $\neg(p \vee (\neg p \wedge q))$ and $\neg p \wedge \neg q$ are logically equivalent.

    b)   If the domain of a function is countable, show that its range is also countable.

    c)   If ϕ denote the empty set and A is a subset of universal set U, prove the following

        i) $\phi \subseteq A$

        ii) $\overline{\overline{A}} = A$

        $\left(\overline{S} \text{ denotes complement of S}\right)$

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

    a)   i)   Show that the set Q^+ of positive rational numbers is denumerable.

        ii)   Express the statement "Every student in this class has studied calculus" using predicates and quantifiers.

    b)   i)   Show that $A \subseteq B$ if and only if $A \vee B = B$.

        ii)   Show that $\forall x\, P(x) \vee \forall x\, Q(x)$ is NOT logically equivalent with $\forall x (P(x) \vee Q(x))$.

✦ ✦ ✦

[5017]-302

T.Y.B.Sc.

MATHEMATICS

MT - 332 : Real Analysis

(2008 Pattern : Old Course) (Semester - III) (Paper - II)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

  1)   All questions are compulsory.

  2)   Figures to the right indicate full marks.

Q1) Attempt any five of the following.   **[10]**

  a)   If $\{s_n\}_{n=1}^{\infty} = \{3n+1\}_{n=1}^{\infty}$ and $\{n_i\}_{i=1}^{\infty} = \{i^2\}_{i=1}^{\infty}$ find s_{n_4}.

  b)   Does the series $\sum_{n=1}^{\infty} \dfrac{3}{4+2^n}$ converges? Justify.

  c)   Let $f(x) = x^2 \ (0 \leq x \leq 1)$. Let $\sigma = \left\{0, \dfrac{1}{3}, \dfrac{2}{3}, 1\right\}$ be a subdivision on $[0,1]$.

       Compute $U[f;\sigma]$.

  d)   True or False : If $|f| \in R[a,b]$ then $f \in R[a,b]$.

  e)   If $f(x) = \int_0^x \sqrt{t+t^6}\ dt \ (x>0),$ find $f'(3)$.

  f)   Show that for all real x, the series $\sum_{n=1}^{\infty} \dfrac{\cos nx}{n^3}$ converges uniformly.

  g)   Find the limit function of the sequence $\{f_n\}_{n=1}^{\infty}$ where

       $f_n(x) = \dfrac{x^n}{1+x^n} \ (0 \leq x \leq 1)$.

Q2) Attempt any TWO of the following: **[10]**

a) If $\{s_n\}_{n=1}^{\infty}$ is a convergent sequence of real numbers then prove that

$$\liminf_{n\to\infty} s_n = \lim_{n\to\infty} s_n.$$

b) If $\sum_{n=1}^{\infty} a_n$ be a series of nonzero real numbers and $a = \liminf_{n\to\infty} \left| \dfrac{a_{n+1}}{a_n} \right|$ then

prove that the series $\sum_{n=1}^{\infty} a_n$ diverges if $a > 1$.

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

Q3) Attempt any TWO of the following: **[10]**

a) Let f be a bounded function on $[a,b]$ then prove that $U[f;\sigma] \geq L[f;\tau]$ for any subdivisions σ and τ of $[a,b]$.

b) If $f \in R[a,b]$ and λ is any real number then prove that $\lambda f \in R[a,b]$

and $\int_a^b \lambda f = \lambda \int_a^b f$.

c) If f is continuous on $[a,b]$, prove that there exist $C \in (a,b)$ such that

$$\int_a^b f(x)\,dx = f(c)(b-a).$$

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

a) i) Let $\{f_n\}_{n=1}^{\infty}$ is a sequence of continuous real valued funcitons on $[a,b]$ that converges uniformly to f on $[a,b]$ then prove that f is also continuous on $[a,b]$.

ii) Let $f_n(x) = \dfrac{x}{n} e^{-x/n}$ $(0 \leq x < \infty)$. Does $\{f_n\}_{n=1}^{\infty}$ converge uniformly to 0 on [0, 500]? Justify.

b) i) State and prove Weierstrass M test.

ii) Does the series $\sum_{n=0}^{\infty} \dfrac{x^2}{(1+x^2)^n}$ converge uniformly on $(-\infty,\infty)$? Justify.

✦ ✦ ✦

[5017]-303

T. Y. B. Sc.

MATHEMATICS

MT - 333 : Problem Course Based on MT - 331 & MT - 332

(2008 Pattern) (Semester - III) (Paper - III) (Old Pattern)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

1)   All questions are compulsory.

2)   Figures to the right indicate full marks.

3)   Answers to the TWO sections should be written in SEPARATE answer books.

4)   TIE answer books of both sections together.

SECTION - I

(Set Theory and Logic)

Q1) a)   Attempt any three of the following :   **[6]**

   i)   How many rows appear in the truth table for the compound proposition $p \leftrightarrow \left[(q \to r) \wedge (\sim s \vee t)\right]$?

   ii) State the identity relation on the set X = {2, 4, 6, 8, 10}.

   iii) Prove that $\sim (p \wedge q) \equiv \sim p \vee \sim q$.

   iv) Give an example to show that $f(C \cap D) \neq f(C) \cap f(D)$ where $f : A \to B$ is a function and C, D $\subseteq$ A.

   b)   Attempt any one of the following: **[4]**

   i)   The relation ~ on $\mathbb{Z}_+$ is defined as $\langle a,b \rangle \sim \langle c,d \rangle$ if $ad = bc$. Show that ~ is an equivalence relation on $\mathbb{Z}_+$.

   ii) Without constructing truth table, show that $(p \wedge q) \to (p \vee q)$ is a tautology.

Q2) Attempt ANY TWO of the following: **[10]**

   a) Define a countable set and show that a subset of countable set is countable.

   b) Prove $|xy| = |x||y|$ by using cases method.

   c) Show that the composition of functions is an associative operation.

SECTION - II

(Real Analysis)

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

     i) Write a formula for S_n, where $\{S_n\}_{n=1}^{\infty}$ is the following sequence.

$$1, -\frac{1}{2}, \frac{1}{3}, -\frac{1}{4}, \frac{1}{5}, -\frac{1}{6}, \dots$$

     ii) Discuss the convergence of the series $\sum_{n=1}^{\infty} \frac{1}{(\log n)^n}$.

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

     iv) Let $f_n(x) = \frac{x^n}{n}$ $(0 \le x \le 1)$. Show that $\{f_n\}_{n=1}^{\infty}$ converges uniformly to 0 on $[0,1]$.

   b) Attempt any one of the following : **[4]**

     i) Prove that the series $\sum_{n=1}^{\infty} \frac{\left(1+\frac{1}{n}\right)^{2n}}{e^n}$ is convergent.

     ii) If $\{f_n\}_{n=1}^{\infty}$ and $\{g_n\}_{n=1}^{\infty}$ converge uniformly then prove that $\{f_n + g_n\}_{n=1}^{\infty}$ converges uniformly on set E.

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

a) Let $f(x) = x \ (0 \le x \le 1)$. For each $n \in I$ let σ_n be the subdivision $\left\{ 0, \dfrac{1}{n}, \dfrac{2}{n}, \text{---------}, \dfrac{n}{n} \right\}$ of $[0,1]$. Prove that $\lim\limits_{n \to \infty} U[f; \sigma_n] = \lim\limits_{n \to \infty} L[f; \sigma_n] = \dfrac{1}{2}$.

b) Let χ_n be the characteristic function of the open interval $\left(0, \dfrac{1}{n} \right)$ and let $f_n(x) = n\chi_n(x) \ (0 \le x \le 1)$. Does there exist $N \in I$ such that $|f_n(x) - 0| < \dfrac{1}{2} \ (n \ge N)$ for all $x \in [0,1]$ simultaneously?

c) If $\sum\limits_{n=0}^{\infty} |a_n| < \infty$ then prove that $\int\limits_0^1 \left(\sum\limits_{n=0}^{\infty} a_n x^n \right) dx = \sum\limits_{n=0}^{\infty} \dfrac{a_n}{n+1}$.

✦ ✦ ✦

[5017]-303

3

[5017]-304

T. Y. B. Sc.

MATHEMATICS

MT - 334 : Group Theory

(2008 Pattern) (Semester - III) (Paper - IV) (Old Course)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

1) All questions are compulsory.

2) Figures to right indicates full marks.

Q1) Attempt any FIVE of the following.   **[10]**

a)   Give an example of two subgroups of G such that their union is not subgroup of G.

b)   If G is group then prove that $(ab)^{-1} = b^{-1} a^{-1}$, for all $a, b \in$ G.

c)   Let G = $(2\mathbb{Z}, +)$ be the group of integers with usual addition and H = $(6\mathbb{Z}, +)$ be its subgroup. Find all its distinct cosets of H in G.

d)   Let ϕ, $GL_2(\mathbb{R}) \to \mathbb{R} - \{0\}$ defined by $\phi\left(\begin{bmatrix} a & b \\ c & d \end{bmatrix}\right) = ad - bc.$ Show that ϕ is homomorphism.

e)   If G be a group and H is subgroup of index 2 in G then prove that H is normal subgroup of G.

f)   If G is finite group then show that there exists a positive integer N such that a^N = e, for all $a \in$ G.

g)   In S_8, compute the product (1,3,2) (3,4,7) (1,2,8,4,7).

Q2) Attempt any TWo of the following: **[10]**

a)   Let ϕ be a group homomorphism of G into G′ with kernel K. Prove that K is normal subgroup of group G.

b)   Let G be a group and H is subgroup of G. Show that any two right cosets of H in G are either identical or disjoint.

c)   Let σ = (1,2) (3,4) and τ = (5,6) (1,3) be permutations. Find a permutation & such taht $\rho^{-1} \sigma \rho = \tau$.

P.T.O.

Q3) Attempt any TWO of the following: **[10]**

a) Let G be a group and N is normal subgroup of G. Prove that G/N is group with respect to operation $*$ defined on G/N as, for Na, Nb $\in$ G/N, Na $*$ Nb = Nab.

b) Prove that the subgroup N of group G is noraml subgroup of group G if and only if every left coset of N in G is a right coset of N in G.

c) If in a group G, $a^5 = e$, identity element in G and $aba^{-1} = b^2$ for $a,b \in G$ then find the order of b.

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

a) State and prove Cauchy's theorem for abelian groups.

b) Let ϕ be a homomorphism of group G onto group $\overline{G}$ with kernel K. Prove that $G/K \simeq \overline{G}$.

✦ ✦ ✦

[5017]-305

T.Y.B.Sc.

MATHEMATICS

MT - 335 : Ordinary Differential Equations

(2008 Pattern) (Semester - III) (Paper - V)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

1)   All questions are compulsory.

2)   Figures to the right indicate full marks.

Q1) Attempt <u>any five</u> of the following.   **[10]**

a)   Find the family of orthogonal trajectories to the curves $x^2 + y^2 = c$.

b)   Solve the differential equation $\dfrac{dy}{dx} + \dfrac{(1+y^2)}{1+x^2} = 0$.

c)   Find the general solution of the differential equation $\dfrac{d^2y}{dx^2} - 5\dfrac{dy}{dx} + 4y = 0$.

d)   Show that $x = e^{3t}$, $y = e^{3t}$ and $x = e^{2t}$, $y = 2e^{2t}$ are solutions of the homogeneous system

$$\frac{dx}{dt} = x + 2y$$

$$\frac{dy}{dt} = 3x + 2y$$

e)   Find the singular point of differential equation $(1-x^2)\, y'' - xy' + p^2y = 0$, where p is constant.

f)   Is the differential equation $2xy\, dx + (y^2 - 3x^2)\, dy = 0$ exact?

g)   Show that the series

$$y = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \ldots\ldots \text{ satisfies the differential equation } y' + y = 0.$$

Q2) Attempt any two of the following: **[10]**

a) Prove that the necessary and sufficient condition for the differential equation M dx + N dy = 0 to be exact is that $\dfrac{\partial M}{\partial y} = \dfrac{\partial N}{\partial x}$.

b) Solve the linear differential equation $x\dfrac{dy}{dx} - 3y = x^4$.

c) Solve the differential equation $e^y dx + (x \cdot e^y + 2y)\, dy = 0$.

Q3) Attempt any TWO of the following: **[10]**

a) Explain the method of solving the linear non-homogeneous differential equation $\dfrac{d^2 y}{dx^2} + P(x)\dfrac{dy}{dx} + Q(x)y = R(x)$ by using the method of variation of parameter.

b) Solve the differential equation $y'' + 4y = 3\sin x$.

c) Verify that $y_1 = x$ is one solution of the equation $x^2 y'' + xy' - y = 0$ and then find another solution y_2, and the general solution of the differential equation.

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

a) i) If W(t) is the wronskian of the two solutions of the homogeneous system of differential equations, then prove that W(t) is either identically zero or nowhere zero in [a,b].

   ii) Find the general solution of the system $\dfrac{dx}{dt} = 4x - 3y,\ \dfrac{dy}{dt} = 8x - 6y$.

b) Find the power series solution of the differential equation $\dfrac{d^2 y}{dx^2} + x\dfrac{dy}{dx} + y = 0$.

✦   ✦   ✦

[5017]-306

T. Y. B. Sc.

MATHEMATICS

MT - 336 : Problem Course Based on MT - 334 and MT - 335

(2008 Pattern) (Semester - III) (Paper - IV) (Old Course)

Time : 2 Hours]   *[Max. Marks : 40*

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

SECTION - I

(Group Theory)

Q1) A)   Attempt any THREE of the following.   **[6]**

     a)   Prove that there is no permutation σ such that

        $\sigma^{-1}(1,2,3)\, \sigma = (1,3)\,(5,7,8)$.

     b)   Let G be a group, $g \in G$ be fixed element. Define $\phi : G \to G$ defined by $\phi(x) = gxg^{-1}$. Prove that ϕ is one-one homomorphism.

     c)   State whether following statement is true or false with justification: "Any two groups of order 6 are isomorphic".

     d)   Show that every subgroup of abelian group is normal.

   B)   Attempt any ONE of the following :   **[4]**

     a)   If N and M are normal subgroups of group G then prove that NM is also normal subgroup of G.

     b)   Let G be group of all non-zero complex numbers under multiplication and $\overline{G}$ be the group of real 2×2 matrices of the form $\begin{bmatrix} a & b \\ -b & a \end{bmatrix}$ where $a \neq 0$ or $b \neq 0$ under matrix multiplication. Show that G and $\overline{G}$ are isomorphic.

Q2) Attempt any TWO of the following: **[10]**

a) Let $\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 4 & 5 & 3 & 2 & 1 & 7 & 6 & 9 & 8 \end{pmatrix}$

    i)   Write σ as product of disjoint cycles.

    ii)   Write σ as product of transpositions.

    iii) Determine whether σ is odd or even permutation.

    iv) Find order of σ.

    v)   Find inverse of σ.

b) Let H is subgroup of G and $N(H) = \{g \in G / gHg^{-1} = H\}$. Then show that i)   N(H) is subgroup of G.

    ii)   Subgroup H is normal in N(H).

c) If G is finite group and $a \in G$ be any element then prove that $O(a) \mid O(G)$.

SECTION - II

(Ordinary Differential Equations)

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

    a)   Solve the differential equation $\dfrac{d^2y}{dx^2} - 6\dfrac{dy}{dx} + 9y = 0$.

    b)   Find the integrating factor of the differential equation

$$(x^2y - 2xy^2)\,dx - (x^3 - 3x^2y)\,dy = 0$$

    c)   Find the family of orthogonal trajectories $xy = c$.

    d)   Show that the solutions $x = e^{4t}, y = e^{4t}$ and $x = -e^{-2t}, y = e^{-2t}$ of the

       system $\dfrac{dx}{dt} = x + 3y, \dfrac{dy}{dt} = 3x + y$ are linearly independent and write

       the general solution of the system.

[5017]-306

B)   Attempt <u>any one</u> of the following :   **[4]**

    a)   Find the solution of the initial value problem $y'' - 5y' + 6y = 0$, with $y(1) = e^2$, $y'(1) = 3e^2$.

    b)   Find a particular solution of $\dfrac{d^2y}{dx^2} + y = \sec x$ by variation of parameter.

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

    a)   Solve the Bernoulli's differential equation $xy - \dfrac{dy}{dx} = y^3 e^{-x^2}$.

    b)   Find the general solution of the system $\dfrac{dx}{dt} = 3x - 4y$, $\dfrac{dy}{dt} = x - y$.

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

$$\text{✦ ✦ ✦}$$

[5017]-307

T.Y.B.Sc.

MATHEMATICS

MT - 337 (A) : Operations Research

(2008 Pattern) (Semester - III) (Paper - VII) (Elective - I)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

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

Q1) Attempt any five of the following: **[5 × 2 = 10]**

a) Put the following linear programming problem in the standard form:

Maximize $Z = x_1 + x_2$

Subject to $x_1 + x_2 \geq 3$

               $x_1 - x_2 \leq 5,\ \ x_1, x_2 \geq 0.$

b) Find any two basic feasible solutions of the following equations :

$2x_1 + 6x_2 + 2x_3 + x_4 = 3$

$6x_1 + 4x_2 + 4x_3 + 6x_4 = 2$

c) Give an example of unbalanced transportation problem.

d) Find initial basic feasible solution of the following transportation problem using north - west corner rule:

<div align="center">To</div>

	W_1	W_2	W_3	W_4	Supply
F_1	14	25	45	5	6
Factory F_2	65	25	35	55	8
F_3	35	3	65	15	16
Demand	4	7	6	13	

e) State the assignment model.

f) Write the dual of the following L.P.P.

Maximize $Z = 3x_1 + 5x_2$

Subject to $\quad 2x_1 + 6x_2 \leq 50$

$$3x_1 + 2x_2 \leq 35$$

$$5x_1 - 3x_2 \leq 10, \quad x_1, x_2 \geq 0.$$

g) Define a slack and surplus variable.

Q2) Attempt any TWO of the following: [2 × 5 = 10]

a) Solve the following LPP by graphical method:

Maximize $Z = 6x_1 + 8x_2$

Subject to $\quad 5x_1 + 10x_2 \leq 60$

$$4x_1 + 4x_2 \leq 40, \quad x_1, x_2 \geq 0.$$

b) Solve the following LPP by the simpley method

Maximize $Z = 2x_1 + 4x_2$

Subject to $\quad x_1 + 2x_2 \leq 5$

$$x_1 + x_2 \leq 4, \quad x_1, x_2 \geq 0.$$

c) Solve the following LPP:

Maximize $Z = 2x_1 + x_2$

Subject to $\quad x_1 - x_2 \leq 10$

$$2x_1 \leq 40, \quad x_1, x_2 \geq 0.$$

Q3) Attempt any two of the following: [2 × 5 = 10]

a) Find the initial basic feasible of the following T.P. by rogel approximation method:

To

	S_1	S_2	S_3	S_4	Supply
F_1	2	3	11	7	6
F_2	1	0	6	1	1
F_3	5	8	15	9	10
Demand	7	5	3	2	

b) Solve the following assignment problem (A.P):

	I	II	III	IV
1	10	5	13	15
2	3	9	18	3
3	10	7	3	2
4	5	11	9	7

c) Solve the following assignment problem:

	A	B	C	D	E
1	0	0	1	7	0
2	5	6	0	3	5
3	0	4	3	0	1
4	4	0	0	2	0
5	2	2	7	9	0

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

a) Solve the following LPP by the simplex method:

Maximize $Z = 3x_1 + 2x_2$

Subject to $\quad 2x_1 + x_2 \leq 2$

$$3x_1 + 4x_2 \geq 12, \quad x_1, x_2 \geq 0.$$

b) Determing the optimum basic feasible solution of the following T.P.

Destinations

		X	Y	Z	Supply
	A	2	7	4	50
	B	3	3	7	70
Source	C	5	4	1	180
	D	1	6	2	140
Demand		70	90	180	

✦ ✦ ✦

[5017]-308

T.Y.B.Sc.

MATHEMATICS

MT - 337 - B : Lattice Theory (Elective)

(2008 Pattern) (Semester - III) (Paper - VII) (Old Course)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

   1)   *All questions are compulsory.*

   2)   *Figures to the right indicate full marks.*

Q1) Attempt any five of the following.   **[10]**

   a)   Give an example of a modular lattice which is not distributive.

   b)   Draw the Hasse diagram of lattice of all normal subgroups of $\mathbb{Z}_2 \times \mathbb{Z}_4$.

   c)   Write the dual of the following statement " If z is an upper bound of $\{x, y\}$ then $x \vee y \leq z$".

   d)   Show that in Boolean algebra $a = b$ implies $(a \wedge b') \vee (a' \wedge b) = 0$.

   e)   Show that any Boolean lattice is pseudocomplemented.

   f)   Show that intersection of two ideals of a lattice is an ideal of that lattice.

   g)   Show that any chain is distributive lattice.

Q2) Attempt any two of the following: **[10]**

   a)   Show that the lattice L is non distributive iff N_5 or M_3 are not sublattices of L.

   b)   Let P be lattice. Show that $\vee S$ and $\wedge S$ exist for every finite subset S of P.

   c)   Show that lattice $\langle \mathbb{N}_o, \vee = l.c.m, \wedge = g.c.d. \rangle$ satisfies descending chain condition (DCC) but not ascending chain condition (ACC).

*Q3)* Attempt any two of the following: **[10]**

   a)   Write DNF of the function $f(x, y, z) = \left[(x \vee y')' \vee z' \right] \wedge (x' \vee z)'$.

b) Show that set L of equivalence relations of a set X under the operations of join and meet as. $\vee A_i = \cap \{B \in L : \cup A_i \subseteq B\}$ and $\wedge A_i = \cap A_i$ is a complete lattice.

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

a) i) Write family of all down sets of the poset given below. Also draw the diagram of this family.
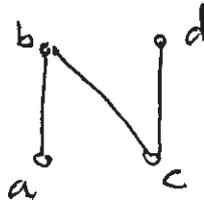
ii) In lattice $\langle P(X) = \text{Power set of } X, \subseteq \rangle$, show that the Join irreducible elements are exactly sets $\{x\}$ for $x \in X$.

b) i) Let B and C are Boolean algebras and $f : B \to C$ is a lattice homomorphism then prove that the statement

p : "$f(0) = 0$ and $f(1) = 1$" is equivalent to the statement

q : "$f(a') = f(a)'$ for all $a \in B$".

ii) Draw the circuit diagram for the Boolean expression

$$\left[a \wedge (a \vee b) \right] \vee \left[b \wedge (a' \wedge b) \right].$$

✦ ✦ ✦

[5017]-309

T.Y.B.Sc.

MATHEMATICS

MT-337(C): C Programming - I

(2008 Pattern) (Old Course) (Semester - III) (Paper - VII)

Time : 2 Hours] *[Max. Marks :40*

Instructions to the candidates:

   1)   *All questions are compulsory.*

   2)   *Figures to the right indicate maximum marks.*

Q1) Attempt <u>any</u> <u>five</u> of the following: **[10]**

   a)   Determine which of the following are valid identifiers. If invalid, explain why?

      i)   Record   ii)   Income tax

   b)   Suppose a, b and c are integer variables that have been assigned the values $a = 8$, $b = 3$ and $c = -5$. Determine the value of the following arithmetic expression: $(2a + 3b) / (a * c)$

   c)   Determine which of the following numerical values are valid constants. If invalid, explain why?

      i)   37, 822   ii)   O X A B F G H

   d)   What is the purpose of break statement?

   e)   List any four keywords.

   f)   Explain the meaning of the following function prototype: Float P(int n, float x).

   g)   Describe the array that is defined in the following statement. Indicate what values are assigned to the individual array elements.

      int P[2] [4] = {4, 6, 8, 10, 12, 14, 16, 20};

Q2) Attempt <u>any</u> <u>two</u> of the following: **[10]**

    a)   Write a short note on for loop.

    b)   Write a C program for addition of two matrices of order 3 × 3.

    c)   Write a short note on printf( ) function.

Q3) Attempt <u>any</u> <u>two</u> of the following: **[10]**

    a)   Write a short note on conditional operator.

    b)   Write a C program to find the maximum number in the given list of 10 numbers.

    c)   Write a short note on function recursion.

Q4) Attempt <u>any</u> <u>one</u> of the following: **[10]**

    a)   i)   Write a short note on relational operators.

            ii)   Write a short note on two dimensional arrays.

    b)   i)   Write a short note on arithmetic operators.

            ii)   Describe the output generated by the following program:

```
#include <stdio.h>
main ( )
{
    int Z [3] [4] = {1,2,3,4,5,6,7,8,9,10,11,12};
    int a,b,c;
    for (a = 0 ; a < 3; + + a)
    {
        c = 999
        for (b = 0 ; b < 4 ; + + b)
            if ( Z [a] [b] < c)
                c = Z [a] [b];
        printf ("% d", c);
    }
}
```

ℰ ℰ ℰ

[5017]-310

T.Y.B.Sc.

MATHEMATICS

MT-337(D): Differential Geometry

(2008 Pattern) (Semester - III) (Paper- VII)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

1) All questions are compulsory.

2) Figures to the right indicate full marks.

Q1) Attempt <u>any</u> <u>five</u> of the following: **[10]**

a)   Find the parametrisation of the level curve $y^2 - x^2 = 1$.

b)   Show that the curve $\gamma(t) = \left(\frac{1}{3}(1+t)^{3/2}, \frac{1}{3}(1-t)^{3/2}, \frac{t}{\sqrt{2}} \right)$ is unit speed curve.

c)   Show that if γ is a unit-speed plane curve, then $\dot{n}_s = -k_s t$

d)   State isoperimetric inequality.

e)   Show that an open disc in the xy-plane is a surface.

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

g)   Find the first fundamental form of the plane $\bar{\sigma}(u,v) = \bar{a} + u\,\bar{p} + v\bar{q}$.

Q2) Attempt any <u>two</u> of the following: **[10]**

a)   If $\gamma(t)$ is a regular curve, then prove that its are length S, starting at any point of γ, is a smooth function of t.

b)   State and prove Serret - Frenet formulae.

c)   By applying the isoperimetric inequality to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, prove

that $\int\limits_{0}^{2\pi} \sqrt{a^2 \sin^2 t + b^2 \cos^2 t}\ dt \geq 2\pi \sqrt{ab}$, with equality holding if and only

if $a = b$.

P.T.O.

Q3) Attempt any <u>two</u> of the following: [10]

a) Compute $k, \tau, \bar{t}, \bar{n}$ and $\bar{b}$ for the curve

$$\gamma(t) = \left(\frac{4}{5}\cos t, 1 - \sin t, -\frac{3}{5}\cos t \right).$$

b) Show that the circular cylinder $S = \{(x, y, z) \,|\, x^2 + y^2 = 1\}$ can be covered by a single surface patch.

c) Let $\bar{\sigma} : U \to \mathbb{R}^3$ be a patch of a surface S containing point P of S, and let (u, v) be coordinates in U. Show that the tangent space to S at P is the vector subspace of $\mathbb{R}^3$ spanned by the vectors $\bar{\sigma}_u$ and $\bar{\sigma}_v$ at $(u_0, v_0) \in U$, where $\bar{\sigma}_{(u_0, v_0)} = P$.

