Total No. of Questions : 4]

SEAT No. :

P712

[Total No. of Pages : 2

[5315] - 301

T.Y.B.Sc.

MATHEMATICS

MT - 331 : Metric Spaces

(2013 Pattern) (Semester - III) (Paper - I) (91113)

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

Instructions to the candidates:

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

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

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

b) In a discrete metric space $\mathbb{R}_d$,find $S_3(2)$ and $S_{\frac{1}{3}}[2]$.

c) State true or false with justification: If A and B are subsets of $\mathbb{R}_u$ such that $\overline{A} \subset \overline{B}$ then $A \subset B$.

d) Let $A=\left\{\frac{1}{n} \middle/ n \in \mathbb{N}\right\}$ be a subset of $\mathbb{R}_u$. Find ∂A (boundary of A).

e) Let $Y=(0,1)$ be a subspace of $\mathbb{R}_u$ and $A=\left(0, \frac{1}{2}\right]$. State with justification whether A is closed in Y.

f) Give an example of compact set which is not connected and connected set which is not compact.

g) Is the set $A=\left\{\frac{1}{n} \middle/ n \in \mathbb{N}\right\} \cup \{0\}$ nowhere dense in $\mathbb{R}_u$? Justify.

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

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

P.T.O.

b) Let A and B be subsets of a metric space (X,d). Show that $\overline{A \cup B} = \bar{A} \cup \bar{B}$. Is it true that $\overline{A \cap B} = \bar{A} \cap \bar{B}$? Justify.

c) Let (X,d) be metric space. Show that $|d(x,z)-d(z,y)| \leq d(x,y)$ for all $x,y,z \in X$.

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

a) Let $f:(X,d) \to (Y,\rho)$ be a homomorphism. Prove that $F \subset X$ is closed in X if and only if $f(F)$ is closed in Y.

b) Let (Y,d_Y) be a subspace of complete metric space (X,d). If Y is closed then prove that Y is complete.

c) Let $\mathbb{C}_u$ be usual metric space with metric $d(z_1,z_2)= |z_1-z_2|; z_1,z_2 \in \mathbb{C}$ (set of complex numbers). Show that $\mathbb{C}_u$ is complete.

Q4) Attempt any one of the following:

a) i) Prove that a metric space (X,d) is compact if and only if every collection of closed subsets of X having FIP (finite intersection property) has non-empty intersection. **[7]**

ii) Prove that any finite subset of metric space (X,d) is compact. **[3]**

b) i) Let (X,d) be metric space and $Y \subset X$ is connected. If $Z \subset X$ is such that $Y \subset Z \subset \bar{Y}$ then prove that Z is connected. Hence prove that $\bar{Y}$ is connected. **[5]**

ii) Let (X,d) be complete metric space and $A \subset X$. Prove that $\bar{A}$ is compact if and only if A is totally bounded. **[5]**

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Total No. of Questions : 4]

SEAT No. :

P713

[Total No. of Pages : 2

[5315] - 302

T.Y.B.Sc.

MATHEMATICS

MT - 332 : Real Analysis - I

(2013 Pattern) (Semester - III) (Paper - II) (91123)

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

Instructions to the candidates:

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

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

a) If $f(x)=x$ and $g(x)=-x$, $x \in \mathrm{R}'$ then find max(f,g) and min(f,g).

b) Give an example of countable bounded subset A of R', whose g.l.b. and l.u.b. lies in R–A.

c) Give an example of unbounded sequence $\{S_n\}_{n=1}^{\infty}$ such that $\lim_{n\to\infty}\frac{S_n}{n}=0$.

d) If sequence $\{|S_n|\}_{n=1}^{\infty}$ converges to 0 then prove that $\{S_n\}_{n=1}^{\infty}$ converges to 0.

e) Show that $\sum_{n=1}^{\infty}\frac{x^n}{m^n}$ converges for all $x \in \mathrm{R}'$.

f) Define conditionally convergent series. Also, give an example of conditionally convergent series.

g) Give an example of sequence $\{S_n\}_{n=1}^{\infty}$ in l^2 such that $\sum_{n=1}^{\infty}|S_n|=\infty$.

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

a) If $\{S_n\}_{n=1}^{\infty}$ and $\{t_n\}_{n=1}^{\infty}$ are real sequences such that $\lim_{n\to\infty} S_n = L$ and $\lim_{n\to\infty} t_n = M$ then prove that $\lim_{n\to\infty} S_n t_n = LM$.

b) If $\{S_n\}_{n=1}^{\infty}$ is convergent sequence of real numbers then prove that $\lim_{n\to\infty}\sup S_n = \lim_{n\to\infty} S_n$.

P.T.O.

c) If $\{S_n\}_{n=1}^{\infty}$ is real sequence such that $\lim_{n\to\infty}\frac{S_n-1}{S_n+1}=0$ then show that $\lim_{n\to\infty} S_n = 1$.

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

a) If $\{a_n\}_{n=1}^{\infty}$ is nonincreasing sequence of positive numbers such that $\sum_{n=0}^{\infty} 2^n a_{2^n}$ converges, then prove that $\sum_{n=1}^{\infty} a_n$ converges.

b) If $\sum_{n=1}^{\infty} a_n$ converges absolutely, then prove that $\sum_{n=1}^{\infty} a_n$ converges.

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

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

a) i) Prove that every Cauchy sequence is bounded. Is converse true? Justify.

ii) If A and B countable sets then show that cartesian product A×B is countable.

b) i) Show that (0,1) and $(0,\infty)$ are equivalent.

ii) If $S=\{S_n\}_{n=1}^{\infty}$ and $t=\{t_n\}_{n=1}^{\infty}\in l^2$ then prove that $\sum_{n=1}^{\infty} S_n t_n$ converges absolutely and $\left|\sum_{n=1}^{\infty} S_n t_n\right| \le \left(\sum_{n=1}^{\infty} S_n^2\right)^{\frac{1}{2}}\left(\sum_{n=1}^{\infty} t_n^2\right)^{\frac{1}{2}}$.

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Total No. of Questions : 4]

SEAT No. :

P714

[Total No. of Pages : 3

[5315] - 303

T.Y.B.Sc.

MATHEMATICS

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

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

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

Instructions to the candidates:

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

SECTION - I

(Metric Spaces)

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

i) Let $\mathbb{R}_u$ be a usual metrix space. Then for $a \in \mathbb{R}_u$ find $S_1(a)$ and $S_1[a]$.

ii) Show that the discrete metric space X_d is bounded.

iii) Find Åfor the subset A=(0 1] in $\mathbb{R}$ and A=$S_1[0]$ in $\mathbb{R}^2$ with respect to standard metric.

iv) Let X be a set containing more than one point with discrete metric. Show that X is not connected.

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

i) For $x=(x_1,x_2)$, $y=(y_1,y_2) \in \mathbb{R}^2$, let $d_1(x,y)=|x_1-y_1|+|x_2-y_2|$ and $d_2(x,y)=\sqrt{(x_1-y_1)^2+(x_2-y_2)^2}$ be metrics for $\mathbb{R}^2$.

Show that d_1 and d_2 are equivalent metrics.

ii) Let $G=\left\{\left(\frac{1}{n},1\right) / n \in \mathbb{N}, n \geq 2\right\}$. Is G an open covering of (0,1)? Justify.

P.T.O.

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

a) Show that any closed subset of a compact metric space is compact.

b) Let $f:[0,1]\to\mathbb{R}$ be function given by $f(x)=\begin{cases}x, & \text{if } x \text{ is rational}\\ 1-x, & \text{if } x \text{ is not rational}\end{cases}$

then show that f is continuous only at $x=\frac{1}{2}$ in [0,1].

c) Let (x,d) be a metric space and let be a fixed positive real number. For $x,y\in x$, define $d^*(x,y)=\mathrm{K}d(x,y)$. Prove that d^* is a metric on x.

SECTION - II

(Real Analysis - I)

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

i) Give an example of function which is one-one but not onto.

ii) Find $\mathrm{N}\in$ I such that $\left|\frac{2n}{n+3}-2\right|<\frac{1}{4},(n\geq \mathrm{N})$.

iii) Evaluate: $\lim_{n\to\infty}\frac{n^2}{(n-7)^2-6}$.

iv) If the series $a_1+a_2+\ldots\ldots\ldots$ converges to S, then prove that $a_2+a_3+\ldots\ldots$ converges to $\mathrm{S}-a_1$.

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

i) If for $n\in\mathbb{N},\mathrm{S}_n=\frac{1\cdot3\cdot5\cdot\ldots\ldots(2n-1)}{2\cdot4\cdot6\cdot\ldots\ldots2n}$, then prove that $\{\mathrm{S}_n\}_{n=1}^{\infty}$ is convergent.

ii) Prove that the series $\sum_{n=0}^{\infty}\frac{1}{(2n)!}$ is convergent.

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

a) Show that the set $[0,1]=\{x \in \mathbb{R} \mid 0 \le x \le 1\}$ is uncountable.

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

c) Show that the series $\sum_{n=0}^{\infty} x^n$ is converges to $\frac{1}{1-x}$ it $0<x<1$ and diverges if $x \ge 1$.

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Total No. of Questions : 4]

SEAT No. :

P715

[Total No. of Pages : 2

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T.Y.B.Sc.

