Total No. of Questions : 4]

SEAT No. :

P226

[Total No. of Pages : 2

[5422]- 301
T.Y. B.Sc.
MATHEMATICS
MT 331 : Metric Spaces
(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) Attempt any Five of the following: **[10]**

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

b) For $x=(x_1, x_2)$, $y=(y_1, y_2)$, $d(x,y)= \max \{|x_1-y_1|, |x_2-y_2|\}$ defines metric on $\mathbb{R}^2$. Sketch $S_1[(2,3)]$.

c) State whether true or false with justification. If A and B are subsets of R_u such that $\bar{A} \subset \bar{B}$ then $A \subset B$.

d) Let $A = \left\{ n + \frac{1}{m} \mid n, m \in \mathbb{N} \right\} CR_u$. What are cluster points of A?

e) In discrete metric space (X, d) prove that every subset of X is open.

f) Show that two disjoint subsets of R_d are seperated.

g) Prove that R-{0} is disconnected.

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

a) In metric space (X, d) prove that arbitrary intersection of closed sets in X is closed.

b) In metric space (X,d) if $A \subset X$ then prove that $\mathring{A}$ is open subset of X.

c) Let $\rho : \mathbb{R}^2 \times \mathbb{R}^2 \to \mathbb{R}$ be defined by

$\rho(x,y) = |x_1 - y_1| + |x_2 - y_2|$ where $x=(x_1, x_2)$,

$y=(y_1, y_2)$. Show that ρ is a metric on $\mathbb{R}^2$

P.T.O.

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

a) If in a metric space (x, d) every decreasing sequence $\{F_n\}_{n=1}^{\infty}$ of non-empty closed subsets with $d(F_n) \to 0$ as $n \to \infty$ has exactly one point in its intersection then prove that (x, d) is complete.

b) Let $f : [0, 1] \to \mathbb{R}$ be a function given by

$$f(x) = \begin{cases} x, & x \text{ is rational} \\ 1-x, & x \text{ is irrational} \end{cases}$$

Prove that f(X) is continuous only at $x = \frac{1}{2}$.

c) Prove that metric space (X,d) is complete if and only if every cauchy sequence in X has convergent subsequence.

Q4) Attempt Any one of the following **[10]**

a) i) Prove that every sequentially compact metric space is compact.

ii) If A and B are compact subsets of $\mathbb{R}$ then prove that A × B is compact subset of $\mathbb{R}^2$.

b) i) Let (x, d) be complete metric space and $A \subset X$. Prove that $\overline{A}$ is compact if and only if A is totally bounded.

ii) Let (x, d) be a metric space and subset Y of X is connected set. Then prove that $\overline{Y}$ is also connected.

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SEAT No. :

P227

[Total No. of Pages : 2

[5422]-302

T.Y.B.Sc.

MATHEMATICS

MT - 332 : Real Analysis -I

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

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

Instructions to the candidates:

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

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

a) Let f, g: $[0, 2] \to \mathbb{R}$ be functions defined as $f(x)=x^2$ and $g(x)=x$. Find max. (f, g) and min.(f, g).

b) Show that the set of all irrational numbers is uncountable set.

c) Give an example of unbounded sequence $\{S_n\}$ of real numbers such that $\lim_{n\to\infty} \frac{S_n}{n} = 0$.

d) Find lim sup and lim inf of sequence $\left\{\sin\left(\frac{n\pi}{4}\right)\right\}_{n=1}^{\infty}$

e) True or false: An unbounded sequence of positive real numbers diverges to infinity. Justify.

f) Show that $\sum_{n=1}^{\infty} \frac{(-1)^n}{n}$ is convergent.

g) Show that $\sum_{n=1}^{\infty} \frac{e^n}{n}$ is divergent.

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

a) Show that (0, 1) and [0, 1] are equivalent sets.

b) Let $f: X \to X$ be a function and $A, B \subseteq X$. Prove that $f(A \cup B) = f(A) \cup f(B)$.

c) If $\{s_n\}_{n=1}^{\infty}$ and $\{t_n\}_{n=1}^{\infty}$ are sequences of real numbers such that $\lim_{n\to\infty} s_n = M$ and $\lim_{n\to\infty} t_n = N$ then show that $\lim_{n\to\infty} (s_n + t_n) = M+N$.

P.T.O.

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

a) Show that every Cauchy sequence of real numbers is bounded. Is converse true? Justify.

b) Show that $\left\{\left(1+\frac{1}{n}\right)^n\right\}_{n=1}^{\infty}$ is convergent sequence.

c) If $\{s_n\}_{n=1}^{\infty}$ is a sequence of real numbers such that $\lim_{n\to\infty} \sup s_n = \lim_{n\to\infty} \inf s_n = L$ then prove that $\lim_{n\to\infty} s_n = L$.

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

a) Let $\{a_n\}_{n=1}^{\infty}$ be nonincreasing sequence of positive real numbers. Prove that series $\sum_{n=1}^{\infty}$ an is convergent if and only if $\sum_{n=1}^{\infty} 2^n a_{2^n}$ is convergent series.

b) i) Discuss the convergence of series $\sum_{n=1}^{\infty} \frac{3}{4+5^n}$ and $\sum_{n=1}^{\infty} \frac{\left(1+\frac{1}{n}\right)^{2n}}{e^n}$

ii) Show that $\sum_{k=1}^{\infty} a_k$ is convergent series if and only if for given $\in > 0$, there exist positive integer N such that $\left|\sum_{k=m+1}^{n} a_k\right| < \in,\ (n > m \geq N)$.

Total No. of Questions : 4]

SEAT No. :

P228

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[5422] - 303

T.Y.B.Sc.

MATHEMATICS

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

(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) ***Answers to the two sections should be written on separate answer books.***
4) ***Tie answer books of both sections together.***

SECTION-I

(Metric Spaces)

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

i) Let $\mathbb{Z}$ be set of all integers with metric $d(x,y) = |x-y|, x, y \in \mathbb{Z}$. Find open sphere $S_5(0)$ and closed sphere $S_5[0]$ in $\mathbb{Z}$.

ii) Let $\mathbb{R}_u$ be usual metric space. Find $\partial\mathbb{N}$ and $\partial\mathbb{Q}$ for sets of natural numbers $\mathbb{N}$ and rational numbers $\mathbb{Q}$.

iii) Let (X, d) be a metric space. Show that the identity function $I : X \to X$ is continuous.

iv) Show that discrete metric space $\mathbb{R}_d$ is totally disconnected.

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

i) Show that the set A = $\{e_i = (0,0,0..0,1,0...) \in l^2 \mid 1 \le i < \infty\}$ is not compact subset of l^2.

ii) Show that every finite subset of a metric space (X, d) is closed.

P.T.O.

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

a) If d_1 and d_2 are metrics for a set X, then show that $d_1 + d_2$ is also metric for set X.

b) Show that $\mathbb{R}^n$ is complete metric space with respect to usual metric.

c) Let $\mathbb{R}_u$ be usual metric space. Then show that function $f : \mathbb{R}_u \to \mathbb{R}_u$ defined as $f(x) = x^2$ is continuous but not uniformly continuous function.

SECTION-II

(Real Analysis)

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

i) If $f(x) = 1 + \sin x (-\infty < x < \infty)$ and $g(x) = x^2 \ \ (0 \le x < \infty)$ then find *fog*.

ii) Prove that $2 - 2^{\frac{1}{2}} + 2^{\frac{1}{3}} - 2^{\frac{1}{4}} \ldots\ldots$ diverges.

iii) Discuss the convergence of the sequence $\left\{\frac{n^2}{n+5}\right\}_{n=1}^{\infty}$.

iv) If $S_n = \frac{50^n}{n!}$, then find $N \in I$ such that $S_{n+1} < S_n, n \ge N$.

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

i) If $\{S_n\}_{n=1}^{\infty}$ is a sequence of real numbers and if $\lim_{m\to\infty} S_{2m} = L$, $\lim_{m\to\infty} S_{2m-1} = L$ then prove that $S_n \to L$ as $n \to \infty$.

ii) Does the series $\sum_{n=4}^{\infty} \frac{1}{(\log n)^2}$ converges?

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

a) Show that if A and B are countable sets, then the cartesian product A×B is countable.

b) Let $S_n = \frac{1\cdot 3\cdot 5....(2n-1)}{2\cdot 4\cdot 6.....2n}, n \in I$. Show that $\{S_n\}_{n=1}^{\infty}$ is convergent and $\lim_{n\to\infty} S_n \leq \frac{1}{2}$.

c) Test the convergence of

i) $\sum_{n=1}^{\infty} a_n$ where $a_n = (3-e)(3-e^{\frac{1}{2}})(3-e^{1/3})...(3-e^{1/n})$.

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

EEE

Total No. of Questions : 4]

SEAT No. : ____

P229

[Total No. of Pages : 2

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T.Y.B.Sc.

MATHEMATICS

MT- 334: Group Theory

(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.***

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

a) On $\mathbb{Q}$, define $*$ by letting $a*b=ab+1$. Determine whether the binary operation is associative.

b) Let F be a group of all real-valued functions with domain $\mathbb{R}$ under addition and let $H=\{f\in F \mid f(1)=0\}$. Is H a subgroup of F? Justify.

c) List the elements of the subgroup generated by the subset {4, 5} of $\mathbb{Z}_{15}$.

d) If H is a subgroup of G and N is a normal subgroup of G, show that $H\cap N$ is a normal subgroup of H.

e) Find order of (3, 1) + $\langle (1, 1)\rangle$ in $\frac{(\mathbb{Z}_4\times\mathbb{Z}_4)}{\langle(1,1)\rangle}$.

f) Find the number of elements in the set $\{\sigma\in S_4 \mid \sigma(2)=2\}$.

g) Find the least positive integer *n* such that S_n contains an element of order 10.

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

a) Let G be a cyclic group with generator *a*. If G has finite order *n*, then prove that G is isomorphic to $\langle\mathbb{Z}_n, t_n\rangle$.

b) i) Let G be a cyclic group with generator *a*, and let G' be a group isomorphic to G. If $\phi: G\to G'$ and $\psi: G\to G'$ are two isomorphisms such that $\phi(a)=\psi(a)$, then prove that $\phi(x)=\psi(x)$ for all $x\in G$.

ii) Find all isomorphisms from $\mathbb{Z}_4$ to $\mathbb{Z}_4$.

c) Show that for every subgroup H of S_n for n ≥ 2, either all permutations in H are even or exactly half of them are even.

P.T.O.

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

a) A subgroup H is conjugate to a subgroup K of a group G if there exists an inner automorphism i_g of G such that $i_g[H] = K$. Show that conjugacy is an equivalence relation on the collection of subgroups of G.

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

c) List all the elements of the group G = $\frac{\mathbb{Z}_2 \times \mathbb{Z}_4}{\langle (0,2) \rangle}$. State identity element of the group G. Find the inverse of (1, 0) + $\langle (0, 2) \rangle$ in the group G.

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

a) Show that every group is isomorphic to a group of permutations.

b) i) Show that M is a maximal normal subgroup of G if and only if $\frac{G}{M}$ is simple.

ii) Show that if H and K are normal subgroups of a group G such that $H \cap K = \{e\}$, then $hk = kh$ for all $h \in H$ and $k \in K$.

EEE

Total No. of Questions :4]

SEAT No. :

P230

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T.Y.B.Sc.

MATHEMATICS

MT - 335 : Ordinary Differential Equations

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

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

Instructions to the candidates:

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

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

a) Solve the differential equation $(D^3 - D^2 - 4D + 4)\, y = 0$.

b) Find the particular solution of the differential equation $(D^5 - D^3)\, y = 1$.

c) Form the linear differential equation with constant coefficients whose solution is $y = e^x \sin 3x$.

d) Verify that $y = x$ is a solution of the differential equation $(1-x^2)y'' - 2xy' + y = 0$.

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

$$\frac{dx}{dt} = 4x - y, \quad \frac{dy}{dt} = 2x + y.$$

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

g) Find the power series solution of the differential equation $xy' = y$.

P.T.O.

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

a) With usual notation prove that $\frac{1}{f(D)}e^{ax} = \frac{e^{ax}}{f(a)}$, if $f(a) \neq 0$.

b) Obtain the general solution of the differential equation $(D^4 - 8D^2 + 16)\, y = e^{2x}$.

c) Solve the differential equation $(D^3 + 8)\, y = x^4 + 2x + 1$.

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

a) If y_1 is a non zero solution of the differential equation $\frac{d^2y}{dx^2} + P(x)\frac{dy}{dx} + Q(x)y = 0$ and $y_2 = vy_1$, with $V = \int \frac{1}{y_1^2} e^{-spdx} dx$, then show that y_1, y_2 are linearly independent.

b) Find a particular solution of the differential equation $y'' = 3y' + 2y = \frac{1}{1+e^{-x}}$, by using variation of parameter method.

c) Find the particular solution of the equation $y'' - 2y' - 2y = 4x^2$, by using method of undetermined coefficients.

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

a) i) If $x = x_1(t), y = y_1(t)$ and $x = x_2(t), y = y_2(t)$ are two solutions of the system $\frac{dx}{dt} = a_1(t)x + b_1(t)y$, $\frac{dy}{dt} = a_2(t)x + b_2(t)y$, then show that $x = c_1x_1(t) + c_2x_2(t), y = c_1y_1(t) + c_2y_2(t)$ is also a solution.

ii) Find the general solution of the system

$$\frac{dx}{dt} = 3x - 4y, \frac{dy}{dt} = x - y.$$

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

Total No. of Questions : 4]

SEAT No. :

P231

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[5422]-306
T.Y.B.Sc.
MATHEMATICS
MT - 336 : Problem Course Based on MT - 334 and MT - 335
(2013 Pattern) (Semester - III) (Paper - VI)

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

Instructions to the candidates:

1) ***All the questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Write both sections on separate answer books and tie together.***

SECTION - I

(Group Theory)

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

i) Show that if $(a*b)^2 = a^2*b^2$, $\forall a,b \in G$ then G is abelian.

ii) Give an example of abelian group which is not cyclic.

iii) Let G be a cyclic group of order 50. What are all possible orders for the subgroups of G? Justify.

iv) Find all the orbits of $\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\ 5 & 6 & 2 & 4 & 8 & 3 & 1 & 7 \end{pmatrix}$

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

i) Show that $Z = \{a \in G / ax = xa, \forall x \in G\}$ is a subgroup of G.

ii) Find all homomorphisms from $\mathbb{Z}$ to $\mathbb{Z}_2$.

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

a) Show that $\mathbb{Z}_4 \times \mathbb{Z}_6 \Big/ \langle (0,1) \rangle$ is isomorphic to $\mathbb{Z}_4$.

b) Let A_n denote the set of all even permutations in S_n. Show that $O(A_n) = \frac{n!}{2}$ and hence deduce that $A_n \lhd S_n$.

c) Let $\phi : G \to G'$ be a group homomorphism. Show that $\text{Ker}\phi \lhd G$ and hence deduce that $SL(n,\mathbb{R}) \lhd GL(n,\mathbb{R})$.

P.T.O.

SECTION - II

(Ordianry Differential Equations)

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

i) A linear differential equation of 5^{th} order has 6 linearly independent solutions. State true or false.

ii) Write the general solution of $(D - 2)(D^2 + 4)y = 0$.

iii) Find the particular integral of $y'' - y = e^{2x}$.

iv) If two solutions of ordinary differential equation are linearly dependent then what will be their Wronskian?

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

i) Solve the differential equation $(D^2 + 4)y = \cos x$.

ii) Use method of undetermined coefficients to solve the differential equation $(D^2 - 6D + 9)y = e^x$.

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

a) Solve the differential equation $(D^2 - 3D + 2)y = \dfrac{1}{1 + e^{-x}}$ by using method of variation of parameters.

b) Find power series solution of differential equation $y'' - 9y = 0$.

c) Solve the following system of linear differential equations :

$$\frac{dx}{dt} = 4x - y, \frac{dy}{dt} = -4x + 4y$$

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Total No. of Questions :4]

SEAT No. :

P232

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T. Y. B. Sc.

MATHEMATICS

MT-337(A): Operations Research

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

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

Instructions to the candidates:

1) ***All Questions are Compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of non programmable calculator is allowed.***

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

a) What is unbalanced assignment problem? Give an example of unbalanced assignment problem.

b) Find an intial basic feasible solution of the following linear programming problem (LPP):

Max. z = $2x_1 + 3x_2$

Subject to

$$x_1 + 2x_2 \leq 4$$

$$3x_1 + 2x_2 \geq 12$$

$$x_1, x_2 \geq 0.$$

c) Final the initial basic feasible solution of the following transportation problem (T.P.) by using North-West corner method.

	D_1	D_2	D_3	D_4	Supply
S_1	2	3	11	7	6
S_2	1	0	6	1	1
S_3	5	8	15	9	10
Demand	7	5	3	2	

P.T.O.

d) Determine the feasible region in the following LPP:

Minimize: $z = 3x_1 + x_2$

Subject to;

$$5x_1 + x_2 \geq 5$$

$$x_1 + x_2 \geq 6$$

$$x_1, x_2 \geq 0$$

e) Define degenerate solution and non - degenerate solution of LPP.

f) Give an example of LPP which does not have solution.

g) Convert the following LPP into the equation form:

Max. $z = 3x_1 + 2x_2$

Subject to,

$$x_1 + x_2 \leq 1,$$
$$3x_1 + x_2 \geq 6,$$
$$x_1, x_2 \geq 0.$$

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

a) Solve the following assignment model:

		Tasks			
		I	II	III	IV
Subordinates	A	8	26	17	11
	B	13	28	4	26
	C	38	19	18	15
	D	19	26	24	10

b) Find initial basic feasible solution of the following T.P. by Vogel's approximation method:

	D_1	D_2	D_3	D_4	Supply
S_1	19	30	50	10	7
S_2	70	30	40	60	9
S_3	40	8	70	20	18
Demand	5	8	7	14	

c) Find the optimal assignment for the following assignment problem.

		Operator			
		I	II	III	IV
	A	10	5	13	15
Machine	B	3	9	18	3
	C	10	7	3	2
	D	5	11	9	7

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

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

Max. $z = 5x_1 + 4x_2$

Subject to;

$$6x_1 + 4x_2 \leq 24$$
$$x_1 + 2x_2 \leq 6$$
$$-x_1 + x_2 \leq 1$$
$$x_2 \leq 2$$
$$x_1, x_2 \geq 0.$$

b) A company manufactures two types of products A and B and sells them at a profit of Rs. 4 on type A and Rs. 5 on type B. Each product is processed on two Machines, X and Y. Type A requires, 2 min. of processing time on X and 3 min. on Y. Type B requires 2 min. on X and 2 min. on Y. The machine X is available for not more than 5 hrs 30 min., while Y is available for 8 hrs during any working day. Formulate problem as a L.P.P.

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

Max $z = x_1 + x_2$

Subject to;

$$x_1 + 2x_2 \leq 6,$$
$$2x_1 + x_2 \leq 16,$$
$$x_1, x_2 \geq 0.$$

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

a) Solve the following L.P.P. by using two - phase method:

Min. $z = x_1 + x_2$

Subject to:

$$2x_1 + x_2 \geq 4,$$
$$x_1 + 7x_2 \geq 7,$$
$$x_1, x_2 \geq 0.$$

b) Find Optimal Solution of the following T.P.

		Warehouse			
		W_1	W_2	W_3	Supply
	F_1	16	20	12	200
Factory	F_2	14	8	18	160
	F_3	26	24	16	90
Demand		180	120	150	

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Total No. of Questions : 4]

SEAT No : ____

P 233

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[5422]-308
T.Y.B.Sc.
MATHEMATICS
MT - 337(B) : Dynamical System
(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 equilibrium point for system of first order differential equations.

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

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

d) Find eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 1 & 3 \\ \sqrt{2} & 3\sqrt{2} \end{bmatrix}$.

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

f) Let A be an $n \times n$ matrix. Show that $\exp(-A)=(\exp A)^{-1}$.

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

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

a) If V_0 is an eigenvector of $A_{n \times n}$ with associated eigenvalue λ, then show that $X(t) = e^{\lambda t} V_0$ is a solution of the system $X' = AX$.

P.T.O.

b) Find the general solution of the system $X' = \begin{bmatrix} -1 & 0 \\ 1 & -2 \end{bmatrix} X$. Also sketch the phase portrait.

c) Find the general solution of the system $X' = \begin{bmatrix} 1 & 1 \\ -1 & 3 \end{bmatrix} X$.

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

a) Let A be a 2×2 matrix for which λ is the only eigenvalue. Show that there exists a 2×2 matrix T such that, $T^{-1}AT = \begin{bmatrix} \lambda & 1 \\ 0 & \lambda \end{bmatrix}$.

b) Let A be a 3×3 matrix for which λ is the only eigenvalue. If $\text{Ker}(A - \lambda I) = 2$ 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 <u>any two</u> of the following: **[10]**

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

b) Let A, B and T be $n \times n$ 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) Find exponential of $A = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$.

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Total No. of Questions : 4]

SEAT No. :

P234

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[5422]-309
T.Y. B.Sc.
MATHEMATICS
MT - 337 (C) : C- Programming - I
(2013 Pattern) (Semester - III) (Paper - VII)

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

Instructions to the candidates:

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

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

a) Which of the following are valid identifiers.
   i) Name - and address.
   ii) 12 - Number.

b) Explain the meaning of the following function definition:
   float fun (int a, float b, char c)

c) Find the value of the following expression:
   3* (5%2) +((4 + 15 – 3%2) /(4 – 3))

d) Explain the meaning of the following array initialization:
   int n[10] = {1, 2, 3, 4,5, 6, 7, 8};

e) What is the purpose of break statement?

f) What are logical operators used in C?

g) What will be the output of the following program:

```
#include <stdio.h>
int main ()
{  int j = 4, k;
   k = ! 5 && j;
   printf ("k = %od\n", k);
   return O;
}
```

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

a) Write a short note on while loop.

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

c) Write a function that receives 5 integers and returns the sum and average of these numbers. Call this function from main() and print the results in main().

P.T.O.

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

a) Write a short note on if-else statement.

b) Write a short note on relational operators.

c) Write a program to print out all Armstrong numbers between land 500. If sum of cubes of each digit of the number is equal to the number itself, then the number is called an Armstrong number.

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

a) i) Write a short note on two dimensional array.

ii) Write a short note on function recursion.

b) i) Write a short note on gets and puts functions.

ii) Trace the output, if the program is correct:

```
#include <stdio.h>
void main ()
{
   int i = 0, x = 0;
   for (i = 1; i < 10; ++ i)
      {
         if (i % 2 = 1)
           x + = i;
         else
           x – – ;
         printf ("%d\n", x);
         continue;
      }
   printf ("\n x = % d", x);
}
```

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Total No. of Questions : 4]

SEAT No :

P235

[Total No. of Pages : 2

[5422]-310
T.Y. B.Sc.
MATHEMATICS
MT-337 (D) : Lattice Theory
(2013 Pattern) (Semester - III) (Paper - VII)

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

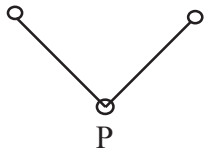
Instructions to the candidates:

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

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

a) Define order isomorphism between two ordered sets.

b) Draw Hasse diagram of O(P), where P is ordered set shown below.



c) Draw Hasse diagram of $2 \oplus 3$ and hence show that $2 \oplus 3 \cong 5$.

d) Define dual ideal (filter) in a lattice

e) Define complete lattice. Give an example of a complete lattice.

f) Give an example of a lattice which has no infinite chains but is not of finite length.

g) Prove that in any lattice L, $a \wedge (b \vee c) \geq (a \wedge b) \vee (a \wedge c)$ holds true for all $a, b, c \in$ L.