Q4) Attempt any <u>one</u> of the following: [10]

a) Show that a diffeomorphism $f : S_1 \to S_2$ is an isometry if and only if for any surface patch $\bar{\sigma}_1$ of S_1, the patches $\bar{\sigma}_1$ and $fo\bar{\sigma}_1$ of S_1 and S_2, respectively have the same first fundamental form.

b) i) Show that every isometry is a conformal map. Give an example of a conformal map that is not an isometry.

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

$\mathcal{EEE}$

[5017]-311

T.Y.B.Sc.

MATHEMATICS

MT-337(E): Combinatorics

(2008 Pattern) (Paper - VII) (Semester - III)

Time : 2 Hours]   *[Max. Marks :40*

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: **[10]**

    a)   How many ways are there to roll two dice to yield a sum divisible by 3?

    b)   How many ways are there to distribute 9 different books among 15 children if no child gets more than 1 book?

    c)   How many arrangements of the letters in the word COMMITTEE are there?

    d)   How many ways are there to distribute four identical oranges into five distinct boxes?

    e)   Find roots of the characteristic equation associated with the recurrence relation $a_n = 5a_{n-1} - 6a_{n-2}$.

    f)   How many integers between 1 and 500 are divisible by 3 or 7?

    g)   State Pigeonhole principle.

Q2) Attempt any <u>two</u> of the following: **[10]**

    a)   State and prove Inclusion -Exclusion formula.

    b)   How many ways are there to place two identical kings on an 8 × 8 chess board so that the kings are not in adjacent squares?

    c)   Among the integers 1, 2, ---, 200, if any 101 integers are chosen, show that there is a pair of coprime numbers among chosen numbers.

Q3) Attempt any <u>two</u> of the following: [10]

a) Find a recurrence relation for the number a_n of binary sequences of length n that do not contain the pattern '11'.

b) How many integer solutions are there to the equation $x_1 + x_2 + x_3 + x_4 = 10$ if $0 \le x_1 \le 3, 0 \le x_2 \le 4, \ x_3 \ge 0, x_4 \ge 0$.

c) Using combinatorial argument, prove that $\dbinom{n}{k}\dbinom{k}{m} = \dbinom{n}{m}\dbinom{n-m}{k-m}$.

Q4) Attempt any <u>one</u> of the following: [10]

a) i) How many triangles are formed by 5 lines, no two of which are parallel and no three intersect at a point?

ii) Let n be an odd positive integer. If i_1, i_2 ---, i_n is a permutation of 1, 2, ---, n, prove that $(1 - i_1)(2 - i_2) --- (n - i_n)$ is an even integer.

b) i) Solve the recurrence relation $a_n - 6a_{n-1} + 9a_{n-2} = 0$ for $n \ge 2$ and $a_0 = 5, a_1 = 9$.

ii) How many permutations of $\{1, 2, ---, 9\}$ are there that agree with 1, 2, ---, 9 in exactly 3 places?

$\mathcal{E}\mathcal{E}\mathcal{E}$

[5017]-312

T.Y.B.Sc.

MATHEMATICS

MT-337:Elective (F): Number Theory

(2008 Pattern) (Old Course) (Semester - III) (Paper - VII)

Time : 2 Hours]   *[Max. Marks :40*
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: **[10]**

a) Find the last digit in the ordinary decimal representation of 3^{60}.

b) Prove that if $ax + by = c$ is solvable then $(a, b) = (a, b, c)$.

c) For $n = 400$, find $\phi(n)$ and $\sigma(n)$.

d) Find the value of Legendre symbol $\left(\dfrac{20}{17}\right)$.

e) True or False: Justify.

 'If $4x \equiv 4y \pmod 6$ then $x \equiv y \pmod 3$ '.

f) Find two Pythagorean triples whose terms form an arithmetic progression.

g) Exhibit three integers that are relatively prime but not relatively prime in pairs.

Q2) Attempt any <u>two</u> of the following: **[10]**

a) Find values of x and y to satisfy $423 x + 198 y = 9$.

b) Find all integers that satisfy simultaneously

 $x \equiv 2 \pmod 3$, $x \equiv 3 \pmod 5$, $x \equiv 2 \pmod 7$

c) Apply Wilson's theorem to show that

 i) $18! + 1 \equiv 0 \pmod{19}$

 ii) $18! + 1 \equiv 0 \pmod{23}$

Q3) Attempt any <u>two</u> of the following: **[10]**

   a)   Find the form of all positive integers n satisfying $d(n) = 10$. What is the smallest positive integer n such that $d(n) = 10$?

   b)   Find the values of Legendre symbols $\left(\dfrac{2}{61}\right)$ and $\left(\dfrac{3}{17}\right)$.

   c)   A pineapple worth Rs.5, a coconut Re.1 and 20 oranges together Re.1. How many pineapples, coconuts and oranges, totalling 100 can be bought for Rs.100.

Q4) Attempt any <u>one</u> of the following: **[10]**

   a)   i)   Prove that all solutions of $3x + 5y = 1$ can be written in the form $x = 2 + 5t$, $y = -1 - 3t$; $t \in \mathbb{Z}$.

        ii)   Find the values of $d(n)$ and $\sigma(n)$, for $n = 3000$.

   b)   i)   Given any integers a and b, with $a > 0$, show that there exists unique integers q and r such that $b = aq + r$, $0 \le r < a$.

        ii)   Find the highest power of 6 dividing 533!

<p align="center">ℰℰℰ</p>

[5017]-313

T.Y.B.Sc.

PHYSICS

PH-331: Mathematical Methods in Physics

(2008 Pattern) (Paper - I)(Semester - III)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

   1)   All questions are compulsory.

   2)   Figures to the right indicate full marks.

   3)   Use of log-tables or calculators is allowed.

Q1) Attempt all of the following (one mark each):   **[10]**

   a)   State Fuch's theorem.

   b)   State Lorentz transformation.

   c)   State order and degree of differential equation $\sqrt{\dfrac{d^2y}{dx^2}} + \left(\dfrac{dy}{dx}\right)^2 + 4y = 0$.

   d)   Show that $x = 0$ is an ordinary point of the differential equation $y'' - 2xy' + 2\lambda y = 0$.

   e)   Define orthogonal co-ordinates system.

   f)   State generating function for Hermite's polynomials.

   g)   Write Rodrigue's formula for Hermite's polynomial.

   h)   What do you mean by Minkowski's space?

   i)   Write the transformation equations between (ρ, ϕ, z) & (x, y, z).

   j)   State degree of differential equations.

Q2) Attempt <u>any two</u> of the following: **[10]**

    a)   Show that, the point $x = \infty$ is an irregular singular point of a given differential equation $x^2 y'' + xy' + (x^2 - n^2)y = 0$.

    b)   Prove that $P'_{n+1}(x) + P'_{n-1}(x) = 2x\, P'_n(x) + P_n(x)$.

    c)   Explain relativistic mass & obtain the equation for relativistic mass of an object.

Q3) Attempt <u>any two</u> of the following: **[10]**

    a)   Derive an expression for divergence of vector $(\nabla \cdot \bar{F})$ in orthogonal curvilinear system.

    b)   Separate the variables in 3D, heat flow equation $\dfrac{\partial \psi}{\partial t} = \alpha^2 \nabla^2 \psi$ where ψ is temp. of body, α^2 is constant.

    c)   Describe time dilation on the basis of Lorentz transformation equation.

Q4) a)   Attempt <u>any one</u> of the following: **[8]**

    i)   Find the series solution about $x = 0$ of $y''(x) - 2xy'(x) + 2y(x) = 0$.

    ii)   Describe Michelson-Morley experiment and explain the physical significance of negative result.

    b)   Attempt <u>any one</u> of the following: **[2]**

    i)   State postulates of special theory of relativity.

    ii)   What is increase in the relativistic mass of a purticle of rest mass 1 gm when it is moving with velocity 0.8 C?

<p align="center">ℇℇℇ</p>

[5017]-314

T.Y.B.Sc.

PHYSICS

PH-332: Classical Electrodynamics

(2008 Pattern) (Paper - II)(Semester - III)

Time : 2 Hours] *[Max. Marks :40*

Instructions to the candidates:

   1) *All questions are compulsory.*

   2) *Figures to the right indicate full marks.*

   3) *Use of log tables and calculator is allowed.*

Q1) Attempt all of the following (1 mark each): **[10]**

   a)   Define volume charge density. Give its SI unit.

   b)   What is non-polar molecule?

   c)   Write the relation between $\vec{D}, \vec{E}$ and $\vec{P}$.

   d)   Define magnetic permeability.

   e)   Write the relation $\vec{B}, \vec{H}$ and $\vec{M}$.

   f)   State Ampere's circuital law.

   g)   Define the term 'current density (J)'.

   h)   Define magnetic dipole moment. Give its SI unit.

   i)   State poynting's theorem.

   j)   What do you mean by circular polarisation.

Q2) Attempt <u>any two</u> of the following:

   a)   What is meant by electrical image? Write down the procedural step for solving electrostatic problems. **[5]**

   b)   State Ampere's circuital law. Obtain the relation $\vec{\nabla} \times \vec{B} = \mu_0 \vec{J}$. **[5]**

   c)   State Faraday's law of electromagnetic induction and obtain the relation

$$\vec{\nabla} \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}.$$ **[5]**

Q3) Attempt <u>any two</u> of the following:

a) Two spheres of charges +10c and +40c are placed 9 cm apart. Find the position of the point between them where the intensity is zero. **[5]**

b) A material having $\sigma = 10^{-2}/\,\Omega$m and $\in\, = 4\in_0$ is exposed to sinusoidally varying electric field of angular - velocity 'ω'. The ratio of conduction current density (J_c) to displacement current density (J_d) is given by

$\dfrac{J_c}{J_d} = \dfrac{\sigma}{\omega \in}$. At what frequency (f) the two current densities will be equal?

(Given $\in_0\, = 8.85 \times 10^{-12}$ c² /Nm²) **[5]**

c) Three point charges 6q, - 4q and 10q are placed at the corners of an equilateral triangle having length of each side 1.5 cm. Compute the potential energy of the structure.

[Given $q = 1.6 \times 10^{-6} C, \dfrac{1}{4\pi \in_0} = 9 \times 10^9\, Nm^2 / C^2$]. **[5]**

Q4) a) Attempt any one of the following:

i) What do you meant by Hysteresis? Draw hysteresis loop and explain the terms remanence and coercivity. Also show that $\mu_r = 1 + \chi_m$. **[8]**

ii) Show that in a charge free- non conducting medium Maxwell's equations lead to wave equations in $\vec{E}$ and $\vec{H}$

$\therefore \nabla^2 \vec{E} - \dfrac{1}{C^2}\dfrac{\partial^2 \vec{E}}{\partial t^2} = 0$ and

$\therefore \nabla^2 \vec{H} - \dfrac{1}{C^2}\dfrac{\partial^2 \vec{H}}{\partial t^2} = 0$ **[8]**

b) Attempt any one of the following:

i) Find the loss of energy per hour of a frequency of 50 cycles per second if the energy dissipated in iron per cycle is 6×10^6 ergs.**[2]**

ii) Find the electric intensity and potential at a point situated at a distance of 10 cm from the point charge q = 1.6 × 10⁻¹²C. **[2]**

ЄЄЄ

[5017]-315
T.Y.B.Sc.
PHYSICS
PH-333: Classical Mechanics
(2008 Pattern) (Paper - III)(Semester - III)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Use of log tables and calculators is allowed.*

Q1) Attempt <u>all</u> of the following (1 mark each):   **[10]**

     a)   State Kepler's first law of planetary motion.

     b)   Write two examples of projectile motion.

     c)   What do you mean by 'centre of mass' of system?

     d)   Define the term 'central force'.

     e)   Define the term 'differential 'cross-section'.

     f)   What do you mean by elastic scattering?

     g)   Define the term 'degrees of freedom'.

     h)   What are cyclic co-ordinates?

     i)   Define the term system in reference frame.

     j)   Calculate the fictitious force acting on a freely falling body of mass 7 kg with reference to a frame moving vertically downward on earth with an acceleration of 3m/s^2.

Q2) Attempt <u>any two</u> of the following: **[10]**

     a)   Show that the total K.E. in LAB & cm system are related

$$T_{cm} = \left(\frac{m_2}{m_1 + m_2}\right) T_{Lab} .$$

     b)   How does a two-body problem reduce to a one body problem?

     c)   Applying Newton's law to a system of particles in conservative force field, establish the law of conservation of angular momentum.

P.T.O.

Q3) Attempt <u>any two</u> of the following: **[10]**

a) The distance between sun and earth is suddenly reduced to half of its present distance. What will be duration of year?

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

c) Calculate the deviation of freely falling body from a height of 150 metres at latitude $30°$ N due to coriolis acceleration.

Q4) a) Attempt <u>any one</u> of the following: **[8]**

i) Give the advantages of Lagrangian formulation. Use Lagrange's equation to obtain equation of motion for a bead sliding on a uniformly rotating wire in a force free region.

ii) What is inelastic collision? Obtain Q value equation in inelastic collision.

b) Attempt <u>any one</u> of the following: **[2]**

i) State the principle of Galilean invariance.

ii) Find the angle of projection when the horizontal range is $4\sqrt{3}$ times of its maximum height.

$$\mathcal{EEE}$$

[5017]-316

T.Y.B.Sc.

PHYSICS

PH-334: Atomic and Molecular Physics

(2008 Pattern) (Paper - IV)(Semester - III)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Figures to the right indicate full marks.*

    3)   *Use of log table and calculator is allowed.*

Q1) Attempt all of the following (one mark each):   **[10]**

    a)   State Duane and Hunt's law.

    b)   What is mean by rigid molecule?

    c)   Define reduced mass of a diatomic molecule.

    d)   What is Rayleigh line?

    e)   State any two limitations of Bohr's theory.

    f)   Which series of hydrogen spectra lies in visible region.

    g)   Give the quantum mechanical relation for orbital angular momentum of an electron.

    h)   State the Larmour theorem.

    i)   What is electronic configuration.

    j)   Determine the values of L for $l_1 = 2$ and $l_2 = 3$.

Q2) Attempt any two of the following:

    a)   Explain sodium doublet in sodium spectra.   **[5]**

    b)   State and prove Lande's interval rule and represent it for $^3D_{1,2,3}$ atomic states.   **[5]**

    c)   Explain the origin of characteristic X-ray spectra.   **[5]**

Q3) Attempt <u>any Two</u> of the following:

a) Spectral line of wavelength 450 nm is placed in the magnetic field of 10 Tesla to observe the normal Zeeman effect. Determine the separation between Zeeman spectral lines.

(Given: C = 3× 10^8 m/s, m = 9.1 × 10^{-31} kg) **[5]**

b) Determine atomic terms for two valence atom with p-d electron configuration using L-S coupling scheme. **[5]**

c) Calculate the total energy of an electron in first orbit of hydrogen atom in eV. [Given: m = 9.1 × 10^{-31} kg, ε_0 = 8.85 × 10^{-12}, h = 6.64 × 10^{-34} Js e = 1.6 × 10^{-19} C, l eV = 1.6 × 10^{-19} J] **[5]**

Q4) a) Attempt any one of the following:

i) Explain space quantisation and spinning of electron concepts in vector atom model. **[8]**

ii) Explain Raman effect on the basis of quantum theory. Draw the necessary energy level diagrams. **[8]**

b) Attempt any one of the following:

i) Give importance of Moseley's law in X-rays. **[2]**

ii) Explain L-S and j-j coupling. **[2]**

$\mathcal{EEE}$

[5017]-317

T.Y.B.Sc.

PHYSICS

PH-335: 'C' Programming and Computational Physics

(2008 Pattern) (Paper - V)(Semester - III)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

   1)   *All questions are compulsory.*

   2)   *Figures to the right indicate full marks.*

   3)   *Use of scientific calculator is allowed.*

Q1) Attempt all of the following (one mark each):   **[10]**

   a)   What are inherent errors?

   b)   Define the terms: Accuracy and Precision.

   c)   Write a syntax for do ... while loop.

   d)   Differentiate between ++n and n++.

   e)   State the use of sizeof ( ) command.

   f)   State two advantages of algorithm.

   g)   What is keyword?

   h)   Write the syntax for defining double dimensional array.

   i)   Write the syntax for checking end of file.

   j)   Write the syntax for 'for' statement.

Q2) Attempt any two of the following:

   a)   Explain different relational operators used in 'C' language by giving suitable example for each.   **[5]**

   b)   Explain the use of goto and contunue statement with sample program.**[5]**

   c)   Write a 'C' program for generating fibonacci sequence.   **[5]**

Q3) Attempt any two of the following:

  a) Explain switch statement with suitable example.   **[5]**

  b) What are function prototypes? State their purpose.   **[5]**

  c) Write a 'C' program to find out the factorial of given number?   **[5]**

Q4) A) Attempt any one of the following:

   a) i) Draw a flow-chart for Simpson's 1/3rd rule.   **[4]**

     ii) Determine the constants a and b by the method of least squares such that $y = a_0\, e^{\beta x}$ fits the following data.   **[4]**

X	1	2	3	4	5
Y	4.077	11.084	30.128	81.897	222.62

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

     ii) Explain the terms: **[4]**

      1) Absolute error and

      2) Relative error with examples.

  B) Attempt any one of the following:

   a) What is chopping?   **[2]**

   b) State the difference between break and continue statement.   **[2]**

<p style="text-align:center">ℰ ℰ ℰ</p>

[5017]-318

T.Y.B.Sc.

PHYSICS

PH-336 (A): Astronomy and Astrophysics

(2008 Pattern) (Paper - VI (A)) (Elective - I) (Semester - III)

Time : 2 Hours] *[Max. Marks :40*

Instructions to the candidates:
1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Draw neat diagrams wherever necessary.*

Q1) Attempt all of the following (1 mark each): **[10]**

a) What is an Asteroid?

b) What is the difference between Absorption and Emission spectra?

c) State application of Bodes law.

d) What are Binary stars?

e) Where does Gravitational condensation occur?

f) What is a Solar Flare?

g) Distinguish between absolute and apparent luminosity of a star.

h) What is the disadvantage of a Newtonian Telescope?

i) What is meant by Chandrashekhar limit?

j) Where do we use a coronagraph?

Q2) Attempt any two:

a) How is Rotational period of a star obtained from its spectra? **[5]**

b) Write a note on the Hubble space Telescope. **[5]**

c) How are Galaxies classified according to their shapes? **[5]**

Q3) Attempt any two:

  a) Explain the proton-proton cycle in stars.   **[5]**

  b) What is the difference between sydonic and sydereal time? **[5]**

  c) What are the advantages of using Radio Telescopes? **[5]**

Q4) a) Attempt any one:

    i) Describe the H-R diagram in detail.   **[8]**

    ii) Which evidences support the Big-Bang theory?   **[8]**

  b) Attempt any one:

    i) What is meant by Super Nova Explosion?   **[2]**

    ii) What is Doppler effect is light?   **[2]**

<p align="center">𝓔 𝓔 𝓔</p>

P720

[5017]-318
T.Y.B.Sc.
PHYSICS
PH-336 (B): Elements of Material Science
(2008 Pattern) (Paper - VI) (Elective - I) (Semester - III)

Time : 2 Hours]   *[Max. Marks :40*
Instructions to the candidates:
1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Draw neat diagrams wherever necessary.*
4) *Use of calculators and log tables is allowed.*

Q1) Attempt all of the following (1 mark each):   **[10]**

a) Define the term "ductility".

b) The resistivity of an aluminium alloy is 2.8×10^{-6} ohm - cm. What would be the resistance of an aluminium wire 101.6 cm long and 0.01 cm² in cross section?

c) What is solid solution?

d) What is recrystallization temperature?

e) State Gibb's phase rule.

f) What is an alloy?

g) What is cold working of metals?

h) The degree of polymerization of a polystrene chain is 20,000. Calculate the molecular weight of the chain.

i) What is atomic diffusion?

j) State any two main characteristics of ceramics.

Q2) Attempt any two of the following:

a) State and explain the rules to predict the existence of extensive solid solubility between two element by W. Hume Rothery. **[5]**

b) What is AX - structure? Explain AX type structure of NaCl. **[5]**

c) Define Critical Resolved Shear Stress (CRSS). Derive Schmid's law of CRSS. **[5]**

Q3) Attempt any two of the following:

a) Discuss the difference between addition and condensation polymerization? **[5]**

b) The diffusivity of aluminium in copper is 2.6×10^{-17} m²/s at 500°C and 1.6×10^{-12} m²/s at 1000°C. **[5]**

i) Determine the values of D_o and E for this diffusion couple.

ii) What is diffusivity at 750°C? (Given: K = 13.8×10^{-24} J/atom K).

c) The compound CdS has the same structure as ZnS. The centres of the two unlike ions are separated by 0.25 mm. **[5]**

i) What is the volume of the unit cell?

ii) What is the density?

(Given: At. mass of Cd = 112.4 amu,

At. mass of S = 32.1 amu.

Q4) a) Attempt any one of the following:

i) What is Hot working of metals? What are the effects of Hot working on metals? What are the advantages and disadvantages of Hot working of metals? **[8]**

ii) State the importance and objectives of phase diagrams? Draw phase diagram for "Two - metals completely soluble in the liquid and solid states" and explain the different areas in it. **[8]**

b) Attempt any one of the following:

i) What is slip? How slip occurs? **[2]**

ii) What do you mean by Frenkl imperfection. **[2]**

$\mathcal{EEE}$

P720

[5017]-318
T.Y.B.Sc.
PHYSICS
PH-336 (C): Motion Picture Physics
(2008 Pattern) (Paper - VI) (Elective - I) (Semester - III)

Time : 2 Hours] *[Max. Marks :40*

Instructions to the candidates:

1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Draw neat diagrams wherever necessary.*

Q1) Attempt all questions (1 mark each): **[10]**

   a) State various types of perspective.

   b) What do you mean by normal lens.

   c) Write C-41 process.

   d) Draw different stages of intermittant in movie camera.

   e) What do you mean by contact printing?

   f) Define slow motion.

   g) State basic principle of photography.

   h) Explain the term equivalent exposer.

   i) What is point source? Give examples.

   j) What is Aperture?

Q2) Attempt any two of the following:

   a) Explain movie camera and its essential parts. **[5]**

   b) Explain the operation of focal place shutter. **[5]**

   c) Distinguish between Freeze action and reverse action. **[5]**

Q3) Attempt any two of the following:

    a)   Explain classification of printing papers. **[5]**

    b)   Describe in brief optical and sound recording on films. **[5]**

    c)   Explain any two aberrations in detail. **[5]**

Q4) a)   Attempt any one of the following:

        i)   Explain construction and working of S.L.R. camera in detail. **[8]**

        ii)   Explain key light, supplimentary light and fill in back light in detail. What do you mean by motor drive in movie camera. **[8]**

    b)   Attempt any one of the following:

        i)   State the composition of colour reversal film. **[2]**

        ii)   What do you mean by projection lens? **[2]**

ℰ ℰ ℰ

P720

[5017]-318
T.Y.B.Sc.
PHYSICS
PH-336 (D): Biophysics
(2008 Pattern) (Paper - VI) (Elective - I) (Semester - III)

Time : 2 Hours] *[Max. Marks :40*
Instructions to the candidates:
    1)   *All questions are compulsory.*
    2)   *Figures to the right indicate full marks.*
    3)   *Draw neat diagrams wherever necessary.*

Q1) Attempt all of the following (1 mark each): **[10]**

    a)   Define Gibbs's free energy.

    b)   Give the composition of a cell.

    c)   State any two names of amino acids.

    d)   Define Bond length.

    e)   Mention different chemical component of DNA.

    f)   What is Bond angles?

    g)   Write the Nernst equation.

    h)   Draw PQRST curve of ECG.

    i)   Define CMRR.

    j)   What is the full form of EEG and ERG.

Q2) Attempt any two of the following:

    a)   Explain the role of PS I and PS II in the photosynthesis process.   **[5]**

    b)   Explain polarizable and non-polarizable electrodes.   **[5]**

    c)   With the help of block diagram explain the working of NMR.   **[5]**

Q3) Attempt any two of the following:

    a)   What is Protein's? Explain structure and properties of proteins.   **[5]**

    b)   Explain principle and working of colorimeter.   **[5]**

    c)   Discuss the construction and working of ECG - Machine.   **[5]**

Q4) a)   Attempt any one of the following:

         i)   What is neuron? Discuss the structure and function of neuron. State Nernst equation.   **[8]**

         ii)   What is electron microscope? Explain in brief the principle and construction of SEM and TEM.   **[8]**

    b)   Attempt any one of the following:

         i)   What do you mean by 'Genetic code'?   **[2]**

         ii)   State the applications of Radioactivity.   **[2]**

ℰ ℰ ℰ

P720

[5017]-318
T.Y.B.Sc.
PHYSICS
PH-336 (E): Medical Electronics
(2008 Pattern) (Paper - VI) (Elective - I) (Semester - III)

Time : 2 Hours]   *[Max. Marks :40*
Instructions to the candidates:
    1)   All questions are compulsory.
    2)   Figures to the right indicate full marks.
    3)   Draw neat diagrams wherever necessary.

Q1) Attempt all of the following (1 mark each):   **[10]**

    a)   State principle of capacitive transducer.

    b)   What is electrophoresis?

    c)   List any two types of blood tests.

    d)   Draw circuit symbol of OP-AMP.

    e)   What is heamatology?

    f)   State principle of electromagnetic flowmeter.

    g)   State essential features of instruments.

    h)   What is polarisation?

    i)   State functions of pacemaker.

    j)   State types of filters.

Q2) Attempt any two of the following: (5marks each)   **[10]**

    a)   Explain differential amplifier.

    b)   Write short note on Electrocardiography.

    c)   Explain construction & working of Ultrasonic flowmeter.

Q3) Attempt any two of the following: (5marks each) **[10]**

    a)   Explain indirect measurement of BP.

    b)   Explain use of active filter.

    c)   Write short note on phethysmography.

Q4) A)   Attempt any one of the following: **[8]**

    a)   Explain standard limb leads & Augmented limb leads for recording electrocardiogram.

    b)   Write short notes on

        i)   Photocardiography.

        ii)   Temperature radiation thermometry.

   B)   Attempt any one of the following: **[2]**

    a)   State precautions while using X-ray unit.

    b)   What are bio-potential electrode? State its use.

<p align="center">ℰ ℰ ℰ</p>

[5017] - 319

T.Y.B.Sc.

