[5522]-301
T.Y. B.Sc.
MATHEMATICS
MT-331: Metric Spaces
(2013 Pattern) (Paper - I) (Semester - III) (91113)

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) Let d be a metric on X. Determine all constants k such that

   i) kd

   ii) $k + d$ is a metric on X.

   b) Show that in a discrete metric space X, every subset is open and closed.

   c) Find the closure of the following subsets in $\mathbb{R}_u$.

   i) $\mathbb{Z}$

   ii) $A = \left\{ 5 + \dfrac{1}{n} \, / \, n \in \mathbb{N} \right\}$

   d) Let X be an infinite set and (X, d) be a discrete metric space. Show that X is not compact.

   e) Give an example of a function f which is continuous and closed, but not a homeomorphism.

   f) Show that (0, 1) is not complete with respect to usual metric space $\mathbb{R}_u$.

   g) Is the set $\{x \in \mathbb{R} / \, |x| > 0\}$ connected in $\mathbb{R}_u$? Justify.

P.T.O.

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

    a)   Let $G_i, 1 \le i \le n$ be a finite collection of open sets in a metric space $(X.d)$.

         Show that $\bigcap\limits_{i=1}^{n} G_i$ is open in X.

    b)   Prove that every closed sphere in a metric space (X, d) is a closed set.

    c)   Let (X,d) be a metric space. For $x, y \in X$ define $d*(x, y) = \dfrac{d(x, y)}{1 + d(x, y)}$.

         Show that $d*$ is a mettric on X.

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

    a)   Let $\{x_n\}$ be a cauchy sequence in a metric space (X, d). Prove that $\{x_n\}$ is convergent if and only if it has a convergent subsequence.

    b)   Let $(X, d), (Y, \rho)$ and (Z, σ) be three metric spaces. Suppose $f : X \to Y$ and $g : Y \to Z$ be continuous functions. prove that $gof : X \to Z$ is continuous function.

    c)   Prove that every totally bounded metric space (X, d) is separable.

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

    a)   i)   Prove that a closed subset of a compact metric space (X, d) is compact.

         ii)   Let (X, d) be a metric space and $\{A_\alpha / \alpha \in \wedge\}$ be a family of connected sets in X, such that $\bigcap\limits_{\alpha \in \wedge} A_\alpha \ne \phi$.

             Prove that $\bigcup\limits_{\alpha \in \wedge} A_\alpha$ is connected.

    b)   i)   Prove that if a metric space (X, d) is sequentially compact, then it has the Bolzano-Weirstrass property.

         ii)   Prove that continuous image of a compact metric space is compact.

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[5522]-302

T.Y. B.Sc.

MATHEMATICS

MT-332: Real Analysis - I

(2013 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.

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

  a)   If B is a countable subset of the uncountable set A, then prove that A-B is uncountable.

  b)   Give an example of a countable bounded subset A of $\mathbb{R}$ whose infimum and supremum are both in $\mathbb{R}$ - A.

  c)   Using definition of limit prove that $\lim_{n \to \infty} \dfrac{1}{\sqrt{n+1}} = 0$.

  d)   Give an example of sequences $\{S_n\}_{n=1}^{\infty}$ and $\{t_n\}_{n=1}^{\infty}$ such that $s_n \to \infty, t_n \to -\infty$ as $n \to \infty$ but $s_n + t_n \to 7$ as $n \to \infty$.

  e)   Does the series $\sum_{n=1}^{\infty} (-1)^{n+1} \dfrac{n}{2n-1}$ converge?

  f)   Show that the sequence $\left\{ \dfrac{1}{e^n} \right\}_{n=1}^{\infty}$ is in l^2.

  g)   Discuss the convergence of the series $\sum_{n=1}^{\infty} \dfrac{n!}{n^n}$.

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

a) If A_1, A_2, A_3, ... are countable sets, then prove that $\bigcup\limits_{n=1}^{\infty} A_n$ is countable.

b) If A and B are subsets of the universal set S, then prove that $(A \cup B)' = A' \cap B'$ and $(A \cap B)' = A' \cup B'$.

c) Let $\{a_n\}_{n=1}^{\infty}$ be a sequence of real numbers and for each $n \in I$, let
$s_n = a_1 + a_2 + ... + a_n$, $t_n = |a_1| + |a_2| + ... + |a_n|$, then prove that if sequence
$\{t_n\}_{n=1}^{\infty}$ is a Cauchy sequence then so is sequence $\{s_n\}_{n=1}^{\infty}$.

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

a) If sequence $\{s_n\}_{n=1}^{\infty}$ converges to L and sequence $\{t_n\}_{n=1}^{\infty}$ converges to
M, then prove that sequence $\{s_n + t_n\}_{n=1}^{\infty}$ converges to L + M.

b) For each $n \in I$, let $I_n = [a_n, b_n]$ be a closed bounded interval of real
numbers such that $I_1 \supset I_2 \supset ... \supset I_n \supset I_{n+1} \supset ...$, and $\lim\limits_{n \to \infty} (b_n - a_n) = 0$,
then prove that $\bigcap\limits_{n=1}^{\infty} I_n$ contains precisely one point.

c) Let $t_n = 1 + \dfrac{1}{1!} + \dfrac{1}{2!} + ... + \dfrac{1}{n!}$, $n \in I$, then show that the sequence $\{t_n\}_{n=1}^{\infty}$ is
convergent.

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

a) i) Prove that the series $\sum\limits_{n=0}^{\infty} x^n$ converges to $\dfrac{1}{1-x}$, if $0 < x < 1$ and
diverges for $x \geq 1$.

ii) Let sequence $\{a_n\}_{n=1}^{\infty}$ be a non increasing sequence of positive real numbers and if the series $\sum_{n=0}^{\infty} 2^n a_{2^n}$ diverges, then prove that the series $\sum_{n=1}^{\infty} a_n$ diverges.

b) i) Let $\{a_n\}_{n=1}^{\infty}$ be a non increasing sequence of positive real numbers such that $\lim_{n\to\infty} a_n = 0$, then prove that the series $\sum_{n=1}^{\infty} (-1)^{n+1} a_n$ converges.

ii) Show that the series $\sum_{n=1}^{\infty} \frac{1}{n(n+1)}$ converges.

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[5522]-303

T.Y. B.Sc.

MATHEMATICS

MT - 333 : Problem Course Based on MT – 331 and MT – 332

(Paper -III) (2013 Pattern) (Semester - III) (91133)

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

Instructions to the candidates:

1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Answer to the two sections should be written in separate answer sheets.*
4) *Tie answer books of both sections together.*

SECTION - I

(Metric Spaces)

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

     i) Does $d(x, \mathrm{y}) = \mathrm{e}^{|x-y|}, x, y \in \mathbb{R}$ define a metric on $\mathbb{R}$? Justify.

     ii) Show that the Euclidean space $\mathbb{R}^n$ is separable.

     iii) Prove that every Cauchy sequence in a discrete metric space is convergent.

     iv) Give an example of a closed subset of $\mathbb{R}_u$ which is neither compact not connected. Justify.

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

     i) Let A and B be subsets of a metric space (X, d). Show that $(A \cap B)^{o} = A^{o} \cap B^{o}$.

     ii) Prove that a function $f : X_d \rightarrow (\mathrm{y}, \rho^{(\mathrm{rho})})$, where X_d is the discrete metric space, is continuous.

P.T.O.

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

    a) Let (X, d) be a metric space. If x, y, z, $W \in X$, then prove that $|d(x, y) - d(z, w)| \leq d(x, z) + d(y, w)$.

    b) Let $\{x_n\}$ and $\{y_n\}$ be sequences in a metric space (X, d) such that $\{y_n\}$ is Cauchy and $d(x_n, y_n) \to 0$ as $n \to \infty$. Prove that $\{x_n\}$ is a Cauchy sequence in X.

    c) Show that $\mathbb{R}$ is not compact with respect to usual metric.

SECTION - II
(Real Analysis)

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

      i) Show that the function $f: \mathbb{R} \to \mathbb{R}$ defined by $f(x) = x^2$ is not one – one.

      ii) Find $N \in I$, so that $\dfrac{1}{\sqrt{n+1}} < 0.03$ when $n \geq N$.

      iii) Find limit superior and limit inferior of the sequence 1, 2, 3, 4, 1, 2, 3, 4, 1, 2, 3, 4, ...

      iv) Does the series $\sum\limits_{n=1}^{\infty} \dfrac{n+1}{10^{10}(n+2)}$ converge or diverge? Justify.

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

      i) If $\{S_n\}_{n=1}^{\infty}$ converges to L, then prove that $\{|S_n|\}_{n=1}^{\infty}$ converges to $|L|$.

      ii) Discuss the convergence of the series $\sum\limits_{n=2}^{\infty} \dfrac{1}{(logn)^n}$.

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

a) If $a_n = \dfrac{1}{\sqrt{n}} + \dfrac{(-1)^{n-1}}{n}$, then show that $\sum\limits_{n=1}^{\infty}(-1)^{n+1}\, a_n$ diverges.

b) If $S_1 = \sqrt{2}$ and $S_{n+1} = \sqrt{2}\sqrt{S_n}$ for $n \geq 1$, then prove that $\{S_n\}_{n=1}^{\infty}$ is convergent.

c) If A and B are countable sets, then prove that the cartesian product A×B is countable.

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[5522]-304

T.Y. B.Sc.

MATHEMATICS

MT-334: Group Theory

(2013 Pattern) (Paper - IV) (Semester - III) (91143)

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)   Show that binary structure $\langle \mathbb{C}, \bullet \rangle$ and $\langle \mathbb{R}, \bullet \rangle$ are not Isomorphic.

   b)   Find all subgroups of $\mathbb{Z}_{18}$.

   c)   Find all orbits of the permutation $\sigma : \mathbb{Z} \to \mathbb{Z}$ of $\mathbb{Z}$, where $\sigma(n) = n - 3$.

   d)   Find the order of (8, 4, 10) in the group $\mathbb{Z}_{12} \times \mathbb{Z}_{60} \times \mathbb{Z}_{24}$.

   e)   Find the maximum possible order for an element of S_7.

   f)   Show that $H = \left\{ e, \begin{pmatrix} 1 & 2 & 3 \\ 1 & 3 & 2 \end{pmatrix} \right\}$ is not a normal subgroup of S_3.

   g)   Find all subgroups of Klein 4-group V.

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

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

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

   c)   Show that the intersection of some subgroups H_i of a group G $i \in I$ is again a subgroup of G, where I is an indexing set.

P.T.O.

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

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

b) Show that , if $n \geq 2$, then the collection of all even permutation of n letters is a subgroup of the group S_n.

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

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

a) i) Show that , following are three equivalent conditions for a subgroup H of a group G to be normal subgroup of G **[6]**

     1) $ghg^{-1} \in H$ for all $g \in G$ and $h \in H$

     2) $gHg^{-1} = H$ for all $g \in G$

     3) $gH = Hg$ for all $g \in G$

   ii) Prove that the group $\mathbb{Z}_m \times \mathbb{Z}_n$ is cyclic if and only if m and n are relatively prime. **[4]**

b) i) Show that $(\mathbb{Z}_4 \times \mathbb{Z}_6) / \langle (0,1) \rangle$ is isomorphic to $\mathbb{Z}_4$. **[4]**

   ii) Let $\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 3 & 1 & 4 & 5 & 6 & 2 \end{pmatrix} \in S_6$ and **[4]**

$$\mu = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 5 & 2 & 4 & 3 & 1 & 6 \end{pmatrix} \in S_6, \text{ then find}$$

     1) $|\langle \sigma \rangle|$

     2) μ^{100}

     3) $\mu \sigma^2$

     4) $\mu \sigma$

   iii) Define: **[2]**

     1) Cyclic group

     2) Simple group

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[5522] - 305
T. Y. B. Sc.
MATHEMATICS
MT - 335 (A): Ordinary Differential Equations (Paper - V)
(2013 Pattern) (Semester - III) (91153)

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) Solve: $\dfrac{d^3y}{dx^3} - \dfrac{d^2y}{dx^2} - 2\dfrac{dy}{dx} + 2y = 0$.

 b) Find a homogeneous linear differential equation with real constant coefficients that is satisfied by $y = e^{-x}\sin x$.

 c) Find particular solution of $y'' + y = \sin x$.

 d) Verify that $y = e^x$ is a solution of $(x-1)y'' - xy' + y = 0$.

 e) Find Wronskian of $y_1 = e^{-x}$ and $y_2 = e^x$.

 f) Classify the singular points in the finite plane for the equation $x^2(x-1)^2(x+3)y'' + xy' - y = 0$.

 g) Find the power series solution of $y' + 5y = 0$.

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

    a) Explain the method of variation of parameters to solve $y'' + p(x)y' + q(x)y = R(x)$.

    b) Solve $y'' + y = \sin x$ using the method of undertermined coefficients.

    c) Find particular solution of $(D^2 + 1)y = \operatorname{cosec} x$ using method of reduction of order.

Q3) Attempt any Two of the following. **[10]**

    a) Solve: $(D^2 - 4)y = 0$; $y(0) = 0$, $y'(0) = 2$.

    b) With usual notation prove that $\dfrac{1}{D^2 + a^2} \cos ax = \dfrac{x}{2a} \sin ax$.

    c) Solve: $(D^2 + 2)y = x^3 + 2$.

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

    a) Find the power series solution of $y'' + x^2 y = 0$.

    b) Solve: $\dfrac{dx}{dt} = 2x - 5y$

             $\dfrac{dy}{dt} = 2x - 4y$.

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[5522]-306
T.Y. B.Sc.
MATHEMATICS
MT-336 : Problem Course Based on MT-334 & MT-335
(2013 Pattern) (Semester - III) (Paper - VI) (91163)

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

Instructions to the candidates:

   1)   *All questions are compulsory.*

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

   3)   *Write both sections on separate answer book and tie together.*

SECTION - I
(Group Theory)

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

    i)   Write down all subgroups of $\mathbb{Z}$.

    ii)   Give an example of cyclic group of order 8 and find all its generators.

    iii) If $\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\ 8 & 2 & 6 & 3 & 7 & 4 & 5 & 1 \end{pmatrix}$ is element of S_8, then express σ as a product of disjoint cycles.

    iv) Find the cosets of <3> in $\mathbb{Z}_{12}$.

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

    i)   Find the number of automorphisms of the group $\mathbb{Z}_8$. Justify your answer.

    ii)   Let $G = \left\{ \begin{bmatrix} a & b \\ c & d \end{bmatrix} \middle/ a,b,c,d \in \mathbb{Z} \right\}$ under addition.

         Let $H = \left\{ \begin{bmatrix} a & b \\ c & d \end{bmatrix} \middle/ a+b+c+d = 0,\ a,b,c,d \in \mathbb{Z} \right\}$. Prove that H is a subgroup of G.

P.T.O.

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

    a)   Determine whether set of $n \times n$ matrices with real entries and determinant 1 or -1 is a subgroup of G.L $(n, \mathbb{R})$.

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

    c)   Let G be a group and a be an element of G. Let $\phi : \mathbb{Z} \to G$ be defined by $\phi(n) = a^n$. Show that ϕ is a homomorphism. Describe the possibilities of $\mathrm{Ker}\,\phi$.

SECTION - II

(Ordinary Differential Equations)

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

        i)   Solve $(4D^2 - 4D + 1)y = 0$.

        ii)   Verify that $y = e^x$ is solution of the differential equation $(x-1)y'' - xy' + y = 0$.

        iii)   Show that $x = 2e^{4t}$, $y = 3e^{4t}$ and $x = e^{-t}$, $y = -e^{-t}$ are linearly independent solutions of homogeneous system $\dfrac{dx}{dt} = 4x - y$, $\dfrac{dy}{dt} = 2x + y$.

        iv)   Find the particular integral of the differential equation $(D^2 - 1)y = e^{2x}$.

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

        i)   Find the general solution of differential equation $(D^2 + 4)y = \cos 2x$.

        ii)   Solve $y'' - y = e^x$ by method of reduction of order.

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

    a)   Solve the differential equation $(D^2 + 1)y = \sin x$ by method of undetermined coefficients.

    b)   Find the general solution of the system

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

$$\frac{dy}{dt} = 4x - 2y$$

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

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[5522] - 307

T. Y. B. Sc

MATHEMATICS

MT - 337 (A): Operations Research

(2013 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 five of the following: **[10]**

a) Write a mathematical formulation of a transportation problem.

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

Max. $Z = x_1 - x_2$

Subject to

$-2x_1 - x_2 \leq -2$

$x_1 + x_2 \leq -1$

and $x_1 x_2 \geq 0$.

c) Use graphical method to show that the following L.P.P. has infeasible solution space.

Max $Z = 3x_1 + 2x_2$

Subject to,

$2x_1 + x_2 \leq 2$

$3x_1 + 4x_2 \geq 12$

$x_1, x_2 \geq 0$.

d) What is the rule for recognizing an alternate optimum solution for the transportation problem?

P.T.O.

e) Justify true or false: Assignment problem is a special case of transportation problem.

f) What is an unbalanced assignment problem? Give an example.

g) Find the initial basic feasible solution of the following transportation problem (T.p.) by using North - West corner method.

Destination

		A	B	C	D	E	Supply
Origin	P	2	11	10	3	7	4
	Q	1	4	7	2	1	8
	R	3	9	4	8	12	9
Demand		3	3	4	5	6	

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

a) Solve the following L.P.P. graphically

Max $Z = 2x_1 + 4x_2$

Subject to

$x_1 + 2x_2 \leq 5$
$x_1 + x_2 \leq 4$
$x_1, x_2 \geq 0$

b) Solve the following L.P.P. by simplex method.

Max $Z = 7x_1 + 5x_2$

Subject to

$x_1 + 2x_2 \leq 6$
$4x_1 + 3x_2 \leq 12$
$x_1, x_2 \geq 0$

c) A firm manufactures two type of product A B and sells it at a profit of Rs. 2/- on type A and Rs. 3/- on type B. Each product is process on two machines M_1 and M_2. Type A require 1 minute processing on M_1 and 2 minutes on M_2 type B requires 1 minute processing on M_1 and 1 minute on M_2. The machine M_1 is available for not more than 6 hrs 40 minutes while M_2 is available for 10 hrs during any working day. Formulate the above problem as linear programming so as to maximize the profit.

Q3) Attempt any Two of the following. [10]

a) Solve the following assignment problem for minimum cost:

Job	Worker				
	W_1	W_2	W_3	W_4	W_5
A	10	3	3	2	8
B	9	7	8	2	7
C	7	5	6	2	4
D	3	5	8	2	4
E	9	10	9	6	10

b) find the optimum solution of the following transportation problem.

Destination

		D_1	D_2	D_3	D_4	Supply
	01	1	2	1	4	30
Origin	02	3	3	2	1	50
	03	4	2	5	7	20
Demand		20	40	30	10	

c) Find the initial basic feasible solution of the following transportation problem by VAM. The entries in the matrix indicate the cost in rupees of transporting a unit from a particular source to a particular destination.

Destination

Source	D_1	D_2	D_3	D_4	Supply
S1	15	18	22	16	30
S2	15	19	20	14	40
S3	13	16	23	17	30
Demand	20	20	25	35	

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

a) Following is a solution to a given transportation problem.

Source	Destination				Supply
	I	II	III	IV	
A	5	10	4 ⑩	5	10
B	6 ⑳	8	7	2 ⑤	25
C	4 ⑤	2 ⑩	5 ⑤	7	20
Demand	25	10	15	5	55

Answer the following by giving reasons.

i) Is this solution feasible?

ii) Is this solution non-degenerate

iii) Is this solution optimal?

iv) Does this problem have more than one optimal solution? If so, find an alternate solution.

b) Solve the following L.P.P. by Big -M method.

Min $Z = 150 x_1 + 150 x_2 + 100 x_3$

Subject to,

$2x_1 + 3x_2 + x_3 \geq 4$
$3x_1 + 2x_2 + x_3 \geq 3$
$x_1, x_2, x_3 \geq 0$

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[5522]-308

T.Y. B.Sc.

MATHEMATICS

MT - 337 (B) : Dynamical Systems

(2013 Pattern) (Semester - III)

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

Instructions to the candidates:

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

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

a) Give an example of a system of differential equations for which $\left(e^{2t},\ e^{-t}\right)$ is a solution.

b) Find stable and unstable line of the system $X^1 = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix} X$.

c) Find the straight line solutions of the system $X^1 = \begin{bmatrix} 1 & 3 \\ 1 & -1 \end{bmatrix} X$.

d) Show that $\exp\left(\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}\right) = \begin{bmatrix} e & 0 \\ 0 & e \end{bmatrix}$.

e) Sketch the direction field associated to the system $x = x^1$ and $y = y^1$.

f) Is the equilibrium point $(0, 0)$ a source for the system $X^1 = \begin{bmatrix} -1 & 2 \\ 0 & 3 \end{bmatrix} X$.

g) Define strong eigen value and weak eigen value of a system of differential equation.

Q2) Attempt any two of the following [10]

    a) Let A be a 2 × 2 matrix for which λ is the only eigen value. Show that

        there exists a 2 × 2 matrix T such that $T^{-1}AT = \begin{bmatrix} \lambda & 1 \\ 0 & \lambda \end{bmatrix}$.

    b) Find the general solution of $X^1 = AX$ and sketch the phase portrait if

        $A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$.

    c) If V_0 is an eigen vector of an n × n matrix A with associated eigen value λ, then show that $X(t) = e^{\lambda t} V_0$ is a solution of the system $X^1 = AX$.

Q3) Attempt any two of the following. [10]

    a) Show that the system $X^1 = AX$ where $A = \begin{bmatrix} 0 & \beta \\ -\beta & 0 \end{bmatrix}$ has general solution

        $X(t) = C_1 \begin{pmatrix} \cos \beta t \\ -\sin \beta t \end{pmatrix} + C_2 \begin{pmatrix} \sin \beta t \\ \cos \beta t \end{pmatrix}$.

    b) Let A be a 3 × 3 matrix for which λ is the only eigen value. If Ker $(A - \lambda I)$ has dimention 2, then show that there exists a 3 × 3 matrix T such that

        $T^{-1}AT = \begin{bmatrix} \lambda & 1 & 0 \\ 0 & \lambda & 0 \\ 0 & 0 & \lambda \end{bmatrix}$.

    c) Find the matrix T that puts $A = \begin{bmatrix} 4 & 4 \\ -1 & 0 \end{bmatrix}$ in its canonical form.

Q4) Attempt any Two of the following. [10]

a) Compute the exponential of the matrix $A = \begin{bmatrix} 5 & -6 \\ 3 & -4 \end{bmatrix}$.

b) Let A, B and T be a n × n matrices. Show that

   i) If $B = T^{-1} AT$ then exp $B = T^{-1}$ exp (A) T.

   ii) If AB = BA then (exp A) B = B (exp A).

c) Prove that if λ, μ are real distinct eigen values of a 2 × 2 matrix, then any non - zero column of the matrix A–λI is an eigen vector for μ.