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

a) Show that the intersection of any two ideals of lattice is an ideal,. show that union of two ideals need not be an ideal.

b) Prove that any lattice homomorphism is an order preserving map.

c) State and prove connecting lemma.

P.T.O.

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

a) Let L and K be bounded lattices and F:L→K a {0,1}-homomorphism. Prove that $f^{-1}(0)$ is an ideal and $f^{-1}(1)$ is a filter in L.

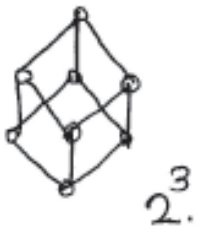
b) If L is a distributive lattice, then prove that any sublattice of L is also distributive.

c) Prove that homomorphic image of a modular lattice is modular.

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

a) i) Let L be a lattice of all positive divisors of 100 with divisibility as a partial order relation. List all ideals in L. What are maximal idealsin L?

ii) Define join-irreducible element of a lattice. Find all join-irreducible elements of following lattice.



b) i) Show that a lattice of length two is modular.

ii) Put the function $f = \left[\left(x \wedge y' \right)' \vee z' \right] \wedge \left(x' \vee z \right)'$ in disjunctive normal form (DNF).

Total No. of Questions :4]

SEAT No. :

P236

[Total No. of Pages : 3

[5422]-311
T.Y.B.Sc.
MATHEMATICS
MT - 337(E) : Financial Mathematics.
(2013 Pattern) (Semester-III) (Paper-VII)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicates full marks.***
3) ***Non programmable calculator is allowed.***

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

a) Define the term annuity.

b) Find the maximum value of the function $f(x)= -2x^3+3x^2+12x+9$ in the interval $[0,\infty)$.

c) Define the term elasticity of demand , hence state the condition when demand is inelastic.

d) Define the term breakeven point.

e) Define the term perfect competition.

f) If for an efficient small firm the cost function $c(q) =800+70q-12q^2+q^3$, then

Determine the profit function.

g) If the return matrix $R = \begin{pmatrix} 1 & 1 & 1.2 \\ 1.05 & 1.05 & 1.05 \\ 0.95 & 1.10 & 0.95 \end{pmatrix}$,

then determine wheter Y=(4000 1000 -5000) is a arbitrage portfolio.

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

a) The demand fucntion for a commodity takes the form $q^D(p) = a+ bp+ \frac{c}{p}$, for some constants a, b, c, .

When p=1, the quantity demanded is 60, when p=2, it is 40 and when p=4 it is 15.

Find the constants a, b and c.

P.T.O.

b) If an input -output model with two industries is given by the technology matrix $A=\begin{pmatrix}0.2 & 0.2\\ 0.1 & 0.3\end{pmatrix}$, then

write down the equation which determines the production schedule $\bar{x}$ in terms of the external demand $\bar{d}$ and solve it.

c) Show that the present value of an annuity I for N years, given the fixed interest rate r, is $P=\frac{I}{(1+r)}+\frac{I}{(1+r)^2}+\frac{I}{(1+r)^3}+\text{-----}+\frac{I}{(1+r)^N}$.

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

a) If the supply and demand functions for a good are $q^s(p)=bp-a$ and $q^D(p)=c-dp$, where a, b, c, d are positive constants.

Show that the equilibrium price is $p^*=\frac{(c+a)}{(b+d)}$.

If an excise of Rs. T is imposed find the resulting market price P^T, also show that $P^T< P^*+T$.

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

c) The demand set for a good is $D=\left\{(q,p)\middle| q(1+p^2)=100\right\}$.Determine the elasticity of demand as a function of p. For what values of p is the demand inelastic?

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

a) i) Suppose an investor invests money in three different assets a_1, a_2 and a_3 and that three possible states can occur, where the returns matrix is

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

Show that there is no state price vector for the return matrix R.

ii) The calculus corporation is a monopoly with cost function $C(q)=q+0.02q^2$ and the upper limit on it's production is 200. The demand set for its product is $D=\{(q,p)\mid q+2p=300\}$

Find (i) The inverse demand function

(ii) The profit function

(iii) Maximum profit.

b) i) Prove that, at the breakeven point for an efficient small firm, the derivative of average cost is zero.

ii) If the supply set $S=\{(q,p)\mid q-6p=-12\}$ and demand set $D=\{(q,p)\mid q+2p=40\}$ then determine

1) The equlibrium set

2) The supply and demand functions

3) The inverse supply and demand functions

4) Sketch S and D.

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Total No. of Questions :4]

SEAT No. : ____

P237

[Total No. of Pages : 2

[5422]-312
T.Y.B.Sc.
MATHEMATICS
MT - 337(F) : Number Theory
(2013 Pattern) (Semester-III) (Paper-VII)

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

Instructions :

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

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

a) Find (a,b) and $[a,b]$ if a and b are positive integers such that a/b.

b) Show that if n is composite integer then $(n-1)! +1$ is not a power of n.

c) Show that 6 is not a quadratic residue of 11.

d) For what real numbers x is it true that $[x]+[x]=[2x]$.?

e) Find all solutions of the congruence $57x \equiv 10 (\text{mod } 105)$.

f) Prove that if x, y, z is a primitive pythagorean triple, then one of x, y is divisible by 3.

g) What is the highest power of 7 that divides 1000 !?

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

a) Prove that if p is a prime, then $(p-1)! \equiv -1 \pmod{p}$.

b) Prove that $\left[\frac{[x]}{m}\right] = \left[\frac{x}{m}\right]$, where m is a positive integer.

c) Find all primitive pythagorean triples (x, y, z) in which y=60.

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

a) Prove that if f is multiplicative function and $F(n) = \sum_{d/n} f(d)$ then F is also multiplicative function. Hence show that $d(n)$ is a multiplicative function

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

c) Find all integers that give the remainder 1, 2, 3 when divided by 3, 4, 5 respectively.

P.T.O.

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

a) i) for any odd prime p, Let $(a,p)=1$.Consider the integers a, $2a$, $3a$, ..., $\left(\frac{p-1}{2}\right)a$ and their least positive residues modular p. If n denotes the number of these residues that exceed $\frac{p}{2}$, then prove that $\left(\frac{a}{p}\right) = (-1)^n$

ii) Find all integer solutions to $147x+258y=369$.

b) i) Let a, b, and $m>0$ be given integers, and let $g= (a, m)$. Prove that the congruence $ax \equiv b \pmod m$ has a solution if and only if $g|b$.

ii) Find all prime p such that $\left(\frac{3}{p}\right)=1$.

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Total No. of Questions : 4]

SEAT No. :

P238

[Total No. of Pages : 2

[5422]- 313
T.Y. B.Sc.
PHYSICS
PH-331 : Mathematical Method in Physics - II
(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) ***Use of log table and calculator is allowed.***

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

a) Write generating Function for Hermite polynomials.

b) State the postulates of special theory of Relativity

c) State Fuch's theorem.

d) State degree of differential equation.

e) Define orthogonal coordinate system.

f) Define metric coefficients.

g) What is length contraction?

h) What is partical differential equation? Give one example.

i) What is coordinate system?

j) State order and degree of differential equation

$$\frac{d^3y}{dx^3}+\sqrt{\frac{d^2y}{dx^2}}+x=0$$

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

a) Prove that $J_{n+1}(x)+J_{n-1}(x)=\frac{2n}{x}J_n(x)$

b) Derive an expression for length contraction on the basis of Lorentz transformation.

c) Find the element of are length and volume element in cylindrical co-ordinate system.

P.T.O.

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

a) Show that the point $x = 0$ is regular singular point of the Bessel differential equation- $x^2y'' + xy' + (x^2 - n^2)y = 0$

b) Prove that the spherical polar coordinate system is orthogonal.

c) Show that the point $x = \infty$ is a regular singular point of the ugendre's differential equation, $(1 - x^2)y'' - 2xy' + l(l+1) = 0$

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

i) Obtain power series solution of $y'' - 2xy' + 2\lambda y = 0$

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

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

i) Prove that Pn(1)=1

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

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Total No. of Questions : 4]

SEAT No. :

P239

[Total No. of Pages : 2

[5422]-314

T.Y.B.Sc.

PHYSICS

PH - 332 : Solid State Physics

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

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

Instructions to the candidates:

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

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

a) What is heel temperature?

b) Define Co-ordination number.

c) What is the main assumptions of Sommerfield theory?

d) Give the names of characterization techniques.

e) Why conductivity of Semiconductor increases with temperature.

f) Give any two applications of UV-Vis Spectrophotometer.

g) What are domains?

h) Define Superconductivity.

i) Determine the number of atoms per unit cell for body centered cubic cell.

j) Sketch (101) planes in simple cubic unit cell.

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

a) Describe the Sodium chloride (Nacl) and Diamond cubic structures with the help of neat diagram.

b) Describe Half effect. Obtain an expression for Hall angle.

c) State and explain Meisner effect.

P.T.O.

Q3) Attempt any <u>two</u> of the following [five marks each]. **[10]**

a) Calculate the miller indices of crystal planes, which cut through the crystal axes at.

i) (2a, -3b, -3c) and ii) $(\frac{3}{2}a, 2b, c)$

b) In case of Nacl crystal, the maxima of reflected X-rays are obtained at glancing angles 5.9º, 8.4º and 5.2º for (100), (110) and (111) planes respectively Determine the type of cubic crystal.

c) In Bohr's model of hydrogen atom the electron is in circular orbit of radius 5.3×10^{-10} m and its speed is 2.2×10^{6} m/s. What is the magnitude of magnetic moment due to the electron motion.

(Given: charge on an electron = 1.6×10^{-19}C)

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

i) Obtain an expression for Bragg's diffraction condition in direct lattice and in reciprocal lattice.

ii) Obtain an expression for energy levels and density of state in one dimenisions.

b) Attempt any one of the following [Two marks each].

i) Obtain packing fraction for simple cubic structures.

ii) What are ferrites? Give two applications.

Total No. of Questions : 4]

SEAT No : ____

P 240

[Total No. of Pages :2

[5422]-315
T.Y.B.Sc.
PHYSICS
PH - 333 : Classical Mechanics
(2013 Pattern) (Semester-III) (Paper-III)

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

Instructions to the candidates:

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

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

a) Define centre of mass of system.

b) State Nature of path followed by particle when Electric Field perpendicular to direction of Motion of particle.

c) State Kepler's Second Law of planetary motion.

d) Draw effective Potential Energy Curve for inverse square force.

e) Define Impact parameter.

f) Define differential cross section.

g) Define constraints.

h) What is cyclic co-ordinate.

i) Show that [u, v] = -[v, u].

j) Define Poisson's Bracket.

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

a) Show that the path of charged particle moving parallel to constant electric field is straight line.

b) Show that square of period of artifical satellite is proportional to cube of radius of orbit. Explain Geo-synchronous and Geo-stationary orbit.

c) Obtain the relation between scattering angles in Lab and CM systems during elastic scattering.

P.T.O.

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

a) A Hamiltonian of one degree of freedom has the form $H = \frac{P^2}{2m} + \frac{1}{2}kq^2$.

Find Lagrangian corresponding to this Hamiltonian.

b) A body is projected at such an angle that horizontal range is three times maximum height. Find angle of projection.

c) The distance between sun and earth is suddenly reduced to half of it's present distance. What will be duration of year?

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

i) Obtain equation of path of projectile in resistive medium.

ii) Show that total energy in central force field is given by

$$E = \frac{1}{2}m\dot{r}^2 + \frac{L^2}{2mr^2} + V(r)$$

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

i) Distinguish between elastic and inelastic scattering.

ii) Prove that if u and v are constants of motion then [u, v] is also constant of motion.

Total No. of Questions : 4]

SEAT No. :

P241

[Total No. of Pages : 2

[5422] - 316

T.Y.B.Sc.

PHYSICS

PH- 334: Atomic and Molecular Physics

(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) Attempt all the following: **[10]**

a) State second postulate of Bohr's theory for Hydrogen atom.

b) What is conclusion of Frank-Hertz experiment?

c) What are stokes and anti-stokes lines in Raman effect?

d) Give any two applications of Raman spectroscopy.

e) Define reduced mass of Diatomic molecule.

f) State three types of molecular spectra.

g) State Duane and Hunt's law.

h) What is stark effect?

i) Write atomic state for L = 1 and S = $\frac{1}{2}$.

j) Write values of m_l for $l = 4$.

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

a) Explain the spectra of sodium atom with the help of energy level diagrm and selection rules.

b) What is Raman effect? Discuss Raman effect on the basis of Quantum theory.

c) Compare optical spectra with X-ray spectra.

P.T.O.

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

a) Find the linear velocity of electron in second and Fourth orbit of Hydrogen atom.

Given: $\in_o = 8.85\times10^{-12} C^2 / Nm^2, h = 6.64\times10^{-34} J-s$

e = 1.6×10^{-19}C.

b) Determine the ground state of sodium atom (z =11) and represent it using spectral notations.

c) Find the minimum magnetic field needed for Zeeman effect to be observed in a spectral line of 400 nm wavelength. When a spectrometer whose resolution is 0.010 nm is used (C = 3×10^8 m/s).

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

a) i) What is L-S coupling? Obtain the spectral terms for two valance electron atom in p-d configuration. Draw the vector diagram.

ii) Show that vibrational energy levels of diatomic molecule are given by an expression. $E_\upsilon = \left(\upsilon + \frac{1}{2}\right)\cdot\frac{h}{2\pi}\sqrt{\frac{k}{\mu}}$. Discuss the vibrational spectra.

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

i) State Mosley's law and give any one application of it.

ii) What is Vibrational Rotational Spectrum?

EEE

Total No. of Questions :4]

SEAT No. :

P242

[Total No. of Pages :3

[5422] - 317

T.Y.B.Sc.

PHYSICS

PH - 335 : Computational Physics

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

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

Instructions to the candidates:

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

Q1) Attempt All (1 - mark each): **[10]**

a) Why C - language is a middle level language?

b) State various jumping statements in C - language.

c) What is the purpose of puts( ) statement?

d) How 2 - D dimension arrays are declared?

e) Give syntax of while statement in C - language.

f) What is the function of getchar( ) statement in C - language?

g) What is pixel?

h) Give syntax of circle( ) function used in C - language.

i) What are inherent errors?

j) What do you mean by computational physics?

P.T.O.

Q2) Attempt any Two: **[10]**

a) Draw flowchart to print greater number from given three number.

b) What is function? Explain how function call by value and call by reference.

c) What are the storage classes? Explain any two storage classes.

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

a) Write C - program to print factorial of given number using for loop.

b) Write C - Program to find time of flight of projectile motion using formula

$$T = \frac{2V \sin\theta}{g}.$$

c) A rocket is launched from the ground. Its acceleration measured every 5-sec is tabulated below. Find velocity and position of rocket at t = 40sec using Trapezoidal rule.

t(s)	0	5	10	15	20	25	30	35	40
α	40	45.25	48.5	51.25	54.45	61.5	61.5	64.3	68.7

Q4) A) Attempt any <u>One</u>:

a) i) What is an operator? Explain any two types of operator in C - language. **[4]**

ii) What is pointer? Describe its uses. **[4]**

b) i) Write C - program to draw circle, ellipse, bar and rectangle. **[4]**

ii) Find the root of equation $x^3 - 2x - 5 = 0$ using Bisection method. **[4]**

B) Attempt any <u>One</u>: **[2]**

a) What is the output of the following program?

```
#include <stdio.h>
main ( )
{
 int i, j = 0, k = 0;
 for (i = 1, i < 3, i++)
 {
   j = j + 1;
   k = k + 2;
 }
 printf("\n %d, %d", j, k);
}
```

b) What is the output of the following program?

```
# include <stdio.h>
main ( )
{
  int i, n = 3;
  int f =1;
  for (i = 5, i > 0, i – –)
  {
   f = f ∗ i;
  }
 printf("\n %d", & f);
}
```

Total No. of Questions : 4]

SEAT No. :

P243

[Total No. of Pages : 12

[5422]-318

T.Y.B.Sc.

PHYSICS

PH - 336(A) : Astronomy and Astrophysics

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

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

Instructions to the candidates:

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

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

a) Where do comets originate from?

b) What are White Dwarfs?

c) What are Meteores?

d) What are Promineances?

e) What are Globular Clusters?

f) What is a Radio Galaxy?

g) What are pulsars?

h) What is the disadvantage of a Newtonian telescope?

i) What is an Asteroid?

j) What is meant by variable stars?

Q2) Attempt any two. (Five marks each)

a) What is the significance of the Hubble's constant? **[5]**

b) What is Butterfly diagram? **[5]**

c) What are spectroscopic Binaries? **[5]**

P.T.O.

Q3) Attempt any two.

a) What is meant by Solar Limb Darkening? **[5]**

b) What are the advantages of Radio Telescope over Optical Telescope? **[5]**

c) Explain the various types of Eclipses in detail. **[5]**

Q4) a) Attempt any one.

i) Describe in detail the working of CCD camera. **[8]**

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

b) Attempt any one.

i) What is Nebula? **[2]**

ii) What is steady state cosmology? **[2]**

♦ ♦ ♦

Total No. of Questions : 4]

P243

[5422]-318

T.Y.B.Sc.

PHYSICS

PH - 336(B) : Elements of Material Science

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

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

Instructions to the candidates:

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

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

a) State Fick's second law for atomic diffusion.

b) Define the term ductility.

c) State types of solid solutions.

d) What is elastic strain in a metal rod if it is stressed at 60 MPa and modulus of elasticity is 10×10^5 MPa?

e) State two properties of single phase alloys.

f) Give two examples of pure oxide ceramics.

g) State two characteristics of polymers.

h) State various types of smart materials.

i) State Gibbs phase rule.

j) What is dielectric strength?

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

a) Write rules of solid solubility.

b) What is polymerization? Explain addition polymerization with example.

c) Differentiate between elastic deformation and plastic deformation.

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

a) What will be the lattice constant and density of compound FeO having structure same as NaCl? The radii of Fe^{2+} and O^{2-} ions are 0.75A° and 1.4 A° respectively. Also the atomic mass of Fe is 55.8 amu and that of O_2 is 16 amu.

b) The diffusivity of aluminium in copper is 2.6×10^{-17} m^2/s at 500°C and 1.6×10^{-12} m^2/s at 1000°C.

i) Determine values of $D_\circ$ and E for the diffusion couple.

ii) What is diffusivity at 750°C? (Given $K = 13.8 \times 10^{-24}$ J/atom °k)

c) How many grams of sulphar are needed per 100gm of final rubber product to completely cross link a polybutadiene $(-C_4H_{6-})_n$ rubber with sulphar according to the pattern of vulcanization.

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

i) What is phase diagram? Draw and explain Cu-Ni phase diagram.

ii) Discuss various types of point defects in solids.

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

i) State applications of smart materials.

ii) What is AX structure? State various AX structures in ceramic crystals.

♦ ♦ ♦

Total No. of Questions : 4]

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T.Y.B.Sc.

PHYSICS

PH - 336(C) : Motion Picture Physics

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

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

Instructions to the candidates:

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

Q1) All questions are compulsory. (One mark each) **[10]**

a) State factors affecting in developing process (B/W).

b) State any two laboratory special effects.

c) Which lenses are used for wide screen?

d) What is the use of projection lens?

e) State use of filters in camera.

f) State two printing techniques.

g) List the constituents of fixer.

h) What is angle of view?

i) State various lens aberations.

j) State Lens maker formula.

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

a) Explain contact printing in short.

b) How slow motion and Reverse action laboratory special effects are added?

c) Explain various sources and its characteristics.

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

a) Explain construction of projector & its drive mechanism.

b) Explain interminent mechanism of movie camera.

c) Explain Indoor lighting setup in brief.

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

i) Explain developer and its constituents. Also explain fixer with its effect and rate.

ii) What are the essential parts of movie camera? Explain shutter and view finders in movie camera?

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

i) What is the composition of colour reversal film?

ii) State characteristics of films.

♦ ♦ ♦

Total No. of Questions : 4]

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[5422]-318

T.Y.B.Sc.

PHYSICS

PH - 336(D) : Biophysics

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat diagrams wherever necessary.***
4) ***Use of log tables and calculator is allowed.***

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

a) Define codon.

b) Define diffusion.

c) Define CMRR

d) What is EEG?

e) State the principle of colorimeter.

f) Define Biostatistics.

g) Define Biometry.

h) Define x-ray.

i) Define Bond angles.

j) State the principle of resistive transducer.

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

a) Distinguish between Prokaryotic and Eukaryotic cells with suitable examples.

b) Describe in detail polarizable and non-polarizable electrodes.

c) Explain the construction and working of centrifuge.

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

a) State the principle of radioimmunoassays. Describe in detail the radioimmunoassays with suitable examples.

b) Describe in detail the functional aspects of cell membrane.

c) State the principle of SEM. Describe in detail the construction and working of SEM.

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

i) State the principle of spectrophotometer. Describe in detail the construction and working of spectrophotometer with suitable examples.

ii) What do you mean by resting potential? Describe in detail the generation of waveform of action potential.

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

i) The distance between two consecutive R waves is 30mm and the paper speed is 50 mm/sec. What is the heart rate?

ii) What do you mean by proteins?

♦ ♦ ♦

Total No. of Questions : 4]

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[5422]-318

T.Y.B.Sc.

PHYSICS

PH - 336(E) : Renewable Energy Sources

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

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

Instructions to the candidates:

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

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

a) Define solar constant.

b) What is tidal energy?

c) Write the energy balance equation of flat plate collector.

d) Give any two limitations of solar concentrating collectors.

e) What are different materials used in solar cell fabrication?

f) Define Fill factor.

g) What is thermochemical pyrolysis?

h) What is gasifier?

i) What is the function of wind mill?

j) Which factors affect the nature of wind close to the surface of earth?

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

a) Explain rotar type wind mill with diagram.

b) Explain the effect of green house on environment.

c) Explain P-V system for street light.

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

a) A monoenergetic radiation beam having a wavelength of one micrometer. Calculate the energy of a single photon.

b) Calculate efficiency of flat plate collector for a given useful net gain 400 kcal/hr, Ac = $2m^2$ and I = 500 kcal/hr-m^2.

c) Calculate the input power of a solar cell having specifications $\eta = 12\%$, $V_{oc} = 4.50$ mV, $I_{sc} = 30$ mA & ff = 0.7.

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

i) Explain biogas plant in detail with necessary diagram.

ii) A) Write a short note on Energy audit.

B) What are the advantages of fixed dome type plant?

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

i) Determine angular divergence if the radius of sun surface is 6.960×10^8 m and mean earth sun distance is 1.5×10^{11}m.

ii) Draw I-V characteristics of solar cell in dark and illuminated condition.

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Total No. of Questions : 4]

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T.Y.B.Sc.

PHYSICS

PH - 336(F) : Applied Optics

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***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) What is interference of light.

b) Define the term numerical aperture.

c) What are cardinal points?

d) State Malus law.

e) What is total internal reflection?

f) What is negative crystal?

g) What is bolometer?

h) What is double refraction?

i) What is the range of vision of normal eye?

j) What are cardinal points?