CHEMISTRY

CH - 331 : Physical Chemistry

(2008 Pattern) (Semester - III) (Paper - I)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

1) *All questions are compulsory.*

2) *Figures to the right indicate full marks.*

3) *Use of logarithmic table and calculator are allowed.*

4) *Actual calculations must be shown while solving problems.*

Q1) Attempt the following: **[10]**

a) Define the term 'order of reaction'.

b) Calculate frequency of visible radiation of wave length 400 nm $(C = 3 \times 10^{10}$ cm sec^{-1}).

c) Sketch 100 plane in BCC crystal lattice.

d) Define heat of adsorption.

e) If Weiss indices are $\frac{3}{2}$:2:1, what are miller indices?

f) Define energy of activation.

g) Why CD_2 molecule does not show rotational spectra?

h) Explain line of symmetry.

i) Define wave number of radiation.

j) Define dipole moment.

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

i) Define energy of activation? How it is determined experimentally.

ii) How dipole moment is useful to determine the percentage ionic character of the compound.

iii) What is Raman effect and Raman shift? Discuss the theory of Raman effect.

P.T.O.

b) Solve any one of the following: **[4]**

   i) Calculate the interplanar spacing of a set of planes if the angle for the first order diffraction is $22.5°$ when x - ray of wavelength 1.53 Å are used.

   ii) The dipole moment of certain molecule is 1.73×10^{-18} esu-cm. Calculate the orientation polarisation of the substance at 27°C Given Boltzman constant $K = 1.38 \times 10^{-16}$ erg deg^{-1} molecule^{-1}.

Q3) Attempt any two of the following: **[10]**

   a) What is second order reaction? Obtain the rate equation for a second order reaction when reaction involves only one reactant.

   b) Derive an expression for the frequency of pure vibrational motion and sketch the spectrum.

   c) What is energy of activation? How it is determined by analytical method.

Q4) a) What is adsorption isotherm? Explain Langmuirs adsorption isotherm.**[6]**

OR

   a) What is crystallography? Explain law of symmetry. **[6]**

   b) Solve any one of the following. **[4]**

   i) The rotational constant for $^1H^{35}Cl$ is observed to be 10.576g cm^{-1}, while rotational constant for ^1HCl with different isotope of chlorin is 10.5739 cm^{-1}. Find the atomic mass of the isotope.

   ii) The temperature coefficient of K_{35} / K_{25} for the saponification of ethyl acetate with NaOH is 1.82. Calculate the energy of activation in calories (R = 2 Cal mol^{-1}deg^{-1}).

ಚಿಖಂಡಚಿಖಂ

[5017] - 320

T.Y.B.Sc.

CHEMISTRY

CH - 332 : Inorganic Chemistry

(2008 Pattern) (Semester - III) (Paper - II)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

1)   All questions are compulsory.

2)   Figures to the right indicate full marks.

3)   Makes are reserved for neat and labelled diagrams.

4)   Use of log table and calculator is allowed.

5)   Atomic numbers:- Be = 4, Fe = 26, Ni = 28, Li = 3, Co = 27.

Q1) Answer the following: **[10]**

a)   What is the bond order in O_2 molecule?

b)   Write M. O. electron configuration Be_2 molecule.

c)   Define term ligand.

d) $[Pt (NH_3)_2 Cl_2]$ is an electrolyte or nonelectrolyte.

e)   What type of isomerism shown by $[Co (NH_3)_5 (NO_2)] Cl_2$ and $[Co (NH_3)_5 (ONO)] Cl_2$.

f)   Calculate EAN in $[Fe (CO)_5]$ complex.

g)   What type of hybridisation is shown by $[Ni (CN)_4]^{2-}$ complex ion.

h)   How many unpaired electrons are present in d^6 strong octahedral ligand field.

i)   Give the spin - only magnetic moment formula.

j)   Write the symmetry symbol for 'p' orbital.

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

     i) Give the application of crystal field theory for tetrahedral complexes.

     ii) Discuss the formation of Li_2 molecule on the basis of MOT.

     iii) What are the assumptions of MOT for octahedral complexes with sigma bonding?

   b) Attempt <u>any two</u> of the following: **[4]**

     i) Give the merits of EAN rule.

     ii) Calculate the CFSE in d^8 octahedral complex.

     iii) Distinguish between, BMO and ABMO.

Q3) Attempt <u>any two</u> of the following: **[10]**

   a) Discuss the formation of CO molecule on the basis MOT.

   b) Explain the formation of $[Co\,(CN)_6]^{3-}$ complex ion without 'Π' bonding according to MOT.

   c) Discuss the formation of $[Fe\,(F_6)]^{3-}$ complex ion on the basis of VBT.

Q4) a) What is meant by 10 Dq? Explain the various factor's affecting 10 Dq. **[6]**

<center>OR</center>

   a) Answer the following: **[6]**

     i) Write note on geometrical isomerism in C.N. = 4 with sutaible example.

     ii) What are the assumptions of crystal field theory?

   b) Discuss the formation of HCl molecule on the basis of MOT. **[4]**

<center>OR</center>

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

     i) Write IUPAC name of the following complexes.

       1) $Na_3\,[Ag\,(S_2O_3)_2]$

       2) $[Cu\,(NH_3)_4]\,SO_4.\,H_2O$

     ii) Draw the primary and secondary velencies in $CoCl_3.\,6NH_3$ compound.

<center>ಚ೩ಂಚ೩ಂ</center>

[5017] - 321

T.Y.B.Sc.

CHEMISTRY

CH - 333 : Organic Chemistry

(2008 Pattern) (Semester - III) (Paper - III)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

1) *All questions are compulsory.*

2) *Figures to the right indicate full marks.*

3) *Draw the structures and neat diagrams if necessary.*

Q1) Answer the following: [10]

a) State Saytzeff rule.

b) Write full name and structure of DMF.

c) Which is a good nucleophile amongst $\overset{\Theta}{O}H$ and H_2O.

d) Which reagent is used to convert $C_6H_5NO_2 \longrightarrow C_6H_5NH_2$

e) Cis -1, 4 - dimethyl cyclohexane is more stable than its trans isomer. Why?

f) Draw zig - zag structure of phenylalanine.

g) List the factors affecting nucleophilic addition to $\underset{}{\diagup}C{=}O$ group.

h) Write the reaction of propene with H - Br in presence of H_2O_2.

i) As size of leaving group increases, proportion of Hofmann product increases. Why?

j) SN^1 reaction is uncommon in gas phase. Why?

Q2) a) Answer <u>any two</u> of the following: [6]

      i)   Explain steric effect with suitable example.

      ii)   Discuss mechanism of Cannizaro's reaction.

      iii)   Cis - 2- butene on hydroxylation by $KMnO_4$ gives meso - 1, 2 - diol. Why?

   b) Attempt <u>any two</u> of the following: [4]

      i)   Explain Markovnikoff rule with suitable example.

      ii)   Explain E_1CB mechanism with suitable example.

      iii)   Explain nature of substrate on rate of SN^1 and SN^2 reaction.

Q3) Answer <u>any two</u> of the following: [10]

   a) Draw chair conformations of trans - 1, 2 - dimethyl cyclohexane. Comment on their stability and optical activity.

   b) What is resonance? Give necessary conditions for resonance. Draw resonance structure of phenoxide ion.

   c) What is SN^1 reaction? Explain SN^1 reaction with the following points

      i)   Kinetics.

      ii)   Formation of intermediate.

      iii)   Attack of nucleophile on intermediate.

Q4) a) What is E_2 reaction? Discuss the mechanism of E_2 with suitable example. Give one evidence supporting E_2 reaction. [6]

<div align="center">OR</div>

a) i) What is reduction? Give mechanism of $\overset{\diagup}{C}=O$ reduction by NaBH$_4$.

ii) Explain addition - elimination reaction of $\overset{\diagup}{C}=O$ compound with phenyl hydrazine and hydroxylamine.

b) Predict the products with justification. [4]

i) $CH_3-CH_2-\underset{\underset{Br}{|}}{CH}-CH_3 \xrightarrow[EtOH]{NaOEt} Ⓐ \xrightarrow{H_2/Ni} Ⓑ$
   major

ii) $CH_3-C \equiv C-CH_3 \xrightarrow[\text{Lindlar catalyst}]{H_2/Pd \cdot BaCO_3} Ⓐ \xrightarrow{Br_2/CCl_4} Ⓑ$
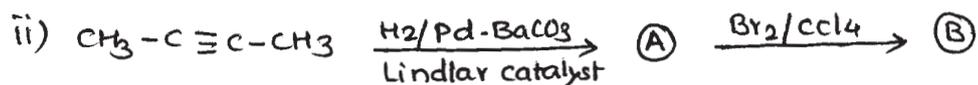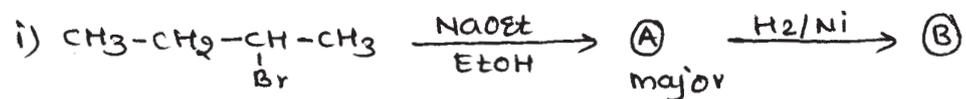
OR

b) i) Propyne on hydration gives acetone. Explain.

ii) (+) 2 - Bromobutane on hydrolysis looses its optical activity. Explain.

ಡಿ೮೦ಡಿ೮೦

[5017] - 322

T.Y.B.Sc.

CHEMISTRY

CH - 334 : Analytical Chemistry

(2008 Pattern) (Semester - III) (Paper - IV)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

  1)   *All questions are compulsory.*

  2)   *Figures to the right indicate full marks.*

  3)   *Neat diagrams must be drawn whenever necessary.*

  4)   *Use of calculator and logorithmic table is allowed.*

  5)   *Actual calculations must be shown while solving problems.*

Q1) Write the following: **[10]**

  a)   What is solubility product?

  b)   State the factors affecting TGA curve.

  c)   What is electrochemical equivalent?

  d)   Define the term transmittance.

  e)   Calculate the absorbance of a solution if it transmitts 30% of incident radiation.

  f)   Define detection limit of AAS.

  g)   State the Boltzman equation.

  h)   What is the basis of Turbidimetric Analysis?

  i)   What is the term digestion in gravimetry?

  j)   State Lambertz law.

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

  i)   Describe the various steps involved in FES.

  ii)   Explain precipitation from homogenions solution with suitable example.

  iii)   Explain mole ratio method by Yoe and Jones.

b) Attempt any two: **[4]**

    i) Calculate the amount of silver deposited when 2.2 amp passed through electrolyte for 20 min (Ec of Ag 1.118×10^{-3}).

    ii) Calculate turbidance of solution when 55% of light is transmitted through a turbid solution.

    iii) Enlist steps involved in Gravimetric Analysis in proper sequence.

Q3) Attempt any two: **[10]**

    a) What is co - precipitation? How a co-precipitation canbe minimized.

    b) Describe the essential component of spectrophotometer with block diagram.

    c) Explain a instrumentation of AAS with block digram.

Q4) a) What are filters? Explain its types in detail. **[6]**

<p style="text-align:center">OR</p>

    a) i) Explain the term decomposition potential with the help of current - applied voltage graph. **[3]**

      ii) Write a note on premix burner in AAS. **[3]**

    b) Solve any one: **[4]**

      i) Calculate solubility of silver chloride in water in gm/lit and in gm mole/ lit if it solubility product is 1.18×10^{-10} at 24°C

      (m.w. Agcl = 143.5)

      ii) The transmittance of 1.63×10^{-3}m colour solution is found to be 80% at 350 nm, when placed in cell of path length 1.1 cm. Calculate absorbance and molar absorptivity.

<p style="text-align:center">ೞೞೞೞ</p>

[5017] - 323

T.Y.B.Sc.

CHEMISTRY

CH - 335 : Industrial Chemistry

(2008 Pattern) (Semester - III) (Paper - V)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:
   1)   All questions are compulsory.
   2)   Figures to the right indicate full marks.
   3)   Draw neat diagrams and flowsheet - wherever necessary.

Q1) Answer the following: [10]

   a)   What do you mean by unit process?

   b)   Give one method of concentration of Nitric acid.

   c)   What are nitrogenous fertilizers?

   d)   Sugar cane cut from the field should be crushed within 24 hrs. Explain?

   e)   Write important uses of ethyl alcohol.

   f)   Explain the term biodegradable waste.

   g)   Define the term selectivity.

   h)   What is rectified spirit.

   i)   What is absolute alcohol.

   j)   Explain the term atom economy.

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

   i)   Differentiate between batch and continuous process.

   ii)   What are importance of fertilizers.

   iii)   What is Oleum? How is it converted in to concentrated sulphuric acid.

b) Answer any two of the following: **[4]**

    i) Explain the role of Rand D in chemical plant.

    ii) Write a note on nature of waste from food industry.

    iii) Explain the terms capital investment and manufacturing cost.

Q3) Answer any two of the following: **[10]**

    a) Discuss with flowsheet - the manufacture of sugar from sugarcane with special reference to crystallisation.

    b) What is fermentation? Discuss the conditions favourable for fermentation.

    c) Describe the various terms involved in waste minimization.

Q4) a) Describe the physico - chemical principle involved in manufacture of ammonia. **[6]**

<div align="center">OR</div>

    a) Describe with flowsheet the manufacture of Urea.

    b) Write note on caffey - still. **[4]**

<div align="center">OR</div>

    b) Write note on multiple effect evaporator.

<div align="center">ಚ೮೩೮</div>

[5017] - 324

T.Y.B.Sc.

CHEMISTRY

CH - 336 (A) : Nuclear Chemistry (613 A3)

(2008 Pattern) (Elective - I) (Semester - III) (Paper - VI)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

1) *All questions are compulsory.*

2) *Figures to the right indicate full marks.*

3) *Draw the diagrams wherever necessary.*

4) *Use of log tables and calculator is allowed.*

Q1) Answer the following: **[10]**

a) Define isotones with examples.

b) Define binding energy and mean binding energy.

c) What is the range of α particle in air?

d) State two applications of semi - empirical mass equation.

e) Define reaction cross section. State its unit.

f) State $\bar{\beta}$ decay with example.

g) Give one example of conservation of protons in Nuclear reaction.

h) Complete the following nuclear reaction.

   $$^{9}_{4}Be + ... \rightarrow ^{12}_{6}C + ^{1}_{0}n$$

i) State Geiger Nuttal's law.

j) What are thermonuclear reactions.

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

   i) Define photonuclear reactions. What are different types of photonuclear reactions.

   ii) Explain the classification of nuclides on the basic of number of protons (Z) and number of neutrons (N).

   iii) Write short note on Geiger - Nuttal's law.

P.T.O.

b) Answer any two of the following: **[4]**

i) Calculate the binding energy of deuteron $_1^2\text{H}$.

Given: Mass of proton = 1.0078 amu.

Mass of Neutron = 1.0080 amu.

Mass of dueteron = 2.014102 amu.

ii) Define:

1) Half life

2) Decay constant

iii) Explain Bethe's Notation with example.

Q3) Answer any two of the following: **[10]**

a) Describe the liquid drop model in detail giving postulates.

b) Show that decay kinetics follows first order kinetics. Give Relation between half life and decay coustant.

c) Explain compound nucleus theory.

Q4) a) State and explain semi-empirical mass equation. What are its applications. **[6]**

OR

Discuss general characteristics of radioactive decay process.

b) Calculate the half life of ^{22}Na, if it dacays 80% in 40 hours. **[4]**

OR

Discuss stability of nuclides on the basis of even and odd nature of protons and neutrons.

ೞೞಯೞಯ

P726

[5017] - 324

T.Y.B.Sc.

CHEMISTRY

CH - 336 (B) : Polymer Chemistry

(2008 Pattern) (Semester - III) (Paper - VI)

Time : 2 Hours] *[Max. Marks :40*

Instructions to the candidates:

1) *All questions are compulsory.*

2) *Figures to the right side indicate full marks.*

3) *Draw the neat diagrams wherever necessary.*

4) *Use of log table and calculator is allowed.*

Q1) Answer the following: **[10]**

a) Define the term - Polymerisation.

b) Choose the correct alternative in the following.

Leo Backeland had inverted ..... Polymer.

(M - F resin / P - F resin)

c) Draw the structure of the following polymers

i) Polypropylene

ii) Teflon

d) Give any three important applications of polystyrene.

e) State whether the following statement is true or false. 'Nylon is the best example of amide polymer'.

f) Give any two initiator used in free radical polymerisation.

g) Write the IUPAC name of,

$$\left(\!\!-CH_2-\underset{\underset{Cl}{|}}{CH}\!\sim\!\!\right)$$
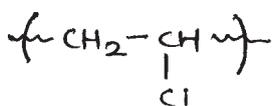
h) What is meant by co-polymer?

i) Write any two commonly used fillers in polymer processing.

j) Calculate the molecular weight of polyvinyl alcohol whose Dp is 1100.

Q2) a) Explain the following (Any two): **[6]**

i) 'Modern age is the age of polymer'.

ii) Antioxidants are often added for making plastic articles.

iii) 'Fevicol is used in plywood industries'.

b) How will you distinguish bet^n the following: (Any two): **[4]**

i) Natural and synthetic polymers.

ii) Thermoplastics and thermosetting plastics.

iii) Addition and condensation polymerisation.

Q3) Attempt any <u>two</u> of the following: **[10]**

a) Discuss in brief, the machanism of cationic polymerisation.

b) Give a detailed account of viscometric method used for determination of molecular weight.

c) Describe the suspension polymerisation in detail. Give the merits of suspension polymerisation.

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

i) A box of apples contains sets of A, B, C and D with their numbers and weights of apples given below,

Set A : 80 apples with its weight 200 gm

Set B : 100 apples with its weight 150 gm

Set C : 150 apples with its weight 100 gm

Set D : 120 apples with its weight 250 gm

Calculate the number average $(\overline{M}n)$ molecular weight for the apples.

ii) Explain in brief the visco - elasticity of polymers.

iii) Explain the role of colourants and plasticizers in polymer processing.

B) Complete the following polymer reactions. **[4]**

i) n $CH_2=CH$ $+$ n $CH_2=CH$ $\xrightarrow{\Delta}$?
        | |
        OH   CN

ii) $\sim CH_2-CH=CH-CH_2 \sim$ $\xrightarrow[\text{ii) } Zn/H_2O]{\text{i) } O_3}$?

iii) $\sim CH_2-CH \sim$ $\xrightarrow{H_2O/H^{\oplus}}$?
              |
              $OCOCH_3$

iv) n $HOOC(CH_2)_6 COOH$ $+$ n $HO-CH_2-CH_2-OH$ $\xrightarrow{\Delta}$?

ఆంఆంఆం
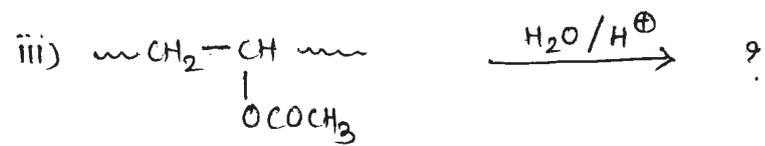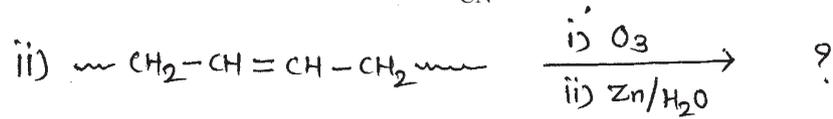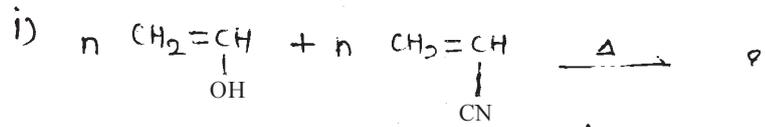
P726

[5017] - 324

T.Y.B.Sc.

CHEMISTRY

CH - 336 (C) : Introduction to Biochemistry & Molecular Biology

(2008 Pattern) (Semester - III) (Paper - VI)

Time : 2 Hours] *[Max. Marks :40*

Instructions to the candidates:

1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Draw structures and neat diagrams wherever necessary.*

Q1) Answer the following: **[10]**

a) What are Anomers? Give example.

b) Name two endocrine glands.

c) Give examples of 'S' containing amino acids.

d) Define zwitter ion.

e) List out two water soluble vitamins.

f) Give the names of two unsaturated fattyacids.

g) Name the monosaccharide unit of starch.

h) What are Holoenzymes?

i) Define essential amino acids.

j) What is the function of Golgi complex.

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

i) Write note on monosaccharides.

ii) Draw the structure of mitochondria and give its functions.

iii) Write note on rancidity of lipids.

b) Give structures of the following.   **[4]**

   i)   Dipeptide.

   ii) Reducing Sugar.

   iii) Palmitic acid.

Q3) Answer <u>any two</u> of the following: **[10]**

   a) Classify enzymes with examples.

   b) Describe the principle, procedure and uses of dialysis.

   c) List out the functions of proteins.

Q4) a) Elaborate on various types of enzyme inhibitions.   **[6]**

                                 OR

   Discuss the reactions of aminoacids.

   b) Write note on biochemical nature of hormones.   **[4]**

                                 OR

   Give the source, functions and deficiency of Vitamin C.

                              ೮೫೮೮೫೮

P726

[5017] - 324

T.Y.B.Sc.

CHEMISTRY

CH - 336 (D) : Environmental Chemistry (Ele.)

(2008 Pattern) (Semester - III) (Paper - VI) (613D3)

Time : 2 Hours] *[Max. Marks :40*

Instructions to the candidates:

1) *All questions are compulsory.*

2) *Figures to the right indicate full marks.*

3) *Neat diagrams must be drawn wherever necessary.*

Q1) Answer the following: [10]

a) Define the term 'pollutant'.

b) 1PPM = ...PPt.

c) Give any two minor components of Air.

d) Give difinition of Air Pollution.

e) Mention any two sources of SPM (Suspended particulate matter.)

f) Define the term P_E.

g) What is detergent?

h) Mention any two names of pesticides.

i) What is Infectious Organism?

j) What are toxins.

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

i) Explain SO_x chemistry in Atmosphere.

ii) Explain corrosion of metal due to Air pollution.

iii) Write note on Eutrophication.

b) Write short note (any two): **[4]**

    i) Lithosphere.

    ii) Troposphere.

    iii) Complexation in Natural and Waste water.

Q3) Answer any two of the following: **[10]**

    a) Explain in detail chemistry of Nitrogen.

    b) Explain Automobile Emission in Air pollution.

    c) How can we determine TOC? Give experimental detail.

Q4) a) Explain in detail NO_x in Atmosphere? Give its control & effect of NO_x pollution. **[6]**

OR

Explain the term chemical specification and describe the chemical specification of Arsenis (As).

    b) Write short note (any one) **[4]**

    i) Stratification of water bodies.

    ii) Earthquake.

ಅಜಬಎಜಬ

P726

[5017] - 324
T.Y.B.Sc.
CHEMISTRY
CH - 336 (E) : Agricultural Chemistry
(2008 Pattern) (Old Course) (Elective - I) (Semester - III) (Paper - VI)

Time : 2 Hours] *[Max. Marks :40*
Instructions to the candidates:
1) *All questions are compulsory.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*

Q1) Answer the following: [10]

a) Define saline soil.

b) What is sewage?

c) Define RSC.

d) What are repellents?

e) What are incomplete fertilisers?

f) What are zoocides?

g) What is soil testing?

h) Define soil solution?

i) What is humus?

j) Define micronutrients.

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

i) Give classification of nitrogenous fertilisers.

ii) Explain the role of inorganic matter in soil.

iii) Give the classification macronutrients.

b) Answer any two of the following: [4]

   i)   How dissolved gases are removed from water?

   ii) Discuss lime requirement of soil.

   iii) What is role of zine in the growth of plants?

Q3) Attempt any two: [10]

a) Discuss biological component of soil.

b) Describe gobar gas plant in detail.

c) Discuss inorganic fungicides.

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

   i)   How salinity of soil is removed?

   ii) How total dissolved solids in water is estimated?

   iii) Give properties and uses of carbamates.

b) Attempt any two [4]

   i)   Give the applications of Baygon.

   ii) Give importance mixed fertilisers.

   iii) Give deficiency symptoms of zinc in plants.

తడిపరి

[5017] - 325

T.Y.B.Sc.

BOTANY

BO - 331 : Algae, Fungi and Bryophytes

(2008 Pattern) (Semester - III) (Paper - I)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Draw neat labelled diagrams wherever necessary.*

    3)   *Figures to the right indicate full marks.*

Q1) Answer the following: **[10]**

    a)   Give any two characters of Bryophyta.

    b)   What is Gemmae?

    c)   Name any two plants from class Bryopsida.

    d)   Give any two applications of Mycorrizae.

    e)   Define Heterocyst.

    f)   Give any two economic importance of <u>Sargassum</u>.

    g)   Give function of operculum in sporophyte of <u>Polytrichum</u>.

    h)   Enlist any two methods of asexual reproduction in Basidiomycetes.

    i)   Name the disease caused by <u>Cercospora</u> in ground nut.

    j)   Name any two divisions of Algae as per G.M. Smith (1955).

Q2) Attempt <u>any two</u> of the following: **[10]**

   a)   Give the general characters of Hepaticopsida.

   b)   Describe external morphology of thallus of <u>Nostoc</u>.

   c)   With the help of neat labelled diagram, describe the Teletospore stage in <u>Puccinia</u>.

Q3) Write notes on any two: **[10]**

   a)   General characters of Rhodophyta.

   b)   Asexual reproduction in zygomycetes.

   c)   Sporophyte or <u>Marchantia</u>.

Q4) Describe external morphology and internal structure of thallus of <u>Anthoceros</u>.   **[10]**

                                    OR

Give general characters and thallus structure of class Phaeophyta.   **[10]**

                            ෩෨෩෨

[5017] - 326

T.Y.B.Sc.

BOTANY

BO - 332 : Molecular Biology

(2008 Pattern) (Semester - III) (Paper - II)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

  1)   *All questions are compulsory.*

  2)   *Draw neat and labelled diagrams.*

  3)   *Figures to the right indicate full marks.*

Q1) Answer the following: **[10]**

  a)   What is the role of t - RNA in translation?

  b)   Specify the initiation and termination codon.

  c)   What is BAC sequencing?

  d)   Enlist any two model organisms used in study of molecular biology.

  e)   What is role of m - RNA in protein translation?

  f)   Define RNA - splicing.

  g)   Define gene.

  h)   What are pyrimidins?

  i)   What is C - value paradox?

  j)   What is cistron?

Q2) Attempt any two of the following: **[10]**

    a)   Explain double stranded break mechanism of DNA repair.

    b)   Elaborate the process of RNA editing and processing of m - RNA.

    c)   Describe role of RNA polymerase in transcription.

Q3) Write short notes on any two of the following: **[10]**

    a)   Mechanism of photoreactivation DNA repair.

    b)   Comparative genomics.

    c)   Eukaryotic gene promotor and terminator.