MATHEMATICS

MT-334: Group Theory

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

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

Instructions to the candidates:

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

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

a) Let m and n be positive integers and consider a subgroup $H = \{mx + ny \mid x, y \in \mathbb{Z}\}$ of a group $\mathbb{Z}$. Show that H is a cyclic subgroup of $\mathbb{Z}$.

b) Find the maximum possible order for an element of S_{15}.

c) Let $\mu = (1, 2, 4, 5)(3, 6)$ in S_6. Find the index of a subgroup $<\mu>$ in S_6.

d) Let G be a finite group with identity e and let $a \in G$. Show that there exists a positive integer n such that $a^n = e$.

e) Determine the condition under which the map $\phi : G \to G$ defined by $\phi(x) = x^{-1}, \forall x \in G$ is a group homomorphism?

f) Show that a group of prime order is a simple group. Also, give an example of a non-cyclic simple group.

g) Give an example of a group G having no element of finit order > 1, but having a factor group G/H, all of whose elements are of finite order.

P.T.O.

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

a) Show that a non-empty subset H of a group G is a subgroup of G if and only if $ab^{-1} \in H$, for all $a, b \in H$.

b) Let $\phi : G \to G'$ be a group homomorphism with kernel H. Prove that $\phi[G]$ is a group and is isomorphic to G/H.

c) Show that there is no permutation σ such that $\sigma^{-1}(1,2,3)\,\sigma = (1,3)\,(5,7,8)$.

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

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

b) Prove that every permutation σ of a finite set is a product of disjoint cycles.

c) Show that the set of n×n matrices with determinant one form a normal subgroup of GL(n, $\mathbb{R}$).

Q4) Attempt any one of the following:

a) i) Is the converse of the Lagrange theorem true in general? Justify. **[4]**

ii) Let $\phi : G \to G'$ be a group homomorphism. Prove that ϕ is a one-to-one map if and only if Ker(ϕ) = $\{e\}$.
Also, show that Ker(ϕ) is a normal subgroup of G. **[6]**

b) i) Show that the binary structure $\langle \mathbb{R}, + \rangle$ is isomorphic to the structure $\langle \mathbb{R}^+, \bullet \rangle$. **[4]**

ii) Prove that the group $\mathbb{Z}_m \times \mathbb{Z}_n$ is cyclic if and only if *m* and *n* are relatively prime. **[6]**

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Total No. of Questions :4]

SEAT No. :

P716

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T.Y.B.Sc.

MATHEMATICS

MT - 335 : Ordinary Differential Equations

(2013 Pattern) (Semester - III) (Paper - V) (91153)

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

Instructions to the candidates:

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

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

a) Find the general solution of the differential equation $(D^2 - 4D + 7)\,y = 0$.

b) Find the particular solution of the differential equation $(D^2 + 9)\,y = \sin 3x$.

c) If y_1=1 is one solution of the equation $xy'' + 3y' = 0$, then find another solution y_2 of this equation.

d) Classify all singular points in the finite plane of the differential equation

$$x(3x+1)y'' - (x+1)y' + 2y = 0.$$

e) Show that $x = 2e^{4t}$, $y = 3e^{4t}$ are solutions of homogeneous system

$$\frac{dx}{dt} = x + 2y, \quad \frac{dy}{dt} = 3x + 2y.$$

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

g) Form a homogeneous linear differential equation with constant coefficients whose solution is $y = 5 + xe^{2x}$.

P.T.O.

Q2) Attempt Any <u>two</u> of the following. **[10]**

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

b) Solve the differential equation $(D^2 - 2D + 1)\, y = x^2\ e^{3x}$.

c) Solve the differential equation $(D^5 - D^3)y = 1$.

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

a) Explain the method of undetermined coefficients to solve non homogeneous linear differential equations with constant coefficients.

b) Solve the differential equation $(D^2 + 1)\, y = \sec x \tan x$, by method of variation of parameters.

c) Solve the differential equation $\left(D^2 + 2D + 1\right)y = \frac{1}{\left(e^x - 1\right)^2}$, by reduction of order method.

Q4) Attempt any <u>one</u> 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 equations $\frac{dx}{dt} = a_1(t)x + b_1(t)\, y, \frac{dy}{dt} = a_2(t)x + b_2(t)\, y$, then show that $x = c_1 x_1(t) + c_2 x_2(t), y = c_1 y_1(t) + c_2 y_2(t)$ is also its solution.

ii) Solve the system of equations

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

b) Find the power series solution of the differential equation

$$\left(1 - x^2\right)y'' - 2xy' + p(p+1)\, y = 0.$$

Total No. of Questions : 4]

SEAT No. :

P717

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T.Y.B.Sc.

MATHEMATICS

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

(2013 Pattern) (Semester - III) (Paper - VI) (91163)

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

Instructions to the candidates:

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

SECTION-I

(Group Theory)

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

i) Determine whether the binary operation* defined on $\mathbb{Z}$ by letting $a * b = a - b$ is commutative. Is it associative?

ii) Let $(\mathbb{Q}, \cdot)$ be a binary structure with multiplication. Let $\phi : \mathbb{Q} \to \mathbb{Q}$ defined by $\phi(x) = x^2, \forall x \in \mathbb{Q}$. Show that ϕ is a homomorphism. Is ϕ an isomorphism? Justify.

iii) Let G be a group of order pq where p and q are prime numbers. Show that every proper subgroup of G is cyclic.

iv) Let $\sigma(1, 2, 5, 4)\ (2, 3) \in S_5$. Find the index of $<\sigma>$ in S_5.

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

i) List all subgroups of $\mathbb{Z}_{50}$ and draw its subgroup diagram.

ii) Let H be a subgroup of group G and $g \in G$. Show that order of subgroups H and gHg^{-1} are same.

P.T.O.

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

a) i) Let G be a group and g be one fixed element of G. Show that the map i_g such that $i_g(x) = gxg^{-1}$, for $x \in G$ is an isomorphism of G.

ii) Show that a group that has only a finite number of subgroups must be a finite group.

b) i) Let H be a subgroup of $\mathbb{Z}_4 \times \mathbb{Z}_6$ generated by (0, 1). List all elements of the factor group $\frac{\mathbb{Z}_4 \times \mathbb{Z}_6}{H}$. Also, find the order of (2, 0) + H.

ii) Let $\tau = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 8 & 7 & 6 & 5 & 2 & 4 & 3 & 9 & 1 \end{pmatrix} \in S_9$. Then

1) Express τ as product of disjoint cycles.

2) Express τ as product of transpositions.

3) Determine whether τ is odd or even permutation.

4) Find inverse of τ.

5) Find order of τ.

SECTION-II

(Ordinary Differential Equations)

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

i) Solve $y''' - 4y'' + y' + 6y = 0$.

ii) Find a homogeneous linear differential equation with real, constant coefficients which satisfied by $y = 6 + 3xe^x - \cos x$.

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

iv) Show that $y = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} +$ - - - is a solution of $y'' + y = 0$.

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

i) Find the particular solution of the differential equation:

$(D^3 - 3D - 2)y = 0; y(0) = 0, \ y'(0) = 0 \ \& \ y''(0) = 0$.

ii) Solve: $(D^2 + 1)y = 2$ by using variation of parameter methods.

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

a) Solve the system: $\frac{dx}{dt} = 8x - y$

$$\frac{dy}{dt} = 4x + 12y.$$

b) Solve: $y'' + 4y = 0$ by using power series method.

c) Solve: $y'' - 3y' - 4y = 6e^x$ by using the method of undetermined coefficients.

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Total No. of Questions :4]

SEAT No. :

P718

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T.Y.B.Sc.

MATHEMATICS

MT - 337 (A) : Operations Research

(2013 Pattern) (Semester - III) (Paper - VII) (911A3)

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

Instructions to the candidates:

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

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

a) What do you meant by redundant constraint in L.P.P.?

b) Define unit worth of a resource.

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

d) Solve the following L.P.P.

Maximize $z = 3x_1 + 2x_2$

Subject to $x_1 \leq 2, x_1, x_2 \geq 0.$

e) Identify the direction of increase in z of the function maximize $Z = 2x_1 - x_2$.

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

Maximize $z = 2x_1 - x^2$

Subject to $x_1 + 2x_2 = 5$

$3x_1 + 7x_2 \leq 3$

$x_1, x_2 \geq 0$

P.T.O.

g) Find the initial basic feasible solution of the following transportation problem by least cost method.

	I	II	III	IV	Supply
A	10	30	20	13	5
B	22	9	7	16	10
C	4	32	5	29	15
Demand	5	5	10	10	

Q2) Attempt Any <u>two</u> of the following. **[2×5=10]**

a) Ozark Farms uses at least 800 lb of special feed daily. The special feed is a mixture of corn and soyabean meal with the following compositions:

lb per lb of feed stuff

Feedstuff	Protein	Fiber	Cost ($/lb)
corn	0.09	0.02	0.30
Soyabean meal	0.6	0.06	0.90

The dietary requirements of the special feed are at least 30% protein and at most 5% fiber. Formulate the problem as a linear programming 50 as to minimize the cost of the feed mix.