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[5522]-309
T.Y. B.Sc.
MATHEMATICS
MT-337 (C) : C Programming-I
(Semester III) (2013 Pattern)

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)   Which of the following are valid identifiers? If not Justify.

      i)   else

      ii)   Good

   b)   What is meant by compilation?

   c)   What is meant by operator precedence?

   d)   What is the purpose of scanf function?

   e)   What useful information is provided by prompts?

   f)   Write a loop using a while statement that will calculate the sum of every integer, begnining with i=2 for all values of i less than 100.

   g)   How is an array name interpreted when it is passed to a function.

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

   a)   Write a short note on logical operators.

   b)   Write a short note on do-while loop.

   c)   Write a C program to compute ^nC_r.

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

    a)   What is the purpose of put char function? How it is used within a C program?

    b)   Write a short note on conditional operator. Explain with example.

    c)   Write a C program to interchange two rows of the given matrix of order 3.

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

    a)   i)   Explain the use of switch statement.

           ii)   Write a C program to reverse a string.

    b)   i)   Write a short note on one-dimensional array.

           ii)   Define a function to final gcd of two numbers.

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[5522]-310

T.Y. B.Sc.

MATHEMATICS

MT-337 (D): Lattice Theory

(2013 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) Attempt any five of the following: **[10]**

    a)   Define $m \le n$ if and only if m/n for all $m, n \in N_o = \{1, 2, 3, 4, 6, 12\}$ .Draw the diagram of the poset $\langle N_o, \le \rangle$.

    b)   Let $\phi : P \to Q$ be a on to map, where P and Q are posets. Suppose $x \le y$ if and only if $\phi(x) \le \phi(y)$. Then prove that ϕ is one-one.

    c)   Define sublattice of a lattice. True or False: Union of two sublattices need not be sublattice. Justify.

    d)   Find all join irreducible elements of the lattice M_3.

    e)   Give an example of nondistributive, non modular lattice.

    f)   Prove that in a Boolean lattice $(x \wedge y)' = x' \vee y'$.

    g)   Prove that in a lattice with finitely many elements every ideal is principal.

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

    a)   Draw the subgroup lattice sub G and shade the elements of N-sub G for group of permulations on three symbols S_3.

    b)   Let L be a lattice. Prove that L is a chain if and only if every non-empty subset of L is a sublattice.

    c)   Draw Hasse diagram of following posets

       i) $\bar{1} \oplus \bar{2} \oplus \bar{3}$

       ii) $M_2 \bigcup M_3$

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

a) Let P be an antichain. Prove that set of all down sets of P is some as set of all subsets of P.

b) Prove that the homomorphic image of modular lattice is modular.

c) Let L be a lattice satisfying D.C.C. Suppose $a, b \in L$ and $a \nleq b$. Prove that there exists $x \in \mathcal{J}$ (L) such that $x \leq a$ and $x \nleq b$.

Q4) Attempt any one of the following:

a) i) If L is a distributive lattice then prove that every sublattice of L is distributive **[3]**

    ii) Prove that the lattice L is non modular if and only if N_5 is sublattice of L. **[7]**

b) i) Let $f : L \rightarrow K$ be a lattice homomorphism and M be a sublattice of L. Prove that f (M) is a sublattice of k. **[5]**

    ii) Express the function $[(x \wedge y')' \vee z'] \wedge (x' \vee z)'$ in the disjunctive normal form. **[5]**

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[5522]-311

T.Y. B.Sc.

MATHEMATICS

MT-337(E) : Financial Mathematics

(2013 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.

   3)   Use of non-programmable calculator is allowed.

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

   a)   Explain the term return matrix.

   b)   Suppose the supply function is given by $q^s(p) = \dfrac{13}{2}P - 10$. Suppose the government imposes an excise tax of Rs. 20 per unit. Write the new supply function.

   c)   Derive the principle : At the startup point, marginal cost is equal to average variable cost.

   d)   An amount of Rs. 1,000 is invested and attracts interest at a rate of 10% p.a. Find the total after 1 year if the interest is compounded monthly.

   e)   Define : Perfect competition, monopoly.

   f)   Determine whether the cobweb model predicts stable or unstable equilibrium for $q^s(p) = 2p - 3$, $q^p(p) = 18 - p$.

   g)   Find the equilibrium set for

        D = {$(q, p) \mid q - 2P = 3$} and

        S = {$(q, p) \mid 3q + 5P = 20$}.

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

a)   Suppose you have won a competition and that you are given a choice between Rs. 1,00,000 now or payment of Rs. 20,000 at the end of each year for the next seven years. Which prize should you choose assuming that the highest interest rate you can obtain constant 7% p.a. over 7 years?

b)   Consider S = $\{(q, P) \mid 2p - 3q = 12\}$ and D = $\{(q, p) \mid 2p + q = 20\}$. Write down the recurrence equation which determine the sequence p_t of prices assuming that the suppliers operate according to the cobweb model. Find the explicit solution given that $p_0 = 10$. Write down a formula for q_t, the quantity on the market in year t.

c)   Suppose S = $\{(q, p) \mid q - 3p = -1\}$ and D = $\{(q, p) \mid q + p = 2\}$. Write down p^S, p^D, q^S, q^D and verify that for any p, q we have $(p^S q^S)p = p$ and $(p^D q^D)p = p$.

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

a)   Find the maximum and minimum values of the function $f(x) = x^4 - 8x^3 + 16x^2 - 7$ in the interval $[1, 4]$.

b)   Calculate the elasticity of demand when the demand function is $q^D(p) = 70 - 4p$. For what range of values of p is your expression valid and for which of these values is the demand inelastic?

c)   A factory makes two goods A and B. To make Rs. 1 worth of A requires Rs. 0.2 worth A and Rs. 0.1 worth of B and to make Rs. 1 worth of B requires Rs. 0.05 worth of A and Rs. 0.1 worth of B. There is a market demand for Rs. 750 worth of A and Rs. 500 worth of B. What should be the total production of each to meet market demand?

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

a)   Suppose that beta and Co. is an efficient firm with cost fucntion $C(q) = q^3 - 10q^2 + 100q + 196$ and suppose maximum level of weekly production is L = 10. Determine : their fixed cost, their profit function, their startup point, their breakeven point, their supply set.

b) i) Suppose an investor invests her money in three different assets and that three possible states can occur. Show that there is no state price vector for the return matrix.

$$R = \begin{pmatrix} 1.05 & 1.20 & 1.10 \\ 1.05 & 1.05 & 1.05 \\ 0.90 & 1.05 & 0.95 \end{pmatrix}$$

Find an arbitrage portfolio.

ii) Suppose that the national economy is described by the following IS-LM equations where the symbols have their usual meaning.

$C = 30 + 0.2Y, \ I = 10 - 20r,$

$M_d = 5 + 0.1Y - 10r, \ M_s = 10, \ G = 10.$

Find the equilibrium values Y* and r*.

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[5522]-312

T.Y. B.Sc.

MATHEMATICS

MT - 337 (F) : Number Theory

(2013 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) Attempt any five of the following.   **[10]**

a) If $(a, b) = 1$, then prove that $(a+b, a - b) = 1$ or 2.

b) If 2^m-1 is a prime, then prove that m is a prime.

c) Find the remainder when $1! + 2! + 3! + ... + 79! + 80!$ is divided by 8.

d) Show that n^7-n is divisible by 42, for any integer n.

e) Find the highest power of 13 that divides 20000!.

f) Find a positive integer n such that $\mu(n) + \mu(n+1)+\mu(n+2)=3$.

g) Find n in the Gauss lemma for $\left(\dfrac{5}{13}\right)$.

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

a) Find greatest common divisor of 12378 and 3054. Also find integers x and y such that $(12378, 3054) = 12378x + 3054 y$.

b) Prove that number of primes is infinite.

c) State and prove Chinese Remainder theorem.

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

a) For any positive integer n, prove that $\sigma(n) = \prod_{p^\alpha \| n}\left(\dfrac{p^{\alpha+1} -1}{p -1}\right)$.

b) If a cock is worth Rs.5, a hen Rs. 3 and three chicks together Rs.1, how many cocks, hens and chicks totalling 100 can be bought for 100 rupees.

c) If p and q are distinct odd primes then prove that $\left(\dfrac{p}{q}\right)\left(\dfrac{q}{p}\right)=(-1)^{\left(\frac{p-1}{2}\right)\left(\frac{q-1}{2}\right)}$.

P.T.O.

Q4) Attempt any one of the following

a) i) Let p denote a prime. Then prove that $x^2 \equiv -1 \pmod{p}$ if and only if $p = 2 \pmod 4$ or $p \equiv 1 \pmod 4$. **[7]**

ii) Prove that $61! + 1 \equiv 0 \pmod{71}$. **[3]**

b) i) Prove that the positive primitive solutions of $x^2 + y^2 = z^2$ with y even are $x = r^2 - s^2, y = 2rs, z = r^2 + s^2$, where r and s are arbitrary integers of opposite parity with $r > s > 0$ and $(r, s) = 1$. **[5]**

ii) Let $f(n)$ be a multiplicative function and let $F(n) = \sum_{d|n} f(d)$, then

prove that F(n) is multiplicative. **[5]**

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[5522]-313

T.Y. B.Sc.

PHYSICS

PH-331 : Mathematical Methods in Physics-II

(Semester-III) (2013 Pattern) (Paper-I)

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

Instructions to the candidates:

　　1) *All questions are compulsory.*

　　2) *Draw neat diagrams wherever necessary.*

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

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

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

　　a)　State transformation equations between cartesian and spherical polar co-ordinate system.

　　b)　State expression for gradient($\nabla \psi$)in curvilinear co-ordinate system.

　　c)　What is time dilation?

　　d)　Define non-inertial frame of reference.

　　e)　What is ordinary differential equation?

　　f)　State degree and order of differential equation.

$$\left(\frac{d^2 y}{dx^2}\right)^3 + \frac{dy}{dx} + xy^2 = 0$$

　　g)　Show that $\nabla.\vec{r} = 3$

　　h)　State generating function for the Bessel function of first kind.

　　i)　Show that $P_n(1)=1$

　　j)　State importance of special functions in Physics.

Q2) Attempt Any one of the following.   **[10]**

　　a)　Prove that, $H'_n(x) = 2nH_{n-1}(x)$

　　b)　A rocket ship leaves the earth at a speed of 300 m/s. How many years must elapse before a clock in the ship and one on ground differ by 1 sec.

c) Show that the point x=0 is a regular singular point of the Bessel differential equation.

$$x^2 y'' + xy' + (x^2 - n^2)y = 0$$

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

a) Prove that

$$np_n(x) = xp'_n(x) - p'_{n-1}(x)$$

b) For spherical polar co-ordinate system,

$$x = r\sin\theta\cos\phi$$
$$y = r\sin\theta\sin\phi$$
$$z = r\cos\theta$$

verify the mutual orthogonality of $\dfrac{d\vec{r}}{\partial r}, \dfrac{\partial\vec{r}}{\partial\theta}, \dfrac{\partial\vec{r}}{\partial\phi}$

c) Calculate kinetic energy of an electron moving with a velocity of 0.98 times the velocity of light in the laboratory.

Q4) a) Attempt any one of the following. **[8]**

i) Represent $\vec{A} = y\hat{i} - z\hat{j} + x\hat{k}$

in spherical polar co-ordinates. Hence calculate $Ar, A\theta$ & $A\phi$.

ii) Obtain power series solution of

$$y'' - 2xy' + 2\lambda y = 0 \text{ for } x=0$$

b) Attempt any one of the following. **[2]**

i) State postulates of special theory of relativity.

ii) Define: 1) Co-ordinate surface.

2) Co-ordinate lines.

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[5522]-314

T.Y. B.Sc.

PHYSICS

PH-332: Solid State Physics

(2013 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) *Draw neat diagrams wherever necessary.*
4) *Use of log tables and calculators is allowed.*

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

   a)   Define curie temperature.

   b)   Define packing fraction.

   c)   What is Fermi level and Fermi energy?

   d)   Give the principle of photoelectron spectorscopy.

   e)   Why conductivity of metal decreases with increases in temperature.

   f)   Give any two applications of SEM.

   g)   What is Neel temperature?

   h)   What are domains?

   i)   Determine the number of atoms per unit cell for a simple cubic crystal.

   j)   Sketch (100) planes in simple cubic unit cell.

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

   a)   What are Miller indices of the plane? How they are determined?

   b)   On the basis of band theory distinguish between insulators, semiconductors and metals.

   c)   Write a note on Ferromagnetic materials. Give their examples.

P.T.O.

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

a) A FCC crystal has an atomic radius of 1.246 Å What are d_{200}, d_{200} and d_{111} spacings?

b) The distance between (111) planes in a face centred cubic crystal is 2 Å. Determine the lattice parameter and atomic diameter.

c) Calculate the magnetization of 1 gram of oxygen gas at normal temperature and pressure in the earth's magnetic field. The susceptibility of the oxygen is 2.1×10^{-26} and earth magnetic field is 5×10^{-5} tesla. ($\mu_o = 4\pi \times 10^{-7}$ SI unit)

Q4) a) Attempt any one of the following (Eight marks each): **[8]**

i) With suitable diagram explain scanning Electron microscope.

ii) Describe Hall effect. Obtain an expression for Hall angle.

b) Attempt any one of the following (Two marks each): **[2]**

i) Give co-ordination number for SC and FCC structure.

ii) Distinguish between Type -I and Type - II superconductor.

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[5522]-315

T.Y. B.Sc.

PHYSICS

PH - 333 : Classical Mechanics

(Paper -III) (2013 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.*

   3)   *Draw neat diagram wherever necessary.*

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

Q1) Attempt all of the following.(One mark each)   **[10]**

   a)   Define range of projecticle.

   b)   Define time of flight of the projectile.

   c)   State Kepler's third law.

   d)   What is geosynchronous orbit?

   e)   Define impact parameter.

   f)   Define term total cross-section in scattering process.

   g)   Give example of holonomic constraint.

   h)   Define cyclic co-ordinates.

   i)   What is generating function?

   j)   Write Jacobi's identity.

Q2) Attempt any two.(Five marks each) **[10]**

    a)   Obtain the expression for range and time of flight of a projectile in non-resistive medium.

    b)   Show that the square of period of the satellite is proportional to the cube of the radius of the orbit.

    c)   Using Lagrange's equation, obtain equation of motion of a simple pendulum.

Q3) Attempt any two.(Five marks each) **[10]**

    a)   An electron that has velocity $\vec{V} = (2\times10^{6})\hat{i}+(3\times10^{6})\hat{j}$ in m/s moves through magnetic field of induction

          $\vec{B} = (0.04)\hat{i} - (0.12)\hat{j}$ in Tesla. Find the force acting on the electron.

    b)   If H is Hamiltonian, then obtain Hamilton's equations of motion in Poisson's bracket notation.

    c)   A geostationary satellite is orbiting the earth at a height of 11 R_e above the surface of earth, where R_e is radius of the earth. Calculate the time period of another satellite at a height of 5 R_e from the surface of earth.

Q4) a)   Attempt any one. (Eight marks each) **[8]**

        i)   Define the elastic and in elastic scattering processes. Obtain Q value equation in inelastic scattering process.

        ii)   Write the Hamiltonian of the system in terms of Lagrangian. Obtain Hamilton's canonical equations of motion.

    b)   Attempt any one.(Two marks each) **[2]**

        i)   State and explain D' Alembert's principle.

        ii)   State principle of virtual work.

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[5522]-316

T.Y. B.Sc.

PHYSICS

PH-334: Atomic and Molecular Physics

(2013 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) *Use of log tables and calculators is allowed.*

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

a) Find the values ml for given l =3.

b) What is anomolous Zeeman effect?

c) State the moseley's law in X-rays.

d) Define the reduced mass of diatomic molecule.

e) What are three major types of molecular spectra.

f) What is Rayleigh scattering.

g) Give the electron configuration for Boron (Z=5)

h) Give the four quantum numbers to specify the state of electron in an atom.

i) Find the S-value for 3_{D_1} atomic state.

j) What is L-S coupling?

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

a) Give the comparison between optical spectra and X-ray spectra.

b) Discuss the experimental set-up of normal Zeeman effect with neat diagram.

c) State and prove the Lande's interval rule and represent it graphically for $3_{D_{123}}$ state.

P.T.O.

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

a) Electrons are accelerated in X-ray machine through the potential difference of 150 kV. Calculate the minimum wavelegth of X-ray line present in the spectrum. Given: $C = 3 \times 10^8$ m/s, $e = 1.6 \times 10^{-19}$C $h = 6.64 \times 10^{-34}$ J.S.

b) Calculate the total energy of an electron in the ground state ($n = 1$) in hydrogen atom. The mass and charge of an electron are 9.1×10^{-31} kg and 1.6×10^{-19}C respectively. Given : $h = 6.64 \times 10^{-34}$ J.S, $\varepsilon_o = 8.85 \times 10^{-12}$.

c) Obtain an expression for vibrational energy levels of diatomic molecule in the following form: $E_V = \left(V + \dfrac{1}{2}\right)\dfrac{h}{2\pi}\sqrt{\dfrac{k}{\mu}}$

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

i) What is Raman effect? Discuss the Experimental arrangement to observe the Raman effect.

ii) Discuss the different series in sodium spectra with the help of energy level diagram. Explain different selection rules for electron transitions.

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

i) State and explain second postulate of Bohr's theory of hydrogen atom.

ii) State and explain Pauli's exclusion principle.

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[5522]-317

T.Y. B.Sc.

PHYSICS

PH-335: Computational Physics

(2013 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 electronic calculator or log table is allowed.

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

a) State the names of two high level languages.

b) Write the syntax of putchar.

c) Give two examples of string constant.

d) What is break; statement.

e) Define unary operators.

f) State the storage classes in C.

g) Define pointer.

h) What is the importance of initgraph function in graphics?

i) What is truncation error?

j) What are identifiers?

Q2) Attempt any two of the following:

a) Write a C program to print factorial of given number. **[5]**

b) Explain pointer variable with example. **[5]**

c) What is function prototype? Explain it with the help of suitable example.**[5]**

Q3) Attempt any two of the following:

a) Write a C program to draw the concentric circle at the center of screen. **[5]**

b) Evaluate $\int_0^2 \dfrac{x}{\sqrt{2+x^2}}\,dx$ using Trapezoidal rule. **[5]**

c) What is operator? Explain any two operators in brief. **[5]**

Q4) a) Attempt any one of the following:

    i)   1) What is flowchart? Draw different symbols to represent their function. **[4]**

          2) Solve using Bisection-method **[4]**

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

    ii)   1) Describe Simpson's $\left(\frac{1}{3}\right)^{rd}$ method of computing integral. **[4]**

          2) Explain do-while loop with suitable example.. **[4]**

   b) Attempt any one of the following:

    i) Define key words. Give two examples. **[2]**

    ii) Find the output of the following program **[2]**

```
# include <stdio.h>
main ( )
{
    int i ;
    for (i = 1; i < = 5 ; i = i + 1)
    printf (" %d \n", i);
}
```

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[5522] - 318

T.Y.B.Sc. (Regular)

PHYSICS

PH - 336 (A) : Astronomy and Astrophysics

(2013 Pattern) (Semester - III) (Elective - I) (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) *Use of log table and calculator is allowed.*

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

   a)   What are Meteores?

   b)   How do we calculate temperature from Wein's law?

   c)   Which type of spectra is observed in 'M' stars?

   d)   What are Globular clusters?

   e)   State difference between transit and occulatation.

   f)   Give Doppler effect in light.

   g)   What is Annulas eclipse a rare event?

   h)   What is cosmic microwave background radiation?

   i)   What are pecular galaxies?

   j)   What are promineances?

P.T.O.

Q2) Attempt any two

    a)   What is meant by solar maxima and solar minima? **[5]**

    b)   Explain photospheric phenomenon on the sun. **[5]**

    c)   Describe Butterfly diagram in detail. **[5]**

Q3) Attempt any two :

    a)   Write a short note on Quasar Red Shift. **[5]**

    b)   Describe cephaid variables. **[5]**

    c)   Explain the Cassegrain Reflector Telescope. **[5]**

Q4) a)   Attempt any one

        i)   Explain the formation of Heavier element in stars. **[8]**

        ii)   Describe in detail the working of CCD Camera. **[8]**

    b)   Attempt any one

        i)   What is a Neutron star? **[2]**

        ii)   What is 'Helium Flash'? **[2]**

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P643

[5522] - 318

T.Y.B.Sc. (Regular)

PHYSICS

PH - 336 (B) : Elements of Material Science

(2013 Pattern) (Semester - III) (Elective - I) (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 neat diagrams wherever necessary.*

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

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

a) Define the term 'Ductility'.

b) State thermal properties of materials.

c) What do you understand by elastic deformation.

d) Define Degree of polymerization.

e) State any two applications of polymers.

f) What is AX-structure?

g) What are ferrites?

h) State 'Lever Rule'.

i) State Gibb's phase rule.

j) State any two properties of smart materials.

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

a) Draw and explain phase Diagram of sugar-water solution.

b) Differentiate between Elastic Deformation and Plastic deformation.

c) The compound CsBr has the same structure as CsCl the centres of the two unlike ions are separated by 0.37 nm. what is the density of CsBr?

Given : Atomic mass of Cs = 132.9 amu

Atomic mass of Br = 79.9 amu.

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

a) A brine solution contains 9% NaCl. How many grams of water (per 100 gm brine) must be evaporated before the solution becomes saturated at 50°C.

Given : wt. of H_2O in brine = 91% H_2O by weight

solubility of NaCl = 27% at 50°C.

b) Consider a syrup made with 18 gm of water (M = 18 amu) containing 10 times the molecules contained in the 18 gm of sugar (M = 180 amu). Based on this 50/50 weight ratio. Calculate average molecular weight on number fraction basis.

c) The coefficient of diffusivity of Aluminium in Copper solution is 4×10^{-5} m²/sec at 750°C. The activation energy per atom is 3×10^{-19} J/atom. Determine diffusivity related to temp.

Given K = 13.8×10^{-24} J/atom.K

Q4) a) Attempt any one of the following. **[8]**

i) What are the types of phase diagram? Explain lens type Cu-Ni phase diagram.

ii) Discuss the electrical behaviour of ceramics.

b) Attempt any one of the following. **[2]**

i) State any two properties of ceramic materials.

ii) State any two applications of smart materials.

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P643

[5522] - 318

T.Y.B.Sc. (Regular)

PHYSICS

PH - 336 (C) : Motion Picture Physics

(2013 Pattern) (Semester - III) (Elective - I) (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 neat diagrams wherever necessary.*

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

    a)   What is zoom lens?

    b)   What do you mean by master print?

    c)   What are the camera movements?

    d)   What is contact printing?

    e)   What is large format?

    f)   Draw a D-logE curve.

    g)   List various parts of projector.

    h)   What is synchronizer?

    i)   State the main role of intermittant in movie camera.

    j)   What is wide angle lens?

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

    a)   Explain various filters used in colour photography.

    b)   Explain Laboratory special effects.

    c)   Explain movie camera and its essential parts.