Q4) Explain the structure and function of eukaryotic gene. **[10]**

<div align="center">OR</div>

Describe the process of gene regulation in eukaryotes by Britten and Davidson's model.

<div align="center">ꛯ౩ꛯ౩</div>

[5017]-327

T.Y.B.Sc.

BOTANY

BO-333: Angiosperms and Evolution

(2008 Pattern) (Semester - III) (Paper - III)

Time : 2 Hours]　　　　　　　　　　　　　　　　　　　*[Max. Marks : 40*

Instructions:

    1)   *All questions are compulsory.*

    2)   *Draw neat labelled diagrams wherever necessary.*

    3)   *Figure to the right indicate full marks.*

Q1) Answer the following:　　　　　　　　　　　　　　　　　　**[10]**

    a)   Give an example of phylogenetic system of plant classification.

    b)   State one merit of Bentham and hooker's plant classification.

    c)   Give the floral formula of subfamily papilionaceae.

    d)   Enlist any two major herbaria of the world.

    e)   What is neoendemism?

    f)   State any two objectives of BSI.

    g)   What is speciation in plants?

    h)   Define floristics.

    i)   Give any two distinguishing characters of fabaceae.

    j)   Enlist any two probable ancestors of angiosperms.

Q2) Answer any two of the following:　　　　　　　　　　　　**[10]**

    a)   Comment on pteridosperm theory.

    b)   Give any five distinguishing characters of magnoliaceae.

    c)   State the importance of Herbaria.

Q3) Write short notes on any two of the following [10]

    a)   Floristic studies in Maharashtra.

    b)   Role of mutation in variation.

    c)   Endemic plants of Maharashtra.

Q4) Describe the family Asteraceae and Lamiaceae with respect to distinguishing characters floral formula and floral diagram of each. [10]

OR

What is phytogeography? Comment on phytogeographical regions of India.

❖   ❖   ❖

[5017]-328

T.Y.B.Sc.

BOTANY

BO-334:Genetics and Plant Breeding

(2008 Pattern) (Semester - III) (Paper - IV)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

   1) All questions are compulsory.

   2) Figures to the right indicate full marks.

   3) Draw neat labelled diagrams wherever necessary.

Q1) Answer the following: **[10]**

   a)   What is test cross?

   b)   Write ratio of supplementary gene interaction?

   c)   Define quantitative trait.

   d)   What is gene mapping?

   e)   Give any two objectives of plant breeding.

   f)   What is chloroplast genome?

   g)   Write any two disadvantages of plant introduction and acclimatization.

   h)   What are mutagens?

   i)   What is bagging?

   j)   Define mutation breeding.

Q2) Answer any two of the following: **[10]**

   a)   Explain cytoplasmic inheritance in <u>Mirabilis</u>.

   b)   Describe complementory gene interaction with suitable example.

   c)   Describe in brief method of emasculation.

P.T.O.

Q3) Write short notes (any two) **[10]**

    a)   Two point test cross and gene mapping.

    b)   Dihybrid ratio.

    c)   Dominance hypothesis.

Q4) What is polyploidy? Explain origin and effects of Autopolyploidy. **[10]**

<div align="center">OR</div>

What is selection? Enlist types of selection. Describe procedure of mass selection.

<div align="center">❖   ❖   ❖</div>

[5017]-329

T.Y.B.Sc.

BOTANY

BO-335: Biometry and Computer Applications

(New course) (2008 Pattern) (Semester - III) (Paper - V)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

    1)   All questions are compulsory.

    2)   Draw neat and labelled diagrams wherever necessary.

    3)   Figures to the right indicate full marks.

Q1) Answer the following :   **[10]**

    a)   What is web page?

    b)   Define variance.

    c)   What is standard error?

    d)   Define Biometry.

    e)   What is server?

    f)   Give any two applications of internet.

    g)   What is sampling?

    h)   What is ALU?

    i)   Give formula to calculate standard deviation.

    j)   What is computer?

Q2) Attempt any two of the following: **[10]**

    a)   What is search engine? Give its applications.

    b)   Explain the different types of correlation.

    c)   What is probability? Explain addition theorem of probability.

Q3) Write short notes on : (any two) **[10]**

    a)   Modem.

    b)   Applications of accessories.

    c)   Regression.

Q4) What is chi-square test? Give its formula and add a note on applications of chi-square test. **[10]**

<div align="center">OR</div>

Give an account of MS-Excel.

<div align="center">❖ ❖ ❖</div>

[5017]-330

T. Y. B. Sc.

BOTANY

BO-336:Cell Biology And Seed Technology

(New Course) (2008 Pattern) (Semester - III) (Paper - VI)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

 1)   All questions are compulsory.

 2)   Draw neat labelled diagrams wherever necessary.

 3)   Figures to the right indicate full marks.

Q1) Attempt the following: **[10]**

 a)   What is pinocytosis?

 b)   Who discovered Nucleolus?

 c)   Give any two functions of Glyoxysomes.

 d)   What is cell cycle?

 e)   Enlist any two properties of cytoplasmic matrix.

 f)   Give two differences between prokaryotic and eukaryotic cell.

 g)   Enlist types of Ribosomes.

 h)   What is role of seed Technology?.

 i)   Give any two principles of seed processing.

 j)   What is seed certification?

Q2) Answer any two of the following: **[10]**

 a)   Explain the types of Lysosomes.

 b)   Describe development of mitochondria in eukaryotic cell.

 c)   Describe sanitation and fumigation of seed stores.

Q3) Write short notes on any two of the following: **[10]**

    a)   Significance of Meiosis.

    b)   Chemical composition of cell wall.

    c)   Demand forecasting.

Q4) What are plastids? Explain the ultrastructure and functions of chloroplast.**[10]**

<div align="center">OR</div>

What is seed sampling? Describe the types of seed samples?

<div align="center">❖ ❖ ❖</div>

[5017]-331
T.Y.B.Sc.
ZOOLOGY
ZY-331:General Zoology
(2008 Pattern) (Semester - III) (Paper - I)

Time : 2 Hours]   *[Max. Marks : 40*
Instructions to the candidates :
　1)　All questions are compulsory.
　2)　Neat labelled diagrams must be drawn wherever necessary.
　3)　Figures to the right indicate full marks.

Q1) Attempt the following: **[10]**

　a)　State the function of statocyst.

　b)　Define sinistral shell.

　c)　What is diphyodont?

　d)　State the function of auricle.

　e)　State the habitat of calotes.

　f)　State the function of Bowman's capsule in calotes.

　g)　Define expiration.

　h)　State the function of Osphradium.

　i)　Give the names of layers of skin in calotes.

　j)　State the function of operculum.

Q2) Attempt any two of the following: **[10]**

　a)　Sketch and label dorsal view of brain of frog.

　b)　Describe neoteny in amphibian.

　c)　Describe the structure of eye of calotes.

Q3) Write short notes on any two of the following: [10]

    a)   Zoea larva.

    b)   Metanephros.

    c)   Radula.

    d)   External characters of calotes.

Q4) Describe the digestive system of pila. [10]

OR

Describe male reproductive system of calotes.

❖   ❖   ❖

[5017]-332

T.Y.B.Sc.

ZOOLOGY

ZY-332:Mammalian Histology

(2008 Pattern) (Semester - III) (Paper - II)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions:

  1)   *All questions are compulsory.*

  2)   *Neat labelled diagrams must be drawn wherever necessary.*

  3)   *Figures to right indicate full marks.*

Q1) Attempt the following: **[10]**

  a)   What is microtechnique?

  b)   What is nervous tissue?

  c)   State the names of any two layers from V.S.of skin.

  d)   What is alveolus.

  e)   Name the histochemical method used for localization of lipids.

  f)   What are podocytes?

  g)   What are sertoli cells?

  h)   What are kuffer cells?

  i)   What are Villi?

  j)   What are haepatocytes.

Q2) Attempt any two of the following: **[10]**

  a)   Sketch and label structure of nephron.

  b)   Give an account of histological structure of parotid gland.

  c)   Describe histochemical localization of carbohydrates.

Q3) Write notes on any two of the following: [10]

    a)   Histology of adrenal gland.

    b)   Taste bud.

    c)   T.S of vein.

    d)   C.S of pancreas.

Q4) Describe histological organization of stomach. [10]

<div align="center">OR</div>

Describe histological structure of Ovary.

<div align="center">❖   ❖   ❖</div>

[5017]-333

T.Y.B.Sc.

ZOOLOGY

ZY-333: Biological Chemistry

(2008 Pattern) (Semester - III) (Paper - III)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

1)   All questions are compulsory.

2)   Neat labelled diagrams must be drawn wherever necessary.

3)   Figures to the right indicate full marks.

Q1) Attempt the following: **[10]**

   a)   Define buffer.

   b)   State the name of amino acid with sulfur in side chain.

   c)   State any two examples of compound lipids?

   d)   What are coenzymes?

   e)   What are Van der Waals forces?

   f)   Define monosaccharides.

   g)   Define pH.

   h)   State the biological function of Ca and Mg.

   i)   State the name of unsaturated fatty acid.

   j)   State the name of Vitamin D deficiency disease.

Q2) Attempt any two of the following: **[10]**

   a)   Describe the concept of Bronsted acid and base.

   b)   Give an account of any one clinical significance of lipids.

   c)   Describe physico-chemical properties of water.

Q3) Write short notes on any two of the following: **[10]**

   a) Lipids.

   b) Mutarotation.

   c) Polysaccharides.

   d) Quaternary structure of protein.

Q4) What are enzymes? Describe any two factors influencing enzyme activity.

<div align="center">OR</div> **[10]**

What are vitamins? Give an account of fat soluble Vitamins.

<div align="center">❖ ❖ ❖</div>

[5017]-334

T. Y. B. Sc.

ZOOLOGY

ZY-334:Environmental Biology & Toxicology

(2008 Pattern) (Semester - III) (Paper - IV)

Time : 2 Hours]   *[Max. Marks : 40*
Instructions to the candidates:
   1)   *All questions are compulsory.*
   2)   *Neat labelled diagrams must be drawn wherever necessary.*
   3)   *Figures to the right indicate full marks.*

Q1) Attempt the following: **[10]**

   a)   Define green house effect.

   b)   What are producers?

   c)   Define ecological pyramid.

   d)   What are abiotic components?

   e)   What is atmosphere?

   f)   Define food chain.

   g)   Enlist conventional energy sources.

   h)   Define global warming.

   i)   Define LD 50.

   j)   Define environmental biology.

Q2) Attempt any two of the following: **[10]**

   a)   Explain basic tests for water pollutants.

   b)   Describe any two toxicants of public health.

   c)   Explain non renewable resources.

Q3) Write notes on any two of the following: **[10]**

   a) Forest conservation.

   b) Explain various types of community wastes.

   c) Sewage.

   d) Explain the goals and objectives of environmental education.

Q4) What is air pollution?Describe different types of air pollutants and their effects.**[10]**

<div align="center">OR</div>

What is wildlife management? Describe causes of wildlife depletion. Add a note on its conservation.

<div align="center">❖ ❖ ❖</div>

[5017]-335
T. Y. B. Sc.
ZOOLOGY
ZY-335(a):General Pathology
(2008 Pattern) (Semester - III) (Paper - V)

Time : 2 Hours]   *[Max. Marks : 40*
Instructions to the candidates :
   1)   All questions are compulsory.
   2)   Neat labelled diagrams must be drawn wherever necessary.
   3)   Figures to the right indicate full marks.

Q1) Attempt the following: **[10]**

   a)   Define fatty degeneration.

   b)   What is moist gangrene?

   c)   What is karryorrhezis?

   d)   What is rigor mortis?

   e)   Define aetiology.

   f)   Define oedema.

   g)   What is metastatic calcification?

   h)   What is jaundice?

   i)   What is biopsy?

   j)   What is gastric analysis?

Q2) Attempt any two of the following: **[10]**

   a)   Describe gas gangrene.

   b)   Describe cloudy degeneration.

   c)   Describe liver function test.

Q3) Write short notes on any TWO of the following: **[10]**

   a)   Acute lymphatic leukaemia.

   b)   Explain Melanosis.

   c)   Explain Ischaemia.

   d)   Explain types of Necrosis.

Q4) Define Thrombosis? Describe the mechanism of thrombus formation. Write effects of thrombosis. **[10]**

<div align="center">OR</div>

What is Repair? Explain process of repair in detail.

<div align="center">❖   ❖   ❖</div>

P737

[5017]-335
T. Y. B. Sc.
ZOOLOGY
ZY-335(b):Basic Entomology
(2008 Pattern) (Semester - III) (Paper - V) (Elective - I)

Time : 2 Hours] *[Max. Marks : 40*
Instructions to the candidates :
  1) *All questions are compulsory.*
  2) *Neat labelled diagrams must be drawn wherever necessary.*
  3) *Figures to the right indicate full marks.*

Q1) Attempt the following: **[10]**

  a) Define entomology.

  b) Enlist thoracic appendages.

  c) Explain prognathous type of head.

  d) What are apodous larva.

  e) What is hormone.

  f) Define moulting.

  g) What is halters.

  h) Write any two types of antennae.

  i) Write the name of moulting hormone.

  j) Name any two insects used in medicines.

Q2) Attempt any two of the following: **[10]**

  a) Describe the use of insects in genetic studies.

  b) Describe medical and forest entomology.

  c) Describe Olfactory receptors in insects.

Q3) Write note on any TWO of the following: [10]

1) Mandibulate type of mouth parts.

2) Sex Pheromone.

3) Bioluminescence in insects.

4) Mechanism of sound production in cricket.

Q4) Describe any two types of Legs in insects. [10]

OR

What is metamorphosis?Describe ametabola and paurometabola type of metamorphosis in insects.

❖ ❖ ❖

[5017]-336

T.Y.B.Sc.

ZOOLOGY

ZY-336:Cell Biology

(2008 Pattern) (Semester - III) (Paper - VI)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

   1)   All questions are compulsory.

   2)   Neat labelled diagrams must be drawn wherever necessary.

   3)   Figures to the right indicate full marks.

Q1) Attempt the following :   **[10]**

   a)   Define Osmosis.

   b)   What is prokaryotic cell?

   c)   Explain pinocytosis.

   d)   Define nuclear sap.

   e)   State any two functions of Nucleolus.

   f)   What are free radicals?

   g)   Define Necrobiosis.

   h)   What is Synapsis?

   i)   Define microtubules.

   j)   What are Oncogenes?

Q2) Attempt any two of the following: **[10]**

   a)   Distinguish between Smooth and Rough Endoplasmic reticulum.

   b)   Describe the functions of lysosomes.

   c)   Give the extrinsic causes of cancer.

Q3) Write notes on any two of the following: **[10]**

    a)   Active transport.

    b)   Apoptosis.

    c)   Structure of Mitochondria.

    d)   Functions of golgi complex.

Q4) Define cell cycle. Describe the various phases of mitosis.   **[10]**

<div align="center">OR</div>

What is ageing? Describe the intracellular changes during ageing.

<div align="center">❖   ❖   ❖</div>

[5017]-337

T. Y. B. Sc.

GEOLOGY

GL : 331- Mineralogy

(Semester - III) (Paper - I) (2008 Pattern)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *All questions carry equal marks.*

    3)   *Figures to the right indicate full marks.*

    4)   *Neat diagrams must be draun wherever necessary.*

Q1) Answer in 2/3 lines.   **[10]**

    a)   What is pseudomorphism?

    b)   What is optic axis?

    c)   What is compensation?

    d)   Give composition of pyrite?

    e)   What are refractory minerals?

    f)   What is quartz wedge?

    g)   What is aegirine augite?

    h)   What is becke line?

    i)   Give composition of Halite?

    j)   What is optic axial angle?

Q2) Answer the following (any two)   **[10]**

    a)   Composition and paragenesis of limonite.

    b)   Silicate structure and composition of amphibole.

    c)   Mineralogy and uses of gypsum.

Q3) Answer the following (any two). [10]

    a)   Properties of precious stones.

    b)   Sign of elongation.

    c)   Paragenesis of Magnesite and Dolomite.

Q4) Give silicate structure chemical composition, physical and optical properties, paragenesis and alteration product of Olivine mineral group or mica mineral group. [10]

✡ ✡ ✡

[5017]-338

T.Y.B.Sc.

GEOLOGY

GL : 332- Igneous Petrology

(2008 Pattern)(Semester - III) (Paper - II)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

1) *All questions are compulsory.*
2) *All questions carry equal marks.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*

Q1) Answer the following in 2/3 lines.   **[10]**

a) Which process of magmatic evolution produces Xenoliths?

b) What is flow differentiation?

c) What are contaminated granites?

d) Name the constituents of discontinuous reaction series.

e) Which rocks are generally formed due to filter pressing.

f) Name the rocks that usually exhibit a glass texture.

g) Mention any two main characteristics of primary magma.

h) Name any two derivative magmas.

i) Define petrographic province.

j) Name any two volatiles present in magma.

Q2) Answer the following (any two)   **[10]**

a) Significance of glomero - porphyritic texture.

b) Mixing of dissimilar magmas.

c) Selective nucleation.

P.T.O.

Q3) Write notes on (any two).   [10]

    a)   Origin and significance of peridolite.

    b)   Role of volatile constituents in magma.

    c)   CIPW classification of igneous rocks.

Q4) What is meant by "Magmatic evolution"? Explain in detail the process of crystal fractionation.   [10]

OR

What is meant by crystal fractionation? Describe Fosterite - Fayalite binary system.

✡ ✡ ✡

[5017]-339

T.Y.B.Sc.

GEOLOGY

GL : 333- Sedimentary Petrology

(2008 Pattern)(Semester - III) (Paper - III)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

1) *All questions are compulsory.*
2) *All questions carry equal marks.*
3) *Figures to the right indicate full marks.*
4) *Neat diagrams must be drawn wherever necessary.*

Q1) Answer the following in 2/3 lines.   **[10]**

a) Branches of Sedimentology

b) Physical weathering.

c) Organic sedimentary structures.

d) Dispersal of sediments based on size.

e) Significance of heavy minerals.

Q2) Write notes on (any two)   **[10]**

a) Concept of shape and size classification.

b) Mobility of oxides.

c) Types of sedimentary facies.

Q3) Answer the following (any two).   **[10]**

a) Chemical parameters of depositional sedimentary environment.

b) Formation and classification of sedimentary basins.

c) Application of sedimentology in prospecting of hydrocarbons and sedimentary ores.

Q4) a)   Explain Dott's scheme of classification of sandstones.   **[10]**

<div align="center">OR</div>

b)   Name some primary inorganic sedimentary structures. Describe ripple marks and graded bedding giving its significance.   **[10]**

<div align="center">✡   ✡   ✡</div>

[5017]-340

T.Y.B.Sc.

GEOLOGY

GL : 334- Structural Geology

(2008 Pattern)(Semester - III) (Paper - IV)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

1) *All questions are compulsory.*
2) *All questions carry equal marks.*
3) *Neat diagrams must be drawn whenever necessary.*
4) *Figures to the right indicate full marks.*

Q1) Answer the following in 2/3 lines.   **[10]**

   a)   What is strike - slip fault?

   b)   What is slip cleavage?

   c)   Define twin gliding?

   d)   What is relation of structural Geology to Geology.

   e)   Define thrust fault.

   f)   Give economic importance of salt domes.

   g)   Define Nappe.

   h)   Define ultimate strength of a rock.

   i)   Define balanced and unbalanced force.

   j)   Draw a diagram of strain ellipsoid.

Q2) Answer any two of the following.   **[10]**

   a)   What is anisotropy and in homogeneity of forces?

   b)   What are primary and secondary lineations?

   c)   Explain the mechanics of normal fault.

Q3) Answer any two of the following. [10]

    a) Describe composition and resolution of forces.

    b) Describe the ultimate causes of folding.

    c) Explain intergranular and intragranular movements.

Q4) a) Explain the stages of deformation with the help of stress - strain diagram. [10]

<div align="center">OR</div>

    b) What is foliation? Describe different types of foliations and add a note on the origin of slaty cleavages. [10]

<div align="center">✡   ✡   ✡</div>

[5017] - 341

T. Y. B. Sc.

GEOLOGY

GL - 335 : Precambrian stratigraphy of India.

(2008 Pattern) (Semester - III) (Paper - V)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions :   *1)*   *All questions are compulsory.*

             2)   *All questions carry equal marks.*

             3)   *Neat diagrams must be drawn wherever necessary.*

             4)   *Figures to the right indicate full marks.*

Q1) Answer the following in 2/3 lines :   **[10]**

   a)   Give tectonic elements of oceans.

   b)   Define 'Khondalites'.

   c)   Give physiographic divisions of India.

   d)   Give any two geographical subdivisions of Himalayas.

   e)   On which craton Closepet Granite is found?

   f)   What is Eparchaean Unconformity?

   g)   Give economic importance of Aravalli craton.

   h)   Give the names of subdivisions of Dharwar Supergroup.

   i)   On which craton rocks of Nandgaon Group are found?

   j)   Explain the term Hornstone Breccia.

Q2) Write notes on (Any Two).   **[10]**

   a)   Peninsular Gneissic Complex.

   b)   Salkhala Group.

   c)   Classification of sausar Group.

Q3) Write notes on (Any Two). [10]

    a)   Lithostratigraphic classification of Cuddapah Supergroup.

    b)   Recent classification of Precambrian.

    c)   Iron Ore Group.

Q4) Give geographical distribution, stratigraphic succession and lithology of Vindhyan SuperGroup. [10]

<div align="center">OR</div>

Give detailed lithostratigraphic succession of Archaean rocks exposed on Dharwar craton.

<div align="center">✩ ✩ ✩ ✩</div>

[5017]-342

T.Y.B.Sc.

GEOLOGY

GL : 336- Applied Geology - I

(Field Geology, Remote Sensing)

(2008 Pattern)(Semester - III) (Paper - VI)

Time : 2 Hours] *[Max. Marks : 40*

Instructions to the candidates:

1) *All questions are compulsory.*
2) *All questions carry equal marks.*
3) *Figures to the right indicate full marks.*
4) *Neat diagrams must be drawn wherever necessary.*

Q1) Answer the following in Three to Four lines. **[10]**

a) What is "black body"?

b) Enlist the factors controlling relief displacement in aerial photos.

c) What is meant by "photographic resolution"?

d) Give the geological significance of Trellis drainage pattern.

e) Give the significance of Stefan - Boltzmann's law.

f) What is Thematic Mapper?

g) State any two uses of GIS.

h) State any three applications of network analysis.

i) What is an "Outcrop"?

j) Give any two uses of field geology.

Q2) Answer any two of the following. **[10]**

a) Explain with neat diagram the spectral reflectance of vegetation.

b) Discuss the importance of contacts during geological surveying.

c) Briefly explain "spatial analysis" with suitable example.

P.T.O.

Q3) Answer any two of the following. **[10]**

    a)   Compare the photocharacters of granite & sandstone.

    b)   Discuss the applications of remote sensing in groundwater survey and geotechnical investigations.

    c)   Give the components of GIS.

Q4) a)   Explain the phenomena of scattering in detail & discuss it's significance in remote sensing. **[10]**

<p align="center">OR</p>

    b)   What is field correlation? Explain how rocks can be correlated with reference to any three criteria.

<p align="center">✡   ✡   ✡</p>

[5017]-343

T.Y.B.Sc.

STATISTICS (Principal)

ST-331: Distribution Theory -I

(2008 Pattern) (Paper - I) (Semester - III)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

    1)   All questions are compulsory.

    2)   Figures to the right indicate full marks.

    3)   Use of scientific calculator and statistical tables 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)   If $X \sim \beta_2(3,4)$ then mean of $\dfrac{1}{X}$ is

            i)   3   ii)   4

            iii) 2   iv)   1

        b)   If $(X_1, X_2, X_3) \sim MD\ (500, 0.4, 0.45, 0.15)$ then $cov(X_1, X_2)$ is

            i)   −90   ii)   90

            iii) −30   iv)   30

        c)   If $X \sim W(\alpha, \beta)$ then hazard rate r (t) is given by

            i) $\left(\dfrac{x}{\alpha}\right)^{\beta-1}$ ii) $\beta\left(\dfrac{x}{\alpha}\right)^{\beta-1}$

            iii) $\left(\dfrac{\beta}{\alpha}\right)\left(\dfrac{x}{\alpha}\right)^{\beta-1}$ iv) $\left(\dfrac{\beta}{\alpha}\right)x^{\beta-1}$

d) A random variable X has mean 1 and variance 1 then upper bound for $P[|X-1| \geq 2]$ is

i) $\dfrac{1}{2}$ ii) $\dfrac{3}{4}$

iii) $\dfrac{1}{3}$ iv) $\dfrac{1}{4}$

B) State whether each of the following statement is true or false: **[1each]**

a) If $X \sim \beta_1(m,m)$ then distribution is symmetric about $\dfrac{1}{2}$

b) The probability density function of first order statistic is $f(x)[1-F(x)]^n$.

C) Define convergence in distribution. **[1]**

D) State the probability density function of beta distribution of first kind with parameter m and n. **[1]**

E) State weak law of large numbers (WLLN). **[1]**

F) State the additive property of Cauchy distribution. **[1]**

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

a) State the variance covariance matrix of a multinomial distribution with parameter $(n; p_1, p_2, ..., p_x)$ and obtain its rank.

b) If $X \sim G(\alpha, \lambda_1), Y \sim G(\alpha, \lambda_2)$ and X, Y are independent variates then find the distribution of $\dfrac{X}{Y}$.

c) If $X \sim W(5,3)$, find the distribution X^2.

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

a) Obtain the probability distribution function of rth order statistic.

b) Let $X \sim \beta_2(m,n)$. Derive the expression for the rth raw moment of the distribution. Hence or otherwise find mean and variance of it.

c) State and prove Chebychev's inequality for a continuous r.v. X with $E(X) = \mu$ and $V(X) = \sigma^2 < \infty$.

Q4) Attempt any one of the following:

a) i) State and prove central limit theorem (CLT) for i.i.d. random variables. **[5]**

   ii) If $X_{(1)}$, $X_{(2)}$, $X_{(3)}$, $X_{(4)}$ be the order statistics of a random sample of size 4 from exponential distribution with parameter 1 then find $P[X_{(4)} \geq 3]$ **[5]**

b) i) Six independent observations are taken on a r.v. X having the following p.d.f. **[5]**

$$f(x) = 2x, \quad 0 < x < 1$$
$$= 0, \quad elsewhere$$

   Suppose the interval $(0,1)$ is divided into 4 equal parts then find the probability that exactly three observations will fall in the left most part.

   ii) If $X \sim W(\alpha, \beta)$, find E(X). **[2]**

   iii) If $\{X_K\}$ is a sequence of independent r.v. each assuming three value -1, 0, 1 with following probabilities

$$P[X_K = -1] = P[X_K = 1] = \frac{1}{K} \text{ and } P[X_K = 0] = 1 - \frac{2}{K}$$

   Examine whether the WLLN holds for this sequence. **[3]**

$$\mathcal{E} \mathcal{E} \mathcal{E}$$

[5017]-344

T.Y.B.Sc.