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

Maximize $z = 3000x + 2000y$

Subject to $x + 2y \leq 6$

$2x + y \leq 8$

$y \leq 2$

$x - y \geq -1$

$x, y \geq 0$

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

Maximize $z = 3x_1 + 9x_2$

Subject to $x_1 + 4x_2 \leq 8$

$x_1 + 2x_2 \leq 4$

$x_1, x_2 \geq 0.$

Q3) Attempt any <u>two</u> of the following. **[2×5=10]**

a) Find the optimal solution of following assignment problem. Also find alternate optional solution if it exists.

	I	II	III	IV	V
A	3	9	2	3	7
B	6	1	5	6	6
C	9	4	7	10	3
D	9	6	2	4	5
E	2	5	4	2	1

b) Four operators are to be assigned to four machines. The assignment costs in dollars are given as below. Operator 1 cannot be assigned to machine C. Also operator 3 cannot be assigned to machine D. Find the optimal assignment.

		Machine			
		A	B	C	D
Operator	1	5	5	–	2
	2	7	4	2	3
	3	8	3	5	–
	4	7	2	6	7

c) Find the initial basic feasible solution of the following transportation problem by VAM.

	F_1	F_2	F_3	supply
A	9	6	0	5
B	5	1	0	20
C	3	2	4	10
D	7	5	2	15
Demand	25	10	15	

Q4) Attempt any <u>one</u> of the following. **[1×10=10]**

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

Minimize $Z = 600x_1 + 500x_2$

Subject to $2x_1 + x_2 \geq 80$

$x_1 + 2x_2 \geq 60$

$x_1, x_2 \geq 0.$

b) Find the optimal solution of the following transportation problem.

Warehouses		W_1	W_2	W_3	W_4	Supply
	F_1	1	2	1	4	30
Factory	F_2	3	3	2	1	50
	F_3	4	2	5	9	20
Demand		20	40	30	10	

Total No. of Questions : 4]

SEAT No. :

P719

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T.Y.B.Sc.

MATHEMATICS

MT-337(B): Dynamical Systems

(2013 Pattern) (Semester - III) (Paper - VII) (911B3)

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

Instructions to the candidates:

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

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

a) Is the equilibrium point (0, 0) a saddle point for the system $X' = \begin{bmatrix} -2 & 1 \\ -1 & 1 \end{bmatrix} X$?

Justify.

b) Find the eigenvalues and eigenvectors of exp(A) if $A = \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$.

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

d) Give an example of a system of differential equations for which $(t, 1)$ is a solution for $t > 0$.

e) For which values of k and b is the system $X' = \begin{bmatrix} 0 & 1 \\ -k & -b \end{bmatrix}$ a center?

Justify.

P.T.O.

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

g) If $\lambda, \mu \in \mathbb{R}$ then show that, $\exp \begin{bmatrix} \lambda & 0 \\ 0 & \mu \end{bmatrix} = \begin{bmatrix} e^{\lambda} & 0 \\ 0 & e^{\mu} \end{bmatrix}$.

Q2) Attempt any <u>two</u> 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 $X' = AX$.

b) Show that $x^2 - y^2 = 1$ is a solution of the system $X'(t) = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix} X(t)$ passing through (1, 0).

c) Find the general solution of $X' = AX$ and sketch the phase portrait if $A = \begin{bmatrix} 0 & 1 \\ -4 & 0 \end{bmatrix}$.

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

a) Let A be an n×n matrix. Show that the initial value problem $X' = AX$ with $X(0) = X_0 \in \mathbb{R}^n$ has unique solution $X(t) = \exp(tA)X_0$.

b) Let A be a 3×3 matrix for which λ is the only eigenvalue. If $\ker(A - \lambda I) = 2$ 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 general solution of $X' = \begin{bmatrix} -1 & 0 \\ 1 & -2 \end{bmatrix} X$ and sketch the phase portrait of the system.

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

a) Let A be a 2×2 matrix which has two real distinct eigenvalues λ_1, λ_2 with associated eigenvectors V_1, V_2. Show that $T^{-1}AT = \begin{bmatrix} \lambda_1 & 0 \\ 0 & \lambda_2 \end{bmatrix}$ is the canonical form of matrix A.

b) Find the canonical form of $A = \begin{bmatrix} 2 & 0 & -1 \\ 0 & 2 & 1 \\ -1 & -1 & 2 \end{bmatrix}$.

c) Find the exponential of $A = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$.

EEE

Total No. of Questions :4]

SEAT No. :

P720

[Total No. of Pages :2

[5315] - 309

T.Y.B.Sc.

MATHEMATICS

MT- 337 (C) : C Programming - I

(2013 Pattern) (Semester - III) (Paper - VII) (911C3)

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

Instructions to the candidates:

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

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

a) What is difference between 5 and '5'?

b) Evaluate $5\% 2 \times 3 + 6 - 4$.

c) Explain meaning of the following statements.

i) float class [10];

ii) int sum (int a, int b);

d) What are keywords? List any two.

e) Explain conditional operator.

f) What is C language? Who developed it?

g) Which of the following are valid identifiers?

i) 2class

ii) Class –1

P.T.O.

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

a) Write a short note on a while loop.

b) Write a short note on types of operators.

c) Write a C program to generate Fibonacci sequence upto n terms.

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

a) Write a short note on a switch statement.

b) Explain one dimensional array.

c) Write a C program to find g.c.d. of two numbers using function.

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

a) i) Explain break and continue statement.

ii) Write a C program to check whether a given number is perfect or not.

b) i) Explain use of printf function with an example.

ii) Describe the output generated by the following C program.

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

Total No. of Questions :4]

SEAT No. :

P721

[Total No. of Pages :2

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T.Y.B.Sc.

MATHEMATICS

MT- 337 (D) : Lattice Theory

(2013 Pattern) (Semester - III) (Paper - VII) (911D3)

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 a partially ordered set.

b) Let P be an ordered set and $x, y \in p$. prove that if $x \leq y$ then $\downarrow x \subseteq \downarrow y$.

c) Draw the Hasse diagram of $M_2 \oplus M_3$.

d) Is the ordered set {1, 2, 4, 8, 16} a lattice? Where divisibility as a partial order relation. Justify your answer.

e) Show that the intersection of two sublattices of a lattice is a sublattice.

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

g) Draw a circuit diagram of $(xvy') \wedge z \wedge (wvx')$.

P.T.O.

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

a) Define linear sum of two ordered sets.

Draw the linear sum of $\overline{1} \oplus \overline{2} \oplus \overline{3}$.

b) State and prove connecting lemma.

c) Let L and K be bounded lattices and $f : L \to k$ be a $\{0,1\}$-homomorphism. Prove that $\overset{-1}{f}(0)$ is on ideal and $\overset{-1}{f}(1)$ is a filter of L.

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

a) State and prove Knaster Tarski fix point theorem.

b) Let L be a lattice satisfying DCC. Suppose $a, b \in$ L and $a \nleq b$. Prove that there exists a join irreducible element x such that $x \leq a$ and $x \nleq b$.

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

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

a) i) Let L denote a lattice of all positive divisors of 100 with divisibility as a partial order relation. list all ideals of L.

ii) Show that any chain is a distributive lattice.

b) i) Show that the homomorphic image of modular lattice is modular.

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

♦ ♦ ♦

Total No. of Questions :4]

SEAT No. :

P722

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T.Y.B.Sc.

MATHEMATICS

MT- 337 (E) : Financial Mathematics

(2013 Pattern) (Semester - III) (911E3)

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) Define the term : Equilibrium set.

b) Define the term : Perfect competition.

c) Define the term : Startup point.

d) Define elasticity of demand. Give it's relation to revenue.

e) Explain when cobweb model is stable.

f) What is technology matrix?

g) If S consist of the pair (q, p) Such that $3q - 2p = 18$. Determine the supply function $q^s(p)$ and inverse supply function $p^s(q)$.

P.T.O.

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

a) Suppose the market for a commodity is governed by supply and demand sets defined as follows. The supply set S is the set of pairs (q, p) for which $q - 6p = -12$ and the demand set D is the set of pairs (q, p) for which $q + 2p = 40$. Sketch S and D and determine the equilibrium set $E = S \cap D$, the supply and demand functions q^S, q^D, and the inverse supply and demand functions p^S, p^D.

b) Suppose you have won a competition and that you are given the choice between \$ 180000 now or \$ 10000 at the start of each year, for the rest of your life. Assume that the bank has a constant interest rate 6% and that you currently have no debts. Which option should you choose if you think you will live

i) until 65,

ii) until 100,

iii) forever?

c) Determine whether the cobweb models predicts stable or unstable equilibrium for the market with

i) $q^{(s)}(p) = 0.05p - 4$, $q^D(p) = 20 - 0.15p$.

ii) $q^s(p) = 2p - 3$, $q^D(p) = 18 - p$.

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

a) 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 deposite will be compounded continuously at the equivalent annual rate of 12.5%, write down an expression for the present value of the amount realised by selling the land affer t years, and determine the optimum time to sell.

b) In each of the following cases find.

i) all points where the derivative of the function is zero;

ii) the points in the given interval where the function attains its maximum and minimum values:

I) $2x^3 - 9x^2 + 12x$ in $[0, 2]$;

II) $x \sin x + \cos x$ in $[0,2]$.

c) Idlers Incorporated is a monopoly with cost function

$C(q) = q^3 - 105q^2 + 140q + 200$,

the demand set for its product is

$D = \{(q, p) | \; p + q^2 - 5q = 100\}$,

and the upper limit on its production is 150. Find the level of production q_m which maximises the firm's profit and determine the maximum profit Sketch a graph of the profit funciton $\pi\ (q)$.