Q2) Attempt any two of the following.

a) Give various properties of a hologram. **[5]**

b) Explain the p-i-n photodiode in detail. **[5]**

c) Explain basic theory and construction of half wave plate. **[5]**

Q3) Attempt any two of the following.

a) The focal length of a zone plate is 0.2m. What is the radius of first zone plate for a light of wavelength 5000 A°. **[5]**

b) Using Fermat's principle establish the laws of reflection of light. **[5]**

c) Write a short note on Rochon prism. **[5]**

Q4) a) Attempt any one of the following.

i) Explain the principle, construction and working of Fabry-Perot interferometer. **[8]**

ii) Describe Fraunhofer diffraction at a double slit. Find the positions of maxima and minima. **[8]**

b) Attempt any one of the following.

i) What is difference between coherent and incoherent sources. **[2]**

ii) State the type of losses in optical fibre. **[2]**

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Total No. of Questions : 4]

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T.Y. B.Sc.
CHEMISTRY
CH-331 : Physical Chemistry
(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) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of calculator and logarithmic table is allowed.***
5) ***Actual calculations must be shown while solving problems.***

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

a) Define temperature coefficient.

b) Find the order of reaction from the rate law, if Rate = $K[A]^{1/2}[B]^{2/3}[C]^{1/3}$.

c) Define transport number of ions.

d) The Specific conductance of 0.02N KCl Solution at 25°C is 3.047×10^{-4} ohm^{-1} cm^{-1}. Calculate the equivalent conductance of solution.

e) What is dielectric constant?

f) Calculate the reduced mass of $^{14}N^{16}O$ molecule

g) What is Rayleigh Scattering?

h) State any two applications of Microwave spectra.

i) Estimate number of components present in following system.

$$MgCO_{3(s)} \rightleftharpoons MgO_{(s)} + CO_{2(g)}$$

j) What you mean by partical molar free energy?

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

i) Describe any one method for determination of energy of activation.

ii) State and explain Kohlrausch's Law of independent migration of ions.

iii) Explain the use of dipole moment to determine the percentage ionic character of the bond.

P.T.O.

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

i) The rate constants of reaction are 2.341×10^{-4} and 21.1×10^{-4}(lit $mol^{-1})^{-1}$ sec^{-1} at 15°C and 32°C respectively. Calculate energy of activation of the reaction. (Given R=8.314 Joules K^{-1} $mote^{-1}$).

ii) If the bond length of $^{1}H\,^{35}Cl$ is 1.274A°, calculate reduced mass and moment of inertia of molecule.

($N=6.023\times10^{23}$ molecules $mole^{-1}$)

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

a) Describe moving boundary method to determine the transport number of an ion.

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

c) Discuss the phase diagram of sulphur system.

Q4) a) Derive the expression for the rotational energy of a diatomic molecule taking it as a rigid rotator. Draw the rotational energy level diagram for such a molecule. **[6]**

OR

Attempt the Following: **[6]**

a) Explain Relaxation Effect.

b) What is monovariant, bivariant and non variant system?

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

i) The frequency difference for successive lines in the rotational spectrum 9 HI molecule is observed to be 13.9 cm^{-1}/12.8cm^{-1}. Calculate the rotational constant and the bond length at equilibrium [At. Wts. H=1, I=127, N=6.023×10^{23} and h=6.626×10^{-27} erg.sec]

ii) A cell constant of conductivity cell is 0.8656 cm^{-1}. It is filled with 0.06M solution of NaCl whose resistance found to be 365 ohm. Calculate equivalent conductance of NaCl solution.

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T.Y.B.Sc.

CHEMISTRY

CH - 332 : Inorganic Chemistry

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Marks are reserved for neat diagrams.***
4) ***Use of log tables and calculators are allowed.***
5) ***Atomic numbers: Li-3: Be-4: C-6: N-7: 0-8: F-9: Co-27: N:28, Cu-29.***

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

a) Calculate the bond order in Be_2 molecule.

b) What is the oxidation state of Ag in $[Ag(CN)_2]^-$ ion?

c) Give the example of ionisation isomerism.

d) Calculate the EAN of the metal in the complex ion$[Cu(NH_3)_4]^{+2}$.

e) Define the term ligand.

f) Give the molecular orbital configuration of CO molecule.

g) Which d - orbital is involved in dsP^2 hybridisation?

h) Calculate the CFSE for d^5 system in weak octohedral field.

i) Give the symmetry symbol for S-orbital.

j) Draw the crystal field splitting diagram for octahedral complex.

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

a) Explain the formation of Li_2 molecule on the basis of MOT.

b) Give the limitation of VBT.

c) Write the correct IUPAC names of the following.

i) $[Ni(NH_3)_6]Cl_2$

ii) $K_3[Al(OX)_3]$

iii) $[Cr(CO)_6]$

P.T.O.

B) Answer any two of the following. **[4]**

a) Distinguish between BMO and ABMO.

b) Give the Assumptions of CFT.

c) State EAN Rule with the help of suitable example.

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

a) Discuss the application of CFT to Tetrahedral complex.

b) Explain the formation of F_2 molecule with the help of MOT.

c) Explain the formation of $[Ni(NH_3)_6]^{+2}$ complex ion without pi bonding with the help of MOT.

Q4) Explain the formation of No molecule on the basis of MOT? Calculate bond order in NO^+ and NO^- ions. **[6]**

OR

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

i) Give the applications of co ordination compounds.

ii) For $[CO(NH_3)_6]^{+3}$ complex ion, ΔO is 275 KJ $mole^{-1}$ and pairing energy P is 150 KJ $mole^{-1}$. Would you expect this complex ion to be diamagnetic or paramagnetic,calculate the CFSE for this complexion.

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

i) Mention the different types of valencies according to werner's co-ordination theory with the help suitable examples.

ii) Identify and explain the type of isomerism in the following inorganic complexes.

1) $[Ir(NH_3)_5(NO_2)]Cl_2$ and $[Ir(NH_3)_5(ONO)]Cl_2$

2) $[Co(en)_2(H_2O)Cl]Cl_2$ and $[Co(en)_2Cl_2]Cl.H_2O$

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T.Y.B.Sc.
CHEMISTRY
CH - 333 : Organic Chemistry
(2013 Pattern) (Semester-III) (Paper-III)

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

Instructions to the candidates:

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

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

a) Di methyl amine is stronger base than methyl amine.

b) Trans 1, 4-dimethyl cyclohexane is optically inactive.

c) Which is a good nucleophile amongst $C1^{\Theta}$ and F^{Θ} ?

d) Write reaction for intramolecular cannizarro's reaction.

e) State Saytzef's rule.

f) What is benzyne intermediate?

g) List two activating and deactivating groups in aromatic electrophilic substitution reactions.

h) Write the reaction of l-butene with HBr in presence of H_2O_2.

i) (+) 2-bromobutane when mixed with NaBr looses its optical activity. Explain.

j) Write the reaction of acetophenone with phenyl hydrazine.

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

i) p-nitro phenol is more acidic than phenol explain.

ii) Discuss the mechanism of Reformat sky reaction.

iii) Explain the formation of cis and trans alkene from z-butyne.

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

i) Explain intramolecular H-bonding with suitable example.

ii) Explain the Diels-Alder reaction with suitable example.

iii) Explain E1 mechanism with suitable example.

P.T.O.

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

a) Draw the chair conformations of cis-1, 2-dimethyl cyclohexane and comment on their stability and optical activity.

b) What is E2 mechanism? Discuss the evidences of E2 mechanism.

c) Discuss the effect of following on S_N1 and S_N2 reaction.

i) Nature of substrate and leaving group.

ii) Nature of solvent.

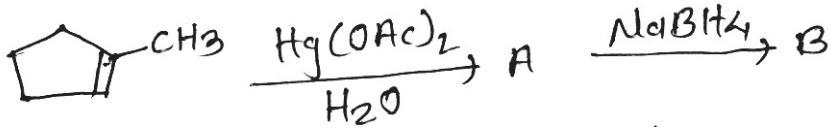
Q4) a) Answer <u>any two</u> of the following: **[6]**

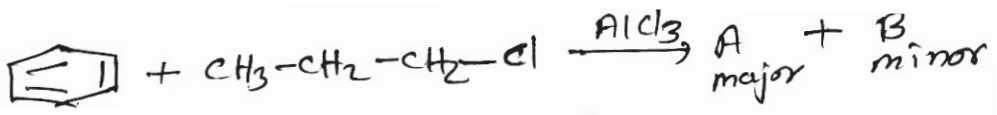
i) What is sulphonation? Discuss the mechanism of sulphonation of benzene.

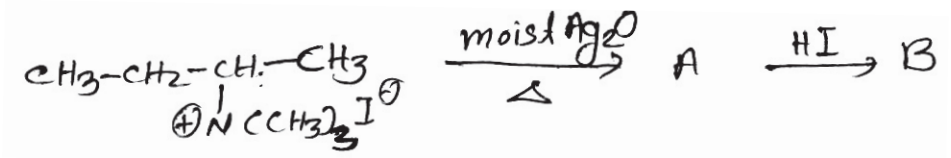
ii) Write the hydroboration-oxidation mechanism of propene.

iii) Give the mechanism of acetophenone with 2, 4-dinitrophenyl hydrazine.

b) Predict the products with mechanism (<u>any two</u>): **[4]**

i) 

ii) 

iii) 

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Total No. of Questions : 4]

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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 indicates full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of log table and calculator are allowed.***

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

a) What is common ion effect?

b) What is limiting current?

c) What is seeding effect in gravimetric analysis?

d) State Beer's law.

e) What is supporting electrolyte in polarography?

f) What is meant by spectral interference in AAS?

g) Give solubility product equation for AgCl.

h) Draw a typical DTA curve.

i) State basic principle of FES.

j) Calculate transmittance of a solution which absorbs 60% of incident radiation.

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

i) Write note on hollow cathode lamp.

ii) Explain construction and working of DME.

iii) Draw schematic diagram of single beam colourimeter. Explain working of it.

P.T.O.

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

i) Differentiate between TGA and DTA.

ii) Calculate weight of silver deposited when current of 4 ampere passed through $AgNo_3$ solution of 20 min.

(Given ECE for Ag = 1.118×10^{-3}).

iii) Calculate molar absorptivity of 0.002 M. Solution having 0.45 absorbance when placed in a cell of 1 cm pathlength.

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

a) Define the term solubility and discuss factors affecting solubility of precipitate.

b) Draw schematic diagram of AAS. Explain roll of each components involved in it.

c) Explain the applications of TGA.

Q4) a) What are essential components of spectrophotometer. Draw block diagram Explain the functions of each components. **[6]**

OR

a) i) What are steps involved in FES. **[3]**

ii) Write note on total consumption burner. **[3]**

b) Calculate diffusion current flowing through the cell containing the solution of cd^{2+} ions having concentration of 5 millimoles l^{-1} if the drop rate is 4.5 seconds and rate of falling mercury is 4 mg s^{-1}. The diffusion coefficient of cd^{2+} ion is 7×10^{-6} cm^2 s^{-1}. **[4]**

OR

b) The solubility of silver chloride in water is 1.435×10^{-3} gm l^{-1} at 25°C. Calculate the solubility product for silver chloride assuming complete dissociation. **[4]**

(given: At.wt of Ag = 108, and of Cl = 35.5)

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Total No. of Questions :4]

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T.Y.B.Sc.

CHEMISTRY

CH - 335 : Industrial Chemistry

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

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

Instructions to the candidates:

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

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

a) Explain the term yield.

b) Give two important uses of ammonia.

c) What are food additives?

d) What is cullet?

e) What is CNG?

f) Explain the term production cost.

g) What are synthetic sweetening agents?

h) Define the term 'Annealing of glass'.

i) What are fungicides?

j) How is dilute nitric acid concentrated?

P.T.O.

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

i) Distinguish between batch and continuous operation.

ii) What are advantages of V_2O_5 over platinised asbestos catalyst.

iii) Give important uses of 'Neem oil'.

b) Answer any Two of the following. **[4]**

i) What are the functions of HR?

ii) Explain the term 'reinforced concrete'.

iii) Give the classification of chemical reactions.

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

a) Discuss advantages and disadvantages of liquid fuels.

b) Explain the food deterioration factors.

c) Write note on coloured glass and safty glass.

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

i) BHC

ii) Endosulphan

OR

a) Describe the process of manufacture of ammonia with flow-sheet. **[6]**

b) What is solar energy? Disucss applications of solar technology. **[4]**

OR

b) Discuss Non-Food application of starch. **[4]**

Total No. of Questions : 4]

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T.Y. B.Sc.
CHEMISTRY
CH - 336 (A) : Nuclear Chemistry
(2013 Pattern) (Paper - VI) (913A3) (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 whenever necessary.***
4) ***Use of logtables and calculator is allowed.***

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

a) Define binding energy and mean binding energy.

b) What is principle quantum number?

c) State the limitations of shell order.

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

e) Define decay constant. State its unit.

f) The decay constant of ^{22}Na is 0.04606 hr^{-1}.What is the value of half life?

g) Which are the two α active nuclides?

h) Complete the following nuclear reaction $^{14}_{7}N + {}^{1}_{0}n \rightarrow {}^{14}_{6}C$+--------

i) What is reaction cross section ? What is the unit of reaction cross section?

j) State Geiger-Nuttals law.

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

i) State different units of radioactivity.

ii) Define photonuclear reaction. What are the different types of photonuclear reaction?

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

P.T.O.

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

i) Calculate the binding energy of $^{56}_{26}Fe$ atom.

Given mass of proton = 1.007825 amu

mass of neutron = 1.008665 amu

mass of $^{56}_{26}Fe$ = 55.934932 amu

ii) Write short notes on Rectangular well potential model.

iii) Write short notes on α energy spectrum.

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

a) Explain different types of radioactive decay processes with examples.

b) What is compound nucleus? Discuss important features of compound nucleus theory.

c) Explain periodicity in Nuclear properties and salient features of shell model.

Q4) a) What are the assumptions of liquid-drop model? What are the similarities between nucleus and a drop of liquid. What are the merits of liquid drop model. **[6]**

OR

Discuss semi-empirical mass equation. What are the limitations of liquid drop model?

b) Calculate half life of Sodium-22, if it decays 90% in 50 hours. **[4]**

OR

Write short notes on Thermonuclear reaction.

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Total No. of Questions : 4]

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T.Y. B.Sc.
CHEMISTRY
CH - 336 (B) : Polymer Chemistry
(2013 Pattern) (Semester-III) (Paper - VI) (913 B3)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right side indicate full marks.***
3) ***Draw the neat diagrams wherever necessary.***
4) ***Use of logtables and calculator is allowed.***

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

a) Define the term-Polymer.

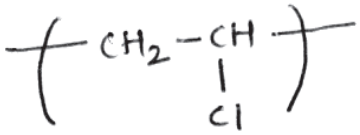
b) Polymer cellophane was inverted by.....

c) Draw the structure of following polymers.

i) Polypropylene

ii) Polyisoprene

d) Write the IUPAC name of



e) Give any two initiator used in cationic polymerisation.

f) State whether the following statement is true or false.

'Nylon-6,6 is the naturally occurring polymer.'

g) What is meant by thermosetting polymer?

h) Name any two commonly used plasticizer.

i) Calculate molecular weight of polyacrylonitrile polymer whose Dp value is 1500.

j) Give any two important applications of polystyrene.

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

i) Polymers are plays vital role in agriculture.

ii) The frying pans are often coated with teflon.

iii) Polymers obtained by anionic polymerisation are alive.

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

i) Organic and inorganic polymers.

ii) Plastics and rubber.

iii) Step and chain polymerisation.

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

a) Discuss in brief the mechanism of free radical polymerisation.

b) Give the brief account of practical significance of molecular weight of polymer. Give significance of threshold value of polymer.

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

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

i) A certain polymer sample contains the fraction A, B and C with their number and molecular weight as shown below:

Fraction A : 120 molecules with molecular weight 10,000

Fraction B : 160 molecules with molecular weight 15,000

Fraction C : 180 molecules with molecular weight 20,000

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

ii) Explain the role of fillers and antioxidants during polymer processing.

iii) Write a note on - Cellulose acetate polymer.

b) Complete the following polymeric reactions. **[4]**

i) $n \cdot CH_2=CH(CHO) \xrightarrow[\Delta]{\text{Polymerisation}} A$

ii) $\sim\!\left(CH_2-C(CH_3)=CH-CH_2\right)\!\sim \xrightarrow[\text{Catalyst.}]{O_3} A \xrightarrow[H_2O]{Zn} B$

iii) $\sim\!\left(CH_2-CH(C_6H_5)\right)\!\sim \xrightarrow[\text{conc. } H_2SO_4]{\text{conc. } HNO_3 +} A + B$

iv) $\sim\!\left(CH_2-CH(O-C(=O)-CH_3)\right)\!\sim \xrightarrow[\Delta]{H_3O^{\oplus} / H^{\oplus}} A$

✓ ✓ ✓

Total No. of Questions : 4]

P249

[5422]-324
T.Y. B.Sc.
CHEMISTRY
CH - 336 (C) : Introduction to Biochemistry & Molecular Biology
(2013 Pattern) (Semester-III) (Paper - VI) (913 C3)

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 logtables and calculator is allowed.***

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

a) Define Vmax.

b) What is the main function of lysosomes?

c) What are hetrodisaccharides? Give example.

d) Name the gelbead used in chromatography.

e) What are zwitter ions?

f) What are the factors that stabilise protein structure?

g) Give the structure of saturated fatty acid.

h) Give MM equation and its significance.

i) What is SDS-PAGE?

j) Give the example of anterior pituitary hormone.

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

i) What are amphipatic lipids? How it behaves in water?

ii) What is ruff degradation?

iii) What are biological function of proteins?

b) Write the structures of <u>any two</u> **[4]**

i) Oleic acid

ii) Sucrose

iii) Lys-Met

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

a) Give the classification of enzymes.

b) Discuss the role of C.AMP as second messenger.

c) Give the principle, working and application of ion exchange chromatography.

Q4) a) Explain various steps involved in determination of primary structure of protein. **[6]**

OR

Give the classification of carbohydrates with suitable example.

b) What types of bond present in biomolecules? **[4]**

OR

Comment on fat soluble vitamins and their biological role.

✓ ✓ ✓

Total No. of Questions : 4]

P249

[5422]-324
T.Y. B.Sc.
CHEMISTRY
CH - 336 (D) : Environmental and Green Chemistry (913D3)
(2013 Pattern) (Semester-III) (Paper - VI) (Elective-I)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***

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

a) Define source.

b) Name any two minor components of atmosphere.

c) Define Reducers.

d) Draw the structure of m-hydroxy benzoic acid.

e) Define Lithosphere.

f) Arrange in order of greater health risk.

Formic acid, 2-butanol, Acetone

g) Define Threshold Limit Value (T.L.V.)

h) What is meant by Pathogens.

i) Define the term Albedo.

j) Give the example of Biotic components.

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

i) Explain Green solvents from plants.

ii) Differentiate Reducing smog and Oxidizing smog.

iii) Explain Biodegradation of pesticides.

b) Write any two the following: **[4]**

i) Biosphere

ii) Sources of renewable energy.

iii) Photocatalysis

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

a) Explain SO_x Chemistry in atmosphere.

b) Describe waste Reduction and waste prevention.

c) Explain Green Chemistry and Sustainable Development.

Q4) a) Give an account of inorganic particulate. **[6]**

OR

Define the term Chemical Oxygen Demand (COD). Describe the method for estimation of COD in water sample.

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

i) Biomass

ii) Green synthesis of Adipic acid using D-glucose and biocatalyst.

✓ ✓ ✓

Total No. of Questions : 4]

P249

[5422]-324
T.Y. B.Sc.
CHEMISTRY
CH - 336 (E) : Agriculture Chemistry
(2013 Pattern) (Semester-III) (Paper - VI) (Elective-I) (913 E3)

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.***

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

a) Define soil solution.

b) What are herbicides?

c) What is acidic soil?

d) Define 'Porosity of soil'.

e) What is nitrification?

f) What is Sodium adsorption ratio?

g) What are mixed fertilizers?

h) What is FYM?

i) Draw structure of D.D.T.

j) What is EPM?

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

i) Discuss cation exchange in soil.

ii) What is Bordeaux mixture? Give its preparation.

iii) Explain role of phosphorus and deficiency symptoms of it in the plants.

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

i) Explain buffer action in soil.

ii) Explain role of calcium in the plants.

iii) Explain the role of Biofertilizers.

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

a) Discuss reclamation of alkali soil.

b) Discuss Biogas plant (Gober gas plant).

c) Discuss theories of nutrient uptake.

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

i) How total dissolved solids are estimated?

ii) Give advantages of complete fertilizers.

iii) Differentiate between surface and sub soil.

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

i) Give functions of humus.

ii) Draw different types of soil structures.

iii) What are sources of water?

✓ ✓ ✓

Total No. of Questions : 4]

SEAT No. :

P250

[Total No. of Pages : 2

[5422]- 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) Write the function of air bladder of Sargassum.

b) What are Lower Cryptogams?

c) Give any to economic importance of Bryophyta.

d) Give the function of Heterocyst of Nostoc.

e) Give any two economic importance of Algae.

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

g) Write the name of division of Anthoceros.

h) Give any two general characters of fungi.

i) What is pteridophyta?

j) Enlist any two methods of vegetative reproduction in Saccharomyces.

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

a) Describe structure of sporophyte of Polytrichum.

b) Describe thallus structure of Batrachospermum.

c) Explain the Telial Stage of Puccinia.

P.T.O.

Q3) Write notes of any Two : **[10]**

a) Sex organs of Chara.

b) Asexual reproduction in Cercospora.

c) Structure of sporocarp of Marsilea.

Q4) Describe external and internal morphology of gametophyte of Marchantia. **[10]**

OR

Describe external morphology and anatomy of stem in Selaginella. **[10]**

✓ ✓ ✓

Total No. of Questions : 4]

SEAT No. :

P251

[Total No. of Pages : 2

[5422]-326

T.Y.B.Sc.

BOTANY

BO - 332 : Cell and Molecular Biology

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

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) Enlist two units for measurement of a cell.

b) What is euchromatin?

c) Enlist any two functions of plasma membrane.

d) What is polytene chromosome?

e) What is an ideogram?

f) Enlist any two functions of chloroplast.

g) What is central dogma of molecular biology?

h) Define nucleoside.

i) What are split genes?

j) Define codon.

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

a) Give an account of enzymes involved in DNA replication.

b) Describe structure and functions of prokaryotic promoter.

c) Explain with suitable diagram - fluid mosaic model of plasma membrane.

P.T.O.

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

a) DNA damage.

b) Structure and function of 80s ribosomes.

c) Functions of mitochondria.

Q4) What is genetic code? Explain properties of genetic code. **[10]**

OR

Describe the ultrastructure and functions of Nucleus.

Total No. of Questions : 4]

SEAT No : ____

P 252

[Total No. of Pages :2

[5422]-327
T.Y.B.Sc.
BOTANY
BO - 333 : Genetics and Evolution
(2013 Pattern) (Semester-III) (Paper-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 Genetics.

b) What is dihybrid cross?

c) Define multiple alleles.

d) What are quantitative traits?

e) Define cytoplasmic inheritance.

f) What are holandric genes?

g) Define duplication of chromosomes.

h) What is trisomy.

i) Give any two characters of multiple alleles.

j) Define Mendelian population.

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

a) What is linkage? Explain its types.

b) Describe the inheritance of colourblindness in human.

c) Explain monoploidy.

P.T.O.

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

a) Law of segregation.

b) Complementary genes.

c) Direct evidances from Genetics.

Q4) What is delation? Explain its types, cytology and genetic effect. **[10]**

OR

Define evolution. Explain theory of natural selection of Darwin.

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Total No. of Questions : 4]

SEAT No. : ____

P253

[Total No. of Pages : 2

[5422] - 328

T.Y.B.Sc.

BOTANY

BO- 344: 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) Write any two economic importance of Gymnosperm.

b) Mention fruit type of family Apocynaceae.

c) Give an example of phylogenetic system of classification.

d) What is mean by monoxylic wood?

e) Write any one example of family Acanthaceae.

f) Give type of infloracence of family Lamiaceae.

g) Write any one economic importance of family Asteraceae.

h) Mention order of psilopsida.

i) What is paleobotany?

j) Write type of pollengrains in Pinus.

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

a) Give merits Hutchinson's system of classification.

b) Describe flower of family Orchidaceae.

c) Sketch, label and describe external characters of Rhynia.

P.T.O.