STATISTICS (Principal)

ST-332: Theory of Estimation

(2008 Pattern) (Paper - II) (Semester - III)

Time : 2 Hours] *[Max. Marks :40*

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Figures to the right indicate full marks.*

    3)   *Use of scientific calculator and statistical tables is allowed.*

    4)   *Symbols and abbreviations have their usual meaning.*

Q1) Attempt <u>each</u> of the following:

  A) In each of the following cases, choose the correct alternative: **[1each]**

    a) Suppose X_1, X_2, ---, X_n is a random sample from $N(0, \sigma^2)$ then

$$S_0^2 = \frac{1}{n}\sum_{i=1}^{n} X_i^2 \text{ is an unbiased estimator of}$$

      i) σ^2 ii) σ^2/n

      iii) $\sigma^2 + 1/n$ iv) σ^2/n-1

    b) If T is MVBUE for population parameter θ then T is also

      i) BLUE for θ ii) Consistent for θ

      iii) Efficient for θ iv) Sufficient for θ

    c) If T_1 and T_2 are two consistent estimators of θ then $T_1 - T_1 T_2$ is consistent estimator of

      i) θ^2 ii) $\theta (1 - \theta)$

      iii) $1 - \theta^2$ iv) $\theta(\theta - 1)$

    d) If T_n is a sufficient statistic for θ based on sample X_1, X_2, ---, X_n then the function $\frac{\partial}{\partial \theta}\log L$ is a function of

      i) T_n only   ii) T_n and θ only

      iii) T_n or θ iv) θ only

B) State whether <u>each</u> of the following statements is true or false: **[1each]**

a) MVUE is always BLUE.

b) Sample variance is biased estimator of population variance.

C) Define the following terms: **[1each]**

a) UMVUE.

b) Consistent estimator.

D) Attempt <u>each</u> of the following: **[1each]**

a) Distinguish between estimator and estimate.

b) Suppose X_1, X_2, X_3 is a random sample of size 3 from poisson (λ). If $T_1 = \dfrac{X_1 + X_2 + X_3}{3}$ and $T_2 = \dfrac{X_1 + 2X_2}{3}$ then find relative efficiency of T_1 w.r.t. T_2.

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

a) Suppose X_1, X_2, ---, X_n is a random sample of size n from the distribution with p.d.f.

$$f(x,\theta) = \begin{cases} x^\theta (\theta + 1) & 0 < x < 1 \\ & \theta > 1 \\ 0 & \text{otherwise} \end{cases}$$

Obtain moment estimator of θ.

b) Find m.l.e. of parameter θ of the distribution with density,

$$f(x,\theta) = \begin{cases} \dfrac{1}{2} e^{-|x-\theta|} & , \ x \in R \\ & \theta \in R \\ 0 & , \ \text{o. w.} \end{cases}$$

c) Suppose X_1, X_2, ---, X_n is a random sample of size *n* from Bernoulli (θ). Show that $\sum\limits_{i=1}^{n} X_i$ is sufficient statistic of θ.

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

   a) Show that sample mean is MVBUE of parameter θ for exponential distribution with mean θ.

   b) Prove that consistent estimator is invariant under the continuous transformation.

   c) Let $X_1, X_2, \text{---}, X_n$ be a random sample of size n from $N(\mu, \sigma^2)$ where σ^2 is known obtain $100(1 - \alpha)$ % confidence interval for μ.

Q4) Attempt <u>any</u> <u>one</u> of the following:

   a) i) State and prove Neyman's factorization theorem for discrete probability distribution. **[6]**

       ii) If X is the number of successes in n independent trials with constant probability 'p' of success at each trial, show that $T = \dfrac{X}{n}$ is a consistent estimator of 'p'. **[4]**

   b) i) With usual notations prove that, MVBUE T of a parameter θ satisfies the relation, **[6]**

$$\frac{\partial}{\partial \theta} \log L = n\, I(\theta)\, (T - \theta).$$

       ii) State Pitman - Koopman form of a sufficient statistic.

          Let $X_1, X_2, \text{---}, X_n$ be a random sample of size n from Poisson (λ). Obtain sufficient statistic for λ using Pitman - Koopman form. **[4]**

$$\mathcal{E}\,\mathcal{E}\,\mathcal{E}$$

[5017]-345

T.Y.B.Sc.

STATISTICS (Principal)

ST-333: Statistical Process Control (On line Methods)

(2008 Pattern) (Paper - III) (Semester - III)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

   1)   All questions are compulsory.

   2)   Figures to the right indicate full marks.

   3)   Use of scientific calculator and statistical tables is allowed.

   4)   Symbols and abbreviations have their usual meanings.

Q1) Attempt each of the following:

   A)   Choose the correct alternative in each of the following: **[1each]**

      a)   Control chart for process average when standards are not given has the following control limits.

         i) $\bar{\bar{X}} - 3\dfrac{\sigma}{\sqrt{n}}$, $\bar{\bar{X}} + 3\dfrac{\sigma}{\sqrt{n}}$

         ii) $\bar{\bar{X}} - 3\dfrac{\bar{R}}{d_2}$, $\bar{\bar{X}} + 3\dfrac{\bar{R}}{d_2}$

         iii) $\bar{\bar{X}} - A_2\bar{R}$, $\bar{\bar{X}} + A_2\bar{R}$

         iv) $\bar{\bar{X}} - A\bar{R}$, $\bar{\bar{X}} + A\bar{R}$

      b)   Computations of control limits in control chart for number of defects per unit is based on

         i)   Normal distribution

         ii)   Poisson distribution

         iii)   Binomial distribution

         iv)   Bernoulli distribution

c)   Which of the following is not a process control tool?

  i)   Check sheet

  ii)   Cause and effect diagram

  iii)   Control chart

  iv)   Box plot

d)   The process is capable if _____.

  i) $C_p < 1$ ii) $C_p \geq 1$

  iii) $C_p = 0$ iv) $C_p < 0$

B)   State whether each of the following statements is true or false: **[1each]**

  a)   Control limits are always straight lines.

  b)   LCL and UCL may not be equidistant from CL.

C)   How do you interpret the low spot in P chart.   **[1]**

D)   Define the term defect.   **[1]**

E)   What are specification limits?   **[1]**

F)   Explain what is the natural tolerence of a process.   **[1]**

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

  a)   Explain the construction and working of a control chart for fraction defectives when the subgroup size is constant and the standards are unknown.

  b)   Explain the theoretical basis of control chart.

  c)   Explain the different criteria for detecting lack of control.

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

   a)   Explain the construction and working of CRL chart for attributes.

   b)   Distinguish between assignable causes and chance causes of variation.

   c)   Explain the construction and working of C chart, when standards are

      i)   given

      ii)   not given.

      Also state the situations where C chart can be used.

Q4) Attempt any one of the following:

   a)   Write short notes on:

      i)   Average run length.   **[3]**

      ii)   Revision of control limits.   **[3]**

      iii)   X-MR chart.   **[4]**

   b)   Write short notes on:

      i)   Capability indices.   **[3]**

      ii)   Size and the frequency of subgroup.   **[3]**

      iii)   Process control tools (describe any two).   **[4]**

<p style="text-align:center">ℰℰℰ</p>

[5017]-346

T.Y.B.Sc.

STATISTICS (Principal)

ST-334: Design of Experiments

(2008 Pattern) (Paper - IV) (Semester - III)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

   1)   *All questions are compulsory.*

   2)   *Figures to the right indicate full marks.*

   3)   *Use of calculator and statistical tables 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)   For LSD with 5 treatments, the error degrees of freedom is

       i)   15   ii)   16

       iii)   18   iv)   12

     b)   For a 2^2 factorial experiment in RBD, the number of experimental units in each block is

       i)   4   ii)   5

       iii)   3   iv)   6

     c)   The ANOCOVA is carried out if the observed variable and concomitant variable are always

       i)   Independent   ii)   Uncorrelated

       iii)   Linearly related   iv)   Correlated

     d)   For CRD with t treatments applied on n experimental units, the degrees of freedoms of F statistic for testing the equality of treatment means are

       i) $(t\text{-}1, n\text{-}1)$ ii) $(t\text{-}1, n)$

       iii) $(t\text{-}1, n\text{-}t)$ iv) $(t, n\text{-}1)$

P.T.O.

B) State whether the following statement are true or false: **[1each]**

    a) For LSD, all the 3 principles of design of experiments are used.

    b) For total confounding in factorial experiments, confounded effect cannot be tested for its significance.

C) Define the following terms: **[1each]**

    a) Treatment contrast.

    b) Experimental unit.

D) a) Give the layout of a replicate where interaction effect BC is confounded for a 2^3 factorial experiment in RBD. **[1]**

    b) State the formula for total sum of squares for CRD with t treatments applied on n experimental units. **[1]**

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

    a) State the mathematical model for RBD with assumptions, also obtain least squares estimates of parameters involved.

    b) Show that mean sum of squares due to error is unbiased estimator of error variance in CRD.

    c) Compute the relative efficiency of LSD with 4 rows w.r.t. corresponding RBD when rows as well as columns are used as blocks based on the data:

    Row. S.S = 46.3, Column. S.S = 58.4, Error. S.S = 29.8.

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

    a) Explain split plot design with a layout.

    b) Explain about ANOCOVA with one real life situation. Also state the least squares estimate of parameters involved in ANOCOVA in RBD.

    c) Describe the principles of randomization and local control.

Q4) Attempt any one of the following:

a) i) Give analysis for testing the significance of regression coefficient and test for the equality of treatment effects for ANOCOVA in CRD. **[6]**

   ii) Explain Yate's procedure to obtain factorial effect totals in 2^3 factorial experiment. **[4]**

b) i) Explain about confounding in factorial experiments, differentiate between total and partial confounding. Identify the confounded effect in a replicate divided into two blocks. **[6]**

Block 1	(a)	(b)	(c)	(abc)
Block 2	(bc)	(ac)	(ab)	(1)

   ii) Write a note on testing any pairs of treatments in RBD using t-test. **[4]**

$\mathcal{EEE}$

[5017]-347

T.Y.B.Sc.

STATISTICS (Principal)

ST-335: C-Programming (Turbo C)

(2008 Pattern) (Paper - V) (Semester - III)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Use of scientific calculator and statistical tables 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) The following is not a valid C-variable name

      i) amt   ii) bill-amt

      iii) *xyz*   iv) float

    b) The following is a logical operator

      i) $>$ ii) $==$

      iii) &&   iv) &

    c) The following assignment statement is wrong

      i) $x + y = z$;   ii) $y = 3.3$;

      iii) $z = a * b$;   iv) $a = b$;

    d) The following C expression gives absolute value of x

      i) $|x|$ ii) fabs $(x, 0)$

      iii) absolute x iv) abs (x)

B) State whether each of the following statement is true or false: **[1each]**

a) If $a = 3$, $b = 4$, $c = 5$ then the truth value of $(a > b)$ && $(b > c)$ is one.

b) A statement that start with # is a preprocessor statement.

C) a) Explain any two relational operators with illustrations. **[1]**

b) Define structure. Give an illustration. **[1]**

D) a) Write an expression in C for the following arithmetic expression

$$\frac{a^2 - b^2}{\sqrt{a^3 + ab}}.$$ **[1]**

b) Give the syntax rule of 'if ---- else'. **[1]**

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

a) Explain the syntax and one illustration for each of the following:

i) scanf ( )

ii) gets ( )

iii) strlen ( )

b) Draw a flowchart to get and print the maximum of n given observations $X_1, X_2, ---, X_n$ on a variable X.

c) Write a C program to get and print the sum of digits of a given positive integer.

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

a) Explain the syntax and one illustration for each of the following:

i) for --- loop

ii) do --- while

b) Define the following, giving one illustration each:

i) One dimensional array

ii) Library funciton

c) Write a C program to get and print covariance (X, Y) when a bivariate data X_i, Y_i), i = 1, 2, --- n on variables X and Y are given.

Q4) Attempt <u>any one</u> of the following:

    A)   a)   Explain each of the following with one illustration each: **[5]**

            i)   call by value.

            ii)   call by reference.

        b)   Write a C program to combine two given strings, using a library funciton. **[5]**

    B)   a)   Explain the following terms with one illustration each: **[4**

            i)   recursion

            ii)   switch

        b)   Write a C program to read two given matrices A and B, each of order m×n, and obtain and print their subtraction (A–B). **[6]**

<p align="center">♫♫♫</p>

[5017]-348

T.Y.B.Sc.

STATISTICS (Principal)

ST 336(A): Operations Management

(2008 Pattern) (Semester - III) (Paper - VI) (Elective - I)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

1)   All questions are Compulsory.

2)   Figures to the right indicate full marks.

3)   Use of scientific calculators and statistical tables 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 an activity has zero float, it implies that

            A)   It is a dummy activity

            B)   It lies on the critical path

            C)   There are more than one critical paths

            D)   The project is progressing well

        ii)   In time-cost trade-off analysis.

            A)   cost decreases linearly as time increases

            B)   time increases linearly as cost increases

            C)   cost at normal time is zero

            D)   cost increases linearly as time increases

        iii) When time value of money is considered,

            A)   cost need to be discounted

            B)   timing of incurrence of cost is important

            C)   the present value factors serve as the weights

            D)   all of above

P.T.O.

iv) The penalty cost that are incurred as a result of running out of stock is,

    A) Purchase cost

    B) Set up cost

    C) Shortage cost

    D) Holding cost

b) In each of the following cases state whether the given statement is true or false.

    i) Using ABC analysis warehouse and storage costs can be reduced significantly. **[1]**

    ii) PERT is a probabilistic method where activity times are random variables. **[1]**

c) Explain the following terms: **[1 each]**

    i) Crash cost

    ii) Expected monetary value (EMV)

d) i) State any two reasons for maintaining inventory. **[1]**

    ii) What is economic order quantity? **[1]**

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

a) Describe generalized inventory model.

b) A small project is composed of 7 activities whose time estimates in days is listed in the table as follows:

Activity	1-2	1-3	1-4	3-4	3-5	5-7	5-6
Duration (days)	4	7	6	5	7	6	5

    i) Draw the project network.

    ii) Calculate total float for each activity and highlight the critical path in the network. Hence, find the project completion time.

c) A firm has a machine whose cost price is Rs. 82,200/- and the scrap value is Rs. 2,200/-. The running (maintenance and operating) cost in rupees found from experience are as follows:

Year	1	2	3	4	5	6	7	8
Running cost	1000	3000	5000	7000	9000	18000	22000	26000

When should the machine be replaced? Justify your answer.

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

a) Write a short note on VED analysis.

b) Derive an expression for economic lot size with uniform rate of demand, instantaneous replenishment rate without shortages.

c) Growfast company is evaluating four alternative single period investment opportunities whose returns are based on the state of the economy. The possible states of the economy and the associated probability distribution is as follows:

State	Fair	Good	Great
Probability	0.2	0.5	0.3

The returns for each investment opportunity and each state of the economy are as follows:

Alternative	States of economy (in Rs.)		
	Fair	Good	great
W	1,000	3,000	6,000
X	500	4,500	6,800
Y	0	5,000	8,000
Z	– 4,000	6,000	8,500

Using the decision tree approach, determine the expected return for each alternative. Which alternative investment proposal would you recommend if the EMV criterion is to be employed?

Q4) Attempt any one of the following:

a) i) A project consists of eight activities with the following relevant information: **[7]**

Activity	Immediate Predecessor	Estimated duration (days)		
		Optimistic	Most likely	Pessimistic
A	-	1	1	7
B	-	1	4	7
C	-	2	2	8
D	A	1	1	1
E	B	2	5	14
F	C	2	5	8
G	D,E	3	6	15
H	F,G	1	2	3

A) Draw the PERT network and find out the expected project completion time.

B) If the average duration for activity F increases to 14 days, then what will be the value of project completion time with probability 0.95.

ii) Explain float of an activity and its significance. **[3]**

b) i) Discuss in brief Laplace criterion and Hurwitz criterion in decision making. **[5]**

ii) The demand rate of a particular item is 12,000 items per year. The set up cost per run is Rs. 350/- and the holding cost is Rs.0.2 per item per month. If no shortages are allowed and the replacement is instantaneous determine

A) the optimum lot size

B) the optimum scheduling period

C) minimum total expected annual cost **[5]**

✕ ✕ ✕

P750

[5017]-348

T.Y.B.Sc.

STATISTICS (Principal)

ST 336(B): Actuarial Statistics

(2008 Pattern) (Semester - III) (Paper - VI)

Time : 2Hour] *[Max. Marks :40*

Instructions to the candidates:

  1) *All questions are Compulsory.*

  2) *Figures to the right indicate full marks.*

  3) *Use of scientific calculators and statistical tables 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) Under the assumption of uniformity of death in a unit interval the survival function can be written as

   A) $S(x+t)=s(x)+ts(x+1)$

   B) $S(x+t)=s(x)-ts(x+1)$

   C) $S(x+t)=ts(x)+(1-t)s(x+1)$

   D) $S(x+t)=(1-t)s(x)+ts(x+1)$

   ii) If $T(x)=9$ then $K(x)$ is equal to

   A) 9 B) 10

   C) 8 D) 9.5

   iii) In equivalence principal premium P is found such that

   A) $E(Z)=\dfrac{E(Y)}{P}$ B) $E(Z)=PE(Y)$

   C) $E(Z)=E(Y)$ D) $E(Z)=E(PY)^2$

iv) The probability density function *g(t)* of *T(x)* is given by

A) $_t p_X \, \mu_x$
B) $_t q_X \, \mu_{x+t}$

C) $_t p_X \, \mu_{x+t}$
D) $_t q_X \, \mu_x$

b) In each of the following cases, state whether the given statement is true or false: **[1 each]**

i) *K(x)* is discrete random variable.

ii) The present value of annuity certain immediate at the rate of 1 unit per annum for n years is greater than that for annuity certain due.

c) Explain each of the following terms: **[1 each]**

i) Loss Function

ii) Insured

d) Give meaning of each of the following notation: **[1 each]**

i) $_t q_X$

ii) A_x

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

a) i) State any three characteristics of insurable risk.

ii) Explain Role of an actuary in an insurance company.

b) For certain insect population the probabilities q_x obtain for five weeks are $q_0 = 0.3, q_1 = 0.1, q_2 = 0.2, q_3 = 0.4, q_4 = 0.7 \, \& \, q_5 = 1.$ Taking $l_0 = 100$ construct a life table with values for $l_x, d_x, L_x, T_x \, \& \, e_x$.

c) Under uniformity assumption of death in the unit interval at time with usual notation show that $_{1-s} q_{x+t} = \dfrac{(1-s) q_x}{(1-t q_x)}$

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

a) Find the amount to which ₹ 1000 will accumulate at

   i) 4% per annum payable quarterly for 10 years.

   ii) 6% per annum payable half yearly for 5 years.

   iii) 5% effective for 10 years, 4% effective for 5 years & 25% effective for 3 years.

b) Show that the actuarial present value of n-year endowment insurance with benefit payable at the end of year of death is the addition of a present value of n-year term insurance and a present value of n-year pure endowment insurance.

c) Define survival function of time until death random variable (X). Also obtain probability density function *g(t)* of the variable *T(x)*.

Q4) Attempt any one of the following:

a) i) Explain the following annuities

   A) n-year temporary annuity due. **[3]**

   B) Whole life annuity immediate. **[3]**

   ii) The actuarial present value at age 27 of unit benefit to be paid at the moment of death in 5 years endowment insurance with force of interest $\delta = 6\%$ is 0.7395. Find premium payable as a continuous 5 year temporary life annuity. State the rusults that you may use **[4]**

b) i) Obtain *E(Z)* where *Z* is net single premium in terms of V for **[6]**

   A) n-year term insurance.

   B) Whole life insurance.

   C) n-year pure endowment insurance when benefit is payable at the moment of death.

   ii) Suppose the effective rate of interest is zero. Show that $\bar{P}(\bar{A}_x)$ is the reciprocal of complete expectation i.e. expectation of T(x). **[4]**

✗   ✗   ✗

P750

[5017]-348
T.Y.B.Sc.
STATISTICS (Principal)
ST 336(C): Time Series Analysis
(2008 Pattern) (Semester - III) (Paper - VI) (Elective - I)

Time : 2Hour]   *[Max. Marks :40*

Instructions to the candidates:
  1)   *All questions are Compulsory.*
  2)   *Figures to the right indicate full marks.*
  3)   *Use of scientific calculator and statistical tables 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)   A time series consist of:

      A) two components   B)   three components

      C) four components   D)   five components

    ii) Box-Cox transformation is

      A) $\dfrac{Y^{\lambda-1}}{\lambda}, \quad \lambda > 1$ B) $\dfrac{Y^{\lambda-1}}{\lambda}, \quad \lambda \neq 1$

      C) $\dfrac{Y^{\lambda-1}}{\lambda}, \quad \lambda < 1$ D)   None of these

    iii) Let X_t be an $AR(1)$ series given by
         $X_t = \phi X_{t-1} + \epsilon_t \sim i.i.d. N(0, \sigma^2)$
         Then $E(X_t)$ is equal to:

      A) 0   B) σ^2

      C) Infinity   D) ϵ^2

8

iv) The additive model of time series is

A) $\log y_t = \log T + \log S + \log C + \log J$

B) $y_t = T.S.C.I.$

C) $y_t = T + S.C + I$

D) $y_t = T + S + C + I$

b) State whether each of the following statement is true or false: **[1 each]**

i) Monthly price index series is not a time series.

ii) Time series is same as regression analysis with the regressor x replaced by time t.

c) i) State multiplicative model of time series. **[1]**

ii) State AR(2) model. **[1]**

d) Define: **[1 each]**

i) Time series: Give one illustration.

ii) Exponential smoothing.

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

a) Explain the concept of moving averages. Also mention its merits and demerits.

b) Suppose the first six observation of a time series are 20, 24, 22, 26, 21 & 22. Forecast the next four observations using the single exponential smoothing with parameter $\alpha=0.4$

c) Find Auto Covariance Function of MA(1) model.

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

a) What are the different components of a time series? Explain in brief any one.

b) The following data shows the number of public sector industries failures in India during the period 1987 to 1993 using 4 years moving average method. Calculate the mean square error(MSE) of this data.

Year	1987	1988	1989	1990	1991	1992	1993
Number of Failure	32	26	30	28	24	22	26

c) Explain in brief Durbin-Watson test.

Q4) Attempt any one of the following:

    a)   i)   Write a note on Box-Jenkin technique. **[6]**

          ii)   Define Auto Correlation Function. Also state its uses. **[4]**

    b)   i)   What are non-parametric tests used in analysis of time series? Explain in brief in any one. **[5]**

          ii)   What is seasonal differencing? Explain with the help of an example.**[5]**

✘   ✘   ✘

[5017] - 349

T.Y.B. Sc.

GEOGRAPHY

Gg : 331 - Principles and Techniques of Watershed Management

(2008 Pattern) (Semester - III) (Paper - I)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates :

    1)   *All questions are compulsory.*

    2)   *Figures to the right indicate full marks.*

    3)   *Draw neat diagrams and maps whenever necessary.*

    4)   *Use of maps-stencils is allowed.*

Q1) Answer the following questions in one or two sentences.   **[10]**

    a)   What is drainage basin?

    b)   List any two principles of Watershed management.

    c)   What is the effect of the shape of watershed on management practices?

    d)   What do you mean by interfluves?

    e)   What are Allochthonous Rivers?

    f)   What do you mean by water budget?

    g)   What is infiltration?

    h)   Define milli-watershed.

    i)   What is the need of LCC in Watershed Management.

    j)   What is Crop Management Factor?

Q2) Write short answers (any two).   **[10]**

    a)   Explain the need of Watershed Management.

    b)   Describe the criteria used for LCC.

    c)   Explain the relief aspects of watershed.

Q3) Write short notes (any two): [10]

    a)   Delineation of the watershed.

    b)   Classification of watershed using various criteria.

    c)   Soil erosion due to water and wind.

Q4) Describe the various problems in watershed. [10]

<div align="center">OR</div>

Explain in detail about various factors used in USLE.

<div align="center">✫ ✫ ✫ ✫</div>

[5017] - 350

T.Y.B. Sc.

GEOGRAPHY

Gg - 332 : Geography of Travel and Tourism

(2008 Pattern) (Semester - III) (Paper - II)

Time : 2 Hours] *[Max. Marks : 40*

Instructions:
1) *All Questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Diagrams and Maps must be drawn wherever necessary.*
4) *Use of Maps Stencils is allowed.*

Q1) Answer the following questions in one or two sentences: **[10]**

a) Name two natural features attracting a large number of tourists.

b) What are the different types of resorts?

c) What is tourist season?

d) What is the difference between tourist and tourism?

e) Who is an international tourist?

f) What is heritage preservation?

g) What is a theme park?

h) What is inbound tourism?

i) What is Social carrying capacity?

j) Name two national parks of Maharashtra.

Q2) Write short answers (any two): **[10]**

a) Impact of tourism on vegetation.

b) Spatial patterns of tourism demand.

c) Static elements in tourism.

P.T.O.

Q3) Write short notes (any two):										[10]

    a)   Tourism as a regional resource.

    b)   Domestic tourism.

    c)   Impact of rainfall on tourism.

Q4) Discuss the different types of tourist activities and the levels of tourist satisfaction.										[10]

OR

Explain the different categories of attractions and the kind of tourists each of them attracts.

✫ ✫ ✫ ✫

[5017] - 351
T.Y.B.Sc.
GEOGRAPHY - III
Gg : 333 - Fundamentals of Geoinformatics
(2008 Pattern) (Semester - III) (Paper - I)

Time : 2 Hours]　　　　　　　　　　　　　　　　　　　　　　*[Max. Marks : 40*

Instructions :　*1)*　**All questions are compulsory.**
　　　　　　2)　**Figures to the right indicate full marks.**
　　　　　　3)　**Diagrams and maps nust be drawn whenever necessary.**
　　　　　　4)　**Use of map-stencils is allowed.**

Q1) Answer the following questions in one or two sentences.　　　　**[10]**

　　a)　What is data?

　　b)　What is digitization?

　　c)　What is the meaning of vectorization?

　　d)　What is DBMS (Data Base Management System)?

　　e)　What is entity?

　　f)　What is raster data?

　　g)　Mention any two commercial data sources of GIS?

　　h)　Write any two advantages of GIS.

　　i)　List any two soft ware's of GIS.

　　j)　What is TIN?

Q2) Write short answers (any two).　　　　　　　　　　　　　　**[10]**

　　a)　Explain any two tasks of GIS?

　　b)　Explain how toposheets are data sources in GIS?

　　c)　Distinguish between DEM and DTM.