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

a) Suppose that Alpern and co. is an efficient small firm which cannot produce more than 6 units of its product each week. If their cost function is $C(q) = 100 + 20q - 6q^2 + q^3$ determine:

i) their fixed cost,

ii) their profit function ,

iii) their startup point,

iv) their breakeven point,

v) their supply set.

b) Use the method of elementary row operations to express the vector (6, 4, 9) as a linear combination of the vectors (3, 1, 5) (–3, 7, 10), (5, 5, 15).

B) a) consider an economy with three industries: coal, electricity, railways To produce \$1 of coal requires \$ 0.25 worth of electricity and \$ 0.25 rail costs for transportation. To produce \$1 of electricity requires \$0.65 worth of coal for fuel, \$0.05 electricity for the auxiliary equipment,and \$0.05 for transport. To provide \$1worth of transport the railway requires \$0.55 coal for fuel and \$0.10 electricity, Each week the external demand for coal is \$ 50, 000. and the external demand for electricity is \$25,000. There is no external demand for the railway. What should be the weekly production schedule for each industry?

b) A factory makes three products, X, Y, and Z. The production process for these products are interrelated. To produce \$1 of X requires 0.005 units (in dollors) of X,0.1 of Y and 0.1 of Z. To produce \$1 of Y requires \$0.4 worth of X and 0.1 of Z . To produce \$1 worth of Z requires 0.1 of X and 0.2 of Y. Each week the external demands for X,Y and Z are 200, 500 and 1500 units, respectively. What should be the weekly production level of each good?

Total No. of Questions : 4]

SEAT No. :

P723

[Total No. of Pages : 2

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T.Y. B.Sc.

MATHEMATICS

MT-337 (F): Number Theory

(2013 Pattern) (Semester-III) (Paper-VII) (911F3)

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

Instructions to the candidates:

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

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

a) If c/b and (b,c) = 1 then prove that c/a.

b) Evaluate $\sum_{j=1}^{n} \mu(j!)$.

c) Find the values of $\left(\frac{2}{17}\right)$ and $\left(\frac{-2}{17}\right)$.

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

e) Find highest power of 5 dividing 3000!

f) Prove that for any real number x, $0 \le x - [x] < 1$.

g) Find the last digit in the ordinary decimal representation of 3^{101}.

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

a) Apply Wilson's theorem to show that

$18!+1 \equiv 0 \pmod{19}$ and $18!+1 \equiv 0 \pmod{23}$.

b) State and prove the chinese Remainder Theorem.

c) Prove that the number of primes is infinite.

P.T.O.

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

a) If p and q are distinct odd primes, then show that

$$\left(\frac{p}{q}\right)\left(\frac{q}{p}\right) = (-1)^{\left(\frac{p-1}{2}\right)\left(\frac{q-1}{2}\right)}$$

b) Use Euclidean algorithm to obtain the g.c.d. 'd' of 3997 and 2947. Also find integers x and y such that d = 3997 x+2947 y

c) Prove that the function μ (n) is multiplicative function and hence show that

$$\sum_{d/n} \mu(d) = \begin{cases} 1, \text{ if } n=1 \\ 0, \text{ if } n=1 \end{cases}$$

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

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

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

b) i) Prove that $ax \equiv ay \pmod{m}$ if and only if $x \equiv y \left(\mod \frac{m}{(a,m)}\right)$.

ii) Find a positive integer n such that $\frac{n}{2}$ is a square, $\frac{n}{3}$ is a cube and $\frac{n}{5}$ is fifth power.

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Total No. of Questions : 4]

SEAT No. :

P724

[Total No. of Pages : 2

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T.Y.B.Sc.

PHYSICS

PH-331 : Mathematical Method in Physics - II

(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 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 postulate of special theory of relativity.

c) State Fuch's theorem.

d) State degree of differential equations.

e) Define orthogonal co-ordinate system.

f) Define Metric coefficients.

g) What is length contraction?

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

i) What is co-ordinate system.

j) State order and degree of differential equation $\frac{d^3y}{dx^3}+\frac{\sqrt{d^2y}}{dx^2}+x=0$

Q2) Attempt any two of the following: (5 Mark each) **[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 lorent'z transformation equation.

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

P.T.O.

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

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

b) Prove that the spherical polar co-ordinate system is orthogonal.

c) Show that the point $x=\infty$ is a regular singular point of the Legendre'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 $y''-2xy'+2\lambda y=0$ for $x=0$.

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

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

i) Prove that $P_n(1)=1$.

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

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Total No. of Questions : 4]

SEAT No. :

P725

[Total No. of Pages : 2

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T.Y.B.Sc.

PHYSICS

PH-332 : Solid State Physics

(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) ***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 packing fraction.

b) Define the term symmetry operation.

c) State Bragg's diffraction condition in reciprocal lattice.

d) What is nearly free electron model.

e) What do you mean by quantitative analysis?

f) Define Fermi energy.

g) What are domains?

h) What is Neel temperature?

i) Define super conductors.

j) Define primitive unit cell.

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

a) Discuss crystal structure of NaCl in details.

b) With the help of Ewald's construction show that the diffraction condition in reciprocal lattice is exactly equivalent to $2d \sin\theta = n\lambda$ in the direct lattice.

c) Write a note on type-I and type - II superconductors.

P.T.O.

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

a) Find out the number of atoms per square millimeter on a plane (100) of lead whose interatomic distance is 3.499 $\mathring{A}$. Lead has Face-centred cubic structure.

b) In a Hall effect experiment on Zinc, a potential of 4.5μv is developed across a foil of thickness 0.02 mm. When a current of 1.5 A is passed in a direction perpendicular to a magnetic field of 2.0 T. Calculate

i) The Hall cofficent for Zinc.

ii) The electron density.

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

c) A paramagnetic substance has 10^{28} atoms/m^3. The magnetic moment of each atom is 1.79×10^{-23} A–m^2. Calculate the para magnetic susceptibility of the material at temperature 320°K. What would be the dipole moment of the rod of this material 0.1 m long and 1cm^2 cross - section placed in a field of 7×10^4A/m? (K=1.38×10^{23}J/°K, $\mu_0=4\pi\times10^{-7}$ Wb/A–m).

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

i) State three assumptions of sommerfeld's free electron model and obtain on expression for energy levels and density of states in one dimension.

ii) Write detailed note on TGA and Ultraviolet visible spectrophotometer.

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

i) What are ferrites? Give two examples.

ii) Sketch (112) and (2,0,0) planes in simple cubic cell.

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Total No. of Questions :4] SEAT No. :

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[5315]-315
T.Y.B.Sc.
(PHYSICS)
PH-333 : Classical Mechanics
(2013 Pattern) (Paper - III) (Semester-III)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of Logtables and Calculators is allowd***

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

a) Define Centre of mass of a system.

b) What is the effect of Magnetic field on the kinetic energy of a charged particle.

c) What is geosynchronous orbit?

d) Define apsidal distance.

e) What do you mean by total cross-section in Scattering process?

f) What is impact parameter?

g) What do you mean by degree of freedom?

h) State D'Alembert's principle.

i) What is the condition for a transformation to be canonical?

j) Write Jacobis identity.

Q2) Attempt any two of the following.

a) State and prove kepler's third law of planetory motion. **[5]**

b) Obtain the relation between scattering angles in LAB and CM systems. **[5]**

c) What do you mean by constraints? Explain holonomic and nonholonomic constraints with suitable examples. **[5]**

P.T.O.

Q3) Solve any two of the following.

a) A body is projected at such an angle that the horizontal range is 3 times the maximum height. calculate the angle of projection. **[5]**

b) Evaluate following poisson's bracket.

i) $[J_x, P_x]$ ii) $[J_x, P_y]$ **[5]**

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

Q4) a) Attempt any one of the following.

i) Write the Hamiltonian of the system in terms of lagrangian.Obtain Hamilton's canonical equations of motion. **[8]**

ii) What is inelastic scattering ? Obtain the Q-value equation in inelastic scattering process. **[8]**

b) Attempt any one of the following.

i) show that the poisson bracket of any two dynamical variables is anti-commutative. **[2]**

ii) What is central force ? Give examples. **[2]**

Total No. of Questions :4] SEAT No. :

P727 [Total No. of Pages : 2

[5315]-316
T.Y.B.Sc.
PHYSICS
PH-334 : Atomic and Molecular Physics
(2013 Pattern) (Paper - IV) (Semester-III)

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

Instructions to the candidates:

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

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

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

b) State pauli's exclusion principle.

c) What is ground state of an electron?

d) State the values of m_l for l=4.

e) State formula for wavelength of Balmer series.

f) What is the conclusion of Frank -Hertz experiment?

g) What is the physical significance of principal quantum number?

h) Define equivalent electrons.

i) State Bohr's first postulate in Bohr's theory.

j) State formula for reduced mass of molecule.