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

a) Bennettitalean theory.

b) Compression.

c) Internal structure of Lyginopteris othamia.

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

OR

Give distinguishing characters, floral formula and floral diagrams of family Magnoliaceae and Cannaceae.

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Total No. of Questions :4]

SEAT No. :

P254

[Total No. of Pages :2

[5422] - 329

T.Y.B.Sc.

BOTANY

BO - 335 : Horticulture and Floriculture

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

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

Instructions to the candidates:

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

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

a) Define Pomoculture.

b) Give source of calcium.

c) Enlist any two names of growth regulators.

d) What is thining?

e) Write any two chemical properties of soil.

f) What is landscape gardening?

g) Give any one importance of floriculture.

h) What is grading?

i) Define dry flowers.

j) What is drying?

P.T.O.

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

a) Explain the factors affecting seed viability.

b) Write about economic importance of horticultural crops.

c) Give the methods of preservation of horticulture.

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

a) Blanching.

b) Selection of material for dried flower.

c) English garden.

Q4) Give an account of Banana with reference to soil, climatic requirement, commercial varieties, harvesting and post harvest management. **[10]**

OR

What is Floriculture? Write scope and importance of floriculture. Add note on various methods of cultivation of Tagetus.

Total No. of Questions : 4]

SEAT No. :

P255

[Total No. of Pages : 2

[5422]- 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 and labelled diagrams wherever necessary.***
3) ***Figures to the right indicate full marks.***

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

a) What is standard deviation?

b) Give formula to calculate chi-square test.

c) What is germination index (GI)?

d) Define variance.

e) What is sample?

f) Define density.

g) What is histogram?

h) What is standard error?

i) Define dispersion.

j) What is promptness index (PI)?

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

a) Define biostatistics. Give it's scope and applications.

b) What is sampling? Give its merits and limitations.

c) What is probability distribution? Explain poisson distribution.

P.T.O.

Q3) Write short notes on Any Two of the following: **[10]**

a) Line diagram

b) Mode as a central tendency.

c) Normalised Difference vegetation Index (NDVI)

Q4) What is correlation? Describe various methods of studying correlation. **[10]**

OR

What is seed germination? Give an account of Crop Growth Rate (CGR). and Leaf Area Index (LAI).

✓ ✓ ✓

Total No. of Questions : 4]

SEAT No. :

P256

[Total No. of Pages : 2

[5422]-331

T. Y. B. Sc.

ZOOLOGY

ZY - 331 : Animal systematics and Diversity - V

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat labelled diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

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

a) State the habitat of Pila.

b) Define hibernation.

c) State the function of oesophageal pouches.

d) State the function of Jacobson organ in calotes.

e) Define homodont dentition.

f) What are aortic arches.

g) Define eupyrene sperm.

h) Define columella in pila.

i) State the food of calotes.

j) Define corals.

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

a) Describe different types of scales in calotes.

b) Sketch and lable brain of scoliodon.

c) Describe electric organs in fishes.

P.T.O.

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

a) Osphradium in pila.

b) Affinities of Hemichordata

c) Eye of calotes.

Q4) Describe Digestive system of Pila. **[10]**

OR

Describe central Nervous system of calotes.

Total No. of Questions :4]

SEAT No. :

P257

[Total No. of Pages : 2

[5422]-332
T. Y. B. Sc.
ZOOLOGY
ZY- 332: Mammalian Histology
(2013 Pattern)(New Course) (Semester-III) (Paper - II)

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 are Peyer's patches?

b) What are taste buds?

c) What are islets of Langerhans?

d) Define JG complex.

e) Mention the names of layers in adrenal cortex.

f) State the name of duodenal glands.

g) What is stratum corneum?

h) What are pericytes?

i) Define simple epithelium.

j) What are Leydig's cells?

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

a) Sketch and label T.S. of thyroid gland.

b) Describe histological structure of tooth.

c) Describe histological structure of trachea.

P.T.O.

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

a) Structure of striated muscle.

b) Histology of ovary.

c) Histology of parotid gland.

Q4) Describe histological structure of liver. **[10]**

OR

Describe histological structure of rectum.

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Total No. of Questions : 4]

SEAT No : ____

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[Total No. of Pages :2

[5422]-333
T.Y.B.Sc.
ZOOLOGY
ZY - 333 : Biological Chemistry
(2013 Pattern) (Semester-III) (Paper-III)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat labelled diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

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

a) Define compound lipids.

b) Define Bronsted base.

c) Define essential amino acids.

d) What is hypoglycemia?

e) Define hyperglycemia.

f) State any two properties of water.

g) Define reverssible enzyme inhibition.

h) State two examples of monosaccharides.

i) State the Henderson Hasselbalch equation.

j) Define epimerism.

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

a) Give an account of biological significance of lipids.

b) Explain the concept of buffers with suitable examples.

c) Describe any two types of non-covalent bonds. State their importance in biomolecules.

P.T.O.

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

a) Formal titration.

b) Polysaccharides.

c) Clinical significance of enzymes.

Q4) What is 'substrate specificity of enzymes'? Describe effect of substrate concentration on enzyme reaction. State the definition of km. **[10]**

OR

Describe in detail primary and secondary structures of protein.

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Total No. of Questions : 4]

SEAT No. : ____

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[Total No. of Pages : 2

[5422] - 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 indicates full marks.***

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

a) Define sewage.

b) Enlist metallic pollutants.

c) What is meant by threatened species?

d) What is LD 50?

e) What are biotic components?

f) Define toxicology.

g) Define soil pollution.

h) What is lithosphere?

i) What are consumers?

j) Mention any two pesticides.

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

a) Explain non-renewable resources.

b) What is the importance of wildlife management in India.

c) Explain any two factors influencing toxicity.

P.T.O.

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

a) Acid rain.

b) Biotic components.

c) Conventional and non conventional energy sources.

Q4) What is noise pollution? Explain sources and effects of noise pollution. **[10]**

OR

What is natural ecosystem? Explain the structure and function of forest ecosystem.

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Total No. of Questions :4]

SEAT No. :

P260

[Total No. of Pages :2

[5422] - 335

T.Y.B.Sc.

ZOOLOGY

ZY - 335 : Parasitology

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat labelled diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

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

a) What is endoparasite.

b) Give any two symptoms of Dengue.

c) Write the habitat of Ascaris lumbricoides.

d) Define permanent parasite.

e) State any one control measure for W. bancrofti.

f) Define vector.

g) What is nocturnal periodicity.

h) Define definative host.

i) State Habitat of Entamoeba histolytica.

j) Define commensalism.

P.T.O.

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

a) Describe gravid proglottid of Taenia Solium.

b) Explain parasitological significance of Rabies.

c) Describe ecological specificity.

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

a) Sporozoite of plasmodium vivax.

b) Parasitism.

c) Pathogenicity and control measures of Tiks.

Q4) Give a detail account of life cycle, mode of infection and pathogenicity of mite. **[10]**

OR

Describe in detail the life cycle of Entamoeba histolytica.

Total No. of Questions : 4]

SEAT No. : ____

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[Total No. of Pages : 2

[5422]- 336
T.Y. B.Sc.
ZOOLOGY
ZY-336 (a) : General Pathology
(2013 Pattern) (Semester-III) (Paper-VI)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat labelled diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

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

a) What is general pathology?
b) Define autopsy.
c) Define haemorrhage.
d) What is gout?
e) What is melanosis
f) What is acute leukemia?
g) Define regeneration,
h) Define thrombosis.
i) State two examples of infectious diseases.
j) Define chronic inflammation.

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

a) Describe gastric analysis.
b) Describe peculiarities of benign tumour.
c) Give an account of cloudy degeneration.

Q3) Write short notes on Any Two of the following: **[10]**

a) Acute inflammation
b) Causes of neoplasia (any two)
c) Types of gangrene

Q4) What is necrosis? Describe nucleo-cytoplasmic changes during necrosis.**[10]**

OR

What is ischaemia? Explain causes and effects of ischaemia.

✓ ✓ ✓

P.T.O.

Total No. of Questions : 4]

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[5422]- 336
T.Y. B.Sc.
ZOOLOGY
ZY-336 (b) : Cell Biology
(2013 Pattern) (Semester-III) (Paper-VI)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat labelled diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

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

a) What is nucleoid?
b) Write two functions of lysosomes.
c) Define : 'Exocytosis'.
d) Give two functions of Golgi complex.
e) What are free redicals?
f) Mentions functions of nucleolus.
g) Give significance of metaphase.
h) Define passive transport.
i) Mention functions of Mitochondrion.
j) Cytokinesis

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

a) Describe Danieli-Davson model of plasma membrane.
b) What is cytoskeleton? Name to types and their functions.
c) Describe generalised structure of prokaryotic cell.

Q3) Write short notes on Any Two of the following: **[10]**

a) Phases of cell cycle.
b) Apoptosis
c) Polymorphism in lysosome.

Q4) What is cancer cell? Describe extrinsic causes of cancer. **[10]**

OR

Describe ultrastructure of nuclear membrance and pore complex. Add a note on 'nucleocytoplasmic interactions'.

✓ ✓ ✓

Total No. of Questions : 4]

SEAT No. : [ ]

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[Total No. of Pages : 2

[5422]-337

T. Y. B. Sc.

GEOLOGY

GL - 331 : Mineralogy

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) Answer the following in 2-3 sentences : **[10]**

a) Define optic axis.

b) What is 'relief' of mineral.

c) Give the general formula of Amphiboles.

d) Give the alteration products of Biotite.

e) Name two varieties of Zeolites.

f) Give the uses of Mica.

g) State the chemical composition of Apatite.

h) Give two examples of twinning in felspars.

i) Define 'pleochroism'.

j) What is 'paramorphism'?

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

a) Uniaxial indicatrix.

b) Uses of chromite.

c) Physical properties & varieties of corundum.

P.T.O.

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

a) Polymorphism.

b) Uses of Gypsum

c) Geological & geographical distribution of Diamonds.

Q4) Give the silicate structure, chemical composition, physical & optical properties, paragenesis and alteration products of

Olivine **[10]**

OR

Amphibole group of minerals

Total No. of Questions :4]

SEAT No. :

P263

[Total No. of Pages : 1

[5422]-338
T.Y.B.Sc.
GEOLOGY
GL - 332 : Igneous Petrology
(2013 Pattern) (Semester-III) (Paper-II)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***

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

a) Discontineous Bowen's reaction series.
b) Define Xenolith.
c) Define Zone melting.
d) Give a role of magma in geological processes.
e) Contaminated Granites.
f) Gas streaming
g) Give the names of volatile constituents in magma.
h) Define filter pressing
i) Give the density of magma
j) Give importance of Bowen's reaction series.

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

a) Shand's classification
b) Describe the composition, origin and occurrence of Basalt.
c) Define primary magma. Give it's types and derivatives.

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

a) CIPW classification.
b) Give the characteristics composition and origin of Granite in relation to their tectonic settling.
c) Petrographic provinces and rock kindreds.

Q4) What is meant by crystal fractionation ? Describe fosterite-fayalite system.**[10]**

OR

a) Generation of magma in different tectonic setting.
b) Describe the porphyritic and poiklitic textures. Give their significance.

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Total No. of Questions : 4]

SEAT No : ____

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[5422]-339
T.Y.B.Sc.
GEOLOGY
GL - 333 : Sedimentary Petrology
(2013 Pattern) (Semester-III) (Paper-III)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***
3) ***Figures to the right indicate full marks.***
4) ***Neat labelled diagrams must be drawn wherever necessary.***

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

a) Define Sedimentology.

b) Name any two branches of sedimentary petrology.

c) What are stromatolites?

d) Draw neat labelled diagram of clastic texture.

e) Give two agents of physical weathering.

f) Name any four heavy minerals.

g) Name two varieties of ripple marks.

h) What do you mean by facies?

i) What are concretions?

j) What are arkose?

Q2) Write notes on (Any 2): **[10]**

a) Field procedures in Sedimentary Petrology.

b) Stability of minerals and Goldich stability series.

c) Factors controlling textures of sedimentary rocks.

P.T.O.

Q3) Write notes on (Any 2): **[10]**

a) Provenance of sediments using heavy mineral suites.

b) Roundness of sediments and distance of transport.

c) Hydrolysis and oxidation.

Q4) Describe Dott's classification of sandstones. **[10]**

OR

Explain the different sedimentary depositional environments.

✈ ✈ ✈

Total No. of Questions :4]

SEAT No. :

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[Total No. of Pages :2

[5422] - 341

T. Y. B. Sc.

GEOLOGY

GL - 335 : Precambrian Stratigraphy of India

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagram must be drawn wherever necessary.***

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

a) What are Khondalites?

b) On which craton Dongargarh Granite is found?

c) Name older greenstone belt of Dharwar craton.

d) As per recent Geological Time Scale give the classification of proterozoic eon into Eras.

e) Give geographical location of Vaikrita Group.

f) Define 'Transform faults'.

g) Give economic importance of Mansar formation.

h) Name subdivisions of Cuddapah super group.

i) Where is Daling group exposed?

j) What is Eparchean Unconformity?

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

a) Precambrians of Western Lesser Himalaya.

b) Tectonic elements of continent.

c) Mahakoshal Group.

P.T.O.

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

a) Stratigraphic succession of Vindhyan super group.

b) Current classification of Precambrian formation.

c) Stratigraphic succession of Dharwar super group.

Q4) Give geographical distribution, stratigraphic succession and lithology of Delhi super group. **[10]**

OR

Give detailed general stratigraphy of singhbhum - Odisha Craton in a tabular form. **[10]**

Total No. of Questions : 4]

SEAT No. :

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[5422]- 342
T.Y. B.Sc.
GEOLOGY
GL-336 : Applied 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) Answer the following in 2/3 lines. **[10]**

a) What is meant by specular reflection?

b) What is bad land topography?

c) What is principal-point?

d) What is texture of aerial photograph?

e) What is vertical aerial photograph?

f) What is cartosat?

g) What does LIDAR stand for?

h) What is GIS?

i) What is line feature?

j) Give the aim of geological feldwork.

Q2) Write the short (Any Two) **[10]**

a) Atmospheric scattering

b) Trellis drainage pattern

c) Sub-Synchronous satelite

P.T.O.

Q3) Write short notes (Any Two) **[10]**

a) Procedure for collecting samples during geological surveying.

b) Role of lithology in land form development.

c) Hyperspectral scanner

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

OR

What is aerial photography? Discuss the various factors to be considered while planning the aerial photography. **[10]**

✓ ✓ ✓

Total No. of Questions : 4]

SEAT No. :

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[5422]-343

T. Y. B. Sc.

STATISTICS

ST - 331 : Distribution Theory (Principal)

(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.***
3) ***Use of scientific calculator and statistical tables is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

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

a) Choose correct alternative in each of the following :

i) If $X \sim C(\mu, \lambda)$ then the third quartile of X is

A) $\mu-\lambda$ B) $\lambda-\mu$

C) $\mu-2\lambda$ D) $\mu+\lambda$

ii) If $X \sim LN(a = 0, \mu = 0, \sigma^2 = 1)$ then E(X) is

A) 1.648 B) 1.684

C) 2.648 D) 2.682

iii) If $X \sim \beta_2(1,2)$ then distribution of $\frac{1}{X}$ is

A) $\beta_2(1, 2)$ B) $\beta_2(2, 1)$

C) $\beta_1(1, 2)$ D) $\beta_1(2,1)$

iv) Let X be a continuous r.v. with distribution function $F_X(x)$. Let $X_1, X_2, X_3, \ldots, X_n$ be a random sample of size n is drawn from above distribution. The distribution function of n^{th} order statistic $X_{(n)}$ is.

A) $[F_X(x)]^n$ B) $[1-F_X(x)]^n$

C) $1-[1-F_X(x)]^n$ D) $n*[F_X(x)]^n$

P.T.O.

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

i) If X~L (μ, λ) then Bowley's coefficient of skewness of distribution of X is zero.

ii) If X~C (0,1) then P(–1 < X < 1) = 1.

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

i) Bivariate normal distribution.

ii) Laplace distribution

d) Attempt the following : **[1 each]**

i) If X~W (α,β) then state the distribution of $\left(\frac{X}{\alpha}\right)^{\beta}$.

ii) If X~β_1 (m = 1, n = 2) then obtain harmonic mean of X.

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

a) Show that Laplace distribution can be derived as the distribution of the difference of two i.i.d exponential r.vs with mean $1/\lambda$

b) If X~W (α, β) then obtain the distribution of Y = cX, where c>0 is constant.

c) Let X_1, X_2, X_3...., X_n be a random sample of size n is drawn from exponential distribution with mean $\frac{1}{\theta}$. Obtain the distribution of 1st order statistic $X_{(1)}$.

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

a) Let X be a continuous r.v with p.d.f.

$$f(x) = \frac{1}{12}x^2(1-x), 0 < x < 1$$
$$= 0; \text{ otherwise}$$

Find E[X] and Var[X].

b) If (X, Y) ~ BN (μ_1, μ_2, σ_1^2, σ_2^2, ρ) then find conditional distribution of Y given X=x. Further state the variance of the conditional distribution.

c) If X_1, X_2, X_3...., X_r are i.i.d LN(0, μ, σ^2) variates. Obtain the distribution of geometric mean of X_1, X_2, X_3....,X_r.

Q4) Attempt any one of the following :

a) i) If X and Y are two independent gamma variates with parameters (α,λ_1) and (α,λ_2) respectively. Show that U=X+Y and V= $\frac{X}{Y}$ are independently distributed. Further identify their distributions. **[7]**

ii) If X and Y are i.i.d C(μ,λ) r.vs then obtain the distribution of $\frac{X+Y}{2}$.**[3]**

b) i) If (X,Y) ~BN (μ_1,μ_2, σ_1^2,σ_2^2,ρ), obtain MGF of (X,Y). **[7]**

ii) If X~L (0,1) then obtain E[X]. **[3]**

Total No. of Questions :4]

SEAT No. :

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[5422]-344
T.Y.B.Sc.
STATISTICS (Principle)
ST - 332 :Theory of Estimation
(2013 Pattern) (Semester-III) (Paper-II)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of scientific calculator and statistical tables is allowed.***
4) ***Symbols and abbreviations have their usual meanings.***

Q1) Attempt each of the following:

a) In each of the following cases, choose the correct alternative: **[1each]**

i) If X ~ Poisson (m) then (X-1) X is an unbiased estimator of

a) m^2 b) m

c) (m-1)m d) m^2+m

ii) If $X_1, X_2, \ldots X_n$ is a random sample from U(0, θ) then M.L.E of parameter θ is

a) $X_{(1)}$ b) $X_{(n)}$

c) $X_{(1)} + X_{(n)}$ d) $\frac{X_{(1)} + X_{(n)}}{2}$

iii) Which of the following properties of an estimator is examined by using Pitman-Koopman form?

a) Sufficiency b) Unbiasedness

c) Consistency d) Efficiency

iv) Consistency is invariant under which of the following transformation

a) Linear b) Continuous

c) One to one d) One to one and onto

b) State whether each of the following statements is TRUE or FALSE. **[1each]**

i) UMVUE is always unique.

ii) MLE's are always consistent.

P.T.O.

c) Define the following terms: **[1each]**

i) Pivotal Quantity

ii) Best linear unbiased estimator

d) Attempt each of the following:

i) Suppose X_1, X_2 is a random sample form poisson (m). **[1each]**

$$If\ T_1 = \frac{X_1 + 3X_2}{4} and\ T_2 \frac{X_1 + X_2}{2}$$

are two unbiased estimators of m then find relative efficiency of T_1 w.r.t. to T_2.

ii) State Neyman's factorization theorem.

Q2) Attempt any two of the following. **[5each]**

a) A random variable takes values 1 and 0 with respective probabilities θ and $1-\theta$. If $X_1, X_2, \ldots X_n$ are n independent observations on X, then show that $\frac{T(n-T)}{n(n-1)}$ is an unbiased estimator of $\theta(1-\theta)$ where $T = \sum_{i=1}^{n} X_i$.

b) Suppose $X_1, X_2, \ldots, X_n$ is a random sample from distribution with probability density function $f(x,\theta) = \frac{1}{2} e^{-|x-\theta|}$ $-\infty < x < \infty$, $-\infty < \theta < \infty$

Find the M.L.E. of θ

c) Suppose $X_1, X_2, \ldots, X_n$ is a random sample from pareto distribution with p.d.f.

$$f(x,\theta) \begin{cases} \frac{\theta}{x^{\theta+1}} & x \geq 1, \theta > 10 \\ 0 & otherwise \end{cases}$$

Show that $T = \sum_{i=1}^{n} \log X_i$ is a sufficient statistic for θ.

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

a) Describe method of moments to estimate the parameter. Also obtain moment estimator of p for Bernoulli (p).

b) Let $X_1, X_2, \ldots\ldots X_n$ be random sample from $N(\mu,\sigma^2)$ where μ is unknown show that $S^2 = \frac{1}{n-1}\sum_{i=1}^{n}(X_i - \overline{X})^2$ is consistent estimator of σ^2.

c) Define Fisher's information function. Also find I (p) for Bernoulli (p).

Q4) Attempt any one of the following:

a) 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) Obtain 100(1-α)% confidence interval for σ^2 if a random sample of size n is drawn from $N(\mu,\sigma^2)$ distribution when μ is known. **[4]**

b) i) State and prove Cramer-Rao inequality **[7]**

ii) Let $X_1, X_2, \ldots X_n$ be a random sample from B(n,p) distribution

Show that $T = \frac{\sum_{i=1}^{n} Xl}{mn}$ is consistent for p. **[3]**

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Total No. of Questions : 4]

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T.Y.B.Sc.

STATISTICS (Principal)

ST- 333: Sampling Methods

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of 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) The probability that an item is included in a sample of size n under simple random sampling with replacement from a population of size N is _____.

i) $\frac{n}{N}$ ii) $\frac{1}{N_{C_n}}$

iii) $\frac{1}{N}$ iv) $\frac{1}{n}$

b) The ratio estimator of the population mean $\bar{Y}_R$ is _____.

i) $r_n \bar{x}_n$ ii) $r_n \bar{X}_N$

iii) $R_N \bar{X}_N$ iv) $R_N \bar{y}_n$

c) The estimator of population total (Y) in case of systematic sampling is given by

i) $\bar{Y}_{sys}^2$ ii) $\frac{N-1}{N}\bar{Y}_{sys}$

iii) $N\,\bar{Y}_{sys}$ iv) $\bar{Y}_{sys}$

P.T.O.

d) As sample size n increases _____.

i) Both sampling and non-sampling error increases

ii) Both sampling and non-sampling error decreases

iii) Sampling error decreases

iv) Non-sampling error decreases

B) State whether the following statements are True or False: **[1 each]**

a) Ratio estimator ($R_N > 0$) of population mean is more precise than that given by SRSWOR if $\rho < \frac{1}{2}\frac{c_x}{c_y}$.

b) A list of all elements of the population is called as sampling frame.

C) Explain the term sampling unit. **[1]**

D) Explain when stratified sampling is used. **[1]**

E) State a real life situation in which it is appropriate to use systematic sampling method. **[1]**

F) State the condition when the ratio estimator is same as that of regression estimator. **[1]**

Q2) Attempt any Two of the following: **[5 each]**

a) In SRSWOR show that sample mean square is an unbiased estimator of population mean square.

b) Explain the ratio method of estimation of population mean. Show that the ratio estimator of population mean is not an unbiased estimator of population mean. State its standard error.

c) Derive the expression for the variance of the estimator $\bar{y}_{st}$ of the population mean in case of Neyman allocation and proportional allocation in stratified random sampling and compare them.