P.T.O.

Q3) Write short notes (any two) :   **[10]**

   a) Spatial measurements.

   b) DEM.

   c) GIS soft ware's for vector data analysis.

Q4) Give comparative account of Raster and Vector data models in GIS.   **[10]**

OR

Give an account of types of data and explain major data sources in GIS.

�✩ ✩ ✩ ✩

[5017]-352

T.Y.B.Sc.

GEOGRAPHY

Gg 334: India-A Geographical Study

(2008 Pattern) (Semester - III) (Paper - IV)

Time : 2Hour]   *[Max. Marks :40*

Instructions to the candidates:

    1)   All questions are Compulsory.

    2)   Figures to the right indicate full marks.

    3)   Diagrams and maps must be drawn wherever necessary.

    4)   Use of Maps Stencils is allowed.

Q1) Answer the following questions in one or two sentences: **[10]**

    a)   Name the country with which India shares the largest land border.

    b)   Name one region where the Dharwar Rock systems are predominant.

    c)   What is the Khadar?

    d)   State two predominant characteristics of the east flowing peninsular rivers.

    e)   Name two states important for littoral forests in India.

    f)   State two trees important for softwood in India.

    g)   Name two Regions affected by Water Erosion in India.

    h)   State two important characteristics of Black Soils.

    i)   Name two tributaries of the River Krishna.

    j)   Mention one impact of the La Nina on the climate of India.

Q2) Write short answers (any two): [10]

    a)   The Himalayan river systems.

    b)   The problem of soil erosion in India.

    c)   Variability of rainfall in India.

Q3) Write short notes (any two): [10]

    a)   The Coastal lowlands.

    b)   Alluvial soils in India.

    c)   The Deccan Trap.

Q4) Discuss the mechanism of the Indian Monsoon. [10]

OR

Which are the major forest types in India? Discuss their economic importance.

✗   ✗   ✗

Total No. of Questions :4]

P755

SEAT No. :

[Total No. of Pages :2

[5017] - 353

T.Y.B.Sc.

GEOGRAPHY

Gg - 335 : Geography of Soils (Paper - I)

(2008 Pattern) (Semester - III) (Paper - V)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

1) *All questions are compulsory.*

2) *Figures to the right indicate full marks.*

3) *Draw neat diagrams and maps whenever necessary.*

4) *Use of map - stencils is allowed.*

Q1) Answer the following questions in one or two sentences: **[10]**

a) What do you mean by soil profile?

b) What is regolith?

c) Define Pedogenesis.

d) What is the inter-relation between vegetation and soil development?

e) What is carbonation?

f) What do you understand by soil moisture?

g) Define wilting point.

h) What are Zonal soils?

i) What is soil pH?

j) What is ion exchange?

Q2) Write short answers (**any two**): **[10]**

a) Describe soil texture and structure.

b) Explain the effects of soil temperature and soil moisture on soil development.

c) Discuss the importance of soil studies.

P.T.O.

Q3) Write short notes (**any two**): [10]

    a)   History of soil science.

    b)   Classification of tropical soils.

    c)   Porosity and density of the soil.

Q4) What is soil Pedology? Give the general ideas about soil formation. [10]

OR

Discuss the classification of azonal soils.

 CRUCR

[5017] - 354

T.Y.B.Sc.

GEOGRAPHY (Paper - XI)

Gg - 336 : Fundamentals of Geoinformatics (Part - II)

(2008 Pattern) (Semester - III) (Paper - II)

Time : 2 Hours] *[Max. Marks :40*

Instructions to the candidates:

1) *All questions are compulsory.*

2) *Figures to the right indicate full marks.*

3) *Diagrams and maps must be drawn wherever necessary.*

4) *Use of map stencils is allowed.*

Q1) Answer the following questions in <u>one or two</u> sentences: **[10]**

a) Name any two types of aerial cameras.

b) What does RADAR stands for?

c) What is Photogrammetry?

d) What is wavelength?

e) What is Scanner?

f) What does ISRO stands for?

g) What is Sensor?

h) What is a fiducial mark?

i) What is frequency?

j) What is photo nadir?

Q2) Write short answers (any two): **[10]**

a) What do you mean by false color composite?

b) What is annotation strip on aerial photograph?

c) What is visible portion of the spectrum?

P.T.O.

Q3) Write short notes (any two): **[10]**

    a)   Types of aerial photograph.

    b)   Types of aerial cameras.

    c)   Flying altitude and flying height.

Q4) Explain in detail the visual methods of image or photo interpretation. **[10]**

<div align="center">OR</div>

How Remote sensing technology is useful in resource management? Explain in detail.

<div align="center">ങ്ക്രങ്ക്ര</div>

[5017] - 355

T.Y.B.Sc.

MICROBIOLOGY

MB - 331 : Medical Microbiology - I

(2008 Pattern) (New) (Semester - III) (Paper - I)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

   1)   *All questions are compulsory.*

   2)   *All questions carry equal marks.*

   3)   *Draw neat, labelled diagrams wherever necessary.*

Q1) A)   Match the following: **[5]**

	A		B
a)	Bacillus anthracis	i)	Gram nagative diplococci
b)	Treponema pallidum	ii)	Gram negative commas
c)	Mycobacterium leprae	iii)	Pale stained spirals
d)	Vibrio cholerae	iv)	Acid fast cigar shaped
e)	Neisseria meningitidis	v)	Gram positive plump rods

   A)   State True or False: **[2]**

      a)   Pneumococci are bile soluble.

      b)   Sore throat is caused by streptococcus viridans

   C)   Fill in the blanks: **[3]**

      a)   Cutaneous anthrax is also called_____

      b)   Scalded skin syndrome is caused by_____

      c)   Weil Felix test is used for the diagnosis of_____

Q2) Attempt any two: **[10]**

   a)   Name the causative agents and symptoms of any two diseases of central Nervous system.

   b)   Explain Tuberculin test.

   c)   Discuss Laboratory diagnosis of staphylococcal infections.

Q3) Write short notes on any two: **[10]**

   a)   Pathogenesis of syphilis.

   b)   Prophylaxis of Tetanus.

   c)   Types of Leprosy.

Q4) Attempt any one: **[10]**

   a)   Discuss antigenic structure, types of infections and epidemiology of E. coli.

   b)   Describe various sources and reservoirs of infections.

CRITICAL

[5017] - 356
T.Y.B.Sc.
MICROBIOLOGY
MB - 332 : Genetics and Molecular Biology - I
(2008 Pattern) (Semester - III) (Paper - II)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:
 1) *All questions are compulsory.*
 2) *All questions carry equal marks.*
 3) *Draw neat, labelled diagrams wherever necessary.*

Q1) A) Match the following: **[5]**

	A		B
i)	IF2	a)	Replication of DNA
ii)	Ter sequence	b)	Translation
iii)	Rho	c)	Holoenzyme
iv)	Sigma factor	d)	Recombination repair
v)	Rec A	e)	Termination of transcription

 B) Answer the following: **[5]**

 a) Which of the following is the constitutive mutant of lac operon

   i) $i^+ p^+ o^+ z^+ y^+$ ii) $i^+ p^+ o^c z^+ y^+$

   iii) $i^+ p^- o^c z^+ y^+$ iv) $i^+ p^+ o^+ z^- y^-$

 b) Which of the following is used to terminate translation.

   i) AUG   ii) UAG

   iii) UGC   iv) CAG

c) Melting of DNA during transcription begins at _____ region.

    i)   -35   ii)   -10

    ii)   +1   iv)   +10

d) State True or False - Lac operon is glucose sensitive operon.

e) State True or False - Mitosis is reduction division.

Q2) Draw neat, labelled diagrams of <u>any two</u> of the following: **[10]**

a) Mismatch repair of damaged DNA.

b) Structure of bacterial ribosome and reaction centers in it.

c) Establishment of λ lysogeny.

Q3) Answer any two of the following: **[10]**

a) Positive regulation of lac operon.

b) Enlist stages in parasexual cycle and give their significance.

c) Explain one step growth curve of bacteriophage.

Q4) Explain bidirectonal replication of bacterial DNA with the help of diagram of replication fork. **[10]**

<div align="center">OR</div>

With the help of diagrams explain initiation and elongation of translation in protein synthesis.

<div align="center">ⓒⓈⓄⓒⓈⓄ</div>

[5017] - 357

T.Y.B.Sc.

MICROBIOLOGY

MB - 333 : Enzymology and Biochemistry

(2008 Pattern) (Semester - III) (Paper - III)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

   1)   *All questions are compulsory.*

   2)   *All questions carry equal marks.*

   3)   *Draw neat labelled diagrams wherever necessary.*

Q1) Attempt the following: **[10]**

   a)   State - True or False

      i)   Velocity of enzyme catalysed reaction is independent of substrate concentration.

      ii)   DEAE cellulose is an example of cation exchanger.

      iii) Allosteric enzymes do not show classical Michaelis Menten behaviour.

   b)   Define:

      i)   Specific activity of an enzyme.

      ii)   Feedback inhibition.

      iii) Isoelectric pH.

   c)   Which vitamin contain isoalloxazine ring.

      i)   Thiamin

      ii)   Folic acid

      iii) Riboflavin

      iv)   Vit B_6.

   d)   Enlist any two zymogens.

   e)   Enlist any two gels used in gel filtration chromatography.

   f)   Give the equation for Hanes plot.

P.T.O.

Q2) Attempt any two of the following: **[10]**

   a)   Explain covalent modification in regulatory enzymes.

   b)   How will you use solubility criteria for purification of an enzyme.

   c)   Explain the KNF model of allosteric regulation.

Q3) Attempt any two of the following: **[10]**

   a)   What is immobilization of an enzyme? Explain any one method of it.

   b)   Explain the concept of isoenzymes with suitable example.

   c)   Draw the structure of Thiamin and explain its role as a coenzyme with suitable example.

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

   a)   Define chromatography. Explain principle, working and applications of affinity chromatography.

   b)   Derive Michaelis Menten equation for single substrate enzyme catalyzed reaction using steady state approach.

CRUCRU

[5017] - 358
T.Y.B.Sc.
MICROBIOLOGY
MB - 334 : Immunology - I
(2008 Pattern) (Semester - III) (Paper - IV)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:
1) *All questions are compulsory.*
2) *All questions carry equal marks.*
3) *Draw neat labelled diagrams wherever necessary.*

Q1) a)   Match the following and <u>rewrite</u>   **[5]**

<u>Column I</u>		<u>Column II</u>
1) CD_4 molecule	i)	Hapten detection
2) Rhodamine	ii)	Lymphocyte formation
3) Agglutination inhibition	iii)	Properdin pathway
4) Haemopoietic stem cell	iv)	Fluorescent dye
5) Factor B	v)	Helper T cell

b)   Attempt the following in brief: **[5]**

i)   Which are the membrane immunoglobulins present on naive, mature B cell?

ii)   Name one tabel used for RIA.

iii)   Which is the most abundant component of complement?

iv)   Write one function of macrophage.

v)   Give one application of Western Blot Technique.

Q2) Describe <u>Any Two</u>:   [10]

    a)   Dendritic cells.

    b)   Rocket immunoelectrophoresis.

    c)   Autoantigen and isoantigen.

Q3) Attempt <u>Any Two</u> :   [10]

    a)   Compare in tabular form - Active and passive immunity.

    b)   Illustrate diagrammatically - Preparation of monoclonal antibodies by hybridoma technology.

    c)   Justify - Adjuvants enhance the immunogenecity of antigen.

Q4) Attempt <u>ANY ONE</u> :   [10]

    a)   Describe acute inflammation in detail.

    b)   Describe structure of IgG in detail.

CRITICAL CRITICAL

[5017] - 359

T.Y.B.Sc.

MICROBIOLOGY

MB - 335 : Fermentation Technology - I

(2008 Pattern) (Semester - III) (Paper - V)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

1) *All questions are compulsory.*

2) *All questions carry equal marks.*

3) *Figures to the right indicate full marks.*

4) *Draw neat labelled diagram wherever necessary.*

Q1) Do as directed below:

a) Match the following and rewrite correct pairs   **[5]**

	Column A		Column B
1)	Corynebacterium glutamicum	i)	Strain improvement
2)	CMC	ii)	Animal inoculation
3)	Protoplast fusion	iii)	IPR
4)	Patent	iv)	Ion - exchange chromatography
5)	Toxicity testing	v)	Altered permeability mutant

b) Fill in the blanks:

   i) Specific gravity method is used for estimation of_____ **[1]**

   ii) The area with in the axes of contour plot is determined in _____method.   **[1]**

c) i) Give two types of rotors of centrifuge.   **[1]**

   ii) Define strain improvement.   **[1]**

d) True or False: **[1]**
   Thioglycolate broth is used for toxicity testing.

Q2) Attempt <u>any two</u>:   [5 each]

    a)   Toxicity test.

    b)   Selection of analogue resistant mutant.

    c)   Monitoring temperature in the fermenter.

Q3) <u>Attempt Any Two</u> :   [5 each]

    a)   Validation.

    b)   Plackett - Burman design.

    c)   Market Potential of Fermentation product.

Q4) a)   List different methods of cell disruption. Describe ion - exchange chromatography for product recovery.   [10]

<div align="center">OR</div>

    b)   List various methods of quantification of fermentation product. Describe bioassay for quantification of the fermentation product.   [10]

<div align="center">CBCBCBCB</div>

SEAT No. :

[Total No. of Pages :2

[5017] - 360

T.Y.B.Sc.

MICROBIOLOGY

MB - 336 : Food and Dairy Microbiology

(2008 Pattern) (Semester - III) (Paper - VI)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

1) All questions are compulsory.

2) All questions carry equal marks.

3) Figures to the right indicate full marks.

4) Draw neat labeled diagram wherever necessary.

Q1) Attempt the following: **[10]**

a) State True or False -

"Reduction of methylene blue in MBRT test is due to change in pH of milk.

b) Fill in the blanks: The substrate used for phosphatase test is_____.

c) Define:

i) Probiotics

ii) Skimmed milk

d) Match the following:

"A"		"B"	
i)	OR potential	1)	*Penicillium*
ii)	Sweet curdling	2)	Extrinsic factor
iii)	Spoilage of bread	3)	*Bacillus* spp.
iv)	Relative humidity	4)	*Brucella abortus*
v)	Milk ring test	5)	Intrinsic factor

e) Name any two organisms involved in food infection.

P.T.O.

Q2) Attempt any two of the following: **[10]**

   a) Describe the use of sodium chloride and sulphur dioxide as preservatives.

   b) Describe stormy fermentation of milk.

   c) Describe food poisoning by *Aspergillus flavus* with respect to sources and prevention.

Q3) Write short note on any two of the following: **[10]**

   a) Types of milk.

   b) Spoilage of eggs.

   c) Significance of fermented foods.

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

   a) Explain principles of food preservation. Enlist different methods of food preservation.

   b) Define pasteurization. Explain any two methods of pasteurization.

ॐॐॐ

[5017] - 361

T.Y.B.Sc.

ELECTRONIC SCIENCE

EL - 331 : Advanced Digital System Design

(2008 Pattern) (Semester - III) (Paper - I)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

    1)   All questions are compulsory.

    2)   Neat diagrams must be drawn wherever necessary.

    3)   Figures to the right indicate full marks.

Q1) Attempt <u>all</u> of the following:

    a)   What is synthesis in VHDL?   **[1]**

    b)   For a given state table, using state assignment rule 1 obtain adjacent state pairs.   **[1]**

Present state	Next state / out put	
	x = 0	x = 1
a	b/0	c/1
b	d/1	a/0
c	b/0	b/1
d	c/1	a/0

    c)   State two basic methods for PLD programming.   **[1]**

    d)   Write two main types of logic circuits.   **[1]**

    e)   Draw compatibility class graph for given maximal compatibles.   **[2]**

        {a, b, e, f}, {b, c, h}, {c, d}, {g}

    f)   Write basic difference between BIT and STD - LOGIC in VHDL.   **[2]**

    g)   Compare PLA and PAL with respect to speed and cost.   **[2]**

    h)   "Multiple input variables can change at a time in a fundamental mode asynchronous sequential machine". - Comment.   **[2]**

Q2) Attempt any <u>two</u> of the following:

    a)   Explain sequential machine with proper block diagram.   **[4]**

    b)   Describe different types of PAL.   **[4]**

    c)   What is data synchronizer? Explain working of a simple data synchronizer.   **[4]**

Q3) Attempt any <u>two</u> of the following:

    a)   Write various steps for designing of a modern digital system.   **[4]**

    b)   Draw general structure of FPGA and explain it.   **[4]**

    c)   With the help of suitable state table, explain how implication chart is used for equivalent state reduction.   **[4]**

Q4) Attempt any <u>two</u> of the following:

    a)   With the help of block diagram, explain working of stepper motor sequence generator.   **[6]**

    b)   i)   Write short note on CPLD.   **[3]**

            ii)   Describe various types of data operators in VHDL.   **[3]**

    c)   For asynchronous sequential machine, explain.   **[6]**

        i)   Total state

        ii)   Primitive flow table

        iii)   Non critical and critical races

        iv)   Cycles

        v)   Aim of state assignment.

<div align="center">OR</div>

a) Obtain compatible states using merger graph for the following incompletely specified state table. **[4]**

Present state	Next state		Out put	
	x = 0	x = 1	x = 0	x = 1
a	c	b	0	-
b	c	b	0	1
c	d	a	-	1
d	a	e	0	-
e	e	a	-	0

b) Write VHDL programs for the following logic circuits. **[4]**
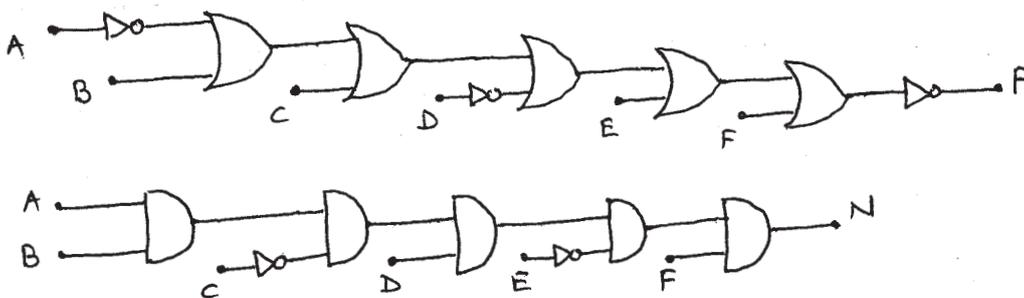
c) Implement the full adder circuit using PLA. **[4]**

ಅಜಬಔಅಜ

[5017] - 362

T.Y.B.Sc.

ELECTRONIC SCIENCE

EL - 332 : Microcontrollers

(2008 Pattern) (Semester - III) (Paper - II) (New)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

1) *All questions are compulsory.*

2) *Neat diagrams must be drawn whenever necessary.*

3) *Figures to right indicate full marks.*

4) *Use of calculator is allowed.*

Q1) Attempt <u>all</u> the following:

    a) Specify the address space for bit addressable area of internal RAM in microcontroller 8051. **[1]**

    b) What is advantage of register indirect addressing mode? **[1]**

    c) List the derivatives of microcontroller 8051 family. **[1]**

    d) What is size of SP register? **[1]**

    e) If the capacity of memory is 32 k bytes what is size of address and data bus? **[2]**

    f) What are the advantages of LCD? **[2]**

    g) "MOVA, DPTR is invalid instruction" comment. **[2]**

    h) What is the function of cross compiler? **[2]**

Q2) Attempt any <u>two</u> of the following:

    a) Explain in brief Timer / counter unit of microcontroller 8051. **[4]**

    b) Write a program to add four numbers stored in internal RAM locations 00H to 03H. Store the result in R_5. (Result is less than $(255)_{10}$). **[4]**

    c) Write a short note on Linkers, simulators and emulators. **[4]**

Q3) Attempt any <u>two</u> of the following:

a) Explain various addressing modes of μC 8051 with suitable example.**[4]**

b) Show the contant of PSW register and Accumulator after execution of following instructions. **[4]**

MOV A, # 96H

ADD A, # 64H

c) Draw and explain block diagram to interface ROM of capacity 32 k byte with microcontroller 8051. **[4]**

Q4) Attempt any <u>two</u> of the following:

a) What is stack? How stacks are accessed in μC 8051. **[6]**

b) Write a program to create square waves of 50% duty cycle on $P_{1.5}$ bit. Use timer 0 to generate time delay. **[6]**

c) Assume 5 bytes of data saved in memory location starting from 40 H to 44 H. Add 04 to each of them and save the result in the RAM location starting from 70 H to 74H. **[6]**

OR

Attempt <u>all</u> the following:

a) Assume that A = 02 H, B = 05H perform the following operations and indicate result. **[4]**

MUL AB

ANL A, # 0F H

ADD A, # 0lH

SWAP A

b) List the conditional jump instructions. Explain any one with suitable example. **[4]**

c) How microcontroller is used to control the speed of DC motor using PWM technique. **[4]**

ೞೞೞ

[5017]-363

T.Y.B.Sc.

ELECTRONIC SCIENCE

EL - 333 : Analog Circuits Design and Applications of Linear IC's
(Paper - III) (Semester - III) (New Course) (2008 Pattern)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:
1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Neat diagrams must be drawn wherever necessary.*

Q1) Attempt <u>all</u> of the following:

   a)   What is sheilding technique? **[1]**

   b)   Write any one application of differentiator. **[1]**

   c)   Write any one feature of regulator IC LM 317. **[1]**

   d)   Write any two test signals for the analog systems. **[1]**

   e)   Draw the frequency response for second order low pass filter. Write the expression for cut-off frequency of it. **[2]**

   f)   For Op-Amp in inverting configuration gain bandwidth product = 2 MHz, closed loop bandwidth = 400 KHz. Calculate voltage gain. **[2]**

   g)   Write any two applications of Function generator IC XR 2206. **[2]**

   h)   Write expression for output frequency of astable multivibrator using Op-Amp 741. **[2]**

Q2) Answer any <u>two</u> of the following:

   a)   Write the various designing steps for Practical integrator. **[4]**

   b)   Draw the circuit of peak detector using Op-Amp and explain its working. **[4]**

   c)   Explain the working of monostable multivibrator using Op-Amp. **[4]**

Q3) Answer any <u>two</u> of the following:

   a)   List the selection criteria used to select the Op-Amp for a Particular application. Explain any one in brief. **[4]**

   b)   Explain the working of sample and hold circuit using Op-Amp. **[4]**

   c)   Draw the circuit diagram of second order high pass butterworth filter. Write down its designing steps. **[4]**

Q4) Answer any <u>two</u> of the following:

a) Draw circuit diagram of log amplifier using diode as a log element. Derive expression for output voltage. Write its limitations. **[6]**

b) Write the features of regulator IC LM 723. Draw circuit diagram of low voltage regulator with external power transistor. Write expression for output voltage and current sense resistor. **[6]**

c) What is Schmitt trigger. Describe ON/OFF controller using Schmitt trigger circuit. **[6]**

OR

Answer <u>all</u> of the following:

a) Design an adjustable voltage regulator for output voltage in the range of 4 to 10 V using IC LM 317. **[4]**

b) Design astable multivibrator using timer IC 555. Given T_{ON} = 3 Sec. T_{OFF} = 1 sec. **[4]**

c) For function generator using IC 8038, if sweep voltage is 9V, R = 3.3 KΩ , C = 0.03 μF, $\pm V_{CC}$ = $\pm$ 12V. Calculate the output frequency.**[4]**

☛ ☛ ☛

[5017]-364

T.Y.B.Sc.

ELECTRONIC SCIENCE

EL - 334 : Foundation of Nanoelectronics

(Paper - IV) (Semester - III) (2008 Pattern)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

1)   All questions are compulsory.

2)   Neat diagrams must be drawn wherever necessary.

3)   Figures to the right indicate full marks.

4)   Log table/calculator is allowed.

Given:

   Mass of electron m = 9.11 × 10⁻³¹ kg.

   Planck's constant h = 6.625 × 10⁻³⁴ Js.

Q1) Attempt all of the following:

   a)   What is Polarization?   **[1]**

   b)   Give the wave equation for $\vec{E}$ & $\vec{H}$.   **[1]**

   c)   What are matter waves?   **[1]**

   d)   Give the equation of continuity.   **[1]**

   e)   Define critical angle.   **[2]**

   f)   List fabrication techniques used for nano-technology.   **[2]**

   g)   State Heisenberg's uncertainty principle.   **[2]**

   h)   What is tunneling effect.   **[2]**

Q2) Answer any two of the following:

   a)   State and explain Pauli exclusion principle.   **[4]**

   b)   State Maxwell equations. Write Maxwell equations in differential and
        Integral form.   **[4]**

   c)   Explain Fermi-Dirac probability distribution function.   **[4]**

Q3) Attempt any two of the following:

    a)   Explain concept of Gaussion probability distribution.   **[4]**

    b)   Describe circular polarization.   **[4]**

    c)   Calculate the De Boglie wavelength of neutron whose energy is 1eV.

        (Given: Mass of neutron = 1.676×10^{-22} kg)   **[4]**

Q4) Answer any two of the following:

    a)   Explain poynting vector theorem with expression.   **[6]**

    b)   What is quantum dot? Explain electron transport in quantum dot.   **[6]**

    c)   Describe the resonant tunneling diode with its constructional diagram. **[6]**

☛ ☛ ☛

[5017]-365

T. Y. B. Sc.

ELECTRONIC SCIENCE

EL - 335 : 'C' Programming

(Paper - V) (Semester - III) (2008 Pattern)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

 1) *All questions are compulsory.*
 2) *Neat diagrams must be drawn wherever necessary.*
 3) *Figures to the right indicate full marks.*
 4) *Use of calculator is allowed.*

Q1) Answer all of the following:

 a) How character constant is represented in 'C' program? **[1]**

 b) State the difference between while and do while loop. **[1]**

 c) What is role of return statement in a function? **[1]**

 d) Define a pointer in C. **[1]**

 e) Write function defination and function declaration in C program. **[2]**

 f) State use of functions put pixel ( ), get pixel ( ) in C graphics. **[2]**

 g) Explain the following: **[2]**

   $F_{pter} = F_{open}$ (file-name, file-type)

 h) List bitwise operators in C language. **[2]**

Q2) Answer any two of the following:

 a) Explain with example relational and logical operators in C language. **[4]**

 b) What is a loop? Explain FOR loop with example. **[4]**

 c) Explain the graphic function circle ( ) and ellipse ( ) in C graphics. **[4]**

P.T.O.