Q2) Attempt any two of the following.

a) What is Raman effect? Describe experimental set up to observe Raman spectra. **[5]**

b) State and explain Lande Interval rule. Represent it graphically for ^3D term. **[5]**

c) Obtain an expression for rotational energy level of rigid diatomic molecule. **[5]**

P.T.O.

Q3) Attempt any two of the following.

a) In an experiment of Raman effect using mercury green radiation of λ =546.1nm, a stoke's line of wavelength 554.3 nm was observed. Find Raman shift and wavelength corresponding to anti-Stoke's line. **[5]**

b) A sample of certain element is placed in 1 Tesla magnetic field and suitably excited. How for apart are the zeeman components of the 5000 A^0 spectral line of this element?

Given: $e=1.6\times10^{-19}c$, $m=9.11\times10^{-31}$ kg, $c=3\times10^{8}$m/s. **[5]**

c) The force constant of the bond in CO molecule is 1956 N/M Calculate the frequency of vibration of the molecule and the spacing between its vibrational energy levels in ev. **[5]**

Given: $h=6.63\times10^{-27}$ erg^{-sec}, $1ev=1.6\times10^{-12}$erg.

$c=3\times10^{8}$m/s, $\mu=1.16\times10^{-26}$kg.

Q4) a) Attempt any one of the following.

i) What are x-rays? Discuss in detail production of characteristic x-ray spectra with energy level diagram. **[8]**

ii) Obtain an expression for spin-orbit interaction energies for two valence electron system (LS coupling). **[8]**

b) Attempt any one of the following.

i) What are 'L' and 'S' quantum numbers corresponding to $^3D_2$? **[2]**

ii) What is vibrational- rotational spectrum? **[2]**

Total No. of Questions :4]

SEAT No. :

P728

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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 electronic calculator or log table is allowed.***

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

a) What is flow chart?

b) Define Key words.

c) What is library function?

d) Define the term error.

e) Why break statement is used?

f) What is pixel?

g) Write general format of scanf function.

h) What do you mean by user defined function?

i) Give uses of gets ( ) and puts ( ) functions.

j) Give two examples of Jump statements.

P.T.O.

Q2) Attempt any two of the following.

a) Evaluate $\int_4^{5.2} \ln(x)dx$ using Trapezoidal rule. **[5]**

b) Describe relational and logical operators in C. **[5]**

c) Write 'C' program to draw line, circle, ellipse, and bar. **[5]**

Q3) Attempt any two of the following.

a) Find root of $x^4 - x - 10$ using Newton - Raphson method. **[5]**

b) Explain storage classes with suitable examples. **[5]**

c) What is array? Explain with suitable examples. **[5]**

Q4) A) Attempt any ONE of the following.

a) i) Describe simpson's $1/3^{rd}$ method of computing integral. **[4]**

ii) What is meant by looping? Describe two forms of looping. **[4]**

b) i) Write an algorithm to print N prime numbers. **[4]**

ii) Write a program to calculate and print square of the number. **[4]**

B) Attempt any ONE of the following.

a) Why C language is a middle level language. **[2]**

b) Find the output of the following 'C' program. **[2]**

```
# include <stdio.h>
   main ( )
  { int i=5;
  While (i)
  {i - -;
   if (i = = 3)
   break;
  Printf  ("%d", i);
  }
}
```

Total No. of Questions :4]

SEAT No. :

P729

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T.Y.B.Sc.

PHYSICS

PH - 336 (A) : Astronomy and Astrophysics

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

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

Instructions to the candidates:

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

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

a) What are white Dwarfs?

b) What are meteors?

c) What is meant by a main squence star?

d) What is the use of image intensifier tube?

e) State kepler's laws of planetary motion.

f) State Wien's law.

g) What is cosmic microwave background radiation?

h) What is a Radio Galaxy?

i) Where do comets originate from?

j) What are Binary stars?

P.T.O.

Q2) Attempt any two (five marks each)

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

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

c) Explain the cassegrain reflector telescope. **[5]**

Q3) Attempt any two (Five marks each)

a) What are the advantages of Radio Telescopes over optical Telescopes? **[5]**

b) How is rotational period of a star obtained from its spectra. **[5]**

c) What is Non- optical Astronomy? **[5]**

Q4) A) Attempt any one

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

b) Write a short note on Quasar Red shift. **[8]**

B) Attempt any one

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

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

Total No. of Questions :4]

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T.Y.B.Sc.

PHYSICS

PH - 336 (B) : Elements of Material Science

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

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

Instructions to the candidates:

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

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

a) What is tensile strength of material?

b) What do you mean by eutectic temperature?

c) Define electricalresistivity of material.

d) Give any two properties of single phase alloys.

e) What do you mean by addition polymerization?

f) Why tempered glasses are used for windows of car?

g) Define smart materials.

h) State lever rule.

i) Define diffusivity.

j) What do you mean by degree of polymerization?

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

a) Explain organic polymer with an illustration of polyethylene polymer and state the unique characteristics of organic polymer.

b) State and explain Fick's first law of diffusion.

c) Distinguish between elastic and plastic deformation.

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

a) Copper has resistivity of 17×10^{-9} ohm-m. What is the resistance of copper wire of length 4m and radius of 0.04 cm.

b) Calculate the volume of unit cell and density of compound of cds having structure same as ZnS. The centres of unlike ions are separated by 2.5 A°. The atomic weight of cd is 112.4 dmu and that of S is 32.1 amu.

c) A tensile stress of 10 MNm^{-2} is applied along the [112] direction of an iron crystal. What is the shear stress in the (010) direction lying on the (001) plane?

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

i) What are phase diagrams? Explain the phase diagram of lead -tin (pb-sn) system qualitatively.

ii) Explain ZnS and NaCl type Ax structure.

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

i) Enlist any four applications of smart materials.

ii) What do you mean by condensation polymerization?

Total No. of Questions :4]

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T.Y.B.Sc.

PHYSICS

PH - 336 (C) : Motion Picture Physics

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

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

Instructions to the candidates:

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

Q1) Attempt all questons. **[10]**

a) What is angle of view?

b) Define the term: Perspective.

c) State types of Enlarger.

d) What are film formats.

e) What is depth of field.

f) Write shutter speed scale.

g) List the contents of fixer.

h) What are special lenses?

i) What is ideal shutter?

j) State different types of printing methods.

Q2) Attempt any two of the following.

a) What are the factors affecting the developing process? Explain in brief. **[5]**

b) Explain the characteristics and types of films. **[5]**

c) Explain advantages and disadvantages of any one type of camera shutter. **[5]**

Q3) Attempt any two of the following.

a) Explain wide angle and Tele photo lenses. **[5]**

b) Explain Indoor Lighting setup. **[5]**

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

Q4) a) Attempt any one of the following.

i) Explain construction, working and features of SLR camera. **[8]**

ii) Describe different stages involved in processing of photographic materials and the chemicals used at these stages. **[8]**

b) Attempt any one of the following.

i) Draw a neat labelled diagram of TLR campera. **[2]**

ii) What do you meant by equivalent exposure. **[2]**

Total No. of Questions :4]

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T.Y.B.Sc.

PHYSICS

PH - 336 (D) : Biophysics

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

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

Instructions to the candidates:

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

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

a) Define the term 'Biometry'.

b) What is x-rays.

c) State the principle of colorimeter.

d) What do you mean by biopotential.

e) Define the term 'diffusion'.

f) Define bond length.

g) Define Resting potential.

h) What do you mean by ECG?

i) Define 'Half cell potential'.

j) Define surface tension.

Q2) Attempt any two of the following.

a) Explain the structural aspects of Mitochondria. **[5]**

b) Explain the construction and working of glass electrode. **[5]**

c) Explain Ramchandran plot. What is its physical significance. **[5]**

Q3) Attempt any two of the following.

a) Describe crystallography as a method for a structure determination of biomolecules using NmR. **[5]**

b) Describe in detail SEM with suitable examples. **[5]**

c) Describe the construction and working of centrifuge. **[5]**

Q4) a) Attempt any one of the following.

i) What is spectro photometer? Explain construction and working of spectro photometer. **[8]**

ii) What is polarization Describe in detail polarizable and non-polarizable electrodes with suitable examples. **[8]**

b) Attempt any one of the following.

i) If heart rate 80 beats/ min. and paper speed is 40 mm/sec, calculate the distance between two concsecutive R waves. **[2]**

ii) Define the term 'Resistive transducers'. **[2]**

Total No. of Questions :4]

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T.Y.B.Sc.

PHYSICS

PH - 336 (E) :Renewable Energy Sources

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

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

Instructions to the candidates:

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

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

a) What is gasifier?

b) State the principle of solar dryer.

c) What is wind energy?

d) What is solar constant?

e) What are non-conventional socerces of energy?

f) Define efficiency of solar cell.

g) State two factors affecting bio-digestion.

h) Define diffuse radiation.

i) State any two advantages of biological conversion of solar energy.

j) What is solar concentrator?

Q2) Attempt any two.

a) Describe various types of wind machine rotors. **[5]**

b) Write a note on solar cooker. **[5]**

c) State the advantages and disadvantages of floating and fixed dome type plant. **[5]**

Q3) Attempt any two.

a) Calculate the efficiency of solar cell using the followeing data.