Q3) Attempt any Two of the following: **[5 each]**

a) State the salient features of a good questionnaire.

b) Obtain an unbiased estimator of population mean and the variance of this estimator under systematic sampling.

c) A population of size 1200 is divided into 3 strata with sizes and standard deviations as follows:

Stratum No.	Size (N_i)	Standard deviations (S_i)
1	400	6
2	500	7
3	300	8

Determine the sample sizes under proportional allocation and Neyman's allocation if the total sample size is 180.

Q4) Attempt any One of the following:

a) i) Obtain the formula for the sample size under SRSWOR so as to achieve the predetermined precision in the estimation of population proportion of a certain attribute, with a given confidence coefficient. **[6]**

ii) For a population with linear trend $y_i = a + b_i$ for i = 1, 2, ..., N. Obtain the expression for variance of the estimator of the population mean when SRSWOR is used. **[4]**

b) i) Write a note on sampling and non sampling errors. **[4]**

ii) In case of stratified random sampling with the cost function of the form $c = c_0 + \sum_{i=1}^{k} c_i n_i$. Determine the size of the sample from the i^{th} stratum when the variance of the unbiased estimator of the population mean to be minimised for fixed cost c. **[6]**

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Total No. of Questions : 4]

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T.Y.B.Sc.

STATISTICS (Principal)

ST-334 : Design of Experiments

(2013 Pattern) (Semester-III) (Paper-IV) (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 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 a model of design of experiment, the random error component is assumed to follow i.i.d. normal variates with mean

i) 1 ii) 2

iii) 0 iv) -1

b) Given the layout of a replicate divided into 2 blocks in a 2^3 factorial experiment,identify in which of the replicate, the interaction effect ABC is confounded.

i)

Replicate I	abc	a	b	c
	ab	ac	bc	(1)

ii)

Replicate I	abc	ab	c	(l)
	a	ac	bc	b

iii)

Replicate I	abc	a	bc	(1)
	ab	ac	b	c

iv)

Replicate I	abc	ac	b	(1)
	a	bc	c	ab

P.T.O.

c) In CRD with model $X_{ij} = \mu + \alpha_i + \varepsilon_{ij}$, the least square estimator of i^{th} treatment effect α_i is

i) $\bar{X}_{..}$ ii) $\bar{X}_{i.}$

iii) $X_{ij} - \bar{X}_{i.}$ iv) $\bar{X}_{i.} - \bar{X}_{..}$

d) The principle of local control is not used in

i) RBD ii) CRD

iii) LSD iv) ANOCOVA in RBD

B) State whether the following statements are True or False: **[1 each]**

a) For LSD, number of treatments and number of columns will be same.

b) In partial confounding, unconfounded effects cannot be tested for their significance.

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

a) Treatment.

b) Linear treatment contrast.

D) a) State the situation where the square root transformation is used. **[1]**

b) Define orthogonal contrasts. **[1]**

Q2) Attempt any Two of the following: **[5 each]**

a) State the model for RBD with assumptions. Obtain the least squares estimators of parameters involved in this model.

b) Obtain the formula of efficiency of LSD over corresponding CRD.

c) Show that mean sum of squares due to error is unbiased estimator of error variance σ_e^2 in CRD

Q3) Attempt any Two of the following: **[5 each]**

a) Explain what ANOCOVA is with one real life situation. Also state the least square estimates of parameters of CRD with ANOCOVA.

b) Explain Kruskal Wallis H — test.

c) Explain Tuckey's procedure for comparing pairs of treatment means in LSD.

Q4) Attempt any One of the following:

a) i) Give the analysis for testing the significance of regression coefficient β and test for the equality of treatment effects for ANOCOVA in RBD. **[5]**

ii) Explain Yate's procedure to obtain factorial effect totals in 2^3 factorial experiment. **[5]**

b) i) Explain about total and partial confounding in factorial experiments. Give ANOVA table for 2^3 factorial experiment where interaction effect ABC is confounded in all the 4 replicates. **[6]**

ii) Explain the procedure for testing for equality of two specified treatment effects in RBD. **[4]**

Total No. of Questions :4]

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T. Y. B. Sc.

STATISTICS (Principal)

ST - 335 : C - Programming (Turbo C)

(2013 Pattern) (Semester - III) (Paper - V) (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 calculator and statistical tables is allowed.***
4) ***Symbols and abbreviations have their usual meanings.***

Q1) Attempt each of the following :

A) Choose the correct alternative in each of the following : **[1 each]**

a) If x = (25/3) % 2 evaluates to

i) 0

ii) 4

iii) 8

iv) –4

b) Elements of an array occupy.

i) Random memory location.

ii) Subsequent memory location.

iii) No space in memory.

iv) Varying length of memory locations for each element.

c) The value of expression (a = = b) & & (b > a) for a = –5, b = 3, c = 1 is

i) 1

ii) –1

iii) 0

iv) 4

P.T.O.

d) A pointer can store

i) Constant value

ii) Value of another variable.

iii) Address of another variable

iv) Real value

B) State whether each of the following statement is True or False : **[1 each]**

a) || is not a logical operator in C.

b) Among all functions, the compiler executes function main ( ) first.

C) a) Give the syntax for 'for' loop in C. **[1]**

b) Write an expression in C for **[1]**

$$\frac{x^2 - y^2}{\sqrt{x + x^2 y}}$$

D) a) What is the use of sizeof ( ) operator. **[1]**

b) What is pointer in C? **[1]**

Q2) Attempt Any Two of the following : **[5 each]**

a) Explain the syntax and one illustration for each of the following :

i) printf ( )

ii) scanf ( )

iii) putchar ( )

b) i) Draw a flowchart to obtain factorial of an integer number.

ii) Write a program to find area of circle.

c) Write a C program to check whether a given integer m is divisible by another integer n or not.

Q3) Attempt Any Two of the following : **[5 each]**

a) What do you mean by a one dimensional array? Explain the declaration and initialization of one dimensional array by giving syntax and an illustration.

b) Write a C Program to check whether a given word is palindrome or not, using string functions.

c) Write syntax of switch ( ). Also write a C program to explain use of switch statement.

Q4) Attempt Any One of the following :

a) i) What is recursion? Write a recursive function to find the value of X^n where x is real and n is integer. **[5]**

ii) Write a C program to check whether a given integer n is prime or not. **[5]**

b) i) Write a C program to find mean and variance of 10 numbers. **[5]**

ii) Write a C program to find sum of digits of a number. **[5]**

Total No. of Questions : 4]

SEAT No. :

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T.Y. B.Sc.
STATISTICS (Principal)
ST-336 :Introduction to Regression Analysis
(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) ***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) In simple linear regression, least square estimate of slope parameter β_1 is given by

i) $\frac{S_{xy}}{S_{xx}}$ ii) $\frac{S_{xx}}{S_{xy}}$

iii) $\frac{S^2_{xy}}{S_{yy}}$ iv) $\frac{S^2_{xy}}{S_{xx}}$

b) In multiple regression modes, which of the following statistic is used to test significance of regression?

i) χ^2 Statistic ii) t - Statistic

iii) F Statistic iv) Z Statistic

c) Standardised residual in a linear regression model is given by

i) $\frac{e_i}{\sqrt{MS_{res}}}$ ii) $\frac{e_i}{\sqrt{SSR}}$

iii) $\frac{e_i}{MS_{res}}$ iv) $\frac{\sqrt{MS_{res}}}{e_i}$

P.T.O.

d) In logistic regression model, errors follows:

i) Normal distribution ii) Binomial distribution

iii) Poisson distribution iv) Uniform distribution

B) State Whether the following statements are true or false: **[1 each]**

a) When we fit the model $Y=\beta_0+\varepsilon$ to a data set, $R^2=0$ always.

b) In logistic regression, Parameters are estimated by using least square Principle.

C) Define the term : Studentised residual. **[1]**

D) State any one variance stabilization transformation. **[1]**

E) State multiple regression model with P-regressors. **[1]**

F) Define "Deviance Statistic-D". **[1]**

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

a) Explain the procedure to fit the simple linear regression model $Y=\beta_0+\beta_1X+\varepsilon$.

b) Describe the procedure of testing significance of individuals regressors in multiple linear regression model.

c) Explain the procedure of testing significance of regressors in case of multiple logistic regression model.

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

a) In simple linear regression model $Y=\beta_0+\beta_1X+\varepsilon$ with $E(\varepsilon)=0$, $var(\varepsilon)=\sigma^2$ and ε is uncorrelated, show that β_1 is an unbiased estimator of model parameter β_1. Also derive an expression for var $(\hat{\beta}_1)$.

b) Explain how residual plots are useful in verifying the assumptions in linear regression model.

c) Write univariate logistic regression model. Explain the procedure of fitting this model.

Q4) Attempt any one of the following :

A) i) Discuss in brief, coefficient of multiple determination as a criteria for evaluating subset regression model in variable selection method. **[5]**

ii) Write a short note on method of weighted least squares for fitting regression models. **[5]**

B) i) Explain the test procedure of likelihood ratio test in logistic regression. **[5]**

ii) In a multiple linear regression model, derive 95% confidence interval for regression coefficient β_j, j=0,1,2,.....,k. Also explain the notations used in it. **[5]**

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Total No. of Questions : 4]

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T. Y. B. Sc.

GEOGRAPHY

Gg - 331 : Fundamentals of Human Geography (Part - I)

(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 indicates full marks.***
3) ***Diagrams and maps must be drawn wherever necessary.***
4) ***Use of map stencils is allowed.***

Q1) Answer the following questions in one or two sentences (any ten) : **[10]**

a) Define determinism.

b) What is possibilism?

c) Who introduced the concept of ncodeterminism?

d) Name any two branches of human geography.

e) Who introduced the concept of welfare approach?

f) Define human race.

g) Name any two physical traits on the basis of human races.

h) Define population density.

i) Name the continents having highest natural population growth rate.

j) State any two push factors responsible for migration.

k) Name the three basic dimensions of human development index.

l) Name the types of diffusion.

m) Name the major cultural realms of the world.

P.T.O.

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

a) Regional and systematic approaches.

b) Causes of Migration.

c) Population policies of India

d) Cultural realms.

Q3) Answer the following questions in 100 words (any two) : **[10]**

a) Explain the scope of Human Geography.

b) Describe the trends in the population growth of developed countries.

c) Explain the contemporary approaches in Human geography.

d) Discuss the physical factors affecting population density.

Q4) Answer the following questions in 200 words (any one) : **[10]**

Describe the characteristics of principal human races of the world.

OR

Explain the distribution of population in Asia and Africa.

Total No. of Questions :4]

SEAT No. : ____

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[Total No. of Pages : 2

[5422]-350
T.Y.B.Sc.
GEOGRAPHY
Gg - 332 : Geography of Travel and Tourism (Part-I)
(2013 Pattern) (Semester-III) (Paper-III)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Diagrams and maps must be drawn wherever necessary.***
4) ***Use of map stencils is allowed.***

Q1) Answer the following questions in two to three sentences (Any ten): **[10]**

a) What is static element in tourism?

b) Name any two summer resorts from the western Ghats.

c) Mention any two major components of tourism.

d) State any two man-made objects which are tourists' attraction.

e) Mention any two effects of seasonality on tourism.

f) Why are mountains popular as tourists' attraction?

g) Name any two national parks from Maharashtra.

h) What is heritage preservation?

i) Define international tourist.

j) State any two economic characteristics of tourists.

k) What is visitor density?

l) Provide any two examples of travel for health.

m) What is MTDC?

Q2) Write short notes (Any two): **[10]**

a) Tourism, a multifaceted phenomena.

b) Accessibility, as a physical asset.

c) Hot springs as tourist attraction.

d) Difference between travel and tourism.

P.T.O.

Q3) Answer the following questions in 100 words (Any two): **[10]**

a) What is spatial pattern of demand?

b) Describe geography of seaside resorts.

c) What is wildlife tourism?

d) Comment on business tourism.

Q4) Answer the following questions in 200 words (Any one): **[10]**

a) Discuss the impact of topography, slope and soils on the development of tourism.

b) Describe cultural diversity and its impact on tourism.

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Total No. of Questions : 4]

SEAT No. : ____

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[Total No. of Pages : 2

[5422] - 351

T.Y.B.Sc.

GEOGRAPHY

Gg- 333: Fundamentals of Geo-Informatics (Part - 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 indicate full marks.***
3) ***Diagrams and maps must be drawn wherever necessary.***
4) ***Use of map stencils is allowed.***

Q1) Answer the following questions in two to three sentences (any ten): **[10]**

a) Give the definition of Geo-informatics.

b) What do you mean by data manipulation in GIS.

c) What is data visualization in GIS?

d) Define spatial data.

e) What is attribute data?

f) Mention any two functions of GIS.

g) What is meant by vector data model?

h) What is a pixel?

i) Define a polygon.

j) What is data conversion?

k) Define spatial information technology.

l) Give any two disadvantages of raster data format.

m) Mention any two applications of geo-informatics in Earth Sciences.

P.T.O.

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

a) Scope of Geo-informatics.

b) Toposheet as a major data source in GIS.

c) Characteristics of vector data.

d) Non-spatial data type in GIS.

Q3) Answer the following questions in 100 words (any two): **[10]**

a) Describe various GIS tasks.

b) Explain the types of data sources in GIS.

c) Explain the process of spatial data generation.

d) Discuss the role of remote sensing in forestry.

Q4) Answer the following questions in 200 words (any one): **[10]**

a) Give an account of GIS applications in urban and regional planning.

b) Explain in detail the process of raster data analysis.

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Total No. of Questions :4]

SEAT No. :

P278

[Total No. of Pages :2

[5422] - 353

T. Y. B. Sc.

GEOGRAPHY

Gg - 335 : Geography of Soils (Part - I)

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Diagrams and maps must be drawn wherever necessary.***
4) ***Use of map stencil is allowed.***

Q1) Answer the following questions in two or three sentences (Any Ten) **[10]**

a) What do you mean by soil science?

b) Give the names of soil components.

c) Write the names of primary minerals of soils.

d) Define field capacity of soil.

e) Write two names of soil colloids.

f) Define the platy soil structure.

g) What is particle density of soils?

h) Define azonal soils.

i) What is difference between micro and macro pore space?

j) Who is known as father of soil science?

k) Write Jenny's equation of soil formation.

l) Give the definition of soils.

m) Define soil moisture.

P.T.O.

Q2) Write short notes (Any Two) **[10]**

a) Geography and Pedology.

b) Podzolization

c) Soil Temperature.

d) Oxidation – Reduction.

Q3) Answer the following questions in 100 words (Any Two) **[10]**

a) Discuss the ideal soil profile development.

b) Explain any two chemical processes of soils.

c) Write how particle size analysis varies soil texture with suitable examples.

d) Write the zonal classification of soils

Q4) Answer the following questions in 200 words (Any One) **[10]**

a) Explain how topography and parent material influence on soil formation.

b) What are peds? Explain the structural classification of soils.

Total No. of Questions : 4]

SEAT No. :

P279

[Total No. of Pages : 2

[5422]- 354
T.Y. B.Sc.
GROGRAPHY
Gg-336 : Fundamental of Geo-informatics (Part-I)
(2013 Pattern) (Semester-III) (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) ***Diagrams and maps must be drawn whenever necessary.***
4) ***Use of map stencils is allowed.***

Q1) Answer the following questions in two to three sentences (any ten). **[10]**

a) Define remote sensing.

b) Define electromagnetic radiation (EMR)

c) What is meant by wave frequency?

d) Define transmission.

e) What is meant by photo nadir?

f) What is meant by flying height?

g) What are fiducial marks?

h) What is pseudoscopic image?

i) What is a stereogram?

j) What is a forward overlap?

k) What do you meant by oblique aerial photography.

l) Give the properties of electromagnetic waves.

m) What is panchromatic photographs.

Q2) Write short notes on: **[10]**

a) Applications of remote sensing in forestry.

b) Characteristics of electromagnetic radiation.

c) Panchromatic cameras

d) Mirror stereoscope

P.T.O.

Q3) Answer the following in 100 words (any two). **[10]**

a) Explain the importance of remote sensing in hydrology.

b) Give an account of interaction with atmosphere in remote sensing.

c) Explain the importance of colour films.

d) Describe various types of aerial photographs.

Q4) Answer the following in 200 words (any one). **[10]**

a) Give an account of types of aerial photo camera in remote sensing.

b) Explain in detail division of electromagnetic spectrum in various regions.

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Total No. of Questions : 4]

SEAT No. : ____

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[Total No. of Pages : 2

[5422]-355

T. Y. B. Sc.

MICROBIOLOGY

MB - 331 : Medical Microbiology - I

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***
3) ***Draw neat labelled diagram wherever necessary.***

Q1) Attempt the following :

a) Match the following : **[5]**

i)	M. leprae	a)	BCG
ii)	Salmonella	b)	Kupffer cells
iii)	Central nervous system	c)	Skin infection
iv)	Vaccine for tuberculosis	d)	Blood brain barrier
v)	Liver	e)	Widal test

b) State true or false : **[3]**

i) Most strains of staphylococci are hemolytic.

ii) Food poisoning is caused by C.tetani.

iii) Treponema pallidum can be stained easily.

c) Define : **[2]**

i) Mortality

ii) Epidemiology

P.T.O.

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

a) Diagramatically represent : Anatomy of Respiratory system.

b) What are the differences between case control and cohort studies.

c) Describe the virulence factors of E.coli.

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

a) Pathogens and diseases of gastrointestinal system.

b) Prophylaxis of Anthrax.

c) Methods used for clinical trials of drugs.

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

a) Describe pathogenesis and laboratory diagnosis of Rickettsia.

b) Explain Epidemiology and pathogenicity of shigella.

Total No. of Questions :4]

SEAT No. :

P281

[Total No. of Pages : 2

[5422]-356
T.Y.B.Sc.
MICROBIOLOGY
MB - 332 :Genetics And Molecular Biology-I
(2013 Pattern) (Semester-III) (Part-II)

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

Instructions to the candidates:

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

Q1) A) Select the correct answer from the given options. **[5]**

a) Which of the following is used for the precipitation of bacterial genomic DNA?

i) Ethanol ii) Benzene

iii) Chloroform iv) Phenol

b) Which of the following enzymes joins okazaki fragments during DNA replication?

i) DNA polymerase III ii) Primase

iii) Helicase iv) DNA-ligase

c) To which class E.coli, DNA gyrase belongs?

i) Topoisomerase I ii) Topoisomerase II

iii) Topoisomerase III iv) Topoisomerase IV

d) Which three nucleotides are present at amino acid arm of t-RNA?

i) CCC ii) CCU

iii) CCA iv) CCG

e) Which of the following techniques is suitable for blotting RNA molecules?

i) Western blotting ii) Southern blotting

iii) Northern blotting iv) PCR technique

B) State true or false. **[2]**

a) Southern blotting is an essential step prior to DNA hybridization.

b) DNA polymerase I has 5'-3' exonuclease activity.

P.T.O.

C) Name the following. **[3]**

a) The site on DNA of E.coli where replication is initiated.

b) Technique used for separating fragments of DNA

c) The blotting technique used for protein molecules.

Q2) Diagrammatically represent the following (Any two). **[10]**

a) Eukaryotic m-RNA

b) Bidirectional replication of DNA

c) Southern blotting

Q3) Attempt the following (Any two) **[10]**

a) With the help of suitable reactions, explain synthesis of aminoacyl- t-RNA during translation.

b) Explain in detail, initiation of translation in eukaryotes.

c) Enlist any five safety precautions for the set up of r-DNA technology laboratory.

Q4) Attempt the following (Any one) **[10]**

a) With suitable diagrams, explain initiation and rho-dependent termination of transcription in prokaryotes.

b) With suitable examples, explain the significance of tetrad analysis in Neurospora crassa.

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Total No. of Questions : 4]

SEAT No : ____

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[Total No. of Pages :2

[5422]-357
T.Y.B.Sc.
MICROBIOLOGY
MB - 333 : Enzymology
(2013 Pattern) (Semester-III) (Paper-III)

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

Instructions to the candidates:

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

Q1) Attempt the following: **[5]**

a) Match the following:

i)	Riboflanin	1)	3-D structure of protein
ii)	X ray crystellography	2)	Isoalloxazine ring
iii)	Competitive Inhibition	3)	Isozyme
iv)	Lactate dehydrogenase	4)	Reversible enzyme inhibition
v)	Polyethylene glycol	5)	Crosslinking agent

b) Draw the structure of pyridoxal phosphate. **[1]**

c) Enlist any two examples of anionic exchanger. **[1]**

d) State True or False: **[2]**

i) Allosteric enzymes are non regulatory.

ii) Density gradient technique is based on solubility differences.

e) Define specific activity of an enzyme. **[1]**

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

a) Draw structure and explain occurance as well as biochemical role of vitamin Niacin.

b) Describe with suitable example spectrophotometric method of enzyme assay.

c) Explain the concept of covalent modification of glycogen phosphorylase.

P.T.O.

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

a) Explain the role of PDH as a multienzyme complex.

b) Define immobilization of an enzyme. Write any one method of immobilization of an enzyme.

c) Describe any one chemical method used for determination of amino acids in active site.

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

a) Derive Michaclis Menten equation by Brigg's and Haldane approach.

b) Explain principle, working and applications of gel filtration chromatography.

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Total No. of Questions :4]

SEAT No. :

P284

[Total No. of Pages :2

[5422] - 359

T. Y. B. Sc.

MICROBIOLOGY

MB - 335 : Fermentation Technology – I

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

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

Instructions to the candidates:

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

Q1) A) Define following : **[2]**

i) Patent ii) Auxotrophic mutant

B) State true or false : **[3]**

i) Ame's Test is used for testing pyrogen.

ii) Strain improvement can be done using rDNA technology.

iii) Penicillin is used in Davis method of auxotroph isolation.

C) Match the following and write correct pairs : **[5]**

A	B
a) Distillation	i) Raw material purchase
b) rDNA technology	ii) Parameter for media sterilization
c) Plackett – Burman	iii) Recovery of ethanol
d) Recurring Expenses	iv) Restriction endonuclease
e) Del factor	v) Media optimization
	vi) Filtration.

Q2) Short Answers (Any Two) : **[10]**

a) Explain in brief scale - up.

b) Describe ion - exchange chromatography for product purification.

c) Describe Batch sterilization.

P.T.O.

Q3) Attempt Any Two : **[10]**

a) Define strain improvement and explain selection of analogue resistant mutant.

b) Filtration as a means of product recovery.

c) Describe optimization of Media by using classical approach.

Q4) Write Any One : **[10]**

a) List various methods of quantification of fermentation products, explain any two physical methods.

OR

b) List different quality tests for fermentation products and explain sterility test.

Total No. of Questions : 4]

SEAT No. :

P285

[Total No. of Pages : 2

[5422]- 360
T.Y. B.Sc.
MICROBIOLOGY
MB -336 : Food and Dairy Microbiology
(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) ***Draw neat labelled diagrams whenever necessary.***

Q1) Attempt the following: **[5]**

A) Match the following

a)	Penicillium	i)	Brucellosis
b)	Brucella ring test	ii)	Serratia marscencens
c)	Bacillus subtilis	iii)	Spoilage of bread
d)	Red milk	iv)	Sweet curdling
e)	Brucella abortus	v)	Antigen-Antibody test

B) Fill in the blanks: **[2]**

i) The full form of IDC is_____

ii) The substrate used in phosphatase test is_____

C) Give two advantages of fermented foods **[1]**

D) Define: **[2]**

i) Stable foods

ii) Z value

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

a) Physico-chemical properties of milk.

b) Recombinant Dairy enzymes.

c) Fermentation of Idli batter.

P.T.O.

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

a) Explain preservation of foods by canning.

b) Describe spoilage of eggs, fruits and vegetables

c) Describe phosphatase test and give its significance

Q4) Attempt any one: **[10]**

a) Define pasteurization. Explain any two methods of pasteurization.

b) Describe spoilage of milk with respect to stormy fermentation and ropiness.