Q3) Answer any two of the following:

   a)   What are Keywords? Discuss restrictions while using identifiers in 'C' language program. **[4]**

   b)   Explain F$_{print}$f( ) and f$_{scan}$f( ) functions in file handling. **[4]**

   c)   Explain with example declaration and initialization of two dimensional array. **[4]**

Q4) Answer any two of the following:

   a)   Discuss printf and scanf Functions with reference to various control strings used with them. **[6]**

   b)   What is initgraph ( )? Why it is used? How graphic drivers are detected?**[6]**

   c)   What is recursion? Write a C program to calculate factorial of an integer using recursion. **[6]**

<div align="center">OR</div>

Answer all of the following:

   a)   Write a C program for generating Fibonacci series. **[4]**

   b)   Explain switch statement with suitable example. **[4]**

   c)   Write a C program to calculate area of a triangle with option of providing input value for base and height, calculate area, print the area. **[4]**

<div align="center">☛ ☛ ☛</div>

[5017]-366

T.Y.B.Sc.

ELECTRONIC SCIENCE (Optional)

EL - 336(A) : Fiber Optics and Fiber Optic Communication

(Paper - VI) (Semester - III) (2008 Pattern)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Darw labelled diagram wherever necessary.*

Q1) Attempt all of the following:

   a)   What is quantum efficiency? **[1]**

   b)   State the working principle of LASER diode. **[1]**

   c)   What are the advantages of LED? **[1]**

   d)   Name two most commonly used optical sources. **[1]**

   e)   State the conditions for total internal reflection. **[2]**

   f)   What are the causes of intramodal dispersion? **[2]**

   g)   State the advantages of optical communication. **[2]**

   h)   "Step index single mode fiber mostly prefer for long distance Communication". Comment. **[2]**

Q2) Attempt any two of the following:

   a)   Explain the various types of Laser diode structure with the requirements of Laser action. **[4]**

   b)   Differentiate LED's and Laser Diodes. **[4]**

   c)   Explain the structure of optical fiber. State the advantages of optical fiber over metallic cables. **[4]**

Q3) Attempt any two of the following:

   a)   Waht are Splices? Give the requirements of splices, in brief.   **[4]**

   b)   Mention the criteria for choosing the photo detectors for optical communication. How does a reverse bias p-n diode act as a detector?**[4]**

   c)   A step index fiber has a core and cladding index of 1.60 and 1.20 respectively. What is the value of NA and acceptance angle of the fiber?**[4]**

Q4) Attempt any two of the following:

   a)   Explain the community Antenna Television (CATV) with neat diagram, in adequate details.   **[6]**

   b)   Explain the losses in splices and connectors, in adequate details.   **[6]**

   c)   Explain the detail about the methods of fiber splicing.   **[6]**

☛ ☛ ☛

P768

[5017]-366

T.Y.B.Sc.

ELECTRONIC SCIENCE (Optional)

EL - 336(B) : Sensors and Actuators

(Paper - VI) (Semester - III) (2008 Pattern)

Time : 2 Hours] *[Max. Marks : 40*

Instructions to the candidates:

1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Darw neat diagrams wherever necessary.*

Q1) All sub questions are compulsory.

a) Define sensitivity of sensor. **[1]**

b) List the performance parameters of sensor. **[1]**

c) Give two applications of strain gauge and LVDT. **[1]**

d) Write full form of LDR, LCD, LED, SMD, MEMs. **[1]**

e) List the sensors used for temperature measurement. State limitations of thermistor. **[2]**

f) Write specifications of electromagnetic relay. **[2]**

g) What is actuator? State different types of actuators. **[2]**

h) What is eddy current sensor? **[2]**

Q2) Attempt any two of the following:

a) List the types of optical sensors with circuit diagram explain the optical driver circuit of photo diode. **[4]**

b) With neat diagram explain the working of electromagnetic Flow Meter.**[4]**

c) Draw the neat block diagram of AC Signal conditioning System. Explain its working in short. **[4]**

Q3) Attempt any two of the following:

a) State types of electromechanical sensors. With neat diagram explain the working of LVDT. **[4]**

b) Explain construction and working of DC motor. **[4]**

c) Describe with neat diagram with construction of LED. **[4]**

Q4) Attempt any two of the following:

a) State different types of magnetic sensors. Explain working principle of magnetic sensor. **[6]**

b) State different types of active filters. Design first order Butterworth low pass filter with gain 5 and cutoff frequency 1kHz. Draw the circuit diagram with design component values. **[6]**

c) Write short note on Automobile applications of sensor and computer applications. **[6]**

[5017]-367

T. Y. B. Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 331 : Science, Technology and National Security

(2008 Pattern) (Semester - III) (Paper - I)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

   1)   All questions are compulsory.

   2)   Figures to the right indicate full marks.

Q1) Answer in 2 to 4 sentences each: **[16]**

   a)   What is Science?

   b)   Define Technology.

   c)   Define National Security.

   d)   What is Nuclear Science?

   e)   What is Archimedes Principle?

   f)   Define Aeronautics.

   g)   What is meant by Maritime Science?

   h)   What is meant by C4 I 2SR?

Q2) Answer in 8 to 10 sentences each (any two):   **[8]**

   a)   Write about the Industrial Revolution.

   b)   Write the concept of Electronic Warfare.

   c)   Write the strategic application of satellite.

Q3) Write short notes on (any two): **[8]**

    a)   Strategic Application of Bio-Technology.

    b)   Development Trends in Defence Material.

    c)   Information Warfare.

Q4) Answer in 16 to 20 sentences (any one): **[8]**

    a)   Explain about Bernoulli's Theorem and explain its application in Theory of Flight.

    b)   Discuss about the promising and new military technologies.

☛ ☛ ☛

[5017]-368

T.Y.B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 332 : Defence Economics

(2008 Pattern) (Semester - III) (Paper - II)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

    1)   All questions are compulsory.

    2)   Figures to the right indicate full marks.

Q1) Answer in 2 to 4 sentences each: **[16]**

    a)   Define Peacetime economy.

    b)   Define Leadership.

    c)   Define Cost of war.

    d)   Define Defence Economics.

    e)   Define budgetary perspectives.

    f)   Define Economic warfare.

    g)   Define War potential.

    h)   State the meaning of Defence vs. Development.

Q2) Answer in 8 to 10 sentences each (any two):   **[8]**

    a)   Explain Effects of war on Industry.

    b)   Discuss merits of wartime economy.

    c)   Explain Techniques of price control.

Q3) Write short notes on (any two): [8]

   a) Economic warfare.

   b) Parliament and defence budget.

   c) Role of leadership in defence budget.

Q4) Answer in 18 to 20 sentences (Any one): [8]

   a) Explain salient features of Indian Economic system.

   b) Explain Defence Budgeting and Planning in India.

☞ ☞ ☞

T.Y.B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 333 : Study of Disaster

(2008 Pattern) (Semester - III) (Paper - III)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

1)   All questions are compulsory.

2)   Figures to the right indicate full marks.

Q1) Answer in 2 to 4 sentences each   **[16]**

a)   Define Disaster.

b)   Define manmade Disaster.

c)   Define Cyclone.

d)   What are the limitations of Disaster Management?

e)   Define Environmental Disaster?

f)   Define Global warming?

g)   Define Chemical warfare.

h)   Define Sustainable development?

Q2) Answer in 8 to 10 Sentences each (any two)   **[8]**

a)   Explain Disaster management in India.

b)   Discuss need of study of Coastal environment.

c)   Describe Global warming.

P.T.O.

Q3) Write short notes on (Any two)   **[8]**

   a)   Nuclear war.

   b)   Disaster and national security.

   c)   Effects of Environmental disaster.

Q4) Answer in 18 to 20 sentences (Any One)   **[8]**

   a)   Explain relationship between war and disaster.

   b)   Discuss relationship between population and environment.

✦   ✦   ✦

T.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS - 334 : Research Methodology
(2008 Pattern) (Semester - III) (Paper - IV)

Time : 2 Hours]   *[Max. Marks : 40*

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

Q1) Answer in 2 to 4 sentences each   **[16]**

a) Establish relationship between discovery and invention.

b) What is meant by observation method?

c) Define experimental data.

d) Write the importance of scientific methods in investigation or research.

e) How Physical Sciences differ from Social Sciences in objectivity?

f) Write the value of Historical research?

g) What is action research?

h) What is Theory?

Q2) Answer in 8 to 10 sentences each (any two)   **[8]**

a) Explain the role of research in Social Sciences.

b) State about the value of research.

c) What are the sources of stating a problem?

Q3) Write short notes on (Any two)   **[8]**

     a)   Research Design.

     b)   Hypothesis.

     c)   Need of research in Internal Security.

Q4) Answer in 16 to 20 sentences (Any One)   **[8]**

     a)   Write about the style and structure of a research report.

     b)   What are the qualities of interviewer?

✦ ✦ ✦

[5017]-371

T.Y.B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 335 : Computer Applcations in Defence Management

(2008 Pattern) (Semester - III) (Paper - V)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

1)   All questions are compulsory.

2)   Figures to the right indicate full marks.

Q1) Answer in 2 to 4 sentences each: **[16]**

   a)   Define Night vision.

   b)   What is scientific approach?

   c)   Define simulations.

   d)   Define Topology.

   e)   State the meaning of cloud computing.

   f)   Define WAN.

   g)   Define Client Server.

   h)   Define Low cost readiness.

Q2) Answer in 8 to 10 sentences each (any two)   **[8]**

   a)   Explain Generations of computer.

   b)   Discuss application of IT in Pay roll system.

   c)   Explain scientific approach to weather forecasting.

Q3) Write short notes on (Any two) **[8]**

    a)   CAD

    b)   Development of machine.

    c)   Computer oriented activities.

Q4) Answer in 18 to 20 sentences (Any One) **[8]**

    a)   Explain future applications of IT in defence management.

    b)   Discuss IT and its importance on national security.

✦ ✦ ✦

[5017]-372

T. Y. B. Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 336 (A) : Indian Military System (I) (Optional)

(2008 Pattern) (Semester - III) (Paper - VI)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

1)   All questions are compulsory.

2)   Figures to the right indicate full marks.

Q1) Answer in 2 or 4 sentences each: **[16]**

a)   How you would like to define Military History?

b)   State the meaning of chaturangbala.

c)   Who was Vishwamitra?

d)   State the duration of Rajput Period.

e)   What was the reason for battle of Jhelum?

f)   State any two types of forts as per Kautilya.

g)   What do you mean by sources of Military History?

h)   What do you know about Vasista?

Q2) Answer in 8 or 10 Sentences each (any two)   **[8]**

a)   Explain in brief Rajputs Art of Warfare.

b)   Write in brief weapon system during Ramayana & Mahabharata period.

c)   What was the backbone of hostility between Mohammad Ghori & Pruthviraj Chauhan.

Q3) Write short notes on (any two)   **[8]**

a)   "Samiti" During Vedic Period.

b)   Battle of Ten Kings.

c)   Laws of war during Ramayana Period.

Q4) Answer in 16 to 20 sentence (any one)   **[8]**

a)   Explain the significance & relevance of Kautilyas thoughts in the present context.

b)   Describe the battle of Jhelum as a "Milestone" in Military histrory of India.

✦   ✦   ✦

P774

[5017]-372

T. Y. B. Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 336 (B) : Maratha Military System (I) (Optinal)

(2008 Pattern) (Semester - III) (Paper - VI)

Time : 2 Hours] *[Max. Marks : 40*

Instructions to the candidates:

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

Q1) Answer in 2 or 4 sentences each: **[16]**
   a) Who was Shahajiraje Bhonsale?
   b) Who was the chief of Shivaji's Navy?
   c) State any four names of Shivaji's Forts?
   d) What do you mean Asttapradhan Mandal?
   e) Write the basic aim of Shivaji's Karnataka Campaign.
   f) Why Shivaji tought a war with Vankoji?
   g) Why Shivaji conqueres Jawali territory?
   h) What was the outcome from battle of Purandar?

Q2) Answer in 8 or 10 sentences each (any two) **[8]**
   a) Write a few lines on "Fort of Purandar".
   b) Explain in brief religious condition in Maharastra before Shivaji.
   c) Write few lines on "Mirza Raje Jaisingh".

Q3) Write short notes on (Any two) **[8]**
   a) Causes of Karnataka Campaign.
   b) Chandrarao More.
   c) Dilerkhan.

Q4) Answer in 16 or 20 sentences (any one) **[8]**
   a) Explain in detail "Military System of Shivaji".
   b) Write an essay on Shivaji's Karnataka Campaign.

✦ ✦ ✦

P774

[5017]-372

T. Y. B. Sc.
DEFENCE AND STRATEGIC STUDIES
DS - 336 (C) : Indian Wars Since Independence (I) (Optional)
(2008 Pattern) (Semester - III) (Paper - VI)

Time : 2 Hours] *[Max. Marks : 40*
Instructions to the candidates:
   1) *All questions are compulsory.*
   2) *Figures to the right indicate full marks.*

Q1) Answer in 2 or 4 sentences each: **[16]**
   a) Why India intervene in Kashmir during 1947-48?
   b) State the meaning of "Ceasefire".
   c) Who give the military assistance to Pak during 1965?
   d) Why chinese launched an attack on India during 1962?
   e) State the basic reason for Indo Pak war of 1947 -48?
   f) What do you know about Tashkand Agreement?
   g) What do you know about National Conference?
   h) Who brought the Ceasefire between India- Pakistan during war of 1947-48.

Q2) Answer in 8 or 10 sentences each (any two) **[8]**
   a) Write a few lines on "India-China Border Dispute".
   b) What were the causes of Indo-Pak War of 1947-48.
   c) Write few lines as "Unilateral Ceasefire by China during 1962 War".

Q3) Write short notes on (any two) **[8]**
   a) Role of U.S.A. during Indo-Pak War of 1965.
   b) Role of USSR during India-China War of 1962.
   c) Impact of Indo-Pak war of 1947-48 at global level.

Q4) Answer in 16 to 20 sentences (any one) **[8]**
   a) Analyse the causes of chinese aggression of 1962 against India.
   b) Explain in detail the background of Indo-Pak war of 1965.

✦ ✦ ✦

[5017]-373

T.Y.B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 337 (A) : Military Sociology (Optional)

(2008 Pattern) (Semester - III) (Paper - VII)

Time : 2 Hours]   *[Max. Marks : 40*

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

Q1) Answer in 2 to 4 sentences each   **[16]**
  a)   Evaluate the Military Values with exiting social values.
  b)   Write about Chetwodian Motto.
  c)   Define morality and ethics.
  d)   What is Nation - Building?
  e)   Define Culture.
  f)   Define Military Sociology.
  g)   What is the concept of Soldiering?
  h)   What is JUST WAR (*Dharma Yudha*).

Q2) Answer in 8 to 10 sentences each (any two)   **[8]**
  a)   Explain about the conceptual relationship between military and society.
  b)   What makes soldier to tick?
  c)   Write about the Strategic Culture in India.

Q3) Write short notes on (Any two)   **[8]**
  a)   Socio-Political causes of War.
  b)   Strategic Importance of Republic Day Parade.
  c)   One Class Army.

Q4) Answer in 16 to 20 sentences (Any One)   **[8]**
  a)   Explain about the need of Militarization of population in India.
  b)   Rationalize, Why Military is necessary to the survival of State?

✦ ✦ ✦

P775

[5017]-373
T.Y.B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS - 337 (B) : Defence Journalism (Optional)
(2008 Pattern) (Semester - III) (Paper - VII)

Time : 2 Hours] *[Max. Marks : 40*
Instructions to the candidates:
   1) *All questions are compulsory.*
   2) *Figures to the right indicate full marks.*

Q1) Answer in 2 to 4 sentences each **[16]**
   a) Write the functions of Army.
   b) Write the role of Submarine.
   c) Who is Supreme Commander of Armed Forces?
   d) What do you understand by Aircraft Carriers?
   e) What do you understand by subsonic and supersonic aircrafts?
   f) What are the functions of Training Command of Army?
   g) Elaborate C^4 ISR.
   h) What do you mean by the term "total war"?

Q2) Answer in 8 to 10 sentences each (any two) **[8]**
   a) Explain the characteristics of defence journalism.
   b) What defence and security matters should not and should be reported?
   c) Write the compass and wide scope of Defence Journalism.

Q3) Write short notes on (Any two) **[8]**
   a) LCA Project of HAL.
   b) Role of Security Forces in Counter Naxalism.
   c) Media and National Security.

Q4) Answer in 16 to 20 sentences (Any One) **[8]**
   a) Write a report on Republic Day Parade.
   b) What are the hurdles and difficulty in Defence Journalism?

✦ ✦ ✦

P775

[5017]-373

T.Y.B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 337 (C) : Defence Preparedness of India - I (Optional)

(2008 Pattern) (Semester - III) (Paper - VII)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

1) **All questions are compulsory.**

2) **Figures to the right indicate full marks.**

Q1) Answer in 2 to 4 sentences each   **[16]**

    a) State the total length of Indias Seacoast.

    b) What do you mean by L.A.C.?

    c) With whom India sharing maximum common land boundary?

    d) What do you mean by H.A.L.?

    e) State the names of Indias immediate neighbours.

    f) Write the total length of Indias western land border.

    g) What do you mean by geopolitical evaluation?

    h) State any two emerging military technology.

Q2) Answer in 8 to 10 sentences (any two)   **[8]**

    a) Explain the concpet of Development.

    b) Write a few lines on line of Actual control in J & K.

    c) Highlight on "strategic culture of India".

Q3) Write short notes on (Any two)   **[8]**

    a) M.D. L. Mumbai.

    b) Socio-culture Harmony in India : Present status.

    c) Indias bottle neck.

Q4) Answer in 16 to 20 sentences (Any One)   **[8]**

    a) Discuss the relationship between Defence & Development with special reference to Indias case.

    b) Explain in detail the issues between India & Pakistan.

✦ ✦ ✦

[5017]-374

T.Y.B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 338 (A) : Armed Conflicts and Human Rights

(2008 Pattern) (Semester - III) (Paper - VIII)

Time : 2 Hours] *[Max. Marks : 40*

Instructions to the candidates:

1) *All questions are compulsory.*

2) *Figures to the right indicate full marks.*

Q1) Answer in 2 to 4 sentences each: **[16]**
   a)   Define Human rights.
   b)   What do you mean by armed conflicts?
   c)   Who is POW?
   d)   Define Combatants.
   e)   Who are non-combatants?
   f)   Write the meaning of 'International Relations'.
   g)   Define Democracy.
   h)   What is meant by Fundamental Rights?

Q2) Answer in 8 to 10 Sentences each (any two) **[8]**
   a)   Why Humanitarian Studies is essential at international level?
   b)   Write the significance of Human Rights.
   c)   Write the role of international relations in promoting Human Rights.

Q3) Write short notes on (Any two) **[8]**
   a)   The origin of Human Rights Regimes.
   b)   International Conventions On Human Rights.
   c)   Implementations of Human Rights Obligations.

Q4) Answer in 16 to 20 sentences (Any One) **[8]**
   a)   Suggest measures to protect civilian during war.
   b)   Discuss the laws of armed conflicts.

✦ ✦ ✦

P776

[5017]-374

T.Y.B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 338 (B) : International Organization and National Security

(2008 Pattern) (Semester - III) (Paper - VIII)

Time : 2 Hours]   *[Max. Marks : 40*

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

Q1) Answer in 2 to 4 sentence each: **[16]**
   a) Write any two purposes of U.N.O.
   b) Write any two principles of U.N.O.
   c) What is right of self defence?
   d) What is deliberative function?
   e) What is enforcement function?
   f) Define veto power.
   g) Define Conflict management.
   h) Define pacific settlement.

Q2) Answer in 8 to 10 sentences each (any two)   **[8]**
   a) Explain history of League of Nations.
   b) Discuss Treaty of Versailles.
   c) Explain structure of United Nations.

Q3) Write short notes on (any two)   **[8]**
   a) General assembly.
   b) Security Council.
   c) Enforcement action.

Q4) Answer in 18 to 20 sentence (any one)   **[8]**
   a) Explain role of UN in International Peace and security.
   b) Discuss Role of U.N in Disarmament.

✦ ✦ ✦

P776

[5017]-374
T.Y.B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS - 338 (C) : International Law (Optional)
(2008 Pattern) (Semester - III) (Paper - VIII)

Time : 2 Hours]   *[Max. Marks : 40*
Instructions to the candidates:
   1)   All questions are compulsory.
   2)   Figures to the right indicate full marks.

Q1) Answer in 2 to 4 sentences each: **[16]**
   a)   Define International Law.
   b)   State the long form of U.N.
   c)   What do you mean "Convention"?
   d)   Write any two subjects of International Law.
   e)   What do you mean by Protocol?
   f)   State any two sources of International Law.
   g)   What do you mean by Human Rights?
   h)   State the meaning of U.N. charter.

Q2) Answer in 8 to 10 sentences (any two)   **[8]**
   a)   Explain in brief nature of International Law.
   b)   Write in brief about U.N. charter.
   c)   Explain any one subject of International Law.

Q3) Write short notes on (Any two)   **[8]**
   a)   Concept of Human Rights.
   b)   Geneva Conventions.
   c)   Chemical Warfare.

Q4) Answer in 16 to 20 sentences (Any One)   **[8]**
   a)   Explain the role of U.N. Peacekeeping forces for maintenance of international peace & security.
   b)   Highlights on "Historical development of International Law".

✦ ✦ ✦

SEAT No. :

[**Total No. of Pages : 3**

[5017]-375

T. Y. B. Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 339 (A) : Defence Management in India (Optional)

(2008 Pattern) (Semester - III)

Time : 2 Hours]   *[Max. Marks : 40*

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

Q1) Answer in 2 to 4 sentences each: **[16]**
    a)   Define Human resource management?
    b)   What are the functions of war preparedness?
    c)   What are the principles of war?
    d)   What are limitations of logistics management?
    e)   Define team building.
    f)   Define Battle dynamism.
    g)   What is supply Chain?
    h)   What is Military - Industrial complex?

Q2) Answer in 8 to 10 sentences each (any two)   **[8]**
    a)   Explain Functions of defence Management.
    b)   Discuss role of R & D in defence preparedness.
    c)   Explain military concept of management.

Q3) Write short notes on (Any two)   **[8]**
    a)   Team building in Armed forces.
    b)   Principles of Management.
    c)   Role of leadership in defence preparedness.

Q4) Answer in 18 to 20 sentences (Any One)   **[8]**
    a)   Discuss Defence organization in India.
    b)   Explain applications of war principles in corporate management.

✦ ✦ ✦

P777

[5017]-375

T. Y. B. Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 339 (B) : Internal Security of India - I (Optional)

(2008 Pattern) (Semester - III) (Paper - IX)

Time : 2 Hours] *[Max. Marks : 40*

Instructions to the candidates:

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

Q1) Answer in 2 to 4 sentences each: [16]
   a) Define Insurgency.
   b) Define national security?
   c) Define Threat Perception?
   d) Define Secessionist movement.
   e) Define Organized crime.
   f) Define counter Terrorism.
   g) Define common security.
   h) What is human trafficking?

Q2) Answer in 8 to 10 sentences each (any two) [8]
   a) Explain Cross - Border Terrorism.
   b) Discuss impact of Globalization on India's internal security.
   c) Discuss issues of human security.

Q3) Write short notes on (Any two) [8]
   a) Role of Media in maintaining India's internal security.
   b) Role of N.G.O in maintaining India's internal security.
   c) Ethnicity in India.

Q4) Answer in 18 to 20 sentences (Any One) [8]
   a) Assess Security challenges to North - East Region of India.
   b) Explain role of the state in maintaining internal security.

✦ ✦ ✦

P777

[5017]-375

T. Y. B. Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 339 (C) : India's Maritime Security - I (Optional)

(2008 Pattern) (Semester - III) (Paper - IX)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Figures to the right indicate full marks.*

Q1) Answer in 2 to 4 sentences each: **[16]**

    a)   Define Maritime security.

    b)   Define sea power.

    c)   What do you mean by Navigational aids?

    d)   Define maritime boundaries.

    e)   What is fixed assets of Indian Navy?

    f)   Write any two functions of Coast guard?

    g)   Define EEZ.

    h)   Define maritime strategy.

Q2) Answer in 8 to 10 sentences each (any two)   **[8]**

    a)   Explain "Freedom to use the seas".

    b)   Discuss strategic significance of Indian Ocean.

    c)   Discuss India's maritime strategy.

Q3) Write short notes on (Any two)   **[8]**

    a)   Role of Maritime trade.

    b)   Brief History of Ocean.

    c)   Role of Naval Bases.

Q4) Answer in 18 to 20 sentences (Any One)   **[8]**

    a)   Describe power rivalry in Indian Ocean and its impact on India.

    b)   Discuss new challenges to Maritime security.

✦ ✦ ✦

[5017]-376

T.Y.B.Sc.

ENVIRONMENTAL SCIENCE

ENV - 301 : Terrestrial Ecosystems and Management

(2008 & 2013 Pattern) (92413) (Paper - I) (Semester - III)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

    1)   All questions are compulsory and carry equal marks.

    2)   Neat and labelled diagrams must be drawn wherever necessary.

    3)   Figures to the right indicate full marks.

Q1) Attempt the following in 1-2 lines each: **[10]**

    a)   What is environmental significance of quadrate method?

    b)   What are objectives of Joint Forest Management?

    c)   Mention any two biogeographical regions of India.

    d)   What are Keystone Species?

    e)   Mention any two traditional methods of Forest Management?

    f)   What is meant by 'Mutualism'?

    g)   Write any two applications of remote sensing in ecosystem management.

    h)   What is meant by 'Carbon Pool'?

    i)   Mention any two species of Tundra biome.

    j)   What is meant by 'Species Association'?

Q2) Write a short note on any two of the following: **[10]**

    a)   Habitat Restoration.

    b)   Role of Chipko movement in Forest Conservation.

    c)   Importance of Biogeocycles.

Q3) Answer ANY TWO questions from the following: **[10]**

   a)   Write an account on causes and control measures of forest fires.

   b)   Discuss predation and commensalism with suitable examples.

   c)   Give a detailed description of grassland biomes.

Q4) Attempt ANY ONE of the following: **[10]**

   a)   What are objectives of sustainable management of resources? Also add a note on role of ecotourism in conservation.

   b)   Discuss in detail on importance of any five ecosystem services in human life.

✦　✦　✦

[5017]-377

T. Y. B. Sc.

ENVIRONMENTAL SCIENCE

ENV - 302 : Wildlife Biology

(2008 Pattern) (Paper - II) (Semester - II)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

  1)   *All questions are compulsory and carry equal marks.*

  2)   *Neat and labelled diagrams must be drawn wherever necessary.*

  3)   *Figures to the right indicate full marks.*

Q1) Attempt the following in 1-2 lines each   **[10]**

  a)   What is meant by 'Habitat'?

  b)   What is importance of Radio tagging?

  c)   Mention any two characteristics of pteridophytes.

  d)   What is environmental significance of managroves?

  e)   Mention significance of diversity assessment.

  f)   Write scientific names of any two mammals.

  g)   What are hotspots of biodiversity?

  h)   Mention any two characteristics of grasslands.

  i)   What are objectives of wildlife management?

  j)   Write any two reasons behind biodiversity formation?