Given : V_{oc} = 400mv, 1_{sc}=40mA, F.F. = 0.7 Input power of the cell = 6×10^{-2}w. **[5]**

b) The solar radiation intensity leaving the surface of the sun is 5.961×10^{7} W/m^2 and radius of sun surface is 6.960×10^{8}m. If the sun emits radiation pically then determine the radiant flux crossing the surface.

[Given : mean earth-sun distance=1.5×10^{11}m]. **[5]**

c) With suitable diagram, discuss the structure of sun. **[5]**

Q4) a) Attempt any one

i) Describe the construction and working of solar distillation and solar water heater (Natural circulation). **[8]**

ii) Discuss in detail presentation of wind data. What is energy audit? **[8]**

b) Attempt any one.

i) State the energy balance equation for the collector. **[2]**

ii) State the advantages of biological conversion of solar energy. **[2]**

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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)

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

Note : - 1) All Questions are compulsory.

2) Figures to the right indicate full marks.

3) Draw neat diagrams wherever necessary.

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

a) Define Nodal Points.

b) State Malus law.

c) What are coherent sources?

d) What is Rochon Prism?

e) Give any one application of Fermat's principle.

f) What are unit planes?

g) Define the term Numerical aperture.

h) Define photo - voltaic detector.

i) What are the types of looses is optical fibre?

j) What are cardinal points?

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

a) Obtain the system matrix for a thin lens.

b) Give theory & construction of a half wave plate.

c) Write a note on Gaussian beam propagation.

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

a) Using format's principle establish the laws of refraction of light.

b) Explain ADD photodiode in detail.

c) Calculate the NA & acceptance angle of an optical Fibre.

Given : μ (core) = 1.55, μ_2 (cladding) =1.50

Q4) a) Attempt any <u>one</u>:- **[8]**

i) Explain the phenomenon of interference of thin film due to transmitted light & obtain the expression for minima & maxima.

ii) Explain non - destructive testing in detail.

b) Attempt any <u>one</u>:- **[2]**

i) Define photo emissive detector.

ii) Define Matrix method.

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 log table and calculator is allowed.***
5) ***Actual calculations must be shown while solving problems.***

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

a) Write the exponential form of Arrhenius equation.

b) Write relationship between $t_{1/2}$ & initial concentration of reactant(a) for third order reaction.

c) Define equivalent conductance what is its unit?

d) Transport number of cation is 0.837 calculate transport number of Anion.

e) State Snell's law.

f) What is C-Br bond length in bromobenzene if its dipolemoment is 1.75 D?

g) Define the terms

i) Wavelength. ii) Frequency.

h) Why CO_2 molecule does not show rotational spectra?

i) What is degree of freedom?

j) Calculate the no. of phases for the system having F=3 and C=2.

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

i) Explain half life method for determination of order of reaction.

ii) Explain the electrophoretic effect.

iii) Explain stokes and antistokes line in Raman Spectra.

P.T.O.

b) Solve ANY ONE of the following: **[4]**

i) A first order reaction is 50% completed in 30 min at 27ºC and in 10 min at 47ºC. Calculate the activation energy of the reaction.

ii) The dielectric constant of $CH_4(g)$ at 0ºC and 1atm pressure is 1.00094, Assuming that methane behaves as an ideal gas, calculate

1) The induced molar polarization.

2) The polarizability of the substance.

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

a) What is specific & equivalent conductance? Explain the effect of dilution on specific and equivalent conductance.

b) Derive exponential form of Arrhenius equation.

c) Discuss main features of the phase diagram of two componant system.

Q4) a) What is vibrational motion? State equation of fundamental vibration frequency $\bar{\omega}$ & discuss pure vibrational spectrum in case of heteronuclear molecules. **[6]**

OR

Attempt the following:

i) How solubility of Sparingly Soluble salt is determined by conductance measurement?

ii) Define phase, component and Degree of freedom.

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

i) Calculate rotational constant of NO molecule if bond length is 1.15 $\mathring{A}$ (At. wt. N=14, O=16 h=6.624×10^{-27}erg sec., Avogadro's number=6.023×10^{23} C=3×10^{10} Cm).

ii) At 25ºC the equivalent conductance of 0.1 N acetic acid is 5.2 cm^2 ohm^{-1} $equivalent^{-1}$. λ_∞ for acetic acid is 390.7 cm^2 ohm^{-1} $equivalent^{-1}$. Calculate the dissociation consant of acetic acid at 25ºC.

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Total No. of Questions : 4]

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T.Y.B.Sc.

CHEMISTRY

CH-332 : Inorganic Chemistry

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of log table and calculator is allowed.***
4) ***Marks are reserved for neat diagram.***
5) ***Atomic numbers : He-2; Be-4; C-6; O-8; V-23; Cr-24; Ni-28 Cu-29; Zn-30.***

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

a) Calculate bond order of He_2 molecule.

b) Give oxidation state of Fe in$[Fe(Co)_5]$.

c) Define hydrate isomerism.

d) What is EAN rule?

e) What are possible geometrics for coordination number 4?

f) Calculate the stabilization energy of Be_2 molecule.

g) What type of hybridization is shown by $[Ni(CN)_5]^{3-}$ ion?

h) Calculate CFSE for d^6 ion in strong octahedral field.

i) Give the symmetry symbol for $dx^2–y^2$ and dz^2 orbitals.

j) Give any two limitations of CFT.

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

i) Draw M.O. energy level diagram of C_2 molecule and calculate bond order.

ii) Give assumptions of Valence bond theory (VBT).

P.T.O.

iii) Write IUPAC names following complexes:

1) $[Pt(NH_3)_2Cl_2]$

2) $K_3[Fe(C_2O_4)_3]$

3) $[Co(NH_3)_5Cl]SO_4$

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

i) Sketch the MOs formed from 'p–p' combination of atomic orbitals.

ii) What are the factor's affecting magnitude of 10 Dq?

iii) State whether EAN rule is obyed in the following Complexes

1) $[Cu(CN)_4]^{2-}$

2) $[V(CO)_6]$

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

a) Explain the formation of CO and CO^+ ion on the basis of MOT.

b) Discuss the formation of $[Zn(NH_3)_6]^{2+}$ ion without 'pi' bonding on the basis of MOT.

c) For the $[Cr(H_2O)_6]^{2+}$ and $[Cr(CN)_6]^{4-}$ the $\triangle_0$ values are 17830cm^{-1} and 26280cm^{-1} respectively. The pairing energy is 23520cm^{-1}. Calculate the number of unpaired electrons and magnetic moment.

Q4) a) With the help of MO energy level diagram explain the formation of 'O_2' molecule and comment how does bond order and magnetic property vary in O_2^-, O_2^{2-} and O_2^+ ions. **[6]**

OR

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

i) Discuss stepwise and overall formation constant.

ii) Give the Crystal field splitting diagram for square planer complex.

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

i) Give postulates of Werner's Coordination theory.

ii) Draw all possible geometrical isomers of $[pt(NH_3)_2(PY)_2(Cl)_2]$ complex. Which isomers shows optical activity?

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Total No. of Questions : 4]

SEAT No. :

P732

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T.Y.B.Sc.

CHEMISTRY

CH-333 : Organic Chemistry

(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) ***Draw the structure and neat diagrams if necessary.***

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

a) Why amides are neutral?

b) Trans 1, 3 - dimethyl cyclohexane is optically active explain.

c) Which is a good nucteophile amongst $\overset{\theta}{M}H_2$ & MH_3.

d) Why cyclopropanone easily form hydrate with water?

e) What is E_2 reaction?

f) What is σ-complex?

g) What is kinetic isotopic effect?

h) Write the reaction of 2-butyne with Lindlar catalyst.

i) How will you convert bad leaving group - OH into good leaving group.

j) Write the reaction of acetaldehyde with hydroxylamine.

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

i) Guanidine is very strong base. Explain.

ii) Discuss the mechanism of Reformatsky reaction.

iii) What is ozonolysis? Explain the addition of ozone to 1-propene.

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

i) Explain Steric effect with suitable example.

ii) What are aryne's? Give evidences for it.

iii) Explain E_1CB mechanism with suitable example.

P.T.O.

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

a) Draw the chair conformations of trans-1, 4-dimethyl cyclohexane and comments on their stability and optical activity.

b) What is E_1 mechanism? Discuss the evidences for E_1 mechanism.

c) What is SN^1 reaction? Discuss the stereo chemistry of SN^1 reaction.

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

i) Discuss the Friedel craft acylation? Give its applications.

ii) Trans 2-butene on hydroxylation by OsO4 gives dl products. Why?

iii) Give the mechanism of benzaldehyde with hydrazine.

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

i) $CH_3-C\equiv C-H \xrightarrow[H_2SO_4/HgSO_4]{H_2O} A \xrightarrow{H_2N-OH} B$

ii)  $\xrightarrow{AlCl_3} A \xrightarrow[H_2SO_4]{HNO_3} B$

iii) $CH_3-CH_2-\underset{\oplus N(CH_3)_3}{CH}-CH_3\ I^{\ominus} \xrightarrow[\Delta]{moist\ Ag_2O} A \xrightarrow{H_2/Ni} B$

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Total No. of Questions : 4]

SEAT No. :

P733

[Total No. of Pages : 2

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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 indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of calculator and logarithmic table is allowed.***

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

a) Define the term solubility.

b) Define co-precipitation.

c) What is residual current.

d) Define Lambert's law.

e) Define the term migration current in polarography.

f) What is meant by chemical interference in AAS.

g) Give solubility product equation for $BaCO_3$.

h) Draw a Typical T.G. curve.

i) Name any two fuels used in FES

j) Calculate absorbance of a solution if it has transmitance 0.5.