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

    a)   Draw neat labelled diagram of stages of focal plane shutter and explain in brief.

    b)   Explain additive and subtractive methods.

    c)   Explain Freeze action and reverse motion.

Q4) a)   Attempt any one of the following. **[8]**

        i)   Explain construction and working of S.L.R. camera in details.

        ii)   Explain the B/W projection print technique with enlarger in details.

    b)   Attempt any one of the following. **[2]**

        i)   What is mirror shot?

        ii)   What is Fed?

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P643

[5522] - 318

T.Y.B.Sc. (Regular)

PHYSICS

PH - 336 (D) : Biophysics

(2013 Pattern) (Semester - III) (Elective - I) (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 neat diagrams wherever necessary.*
4) *Use of calculator is allowed.*

Q1) Attempt all of the following. **[10]**

a) What is mean by adsorption?

b) State any two names of amino acids.

c) State various chemical components of DNA.

d) What is Codon?

e) Define the term 'Transducers'.

f) State the full name (form) of ECG and EEG.

g) State any two properties of bioelectrodes.

h) What do you mean by 'Half cell potential'?

i) Define the term 'Biometry'.

j) What is biostatistics?

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

    a)   Explain the structure and properties of proteins.

    b)   Discuss polarizable and non-polarizable electrodes.

    c)   Explain the construction and working of centrifuge machine.

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

    a)   Describe the functional aspects of Mitochondria.

    b)   With the help of block diagram, Explain working of ECG machine.

    c)   Explain NMR as the method for structure determination of biomolecule.

Q4) a)   Attempt any one of the following. **[8]**

        i)   Define Gain, Noise, CMRR and calibration. Discuss the construction and working of capacitive transducers.

        ii)   State the working principle of an electron microscopy. Explain working of SEM and TEM.

    b)   Attempt any one of the following. **[2]**

        i)   State the applications of Radioactivity.

        ii)   Explain the term Redox couple.

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P643

[5522] - 318

T.Y.B.Sc. (Regular)
PHYSICS
PH - 336 (E) :Renewable Energy Sources
(2013 Pattern) (Semester - III) (Elective - I) (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) *Use of log tables and calculators is allowed.*

Q1) Attempt all of the following.   **[10]**

a) Give any two limitations of solar energy.

b) Define solar efficiency.

c) State visible radiation wavelength range in electromagnetic spectrum.

d) What is principle of solar dryer?

e) State photovoltaic principle.

f) What is Batch fermentation?

g) Give two advantages of fixed done type biogas plant.

h) State any two advantages of using wind energy.

i) Give the main elements of multi-blade type wind machine.

j) Write any two factors affecting bio-digestion.

Q2) Attempt any two. **[10]**

    a)   With neat diagram explain working of Domestic Solar water heater.

    b)   State types of solar cell, explain working of P-n junction solar cell.

    c)   What is biomass? Explain two methods to obtain energy from biomass.

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

    a)   Calculate the fill factor of solar cell using following data

        $V_{oc} = 600$ mV, $I_{sc} = 60$ mA, $V_m = 500$ mV, $I_m = 40$ mA.

    b)   With neat diagram explain construction and working of Downdraft gasifier.

    c)   Explain rotor type wind machine with diagram.

Q4) a)   Attempt any one   **[8]**

      i)   With suitable diagram, discuss the structure of Sun and explain the spectral distribution curve of solar radiation at the earth surface.

      ii)   Explain flat plate collector and concentrating collector with neat diagram.

    b)   Attempt any one.   **[2]**

      i)   Draw the neat diagram of floating Gas-Holder type Biogas plant.

      ii)   Determine angular divergence, if the radius of Sun surface is 6.96×10^8 m and mean earth sun distance is 1.5×10^{11} m.

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P643

[5522] - 318

T.Y.B.Sc. (Regular)

PHYSICS

PH - 336 (F) : Applied Optics

(2013 Pattern) (Semester - III) (Elective - I) (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 neat diagrams wherever necessary.*

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

Q1) Attempt all of the following. **[10]**

a) State the principle of operation of photoemissive detector.

b) What is bolometer?

c) Write the Len's maker formula for a thin convex lens.

d) What is positive crystal?

e) What are the conditions for steady interference pattern?

f) State Malus law.

g) State the principle of hologram.

h) What is a matrix?

i) What is the unit of attenuation?

j) What is diffraction?

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

   a) Describe the construction and action of Nicol prism.

   b) Give the difference between photography and holography.

   c) Explain the phenomenon of interference in thin film due to transmitted light.

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

   a) Refractive index of glass is 1.5. Calculate Brewster's angle for it. Also calculate the angle of refraction.

   b) What is the radius of a first zone plate of focal length 0.2 m for a light of wave length 5000 A°.

   c) Using Fermat's principle explain the laws of refraction.

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

     i) What do you mean by single mode and multimode fibers? Explain the propagation of light in Fibers.

     ii) Discuss the intensity distribution of Fabry-Perot interference Fringes. Find the ratio of I_{max} to I_{min}.

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

     i) Give the applications of polaroid.

     ii) Differentiate between Fresnel and Fraunhofer type of diffraction.

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[5522]-319

T.Y. B.Sc.

CHEMISTRY

CH-331 : Physical Chemistry

(Semester III) (2013 Pattern) (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.*
4) *Use of calculator and logarithmic table is allowed.*
5) *Actual calculation must be shown while solving the problems.*

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

    a)   Define energy of activation.

    b)   Write exponential form of Arrhenius equation.

    c)   Define dipole moment.

    d)   What is the selection rule for rotational spectra.

    e)   Calculate the reduced mass of $^{1}H^{79}Br$

    f)   Why alternating current is used in conductance measurements?

    g)   Calculate area of cross-section of platinum electrode. If the cell constant is 0.3822 cm^{-1} and distance between electrode is 1.72 cm

    h)   Transport number of Mg^{+2} ion is 0.32, calculate transport number of sulphate ion.

    i)   Calculate the degree of freedom(F) for the system having P = 2 & c = 1.

    j)   What is degree of freedom.

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

      i)   Explain the graphical method for the determination of order of reaction.

      ii)   Discuss the graphical method for the determination of dipole moment.

      iii)   How solubility of sparingly soluble salt is determined by conductance measurement?

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

i) The rate constant of a certain reaction are $4.30 \times 10^{-5}\,s^{-1}$ and $6.69 \times 10^{-2}\,s^{-1}$ at 300K and 500K respectively. Calculate the energy of activation of the reaction R=1.987

ii) The density of acetic acid is $1.054\ gm\ cm^3$ and the refractive index for Na-D line is 1.3722 at 20°C. Calculate molar refraction of acetic acid. (mol.wt. of acetic acid=60)

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

a) Define third order reaction. Give its characteristics in detail.

b) Explain wheat-stone bridge method for the determination of unknown resistance of solution with suitable diagram.

c) What is phase diagram? Explain the graph of variation of vapour pressure of a liquid with temperature.

Q4) a) Explain and Derive the vibrational spectra for the transition of vibration level V to V+1 for a diatomic molecule. **[6]**

OR

i) Explain in detail Assymmetric effect.

ii) Explain different types equilibria in connection with phase rule.

b) Solve the following (Any one) **[4]**

i) The molecules of $^{1}H^{35}Cl$. Show a strong absorption line of wavelength 3.465×10^{-4} cm. Assuming origin of line due to vibration. Calculate the force constanst for HCl bond.

ii) At 25°C, the equivalent conductance of 0.1 N acetic acid is $5.2\ cm^2$ ohm^{-1} equivalent^{-1}. The conductance at infinite dilution is $390.7\ cm^2$ ohm^{-1} equivalent^{-1}. Calculate the dissociation constant of acetic acid at 25°C.

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[5522]-320

T.Y. B.Sc.

CHEMISTRY

CH-332: Inorganic Chemistry

(2013 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) *Draw neat diagrams wherever necessary.*
4) *Use of log tables and calculators are allowed.*
5) *Atomic numbers: B = 5, N = 7, Al = 13, Cr = 24, Fe = 26, Co = 27, Ni = 28, Rh = 45.*

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

a) Calculate the bond order for B_2 molecule.

b) Define complex.

c) Calculate CFSE for d^6 strong field octahedral complexes.

d) Define B.M.O.

e) What is the oxidation state of Co in $[Co(NH_3)_5 Cl] Cl_2$.

f) Calculate EAN for $[Cr (CN)_6]^{-3}$ ion.

g) Give the M.O. configuration of N_2 molecule.

h) Give the example of Linkage isomers.

i) What type of hybridisation is shown by $[Ni(NH_3)_6]^{+2}$ ion.

j) Draw the crystal field splitting diagram for Td complexes.

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

i) Distinguish between atomic and molecular orbitals.

ii) Explain the formation of $[Fe(CO)_5]$ on the basis of V.B.T.

P.T.O.

iii) Write the IUPAC names of the following complexes.

1) $[Cr(en)_3]Cl_3$.

2) $[(NH_3)_5 Co. NH_2. Co(NH_3)_5] (NO_3)_5$

3) $K_3[Al(C_2O_4)_3].3H_2O$

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

i) Sketch MO's formed from the combination of S and P atomic orbitals.

ii) Give the assumptions of CFT.

iii) Mention any four applications of coordination compounds.

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

a) Explain the chemical innertness of N_2 molecule on the basis of MOT.

b) Explain the term Inner and outer orbital complexes with suitable examples.

c) Describe the geometrical isomerism in Octahedral complexes containing monodentate ligands.

Q4) a) Give the symmetry symbols for s, p and d orbitals. Explain the formation of $[Co(CN)_6]^{-3}$ complex ion without pi bonding with the help of MOT.**[6]**

OR

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

i) Discuss the factors affecting on the stability of the metal complexes.

ii) Write a note on - electroneutrality principle.

b) For Rh^{+3} ion the electron pairing energy P is 30,000 cm^{-1}. The crystal field energy of octahedral Rhodium complex with chloro and ethylene diammine ligands are 20,300 cm^{-1} and 34,600 cm^{-1} respectively. State which complex is high spin and low spin. Calculate magnetic moment for each complex using splitting diagram. **[4]**

OR

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

i) Draw the optical isomers in the $[Co(OX)_3]^{-3}$ ion.

ii) Give the postulates of Werner's theory.

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[5522]-321

T.Y. B.Sc.

CHEMISTRY

CH - 333 : Organic Chemistry

(Paper -III) (2013 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.*

3) *Draw the structure and neat diagrams wherever necessary.*

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

a)   Trichloroacetic acid is a stronger acid than acetic acid.

b)   Draw two chair conformations for trans 1, 2 dimethyl cyclohexane.

c)   Which is good nucleophile amongest H_2O and $\overset{\ominus}{O}H$?

d)   State "Markovnikov's rule" with suitable example.

e)   Write a reaction for ozonolysis of z-butene.

f)   Write structure of arynes.

g)   List four group which deactivate aromatic electrophilic substitution reactions.

h)   Write the reaction of propylene with HCl.

i)   What is the catalyst for conversion of 2-butyne to cis-2-Butene.

j)   Why Guanidine is strongest base?

Q2) a)   Answer any two of the following.   **[6]**
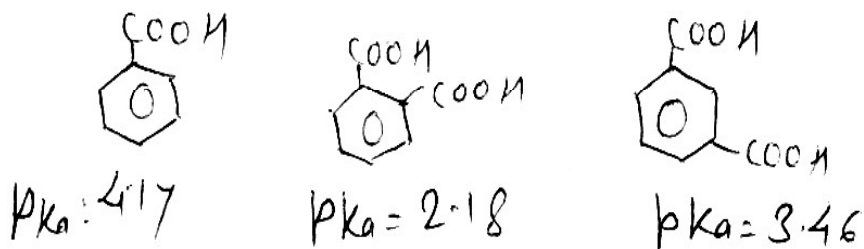
i)   2, 4, 6 –Trinitroaniline is a weaker base than 2, 4, 6 trinitro N, N dimethyl aniline.

ii)   What is Reformatsky reaction? Explain with suitable example.

iii)   Write a note on Hoffmann Elimination.

b) Attempt any two of the following. **[4]**

i) Explain the pKa values of following compounds

ii) Draw energy profile diagram of Nitration of benzene and comment on Kinetics.

iii) Explain IPSO substitution.

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

a) What is SN^2 reaction? Explain SN^2 reaction with the following points.

i) Kinetics.

ii) Stereochemistry.

iii) Solventeffect.

b) What is E1 mechanism? Discuss the evidences for E1 mechanism.

c) Draw chair conformations of cis 1, 4, dimethyl cyclohexane. Comment on their stability and optical activity.

Q4) a) i) Explain Hydroboration – oxidation reaction. **[3]**

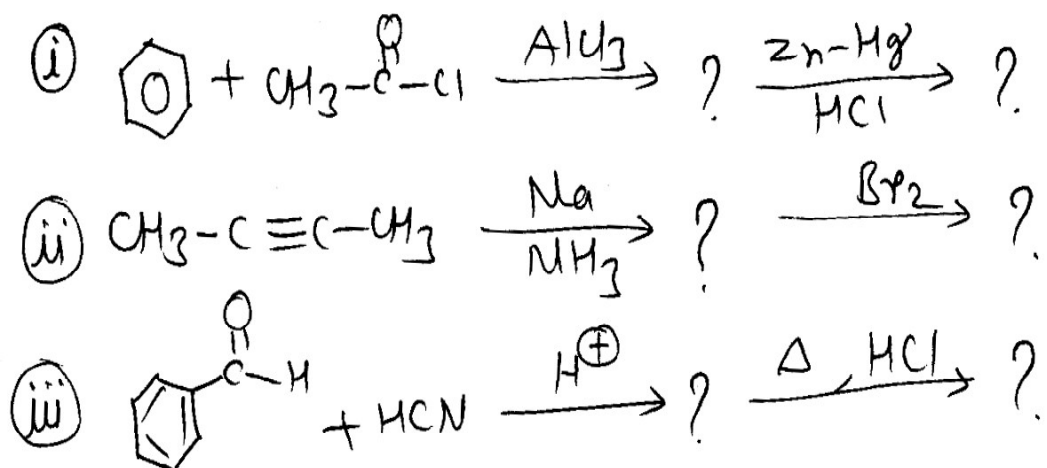ii) Write a note on Kinetic isotopic effect of E2 mechanism. **[3]**

OR

a) i) What is Friedal–Craft acylation? Discuss its advantages. **[3]**

ii) Give an account of perkin reaction. **[3]**

b) Predict the products with mechanism (any two)   [4]

(i) $C_6H_6 + CH_3-\overset{O}{\underset{|}{C}}-Cl \xrightarrow{AlCl_3} ? \xrightarrow[HCl]{Zn-Hg} ?$

(ii) $CH_3-C\equiv C-CH_3 \xrightarrow[NH_3]{Na} ? \xrightarrow{Br_2} ?$

(iii) $C_6H_5-\overset{O}{\underset{|}{C}}-H + HCN \xrightarrow{H^{\oplus}} ? \xrightarrow{\Delta, HCl} ?$

OR

b) Write short notes on (any two)   [4]

i) E_1CB mechanism.

ii) Sulphonation of benzene

iii) S_Ni reaction.

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[5522]-322
T.Y. B.Sc.
CHEMISTRY
CH-334: Analytical Chemistry
(2013 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 tables and calculator are allowed.*

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

   a) What is the function of flame in AAS?

   b) How is the effect of migration current eliminated?

   c) Define:

      i) Straylight

      ii) Cut off wavelength

   d) Name the detectors used in spectrophotometer.

   e) Give the principle of AAS.

   f) Give Boltzman equation.

   g) Define the term maximum supressor.

   h) State Beer's Law.

   i) Name different types of burners used in FES.

   j) Give the function of chopper in AAS.

Q2) a) Answer the following (Any 2):   **[6]**

      i)   Explain common ion effect with an example.

      ii) Differentiate between TGA and DTA technique.

      iii) Write a note on additivity of absarbances.

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

    i) Explain faradays second law of electricity.

    ii) Calculate the transmittance of a solution having an absorbance value of 0.86.

    iii) Calculate the solubility of silver chloride in water if its ksp, is 1.1×10^{-10}.

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

    a) Give a brief account of applications of AAS.

    b) Discuss the factors affecting TGA.

    c) Write a short note on interferences in FES.

Q4) a) Sketch a neat labelled diagram of an ideal Polarographic curve and explain Residual current, condenser current, Faradic current and Migration current. **[6]**

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

    a) i) Draw a neat diagram of a single beam colorimeter and write the role of each component.

       ii) State the factors required for an ideal wash liquid of a precipitate.**[6]**

    b) A solution of concentration 1×10^{-4} M is placed in a cell of 3 cm path length shows an absorbance value of 0.45. What will be the absorbance of the solution of the path length is dausled and the concentration is reduced to half its original value. **[4]**

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

    b) Calculate the solubility of silver chromate $Ag_2 CrO_4$ in 0.001 M and 0.01 M silver nitrate solution [ksp of $Ag_2 CrO_4 = 1.7 \times 10^{-12}$] **[4]**

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[5522]-323

T.Y. B.Sc.

CHEMISTRY

CH-335 : Industrial Chemistry

(Paper-V) (2013-Pattern) (Semester- III)

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

Instructions to the candidates:

   1)   All questions are compulsory.

   2)   Figures to the right indicates full marks.

   3)   Draw neat diagrams and flow sheet wherever necessary.

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

   a)   Explain the term conversion.

   b)   Give two important uses of sulphuric acid.

   c)   What is salting?

   d)   Define the term 'clinker'.

   e)   What is CNG?

   f)   Explain the term copy right.

   g)   What are antioxidants?

   h)   What is cullet?

   i)   Define pesticides.

   j)   How is dilute nitric acid concentrated?

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

   i)   Explain the term unit Operation and unit process with suitable example.

   ii)   Give important uses of ammonia.

   iii)   What are the applications of Karanja oil?

   b)   Answer the following (any two).   **[4]**

   i)   Explain the term selectivity and yield.

   ii)   Write a note on borosilicate glass.

   iii)   Give the classification of chemical reactions.

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

    a)   What are fuels? Discuss advantages and disadvantages of gaseous fuels.

    b)   Discuss the manufacture of Starch from corn with flowsheet.

    c)   What is setting of cement? Discuss selective hydration theory and colloidal theory of Michaelies.

Q4) a)   Give synthesis and applications of. **[6]**

        i)   BHC

        ii)   DDT

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

    a)   Describe the process of manufacture of ammonia with flow sheet.

    b)   Define the term coke number and viscosity. **[4]**

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

    b)   Discuss modern techniques of food preservation.

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[5522]-324

T.Y. B.Sc.

CHEMISTRY

CH-336 (A): Nuclear Chemistry

(2013 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) *Draw the diagrams wherever necessary.*
4) *Use of log tables and calculators is allowed.*

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

a) Define Isotopes with one example.

b) State the magic number of protons & neutrons in case of

   i) $^{210}_{84}\text{Po}$

   ii) $^{208}_{82}\text{Pb}$

c) State the factors affecting the stability of nucleus.

d) State the merits of liquid drop model.

e) Which process of radioactive decay cause a decrease in atomic number?

f) Half life period of a nuclide is 288 sec calculate the decay constant.

g) State Geiger - Nuttal's law.

h) Which of the following nuclides is more stable?

   i) $^{40}_{20}\text{Ca}$

   ii) $^{119}_{50}\text{Sn}$

   iii) $^{30}_{13}\text{Al}$

   iv) $^{2}_{1}\text{H}$

i) Complete the following nuclear reaction.

$$^{24}_{12}\text{Mg} + {}^{2}_{1}\text{H} \rightarrow \text{---} + {}^{4}_{2}\text{He}$$

j) What are photonuclear reaction.

P.T.O.

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

    i) Discuss the classification of nuclides on the basis of their mass number (A) and atomic number (Z).

    ii) State different types of nuclear reactions.

    iii) Discuss the assumption of shell model.

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

    i) Calculate the binding energy of Lithium atom

    Mass of Proton - 1.007825 amu

    Mass of Neutron - 1.008665 amu

    Mass of Lithium atom - 6.941

    ii) Explain the process of electron capture with an example.

    iii) Write short note on α- decay.

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

  a) State and explain semi-empirical mass equation.

  b) What is decay constant? Show that radioactive decay follows first order kinetics.

  c) Explain the following nuclear reaction with suitable example.

    i) Radiative capture.

    ii) Stripping and Pick-up reaction.

Q4) a) Describe liquid drop model in detail giving postulates. **[6]**

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

  a) Explain Fermi theory of β decay.

  b) Disintegration of 1 gram of ^{222}Ac was studied, 0.563 gram of actinium remained after 5 hours find the half life of ^{222}Ac. **[4]**

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

  b) Explain the elastic scatter in nuclear reaction with suitable example.

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P649

[5522]-324

T.Y. B.Sc.

CHEMISTRY

CH-336 (B): Polymer Chemistry

(2013 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) *Draw neat diagrams wherever necessary.*
4) *Use of log table/calculators is allowed.*

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

a) Define the term: Polymer.

b) Calculate the molecular weight of polystyrene whose DP is 2550.

c) Draw the correct structure of polypropylene.

d) Write the IUPAC name of polyvinylbromide.

e) 'Silicone polymer is the best example of inorganic polymer'. State whether the statement is true or false.

f) The bakelite polymer was invented by _____ in 1909.

g) Explain the term: Additives.

h) Write two important uses of nylon.

i) What is meant by homopolymer?

j) Write the names of two common colourants used in polymer processing.

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

   i) Plastic carry-bags are banned by Government. Explain.

   ii) Write a note on cellulose acetate and cellulose nitrate polymers.

   iii) 'Rubber polymers and their different forms is a gift for mankind. Explain.

b) How will you distinguish between the following (any two): **[4]**

    i) Thermoplastic and thermosetting polymers.

    ii) Homochain and Heterochain polymers.

    iii) Bulk and solution polymerisation.

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

a) What is meant by step polymerisation? Give a detailed account of polyaddition polymerisation.

b) Write a note on:

    i) Emulsion polymerisation.

    ii) Melt polycondensation.

c) Explain the meaning of chain polymerisation. Discuss in detail the co-ordination polymerisation with examples.

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

    i) Give a brief account for determination of molecular weight by viscometry method.

    ii) Write a note on: Hydrogenation reaction of polymers.

    iii) A basket of mangoes contains sets of I, II, III and IV with their individual numbers and weights of mangoes is given below.