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Total No. of Questions : 4]

SEAT No. :

P286

[Total No. of Pages : 3

[5422]-361

T. Y. B. Sc.

ELECTRONIC SCIENCE

EL - 331 : Advanced Digital System Design

(2013 Pattern) (Paper - I) (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 the right indicate full marks.***

Q1) Attempt all of the following :

a) Define stable total state. **[1]**

b) State two basic blocks of FPGA. **[1]**

c) State two compiler directives in verilog. **[1]**

d) What is meaning of 'repeat' loop used in verilog. **[1]**

e) Interpret each of following PAL device numbers. PAL12H6 and PAL10H8. **[2]**

f) List equality operators used in verilog. **[2]**

g) State two advantages of ROM as PLD. **[2]**

h) What is difference between bitwise operators and reduction operators. **[2]**

Q2) Attempt any two of the following :

a) Write a program in verilog for 4 to 1 multiplexer using behavioral modeling. **[4]**

b) Explain 'While' loop in verilog with suitable example. **[4]**

c) Compare fundamental mode with pulse mode asynchronous sequential machines. **[4]**

P.T.O.

Q3) Attempt any two of the following :

a) Simplyfy the incompletly specified state machine shown in table. **[4]**

Present State	Next State			
	00	01	10	11
A	-/-	D/0	F/0	C/1
B	A/0	C/0	-/-	D/1
C	E/0	A/0	E/0	-/-
D	-/-	-/-	C/0	G/1
E	C/0	-/-	-/-	F/1
F	D/1	B/0	-/-	E/1
G	E/1	-/-	A/0	C/1

b) Draw the general structure of PAL and explain it. **[4]**

c) Write operator type in verilog and explain any two of them. **[4]**

Q4) Attempt any two of the following :

a) With the help of block diagram, explain the working of Traffic light controller. **[6]**

b) Reduce the following incompletly specified state table. **[6]**

Present State	Next State			
	x=0	z	x=1	z
S_0	S_0	0	S_1	0
S_1	S_0	-	S_2	0
S_2	S_3	-	S_3	1
S_3	S_4	-	S_2	0
S_4	S_0	-	S_1	-

c) What is Timing controls in verilog. Give its methods and explain any one of them. **[6]**

OR

Q4) Answer all of the following :

a) A combinational logic is given by the functions. **[4]**

$Z_1 = A\overline{BC} + ABC + A\overline{C}$

$Z_2 = B\overline{C} + \overline{ABC}$

$Z_3 = B + A + \overline{AC}$

Design the circuit with PLA

b) Compare CPLD and FPGA. **[4]**

c) Explain following token of verilog

White space, comments, operators. **[4]**

Total No. of Questions :4]

SEAT No. :

P287

[Total No. of Pages :2

[5422] - 362

T. Y. B. Sc.

ELECTRONIC SCIENCE

EL - 332 : Microcontrollers

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagram 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) What is the size of internal ROM of 8051 μc ? **[1]**

b) What is 'CPL A' instruction? **[1]**

c) What is the use of 'assembler'? **[1]**

d) What do you mean by 40×2 LCD? **[1]**

e) Write the importance of register 'A'. **[2]**

f) Write the instructions to get '2's complement of a number' using 8051 μc . **[2]**

g) What is 'simulator'? **[2]**

h) "LCD is better than LED" comment. **[2]**

Q2) Attempt Any Two of the following.

a) Write note on 'stack'. **[4]**

b) Explain "unconditional and conditional JUMP" instructions used in 8051 μc . **[4]**

c) Explain how to interface 4× 4 matrix keyboard to 8051 μc . **[4]**

P.T.O.

Q3) Attempt Any Two of the following.

a) List and explain the different flags available in 8051 μc. **[4]**

b) Which are the different addressing modes of 8051 μc ? Explain any two modes with proper example. **[4]**

c) Interface 16 K byte of RAM to 8051 μc. Give its memory map. **[4]**

Q4) Attempt Any Two of the following.

a) Explain timer / counter unit of 8051 μc. **[6]**

b) With proper diagram and example, distinguish between the instructions 'RL A and RLC A'. **[6]**

c) Draw and explain stepper motor interface diagram with 8051 μc. **[6]**

OR

Attempt all of the following.

a) List SFRs used in 8051 μc. Explain any two of them. **[4]**

b) Write assembly language program to transfer 5 bytes of data from memory location 20 H to 30 H. **[4]**

c) Give brief explanation of - **[4]**

i) Editor and

ii) Compiler.

Total No. of Questions :4]

SEAT No. :

P288

[Total No. of Pages : 2

[5422]-363
T.Y.B.Sc.
ELECTRONIC SCIENCE
EL - 333 : Analog Circuit Design & Applications of Linear IC's
(2013 Pattern) (Semester-III) (Paper-III)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***

Q1) Attempt all of the following.

a) What should be the value of CMRR for an ideal op-amp? **[1]**

b) "Percentage of load regulation of an ideal power supply is 100%" Statement is true/false **[1]**

c) Draw output characteristics of an ideal low pass filter. **[1]**

d) Draw symbol of relay. **[1]**

e) State the names of wave forms generated at the output of IC- 8038 as function generater. **[2]**

f) Write the equation of 'T charge' for astable multivibrator using IC-555. **[2]**

g) "Ideal differentiator circuit is nothing but high pass filter" comment **[2]**

h) "Schmitt trigger circuit is sine to square wave converter" comment **[2]**

Q2) Attempt any two of the following.

a) Explain working of astable multivibrator using IC-555. **[4]**

b) What is guarding? Explain it with circuit diagram of inverting and non-inverting amplifier using op-amp. **[4]**

c) Define the terms- aperture time, sampling time and hold time of sample and hold circuit. **[4]**

Q3) Attempt any two of the following.

a) Explain working of adjustable voltage regulator using IC LM 317 write expression for its output voltage. **[4]**

P.T.O.

b) Draw circuit diagram of log amplifier using op-amp and diode as log element. Derive expression for its output voltage. **[4]**

c) With the help of circuit diagram, explain working of second order high pass filter using op-amp. **[4]**

Q4) Attempt any <u>two</u> of the following.

a) Draw circuit diagram of inverting schmitt trigger using op-amp and explain its working. **[6]**

b) Write a short note on "operational Transconductance Amplifier (OTA)" and "open collector op-amp (LM-311)" **[6]**

c) Draw internal block diagram of IC LM723. With proper diagram, explain low voltage regulator using same IC. Write expression for its output voltage. **[6]**

OR

Q4) Attempt <u>all</u> of the following.

a)i) Calculate output voltage of adjustable regulator using IC 317. Given: Vref= 15volts, R_1=R_2= 5kΩ and Iadj = 50 mA **[2]**

ii) For function generator using IC-8038, R= 100KΩ , C= 0.01 υf . What will be the output frequency if duty cycle is 50%. **[2]**

b) Calculate value of upper, lower threshold voltage and hysteresis voltage of inverting schmitt trigger. Given R_1=R_2 = 5kΩ and power supply of op-amp is +10v and -10v. **[4]**

c) Design a second order low pass filter for cut off frequency of 4 kHz with pass band gain 1.586. **[4]**

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Total No. of Questions :4]

SEAT No. :

P290

[Total No. of Pages :2

[5422] - 365

T. Y. B. Sc.

ELECTRONIC SCIENCE

EL - 335 : 'C' Programming

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

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

Instructions to the candidates:

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

Q1) Answer All of the following.

a) What is one dimensional array? **[1]**

b) What do you mean by # include < stdio.h > in 'C'? **[1]**

c) Give the general format of function declaration. **[1]**

d) Write shift operators. **[1]**

e) What is difference between flowchart and algorithm **[2]**

f) State meaning of strcat ( ) function. **[2]**

g) What is identifier? Give the rules for identifiers. **[2]**

h) State any two types of operators in 'C' **[2]**

Q2) Attempt Any Two of the following.

a) Write an algorithm to arrange numbers in ascending order using selection sort. **[4]**

b) What is pointer and how is a pointer initialized? **[4]**

c) Explain 'do-while' loop with example. **[4]**

Q3) Attempt Any Two of the following.

a) Explain function with arguments and no return values. **[4]**

b) Describe get w and put w functions in file handling. **[4]**

c) Explain 'FOR' loop statement with suitable example. **[4]**

P.T.O.

Q4) Attempt Any Two of the following.

a) Write a program to read data from the keyboard, write it to a file. **[6]**

b) Write an algorithm to accept name of 100 students in array and check whether name 'Ajay' is available or not using suitable algorithm. **[6]**

c) Explain call by value and call by reference of a function call in 'C' program. Give suitable example. **[6]**

OR

Q4) Answer All of the following.

a) How array elements are processed by using pointer? Elaborate with suitable example. **[4]**

b) Explain if - elseif - else statement with example. **[4]**

c) Write a program which will ask user to enter two resistor values and print their series and parallel equivalent value. **[4]**

Total No. of Questions : 4]

SEAT No. :

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[Total No. of Pages : 4

[5422]-366
T.Y. B.Sc.
ELECTRONIC SCIENCE
EL-336(B) : Electronic Product Design and Entrepreneurship
(2013 Pattern) (Semester - III) (Paper - VI) (Optional)

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 all of the following :

a) State any two non-government sources of finance. **[1]**

b) What is quality assurance of manufactured product? **[1]**

c) What is small business? **[1]**

d) Define the term entrepreneurship. **[1]**

e) State merits of co-operative societies. **[2]**

f) Compare data and information. **[2]**

g) Write a note on incentive for small business development. **[2]**

h) Explain the term pilot production batch. **[2]**

Q2) Attempt any two of the following :

a) Explain the concept of marketing strategy. **[4]**

b) Explain the factors to be considered for starting business. **[4]**

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

   i) Financial aspects and

   ii) Production aspects while preparing the project report.

Q3) Attempt any two of the following :

a) Explain break even point analysis. **[4]**

b) Write a short note on cash flow and fund flow. **[4]**

c) Explain the designing steps carried out while designing DAS for manufacturing the product. **[4]**

P.T.O.

Q4) Attempt any two of the following :

a) Explain in detail the features of co-operative society. **[6]**

b) Explain the factors affecting reliability of product with neat diagram. **[6]**

c) Explain the terms :

i) Merits of Joint Stock Company. **[3]**

ii) Sole Proprietership. **[3]**

Total No. of Questions : 4]

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[5422]-366
T.Y. B.Sc.
ELECTRONIC SCIENCE
EL-336(A) : Fiber Optic Communication
(2013 Pattern) (Semester - III) (Paper - VI) (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) What do you mean by skew rays? **[1]**

b) Define the term dispersion in optical fiber. **[1]**

c) State the types of losses in fiber. **[1]**

d) List the names of optical detectors used in fiber optic communication. **[1]**

e) What is splicing? Name the different splicing techniques of fiber. **[2]**

f) 'Single mode fiber is preferred in under sea cable system', comment. **[2]**

g) State the characteristics of Long haul communication. **[2]**

h) What are the selection criteria for optical sources in optical fiber system? **[2]**

Q2) Attempt any two of the following :

a) Explain the operating principle of LASER, with suitable diagram. Explain lasing action in p-n junction LASER diode. **[4]**

b) Explain material loss in optical fiber. **[4]**

c) What is the necessity of cladding in fiber? Explain graded index fiber with index profile and ray tracing path. **[4]**

Q3) Attempt any two of the following :

a) Derive an expression for acceptance angle and numerical aperature of optical fiber. **[4]**

b) Explain the method for measurement of diameter of optical fiber. **[4]**

c) Draw the block diagram fiber optic communication system and explain function of each block. **[4]**

Q4) Attempt any two of the following :

a) Draw the construction of PIN photodiode. Explain its working. State its advantages. **[6]**

b) What is optical amplifier? Explain its working with suitable diagram. **[6]**

c) i) Write a note on plastic fiber. **[3]**

ii) Explain the method for dispersion measurement of optical fiber. **[3]**

OR

Attempt all of the following :

a) A multimode step index fiber with a core refractive index of 1.5, a relative refractive index difference of 3% and an operating wavelength of 0.82 μm. Calculate critical radius of curvature at which large bending occur? **[4]**

b) Calculate the NA and the acceptance angle of an optical fiber having core refractive index of 1.55 and cladding refractive index of 1.50. **[4]**

c) Calculate the responsivity of a PIN photodetector if quantum efficiency is 85% at 800 nm. **[4]**

(Given : Planck constant (h) = 6.63×10^{-34} J.S.

Electronic charge (e) = 1.6×10^{-19} C.

Velocity of light (c) = 3×10^{8} m/s.)

Total No. of Questions : 4]

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[Total No. of Pages : 2

[5422]-367

T. Y. B. Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 301 : India's Foreign and Defence Policy

(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) Define world order.

b) State the meaning of strategic doctrine.

c) What are the objectives of India's foreign policy?

d) What are the determinant factors of defence policy?

e) State the meaning of clash of civilization.

f) What do you mean by globalization versus the state?

g) Define national security.

h) Write any two principles of India's nuclear policy.

Q2) Answer in 8 to 10 Sentences each (any two) : **[8]**

a) Explain principles of India's foreign policy.

b) Describe defence versus development.

c) Explain different issues involved in India's nuclear policy.

P.T.O.

Q3) Write short notes on (any two) : **[8]**

a) Role of ethnicity in IR

b) India's role in SAARC

c) Evolution of India's defence policy.

Q4) Answer in 18 to 20 sentences (any one) : **[8]**

a) Explain India's maritime security challenges in 21st century.

b) Describe world order and India's role in it.

Total No. of Questions :4]

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T. Y. B. Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 302 : Defence Economics

(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) 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 to 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.

P.T.O.

Total No. of Questions : 4]

SEAT No : ____

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[Total No. of Pages :2

[5422]-369
T.Y.B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS - 303 : Research Methodology
(2013 Pattern) (Semester-III) (Paper-III)

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

Instructions to the candidates:

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

Q1) Answer in 2 or 4 Sentences each: **[16]**

a) What do you mean by hypothesis?

b) Define Research.

c) What is scientific inquiry?

d) Define Research design.

e) State the meaning of primary data.

f) What are the types of Research?

g) What is Research problem?

h) What do you mean by good research?

Q2) Answer in 8 to 10 Sentences each (any two): **[8]**

a) Explain objectives of social research.

b) Describe advantages of scientific research.

c) Explain conceptualization in research survey of literature.

P.T.O.

Q3) Write short notes on (any two): **[8]**

a) Features of research methodology.

b) Criteria for selecting a sample design.

c) Features of research proposals.

Q4) Answer in 18 to 20 sentences (Any one): **[8]**

a) Explain scope of research in security studies.

b) Describe steps of writing Research Report.

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Total No. of Questions : 4]

SEAT No. : ____

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[Total No. of Pages : 1

[5422]-370
T.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS - 304 : Science, Technology and National Security
(2013 Pattern) (Semester - III) (Paper - IV)

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

Instructions:

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

Q1) Answer in 2 to 4 Sentences each **[16]**

a) What do you mean by RMA?
b) Write full form of C4ISR.
c) Define armament technology.
d) What do you mean by total war?
e) Define military intelligence.
f) Write the meaning of MAD.
g) Write any two functions of Submarine.
h) Write any two importance of surveillance

Q2) Answer in 8 to 10 sentences each (any two) **[8]**

a) Explain functions of Air-Craft career.
b) Describe advantages of joint military technological venture.
c) Discuss role of DPSU in India's Defence production.

Q3) Write short notes on (Any two) **[8]**

a) Battlefield information system.
b) Revolution in digital communication.
c) Transfer of Technology and its impact.

Q4) Answer in 18 to 20 sentences (Any one) **[8]**

a) Explain impact of science and technology on society.
b) Describe relationship between science, technology and national security.

Total No. of Questions :4]

SEAT No. :

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T. Y. B. Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 305 : Defence Planning and Management in India

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

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

Instructions to the candidates:

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

Q1) Answer in 2 to 4 Sentences each **[16]**

a) Define 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.

Total No. of Questions : 4]

SEAT No. : ____

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[5422]- 372
T.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS - 306(A) : Military and Media (Optional)
(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.***

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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P.T.O.

Total No. of Questions : 4]

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[5422]- 372
T.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS - 306(B) : Armed Conflicts and Human Rights
(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.***

Q1) Answer in 2 to 4 Sentences each **[16]**

a) Define "Human Rights".
b) Define "Insurgency".
c) What do you mean by terrorism?
d) State the meaning of "Armed conflict".
e) Define "Justice".
f) What do you understand by Military inteneution?
g) Define Civil War.
h) What do you mean by Peace keeping?

Q2) Answer in 8 to 10 Sentences each (any two) **[8]**

a) Explain the concept of "International conflict".
b) What do you know about UN Declaration of Human Rights?
c) Highlight on reality of the use of force.

Q3) Write short notes on (any two) **[8]**

a) Coercive humanitanianism.
b) Asymmetrical welfare.
c) Relationship between Equility and Liberty.

Q4) Answer in 16 to 20 sentences (any one) **[8]**

a) Discuss the role of U.N. for protecting Human Rights.
b) "USSR intervention in Afghanistan during 1979; was an example of political approach to intervention". Do you agree? Justify your answer.

Total No. of Questions : 4]

SEAT No. :

P298

[Total No. of Pages : 4

[5422]-373
T.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS - 307 (A) : Disaster Management
(2013 Pattern) (Semester - III) (Paper-VII)

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

Instructions to the candidates:

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

Q1) Answer in 2 or 4 sentences each: **[16]**

a) State the meaning of disaster.

b) How you would like to define Disaster Management?

c) State the meaning of pre disaster management.

d) Which disaster took place at Mumbai on 26/11?

e) Write the long form of N.D.R.F.

f) State the any one example of environmental disaster.

g) What do you understand by Mitigation?

h) State any two causes of manmade disaster.

Q2) Answer in 8 to 10 sentences (Any Two) **[8]**

a) Explain in brief role of NGOs during post disaster.

b) Write in short any one example of natural disaster.

c) Discuss in brief effects of disaster.

P.T.O.

Q3) Write short notes on: (Any Two) **[8]**

a) Weapons of Mass Destructions.

b) Ambegaon (Malin) Pune landslide - 2014.

c) Public awareness during disaster.

Q4) Answer in 16 to 20 sentences: (Any One) **[8]**

a) Establish the relationship between "Disaster and National Security".

b) Explain in detail "Disaster Management of India".

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Total No. of Questions : 4]

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[5422]-373
T.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS. - 307 (B) : Global Security-I
(2013 Pattern) (Semester - III) (Paper-VII)

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

Instructions to the candidates:

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

Q1) Answer in 2 or 4 sentences each: **[16]**

a) What do you understand by global warming?

b) State the meaning of global security.

c) What do you understand by Jihad?

d) Define 'Terrorism".

e) State any two escalation point in the present context.

f) When "Israel" came into existance?

g) State the meaning of "cooling" in the context of global security.

h) State any two preventive measures against global warming.

Q2) Answer in 8 to 10 sentences (Any Two) **[8]**

a) Explain in brief the origin of "Taliban"

b) Write in short the concept of global warming.

c) Explain in brief nature of India - china border issue.

Q3) Write short notes on: (any two) **[8]**

a) Causes of Terrorism.

b) Oil as a soure of couflict.

c) Nature of Kashmir problem.

Q4) Answer in 16 to 20 sentences: (any one) **[8]**

a) Explain Arab -Israel conflict as a threat to global security.

b) Evaluate the internal scenario of Afghanistan & its linkages with global politics & security.

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Total No. of Questions : 4]

SEAT No. : ____

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[5422]- 374
T.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS - 308(A) : Indian Military Strategy (1857 - 1947 A.D.)
(2013 Pattern) (Semester-III) (Paper-VIII)

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

Instructions to the candidates:

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

Q1) Answer in 2 or 4 sentences each: **[16]**

a) Define "Strategy".
b) What do you understand by "Military History"?
c) Define contemporary warfare.
d) Why the Indian Army participated during World War-I?
e) What do you mean by Limited War?
f) Why are study of Indian Military history is necessary?
g) State any two sources of Indian Military history.
h) State the duration of World War-II.

Q2) Answer in 8 to 10 sentences each (Any Two): **[8]**

a) Explain the nature of World War-I.
b) Write in brief "Battle of Cambrai".
c) Write in brief Battle of Singapore.

Q3) Write short notes on (Any two): **[8]**

a) Battle of El-Alamein.
b) Concept of Military History.
c) Sources of Indian Military History.

Q4) Answer in 16 to 20 sentences (Any one): **[8]**

a) Highlight on changing nature of war from limited to total.
b) Explain the role of Indian Army during World War-I.

P.T.O.

Total No. of Questions : 4]

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[5422]- 374
T.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS - 308(B) : Indian Military Strategy (1630 - 1680 A.D.)
(2013 Pattern) (Semester-III) (Paper-VIII)

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

Instructions to the candidates:

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

Q1) Answer in 2 or 4 sentences each: **[16]**

a) When & where Shivaji was born?
b) Who was Dadoji Konddev?
c) State any four names of Shivaji's fort?
d) Who was Mirza Raje Jaising?
e) Which fort was a capital fort of Shivaji?
f) State any two names of Shivaji's muslim commrade.
g) Who was Chandrarao More?
h) State any two names of saint in Maharashtra before Shivaji.

Q2) Answer in 8 or 10 sentences each (Any two): **[8]**

a) Write few lines on "economic, condition" of Maharashtra before Shivaji.
b) Explain in brief geostrategic importance of Jawali territory.
c) What were the objectives of Shivaji for Karnataka campaign.

Q3) Write short notes on (Any two): **[8]**

a) Fort system during Shivaji's period.
b) Geographical condition of Maharashtra before Shivaji.
c Jijabai as a maker of Shivaji.

Q4) Answer in 16 to 20 sentences (Any one): **[8]**

a) Assess Shivaji as a "Military Leader".
b) Explain the battle of Purrandar with special reference to the "Treaty of Purandar".

Total No. of Questions : 4]

SEAT No. :

P300

[Total No. of Pages : 4

[5422]-375
T.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS. No. - 309 (A) : Regional Security System
(2013 Pattern) (Semester - III) (Paper - IX)

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

Instructions to the candidates:

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

Q1) Answer in 2 or 4 sentences each: **[16]**

a) Define "Regional Organization".

b) State the long form of N.A.T.O.

c) What was the basic aim of U.S.A. for "SEATO"?

d) What do you understand by W.T.O.?

e) State the meaning of O.P.E.C.

f) What do you mean by SAFTA?

g) State the basic aim of NATO.

h) Which country is founder member of SAARC?

Q2) Answer in 8 to 10 sentences (any two) **[8]**

a) Explain the concept of Regional Security System.

b) Write the objectives of W.T.O.

c) Discuss in brief objectives of SEATO.

P.T.O.

Q3) Write short notes on: (any two) **[8]**

a) SAARC.

b) ASEAN.

c) NAFTA.

Q4) Answer in 16 to 20 sentences: (any one) **[8]**

a) Discuss the implications of W.T.O. on World Trade.

b) Examine the role of "OPEC" for oil production policy & overall politics of Middle East.

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Total No. of Questions : 4]

P300

[5422]-375
T.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS. No. - 309 (B) : Strategic Environment of Indian Ocean
(2013 Pattern) (Semester - III) (Paper - IX)

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

Instructions to the candidates:

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

Q1) Answer in 2 or 4 sentences each: **[16]**

a) State the location of Diego-Garcia Islands.

b) Which country submitted firstly an idea of Indian Ocean as a zone of peace?

c) What do you understand by Brown Water Navy?

d) State any four names of littoral countries of Indian Ocean.

e) What do you understand by B.I.O.T.?

f) Write any two information of Geography of Indian Ocean.

g) Why super powers rivalry taking place in Indian Ocean.

h) State the location of Lakshadweep Islands.