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

i) Write note on total consumption burner.

ii) Give principle of polarography and explain the role of supporting electrolyte in polarography.

iii) Write short note on photomultiplyer tube.

P.T.O.

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

i) Draw and explain the pyrolysis curve for Magnesium Oxalate.

ii) When current of 2.5 Amp. Passed through $AgNO_3$ solution for 30 min during electrolysis. Calculate weight of Ag diposited (ECE of Ag=1.118×10^{-3}).

iii) Calculate the molar absorptivity of 3×10^{-4} M solution having 0.28 Absorbance when passed in 1.5 cm path length.

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

a) What is difference between co-precipitation and post-precipitation. How will you minimize co-precipitation.

b) Draw schematic diagram of FES and explain component used in it.

c) Define Beer's law. Derive mathematical equation of Beer's law.

Q4) a) Explain the principle of AAS and differentiate between AAS and FES.**[6]**

OR

i) What is thermogravimetric analysis and give labeled diagram of thermobalance. **[3]**

ii) Explain principle of Electrogravimetry. Define Faraday's first law with terms involved in it. **[3]**

b) The solubility product of $Mg(OH)_2$ is 1.2×10^{-11} at 25°C. Calculate solubility of $Mg(OH)_2$ in water in grams/Lit. (Mol. wt. of $Mg(OH)_2$ is 58) **[4]**

OR

Calculate the diffusion coefficient of cu^{2+}, ion of 2×10^{-3} M $CuSO_4$ solution shows 45 μA. The mercury drop time is 3.75 second per drop and mass of Hg flowing per second through capillary is 1.011 mg/s. **[4]**

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Total No. of Questions :4]

SEAT No. :

P734

[Total No. of Pages :2

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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 diagrams and flow sheet wherever necessary.***

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

a) Explain the term selectivity.

b) Give two important uses of nitric acid.

c) What is salting?

d) Give uses of cement.

e) What is lubricant?

f) Define the term unit operation.

g) What are antioxidants?

h) What is glass?

i) What are herbicides?

j) Draw the structure of sulphuric acid fog.

P.T.O.

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

i) Explain the terms process control and quality control.

ii) Give important uses of ammonia.

iii) Give advantages of agrochemicals.

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

i) Explain the terms capital investment and manufacturing cost.

ii) Write a note on coloured glass.

iii) What are safety precautions that should be taken in chemical process industry?

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

a) Explain the properties of good fuel.

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

c) Discuss the importance of proportioning of raw material in manufacture of cement.

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

i) DDT

ii) Endosulphan

OR

a) Describe the process of manufacture of nitric acid with flow sheet.

b) Define the terms ignition temperature and fire point. **[4]**

OR

b) Discuss modern techniques of food preservation.

Total No. of Questions :4]

SEAT No. :

P735

[Total No. of Pages :12

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T.Y.B.Sc.

CHEMISTRY

CH - 336 (A) : Nuclear Chemistry

(2013 Pattern) (Semester - III)) (Paper - VI) (913A3)

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 whenever necessary.***
4) ***Use of logtables and calculator is allowed.***

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

a) What is mass defect? Give the relation between binding energy & mass defect.

b) Which of the following nuclei is least stable?

i) $^{4}_{2}He$

ii) $^{16}_{8}O$

iii) $^{24}_{12}Mg$

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

c) What is anger electron?

d) State the magic numbers in shell model.

e) State two general characteristics of radioactive decay processes.

P.T.O.

f) The half life of radioactive element is 140 days. What is the value of decay constant.

g) What are thermonuclear reactions?

h) Complete the following nuclear reaction ${}^{9}_{4}\text{Be} + - - - \rightarrow {}^{12}_{6}\text{C} + {}^{1}_{0}\text{n}$.

i) State one example of conervation of proton in nuclear reaction.

j) What is internal conversion?

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

i) Write short notes on theory of $\alpha-$ decay.

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

iii) Explain periodicity in nuclear properties.

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

i) Calculate the energy released in the following fission reaction.

$${}^{249}\text{Es} + \text{n} \rightarrow {}^{161}\text{Gd} + {}^{87}\text{Br} + 2\text{n}$$

Atomic masses are 249

Es = 249.076 amu

n = 1.0087 amu

^{161}Gd = 160.928 amu

^{87}Br = 86.022 amu

ii) Explain the sequence of filling the orbit in nuclear model

iii) What is reaction cross section? What is its unit?

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

a) State and explain semi- empirical mass equation.

b) Explain Bethe's notation. What are the different types of nuclear reactions.

c) Explain different tuypes of radioactive decay processes with examples.

Q4) a) Explain Fermi theory of β decay. **[6]**

OR

a) Give salient features of shell model. What are the merits and limitations of the shell model? **[6]**

a) Describe liquid drop model in detail giving postulates. **[4]**

OR

b) Define half life and average life show that radioactive decay follows first order Kinetics. **[4]**

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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)

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 claculator is allowed.***

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

a) Define the term – polymerisation.

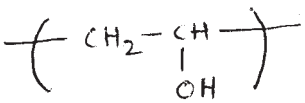
b) Polymer celluloid was inverted by ----.

c) Draw the structure of following polymers.

i) Polystyrene

ii) Teflon

d) Write the IUPAC name of



e) Give any two initiatar used in anionic polymerisation.

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

'Silicone polymer is an inorganic polymer'.

g) What is meant by biopolymer?

h) Name any two commonly used U.V. stabilizer.

i) Calculate molecular weight of polypropylene whose DP value is 2000.

j) Give any two important application of polyvinyl chloride.

Q2) a) Explain the following. **[6]**

i) Polymer science has tremendously developed over the last few decades.

ii) Nylon – 6, 6 is used for making Fisherman's nets.

iii) In polymer solution, saturation point is absent.

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

i) Homopolymers and co-polymers.

ii) Thermoplastic and thermosetting polyners.

iii) Free radical and ionic polymerisation.

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

a) Discuss in brief the mechanism of co-ordination polymerisation.

b) give an account of end group analysis method used for determination of molecular weight of polymer.

c) Describe the melt and solution polymerisation in detail with suitable example.

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

i) A box of mangoes contains sets A, B, and C with their numbers and weight as shown below:

Set A: 30 mangoes with weight of each mango 200 gm

Set B : 20 mangoes with weight of each mango 300 gm

Set C : 40 mangoes with weight of each mango 100 gm

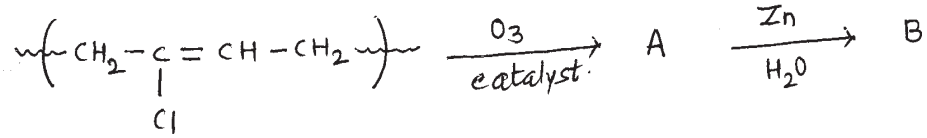
Calculate number average molecular ($\bar{M}n$) weight for the mangoes.

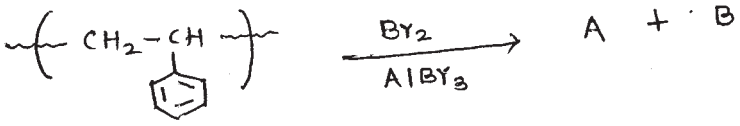
ii) Explain the role of flame retardant and antistatic agent during polymer processing.

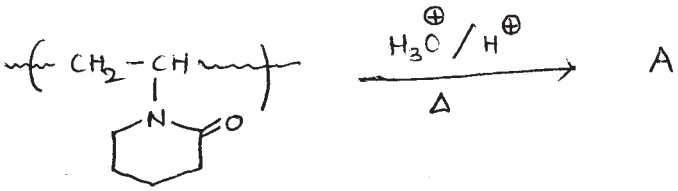
iii) Write a note on - Rayon polymer.

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

i) 

ii) 

iii) 

iv) 

Total No. of Questions :4]

P735

[5315] - 324

T.Y.B.Sc.

CHEMISTRY

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

(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 diagrams wherever necessary.***

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

a) What is affinity chromatography?

b) Give the names of two basic amino acids.

c) Name the deficiency disorder of Vitamin -A.

d) What are disaccharides? give example.

e) Give the function of mitochondria.

f) What is denaturation of protein?

g) Define soponification number.

h) What is active site of enzyme?

i) Name the two pancreatic hormones.

j) Define K_m.

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

i) What are the factors that stabilise protein structure?

ii) Give the classification of carbohydrate.

iii) Draw the structure of endoplasmic reticulum and give its function.

b) Write structures of any two. **[4]**

i) Gly - Trp

ii) Galactose

iii) lecithin

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

a) Comment on distinguishing features of prokaryotic & eukaryotic cell.

b) What is Enzyme inhibition? Discuss reversible & irreversible ezyme inhibition.

c) Give Principle, procedure and applications of electrophoresis.

Q4) a) What are lipids? Classify lipids with suitable examples. **[6]**

OR

Elaborate on titration curve of amino acids. Give its significance.

b) Write note on C.AMP as second messenger. **[4]**

OR

Write note on enzyme specificity.