        Set I: 70 mangoes with weight 250 g

        Set II: 60 mangoes with weight 300 g
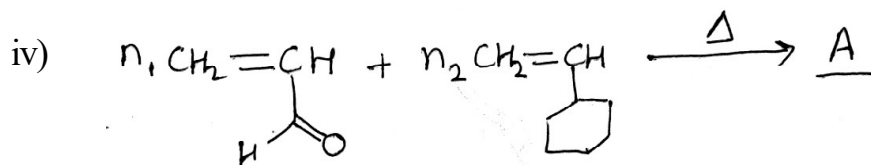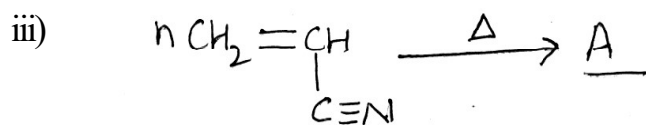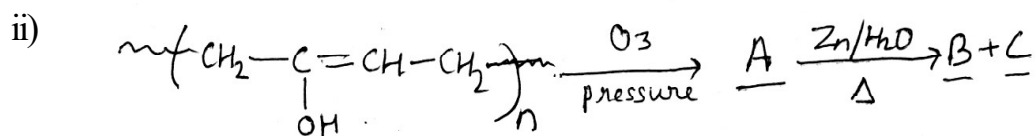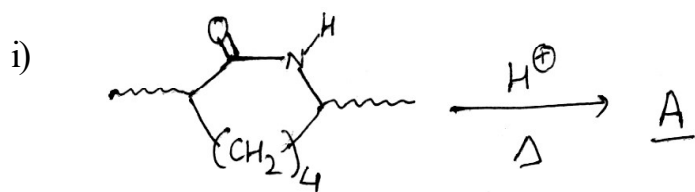
        Set III: 50 mangoes with weight 200 g

        Set IV: 90 mangoes with weight 150 g

        then calculate the number average molecular weight $\left(\bar{M}_n \right)$ of mangoes.

b) Complete the following polymer reactions: [4]

i)

$$\xrightarrow[\Delta]{H^{\oplus}} \underline{A}$$

ii)

$$\sim\left(CH_2-\underset{\underset{OH}{|}}{C}=CH-CH_2\right)_n \xrightarrow[pressure]{O_3} \underline{A} \xrightarrow[\Delta]{Zn/H_2O} \underline{B}+\underline{C}$$

iii)

$$n\ CH_2=\underset{\underset{C\equiv N}{|}}{CH} \xrightarrow{\Delta} \underline{A}$$

iv)

$$\xrightarrow{\Delta} \underline{A}$$

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P649

[5522]-324

T.Y. B.Sc.

CHEMISTRY

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

(2013 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) *Draw structures & neat diagrams if necessary.*

Q1) Answer the following: [10×1=10]

    a) Define anomers.

    b) Name two hormones of adrenal gland.

    c) Give the structure of histidine.

    d) Define phosphoglycerides.

    e) What is active site of enzyme?

    f) Give deficiency disorder of vitamine 'D'.

    g) What is the significance of golgi complex?

    h) What is molecular sieving?

    i) Define rancidity of lipids.

    j) What is optimum pH?

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

    i) Define sphingolipids & give its importance.

    ii) Give the reaction of glucose with oxidizing reagent.

    iii) Justify mitochondria as a power house of cell.

b) Give the structure of following two: [2×2=4]

    i) Sucrose.

    ii) Alanine - Phenylalanine (Ala -Phe).

    iii) Cholesterol.

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

    a) What are isozymes? Give clinical significance of it.

    b) Give the principle & working of SDS-PAGE.

    c) Give the classification of hormones on the basis of location.

Q4) a) Describe various types of enzyme inhibition. [6]

OR

    a) Explain the steps involved in determination of primary structure of protein.

    b) Write note on folding & misfolding of proteins. [4]

OR

    b) Give the source, function, deficiency disorder of vitamine 'C'.

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P649

[5522]-324

T.Y. B.Sc.

CHEMISTRY

CH-336 (D): Environmental and Green Chemistry

(2013 Pattern) (Paper - VI) (Semester - III) (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) *Neat diagrams must be drawn wherever necessary.*

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

    a) Define pollutant.

    b) Name any two tracer component of atmosphere.

    c) Define P_E.

    d) Give examples of Renewable energy sources.

    e) Give structure of m-hydroxy benzaldehyde.

    f) Give structure of dimethyl Acetate.

    g) Define Albedo.

    h) Define pH.

    i) What is meant by Mantle.

    j) Give the examples of green solvent.

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

    i) What is chlorine chemistry in atmosphere.

    ii) What are aims of Green Chemistry.

    iii) give the examples of Green catalyst.

b) Write any two of the following: [2×2=4]

i) Write note on Biosphere.

ii) Explain water resources.

iii) Explain any two green alternative.

Q3) Solve any two of the following: [10]

a) What is chemical oxygen demand (COD)? Explain the determination of COD.

b) Name five sphere of environment explain any two sphere.

c) Explain any four principle of Green Chemistry.

Q4) a) Give an account of SO_x chemistry in atmosphere. [6]

OR

a) Explain chemistry of ground water & rain water.

b) Write a note on any one: [4]

i) Explain structure of atmosphere with altitude.

ii) Cradle to cradle design criteria.

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P649

[5522]-324

T.Y. B.Sc.

CHEMISTRY

CH-336 (E): Agriculture Chemistry

(2013 Pattern) (Paper - X) (New Course) (Semester - III) (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) *Draw neat diagrams wherever necessary.*

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

a) Define 'Soil Structure'.

b) What is buffer action?

c) Define calcareous soil.

d) What is SAR? How is it calculated?

e) What is salinity?

f) What is role of phosphorus in plants?

g) Waht is synthetic fertilizers?

h) What do you mean by complete fertilizer?

i) What are bactericides?

j) Give applications of BHC.

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

i) What is humus? Explain its functions.

ii) Explain in brief collection of soil sample from the field.

iii) What are conditions for good fertilizers?

b) Attempt Any Two of the following: **[4]**

    i) Define 'stomach poisons' and 'contact poisons'.

    ii) Give importance of soil reactions.

    iii) Give deficiency symptoms of phosphorus.

Q3) Attempt Any Two of the following: **[10]**

    a) What is soil temperature? Explain factors affecting soil temperature.

    b) Describe the method for collection of representative sample of irrigation water from different sources.

    c) Define 'Vermi culture'. Describe small scale culturing technique along with proper diagram.

Q4) a) Attempt Any Two of the following: **[6]**

    i) State different methods of soil fertility evaluation.

    ii) Explain the role of molybdenum and Manganese in plant.

    iii) Define 'Pesticides'. Give their classification.

    b) Attempt Any Two of the following: **[4]**

    i) Give classification of inorganic insecticides.

    ii) State factors controlling availability of phosphorus.

    iii) Give importance of bubber action in agriculture.

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[5522]-325

T.Y. B.Sc.

BOTANY

BO-331: Cryptogamic Botany (Algae, Fungi, Bryophytes and Pteridophytes)

(2013 Pattern) (Paper - I) (Semester - III)

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 general characters of Algae.

b) Mention any two classes of fungi as per Alexopoulos, 1979.

c) What are Thallophytes?

d) Give any two economic importance of Algae.

e) Give any two general characters of Fungi.

f) Mention any two types of spores in <u>Puccinia</u>.

g) What are Bryophytes?

h) Give any two economic importance of Pteridophytes.

i) Give any two general characters of Bryophytes.

j) Give any two general characters of pteridophytes.

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

a) Describe thallus structure of <u>Chara</u>.

b) Explain internal structure of <u>Anthoceros</u> thallus.

c) Describe thallus structure of <u>Rhizopus</u>.

P.T.O.

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

    a)   Male conceptacle of <u>Sargassum</u>.

    b)   Structure of Synangium of <u>Psilotum</u>.

    c)   Asexual Reproduction in <u>Cercospora</u>.

Q4) Describe external and Internal structure of gametophyte of <u>Marchantia</u>. **[10]**

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

Describe external morphology and internal structure of stem in <u>Selaginella</u>.

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[5522]-326

T.Y. B.Sc.

BOTANY

BO-332: Cell and Molecular Biology

(2013 Pattern) (Paper - II) (Semester - III)

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)   Enlist two units for measurement of cell.

    b)   What is giant chromosome?

    c)   What is middle lamella?

    d)   Enlist any two functions of nucleus.

    e)   What is nucleoside?

    f)   Enlist any two functions of chloroplast.

    g)   Define molecular biology.

    h)   What is DNA replication?

    i)   Define transduction.

    j)   What is structural gene?

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

    a)   Give the biological properties of cytoplasm.

    b)   What are the functions of golgi bodies?

    c)   What is genetic code? Explain any two properties of genetic code.

P.T.O.

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

    a)   Diadduct type of DNA damage.

    b)   Chargaff's law of genetic equilibrium.

    c)   Karyotype and ideogram.

Q4) Give ultrastructure of mitochondria with functions. **[10]**

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

Explain the Lac-Operon concept of gene regulation proposed by Jacob and Monod.

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[5522]-327
T.Y. B.Sc.
BOTANY
BO - 333 : Genetics and Evolution
(Paper -III) (2013 Pattern) (Semester - III)

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)   Define phenotype.

   b)   What is dihybrid cross.

   c)   State law of segregation.

   d)   What are duplicate genes?

   e)   Enlist any two branches of genetics.

   f)   What are quantitative traits?

   g)   Define multiple alleles.

   h)   What is crossing over?

   i)   Define holandric genes.

   j)   Define aneuploidy.

Q2) Attempt any two of the following [10]

    a) Explain complimentary genes with suitable example.

    b) What is linkage? Explain its types.

    c) Explain Hardy-weinberg law of gene frequencies, in mendelian population.

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

    a) Masking genes (12:3:1)

    b) Significance of polyploidy.

    c) Give in details chloroplast inheritance in 4 O' clock plant.

Q4) What is translocation? Explain its types with suitable diagrams. [10]

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

What is evolution? Explain modern synthetic theory of evolution.

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[5522]-328

T.Y. B.Sc.

BOTANY

BO-334: Spermatophyta and Paleobotany

(2013 Pattern) (Paper - IV) (Semester - III)

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 indicates full marks.*

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

a) Give any one class of gymnosperms as per Chamberlain (1934).

b) Name type of pollen grain found in Pinus.

c) Write any two general characters of gymnosperms.

d) Mention any two examples of Family-Apocynaceae.

e) Who is father of Indian paleobotany?

f) Give any two salient features of Pentoxylae.

g) What is Lepidiodendron?

h) Give the concept of form genera.

i) Name type of fruit in family Cannaceae.

j) What is Fossilization?

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

a) State any five assumptions of Hutchinson's system of classification.

b) Give economic importance of Family Fabaceae.

c) Write external features of Lyginopteris oldhamia.

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

    a)   Bennettitalean theory.

    b)   Pith cast.

    c)   Plant authentication.

Q4) Describe external and internal morphology of male and female cone of Gnetum. **[10]**

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

Give distinguishing characters, floral formula and floral diagram of family Magnoliaceae and Acanthaceae.

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[5522]-329
T.Y. B.Sc.
BOTANY
BO-335 : Horticulture And Floriculture
(Paper-V) (2013-Pattern) (Semester- III)

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 indicates full marks.*

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

   a)   What is pomoculture?

   b)   What is landscape gardening?

   c)   Define Horticulture.

   d)   Give the plant sources of vitamin B_2.

   e)   Give the sources of phosphorus.

   f)   Mention two vegetables from solanaceae.

   g)   What is freezing?

   h)   Define sexual propagation.

   i)   Give any two disadvantages of sexual propagation.

   j)   Give any two features of English gardens.

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

   a)   Explain the method of layering.

   b)   Describe pruning.

   c)   Explain the plant protection methods in peas.

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

    a)   Earthingup

    b)   Packaging.

    c)   Italian gardens.

Q4) What is floriculture? Describe scope and importance of floriculture.   **[10]**

OR

What are cut flowers? write a short note on Indian market of cut flowers.

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[5522]-330

T.Y.B.Sc.

BOTANY

BO- 336 : Computational Botany

(2013 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 indicates full marks.

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

     a)   What is primary data?

     b)   Define dispersion.

     c)   What is standard error?

     d)   Define frequency.

     e)   What is ratio vegetation index?

     f)   What is level of significance?

     g)   Define correlation.

     h)   What is frequency polygon?

     i)   Give the formula to calculate chi-square test (χ^2).

     j)   Define probability.

Q2) Answer any <u>two</u> of the following.   **[10]**

     a)   Explain the merits and limitations of sampling.

     b)   Explain in brief the analysis of quadrate data.

     c)   What is Null Hypothesis ?Explain in brief.

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

    a)   Coefficient of varience.

    b)   Poisson distribution.

    c)   Merits and limitations of measures of central tendency.

Q4) Describe in detail the methods of diagrammatic representation of data. **[10]**

OR

Give an account of different parameters to study germination & the early seedling growth. **[10]**

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[5522]-331

T.Y. B.Sc.

ZOOLOGY

ZY-331 : Animal Systematics and Diversity-V

(Semester-III) (2013 Pattern) (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)   Mention food of Pila.

    b)   What is pallial complex?

    c)   Define holozoic nutrition in Protozoa.

    d)   Mention major sense organs of <u>Calotes.</u> (Any two)

    e)   Give any two examples of integumentary derivatives.

    f)   Define pronephros kidney.

    g)   Mention functions of olfactory lobes.

    h)   Name accessory respiratory organs in fishes (Any two)

    i)   Mention functions Peeten in <u>Calotes</u>. (Any two)

    j)   State functions of precaval veins.

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

    a)   Sketch and label brain of <u>Pigeon</u>.

    b)   Describe Ascon type of canal system in sponges.

    c)   Give the general characters of <u>Rhynchocephalia</u>.

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

    a)   Statocyst of <u>Pila</u>.

    b)   Dipnoi fish

    c)   Locomotion in <u>Protozoa</u>

Q4) Describe systematic position, habits, Habitat and external characters of <u>Pila</u> **[10]**

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

Describe male Reproductive system of <u>Calotes</u>

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[5522]-332

T.Y. B.Sc.

ZOOLOGY

ZY-332: Mammalian Histology

(2013 Pattern) (Paper - II) (Semester - 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 Nephron.

    b)   Enlist any two layers of T.S. of trachea.

    c)   What are Goblet cells?

    d)   Give any two types of cells in Islets of Langehans.

    e)   What are Sertoli cells?

    f)   Define dentine.

    g)   Mention two layers of adrenal gland.

    h)   Give any two layers of T.S. of vein.

    i)   Enlist any two types of salivary glands.

    j)   Define epithelial tissue.

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

    a)   Sketch and label V.S. of taste bud.

    b)   Describe the histological structure of Liver.

    c)   Describe the histological structure of ovary.

P.T.O.

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

    a)   J.G. complex.

    b)   V.S. of skin.

    c)   Connective tissue.

Q4) Describe the histological structure of stomach. **[10]**

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

Describe the histological structure of <u>Pituitary</u> gland.

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[5522]-333

T.Y. B.Sc.

ZOOLOGY

ZY - 333 : Biological Chemistry

(Paper -III) (2013 Pattern) (Semester - 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 Holoenzyme.

　　b)　　Give any two examples of essential amino acids

　　c)　　Define colloid.

　　d)　　What is Atherosclerosis?

　　e)　　Define Buffering capacity.

　　f)　　What are Disaccharides?

　　g)　　What is Acidosis?

　　h)　　Define Enantiomer.

　　i)　　What are compound lipids?

　　j)　　Give any two biological significance of proteins.

Q2) Attempt any two of the following [10]

   a)   Describe primary structure of proteins.

   b)   Explain clinical significance of hypoglycemia & hyperglycemia.

   c)   Derive Handerson Hasselbalch equation.

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

   a)   Irreversible enzyme inhibition.

   b)   Mutarotation.

   c)   Biological significance of lipids.

Q4) What are proteins? Describe the types of bonds responsible for protein synthesis. [10]

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

What are Enzymes? Explain the influence of substrate concentration & temperature on an enzyme catalysed reaction.

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[5522]-334

T.Y. B.Sc.

ZOOLOGY

ZY-334: Environmental Biology and Toxicology

(2013 Pattern) (Paper - IV) (Semester - 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)   What is industrial waste?

   b)   Mention <u>any two</u> metallic pollutants.

   c)   What is meant by Vulnerable species?

   d)   What is LD 50?

   e)   Define food web.

   f)   Define noise pollution.

   g)   Give two examples of abiotic components?

   h)   What is atmosphere?

   i)   Mention <u>any two</u> pesticides.

   j)   What are consumers?

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

   a)   What is the role of Bioindicators in environmental monitoring.

   b)   Explain green house effect.

   c)   Explain effects of toxicants on Public Health.

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

    a)   Wild life conservation.

    b)   Renewable resources.

    c)   Land degradation.

Q4) What is air pollution? Write in details about the sources and effects of air pollution. **[10]**

OR

What is artificial ecosystem? Write in details about the structure and function of crop land ecosystem.

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SEAT No :

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

[5522]-335
T.Y. B.Sc.
ZOOLOGY
ZY-335 : Parasitology
(Paper-V) (2013-Pattern) (Semester- 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 accidental parasite.

   b)   Give any two symptoms of malaria.

   c)   Define intermediate host.

   d)   Define commensalism.

   e)   State habitat of Entamoeba histolytica.

   f)   Write the name of causative agent of cholera.

   g)   Define host.

   h)   State any one control measure for Head louse.

   i)   What is nocturnal periodicity?

   j)   Write any one example of digenic parasite.

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

   a)   Describe physiological specificity.

   b)   Explain parasitological significance of Toxoplasmosis.

   c)   Explain eradication programmes of cholera.

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

    a)   Control measures of arthropod vector of dengue.

    b)   Mutualism.

    c)   Pathogenecity and control measures of Ascaris lumbricoides.

Q4) Give a detail account of life cycle, mode of infection and control measure of Tick. **[10]**

OR

Describe in detail the Life cycle, pathogenicity and control measures of plasmodium vivax.

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[5522]-336

T.Y. B.Sc.

ZOOLOGY

ZY-336 (a): General Pathology

(2013 Pattern) (Paper - VI) (Semester - 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)   What is surgery?

   b)   What is disease?

   c)   What is fatty degeneration?

   d)   Define necrosis.

   e)   State any two types of gangzene.

   f)   What is embolism?

   g)   Define metastatic classification.

   h)   What is repair?

   i)   Define malignant tumour.

   j)   What is melanosis?

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

   a)   Describe Renal function test.

   b)   Describe types of necrosis.

   c)   Describe amyloid degeneration.

Q3) Write notes on <u>any two</u> of the following: [10]

    a)   Types of tumours.

    b)   Healing of wounds.

    c)   Autopsy.

Q4) What is circulatory disturbance? Give an account of embolism. [10]

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

Describe inflammation as vascular phenomenon.

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[5522]-336

T.Y. B.Sc.

ZOOLOGY

ZY-336 (B): Cell Biology

(2013 Pattern) (Paper - VI) (Semester - 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 "phagocytosis"

   b)   What is Active Transport.

   c)   What is RER.

   d)   Give any two features of 'Prokaryotic cell'.

   e)   Define 'Necrosis'.

   f)   Write two special features of 'Diakinesis'.

   g)   Give any two functions of E.R.

   h)   Mention two peculiarities of unit membrane.

   i)   Mention any two salient features of 'G_2 phase of cell cycle'.

   j)   Define 'somatic mutation'.

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

   a)   Describe the ultrastructure of mitochondria.

   b)   Explain polymorphism in Lysosomes.

   c)   What are the Intrinsic causes of cancer?

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

    a)   Biochemical composition & functions of microtubule.

    b)   Composition & function of Nucleolus.

    c)   Functions of Golgi complex.

Q4) Describe the process of mitosis with suitable diagram. Add a note on its significance. **[10]**

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

Explain the fluid mosaic model of plasma membrane with a suitable diagram.

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[5522]-337

T.Y. B.Sc.

GEOLOGY

GL - 331 : Mineralogy

(Paper -I) (2013 Pattern) (Semester - III)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

1) All questions are compulsory.

2) All questions carry equal marks.

3) Neat labelled diagrams must be drawn wherever necessary.

4) Figures to the right indicate full marks.

Q1) Answer the following in 2/3 lines. **[10]**

a) Enlist any two alteration products of olivine.

b) Name any two minerals of clay group.

c) What is gypsum plate?

d) Give any two occurrences of dolomite.

e) Draw silicate structure of amphibole group.

f) What is meant by length fast?

g) Name the gem variety of garnet.

h) Enlist any two uses of pyrite.

i) Give the chemical composition of halite.

j) What is the sign of elongation of kyanite?

Q2) Write notes on: (Any Two)   **[10]**

    a)   Sign of minerals.

    b)   Structure, Chemical composition & occurrence of chlorite.

    c)   Properties and uses of ruby.

Q3) Write notes on : (Any Two)   **[10]**

    a)   Properties and paragenesis of hornblende.

    b)   Pleochroism and absorption.

    c)   Physical properties and uses of calcite & rhodochrosite.

Q4) Give silicate structure, Chemical composition, Physical and optical properties, paragenesis and alteration products of FELSPAR OR MICA mineral group.**[10]**

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[5522]-338

T.Y. B.Sc.

GEOLOGY

GL-332: Igneous Petrology

(2013 Pattern) (Paper - II) (Semester - 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 questions: **[10]**

  a)   Enlist' structures in Basalt.

  b)   Define petrographic province.

  c)   What is intergranular texture?

  d)   Name the minerals found in rock anorthosite.

  e)   What is porphyritic texture.

  f)   What is chemical composition of Aplite.

  g)   What are expansion cracks.

  h)   Name the rocks showing glassy texture.

  i)   Name the mineral composition of pegmatite.

  j)   Define granitic texture.

Q2) Write notes on any two: **[10]**

  a)   Mixing of magmas.

  b)   Ophitic and sub-ophitic texture.

  c)   Peridotite.

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

a) Explain the role of magma in geological processes.

b) Define structure and explain ropy and amygdaloidal structure.

c) Give the chemical composition and origin of granites.

Q4) Describe in detail the crystallisation of Albite - Anorthite - Diopside system.**[10]**

OR

What is meant by magmatic evolution? Explain in detail the process of crystal fractionation. Add a note on Fosterite - Fayalite system.

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[5522]-339
T.Y. B.Sc.
GEOLOGY
GL - 333 : Sedimentary Petrology
(Paper -III) (2013 Pattern) (Semester - 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)   What are placer deposits?

    b)   Define maturity of sediments.

    c)   Name two heavy minerals.

    d)   Define Provenance.

    e)   Define selective abrasion.

    f)   Mention any two types of sedimentary facies

    g)   What are concretions?

    h)   What is greywacke?

    i)   Draw figure of cross bedding.

    j)   Define roundness.

Q2) Answer the following (Any two) **[10]**

    a)   Define weathering. Explain the role of water in rock weathering.

    b)   Describe roundness of sediments.

    c)   Discuss rate of subsidence and sedimentation.

Q3) Answers the following. (Any two) **[10]**

    a)   Define mineral stability. Explain Goldich's mineral stability series.

    b)   Explain progressive dilution.

    c)   Explain concretions.

Q4) Explain the characters of sediments deposited in Terrestrial environment.**[10]**

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

Describe the following sedimentary structures

    a)   Cross bedding.

    b)   Graded bedding

    c)   Ripple marks.

Also give their significance.

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[5522]-340

T.Y. B.Sc.