Q2) Write a short note on ANY TWO of the following   **[10]**

  a)   Land Races of Crop Plants.

  b)   Role of RS and GIS in Wildlife Management.

  c)   Human - Wildlife Conflicts.

Q3) Answer ANY TWO questions from the following **[10]**

   a) Discuss on various population assessment techniques in relation with insects.

   b) What are various reasons associated with habitat destruction of wildlife?

   c) What are Wetlands? Add a note on need for conservation of wetlands.

Q4) Attempt ANY ONE of the following **[10]**

   a) Discuss in detail on importance of forests and marine ecosystems as habitats for wildlife.

   b) Write an account on various assessment techniques used for diversity of plants.

✦ ✦ ✦

[5017]-378
T.Y.B.Sc.
ENVIRONMENTAL SCIENCE
ENV - 303 : Water Quality
(2008 & 2013 Pattern) (Paper - III) (Semester - III)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:
1) All questions are compulsory.
2) Neat and labelled diagrams must be drawn wherever necessary.
3) Figures to the right indicate full marks.

Q1) Attempt the following in 1-2 lines each: **[10]**

    a) Define entrophication.

    b) Enlist any two physical factors causing rock weathering.

    c) What are the non-point sources of Water Pollution?

    d) Define BOD.

    e) What is meant by vector.

    f) What is hard water?

    g) Enlist any two water borne diseases.

    h) Write full form of BIS and WHO.

    i) When world water day celebrates every year.

    j) Write full form of GIS.

Q2) Write a short note on (any two):   **[10]**

    a) Ballast water and its problems.

    b) Arsenic in ground water.

    c) Aerobic Waste Water Treatment.

P.T.O.

Q3) Answer any two from the following: [10]

   a) Explain the application of GIS in water management.

   b) Briefly write the preventive measures for epidemic diseases.

   c) Classify the detergents with suitable examples.

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

   a) Explain the sources of oil pollution. Add a note on its effects on marine biota.

   b) What are the significance of biological treatment in Waste Water. Add a note on any one, you had studied.

✦ ✦ ✦

[5017]-379

T. Y. B. Sc.

ENVIRONMENTAL SCIENCE

ENV : 304 - Issues in Environmental Science - I

(2008 Pattern) (Semester - III) (Paper - IV)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

1)   All questions are compulsory and carry equal marks.

2)   Neat and labelled diagrams must be drawn wherever necessary.

3)   Figures to the right indicate full marks.

Q1) Attempt the following in 1-2 lines each.   **[10]**

    a)   What are non renewable resources?

    b)   What is carbon sequestration?

    c)   Enlist types of LCA.

    d)   Give any two examples of GM plants.

    e)   What is Eco - terrorism?

    f)   Mention effects of ozone depletion.

    g)   Give names of any two Environmental taxicant.

    h)   Mention any two Environmental movements in India.

    i)   Write full form of WTO.

    j)   Define 'pastoralism'

Q2) Write a short note on ANY TWO of the following.   **[10]**

    a)   Sustainable development.

    b)   Biological warfare.

    c)   Methods of carbon sequestration.

Q3) Answer ANY TWO of the following. [10]

    a) Explain role of NGO's in Environment conservation.

    b) Write impacts of bioresources on local economy.

    c) Discuss reasons & effects of Energy Crisis.

Q4) Answer ANY ONE of the following. [10]

    a) Define life cycle analysis. Discuss in detail LCA methodology with suitable example.

    b) What is green house effect? Discuss impacts of Global warming on Biodiversity & Agriculture.

✡ ✡ ✡

[5017]-380

T.Y.B.Sc.

ENVIRONMENTAL SCIENCE

ENV : 305 - Environmental Governance & Equity : Law and Ethics

(2008 & 2013 Pattarn)(Semester - III) (Paper - V)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:
  1) *All questions are compulsory and carry equal marks.*
  2) *Neat and labelled diagrams must be drawn wherever necessary.*
  3) *Figures to the right indicate full marks.*

Q1) Attempt the following in 1-2 lines each.   **[10]**

  a)   Write full form of UNEP.

  b)   What is ecomark scheme?

  c)   Mention the scope of water Act, 1974.

  d)   What is PIL?

  e)   Give objective of National Environment Tribunal Act,1995.

  f)   Write the name of 'Umbrella Act' in India.

  g)   What is polluter pays principle?

  h)   Mention any two principles of 'stockholm declaration'.

  i)   Write important provisions of Motor Vehicle regulations.

  j)   Write difference between Act and Policy.

Q2) Write a short note on ANY TWO of the following.   **[10]**

  a)   Earth Summit, 1992.

  b)   Fundamental rights & duty for environment protection.

  c)   Features of Indian Forest Act, 1982.

Q3) Answer ANY TWO questions from the following. **[10]**

    a)   Discuss functions of pollution control board under Air Act, 1981.

    b)   Explain importance of public liability Insurance Act, 1991.

    c)   Discuss salient features of Wildlife Act, 1972.

Q4) Attempt ANY ONE of the following. **[10]**

    a)   What is Environmental Ethics? Discuss an ethical theories applied to the Environment.

    b)   Discuss in detail salient features of Environment (Protection) Act, 1986.

✡ ✡ ✡

[5017]-381

T.Y.B.Sc.

ENVIRONMENTAL SCIENCE

ENV : 306 - Environmental Biotechnology - I

(New Course) (Semester - III) (Paper - VI)(2008 & 2013 Pattern)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:
1) *All questions are compulsory.*
2) *Neat and labelled diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*

Q1) Attempt the following in 1-2 lines each.   **[10]**

   a) Write any two names of earthworm species used in vermicomposting.

   b) Define composting.

   c) What is rhizosphere?

   d) How much percentage of moisture maintain in vermicomposte.

   e) Define Bioconversion.

   f) Mention any two microbes involved in bioleaching.

   g) Enlist any two names of bacterial pesticides.

   h) Define bioagumentation.

   i) Wrtie any two enzymes useful for hydrogen production.

   j) Define pheromones.

Q2) Write a short note on (ANY TWO).   **[10]**

   a) Pyrolysis.

   b) Green manuring.

   c) Biomethanation.

Q3) Answer ANY TWO of the following. [10]

a) Explain the multifaceated action of neem bitter.

b) Explain the directive principles for GMO.

c) Write the methods for drying of microbes.

Q4) Answer ANY ONE of the following question. [10]

a) Explain the solid substrate fermentation process for production of fungal biopesticides.

b) What is stabilization of biopesticides? Draw flow chart of process technology of neem product.

✡   ✡   ✡

[5017]-383

T.Y.B.Sc. (Vocational)
BIOTECHNOLOGY
VOC- BIOTECH - 335 : Plant Biotechnology
(2008 Pttren) (Semester - III) (Paper - V)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:
1) *All questions are compulsory.*
2) *All question carry equal marks.*
3) *Neat diagrams must be drawn wherever necessary.*

Q1) Answer the following in short.   **[10]**

   a)   What is plant tissue culture?

   b)   Define somaclonal variation.

   c)   What is artificial seed?

   d)   What are haploids?

   e)   Define gene transfer.

   f)   What is cryopreservation?

   g)   Give one example of medicinal plant.

   h)   What are vegetable vaccines?

   i)   Define embryogenesis.

   j)   Enlist disinfectants.

Q2) Attempt ANY TWO of the following.   **[10]**

   a)   Discuss about selection of superior phenotypes.

   b)   Comment on biological methods of gene transfer.

   c)   Comment on uses of haploids.

P.T.O.

Q3) Write short notes on any two: **[10]**

    a)   *Ex situ* conservation of germplasm.

    b)   Micropropogation of endangered species.

    c)   Transgenic plants.

Q4) a)   Explain somaclonal variation with respect to advantages and causes of variation. **[10]**

<div align="center">OR</div>

    b)   What are secondary metabolites? Explain with production, advantges and limitations of it. **[10]**

<div align="center">✡   ✡   ✡</div>

[5017]-384

T.Y.B.Sc. (Vocational)

PHOTOGRAPHY & AUDIO-VISUAL PRODUCTION

Fundamentals of Video

(2008 Pattern) (Semester - III) (Paper - V)

Time : 2 Hours] *[Max. Marks :40*

Instructions to the candidates:

1) *All questions are compulsory.*

2) *Give suitable examples wherever necessary.*

3) *Figures to the right indicate full marks.*

Q1) Answer ALL the following: **[10]**

a) Explain the term contrast of a TV picture.

b) State the working principle of image orthicon camera tube works.

c) State the horizontal and vertical scanning frequencies used in India.

d) What is the application area for a magnetic video disc machine?

e) State the bandwidth of TV signal used in India.

f) Draw the track survey for helical scanning.

g) Draw a diagram showing tracks of an optical video disc.

h) Explain the function of synchronizing pulses in a TV receiver.

i) What type of modulation is used for picture and sound signals in TV transmission?

j) What are the primary colours used in colour TV?

Q2) Answer <u>ANY TWO</u> of the following: **[10]**

a) With a neat diagram explain the working of colour picture tube. What is the shadow mask?

b) Giving a block diagram explain the working of a B/W TV camera.

c) How is electrical signal recorded on a magnetic tape?

P.T.O.

Q3) Answer <u>ANY TWO</u> of the following: [10]

a) What do you mean by photoconductivity? How is this principle used in Videocon camera tube? Draw a neat labeled diagram of Videocon tube.

b) Give a block diagram and explain the working of magnetic video disc machine.

c) Explain one complete frame of interlaced scanning pattern used in India. What is the need for interlaced scanning?

Q4) Answer <u>ANY ONE</u> of the following: [10]

a) Draw a neat block diagram of a B/W TV receiver explain the working of its sound section.

b) i) Explain the working of record electronics in a VCR.

ii) Compare the performance of a film camera with a digital camera.

ξ ξ ξ

T. Y. B. Sc. (Vocational)
ELECTRONIC EQUIPMENT MAINTENANCE (EEM)
Electronic Equipment Troubleshooting & Repairs
(2008 Pattern)(Semester - III) (Paper - V)

Time : 2 Hours]   *[Max. Marks : 40*
Instructions to the candidates:
  1)   All questions are compulsory.
  2)   Figures to the right indicate full marks.
  3)   Use of log table, calculator is allowed.

Q1) Answer the following:

  a)   Answer the following.   **[4 × 1 = 4]**

     i)   How will you identify terminals of transistor?

     ii)   What is 'Intermittent fault'?

     iii)   State the importance of circuit diagrams in the troubleshooting
            process.

     iv)   What is possible fault if output of digital circuit is always low?

  b)   Answer the following: **[2 × 2 = 4]**

     i)   How will you test transformer?

     ii)   State common faults in an Inductor.

  c)   Answer the following: **[2 × 2 = 4]**

     i)   Write a comment on 'User complaints are important in
            troubleshooting of electronic instrument'.

     ii)   Write comment on 'Reading drawing and circuit diagrams are
            important in troubleshooting of electronic equipments'.

Q2) Answer any two of the following: **[2 × 4 = 8]**

    a)   Mention typical faults in resistor and indicate their causes.

    b)   Explain faults in dc power supply and their remedies.

    c)   Describe the important steps in troubleshooting of electronic equipment.

Q3) Answer any two of the following: **[2 × 4 = 8]**

    a)   What are the typical faults in rectifier circuit?

    b)   Describe the troubleshooting of microcontroller based instrument.

    c)   Explain typical faults and their diagnosis in OP - AMP circuit.

Q4) Answer the following: **[2 × 6 = 12]**

    a)   Draw a neat block diagram of SMPS and explain the faults in it.

    b)   Draw block diagram of Analog multimeter. State common faults in it.

<div align="center">OR</div>

Answer the following: **[3 × 4 = 12]**

    a)   Explain common faults in transistor.

    b)   Explain typical faults in CRO.

    c)   Explain the working of following digital test equipments.

        i)   Logic comparator.

        ii)   Logic probe.

<div align="center">✡ ✡ ✡</div>

[5017] - 386

T. Y. B. Sc. (Vocational)
INDUSTRIAL MICROBIOLOGY
VOC-IND-MIC 335 : Pollution Control Technology
(2008 Pattern) (Semester - III) (Paper - V)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions :   *1)   Neat diagrams must be drawn wherever necessary.*
           2)   Black figures to the right indicate full marks.
           3)   All questions carry equal marks.
           4)   Use of electronic pocket calculator is allowed.
           5)   Assume suitable data, if necessary.
           6)   All questions are complusory.

Q1) Answer as directed: **[10]**

a)   State whether the statement is TRUE or FALSE.
     Alum is usually added in secondary settling tanks.

b)   State whether the statement is TRUE or FALSE.
     MCRT greater than HRT.

c)   Name any two flocculating agents used in wastewater treatment.

d)   State whether the statement is TRUE or FALSE.
     Accelerated gravity settling is a process for faster sedimentation of
     biological solids in post-activated sludge treatment.

e)   State whether the statement is TRUE or FALSE.
     Sludge treatment usually involves anaerobic processes.

f)   Which of the following treatment processes is used when the wastewater
     has a high volume and low BOD?
     Activated sludge process, Trickling Filter process.

g)   State the deleterious effect of excess sulfite in the influent for wastewater
     treatment using anaerobic processes.

h)   State two reasons why EIA is necessary before setting up any industrial
     unit.

i)   State two advantages of in-situ bioremediation.

j)   Justify why COD is a better method for monitoring and control compared
     to BOD.

Q2) Answer any two of the following. [10]

   a) List the mechanisms of sedimentation that occur in secondary settling units. Explain zone settling.

   b) Describe the working of a Trickling filter.

   c) Explain denitrification of wastewaters as a process of nutrient removal.

Q3) Answer any two of the following. [10]

   a) Justify why adsorption cannot be used to remove pollutants during primary treatment.

   b) Describe the working of a Upflow Anaerobic Sludge Blanket reactor for wastewater treatment.

   c) What is 'breakpoint chlorination'? Explain how it is useful in determining the dosage of chlorinc for disinfection process in wastewater treatment.

Q4) Answer any one of the following. [10]

   a) Describe the operation of an Activated Sludge Process. Explain the mass-balance approach used to compute the operating parameters for the process.

   b) Given the following information calculate the MCRT for an activated sludge process.

Influent TSS	=	315 mg/L
Waste activated sludge (WAS) TSS	=	6300 mg/L
MLSS	=	3300 mg/L
Effluent TSS	=	15 mg/L
Influent flow	=	50,000 m³/d
WAS flow	=	400 m³/d
Primary clarifier volume	=	2670 m³
Aeration tank volume (V)	=	8000 m³
Secondary clarifier volume	=	2200 m³

☆ ☆ ☆ ☆

[5017] - 387

T.Y.B.Sc. (Vocational)
COMPUTER HARDWARE & NETWORK ADMINISTRATION
Computer / IT Service Management
(2008 Pattern) (Semester - III) (Paper - V)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates :
>   *1)   All Questions are compulsory.*
>   *2)   Figures to the right indicate full mark.*

Q1) Attempt all of the following: **[10× 1= 10]**
   a)   What is Segregation of Duties in IS?
   b)   COBIT Stands for.
   c)   What is the function of Request For Proposal?
   d)   Who manages the Helpdesk?
   e)   Use of Multiuser License on Single PC is allowed State True or False.
   f)   Name an ISO Standard for ISMS.
   g)   CEO stands for-
   h)   Database Administarator is responsible to maintain Database. State True or False.
   i)   What is Stored in Access Control List?
   j)   What is Problem Escalation?

Q2) Attempt any Two of the following: **[2 × 5 = 10]**
   a)   How social engineering helps to extract information from a user?
   b)   What are the Functions of a Helpdesk?
   c)   Explain the importance of incident management.

Q3) Attempt any Two of the Following: **[2 × 5 = 10]**
   a)   Explain the Importance of Software Testing before implementation.
   b)   What is the role of Control Matrix in SOD?
   c)   How cost based analysis and planning helps CIO?

Q4) Attempt any One of the Following: **[1 × 10= 10]**
   a)   Comment on:-i. Software Licensing Issues ii. Service Level Agreement.
   b)   What is the importance of Information System Organizational Structure?

✮ ✮ ✮ ✮

[5017] - 388

T.Y.B.Sc. (Vocational)
SEED TECHNOLOGY
Seed Pathology and Entomology
(2008 Pattern) (Semester - III) (Paper - V)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates :
  1)   Answer all questions.
  2)   Figures to right indicate full marks
  3)   Draw neat and well labeled diagrams wherever necessary.

Q1) Answer the following: **[10×1=10]**

  a)   What the seed pathology deals with?

  b)   Give the scientific name of one fungus causing seed disease.

  c)   What is the importance of seed treatment?

  d)   What is seed infection?

  e)   Define storage fungi.

  f)   What is meant by seed transmission?

  g)   Mention the damage an insect pest causes to seeds.

  h)   Define seed entomology.

  i)   Give the scientific name of any one pest damaging seeds.

  j)   Give the objective of seed health testing.

Q2) Attempt any two of the following: **[2×5=10]**

  a)   Give an account on the history of insect pest.

  b)   Write any five differences between seed borne fungi and storage fungi.

  c)   Explain the impact of seed borne bacteria.

Q3) Write notes on any Two of the following: [2×5=10]

    a)   Pest problem in seed storage.

    b)   Influence of seed borne diseases.

    c)   Management of seed storage structures.

Q4) Explain in detail various methods followed for classificastion of insects. **[10]**

<div align="center">OR</div>

Describe in detail the life cycle of insect pest.

<div align="center">✮ ✮ ✮ ✮</div>

[5017]-390

T.Y.B.Sc. (Vocational)
BIOTECHNOLOGY
VOC-BIOTECH-336:Environmental Biotechnology
(2008 Pattern) (Paper - VI)(Semester - III)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

1) *All questions carry equal marks.*
2) *All questions are compulsory.*
3) *Neat diagrams must be drawn wherever necessary.*

Q1) Answer the following in short: **[10]**

a) What is environmental protection?

b) Define bioreactor.

c) Define biosorption.

d) Give two applications of bioremediation.

e) Define recalcitrant.

f) What is biogas?

g) Give one source of ethanol.

h) What are biofertilizers?

i) Define biopesticides.

j) Give one role of biotechnology in food industry.

Q2) Attempt Any Two of the following: **[10]**

a) Discuss role of biotechnology in environmental protection.

b) Comment on bioaugmentation and biostimulation.

c) Discuss biofuels in details.

Q3) Write short notes Any Two: **[10]**

  a) Bioremediation of sludges and subsurface material.

  b) Applications of biotechnology to pesticides and tannery industry.

  c) Composting.

Q4) What are xenobiotic compounds? Comment on hazardous wastes. **[10]**

<div align="center">OR</div>

Comment on biotreatment of waste with respect to pollutants.

<div align="center">ℰ ℰ ℰ</div>

[5017]-391

T.Y.B.Sc. (Vocational)

PHOTOGRAPHY & AUDIO-VISUAL PRODUCTION

Television Software

(2008 Pattern) (Semester - III) (Paper - VI)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Draw neat and labeled diagrams wherever necessary.*

    3)   *Figures to the right indicate full marks.*

Q1) Answer the following: **[10]**

    a)   Differentiate between watching a TV programme and watching a movie.

    b)   When is a compact shot and an extreme close up useful?

    c)   Discuss: 'Brainstorming'.

    d)   Discuss the importance of postproduction stage.

    e)   Which format is used for generating a social message? Why?

Q2) Answer any two of the following: **[10]**

    a)   Give suitable examples and explain the concept of 'Following Camera'.

    b)   Give suitable examples and discuss the use of various camera angles.

    c)   Give suitable examples and distinguish between "Zoom in and Zoom out".

Q3) Write a script for 30 sec social advertisement on the following theme in the **Interview format**. [10]

'Relevance of cleanliness'.

OR

Q3) Write a script for 30 sec social advertisement on the following theme in the **documentary format**. [10]

'Relevance of cleanliness'.

Q4) Write short notes on ANY TWO of the following: [10]

a) Drama format.

b) Importance of storyboarding.

c) Camera movements.

ℰ ℰ ℰ

[5017]-392

T.Y.B.Sc. (Vocational)

ELECTRONIC EQUIPMENT AND MAINTENANCE

Electronic Instrumentation

(2008 Pattern) (Paper - VI)(Semester - III)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Figures to the right indicate full marks.*

    3)   *Use of log tables, calculators is allowed.*

Q1) a)   Answer the following: **[4×1=4]**

        i)   What is PTC for a temperature sensor?

        ii)   Classify the instrument - "Bourdon tube".

        iii)   State applications of LCR meter.

        iv)   Define - "precision" characteristic of instrument.

   b)   Comment on following: **[2×2=4]**

        i)   "Transducer with linear transfer characteristic is preferred.

        ii)   "Precise measurement need not necessary be accurate".

   c)   Answer the following: **[2×2=4]**

        i)   State different types of standards of instruments.

        ii)   Give one example each of active and passive transducers.

Q2) Answer any two: **[2×4=8]**

   a)   Explain balance type force measurement.

   b)   Discuss relative motion measurement.

   c)   Write a short note on "traceability".

Q3) Answer any two: [2×4=8]

   a)   Discuss "Calibration" of instrument.

   b)   Write a note on hydraulic load cell.

   c)   What is "impedance"? Give its representation in complex and polar forms.

Q4) Answer any two: [2×6=12]

   a)   Explain principle of digital LCR meter.

   b)   Discuss servo potentiometric DVM.

   c)   What is signal spectrum? Explain signal analysis.

                                OR

   Answer the following: [3×4=12]

   a)   For an R-C series circuit; R = 150Ω, C = 0.2 μF. If operating frequency is 1kHz, find impednace $(\bar{Z})$ in complex form.

   b)   Write a note on logic analyzer.

   c)   Discuss distortion analyzer.

                              ℰℰℰ

[5017]-393

T.Y.B.Sc. (Vocational)
INDUSTRIAL MICROBIOLOGY
VOC-IND-MIC-336:Animal and Plant Tissue Culture
(2008 Pattern) (Paper - VI)(Semester - III)

Time : 2 Hours]   *[Max. Marks :40*

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

Q1) Answer as directed: **[10]**

  a) Define/Explain in one line:Trypsinization.

  b) Define / Explain in one line: Primary Cell Line.

  c) Mark True/ False: The term organ culture implies a three-dimensional culture of disaggregated tissue retaining the histological features of the animal tissue *in vivo*.

  d) Mark True /False: The growth medium used for anchorage dependent cells contain collagenase and EDTA.

  e) Mark the correct choice:

  Following are the products used in therapeutics that are derived from animal cell culture,

  EXCEPT:

      i)   human growth hormones

      ii)   monoclonal antibodies

      iii)   antifungal antibiotics

      iv)   viral vaccines

  f) What is crown gall disease?

  g) How protoplasts are obtained?

  h) State True or false 'Functional antibodies can be produced from plants'.

  i) Justify in one line: Plant cells are totipotent.

  j) Enlist the micronutrient requirement of plants.

P.T.O.

Q2) Answer any two of the following: **[10]**

    a)   Justify, "Serum plays an important role in animal cell culture medium".

    b)   Explain in brief, the use of phenotypic properties for characterization of animal cell lines.

    c)   How cultured animal cells are used for industrial production of monoclonal antibodies?

Q3) Answer any two of the following: **[10]**

    a)   Enlist the Compounds which are commercialized from Plant Cell Culture and comment on the use of bioreactor for large scale production.

    b)   Describe the use of Gene gun as non vector dependent methods of gene transfer for making transgenic plants.

    c)   What is callus culture? Discuss the steps involved and write the protocol for organogenesis.

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

    a)   With the help of flow-sheet, explain the mechanical disaggregation of explant. Discuss the advantages and disadvantages of this method.

    b)   Describe in detail use of *Agrobacterium tumafaciens plasmids* as a vector with suitable examples of transgenic plants.

ℰ ℰ ℰ

[5017]-394

T.Y.B.Sc. (Vocational)

COMPUTER HARDWARE & NETWORK ADMINISTRATION

Network Concepts -I

(2008 Pattern) (Paper - VI)(Semester - III)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Figures to the right indicate full marks.*

Q1) Attempt all of the following: **[10×1=10]**

    a)   Specify the Port used for SMTP Mail Transfer.

    b)   What is a VPN?

    c)   What is a File Server?

    d)   Specify the use of DHCP Server?

    e)   Why do we need a NOS?

    f)   Give the importance of FTP protocol in internet world.

    g)   Windows 2003 is used only as a Network Operating System. State True or False.

    h)   Which Network Topologies are widely used today?

    i)   Which type of Server is used to host a Website?

    j)   What is a Domain Name Server?

Q2) Attempt any <u>Two</u> of the following: **[2×5=10]**

    a)   Client Server Technology is used Widely today. WHY?

    b)   Explain in brief various Protocols and their applications.

    c)   Users and Groups are create in a Domain. Explain its Importance.

P.T.O.

Q3) Attempt any <u>Two</u> of the following: **[2×5=10]**

a) Explain the various Communication Medias used in Computer Networks?

b) What is a Mail Server? Explain its need.

c) Differentiate between: Personal Desktop and Server.

Q4) Attempt any <u>One</u> of the following: **[1×10=10]**

a) With Correct Diagram explain the working of OSI Model.

b) List any 5 Linux Commands with proper syntax and state the use of each command.

ℰ ℰ ℰ

[5017]-395

T.Y.B.Sc. (Vocational)
SEED TECHNOLOGY
Seed Farm Management, Processing and Storage
(2008 Pattern) (Paper - VI)(Semester - III) (Backlog)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

    1)   All questions are compulsory.

    2)   Figures to the right indicate full marks.

    3)   Draw neat and labeled diagrams wherever necessary.

Q1) Answer the following: **[10×1=10]**

    a)   Enlist any one objective of farm management.

    b)   What is seed marketing?

    c)   Enlist methods of seed bagging.

    d)   What is chemical seed treatment?

    e)   Define seed processing.

    f)   What is farm business?

    g)   Give the name of any one seed organization in seed marketing.

    h)   Enlist storage containers.

    i)   What is specialized farming?

    j)   Define seed cleaning.

Q2) Answer any two of the following: **[2×5=10]**

    a)   What is bagging? Write in detail any two methods of bagging.

    b)   Describe in detail maintenance of seed processing plant.

    c)   Write an account on general farming for the beginners.

Q3) Write Notes on any two of the following: **[2×5=10]**

    a)   Farm management as personal matter.

    b)   Need of seed treatment.

    c)   Major components of seed marketing.

Q4) Draw a flow chart including various steps in seed processing and describe in detail management of seed processing plant. **[10]**

OR

What is farm management? Explain with the help of graph the place of farm management.

𝓔 𝓔 𝓔