Q2) Answer in 8 to 10 sentences (any two) **[8]**

a) Explain the strategic importance of Diego-Garcia Islands.

b) Write in short the concept of Blue water Navy.

c) Explain the significance of Rim Land Countries of Indian ocean.

P.T.O.

Q3) Write short notes on: (any two) **[8]**

a) Concept of Indian Ocean as a zone of peace.

b) Naval strategy of U.S.A.

c) Historical linkages of India with Indian Ocean.

Q4) Answer in 16 to 20 sentences: (any one) **[8]**

a) Explain the India's Indian Ocean policy with special reference to the "live &Let live" statement.

b) Evaluate the Chinese Naval strategy with special reference to "We would not allow to let Indian Ocean to be Indias Ocean" statement.

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Total No. of Questions : 4]

SEAT No. : ____

P301

[Total No. of Pages : 2

[5422]-376

T. Y. B. Sc.

ENVIRONMENTAL SCIENCE

EVS - 301 : Terrestrial Ecosystem & Management

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

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 follwing in 1-2 lines each : **[10]**

a) Define terrestrial ecosystem?

b) Explain the term ecotone?

c) Write full form of JFM?

d) Define term ‘eco-tourism’?

e) Explain term predation with example?

f) Define term ‘Biome’?

g) What is meant by carbon sequestration?

h) Mention any 2 uses of forest resources?

i) What is meant by eco-development program?

j) Mention any 2 control measures for forest fires?

Q2) Write a short note on (any two) : **[10]**

a) Hot spots in India.

b) Role of Local Government and people in conservation

c) Applications of remote sensing and G/S in terrestrial ecosystem management.

P.T.O.

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

a) Explain concept of Eco-development program?

b) What are various types of interactions observed in community?

c) Explain concept of community based forest management?

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

a) Discuss in detail concept of Eco-tourism with special reference to India?

b) Discuss various methods of vegetation sampling and data analysis?

Total No. of Questions :4]

SEAT No. :

P302

[Total No. of Pages :2

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T. Y. B. Sc.

ENVIRONMENTAL SCIENCE

ENV - 302 : Wildlife Biology

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

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

Instructions to the candidates:

1) ***All questions are compulsory and carry equal marks.***
2) ***Neat and labelled diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) Attempt the following in 1 - 2 lines each. **[10]**

a) Define 'Habitat'.

b) Write distinguish characters of bryophytes.

c) Name any two protected bird species.

d) What is meant by 'arid zone'?

e) Write food chain of grassland ecosystem.

f) Define 'Remote Sensing'.

g) What is landscape?

h) Write any two examples of pteridophytes.

i) What are habitats of reptiles?

j) What is genetic resources?

Q2) Write a short note on ANY TWO of the following. **[10]**

a) Hot and Cold desert.

b) Arthropods.

c) Land races of crop plants.

P.T.O.

Q3) Answer ANY TWO questions from the following. **[10]**

a) Explain Fresh water ecosystem with it's food chain.

b) Discuss distinguish characteristics of angiosperms.

c) Describe the method of Flying insect population assessment.

Q4) Attempt ANY ONE of the following. **[10]**

a) What are diversity indices? Explain the field methods to assess plant diversity.

b) What is wildlife? Describe various threats to wildlife with suitable example.

Total No. of Questions : 4]

SEAT No : ____

P 303

[Total No. of Pages :2

[5422]-378
T.Y.B.Sc.
ENVIRONMENTAL SCIENCE
ENV - 303 : Water Quality
(2013 Pattern) (Semester-III) (Paper-III)

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

Instructions to the candidates:

1) ***All questions are compulsory and carry equal marks.***
2) ***Neat and labelled diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) Attempt the following in 1-2 lines each: **[10]**

a) Define : Eutrophication.

b) What is meant by non-point source pollution.

c) What is the difference between physilogical and biological lake?

d) Define : Hydrological cycle.

e) Name the causative agents of direct transmission of communicable diseases.

f) Enlist any four physical parameter of water.

g) Define : Aquifier and its types.

h) What is difference between sewage and effluent?

i) What is Ballast water?

j) Define : Epidermic diseases.

Q2) Write a short note on ANY TWO of the following: **[10]**

a) Ground water pollution.

b) History of Water Resourses development.

c) Hydrological cycle.

P.T.O.

Q3) Answer ANY TWO questions from the following: **[10]**

a) Explain in brief river water pollution.

b) What are the effects of thermal pollution on aquatic life?

c) What are Eco-friendly detergents? Explain in detail.

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

a) How water pollution can be controled at source level? Add a note on primary and secondary treatment.

b) Discuss in brief water borne diseases and explain the potential and wide spread effects of epidermic diseases.

✈ ✈ ✈

Total No. of Questions : 4]

SEAT No. :

P304

[Total No. of Pages : 1

[5422]-379
T.Y. B.Sc.
ENVIRONMENTAL SCIENCE
ENV - 304 : Issues in Environmental Science - I
(2013 Pattern) (Semester - III) (Paper - IV)

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

Instructions to the condidates:

1) ***All questions are compulsory and carry equal marks.***
2) ***Neat and labelled diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) Attempt the following in 1-2 lines each. **[10]**

a) Define the term LCA.
b) Write the types of population dispersion in community.
c) Write full form of ENVIS.
d) Write any two Potential effects of Global Norming.
e) Define Pastoralism.
f) Name the three types of age pyramid.
g) Write full form it WTO.
h) Write any two name of biological weapons.
i) Define Ecotoxicology.
j) Who defined the term nano technology.

Q2) Write a short note on ANY TWO of the following. **[10]**

a) E waste Managment.
b) Remedial measures for GHG effects.
c) Copenhegan out come.

Q3) Answer ANY TWO questions from the following **[10]**

a) Explain the reasons for food crisis.
b) Write the importance of forest resources in tribal economy.
c) What are the merits of environmental movements.

Q4) Attempt ANY ONE of the following **[10]**

a) Briefly write the guiding principles of sustainable development.
b) What is eco-terrism? Explain its impact on development projects.

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Total No. of Questions :4]

SEAT No. :

P305

[Total No. of Pages :2

[5422] - 380

T. Y. B. Sc.

ENVIRONMENTAL SCIENCE

ENV - 305 : Environmental Governance and Equity : Law and Ethics

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

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

Instructions to the candidates:

1) ***All questions are compulsory and carry equal marks.***
2) ***Neat and labelled diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) Attempt the following in 1 - 2 lines each **[10]**

a) What is meant by environmental governance?

b) Mention any two principles of Rio declaration.

c) Write full form for 'PIL'.

d) What is meant by 'Non - Forest Purpose'?

e) Write any two fundamental rights provided to citizens of India.

f) What is the main objectives of Motor Vehicle Act.

g) Write any two objectives of National Forest Policy.

h) Which act is called as 'Umbrella Act'?

i) Mention the act under which 'Chief Wildlife Warden' is appointed.

j) What is the main function of 'Government Analyst'?

Q2) Write a short note on Any Two of the following **[10]**

a) Biological Diversity Act

b) Issues Involved in Environmental Ethics

c) Salient Features of Environment Act

P.T.O.

Q3) Answer Any Two questions from the following **[10]**

a) Discuss the outcome of stockholm conference with reference to environment conservation

b) What are the important provisions under Public Liability Insurance Act?

c) What is Ecomark? Discuss various criteria mentioned in ecomark scheme.

Q4) Attempt Any One of the following **[10]**

a) Discuss in detail important provisions and authorities created under Wildlife (Protection) Act.

b) Explain the importance of environmental ethics in modern society. Also add a note on various ethical theories applied to environment.

Total No. of Questions : 4]

SEAT No. :

P306

[Total No. of Pages : 2

[5422]- 381
T.Y. B.Sc.
ENVIRONMENTAL SCIENCES
ENV-306 : Environmental Biotechnology-I
(2013 Pattern) (Semester-III) (Paper-VI)

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

Instructions to the candidates:

1) ***All questions are compulsory and carry equal marks.***
2) ***Neat and labelled diagrams must be drawn wherever necessary***
3) ***Figures to the right indicate full marks.***

Q1) Attempt the following in 1-2 lines each **[10]**

a) What are neem bitter?

b) Define the term Biosafety?

c) What is meant by Environmental Biotechnology?

d) Mention any two benefits of Biodiesel?

e) What are non-fossile Fuels?

f) Enlist the any two solid wastes generated through Agriculture

g) What is syntrophism?

h) Define the term 'Ecology'?

i) Write any two types of airborne infections.

j) What is meant by "Risk Aessesment".

Q2) Write a short note on Any Two of the following **[10]**

a) GMO's in Ecosystem.

b) Life cycle of Earthworms

c) Recovery of metals from polluted environment

P.T.O.

Q3) Answer Any Two questions from the following: **[10]**

a) What are various methods of measurement of microbial activity in soil?

b) What are Biofertilizations? Discuss their role in agriculture

c) Objectives of environmental biotechnology.

Q4) Attempt Any one of the following **[10]**

a) Discuss the mehanism of biological pest control with suitable Examples.

b) Discuss the applications of Environmental biotechnology in agricultural production?

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Total No. of Questions :4]

SEAT No. :

P307

[Total No. of Pages :2

[5422] - 383

T. Y. B. Sc. (Vocational)

BIOTECHNOLOGY

(VOC-BIOTECH-335): Plant And Animal Biotechnology

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

a) Give two examples of secondary metabolites.

b) Which part of Agrobacterium is responsible for genetic transformation?

c) Define indirect organogenesis.

d) Define artificial seeds.

e) Define embryo rescue.

f) Define Monoclonal antibodies.

g) Give two commonly used cell lines with their origin.

h) Give the role of insulin.

i) Enlist two types of stem cells.

j) give two applications of somaclonal variants.

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

a) Describe various stages of somatic embryogenesis and factors influencing somatic embryos formation.

b) Explain large scale production of Factor VIII.

c) Discuss secondary metabolite production.

P.T.O.

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

a) Embryo culture.

b) Invitro fertilization.

c) Gene transfer using Agrobacterium.

Q4) Discuss vaccine production using animal cells. **[10]**

OR

What is somaclonal variation? How can the somaclonal variants be obtained?

* * *

Total No. of Questions :4]

SEAT No. :

P308

[Total No. of Pages :2

[5422] - 384

T. Y. B. Sc. (Vocational)

PHOTOGRAPHY AND AUDIO VISUAL PRODUCTION

Fundamentals of Video

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

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

Instructions to the candidates:

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

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

a) Explain the term contrast of a TV picture.

b) State the working principle of image orthicon camera tube works.

c) State the horizontal and vertical scanning frequencies used in India.

d) What is the application area for a magnetic video disc machine?

e) State the bandwidth of TV signal used in India.

f) Draw the track survey for helical scanning.

g) Draw a diagram showing tracks of an optical video disc.

h) Explain the function of synchronizing pulses in a TV receiver.

i) What type of modulation is used for picture and sound signals in TV transmission?

j) What are the primary colours used in colour TV.

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

a) Wich a neat diagram explain the working of colour picture tube.What is the shadow mask?

b) Giving a block diagram explain the working of a B/W TV camera.

c) How is electrical signal recorded on a magnetic tape?

P.T.O.

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

a) What do you mean by photoconductivity? How is this principle used in Vidicon camera tube? Draw a neat labelled diagram of Vidicon tube.

b) Give a block diagram and explain the working of magnetic video disc machine.

c) Explain one complete frame of interlaced scanning pattern used in India. What is the need for interlaced scanning?

Q4) Answer any one of the following. **[10]**

a) Draw a neat block diagram of a B/W TV receiver explain the working of its sound section .

b) i) Explain the working of record electronics in a VCR.

ii) Compare the performance of a film camera with a digital camera.

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Total No. of Questions :4]

SEAT No. :

P309

[Total No. of Pages :2

[5422] - 385

T. Y. B. Sc. (Vocational)

ELECTRONIC EQUIPMENT MAINTENANCE

Troubleshooting Of Audio And Video Equipment

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

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

Instructions to the candidates:

1) ***All Questions are Compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of log table, calculator is allowed.***

Q1) Answer the following:

a) What is AM? **[1]**

b) Define FM? **[1]**

c) What is Blue ray ? **[1]**

d) State two faults in Plasma TV. **[1]**

e) State two common faults in video monitor. **[2]**

f) Give two differences 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 two of the following. **[2×4 = 8]**

a) Satellite receiver.

b) DVD player.

c) PA system.

Q3) Discuss troubles and their repairing in any two of the following. **[2×4 = 8]**

a) Smart phone.

b) LASER printer.

c) Laptop computer.

P.T.O.

Q4) Discuss faults and their remedies in following. **[2×6 = 12]**

a) AM receiver.

b) Digital TV

OR

Write short notes on the following. **[2×6 = 12]**

a) Cellular phone technology

b) Home theatre.

* * *

Total No. of Questions : 4]

SEAT No : ____

P 310

[Total No. of Pages : 2

[5422]-386
T.Y.B.Sc. (Vocational)
INDUSTRIAL MICROBIOLOGY
VOC-IND-MIC-335 : Pollution Control Technology
(2013 Pattern) (Semester-III) (Paper-V)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***
3) ***Draw neat labelled diagrams wherever necessary.***

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

a) State true or false: Aeration of water cannot be done by turbines.

b) Define Chemical process unit of waste water treatment plant.

c) Write two processes used in preliminary treatment of water.

d) Define adsorption.

e) What are flow detection devices? Name two devices used for closed channels.

f) Write names of 2 types of sedimentation tanks.

g) _____ is used for precipitation of phosphates from water.

h) Name two chemicals used for coagulation process.

i) Write two processes used in preliminary treatment of water.

j) Write names of 2 heavy metal pollutants.

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

a) Draw a neat labeled diagram of a UASB showing all operational features and explain its functioning.

b) Explain role of F/M ratio in activated sludge process.

c) Write a detail note on aerated lagoons.

P.T.O.

Q3) Write a short notes on: (Any two of the following) **[10]**

a) Enlist 5 advantages of anaerobic treatment as compared to aerobic treatment of wastewater.

b) Describe working of upflow anaerobic sludge blanket eactor for wastewater treatment.

c) Explain any two methods of preliminary treatment of wastewater.

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

a) Describe any two problems associated with functioning of activated sludge processes and their remedies.

b) Draw a flowchart of wastewater treatment of fruit pulp processing unit. Explain its working.

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Total No. of Questions : 4]

SEAT No. :

P910

[Total No. of Pages : 2

[5422]-387

T.Y. B.Sc. (Semester - III)

COMPUTER HARDWARE & NETWORK ADMINISTRATION

Network Concepts - I

(Vocational) (Paper - V) (New Course)

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

Instructions to the candidates:

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

Q1) Attempt all of the following : **[10 × 1 = 10]**

i) Give the default Port no for FTP Service.

ii) What is a VLAN?

iii) What is a Mail Server?

iv) What is a Dynamic IP?

v) Why do we need a Desktop Operating System?

vi) Give the importance of HTTP protocol in internet world.

vii) Linux is used only as a Network Operating System. State True or False.

viii) Name any two Network Topologies.

ix) Which type of Server is used to host a Website?

x) What is a DNS?

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

a) Explain in brief importance of Client Server Technology.

b) Name any Five different Protocols and their applications.

c) Why do we need to create Users and Groups?

P.T.O.

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

a) What types of cables are used in Computer Networks?

b) What is a Database Server? Explain its need.

c) Differentiate between: Desktop OS and Network OS.

Q4) Attempt any One of the following. **[1×10=10]**

a) Explain the various Layers of OSI Model with correct diagram.

b) Specify the Applications of :

i) DHCP Server

ii) DNS Server

Total No. of Questions : 4]

SEAT No : ____

P 311

[Total No. of Pages : 2

[5422]-388
T.Y.B.Sc. (Vocational)
SEED TECHNOLOGY
Seed Pathology and Entomology
(2013 Pattern) (Semester-III) (Paper-V)

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

Instructions to the candidates:

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

Q1) Answer the following: **[10×1=10]**

a) What is seed infection?

b) Mention one stage of the life cycle of insect pest.

c) Give the meaning of seed transmission.

d) What is entomology?

e) Write one distinguishing character of coleoptera.

f) Define seed pathology.

g) What is seed treatment?

h) Mention one method for testing seed health.

i) Give one example of seed borne fungi.

j) Give one example of storage grain pest.

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

a) What are the problems in seed storage.

b) Give a brief account on history of seed pathology.

c) Write about any two entry points of seed infection.

P.T.O.

Q3) Write notes on (Ant two): **[2×5=10]**

a) Influence of seed borne diseases.

b) Plants-Insects relationship.

c) Order Isoptera.

Q4) Explain the life cycle of grain pest and damages caused by it. **[10]**

OR

Point out the differences between seed borne and storage fungi.

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Total No. of Questions : 4]

SEAT No : ____

P 312

[Total No. of Pages : 2

[5422]-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) What are bioplastics?

b) Name the components of fermentation media.

c) Define fermentataion.

d) What is SOP?

e) Give the role of impellor.

f) What is diauxic growth?

g) Name the organism used for production of amylase enzyme.

h) What is MEOR?

i) Define halophiles. Give one example of halophilic organism.

j) What is packed bed reactor?

Q2) Write short notes on any two of the following: **[10]**

a) Types of fermenters.

b) Wine production.

c) Strain improvement.

P.T.O.

Q3) Attempt any 2 of the following: **[10]**

a) What are psychrophiles? Discuss the adaptations of these organisms to low temperature environment.

b) Discuss growth linked and non-growth linked products.

c) Enlist the different parameters that have to be controlled during fermentation? Explain any two parameters in detail.

Q4) Describe in detail the process of production and recovery of streptomycin antibiotic. **[10]**

OR

a) Discuss enzyme immobilization in detail.

b) Describe biofertilizers with the help of examples.

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Total No. of Questions : 4]

SEAT No : ____

P 313

[Total No. of Pages :1

[5422]-391

T.Y.B.Sc. (Vocational)

PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION

Television Software

(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.***

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

a) Explain the stages of writing a screenplay of a film.

b) Explain the meaning of the 'concept' in a film. Write the concept of the last three films you have seen recently.

c) Explain the process of pre-production in film production.

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

a) Explain the different shot sequences used in the making of a film.

b) Explain the importance of continuity during shooting of a film.

c) Illustrate the importance of a cinematographer in the production process.

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

a) Write a script for a 1-minute social advertisement on 'Rape'.

b) Write a script for a 1-minute documentary on Shaniwarwada.

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

a) Illustrate the importance of music in films.

b) Explain the role of the editor in a film.

c) Explain the importance of research in writing a story.

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Total No. of Questions : 4]

SEAT No : ____

P 314

[Total No. of Pages :2

[5422]-392
T.Y.B.Sc. (Vocational)
ELECTRONIC EQUIPMENT MAINTENANCE
VOC-EEM-211 : Electronic Instrumentation
(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) ***Use of log table, calculator is allowed.***

Q1) Answer the following:

a) Define Instrumentation. **[1]**

b) Define sensor. **[1]**

c) State use of sensor. **[1]**

d) Why sensors are required? **[1]**

e) Distinguish between transducer and sensor. **[2]**

f) Define parameters of sensor. **[2]**

g) What is displacement sensor? **[2]**

h) State principle of force sensor. **[2]**

Q2) Attempt any <u>two</u> of the following: **[2×4=8]**

a) Discuss any one type of temperature sensor.

b) Define accuracy? How it is calculated?

c) Discuss - traceability.

P.T.O.

Q3) Answer any two of the following: **[2×4=8]**

a) Discuss impedance measurement system.

b) Explain digital phase meter.

c) Discuss with neat diagram the general instrumentation system.

Q4) Explain with neat diagram following: **[2×6=12]**

a) Spectrum analysis system.

b) Microcontroller based measurement system.

OR

Write short notes on the following: **[2×6=12]**

a) Digital Signal Processing.

b) Digital voltmeter.

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Total No. of Questions : 4]

SEAT No : ____

P 315

[Total No. of Pages :2

[5422]-393
T.Y.B.Sc. (Vocational)
INDUSTRIAL MICROBIOLOGY
VOC-IND-MIC : Animal and Plant Tissue Culture
(2013 Pattern) (Semester-III) (Paper-VI)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***All question carry equal marks.***
3) ***Draw neat labeled diagrams wherever necessary.***

Q1) Answer the following: **[10×1=10]**

a) Which two genes are responsible for maintaining size of plant stem niche?

b) Draw the graph showing evolution of cell line.

c) What is the importance of meristematic tissues in plants?

d) Name any two compounds required for adherence of cells in culture flask.

e) In callus formation low concentration of _____ promotes shooting.

f) State an example for lymphoblast call line.

g) State examples of transgenic plant along with the genetic modification.

h) What are plantibodies?

i) Fill in the blanks: In ATC the medium are sterilized by _____.

j) Define explant.

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

a) What are the different ways for disaggregation of tissues for establishing a primary culture?

b) Discuss the role of phytohormones in performing callus culture.

c) What is embryo culture?

P.T.O.

Q3) Comment on: (any two of the following) **[2×5=10]**

a) Organ culture in ATC.

b) Virus free plants.

c) Characterization of animal cell lines.

Q4) Attempt any one of the following: **[2×5=10]**

a) Discuss in detail *Agrobacterium* mediated gene transfer in plants.

b) Explain in detail the applications of Animal tissue culture. State examples wherever necessary.

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Total No. of Questions : 4]

SEAT No. :

P909

[Total No. of Pages : 2

[5422]-394

T.Y. B.Sc. (Semester III)

COMPUTER HARDWARE & NETWORK ADMINISTRATION (Vocational) (Paper - VI)

Computer/IT Service Management

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]**

i) What is Segregation of Duties in IS?

ii) COBIT Stands for

iii) What is the function of Request For Proposal?

iv) Who manages Problem Escalation?

v) Use of Freeware License on Multiple PC is not allowed. State True or False.

vi) Name an ISO Standard for ISMS.

vii) What does EUL stands for-

viii) Network Administrator is responsible to maintain Database. State True of False.

ix) What is Stored in Access Control List?

x) What is Escalation?

Q2) Attempt any Two of the Following : **[2 × 5 = 10]**

a) How social engineering helps to extract information from a user?

b) Explain the Functions of a Helpdesk

c) What is an incident management Process?

P.T.O.

Q3) Attempt any Two of the Following : **[2 × 5 = 10]**

a) Explain the Importance of Patch Testing before implementation.

b) Explain Importance of Control Matrix in SOD?

c) How cost based analysis and planning helps CFO?

Q4) Attempt any One of the Following. **[1×10=10]**

a) Comment on :-

i) Hardware Selection Process

ii) Software Licensing

b) What is the importance of Information System Organizational Structure?

Total No. of Questions : 4]

SEAT No : ____

P 316

[Total No. of Pages :2

[5422]-395
T.Y.B.Sc. (Vocational)
SEED TECHNOLOGY
Seed Farm Management, Processing & Storage
(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 the following: **[10×1=10]**

a) Define seed drying.

b) What is seed bagging?

c) Give any one factor involved in the selection of a farm bussiness.

d) Define seed treatment.

e) What is farm management?

f) Give any one component of seed marketing.

g) Give diagrammatic representation of seed flow during processing.

h) What is seed storage?

i) Enlist seed treating equipments.

j) What is general farming?

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

a) Write an account on comparision of general and specilized farming.

b) Write an account on role of different seed organizations in seed marketing.

c) Describe in detail any two methods of seed treatment.

P.T.O.

Q3) Write notes on (Any two): **[2×5=10]**

a) Basic requirment of seed storage.

b) Farm management Vs Agricultural economics.

c) Receiving the seed in seed processing unit.