GEOLOGY

GL-334: Structural Geology

(2013 Pattern) (Paper - IV) (Semester - 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) Define Brittle and ductile.

b) Define fracture tension.

c) Define balanced and unbalanced force.

d) Define shear fracture.

e) Define Hydrostatic pressure.

f) Define strain.

g) Define fundamental strength.

h) Define tension fracture.

i) Define Riecke's principle.

j) Define strike-slip fault.

Q2) Write notes on (Any Two):   **[10]**

a) Role of confining pressured in controlling the behaviour of rocks under stress.

b) Flexure-slip folding.

c) Mechanics of gravity fault.

P.T.O.

Q3) Write notes on (Any Two):   **[10]**

  a) Mechanics of plastic deformation.

  b) Describe the concept of strain ellipsoid.

  c) Origin of fracture cleavage.

Q4) Define lineation and foliation. Give its type. Add a note on slaty cleavage.**[10]**

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

What are Dip Iogons. Explain Ramsay classification.

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SEAT No :

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

[5522]-341

T.Y. B.Sc.

GEOLOGY

GL-335 : Precambrian Stratigraphy of India

(Paper-V) (2013-Pattern) (Semester- 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 indicates full marks.

4) Neat diagrams must be drawn wherever necessary.

Q1) Answer the following in 2/3 lines.   **[10]**

a) Give tectonic elements of ocean.

b) What is Eparchean Unconformity?

c) Name subdivisions of Cuddapah super group.

d) Define Craton

e) Give economic importance of Aravalli craton.

f) Give tectonic subdivisions of Himalaya.

g) Name the group units of lithostratigraphic classification of chhattisgarh supergroup.

h) What are stromatolites?

i) What are geosynclinal basins?

j) As per recent geological time scale, give the classification of Proterozoic Eon into Era.

Q2) Write notes on (any two).   **[10]**

a) N-S tabular cross section of CITZ.

b) Comparison of physiographic divisions of India with respect to their stratigraphy.

c) Singhbhum granites.

P.T.O.

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

    a) Jutogh group

    b) World precambrian history

    c) Chalk Hills

Q4) Give geographic distribution, classification with stratigraphic succession, lithology and economic importance of Vindhyan Supergroup **[10]**

OR

Give geographic distribution and detailed general stratigraphy of Dharwar Craton in tabular form. **[10]**

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[5522]-342
T.Y.B.Sc.
GEOLOGY
GL- 336 : Fluid Geology-I
(Geomorphology, Remote Sensing GIS And Field Geology)
(2013 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) Write answers in 2/3 Lines   **[10]**

   a)   What is diffuse reflection?

   b)   What is badland topography.

   c)   What is Air Base?

   d)   What is stereo vision?

   e)   What is texture of aerial photo?

   f)   What is oblique aerial photograph?

   g)   What in Resourcesat?

   h)   What does LIDAR stand for?

   i)   State two types of data in G.I.S.

   j)   Give any two criteria for field correlation.

Q2) Write notes (any two)   **[10]**

   a)   Atmospheric absorption.

   b)   Hyperspectral scanners.

   c)   Sun-synchronous satellite.

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

    a)   Role of lithology on landform development.

    b)   Selection of area for field survey.

    c)   Rectangular drainage pattern.

Q4) Give a brief history of Remote sensing satellites.   **[10]**

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

What do you mean by 'Geological Report'? Explain how the text of geological report is written.   **[10]**

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[5522]-343

T.Y. B.Sc.

STATISTICS (Principal)

ST - 331 : Distribution Theory – I

(Paper -I) (2013 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.*

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

    4)   *Symbols and abbreviations have their usual meaning.*

Q1) Attempt each of the following: **[1each]**

    A)   Choose the correct alternative in each of the following:

        a)   If $(X,Y) \sim BN(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho$ then $E(Y / X = x)$ is

            i) $\mu_2 + \rho \dfrac{\sigma_1}{\sigma_2}(x - \mu_1)$ ii) $\mu_2 + \rho \dfrac{\sigma_2}{\sigma_1}(x - \mu_1)$

            iii) $\mu_1 + \rho \dfrac{\sigma_2}{\sigma_1}(x - \mu_2)$ iv) $\mu_1 + \rho \dfrac{\sigma_1}{\sigma_2}(x - \mu_2)$

        b)   Distribution function of $X_{(n)}$ is

            i) $n.f(x)[F(x)]^{n-1}$ ii) $1 - [1 - F(x)]^n$

            iii) $n.f(x)[1 - F(x)]^{n-1}$ iv) $[F(x)]^n$

P.T.O.

c) If $X \sim LN(0, \mu, \sigma^2)$ then the distribution of X^α is

    i) $LN(0, \alpha\mu, \alpha\sigma^2)$ ii) $LN(0, \alpha\mu, \alpha^2\sigma^2)$

    iii) $LN\left(0, \alpha\mu, \dfrac{\sigma^2}{\alpha}\right)$ iv) $LN\left(0, \alpha\mu, \dfrac{\sigma^2}{\alpha^2}\right)$

d) If $X \sim C(\mu, \lambda)$ then the first quartile is

    i) $\mu - \lambda$ ii) μ

    iii) λ iv) $\mu + \lambda$

B) State whether each of the following statements is true or false: **[1each]**

a) Laplace distribution is symmetric and leptokurtic.

b) If $X \sim \beta_1(1,1)$ distribution it means that $X \sim U(0,1)$ distribution.

C) Define the following: **[1each]**

a) Bivariate normal distribution.

b) Laplace distribution.

D) Attempt the following: **[1each]**

a) If $X \sim \beta_1(m,n)$ then state harmonic mean of the distribution.

b) State the additive property of Cauchy distribution.

[5522]-343   2

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

a) If $X \sim W(\alpha,\beta)$ distribution then show that $X^{\beta} \sim G\left(\dfrac{1}{\alpha^{\beta}},1\right)$.

b) If $X \sim L(\mu,\lambda)$ distribution then obtain quartile deviation of X.

c) Let X_1, X_2,.......X_n be a random sample of size n drawn from U(0,1) distribution. Obtain the distribution of sample median if n is odd.

Q3) Attempt Any Two of the following: **[5 each]**

a) If $X \sim \beta_1(m,n)$ then prove that $1 - X \sim \beta_1(n,m)$.

b) If $X \sim U\left(-\dfrac{\pi}{2},\dfrac{\pi}{2}\right)$, find probability distribution of Y = tan X.

c) If X and Y are independent and identically distributed $LN(0,\mu,\sigma^2)$ variates. State the probability density function of U=XY and V=X/Y. Further obtain $P(U > e^{2\mu})$ and $P(V > 1)$.

Q4) Attempt any one of the following:

a) i) If X and Y are i.i.d. random variables with distribution G(1, 1) then
   find $P\left(X + Y > 1, \dfrac{x}{x+y} < \dfrac{1}{2}\right)$ and $P\left(\dfrac{x}{y} < \dfrac{1}{2}\right)$. **[7]**

   ii) If X_i's are independent $LN(0,\mu,\sigma^2)$, $i = 1,2,........n$, variates then
   find the distribution of $\displaystyle\prod_{i=1}^{n} X_i$. **[3]**

[5522]-343   3

b) i) Let $(X,Y) \sim BN(3, 6, 2^2, 4^2, 0.8)$. Compute $P(5 < X < 7 / Y = 7)$

and state the distribution of $(3X + 2Y + 1)$. **[6]**

ii) Let X and Y be two i.i.d. exponential variates with parameter λ. Then show that W = X – Y follows Laplace distribution. **[4]**

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[5522]-344

T.Y. B.Sc.

STATISTICS

ST-332: Theory of Estimation

(2013 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 meanings.*

Q1) Attempt <u>each</u> of the following:

  A) In each of the following cases, choose the correct alternative: **[1 each]**

    a) If T is an unbiased estimator of parameter θ then amount of bias is

      i) equal to 0   ii) greater than 0

      iii) less than 0   iv) greater than or equal to 0

    b) If $X_1, X_2, ..., X_n$ is random sample from U $(0, \theta)$ then m.l.e. of θ is

      i) $X_{(1)}$ ii) $X_{(n)}$

      iii) $\bar{X}$ iv) $\sqrt{-\bar{X}}$

    c) Which of the following estimator is unique?

      i) Sufficient   ii) UMVUE

      iii) Unbiased   iv) Biased

    d) As sample size tends to infinity an estimator is consistent if

      i) its bias and variance tends to zero

      ii) its bias tends to zero

      iii) its variance tends to zero

      iv) its bias and variance tends to infinity

P.T.O.

B) State whether each of the following statements is TRUE or FALSE

[1 each]

a) Sample variance is biased estimator of population variance.

b) Consistency is invariant under continuous transformaiton.

C) Define the following terms: **[1 each]**

a) BLUE

b) Relative efficiency of estimator T_1 w.r.t. T_2.

D) Attempt each of the following: **[1 each]**

a) State the Neyman factorization criterion to find the sufficient statistic.

b) Find likelihood function for a random sample X_1, X_2 ... X_n from a distribution with probability mass function

$$f(x,\theta) = \begin{cases} \theta(1-\theta)^{x-1} & x=1,2,...;0<\theta<1 \\ 0 & \text{otherwise} \end{cases}$$

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

a) Show that there exist infinitely many unbiased estimators for parameter λ of Poisson (λ).

b) If X is random variable with probability density function

$$f(x,\theta) = \quad \theta x^{\theta-1} \quad 0 \le x \le 1; \theta > 0$$
$$= \quad 0 \quad \text{otherwise}$$

Find moment estimator of θ.

c) If T is consistent estimator of parameter θ then show that T^2 is a consistent estimator of θ^2.

[5522]-344   2

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

a) Define Fisher's information function. Also find I(p) for Bernoulli (p).

b) Let X_1, X_2, ..., X_n be a random sample from distribution having p.m.f.

$$P[X = x] = \begin{cases} \theta(1-\theta)^x & x = 0,1,2...;0 < \theta < 1 \\ 0 & \text{otherwise} \end{cases}$$

Obtain M.L.E. of θ.

c) If X_1, X_2, ..., X_n is a random sample from $P(\lambda)$. Find sufficient statistic for λ.

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

a) i) State and prove Cramer-Rao inequality. **[7]**

   ii) Distinguish between estimator and estimate. **[3]**

b) i) With usual notations prove that minimum variance bound unbiased estimator T of a parameter θ satisfies the relation,

$$\frac{\partial}{\partial \theta} \log L = nI(\theta)(T - \theta).$$ **[6]**

   ii) If $(X_{(1)}, X_{(10)})$ is the confidence interval for population median find the confidence coefficient if the sample size is 10. **[4]**

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[5522]-345

T.Y. B.Sc.

STATISTICS (Principal)

ST - 333 : Sampling Methods

(Paper -III) (2013 Pattern) (Semester - III) (Theory)

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]**

      a)   In case of simple random sampling without replacement (SRSWOR), the probability that particular random sample of size 3 selected from population of size 15 is

         i) $\dfrac{1}{15}$ ii) $\dfrac{1}{5}$ iii) $\dfrac{1}{^{15}C_3}$ iv) $\dfrac{1}{3}$

      b)   In Stratified sampling with Neyman allocation......

         i) $n_i \propto N_i$ ii) $n_i \propto N_i S_i$

         iii) $n_i \propto \dfrac{N_i S_i}{\sqrt{C_i}}$ iv) $n_i \propto \dfrac{N_i S_i}{C_i}$

      c)   The estimator of population total Y_t in case of Systematic sampling is given by

         i) $\dfrac{N}{N-1}\bar{y}_{sys}$ ii) $\bar{y}_{sys}$

         iii) $(\bar{y}_{sys})^2$ iv) $N\bar{y}_{sys}$

d) A non sampling errors may occurs due to

   i)   an enumerator   ii)   size of the population

   iii) nature of the population iv) size of sample

B) State whether each of the following statement is True or False. **[1 each]**

   a) Ratio estimator of population mean is always unbiased estimator.

   b) The selection of cricket team for the world cup is called purposive sampling.

C) a) Explain the term 'Sampling errors'.   **[1]**

   b) State two advantages of sampling over census.   **[1]**

D) a) State the real life situation where regression method of estimating population mean is used.   **[1]**

   b) Explain what is stratification.   **[1]**

Q2) Attempt any two of the following.   **[5 each]**

a) Derive expression for standard error of an unbiased estimator of population mean in case of SRSWR.

b) State the ratio estimator of population mean. State the expression for its variance and compare it with regression estimator of population mean.

c) Describe the procedure of drawing a systematic sample. Obtain the variance of the estimator of population mean under systematic sampling method.

Q3) Attempt any two of the following.   **[5 each]**

a) The values of $\{(x_i, y_i), i = 1, 2, 3, 4, 5\}$ in sample of size 5 are as follows

x_i	1	2	2	3	3
y_i	3	5	8	6	7

The population total of 50 observation is known to be 100. Obtain ratio and regression estimator of population mean.

b) Write a note on Cronbach's coefficient alpha.

c) In case of stratified random sampling cost function is $C = C_0 + \Sigma C_i n_i$. Determine the value of n_i's so that variance of an unbiased estimator of population mean is minimum for fixed cost C.

Q4) Attempt any one of the following.

a) i) With usual notations by ignoring finite population correction. Prove that $\text{Var}(\bar{y}_{st})_{SRSWOR} \geq \text{Var}(\bar{y}_{st})_{P.A}$. **[5]**

ii) State the advantages of sampling over the complete census. **[5]**

b) i) The Unit in a population are classified into two classes C and C'. Determine the size of a sample in the case of simple random sampling without replacement so that the sample proportion p of units in the class C satisfies the condition $P[|p - P| \geq d] = \alpha$ where d = 0.05, α = 0.05, N = 100 and estimate of the population proportion P based on previous survey is 0.5. **[5]**

ii) Distinguish between systematic sampling and simple random sampling without replacement (SRSWOR) **[5]**

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[5522]-346
T.Y. B.Sc.
STATISTICS (Principal)
ST-334: Design of Experiments
(2013 Pattern) (Paper - IV) (Semeseter - 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)   *Symbol and abbreviations have their usual meanings.*

Q1) Attempt each of the following:

   A)   Choose the correct alternative in each of the following: **[1 each]**

       a)   In LSD with 5 treatments, the error degrees of freedom is

          i)   12   ii)   16

          iii)   4   iv)   20

       b)   In 2^3 factorial experiment, the expression for the interaction effect ABC is

          i) $\frac{1}{4}(a-1)(b-1)(c+1)$ ii) $\frac{1}{4}(a+1)(b+1)(c-1)$

          iii) $\frac{1}{4}(a+1)(b-1)(c+1)$ iv) $\frac{1}{4}(a-1)(b-1)(c-1)$

       c)   Which of the following is not a basic principle of design of experiment.

          i)   Replication   ii)   Local control

          iii)   Regression analysis   iv)   Randomization

d) Which of the following is a treatment contrast.

i) $T_1 - 2T_2 - T_3$

ii) $2T_1 - 3T_2 - T_3$

iii) $2T_1 - T_2 + T_3 - T_4$

iv) $T_1 + T_2 - T_3 - T_4$

B) State whether the following statements are True or False: **[1 each]**

a) In total confounding, the confounded effect cannot be tested for its significance.

b) The square root transformation is used when the observations follow Poisson distribution.

C) Define the following terms: **[1 each]**

a) Treatment

b) Experimental unit.

D) a) What is meant by orthogonal contrasts. **[1]**

b) State the model for LSD. **[1]**

Q2) Attempt any Two of the following: **[5 each]**

a) State the model for CRD with assumptions. Obtain the least squares estimators of parameters involved in this model.

b) The following data is available in case of LSD with 12 error degrees of freedom,

Row S.S. = 49.6, Column S.S. = 58.9,

Treatment S.S. = 50.2, Error S.S. = 79.4

Compute the efficiency of LSD over corresponding RBD, when

i) Rows are used as blocks.

ii) Columns are used as blocks.

c) Explain Yate's procedure to obtain factorial effect totals in 2^3 factorial experiment.

Q3) Attempt any Two of the following: **[5 each]**

a) Describe the principles of randomization and local control in design of experiments.

b) Obtain the expression for the expectation of mean sum of squares due to error for RBD.

c) Explain ANOCOVA with real life situation. Also state the least squares estimates of parameters of RBD with ANOCOVA.

Q4) Attempt any One of the following:

a) i) What is meant by confounding in factorial experiments? Explain the difference between total and partial confounding. Give ANOVA table for 2^2 factorial experiment replicated 4 times with factors A and B. **[6]**

ii) Write a note on Kruskal Wallis H-test. **[4]**

b) i) Give analysis for testing the significance of regression coefficient and test for equality of treatment effects for ANOCOVA in CRD.**[6]**

ii) Explain Tuckey's procedure for comparing pairs of treatment means in RBD. **[4]**

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[5522] - 347

T. Y. B. Sc.

STATISTICS (Principal)

ST - 335: C – Programming (Turbo C)

(2013 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 calculator and statistical table is allowed.*

   4)   *Symbols and abbreviations have their usual meaning.*

Q1) Attempt each of the following:

  A)   Choose the correct alternative in each of the following: **[1 each]**

     a)   In C program the newline character is

       i)   \0   ii)   \t

       iii)   \n   iv)   \b

     b)   Which of the following assignment is wrong

       i)   y + z = x   ii)   a = 4

       iii)   k = 4.92   iv)   z = a / b

     c)   By declaration in x[4] [5] , the number of elements in an array x is

       i)   4   ii)   5

       iii)   9   iv)   20

     d)   Which of the following is not relational operator?

       i)   >   ii)   <=

       iii)   = =   iv)   &&

B) State whether each of the following statement is True or False: **[1 each]**

    a) An array should be used to store dissimilar elements.

    b) The operator used for comparison are called relational operators.

C) a) Give the syntax and illustration of gets (). **[1]**

    b) Explain the use of conditional operator (? :) in C. **[1]**

D) a) Write an expression in C for $a^3 - b^3 - 3a^2b + 3ab^2$. **[1]**

    b) Explain how the string function strcmp ( ) works. **[1]**

Q2) Attempt any Two of the following: **[5 each]**

    a) Explain each of the following giving syntax and one illustration each.

        i) if...else

        ii) printf ( )

    b) Write a C program to convert a decimal number to equivalent binary number.

    c) Draw the flowchart to obtain maximum of three numbers.

Q3) Attempt any Two of the following. **[5 each]**

    a) What do you mean by two dimensional array? Explain the declaration and initialization of two dimensional array by giving syntax and an illustration.

    b) Write a C program to find roots of quadratic equations.

    c) Write a C program to check whether a given string is palindrome or not. (Palindrome i.e. malayalam)

Q4) Attempt any one of the following:

    a)   i)   What is recursion? Write a C program to find GCD of two integers using recursive function. **[7]**

          ii)   Define Pointer. Give one illustration. How it is declared and assigned. **[3]**

    b)   i)   Write a C program to arrange the given n observations in increasing order of magnitude to find the median of the observations. **[7]**

          ii)   Write a C program to compute area of circle. **[3]**

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[5522]-348
T.Y. B.Sc.
STATISTICS (Principal)
ST-336 : Introduction to Regression Analysis
(Semester-III) (2013 Pattern) (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) *Use of scientific calculator and statistical tables is allowed.*
4) *Symbols and abbreviations have their usual meaning.*

Q1) **A)** In each of the following cases, choose correct alternative: **[1 each]**

a) One of the variance stabilizing transformation, when σ^2 is proportional to $[E(Y)]^2$ is

i) Arcsin   ii) Reciprocal of square root
iii) Log-transformation   iv) Square root

b) In multiple regression analysis involving six independent variables, the total variation in y is 900 and SSR=600. Then SSE is

i) 300   ii) 1.50   iii) 0.67   iv) 0.50

c) In simple linear regression, estimate of β_o is given by

i) $\bar{y} - \hat{\beta_1}\bar{x}$ ii) $\bar{x} - \hat{\beta_1}\bar{y}$ iii) $\bar{y} + \hat{\beta_1}\bar{x}$ iv) $\bar{x} + \hat{\beta_1}\bar{y}$

d) An outliers is indicated by

i) Large value of MS_{Res} ii) Large studentised residual

iii) Small C_p statistic   iv) Large value of R^2

B) State whether the following statements are true or false: **[1 each]**

a) If residual plot shows the outward funnel pattern it indicates that variance is increasing function of Y.

b) Large values of C_p statistic are desirable.

C) Explain the following terms: **[1 each]**

    a) AIC criteria for model selection.

    b) Deviance statistic D.

D) Answer the following: **[1 each]**

    a) State any two differences between linear & logistic Regression.

    b) State the use of normal probability plot.

Q2) Attempt any TWO of the following: **[5 each]**

    a) Consider the simple linear regression model, $Y = \beta_0 + \beta_1 x + \epsilon$ with $E(\epsilon) = 0$, $\text{var}(\epsilon) = \sigma^2$ and ϵ uncorrelated. Show that

$$\text{cov}(\hat{\beta}_0, \hat{\beta}_1) = \frac{-\bar{x}\sigma^2}{\Sigma(x_i - \bar{x})^2}$$

    b) Explain the procedure of estimating the parameters in logistic regression model.

    c) Write a note on forward selection method.

Q3) Attempt any TWO of the following: **[5 each]**

    a) Explain K^{th}-order polynomial model in one variable. Discuss in brief, the model building strategy in polynomial regression model.

    b) In a simple regression problem, if sample size is 25, the slope is 2.10, standard error estimate $(\hat{\sigma})$ is equal to 10.70 and the quality $\Sigma x_i^2 - n\bar{x}^2 = 400.52$ then

        i) Compute the standard error of the regression slope coefficient (β_1).

        ii) Test whether the regression coefficient is different from zero at siginificance level 0.01.

    c) Write a note on weighted least squares for fitting of linear regression models.

Q4) Attempt any ONE of the following:

a) i) For testing $H_o : \beta_1 = \beta_2 = \text{.......} = \beta_k = 0$ against $H_1 : \beta_j \neq 0$ for at least one j. Show that

$$F_o = \frac{R^2 * (n-p)}{K * (1 - R^2)} \; ; \text{ where p=KH}$$ **[4]**

ii) In multiple regression model, state $100(1 - \alpha)\%$ confidence interval for regression coefficient β_j. Also explain the notation used in it. **[6]**

b) i) Write a note on plot of residuals against the fitted values. **[4]**

ii) Write a note on multiple logistic regression model and explain the procedure of testing significance of multiple logistic regression model. **[6]**

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[5522]-349

T.Y. B.Sc.

GEOGRAPHY

Gg - 331 : Fundamental of Human Geography

(Paper -I) (2013 Pattern) (Semester - III) (Part - 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 sketches and diagrams wherever necessary.*
4) *Use of map stencils is allowed.*

Q1) Answer the following questions in two or three sentences (Any Ten)   **[10]**

a)   What do you mean by Ecological approach?

b)   Define Human Geography.

c)   What is the Mongoloide Race? Give examples.

d)   What is the Migration?

e)   Define Human Geography.

f)   Write any two physical trails.

g)   Write names of Grifith Taylor evaluation theory.

h)   What is the meaning of cultural diffusion.

i)   Concept of Human race.

j)   Name any two states with low density of population.

k)   Define HDI (Human Development Index).

l)   Write concept of possibilism.

m)   Name any two geographer who classified the 'Indian Race'.

P.T.O.

Q2) Write notes on following questions (Any Two) **[10]**

    a)   Nature and scope of Human geography.

    b)   Factors affecting on distribution of population.

    c)   Classification of Human Race.

    d)   Approaches to the study of Human Geography.

Q3) Answer the following questions in 100 words (Any two) **[10]**

    a)   Explain stages of evaluation of Man.

    b)   Write the types of diffusion.

    c)   Explain physical trails of race.

    d)   Write the policies of India.

Q4) Answer the following questions in 200 words (Any One) **[10]**

    a)   Grifith Taylor's Migration zone theory of Race Evaluation.

    b)   Explain Types causes-consequences of Migration.

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[5522]-350

T.Y. B.Sc.

GEOGRAPHY

Gg-332: Geography of Travel and Tourism (Part - I)

(2013 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) *Diagrams and maps must be drawn wherever necessary.*

4) *Use of map stencils is allowed.*

Q1) Answer the following in two to three sentences (Any ten): **[10]**

a) Define tourist.

b) What is heritage tourism?

c) In which states are Hampi and Sanchi located?

d) Name any two UNESCO word heritage sites in Maharashtra.

e) Name any two traditional types of accommodation.

f) Why is India well known for medical tourism.

g) What do you mean by winter resort?

h) Define recreation.

i) State any two hot springs in India.

j) What do you mean by rural tourism?

k) What do you mean by International tourist?

l) What is relative location?

m) Mention any two natural features from Maharashtra which are tourists attractions.

P.T.O.

Q2) Write short notes (Any two):   **[10]**

    a)   Waterfalls as tourist attractions.

    b)   Tourism as a regional resource.

    c)   Locational factors in tourism.

    d)   Elements of tourism.

Q3) Answer the following questions in 100 words (Any two):   **[10]**

    a)   Explain the role of Geography in tourism.

    b)   Why are historical places tourism attractions?

    c)   Desctibe the effect of seasonality on tourism.

    d)   Explain tourism as an economic activity.

Q4) Answer the following questions in 200 words (Any one):   **[10]**

    a)   What is tourism? Explain tourism as a multifaceted phenomena.

    b)   Discuss various attractions that are required for any location to become tourist center.

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[5522]-351

T.Y. B.Sc.

GEOGRAPHY

Gg - 333 : Fundamentals of Geoinformatics - I (Part - I)

(Paper -V) (2013 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.*

    3)   *Draw neat sketches and diagrams wherever necessary.*

    4)   *Use of map stencils is allowed.*

Q1) Answer the following questions in two or three sentences (Any Ten)   **[10]**

    a)   Define the term 'Geoinformatics'.

    b)   Write the name of major GIS tasks.

    c)   Write the name of input devices of hardware in GIS.

    d)   Name the types of query.

    e)   What is spatial data?

    f)   What is Raster?

    g)   Give any two merits of vector data?

    h)   What is attribute data?

    i)   Write full acronym of DBMs.

    j)   What is conversion of data?

    k)   Write any two examples of GIS application in water resource management.

    l)   What is full form of ISRO?

    m)   What is entity?

P.T.O.

Q2) Write short notes. (Any Two) **[10]**

   a)   Importance of GIS.

   b)   Aerial photographs.

   c)   Query analysis.

   d)   GIS in Regional planning.

Q3) Answer the following questions in 100 words (Any two) **[10]**

   a)   Explain the significance of Geoinformatics.

   b)   What are major types of GIS data?

   c)   Explain the merits and demerits of raster and vector data structure.

   d)   What is spatial and non-spatial database management system.

Q4) Answer the following questions in 200 words (Any One) **[10]**

   a)   Give an account of vector Data model structure.

   b)   Explain the application of geoinformatics in natural resource management.

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[5522]-352
T.Y. B.Sc.
GEOGRAPHY
Gg-334: Geography of India (Part - I)
(2013 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) *Draw neat diagrams and sketches wherever necessary.*
4) *Use of map stencils is allowed.*

Q1) Answer the following questions in one or two sentences (any ten):   **[10]**

a)   What is the length of land frontier of India?

b)   Name the boundary shared between India-Pakistan.

c)   Name the highest peak in Shivalik mountain range.

d)   What is the significance of western coast of India?

e)   Name any two tributaries of Indus River.

f)   List any two west flowing rivers of India.

g)   Name any two hill ranges located along Deccan Plateau.

h)   Give the significance of summer season in India.

i)   Write any two characteristics of Indian desert.

j)   What do you mean by monsoon?

k)   Name the states where laterite soil is found in India.

l)   What do you mean by regur soil?

m)   What is the soil degradation?

P.T.O.

Q2) Write short notes on (any two):   **[10]**

    a)   Location and extent of India.

    b)   The Northern Indian plains.

    c)   East flowing river systems.

    d)   Origin and mechanism of Monsoon.

Q3) Answer the following in 100 words (any two):   **[10]**

    a)   Explain the historic background of India.

    b)   Discuss the rivers of Sahyadri.

    c)   Describe the factors controlling various seasons in India.

    d)   Explain the types of natural vegetation in India.

Q4) Answer the following in 200 words (any one):   **[10]**

    a)   Give a detail account of Northern Mountains in India with a suitable diagram.

    b)   Explain the problem of soil degradation in various parts of India and discuss the measures of soil degradation.

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[5522]-353

T.Y. B.Sc.

GEOGRAPHY

Gg-335 : Geography of Soils (Part-I)

(Semester-III) (2013 Pattern) (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 sketches and diagrams wherever necessary.*

  4)   *Use of map stencils is allowed.*

Q1) Answer the following questions in two or three sentences (Any ten)   **[10]**

  a) Define pedogenesis.

  b) What do you understand by the process of leaching?

  c) Define porosity.

  d) Name any two azonal soils.

  e) What is soil peds?

  f) Define metamorphic rock.

  g) What is primary mineral?

  h) Write the types of soil density.

  i) Define oxidation.

  j) What is calcic layer?

  k) Write two names of secondary minerals.

  l) Define humus.

  m) Write two names of tropical soils.

Q2) Write short notes on (any two)   **[10]**

  a) Types of soil colloids.

  b) Factors affecting on soil moisture.

  c) Basis of soil classification.

  d) Water holding capacity of the soil.

Q3) Answer the following questions in 100 words (any two)   **[10]**

    a)   Write the factors affecting on hydrogen ion concentration.

    b)   Explain the development process of soil.

    c)   Explain soil structure.

    d)   Write the difference between erosion and weathering.

Q4) Answer the following questions in 200 words (any one)   **[10]**

    a)   Elaborate classification of soil.

    b)   Define soil and describe the brief history of soil.

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Total No. of Questions : 4]

P679

SEAT No. :

[Total No. of Pages : 2

[5522]-354

T.Y. B.Sc.

GEOGRAPHY

Gg-336 : Fundamentals of Geoinformatics-II (Part-I)

(Semester-III) (2013 Pattern) (Paper-XI)

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 sketches and diagrams wherever necessary.*

    4)   *Use of map stencils is allowed.*

Q1) Answer the following questions in two or three sentences. (ANY TEN) **[10]**

    a)   Define aerial photography.

    b)   What is electromagnetic spectrum?

    c)   Define transmission.

    d)   Define wave velocity.

    e)   What is focal length of camera?

    f)   Define Rayleigh scattering.

    g)   What are Fiducial marks?

    h)   Give the spectral range of Infrared rays.

    i)   What is Infrared Black & White photos?

    j)   Define photo nadir.

    k)   What is mirror stereoscope?

    l)   What is side overlap?

    m)   What are stereo pairs?

Q2) Write short notes on (ANY TWO)   **[10]**

    a)   Vertical aerial photographs.

    b)   Central perspective projection.

    c)   Divisions of electromagnetic spectrum.

    d)   Pseudoscopic image.

P.T.O.

Q3) Answer the following questions in 100 words (ANY TWO) **[10]**

    a)   Explain the properties of electromagnetic radiation.

    b)   Discuss historical development of remote sensing.

    c)   Explain geometrical properties of aerial photograph.

    d)   Explain how EMR interacts with atmosphere.

Q4) Answer the following questions in 200 words (ANY ONE) **[10]**

    a)   Give an account of various types of aerial photographs.

    b)   Discuss the parameters of annotations mentioned on an aerial photograph.

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[5522]-355

T.Y. B.Sc.

MICROBIOLOGY

MB - 331 : Medical Microbiology - I

(Paper -I) (2013 Pattern) (Semester - 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:

A) Define the following. **[2]**

i) Mortality rate

ii) Morbidity rate

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

I		**II**	
a)	Wool sorter's disease	i)	Mycobacterium tuberculosis
b)	DOTS	ii)	Bacillus anthracis
c)	Toxic shock syndrome	iii)	Campylobacter
d)	Gastroeuteritis	iv)	Staphylococcus aureus
		v)	Neisseria gonorrhoeae

C) Multiple choice questions. **[2]**

a) The functional unit of Kidney is the _____

i) Pelvis ii) Nephron

iii) Glomerulus iv) Renal pyramid

b) Which of the following is not the part of GIT.

i) Stomach ii) Colon

iii) Liver iv) Mouth

P.T.O.

D) State True or False: **[2]**

    a) The study of disease with respect to time, place and person is called as epidemiology.

    b) The no. of people infected by a disease at any point in time is called as prevalence.

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

    a) Draw a neat, labelled diagram of female reproductive system.

    b) Write a short note on modes of transmission of disease.

    c) Describe the types of leprosy.

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

    a) What is randomized control trials (RCT)? Give its significance and types.

    b) Explain diagrammatically the pathogenesis of clostridium tetani.

    c) Describe the methods of diagnosis of typhoid fever.

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

    a) Explain in detail the virulence factors and pathogenesis of Neisseria gonorrhoeae.

    b) Diagramatically represent the human respiratory system. Enlist the diseases of lower respiratory tract and explain any two in detail.

        i) Mode of transmission

        ii) Virulence factors &

        iii) Symptoms

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[5522]-356

T.Y. B.Sc.

MICROBIOLOGY

MB-332: Genetics and Molecular Biology - I

(2013 Pattern) (Paper - II) (Semester - 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) What is Prokaryotic RNA polymerase holoenzyme made of?

b) Which of the following enzymes replaces a primer during DNA replication?

    i) Helicase

    ii) DNA polymerase I

    iii) DNA ligase

    iv) Gyrase

c) State True or False:

    Prokaryotic genes have several introns.

d) Which of the following is an initiation codon?

    i) AUG

    ii) CCC

    iii) UCC

    iv) UAG

e) For which molecules, southern blotting is a suitable technique?

f) What is the unit for gene mapping?

g) Which enzyme has both 5' to 3' and 3' to 5' exonuclease activity?

h) Name the enzyme which synthesizes m-RNA in Eukaryotes.

i) Give any two differences between prokaryotic and eukaryotic DNA replication.

j) Define the term "Operon".

P.T.O.

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

    a)   Eukaryotic m-RNA.

    b)   Clover-leaf model of t-RNA.

    c)   rho-independent transcription termination in prokaryotes.

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

    a)   With a suitable diagram. Explain initiation of Translation in prokaryotes.

    b)   With a suitable diagram, explain mismatch repair of damaged DNA.

    c)   Enlist any 5 bio-hazards associated with r-DNA technology.

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

    a)   With a suitable diagram, explain Agarose gel electrophoresis.

    b)   Explain important findings and significance of Tetrad analysis in <u>Neurospora</u> <u>crassa</u>.

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[5522]-357
T.Y. B.Sc.
MICROBIOLOGY
MB - 333 : Enzymology
(Paper -III) (2013 Pattern) (Semester - 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) *Draw neat labelled diagrams wherever necessary.*

Q1) A)   Attempt the following.   **[5]**

   a)   Give any four examples of commonly occuring amino acids at active
        sites.

   b)   State biochemical function of Riboflavin.

   c)   What is uncompetitive inhibition?

   d)   Define turn over number.

   e)   State any two types of feed back inhibitions.

   B)   Match the following: **[5]**

	A		B
i)	Trypsinogen	a)	Competitive inhibition
ii)	Reversible inhibition	b)	Freezing & thewing
iii)	Cell disruption	c)	Zymogen
iv)	Ultracentrifugation	d)	Ligand
v)	Specific binding groove	e)	Molecular weight determination.
		f)	Pyruvate dehydrogenase

P.T.O.

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

    a)   Explain principle and working of molecular exclusion chromatography.

    b)   Explain enzyme compartmentation at cellular level.

    c)   Explain radioisotope technique of enzyme assay.

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

    a)   Explain structure and biochemical role of thiamine.

    b)   Explain in detail NMR spectroscopy.

    c)   Explain covalent modification with suitable examples.

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

    a)   Explain principle working and application of SDS-PAGE.

    b)   Derive Michaelis-Menten equation for initial velocity of single substrate enzyme catalysed reaction.

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[5522]-358

T.Y. B.Sc.

MICROBIOLOGY

MB-334: Immunology -I

(2013 Pattern) (Paper - IV) (Semeseter - 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:

  A)   Match the following: **[5]**

a)	Most cells	i)	Give rise to RBCs
b)	NK cells	ii)	Macrophages in the liver
c)	Kupffer cells	iii)	Play important role in allergies
d)	Dendritic cells	iv)	ADCC
e)	Erythroid progenitor cells	v)	One of the APCS
		vi)	Give rise to WBCs

  B)   State true or false: **[1]**

    Molecular weight of a molecule can influence its immunogenecity.

  C)   Multiple choice questions: **[2]**

    a)   Cytotoxic T cells recognise the antigen in association with _____.

        i)   MHC II   ii)   MHC I

        iii)   HLA - DR   iv)   MHC III

P.T.O.

b) Proteosomes are involved in the processing and presentation of _____.

   i) Exogenous Ag   ii) Endogenous Ag

   iii) Both   iv) None of the above

D) Define: **[2]**

   a) Opsonization

   b) Immunogenecity

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

   a) Give comparative account of classical, alternative and lectin pathway of complement activation.

   b) Differentiate between active and passive immunity.

   c) Illustrate diagrammatically: Structure of thymus.

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

   a) Phagocytosis.

   b) Types of grafts.

   c) Primary and secondary immune response.

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

   a) Describe inflammation with respect to mediators involved, vascular and cellular changes and mechanism involved.

   b) i) Explain the molecular basis of heavy chain diversity.

      ii) Give the structure of IgG and its properties.

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[5522]-359

T.Y. B.Sc.

MICROBIOLOGY

MB-335 : Fermentation Technology-I

(Semester-III) (2013 Pattern) (Paper-V)

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) Do as directed.

   A) Define: i) Strain improvement   **[3]**

                    ii) Shelf life

                    iii) rDNA technology

   B) Match the following   **[5]**

I	II
i) RSM	a) Sterilization indicator
ii) Del factor	b) Media optimization
iii) Intracellular product	c) Distillation
iv) Volatile compounds	d) Ion exchange chromatography
v) Charged compounds	e) Cell disruption

   C) State true/false   **[2]**

      i)   Biological assays are less reproducible.

      ii) Ascending chromatography gives faster separation than descending chromatography.

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

   a) Explain use of Plackett Burman design.

   b) With suitable diagram explain continuous sterilization.

   c) Describe scale down.

Q3) Attempt any two of the following [10]

    a) Describe Enzymatic assay with example.

    b) Explain pyrogen testing.

    c) Enlist types of IPR.

Q4) Attempt any one of the following [10]

    a) Describe any two methods of isolation of auxotrophic mutants.

    b) Explain different types of liquid-liquid extraction by giving suitable example.

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[5522]-360
T.Y. B.Sc.
MICROBIOLOGY
MB-336 : Food and Dairy Microbiology
(Semester-III) (2013 Pattern) (Paper-VI)

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)   Define: a)   Perishable food

        b)   'D' value

  B)   State true/false

    Nisin is a antibiotic produced by <u>Lactococcus</u> <u>lactis</u> that is used as food preservative.

  C)   Fill in the blank.

    The food code was written by_____and is reviewed and modified on regular basis.

  D)   MCQ

    Who among the following is called as father of white revolution in India.

    a)   Norman Borlaug   b)   Verghese Kurien

    c)   Lakdawala M   d)   S.Swaminathan

  F)   Match the following.

    a)   Swiss cheese   i)   Low temperature

    b)   Natural preservative   ii)   Flavouring

    c)   Radiation treatment   iii)   High temperature

    d)   Freeze drying   iv)   Vinegar

    e)   Smoking food   v)   Minimal changes in food

                vi)   <u>Propionibacterium</u>

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

    a)   Describe any two tests for detection of mastitis.

    b)   Describe the spoilage of canned food.

    c)   Explain the food grade biopreservatives.

Q3) Write short notes on <u>any two</u>. [10]

    a)   Nutritive value of milk.

    b)   Botulism.

    c)   Dairy co-operatives.

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

    a)   Describe various milk borne diseases.

    b)   Explain the physical and chemical properties of food affecting microbial growth.

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[5522]-361

T.Y. B.Sc.

ELECTRONIC SCIENCE

EL - 331 : Advanced Digital System Design

(Paper -I) (2013 Pattern) (Semester - III)

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

Instructions to the candidates:

    1)   *All questions are compulsory.*

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

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

    4)   *Use of calculator is allowed.*

Q1) Attempt all of the following:

    a)   List different variables used in state machine. **[1]**

    b)   What is FPGA? **[1]**

    c)   Give the meaning of number specification 6' hx & – 8'd4 in verilog. **[1]**

    d)   State two compiler directives in verilog. **[1]**

    e)   Write the format of module used in verilog. **[2]**

    f)   List four data types used in verilog. **[2]**

    g)   Define state equivalence theorem. **[2]**

    h)   What is PLD? Give its types. **[2]**

Q2) Attempt any two of the following:

    a)   Explain mealy sequential machine model with the help of block diagram. **[4]**

    b)   Explain CPLD with the help of block diagram. **[4]**

    c)   Write program in verilog for 2 to 4 decoder using NAND gates by gates level modeling. **[4]**

P.T.O.

Q3) Attempt any two of the following.

   a)   Draw and explain block diagram of stepper motor sequence generator.**[4]**

   b)   Write verilog code for half adder. **[4]**

   c)   Explain various steps involved in equivalence classes state reduction technique with suitable example. **[4]**

Q4) Answer any two of the following:

   a)   i)   Describe various ASM symbols. **[3]**

        ii) State and explain arithmetic and shift operator in verilog. **[3]**

   b)   What is Merger graph? Write the procedure to draw Merger graph. **[6]**

   c)   Describe sized and unsized numbers in verilog with suitable examples.**[6]**

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

Attempt all the following:

   a)   Describe 'initial' and 'always' statements in verilog with examples. **[4]**

   b)   Implement following logical function using PAL. **[4]**

   $f_1 = \overline{x}yz + y\overline{z} + xy$, $f_2 = \overline{x}y\overline{z} + xyz + x\overline{z}$.

   c)   What is vending machine? Explain with proper block diagram. **[4]**

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[5522]-362
T.Y. B.Sc.
ELECTRONIC SCIENCE
EL-332: Microcontrollers
(2013 Pattern) (Paper - II) (Semester - III)

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 right indicate full marks.*
4) *Use of calculator is allowed.*

Q1) Attempt all the following:

a) Define algorithm.   **[1]**

b) Define assembler.   **[1]**

c) What is the role of RS Pin in LCD interfacing?   **[1]**

d) How many address lines are required, if 16kB RAM is to be interfaced
    with 8051 μC?   **[1]**

e) Draw 8 bit format of PSW register.   **[2]**

f) What is the function of program counter and stack pointer?   **[2]**

g) Give any two conditional jump instructions.   **[2]**

h) Give examples of any two addressing modes.   **[2]**

Q2) Attempt any two of the following:

a) Explain in brief internal RAM structure of 8051 μC.   **[4]**

b) Explain PUSH and POP instruction using example.   **[4]**

c) Write a short note Keil IDE and proteus.   **[4]**

P.T.O.

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

    a)   State the dual functions of port P3. **[4]**

    b)   Write the role of ORG, EQU, DB, END directives in assembly language programs. **[4]**

    c)   Draw and explain stepper motor interface with 8051µC. **[4]**

Q4) Attempt any <u>two</u> of the following:

    a)   Draw and explain functional block diagram of 8051 microcontroller. **[6]**

    b)   Explain mode 1 programming of timer with the help of proper diagram. Write instructions to start timer O and to clear flag TFO. **[6]**

    c)   Draw interface diagram of LCD with 8051 µC. Write assembly language program to display 'Y' on 2nd line of display. **[6]**

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

Attempt <u>all</u> of the following:

    a)   Draw interface diagram to interface 32kB ROM with 8051µC. What is the role of EA pin. **[4]**

    b)   Write assembly language program to transfer 20 bytes of data from memory location 30H to memory location 60H. **[4]**

    c)   Write assembly language program to read status of thumbwheel switch connected to lower 4 bits, of port P1 complement it and then send to lower 4 bits of port P2. **[4]**

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[5522]-363

T.Y. B.Sc.

ELECTRONIC SCIENCE

EL- 333 : Analog Circuit Design & Applications of Linear IC's

(Paper - III) (2013 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.*

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

Q1) Attempt all of the following.

a) What do you mean by interference noise? **[1]**

b) Write any one advantage of active filter over passive filter. **[1]**

c) What is ideal value of input offset voltage of op-amp? **[1]**

d) Write the IC number for adjustable negative voltage regulator. **[1]**

e) Draw the circuit diagram of fixed voltage regulator using IC 7805. **[2]**

f) "Ideal differentiator is nothing but the high pass filter". Comment. **[2]**

g) Write the number of linear IC's used for four quadrant multiplier and balanced modulator. **[2]**

h) State the important blocks of PLL. **[2]**

Q2) Attempt any two of the following.

a) What is guarding? Explain it with circuit diagram of inverting and unity gain amplifier using op-amp. **[4]**

b) Explain working of peak detector using op-amp. **[4]**

c) Draw the circuit diagram of inverting schmitt trigger using op-amp and explain its working. **[4]**

P.T.O.