Q4) Give an account on use of farm management as personal matter and describe in detail factors involved in the selection of a farm business. **[10]**

OR

What is seed processing? Describe in detail any two steps involved in seed processing. **[10]**

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Total No. of Questions : 4]

SEAT No. :

P911

[Total No. of Pages : 2

[5422]-396
T.Y. B.Sc. (Semester III)
PSYCHOLOGY (Paper - I)
Communication Psychology

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 Communication.

b) What is the difference between old and new technologies.

c) state the types of communication.

d) what is semiotics?

e) Define network economy.

f) Mention the Technologies of Communication.

g) What are the effective Communication techniques?

h) Explain the transformation of space and time.

Q2) Answer in eight or ten sentences (Any two) : **[8]**

a) Explain the relationship between education and technology.

b) Describe in detail Communication Process.

c) Explain in brief different gestures, postures and expressions in Communication

P.T.O.

Q3) Write short note (Any two) : **[8]**

a) Cyber Hijacking

b) Channels of non. verbal Communication

c) Internet Society

Q4) a) Define Communication? Explain Correlation between Communication and their social Contexts. **[8]**

OR

b) Describe various technologies for sexual explailation is its preventing measures.

Total No. of Questions : 4]

SEAT No. :

P912

[Total No. of Pages : 2

[5422]-397
T.Y. B.Sc. (Semester - III)
PSYCHOLOGY
Cognitive Psychology
(Paper - II)

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

Instructions to the candidates:

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

Q1) Answer in two or four sentences. **[16]**

a) What is learning?

b) Define Cognitive Psychology.

c) Name the types of memory.

d) Define Sensation.

e) Define Problem.

f) What is Perceptual Constancy.

g) State the Psychological roots of Cognitive Psychology.

h) What is Insightful learning.

Q2) Answer in eight or ten sentences (Any two). **[8]**

a) Explain the Gestatt Principles of Perception.

b) Describe the causes of forgetting.

c) Discuss the technological roots of cognitive Psychology.

P.T.O.

Q3) Write short note (Any two) : **[8]**

a) Problem Solving Cycle.

b) Thorndike's laws.

c) Types of attention

Q4) a) Define Conditioning. Explain the Classical and Operant Conditioning. **[8]**

OR

b) Describe the various Perspectives of Cognition.

Total No. of Questions : 4]

SEAT No. :

P 913

[Total No. of Pages : 2

[5422]-398
T.Y. B.Sc. (Semester - III)
PSYCHOLOGY
Statistical Methods
(Paper - III)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat diagrams wherever necessary.***
4) ***Use of calculator is allowed.***

Q1) Answer in two or four sentences. **[16]**

a) Explain the uses of statistics.

b) Define Percentile.

c) What is Scale?

d) Define variability.

e) Define correlation.

f) State the formula of rank order correlation.

g) What is graphical representation?

h) State the types of graph.

Q2) Answer in eight or ten sentences. **[8]**

a) Describe the advantages of graphical representation.

b) Explain the characteristics of Normal probability curve.

P.T.O.

c) Calculate SD for the following frequency distribution.

Scores	F
21-22	1
19-20	0
17-18	2
15-16	2
13-14	5
11-12	9
9-10	4
7-8	3
5-6	2
3-4	1
1-2	1
	N = 30

Q3) Write short notes (Any two) : **[8]**

a) Nature of psychological research.

b) Normal distribution.

c) Basics of graph.

Q4) Describe various methods and types of variability. **[8]**

OR

Find the correlation coefficient between the following two sets of scores using product moment method.

Individuals	A	B	C	D	E	F	G	H	I	J
Test X	13	12	10	8	7	6	6	4	3	1
Test Y	7	11	3	7	2	12	6	2	9	6

Total No. of Questions : 4]

SEAT No. :

P914

[Total No. of Pages : 2

[5422]-399
T.Y. B.Sc. (Semester - III)
PSYCHOLOGY
Psychopathology
(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) Define Delirium.

b) Define abnormal behaviour.

c) State the causes of cognitive disorder.

d) Define Stress.

e) What is Psychoanalysis?

f) State the full form of DSM.

g) What is mood disorder?

h) State the Symptoms of depression.

Q2) Answer in eight or ten sentences (Any two) : **[8]**

a) Explain the symptoms, causes and treatment of panic disorder.

b) Describe the Psychotheraptic interventions for cognitive disorders.

c) Differentiate between Humanistic and behavioristic model.

P.T.O.

Q3) Write short note (Any two) : **[8]**

a) Causes of Depression.

b) Criteria of abnormal behaviour.

c) Behavioristic approach.

Q4) a) Explain the causes and types of Mental Retardation. **[8]**

OR

b) Explain in detail participating and reinforcing causes of abnormal behaviour.

Total No. of Questions : 4]

SEAT No. :

P915

[Total No. of Pages : 2

[5422]-399A
T.Y. B.Sc. (Semester III)
PSYCHOLOGY (Paper - V)
Applied Psychology

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) Name the Psychological tests used in Applied Psychology.

b) What is Psychometric approach.

c) Name the 4 Es used in traffic Psychology.

d) State the names of emerging areas of Applied Psychology.

e) Define Meditation.

f) What is Engineering Psychology.

g) Define Military Psychology.

h) Explain the role of Psychology in Sport area.

Q2) Answer in eight or ten sentences (Any two) : **[8]**

a) Describe the relationship between religion and Psychotherapy.

b) Explain in detail legal Psychology.

c) Describe the various Psychological tests used in Applied Psychology.

P.T.O.

Q3) Write short note (Any two) : **[8]**

a) Political Psychology.

b) Religion and Mental health.

c) Psychological Assessment.

Q4) a) Explain in detail main and other relevant fields of system Psychology. **[8]**

OR

b) Explain the evolutionary Psychology of religion.

Total No. of Questions : 4]

SEAT No. :

P916

[Total No. of Pages : 2

[5422]-399B
T.Y. B.Sc. (Semester - III)
PSYCHOLOGY (Paper - VI)
Organizational Behaviour

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]**

i) Define Motivation.

ii) What is organizational behaviour?

iii) Define Conflict.

iv) State the Consequences of work stress.

v) What is group dynamic?

vi) State the key Concepts of Organizational behaviour.

vii) What is job Satisfaction?

viii) Explain motivation Cycle.

Q2) Answer in eight or ten sentences (Any two). **[8]**

i) Describe in brief Maslow's theory of motivation.

ii) Explain the factors affecting on job satisfaction.

iii) Differentiate between Autocratic and free well leadership style.

P.T.O.

Q3) Write short note (Any two) : **[8]**

i) Emotional Intelligence.

ii) Characteristics of good leader.

iii) Incentive System.

Q4) a) Write in detail approaches of work stress management. **[8]**

OR

b) Explain the various challenges and apportunities of Organizational Behaviour.

Total No. of Questions :4]

SEAT No. :

P317

[Total No. of Pages :2

[5422] - 501

T. Y. B. Sc.

PHYSICS

PH - 333 : Classical Mechanics

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

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

Instructions to the candidates:

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

Q1) Attempt All (one mark each) **[10]**

a) Define the term time of flight of the projective.

b) State the principle of rocket motion.

c) What is geosynchronous orbit.

d) State any two properties of central forces.

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

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

g) What is the effect of impact parameter on scattering angle?

h) What are degree's of freedom?

i) What do you mean by frame of reference?

j) Give example of peseudo force.

Q2) Attempt Any Two **[10]**

a) Obtain the equation of path of projectile in a resistive medium.

b) State and prove kepter's third law of planetory motion.

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

P.T.O.

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

a) The projectile is projected at such an angle that the horizontal range is four times the maximum height. Determine the angle of projection.

b) Two bodies of masses 5 gm and 10 gm have position vectors $2\hat{i}+3\hat{j}-\hat{k}$ and $\hat{i}-\hat{j}+2\hat{k}$ respectively. Determine the position vector and distance of centre of mass from origin.

c) Distinguish between inertial and non inertial frame.

Q4) a) Attempt Any One of the following. **[8]**

i) What is inelastic scattering? Obtain the Q - value equation in inelastic scattering process.

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

b) Attempt Any One of the following. **[2]**

i) State and explain principle of virtual work.

ii) Under what conditions the coriolis force is zero and maximum.

Total No. of Questions : 4]

SEAT No. :

P318

[Total No. of Pages : 2

[5422]-502
T.Y. B.Sc.
PHYSICS
PH-335 : C-Programming and Computational Physics
(2008 Pattern) (Semester - III) (Paper - V)

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

Instructions to the candidates:

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

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

a) Define algorithm

b) Give Syntax of scant function.

c) What is purpose of switch statement?

d) Define term error.

e) What is pixel?

f) What is use of break statement?

g) What is difference between gets ( ) and puts ( ) functions?

h) Convert in to C - equivalent $C = \frac{F-32}{1.8}$

i) How arrays are declared?

j) Define Keywords.

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

a) What are different operators used in 'C'? Explain any two operators with example.

b) Write C-program for finding factorial of given integer number.

c) Explain Newton - Raphson method used for obtaining real roots of equation.

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

a) What are storage classes of variable? Explain any two.

b) What is function? Explain difference between Library and user defined functions.

c) Explain for statement with suitable example.

P.T.O.

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

a) i) Evaluate $\int_0^6 \frac{1}{1+x}\,dx$ by using simpson's $\frac{1}{3}$ rule dividing it into 10 sub intervals.

ii) In simple electrical circuit, the values of current I passing through a resistor R are given for different values of P.D. V across R. Least square fit a straight line for the following points.

V.....Volts	1	2	4	5	6	8	9
I ..... MA	2	5	7	10	12	15	19

b) i) Find the truncation error in the result of the following function for $x = \frac{1}{5}$ when we use

1) first three terms 2) first four terms and

3) first five terms

$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \frac{x^5}{5!} + \frac{x^6}{6!}$$

ii) Write C-program to find the smallest of three integers.

B) Attempt one: **[2]**

a) State the rules which must be followed while selecting the identifier name.

b) Draw flow chart for finding the sum of digits of any decimal number.

Total No. of Questions : 4]

SEAT No. :

P319

[Total No. of Pages : 2

[5422]-503

T.Y.B.Sc.

PHYSICS

PH - 336(E) : Medical Electronics

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

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

Instructions to the candidates:

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

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

a) What is action potential?

b) Give any two physiological effects of electricity.

c) State the principle of capacitive sensor.

d) What are bio-potential electrodes?

e) State CMRR in dB.

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

g) State various types of calorimeter.

h) State any two disadvantages of flame photometer.

i) State Doppler frequency shift relation.

j) What is purpose of phonocardiography?

P.T.O.

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

a) Give the analysis of ECG pattern with a neat diagram.

b) Explain an isolation amplifier with block diagram.

c) Explain clinical photo flame photometer. Also give its applications.

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

a) If the systolic blood pressure of the patient is 155mm Hg and his diastollic pressure is 95mm Hg then

i) What its pulse pressure?

ii) What its mean arterial pressure?

iii) What its condition?

b) For a 1-cm^2 capacitance sensor, R is 100mΩ. Calculate radius(r), the plate spacing required to pass sound frequency above 20 Hz.

c) A differential amplifier has an output of 1V with a differential input of 10mV and an output of 5mV with a common mode input of 10mV. Find the CMRR in dB.

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

i) What do you mean by electrode-electrolyte interface? Describe silver-silver chloride electrode interface.

ii) Describe direct measurement of blood pressure with suitable diagram. Also gives its advantages and disadvantages.

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

i) Draw diagram for double beam spectrophotometer.

ii) State Nernst equation for bio-potential.

♦ ♦ ♦

Total No. of Questions : 4]

SEAT No. :

P320

[Total No. of Pages : 3

[5422]-504

T.Y.B.Sc.

STATISTICS

ST - 331 : Distribution Theory - I

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of scientific calculator and statistical tables is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

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

a) If $(X_1, X_2, X_3) \sim MD(500, 0.4, 0.45, 0.15)$ then $cov(X_1, X_2)$ is

i) –90 ii) 90

iii) –30 iv) 30

b) Let $X \sim W(\alpha = 6, \beta = 1)$ then mean of X is

i) 6 ii) 5

iii) $\frac{1}{6}$ iv) $\frac{1}{5}$

c) The p.d.f of the first order statistic $X_{(1)}$ of a random sample of size n drawn from distribution of random variable X is

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

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

d) A random variable(r.v.) X has $E(X) = 3$ and $E(X^2) = 13$ then upper bound for $P[|X-3|>8]$ is

i) $\frac{3}{4}$ ii) $\frac{1}{2}$

iii) $\frac{1}{16}$ iv) $\frac{1}{4}$

P.T.O.

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

a) If $(X_1, X_2, X_3) \sim MD(30, 0.2, 0.3, 0.5)$ then the distribution of r.v. $U = X_1 + X_2$ is binomial.

b) If $X \sim \beta_1(7,8)$ then the distribution of $\frac{X}{1-X}$ is $\beta_2(8,7)$

C) Obtain hazard rate of W(α, β) distribution. **[1]**

D) Define order statistic. **[1]**

E) Define multinomial distribution with parameters $(n; P_1, P_2, \ldots\ldots, P_k)$. **[1]**

F) Give one application of Chebychev's inequality. **[1]**

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

a) Let $(X_1, X_2, \ldots\ldots, X_k) \sim MD(n, P_1, P_2, \ldots\ldots, P_k)$. Obtain the moment generating function of $(X_1, X_2, \ldots, X_k)$ and hence find variance of X_i.

b) Let $X \sim \beta_1(m,n)$. Obtain mean and variance of the distribution of X.

c) Let $X \sim W(5,3)$, find the distribution of $Y = X^2$.

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

a) State and prove central limit theorem for independent and indentically distributed random variables.

b) Obtain the probability distribution of sample range$(X_{(n)} - X_{(1)})$ of ordered observation.

c) State and prove Chebychev's inequality for continuous random variable.

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

A) a) If $X \sim G(\alpha, \lambda_1)$ and $Y \sim G(\alpha, \lambda_2)$ and X and Y are independent variates, find distribution of $\frac{X}{X+Y}$. **[5]**

b) Obtain probability density function of i^{th} order statistic for a random sample of size n from a continuous distribution. **[5]**

B) a) Let $(X_1, X_2, ..., X_k) \sim MD(n, P_1, P_2, ..., P_k)$. State the variance-covariance matrix. Also obtain it's rank. **[5]**

b) i) State weak law of large number(WLLN) for i.i.d random variables. **[2]**

ii) If $\{X_k\}$ is a sequence of independent random variable each assuming three values –1,0,1 with the following probabilities

$$P[X_k = -1] = P[X_k = 1] = \frac{1}{k} \text{ and } P[X_k = 0] = 1 - \frac{2}{k}$$

Examine whether the WLLN holds for this sequence. **[3]**

♦ ♦ ♦

Total No. of Questions :4]

SEAT No. :

P321

[Total No. of Pages :3

[5422] - 505

T. Y. B. Sc.

STATISTICS (Principal)

ST - 333 : Statistical Process Control (Online Methods)

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of scientific calculator and statistical tables is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following:

a) In each of the following cases, choose the correct alternative. **[1 each]**

i) A discrepancy in standards is known as

A) Non - confirming unit B) Non - conformity

C) Assignable causes D) Chance causes

ii) P chart is used to control

A) Process average B) Process standard deviation

C) Process fraction defective D) Number of defects per unit

iii) When process standard deviation σ is not known, it is estimated by

A) R/D_2 B) R/d_2

C) R/D_3 D) R/d_1

iv) Which of the following limits are not determined directly by using sample observations?

A) Probability limits B) 3σ limits

C) Natural tolerance limits D) Specification limits

P.T.O.

b) In each of the following, state whether the given statement is true or false: **[1 each]**

i) When process standard deviation μ is not known, it is estimated by $A_2\bar{X}$.

ii) Cause and effect diagram gives idea about which causes are important.

c) Define the following terms: **[1 each]**

i) k - σ limits.

ii) Assignable cause

d) i) Give interpretation of "low spot" on p - chart. **[1]**

ii) State any two disadvantages of variable control chart. **[1]**

Q2) Attempt Any Two of the following: **[5 each]**

a) State the modern and traditional definition of quality. Also explain the online methods in statistical process control with an illustration.

b) Define C_{pk} indices for a stable process. Also interpret the following:

i) $C_p = C_{pk}$ ii) $C_{pk} = 0$ iii) $C_{pk} = 1.33$

c) Explain the concept of confirming run length chart (CRL). What is the distinction between CRL and P chart.

Q3) Attempt Any Two of the following: **[5 each]**

a) State the seven SPC tools. Explain Pareto diagram.

b) Explain the construction and interpretation of p - chart by using stabilized control limits when subgroup sizes n_i are different and process fraction defective is not known.

c) $\bar{X}$ and R charts with sample size n = 4 are used to monitor a normally distributed quality characteristic X. It is observed that $\bar{R}$ = 20.59 mm and $\bar{X}$ = 800 mm. Both charts exhibit statistical control. The process average shifts to 790 mm. Obtain the probability that the shift will be caught on second sample after the shift.

Q4) Attempt Any One of the following.

a) i) The following is a record of the number of point defects per unit for metal disk equipment painted by dipping

6, 5, 7, 5, 4, 6, 8, 7

Draw a suitable control chart and comment on it.

ii) Distinguish between a defect and a defective.

[6 + 4]

b) i) Explain the following terms:

1) Natural Tolerance Limits.
2) Specification Limits.
3) Probability Limits.

ii) Explain the purpose and uses of Statistical Process Control.

[6 + 4]

Total No. of Questions : 4]

SEAT No. :

P322

[Total No. of Pages : 6

[5422]-506

T.Y.B.Sc.

STATISTICS (Principal)

ST - 336(A) : Operations Management

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of statistical tables and calculator is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following :

a) Choose the correct alternative in each of the following : **[1 each]**

i) A type of decision making environment is

A) certainty B) uncertainty

C) risk D) all of the above

ii) Coefficient of optimism(α) is always

A) Less than –1 B) More than 2

C) Between 0 and 1 D) Any constant value

iii) If EOQ is calculated but an order is then placed which is smaller than this, will the total inventory cost

A) Decrease B) Increase

C) No change D) Half of EOQ

iv) Network problems have advantage in terms of project

A) scheduling B) planning

C) controlling D) all the above

P.T.O.

b) In each of the following cases state whether the given statement is true or false : **[1 each]**

i) In replacement problem the equipment should be replaced when maintenance cost is greater than the average annual total cost.

ii) PERT is applied mainly for planning and scheduling research programs.

c) Explain the following terms : **[1 each]**

i) Expected Monetary Value (EMV)

ii) Critical activity

d) i) State the situations when replacement of certain items needs to be done. **[1]**

ii) A project consists of series of tasks labelled. A, B, ... I with the following relationships. With this notation construct the network diagram having the following constraints. **[1]**

A < D, E; B, D < F; C < G; B, G < H; F, G < I.

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

a) From the following information find the critical path and expected time of the project :

Activity	A	B	C	D	E	F
Predecessor	-	-	A	A	B,C	D,E
Normal time(weeks)	16	20	8	10	6	12

b) Explain in brief maximin criterion and Minimin criterion for the decision under uncertainty.

c) The data on the operating costs per year and resale price of equipment A whose purchase price is Rs. 10000 are given below :

Year	1	2	3	4	5	6	7
Operating cost	1500	1900	2300	2900	3600	4500	5500
Resale Value	5000	2500	1250	600	400	400	400

i) What is the optimum period for replacement?

ii) When equipment A is 2 years old, equipment B which is a new model for the same usage is available. The optimum period for replacement is 4 years with an average cost of Rs. 3600. Should we change equipment A with that of B? If so when?

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

a) Derive an expression for the economic lot size model with uniform rate of demand, finite replenishment rate and no shortage.

b) A businessman has two independent investments A and B available to him, but he lacks the capital to undertake both of them simultaneously. He can choose to take A first and then stop, or if A is successful then take B or vice-versa. The probability of success on A is 0.7, while for B it is 0.4. Both investments require an initial capital outlay of Rs. 2000 and both return nothing if the venture is unsuccessful. Successful completion of A will return Rs. 3000 (over cost), successful completion of B will return Rs. 5000 (over cost). Draw the decision tree and determine the best strategy.

c) A shopkeeper has a unifrom demand of an item at the rate of 600 items per year. He buys from a supplier at a cost of Rs 8 per item and the cost of ordering if Rs 12 each time. If the stock holding cost is 20% per year of stock value, how frequently should he replenish his stock and what is the optimal order quantity?

Q4) Attempt any one of the following :

a) i) Explain the following costs associated with inventories:

A) Set-up cost

B) Carrying cost

C) Shortage cost

D) Salvage cost

E) Production cost **[5]**

ii) Under an employment promotion programme it is proposed to allow sale of newspapers on buses during off peak hour. The vendor can purchase the papers at a special concessional rate of 25 paise and sell it for 40 paise (a piece). Any unsold copy is dead loss. A vendor has estimated the following probabilities for the number of copies demanded :

No. of copies	15	16	17	18	19	20
Probability	0.04	0.19	0.33	0.26	0.11	0.07

Prepare a payoff table and find out how many copies should be ordered so that his expected profit will be maximum? **[5]**

b) A small project is composed of seven activities whose time estimates are given in the following table : **[5]**

Event	Name	Optimistic time	Most likely time	Pessimistic time
1-2	A	6	6	24
1-3	B	6	12	18
1-4	C	12	12	30
2-5	D	6	6	6
3-5	E	12	30	48
4-6	F	12	30	42
5-6	G	18	30	54

i) Find the expected duration and variance of each activity.

ii) What is expected project length?

iii) Calculate the variance and standard deviation of the project length.

♦ ♦ ♦

Total No. of Questions : 4]

P322

[5422]-506

T.Y.B.Sc.

STATISTICS(Principal)

ST - 336(C) : Time Series Analysis

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of scientific calculators and statistical tables is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) a) Attempt each of the following. In each of the following cases, choose the correct alternative. **[1 each]**

i) Let X_t be an AR(1) model given by $X_t = \varnothing X_{t-1} + \varepsilon_t$ $\varepsilon_t \sim$ iid $N(0,\sigma^2)$ then $E(x_t)$ is equal to

A) 0 B) σ^2

C) ∞ D) ε^2

ii) A time series consist of :

A) Short term variation B) Long term variation

C) Irregular variation D) All of the above

iii) In time series analysis the exponential smoothing methods helps to

A) smoothout the fluctuations B) remove trend

C) estimate exponential trend D) estimate logarithmic trend

iv) Box-Cox transformation is

A) $\frac{Y^{\lambda}-1}{\lambda}\lambda>1$ B) $\frac{Y^{\lambda}-1}{\lambda}\lambda<1$

C) $\frac{Y^{\lambda}-1}{\lambda}\lambda\neq1$ D) None of these

b) State whether each of the following statement is True or False : **[1 each]**

i) Seasonal variation have period less than one year.

ii) Moving averages can give estimate of trend of future.

c) Define **[1 each]**

i) Cyclical variation. Give one illustration.

ii) Exponential smoothing.

d) i) Define time series analysis and give the one example.

ii) State AR(1) model.

[1 each]

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

a) Explain the components of time series Analysis.

b) Explain utility of Box-Jenkins technique.

c) Estimate the trend using 10% smoothing constant for the following time series

t	1	2	3	4	5	6	7	8	9	10
Yt	31	37	39	41	41	39	33	29	27	29

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

a) Discuss how non-parametric tests are useful in time series modeling.

b) Explain in brief Durbin-Watson test.

c) Fit autoregression model of first order to the following time series

Year (t)	1	2	3	4	5	6	7	8	9	10	11
Yt	99	95	83	100	109	105	97	104	94	105	109

Q4) Attempt **any one** of the following :

a) i) Describe two different methods of removing the trend form a time series and compare their merits and demerits. **[5]**

ii) Define autocorrelation function and state its properties. **[5]**

b) i) What are the different plots used in studying time series? Explain in brief any one. **[5]**

ii) Write a note on exponential smoothing. **[5]**

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