Q3) Attempt any two of the following.

   a)   What are the earth loops? How to avoid earth loop in case of op-amp?**[4]**

   b)   Explain the working of logarithmic amplifier using op-amp and diode as log element. Derive expression for its output voltage. **[4]**

   c)   Draw the block diagram of IC 555 and explain it in short. **[4]**

Q4) Attempt any two of the following.

   a)   Draw the internal block diagram of IC LM 723 with proper diagram explain low voltage regulator using it. Write expression for its output voltage. **[6]**

   b)   i)   What is selection criteria of op-amp in dc and low frequency application. **[3]**

        ii) Draw the circuit diagram of active BPF using op-amp and sketch its ideal frequency response. **[3]**

   c)   Draw and explain circuit diagram of function generator using IC 8038. Write the expression for frequency of oscillator for it. **[6]**

OR

Attempt all of the following.

   a)   i)   Calculate lower cut off frequency (f_L) of 2nd order active high pass filter. Given: $R_1 = R_2 = 15.9$ KΩ, $C_1 = C_2 = 0.01$ μF. **[2]**

        ii) Calculate output voltage of adjacent regulator using IC 317. Given : $V_{ref} = 12$V, $R_1 = R_2 = 1$KΩ and $I_{adj} = 10\mu$A. **[2]**

   b)   For astable multivibrator using IC 555, determine the charging and discharging time for $R_A = 2.2$KΩ, $R_B = 3.9$ KΩ and $C = 0.1$ μF. **[4]**

   c)   Determine free running frequency (f_{out}) and lock range (f_L) of PLL IC565 for $R_1 = 12$KΩ, $C_1 = 0.01$ μF and $\pm V = \pm 10$V. **[4]**

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[5522]-364

T.Y. B.Sc.

ELECTRONIC SCIENCE

EL-334 : Principles of Semiconductor Devices

(2013 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 indicates full marks.*

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

   4)   *Use of calculator is allowed.*

Q1) Attempt all of the following.

   a)   What is doping?   **[1]**

   b)   Define contact potential.   **[1]**

   c)   What is emitter injection efficiency?   **[1]**

   d)   Define pinch off voltage.   **[1]**

   e)   What is photo conductivity?   **[2]**

   f)   Write a short note on "Electron-luminesence".   **[2]**

   g)   "JFET is a voltage controlled device". Comment.   **[2]**

   h)   What is miller indices?   **[2]**

Q2) Attempt any Two of the following.

   a)   Write the Bohr's Postulates.   **[4]**

   b)   Explain zener breakdown mechanism in PN junction.   **[4]**

   c)   Write a note on "Thermal effects in BJT".   **[4]**

Q3) Attempt any Two of the following.

   a)   Explain with neat diagram the vapour phase epitaxy.   **[4]**

   b)   Draw energy band diagram for metal-n type semiconductor before and after contact.   **[4]**

   c)   Write the basic operating modes of MOSFET and draw I_D-V_D characteristics.   **[4]**

P.T.O.

Q4) Attempt any Two of the following.

    a)   i)   Write a note on "diffusion of carriers".   **[3]**

          ii)   Explain the bonding in si-crystal.   **[3]**

    b)   Explain in detail the coupled diode model.   **[6]**

    c)   What is threshold voltage in MOSFET? Draw the output and transfer characteristics of MOSFET.   **[6]**

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

Attempt all of the following.

    a)   i)   Write the difference between direct and Indirect semiconductor.   **[2]**

          ii)   What is reverse bias breakdown?   **[2]**

    b)   Draw and explain the operation of BJT.   **[4]**

    c)   Explain the construction of GaAs MESFET.   **[4]**

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Total No. of Questions : 4]

P690

SEAT No. :

[Total No. of Pages : 2

[5522]-365

T.Y. B.Sc.

ELECTRONIC SCIENCE

El-335 : C Programming

(Semester-III) (2013 Pattern) (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)   *Neat diagrams must be drawn wherever necessary.*

    4)   *Use of calculator is allowed.*

Q1) Answer <u>all</u> of the following:

    a)   Explain the meaning of 'scanf( )' statement.   **[1]**

    b)   State various data types in 'C' language.   **[1]**

    c)   Define flowchart.   **[1]**

    d)   Explain the term 'put c'.   **[1]**

    e)   State the difference between do.....while loop and for loop.   **[2]**

    f)   State the meaning of \n and \b.   **[2]**

    g)   Explain the function strcat( ).   **[2]**

    h)   'C is middle level language'. Comment.   **[2]**

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

    a)   Define an array. How to initialise one dimensional and two dimensional array?   **[4]**

    b)   Explain with suitable example, difference between fprintf and printf in C.   **[4]**

    c)   Explain bitwise operators in 'C' with one example.   **[4]**

P.T.O.

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

    a)   Write a program in 'C' to print the address of variable along with its values. **[4]**

    b)   Explain with suitable example 'switch' statement in 'C'. **[4]**

    c)   What are the formal and actual parameters in function? Explain it with suitable example. **[4]**

Q4) Answer any <u>two</u> of the following:

    a)   Write algorithm using bubble sort method to arrange 10 numbers in ascending order. **[6]**

    b)   What is recursion? Write a program to find the factorial of n using recursion. **[6]**

    c)   Write an algorithm to accept name of student from user and check whether name of student exist in the list, using linear search method. **[6]**

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

Q4) Answer <u>all</u> of the following:

    a)   Explain with suitable example relational and logical operator. **[4]**

    b)   Explain with suitable example how to initialise pointer variable. **[4]**

    c)   Distinguish between the following

        i)   int x and long x **[2]**

        ii)   int main( ) and void main( ) **[2]**

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[5522]-366

T.Y. B.Sc.

ELECTRONIC SCIENCE

EL-336(A) : Fiber Optic Communication

(Semester-III) (2013 Pattern) (Paper-VI(A)) (Optional)

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) Attempt all of the following.

a) Define numerical aperture (NA) of optical fiber. **[1]**

b) State two types of LED configurations. **[1]**

c) What is quantum efficiency? **[1]**

d) What are major fiber joints? **[1]**

e) "Band width of optical fiber is infinite". Comment. **[2]**

f) How does laser light differ from normal light. **[2]**

g) Which factors are responsible for intrinsic joint losses in a fiber? **[2]**

h) What is optical repeater? **[2]**

Q2) Attempt any two of the following.

a) Discuss in brief any four inherent advantages of optical fiber over conventional copper system. **[4]**

b) With suitable energy level diagram explain the phenomena of population inversion & lasing. **[4]**

c) Explain optical power loss model for point to point link. **[4]**

Q3) Attempt any two of the following

a) Draw the schematic of an edge emitting double hetrojunction LED. Explain it in brief. **[4]**

b) Explain the attenuation in the optical fiber due to absorption mechanism. **[4]**

c) What are selection criteria of optical fiber for short haul and long haul communication. **[4]**

Q4) Attempt any two of the following

a) i) With neat diagram explain the structure of fiber optic cable. **[3]**

ii) Discuss significance of numerical aperture (NA) and refractive index profile of an optical fiber. **[3]**

b) With neat diagram discuss method for fiber attenuation measurement. **[6]**

c) What is optical amplifier? Explain the working of erbium-doped optical amplifier. **[6]**

OR

Attempt all of the following

a) When a mean optical power launched into an 8 km long fiber is $120\,\mu W$, the mean output power at the fiber output is $3\,\mu W$ determine **[4]**

i) Signal attenuation per kilometer for fiber.

ii) Overall signal attenuation through fiber assuming there is no connector and splice loss.

b) A photo diode has quantum efficiency of 65% when photon of energy 1.5×10^{-19}J are incident upon it. **[4]**

i) Calculate wavelength at which photo diode is operating

ii) Calculate the incident optical power required to obtain a photo current of $2.5\,\mu A$

(Given Planck constant (h)=6.626×10^{-34}J.s., Electronic charge (q)=1.6×10^{-19}C, velocity of light (c)=3×10^{8}m/s)

c) i) A certain optical fiber has an attenuation of 1.5 dB/km at 1300 nm. If 0.5 mW of optical power is initially launched into fiber what is the power level in micro watt after 8 km. **[2]**

ii) An optical signal has lost 55% of its power after travelling 3.5 km of fiber. What is loss in dB/km of this fiber. **[2]**

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P691

[5522]-366

T.Y. B.Sc.

ELECTRONIC SCIENCE

EL-336(B) : Electronic Product Design and Entrepreneurship

(Semester-III) (2013 Pattern) (Paper-VI(B)) (Optional)

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 all of the following.

    a) Define the term sole proprietorship. **[1]**

    b) What is decision? **[1]**

    c) What is maintainability of electronic products? **[1]**

    d) State any two sources of finance for starting business. **[1]**

    e) Explain the term small business. **[2]**

    f) What are the advantages of co-operative societies. **[2]**

    g) Write a note on quality assurance testing of manufactured product. **[2]**

    h) What is pricing? Explain it in detail. **[2]**

Q2) Attempt any two of the following.

    a) Explain capacitive touch screen technology. **[4]**

    b) State merits and demerits of joint stock company. **[4]**

    c) Write a note on women entrepreneurship. **[4]**

Q3) Attempt any two of the following.

    a)   Explain break even point analysis with neat diagram.   **[4]**

    b)   Explain 4-Ps of marketing mix.   **[4]**

    c)   Explain any two selection parameters of microcontroller for multi touch screen technology.   **[4]**

Q4) Attempt any two of the following.

    a)   What is failure of system? Explain the factors responsible for failure of system.   **[6]**

    b)   State and explain the steps for registration of partnership firm.   **[6]**

    c)   Write a note on cash flow and working capital.   **[6]**

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[5522]-367

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS-301 : India's Foreign and Defence Policy

(2013 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) Define Defence policy.

　b) State the meaning of strategic thought.

　c) What do you mean by nuclear doctrine?

　d) Write any two determinants of Defence policy.

　e) State the meaning of Defence vs Development.

　f) What do you mean by MAD?

　g) Write any two basis of India's foreign policy.

　h) What do you mean by perspective planning?

Q2) Answer in 8 to 10 sentences each (any two) **[8]**

　a) Explain characteristics of India's foreign policy.

　b) Describe relationship between defence policy and military power.

　c) Explain evolution of India's foreign policy.

P.T.O.

Q3) Write short notes on (Any two) **[8]**

   a)   Non-Alignment.

   b)   India's policy in Indian Ocean region.

   c)   India's security consideration in South Asia.

Q4) Answer in 18 to 20 sentences (Any One) **[8]**

   a)   Explain India's nuclear policy since 1970's.

   b)   Describe India's role in world order.

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[5522]-368

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS-302: Defence Economics

(2013 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.*

Q1) Answer in 2 to 4 sentences each: **[16]**

a) Define war potential.

b) State the meaning of economic mobilization.

c) State the meaning of perspectives in defence planning.

d) Define Defence Budget.

e) Define National Power.

f) Write full form of DPSU.

g) What do you mean by Defence versus development?

h) Write any two foreign sources of war finance.

Q2) Answer in 8 to 10 Sentences each (any two):   **[8]**

a) Explain consequence of war.

b) Describe elements of war potential.

c) Explain domestic sources of war finance.

Q3) Write short notes on (any two): **[8]**

    a)   Characteristics of India's nuclear Policy.

    b)   Defence and Development.

    c)   Concept of public good.

Q4) Answer in 18 to 20 sentences (Any one): **[8]**

    a)   Explain rational of arms production in the Third world countries.

    b)   Describe modernization programme of Indian armed forces.

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[5522]-369

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS- 303 : Research Methodology

(2013 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)   Write any two characteristics of good Research.

  b)   Define scientific Research.

  c)   Define hypothesis.

  d)   What do you mean by Research design?

  e)   State the meaning of secondary data.

  f)   What do you mean by fundamental Research?

  g)   What are the objectives of social science Research?

  h)   What are the sources of primary data?

Q2) Answer in 8 to 10 Sentences each (any two)   **[8]**

  a)   Explain importance of selection of research problem.

  b)   Describe differences between research methods and methodology.

  c)   Explain conceptualization in research survey of literature.

Q3) Write short notes on (any two) **[8]**

   a) Features of good research design

   b) Development of working hypothesis

   c) Criteria for good research

Q4) Answer in 18 to 20 sentences (Any One) **[8]**

   a) Explain Role of Research in security studies.

   b) Describe Research process in flow chart.

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[5522]-370

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 304: Science, Technology and National Security

(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 Science.

    b)   Write full form of C4ISR.

    c)   State the meaning of armament technology.

    d)   What do you mean by accidental nuclear war?

    e)   State the meaning of Battlefield information system.

    f)   Write the meaning of surprise first strike.

    g)   Write any two characteristics of submarine.

    h)   What do you mean by Revolution in Military Affairs?

Q2) Answer in 8 to 10 Sentences each (any two)   **[8]**

    a)   Explain impact of submarine in Naval Warfare.

    b)   Describe Role of private sector in India's Defence production.

    c)   Examine role of military technology in making foreign policy.

Q3) Write short notes on (any two)   **[8]**

    a)   Science and armament technology.

    b)   Transfer of technology and its economic impact.

    c)   Impact of science on weapon development.

Q4) Answer in 18 to 20 sentences (Any one).   **[8]**

    a)   Explain impact of major technological breakthrough on society.

    b)   Describe relationship between science and national security.

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[5522]-371

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS-305 : Defence Planning and Management in India

(Semester-III) (2013 Pattern) (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 defence management.

   b)   State any two importance of team work.

   c)   Define strategic perspectives.

   d)   State the meaning of action-reaction military preparedness.

   e)   State the meaning of Battlefield dynamism.

   f)   State the meaning of military leadership.

   g)   Write the meaning of logistics.

   h)   State the concept of human resource management.

Q2) Answer in 8 to 10 Sentences each (any two).   **[8]**

   a)   Explain higher defence organization in India.

   b)   Describe military leadership in defence management.

   c)   Explain relationship between war and economy.

Q3) Write short notes on (any two)   **[8]**

   a)   Industrial management vs defence production.

   b)   Salient features of defence management.

   c)   Elements of war potential.

Q4) Answer in 18 to 20 sentences (Any one).   **[8]**

   a)   Explain relationship between war principles in corporate management.

   b)   Describe applications of war principles in supply chain management.

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[5522]-372

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS-306(A) : Military and Media (Optional)

(Semester-III) (2013 Pattern) (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 to 4 Sentences each.   **[16]**

   a)   State the meaning of media management.

   b)   Write the meaning of Defence journalism.

   c)   Write any two functions of defence journalism.

   d)   Define mass communication.

   e)   What do you mean by news analysis?

   f)   State the meaning of scientific inquiry.

   g)   Write any two ingredients of defence journalism.

   h)   Write steps of writing report.

Q2) Answer in 8 to 10 Sentences each (any two). **[8]**

a) Explain ethic of media.

b) Discuss important feature of good communication.

c) Describe about role of media during war.

Q3) Write short notes on (any two) **[8]**

a) Scope of defence journalism.

b) Difficulties in defence reporting.

c) Essential information for war reporting.

Q4) Answer in 18 to 20 sentences (Any one). **[8]**

a) Explain current status of defence journalism in India.

b) Describe laws and role of media in communication.

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P697

[5522]-372

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS-306(B) : Armed Conflict and Human Rights (Optional)

(Semester-III) (2013 Pattern) (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 to 4 Sentences each. **[16]**

    a)   Why do we need rights?

    b)   Define human rights.

    c)   Define civil war.

    d)   Define insurgency.

    e)   Define terrorism.

    f)   Define liberty.

    g)   What do you mean by human value?

    h)   State the meaning of peace keeping force.

Q2) Answer in 8 to 10 Sentences each (any two). [8]

a) Explain nature of human rights.

b) Discuss different approaches to intervention.

c) Describe characteristics of insurgency.

Q3) Write short notes on (any two) [8]

a) Peace keeping theory.

b) Dimensions of liberty.

c) Coercive humanitarianism.

Q4) Answer in 18 to 20 sentences (Any one). [8]

a) How do human rights work? Explain.

b) Describe universal human rights in theory and practice.

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[5522]-374

T.Y. B.Sc. (Vocational)

DEFENCE AND STRATEGIC STUDIES

DS. No. – 308 (A) : Indian Military Strategy [1857 – 1947]

(2013 Pattern) (Semester - III) (paper - VIII) (Regular)

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)   Define "Total War".

    b)   What do you mean by contemporary warfare?

    c)   State any two sources of Indian Military History.

    d)   How you would like to define Military History?

    e)   State the duration of World War – I.

    f)   Why the study of Military History is necessary?

    g)   State the Allied countries during World War – II.

    h)   Which treaty was signed at the end of World War – I.

Q2) Answer in 8 to 10 sentences (Any Two)   **[8]**

    a)   Explain any one example of Total War.

    b)   Write in brief any one source of Indian Military History.

    c)   Discuss in short the concept of Military History.

Q3) Write short notes on (Any Two) [8]

    a)   Examples of Limited War since 1945.

    b)   Concept of Total War.

    c)   Indian Military Strategy during World War – II.

Q4) Answer in 16 to 20 sentences (Any One) [8]

    a)   Highlight on how the nature of war changing from limited to Total.

    b)   Explain the role of Indian Army during World War – II.

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[5622]-374

T.Y. B.Sc. (Vocational)

DEFENCE AND STRATEGIC STUDIES

DS. No. – 308 (B) : Indian Military Strategy [1630 – 1680 A. D.]

(2013 Pattern) (Semester - III) (Paper - VIII) (Regular)

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 Shahaji Raje Bhosale?

b) Who was the chief of Shivajis Navy?

c) State any four names of Shivajis forts.

d) What do you mean Ashttapradhan Mandal?

e) Write the basic aim of Shivaji's Karnataka campaign.

f) Why Shivaji fought a war with Vankoyji?

g) Why Shivaji conquered Jawali territory?

h) What was the outcome from battle of Purrandar?

Q2) Answer in 8 or 10 sentences (Any Two) [8]

a) Write a few lines on "Fort of Purrandar".

b) Explain in brief political condition in Maharashtra 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 to 20 sentences (Any One)   **[8]**

    a)   Explain in detail "Military system of Shivaji".

    b)   Write an essay on Shivaji's Karnataka Campaign.

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[5522]-376
T.Y. B.Sc.
ENVIRONMENTAL SCIENCE
ENV 301 : Terrestrial Ecosystems & Management
(Paper -I) (2013 Pattern) (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 Hotspot and give one example from India.

    b)   State the difference between antibiosis & co-operation.

    c)   What is phytosociology?

    d)   Mension any two examples of macrobiota.

    e)   Write any two sinks of carbon sequestration.

    f)   Define Keystone species.

    g)   Enlist any two effects of forest fire.

    h)   What is Eco-development programme?

    i)   Define Ecosystem & mention any two terrestrial ecosystems.

    j)   What are Biogeo chemical cycles?

Q2) Write a short note on (Any Two) **[10]**

    a)   Temperate Grasslands.

    b)   Chipko movement.

    c)   Joint Forest management.

Q3) Answer any two from the following **[10]**

    a)   Describe the Raunkaier's classification.

    b)   What is Habitat Restoration? Explain by giving example of Guan caste National park.

    c)   Explain the role of local government & people in conservation of natural resource.

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

    a)   Describe Carbon pool and sequestration potential of terrestrial ecosystems.

    b)   Explain the general structure of terrestrial communities.

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[5522]-377

T.Y. B.Sc.

ENVIRONMENTAL SCIENCES

Wild Life Biology

(2013 Pattern) (Paper - II) (Semester - III)

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

Instructions to the candidates:

   1)   *All questions are compulsory.*

   2)   *Neat and labeled 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 wildlife?

   b)   What are bryophytes?

   c)   Write example of protected wildlife species.

   d)   What are arthropods?

   e)   Enlist the types of aquatic wildlife habitats.

   f)   Define 'food chain'.

   g)   What is 'urbanization?

   h)   Write the use of transect method.

   i)   Define 'remote sensing'.

   j)   What are land races?

Q2) Write a short note on (any two):   **[10]**

   a)   Habitat Destruction.

   b)   Algal Diversity.

   c)   Conservation of genetic resources.

P.T.O.

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

    a)   Explain the need for wildlife management.

    b)   Describe the food chain in hot & cold desert habitats.

    c)   Explain the reasons for biodiversity formation.

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

    a)   Why we need the assessment of wildlife? Describe any two assessment techniques for mammals.

    b)   What are biodiversity hotspots? Add a note on highly productive and unique habitats.

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[5522]-378

T.Y. B.Sc.

ENVIRONMENTAL SCIENCE

Water Quality

(Paper -III) (2013 Pattern) (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)   What is meant by Gray Water?

   b)   The World Water Day is celebrated on which date?

   c)   What is BOD?

   d)   Define Point & Non-point sources of water pollution.

   e)   Name any 2 viral water borne diseases.

   f)   What are detergents?

   g)   Name any 2 methods of secondary water treatment.

   h)   What is meant by 'Water Crisis'?

   i)   Write the full form of WHO & BIS.

   j)   Enumerate any 2 effects of thermal water pollution.

Q2) Write a short note on (any two) **[10]**

   a)   Water inventory & available water.

   b)   Marine pollution.

   c)   Effects of water on rocks & minerals.

Q3) Answer any two from the following **[10]**

   a)   Describe water cycle. Explain how is water cycle in urban area different from the natural cycle.

   b)   How can science & policy play a role in solving water problems?

   c)   Give an overview of the various stages of treatment in a water treatment plant.

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

   a)   Describe any 5 water parameters & their respective methods of analysis.

   b)   What is Eutrophication? Explain the characteristic changes of eutrophication, observed in a water body with a suitable case study.

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[5522]-379

T.Y. B.Sc.

ENVIRONMENTAL SCIENCE

Issues in Environmental Science

(2013 Pattern) (Semester - III) (Paper - IV)

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

Instructions to the candidates:

 1) *All questions are compulsory.*
 2) *Neat and labeled 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 the term 'Ozone Depletion'.

 b) Write the full form of CDM.

 c) What is meant by Genetically Modified Plant?

 d) Mention the significance of conservation of Biodiversity.

 e) Write any 2 problems of Green House Effect.

 f) What is the meaning of carbon credits?

 g) Define pastoralism.

 h) Write any 2 impacts of population explosion.

 i) Mention any example of gender and environmental debate.

 j) Write any 2 functions of WTO.

Q2) Write a short note on (any two)   **[10]**

 a) Bio-resources and local economy.

 b) Sustainable development.

 c) Access to environmental information.

Q3) Answer any two from the following. **[10]**

    a)   What is meant by environmentalism? Elaborate on its significance with suitable examples.

    b)   Discuss the impacts of Green House Gases on global climate.

    c)   Write about the role of NGO's in environmental conservation.

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

    a)   What is meant by Global Warming? Explain the impact of global warming on human health, agriculture and biodiversity.

    b)   Mention the process of genesis of environmental movements. Write about their impact with reference to any 2 movements.

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Total No. of Questions : 4]

P705

SEAT No. :

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

[5522]-380
T.Y. B.Sc.
ENVIRONMENTAL SCIENCE
ENV-305 : Environmental Governance and Equity : Laws and Ethics
(Semester-III) (2013 Pattern) (Paper-V)

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

Instructions to the candidates:

    1) All questions are compulsory.

    2) Neat and labeled diagrams must be drawn wherever necessary.

    3) Figures to the right indicate full marks.

Q1) Answer the following in 1-2 lines each. **[10]**

    a) Write name of the Act under which 'Government Analyst' is appointed?

    b) Write the full form for 'UNFCCC'.

    c) What is meant by 'Provision'?

    d) Define the term 'Occupier'.

    e) What is meant by 'Earth-Centric Thinking'?

    f) Mention any two functions of 'National Biodiversity Authority'.

    g) Mention any two principles of Rio declaration.

    h) Write the full form for 'UNCED'.

    i) Which act is referred as 'Umbrella Act'.

    j) What is the objective of Water Act, 1974?

Q2) Write a short note on (Any two). **[10]**

    a) Environmental Governance in India.

    b) Public Liability Insurance Act.

    c) Forest Conservation Act, 1980.

P.T.O.

Q3) Answer any two from the following.   [10]

   a)   What are environmental ethics? Discuss anthropocentric view.

   b)   What are important functions of central pollution control board?

   c)   What are important features of 'Ecomark scheme'?

Q4) Attempt any one of the following   [10]

   a)   Discuss the salient features of

        i)   Wildlife Act, 1972 and   ii)   Air Act, 1981

   b)   What are various ethical theories applied to environment? Also add a
        note challenges of world environmental ethics.

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[5622]-381
T.Y. B.Sc.
ENVIRONMENTAL SCIENCE
ENV-306 : Environmental Biotechnology-I
(Semester-III) (2013 Pattern) (Paper-VI)

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

Instructions to the candidates:
  1) *All questions are compulsory.*
  2) *Neat and labeled 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 fullform of NPV.

  b) Write any one bacterial biopesticide.

  c) What is meant by VAM Fungi?

  d) Write any one earthworm species used for vermicomposting.

  e) Enlist two microbes involved in biogas production.

  f) What is meant by black smoker?

  g) Write two examples of microbes used in bioleaching.

  h) Mention two examples of biochemical pest control agents.

  i) What is biodiesel?

  j) What are dropletnuclei?

Q2) Write a short note on (Any two). [10]

 a) Cartagena Protocol.

 b) Objectives of environmental biotechnology.

 c) Factors influencing composting process.

Q3) Answer any two from the following. [10]

 a) Explain the process of biological hydrogen production.

 b) How Blue Green algae used as biofertilizer?

 c) Describe advantages and disadvantages of biopesticides.

Q4) Attempt any one of the following [10]

 a) What is agrobased solid wastes? Explain different ways of it's utilization.

 b) Explain methods used for collection and enumeration of aerial microbes.

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[5522]-383

T.Y.B.Sc.

BIOTECHNOLOGY (Vocational)

(VOC-BIOTECH-335): PLANT AND ANIMAL BIOTECHNOLOGY

(2013 Pattern) (Semester-III) (Paper-V)

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

Instructions to candidates.

   1)   *Attempt all questions.*

   2)   *figures to right indicate full marks.*

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

   a)   Give any two physical methods of gene transfer in plants.

   b)   Define anther culture.

   c)   Enlist any two plant hormones with examples.

   d)   Define embryogenesis.

   e)   Define haploids.

   f)   Give any two applications of stem cells.

   g)   Give the role of plasminogen activator.

   h)   Define gynogenesis.

   i)   What are vaccines?

   j)   What are secondary metabolites?

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

   a)   How are secondary metabolites produced? Add a note on limitations of secondary metabolites.

   b)   Comment on large scale production of monoclonal antibodies.

   c)   Write a short note on detection of haploids.

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

   a)   Artificial seeds.

   b)   Ovary culture.

   c)   Over production and processing of chosen protein in animal cells.

Q4) Discuss gene transfer methods in plants. **[10]**

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

Explain a method to generate transgenics using stem cell technology.

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[5522]-384

T.Y. B.Sc. (Voctional)

PHOTOGRAPHY AND AUDIO VISUAL PRODUCTION

Video Recording and Playback Systems

(2013 Pattern) (Paper-V) (Semester- III)

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 indicates full marks.*

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

a) State the difference between audio and video signals.

b) What are the primary colours used in colour TV?

c) A CCD sensor has higher power consumption than a CMOS sensor. Comment.

d) What does PAL stand for?

e) State the horizontal and vertical scanning frequency used in India.

f) What is 'drop out' in a VCR?

g) State any two adjustments required before using a video camera.

h) What is the use of a 'dichroic mirror'?

i) State any two types of TV camera tubes.

j) State two advantages of LCD TV over CRT TV.

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

a) Explain the interlaced scanning pattern used in india.

b) Explain with a block diagram working of a colour TV camera.

c) Explain the need for rotating head mechanism in a VCR. Give track survey of a typical video tape.

P.T.O.

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

    a)   Explain the working of ACD player. What is the sampling frequency used for digital audio?

    b)   Explain the layout and equipment available in a OB van. What are its applications?

    c)   Explain the working of a videocon camera tube. Give its light transfer characteristic and spectral response.

Q4) Answer any one of the following. **[10]**

    a)   Describe the record and replay electronics in a VCR.

    b)   Draw the block diagram of a clour TV and explain its working.

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[5522]-385

T.Y. B.Sc.(Vocational)

ELECTRONIC EQUIPMENT MAINTENANCE (EEM)

Troubleshooting and Repair of Audio and Video Equipment
(Paper-V) (2013 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.*
3) *Use of log table, calculator is allowed.*

Q1) Answer the following.

a) Define AM? **[1]**

b) What is FM? **[1]**

c) What is Blue ray? **[1]**

d) List two faults in Plasma TV. **[1]**

e) List two common faults in video monitor. **[2]**

f) Distinguish between CD and DVD. **[2]**

g) State two common faults in Ink Jet Printer. **[2]**

h) State two common faults in VCD player. **[2]**

Q2) Draw block diagram of any <u>two</u> of the following. **[2×4=8]**

a) Public address system.

b) Set top box.

c) CD player.

Q3) Discuss troubles and their repairing in any <u>two</u> of the following. **[2×4=8]**

a) Smart phone.

b) Laptop computer.

c) Dot matrix printer.

P.T.O.

Q4) Discuss faults and their remedies in following. [2×6=12]

a) FM receiver.

b) Digital TV.

OR

Write short notes on the following. [2×6=12]

a) Cellular phone technology.

b) Home theatre.

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[5522]-386

T.Y. B.Sc. (Vocational)
INDUSTRIAL MICROBIOLOGY
VOC-IND-MIC-335 : Pollution Control Technology
(Semester-III) (2013 Pattern) (Paper-V)

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

  a) Screens are used in pre-treatment of water to remove sludge State T/F.

  b) Enlist two preliminary treatments for waste water .

  c) Name two flow measurement devices.

  d) Define Adsorption process.

  e) What is the difference between primary clarifier and secondary clarifier?

  f) What is sedimentation?

  g) Define dissolved air flotation.

  h) Name two chemicals that can be used for phosphorus precipitation.

  i) Write two processes used in advanced treatment of water.

  j) What are refractory organics?

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

  a) Draw a neat labelled diagram of sequential biological reactor and explain its working in detail.

  b) Explain characteristic properties of waste water.

  c) What is role of In-situ Bioremediation in waste water treatment.

Q3) Write a short note on: (<u>Any two</u> of the following)   **[10]**

   a)   Environmental Impact Assessment.

   b)   Trickling filter.

   c)   Granular medium filtration.

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

   a)   With help of flowchart explain working of leather industry wastewater treatment plant.

   b)   Given the following information, calculate the MCRT.

Influent TSS	200 mg/L
Waste activated sludge total suspended solids	7500 mg/L
Mixed liquor suspended solids	2500 mg/L
Effluent total suspended solids	10 mg/L
Influent flow	9.0 mgd
Waste activated sludge flow	0.03 mgd
Primary clarifier volume	0.6 million gal
Aeration basin volume	1.0 million gal
Secondary clarifier volume	0.3 million gal

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[5522]-387

T.Y. B.Sc. (Vocational)

COMPUTER HARDWARE & NETWORK ADMINISTRATION

Network Concepts-I

(2013 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 indicates full marks.*

Q1) Attempt all of the following: **[10×1=10]**

a) Specify the Port used for FTP File Transfer.

b) What is a VPN?

c) What is a Database Server?

d) Specify the use of DNS?

e) What is a NOS?

f) Give the importance of HTTPS protocol in internet world.

g) Windows7 is used only as a Network Operating System. State True or False

h) Give one example of a Network Topology widely used today?

i) Which type of Server is used to host Mails?

j) What is a Application Server?

Q2) Attempt any <u>Two</u> of the following: **[2×5=10]**

a) Client Server Technology is used Widely today. Explain.

b) Give any Five Protocols and state 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.

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[5522]-388

T.Y. B.Sc. (Vocational)
SEED TECHNOLOGY
Seed Pathology & Entomology
(Paper-V) (2013 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.
  3)   Draw neat and labeled diagrams wherever necessary.

Q1) Answer the following: **[10×1=10]**

  a)   Write the purpose or objective of seed treatment.

  b)   Define seed borne fungi.

  c)   What is a pest?

  d)   Give one distinguishing character of Lepidoptera.

  e)   Give one example of seed borne bacterial disease.

  f)   What is seed infection?

  g)   Mention one step for management of seed storage structure.

  h)   Give one example of seed borne viral disease.

  i)   Give one example of storage fungi.

  j)   Write one method for seed health test.

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

  a)   Explain the seed treatment method.

  b)   Write a brief history of seed pathology.

  c)   Comment on seed transmission.

Q3) Write notes on (Any two):   **[2×5=10]**

   a)   History of insect pest.

   b)   Insects as vectors of plant diseases.

   c)   One method adopted for seed health test.

Q4) Write about various entry points of seed infection.   **[10]**

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

Describe the life cycle, symptoms and damages caused by any one insect pest of cereal crop seeds.

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[5522]-390

T.Y. B.Sc. (Vocational)
BIOTECHNOLOGY
Microbial Biotechnology and Fermentation
(2013 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 neat and labelled diagrams wherever necessary.

Q1) Answer each of the following in 1-2 lines.   **[10]**

   a) Define biopesticides.

   b) What is GMP.

   c) Mention any 2 principles of microbial biotechnology.

   d) Name an organism which is used for the production of protease enzyme.

   e) What is primary screening?

   f) Name two oriental fermented foods.

   g) What is strain improvement?

   h) Give any two examples of growth linked products.

   i) Mention any two steps of downstream processing of fermentation products.

   j) Give any two applications of whole cell immobilization.

P.T.O.

Q2) Write short notes on any two of the following. **[10]**

   a)   Fermentation Media.

   b)   Acidophiles.

   c)   MEOR.

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

   a)   Give a comparative account of batch, fed-batch and continuous culture.

   b)   Describe air life fermenters in detail.

   c)   Describe the industrial fermentation of vitamin $- B_{12}$.

Q4) Describe in detail the process of production recovery of citric acid. **[10]**

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

Describe the types of bioremediation. Explain any one example of bioremediation in detail.

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[5522]-391

T.Y. B.Sc. (Vocational)

PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION

Video Production

(Paper -VI) (2013 Pattern) (Semester - III)

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

Instructions to the candidates:

1) *Attempt all questions.*
2) *Figures to the right indicate full marks.*

Q1) Attempt any two of the following: **[10]**

a)   Explain the importance of research in a documentary production.

b)   Explain the concept of '*Satyamev Jayate',* the television serial.

c)   Explain the process of editing in film production.

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

a)   Explain the development of a 'scene' in a screenplay.

b)   What is essential while writing the dialogues of a film?

c)   Explain the importance of continuity during shooting of a film.

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

a)   Write a script for a 30 second social advertisement on 'Save the Earth'.

b)   Write a script for a 1-minute documentary on Amphi Theatre of Fergusson College.

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

a)   Illustrate the importance of music in films.

b)   Explain the role of an assistant director in a film.

c)   Explain different types of shots used in a film.

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[5522]-392

T.Y. B.Sc. (Vocational)

ELECTRONIC EQUIPMENT MAINTENANCE (EEM)

VOC - EEM - 211 : Electronic Instrumentation

(Paper -VI) (2013 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.*
3) *Use of log table, calculator is allowed.*

Q1) Answer the following.

a) What is the instrumentation? **[1]**

b) What is sensor? **[1]**

c) State applications of sensor. **[1]**

d) State the need of sensor. **[1]**

e) State the difference between sensor and transducer. **[2]**

f) State parameters of sensor. **[2]**

g) State principle of displacement sensor? **[2]**

h) What is force sensor? **[2]**

Q2) Answer any two of the following. **[2×4=8]**

a) State and explain any one type of temperature sensor.

b) What is accuracy? How it is calculated?

c) Explain traceabililty.

P.T.O.

Q3) Answer any two of the following. [2×4=8]

    a) Define impedance. How it is measured?

    b) Discuss the digital phase meter.

    c) Explain with neat diagram the generalized instrumentation system.

Q4) Explain with neat diagram following. [2×6=12]

    a) Spectrum analyzer.

    b) Microcontroller based instrumentation.

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

Write short notes on the following. [2×6=12]

    a) DSP.

    b) DVM.

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[5522]-393

T.Y. B.Sc. (Vocational)

INDUSTRIAL MICROBIOLOGY

VOC-IND-MIC-336 : Plant and Animal Tissue Culture

(Semester-III) (2013 Pattern) (Paper-VI)

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

Instructions to the candidates:

1) *All questions are compulsory.*
2) *All questions carry equal marks.*
3) *Draw neat labeled diagrams wherever necessary.*

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

a) Name the pH indicator used in Animal cell culture medium.

b) What is a totipotent cell?

c) State examples of fibroblast cell line.

d) Name any two compounds required for adherence of cells in culture flask.

e) Fill in the blank: In callus formation low concentration of _____ promotes rooting.

f) Which two genes are responsible for maintaining size of plant stem niche?

g) Name any one recombinant protein made by genetic engineering benefiting humans?

h) Name the carbon source for medium used in PTC.

i) Draw the diagram of disarmed Ti plasmid.

j) State the role of serum in ATC.

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

a) What is Hollow fibre reactor and state its application.

b) What are the differences observed in growth pattern of animal cells in In-vitro and In-vivo?

c) Compare finite Vs continuous cell line.

P.T.O.

Q3) Write a short note on: (<u>Any two</u> of the following)   **[10]**

    a)   Types of cell lines based on morphology with examples.

    b)   Test tube babies.

    c)   Non vector mediated method of gene transfer.

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

    a)   Discuss in detail the method involved for production of monoclonal antibody production.

    b)   What is micropropagation? Discuss different stages involved in the process.

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[5522]-394

T.Y. B.Sc. (Vocational)

COMPUTER HARDWARE & NETWORK ADMINISTRATION

Computer/IT Service Management

(Semester-III) (2013 Pattern) (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) Attempt all of the following: **[10×1=10]**

   a)   What is SOD?

   b)   What are the contents of a SLA?

   c)   ITT stands for-

   d)   Who manages a Helpdesk?

   e)   Use of Win7 on Multiple PCs is not allowed. State True or False.

   f)   Give any one Standard for Information Security.

   g)   CIO stands for-

   h)   Database Maintenance is done by a Security Administrator. State True or False.

   i)   What is COBIT?

   j)   What is a Data Disaster?

Q2) Attempt any <u>Two</u> of the following: **[2×5=10]**

   a)   What are different Types of Access Controls?

   b)   Write a note on RFP?

   c)   Explain the importance of Incident Management Process.

P.T.O.

Q3) Attempt any <u>Two</u> of the following: [2×5=10]

    a)   Explain the Concept of Social Engineering.

    b)   What is an 'IS Audit'?

    c)   Testing plays an important role in IT Service Delivery-Explain.

Q4) Attempt any <u>One</u> of the following: [1×10=10]

    a)   What is a Helpdesk? Explain the Procedure for Problem Escalation.

    b)   Comment on 'Study of Requirements' and 'Hardware Selection'.

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[5522]-395

T.Y. B.Sc. (Vocational)

SEED TECHNOLOGY

Seed Farm Management, Processing & Storage

(Semester-III) (2013 Pattern) (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 neat and labelled diagrams wherever necessary.*

Q1) Answer the following: **[10×1=10]**

    a)   What is seed grading?

    b)   Draw basic flow pattern in seed processing plant.

    c)   Give any one objective of farm management.

    d)   What is seed cleaning?

    e)   Enlist methods of seed storage.

    f)   Define seed marketing.

    g)   What is seed processing?

    h)   What is capital limitation?

    i)   What is seed conditioning?

    j)   Give the name of any one equipment used in seed treatment.

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

    a)   Write an account on major components of seed marketing.

    b)   What is seed treatment? Write in detail any one method of seed treatment.

    c)   Describe in detail fundamentals of farm management.

                                         P.T.O.

Q3) Write notes on (Any two):   **[2×5=10]**

    a)   Maintenance and management of seed processing plant.

    b)   Scope of seed farm management.

    c)   Factors involved in the selection of a business.

Q4) What is seed drying? Explain in detail methods of seed drying.   **[10]**

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

Q4) What is seed storage? Explain in detail factors affecting storability of seeds.
                                                                           [10]

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[5522]-396

T.Y. B.Sc.

PSYCHOLOGY

Communication Psychology

(Paper -I) (2013 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.

    3)   Draw neat diagrams wherever necessary.

Q1) Answer in two or four sentences.   **[16]**

    a)   Define language.

    b)   What is Syntax?

    c)   State the names of channels of nonverbal communication.

    d)   What is technology?

    e)   Define nonverbal communication.

    f)   Explain the uses of Internet in communication.

    g)   What is anonymity?

    h)   Explain the role of culture in communication.

Q2) Answer in eight or ten sentences (Any Two)   **[8]**

    a)   Explain the various old technologies.

    b)   Discuss the meaning emerges through dialogue.

    c)   What is information technology and explain its uses in communication.

Q3) Write short note : (Any Two)   **[8]**

   a)   Social Contexts.

   b)   Different Gestures & Postures in communication.

   c)   Transformation of space & time.

Q4) a)   Explain in detail communication barriers.   **[8]**

                              OR

   b)   Discuss in detail technologies for anonymity and disguise for sexual exploitation.

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[5522]-397

T.Y. B.Sc.

PSYCHOLOGY

Cognitive Psychology

(2013 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) *Draw neat diagrams wherever necessary.*

Q1) Answer in two or four sentences: **[16]**

 a) Define threshold.

 b) What is forgetting.

 c) Define cognition.

 d) What is Gestalt?

 e) Define memory.

 f) Who is the founder of trial and error method.

 g) Explain information processing approach.

 h) State the types of learning.

Q2) Answer in eight or ten sentences (Any two): **[8]**

 a) Explain the various memory improvement techniques.

 b) Describe the classical conditioning and its basic concepts.

 c) Explain the relationship between attention and perception.

P.T.O.

Q3) Write short note (Any two):   **[8]**

      a)   Connectionist approach.

      b)   Process of sensation.

      c)   Insightful learning.

Q4) a)   Describe the types of problem and explain the problem solving cycle.**[8]**

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

      b)   Explain the psychological and technological roots of cognitive psychology.

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[5522]-398
T.Y. B.Sc.
PSYCHOLOGY
Statistical Methods
(Paper -III) (2013 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.*
3) *Draw neat diagrams wherever necessary.*

Q1) Answer in two or four sentences. **[16]**

a) Define ordinal scale.

b) Explain the uses of Median.

c) Give the formula of SD.

d) Define Histogram.

e) What is NPC curve?

f) Explain the uses of frequency polygon.

g) State the types of correlation.

h) Explain normal distribution.

Q2) Answer in eight or ten sentences (Any Two) **[8]**

a) Explain the methods of central tendencies for grouped data.

b) Describe the modes of graphical representation.

P.T.O.

c) Compute the $(P_{25})25^{th}$ percentile from the following frequency distribution.

Scores	Frequency
70-79	3
60-69	2
50-59	2
40-49	3
30-39	5
20-29	4
10-19	3
0-09	2
	N=24

Q3) Write short note (Any Two)   **[8]**

a) Application of statistics

b) Types of percentile

c) Basics of Graph.

Q4) a) Explain the advantages and applications of graphical representation. **[8]**

OR

b) Find Rank correlation coefficient from the following and interpret the result.   **[8]**

Individuals	A	B	C	D	E	F	G	H
Test X	30	40	50	20	10	45	22	18
Test Y	55	75	60	12	11	38	25	15

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[5522]-399

T.Y. B.Sc.

PSYCHOLOGY

Psychopathology

(2013 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 diagrams wherever necessary.

Q1) Answer in two or four sentences.   **[16]**

a)   State the full form of DSM.

b)   Define stress.

c)   Explain the components of mind.

d)   State the full form of Gas.

e)   Who introduced psychodynamic approach.

f)   Name the cognitive disorders.

g)   State the types of phobia.

h)   What are the symptoms of Dementia?

Q2) Answer in eight or ten sentences (Any two)   **[8]**

a)   Explain the brain damage symptoms.

b)   Describe the biological causes of abnormal behavior.

c)   Explain in brief reinforcing causes of abnormal behavior.

Q3) Write short note (Any two)   **[8]**

a)   OCD

b)   Amnestic Syndrome.

c)   Diathesis - stress model.

Q4) a)   Explain the symptoms, causes and types of schizophrenia.   **[8]**

b)   Describe in detail DSM 5 based classification of mental disorder.

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[5522]-399-A
T.Y. B.Sc.
PSYCHOLOGY
Applied Psychology
(Semester-III) (2013 Pattern) (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 wherever necessary.

Q1) Answer in two or four sentences.   **[16]**

   a)   Define applied Psychology.

   b)   What is Psychotherapy?

   c)   Who is the founder of applied Psychology?

   d)   Define religion Psychology.

   e)   State the main theme of System Psychology.

   f)   Define Media Psychology.

   g)   What is traffic Psychology?

   h)   Explain the legal Psychology.

Q2) Answer in eight or ten sentences (Any two).   **[8]**

   a)   Explain the field of school Psychology.

   b)   Describe the various themes of traffic Psychology.

   c)   Explain the role of Psychology in religion.

Q3) Write short note (Any two) [8]

    a)   History of applied Psychology.

    b)   Accident Prevention.

    c)   Evolutionary Psychology of religion.

Q4) a)   Explain the role of Psychologists in military (Defence Services) area. **[8]**

                         OR

    b)   Explain the various emerging areas of applied Psychology.

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[5522]-399-B
T.Y. B.Sc.
PSYCHOLOGY
Organizational Behaviour
(Paper-VI) (semester- III)

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

Q1) Answer in <u>two</u> or <u>four</u> sentences   **[16]**

   a)   Define job satisfaction.

   b)   Define attitude.

   c)   state the concept of work stress.

   d)   Define personality.

   e)   What is extrensic motivation?

   f)   What is management grid?

   g)   What is Emotional intelligence?

   h)   What is leadership style?

Q2) Answer in <u>Eight</u> or <u>Ten</u> sentences (any two)   **[8]**

   a)   Explain in detail Herzberg's theory of motivation.

   b)   Describe the sources of work stress.

   c)   Explain in detail role of power in leadership.

Q3) Write short notes (Any Two)   **[8]**

    a)   personality and values.

    b)   Group dynamics.

    c)   Alder fer's ERG model.

Q4) Define leadership. Describe in detail fiedler's contingency model.   **[8]**

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

Explain various innovations in Organizational planning.

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