Total No. of Questions :4]

P735

[5315] - 324

T.Y.B.Sc.

CHEMISTRY

CH - 336 (D) : Environmental and Green Chemistry

(2013 Pattern) (Semester - III) (Elective - I) (913D3) (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) ***Neat diagrams must be drawn wherever necessary.***

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

a) Define Pollutant.

b) Name any two trace components of atmosphere.

c) Define producers.

d) Draw the structure of m-hydroxy benzaldehyde.

e) Define atmosphere.

f) Arrange in order of greater health risk.

1 Butanol, Acetic unhydride, Benzene.

g) Define speciation.

h) What is mean by carcinogen.

i) Define the term Temperature Inversion.

j) Give any two examples of Green products.

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

i) What is the effect of hazardous solvents on environmental and workers of chemical industry.

ii) How detergents can cause water pollution?

iii) Explain organic particulate matter.

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

i) Hydrosphere

ii) Green Solvents

iii) Use of biomaterials as feedstock.

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

a) Explain Earth's radiation balance.

b) What is Green Chemistry? Give examples, use of Green Chemistry in industry.

c) Give any four scientific areas for practical applications of Green Chemistry.

Q4) a) Discuss the factors required in oreder to obtain good sample of air. Explain how gaseous and Vapour samples are collected. **[6]**

OR

Describe Thermal Pollution.

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

i) Renewable energy sources.

ii) Greener Synthesis of methyl Methacrylate.

♦ ♦ ♦

Total No. of Questions :4]

P735

[5315] - 324

T.Y.B.Sc.

CHEMISTRY

CH - 336 (E) : Agriculture Chemistry (Elective - I)

(2013 Pattern) (Semester - III) (New Course) (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) Answer the following. **[10]**

a) Give Importance of agriculture chemistry.

b) What is Bordeaux Mixture?

c) What is neutral soil?

d) Define 'Particle density'.

e) Define 'Ammonification'.

f) What is Total soluble salts.?

g) What is Manure?

h) What are organic fertilizers?

i) What are attractants?

j) What are the objectives of soil testing?

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

i) What is humus? Explain its functions.

ii) What is Herbicide? Give classification of herbicides according to mode of action.

iii) Explain role of nitrogen and deficiency symptoms of it in the plant.

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

i) Explain the term m. eq/L and ppm.

ii) What is the role of magnesium in the plants?

iii) Explain 'Lime Requirement'.

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

a) Discuss in brief sources of water.

b) Describe vermicompost in details.

c) Discuss reclamation of alkali soil.

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

i) Discuss Sodium Adsorption Ratio.

ii) Give advantages of mixed fertilizers.

iii) Give physical properties of soil.

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

i) Discuss anion exchange in soil.

ii) Give deficiency symptoms of calcium.

iii) Give structure and uses of BHC.

Total No. of Questions : 4]

SEAT No. :

P736

[Total No. of Pages : 2

[5315] - 325

T.Y.B.Sc.

BOTANY

BO-331 : CRYPTOGAMIC BOTANY

(Algue, Fungi, Bryophytes and Pteridophytes)

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

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

Instructions to the candidates:

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

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

a) Mention any two classes of pteridophyta as per sporne, 1975.

b) What are Higher Cryptogams.

c) Mention any two classes of Fungi as per Alexopoulos, 1979.

d) Name the sex organs in Chara.

e) Mention any two divisions of algae as per Chapman and Chapman, 1973.

f) Give any two general characters of Bryophytes.

g) Enlist any two types of spores in Puccinia.

h) Give any two economic importance of pteridophyta.

i) Enlist the parts of sporophyte of Polytrichum.

j) Mention the sex organs in Batrachospermum.

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

a) Explain the Sporophyte of Marchantia.

b) Give taxonomic position and describe thallus structure of Nostoc.

c) Describe the cell structure of Saccharomyces.

P.T.O.

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

a) Female conceptacle of Sargassum.

b) Thallus structure of Rhizopus.

c) External morphology of sporophyte of Psilotum.

Q4) Describe external and internal structure of thallus of Anthoceros. **[10]**

OR

Describe the external morphology and internal structure of petiole of Marsilea. **[10]**

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Total No. of Questions :4] SEAT No. :

P737 [Total No. of Pages : 2

[5315]-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 diagram wherever necessary***
3) ***Figures to the right indicate full marks.***

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

a) Define cell.

b) Enlist major chemical constituents of matrix.

c) Enlist any two functions of cell wall.

d) What is endocytosis?

e) What is Karyotype?

f) Enlist any two types of chromosomes.

g) What is C-value paradox?

h) Define nucleotide.

i) Enlist units of gene.

j) Enlist components of Lac-operon?

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

a) Describe Hershey and chase experiment on DNA.

b) Describe Watson and Crick model of DNA.

c) Explain one gene one enzyme hypothesis.

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

a) Dark excision repair system of DNA.

b) Characteristics of forms of DNA.

c) Structure and functions of lysosomes.

P.T.O.

Q4) What are giant chromosomes ? Describe in brief the giant chromosome studied by you. **[10]**

OR

What is genetic code? Explain the properties of genetic code.

Total No. of Questions :4] SEAT No. :

P738 [Total No. of Pages : 2

[5315]-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 diagram wherever necessary***
3) ***Figures to the right indicate full marks.***

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

a) Define heredity.

b) What is monohybrid cross?

c) Define crossing over.

d) What is sex-limited genes?

e) Define monosomy.

f) What are sex influenced genes?

g) Define deletion.

h) What is gene pool?

i) Define lethal genes.

j) What is mean by Genetics polymorphism?

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

a) Explain inheritance of blood group in human.

b) Differentiate between qualitative and quantitative traits.

c) Explain origin and production of autopolyploidy.

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

a) Law of dominance.

b) Duplicate genes (15:1).

c) Evidences from bio- geographical relations of evolution.

Q4) What is duplication ? Explain its types,cytology, position effect and bar eye phenotype in Drosophila. **[10]**

OR

Define evolution .Explain theory of inheritance of acquired characters (Lamark's)

Total No. of Questions :4] **SEAT No. :**

P739 **[Total No. of Pages :2**

[5315]-328
T.Y.B.Sc.
BOTANY
BO-334 : Spermatophyta and Palaeobotany
(2013 Pattern) (Semester-III) (Paper - IV)

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

a) Enlist any two characters of Gymnosperms.

b) Mention Fruit type of Family Asteraceae.

c) Give any example of natural system of classification.

d) Write any one economic importance of Gymnosperms.

e) Write any one example of family Nyctaginaceae.

f) Write type of inflorescence of family Magnoliaceae.

g) Write any one economic importance of Orchidaceae.

h) Write any one order of Lycopsida.

i) What are fossils.

j) Give any two orders of Gymnosperms.

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

a) Give assumptions of Hutchinson's system of classification.

b) Describe flower of Sub family Papilionaceae.

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

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

a) Pteridosperm theory.

b) Petri faction.

c) Salient features of Psilopsida.

P.T.O.

Q4) Describe external and internal morphology of male and female cone of pinus.

OR

Give distinguishing characters, floral formula and floral diagram of family Capparidaceae and Lamiaceae. **[10]**

Total No. of Questions :4]

SEAT No. :

P740

[Total No. of Pages :2

[5315] - 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 diagrams wherever necessary.***
3) ***Figures to the right indicate full marks.***

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

a) Define horticulture.

b) Give source of Vitamin A.

c) What is seed viability?

d) Give any one objective of training of horticultural plants.

e) Write any two physical propertics of soil.

f) Enlist any two names of famous gardens in India.

g) Give any one scope of floriculture.

h) What is impregnation?

i) Write any two names of chemicals used for painting of dry flowers.

j) What is canning?

P.T.O.

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

a) Write about export potential of horticultural crops and products in India.

b) Explain any two methods of artificial vegetative propagation.

c) Give an account of classification of horticultural crops.

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

a) Japanese Garden.

b) Bahar treatment.

c) Preservation methods for dry flowers.

Q4) Give an account of mango, with reference to soil, climatic requirements, 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 Gladiolus. **[10]**

Total No. of Questions :4] SEAT No. :

P741 [Total No. of Pages :2

[5315]-330
T.Y.B.Sc.
BOTANY
BO-336: Computational Botany
(2013 Pattern) (Semester-III) (Paper -VI)

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

Instructions to the candidates:

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

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

a) What is null hypothesis?

b) Give any two objectives of classification of data.

c) What is standard error?

d) Enlist any two types of correlation.

e) What is vigor Index (VI)?

f) Give any two Significance of chi-squaretest.

g) Define Leaf Area Index (LAI).

h) Give any two properties of correlation coefficient.

i) What is primary and secondary data?

j) Give formula to calculate frequency.

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

a) What is biostatistics? Describe its applications.

b) What is non- random sampling? Describe its methods.

c) Explain how to compute frequency and density from data obtained through Quadrats.

P.T.O.

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

a) Pie diagram.

b) Normal distribution.

c) Standard deviation.

Q4) What are measures of central tendency? Give an account of any two central tendency with its merits and limitations. **[10]**

OR

What is seed germination? Give an account of seed germination and early seedling growth under stress.

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Total No. of Questions : 4]

SEAT No. :

P742

[Total No. of Pages : 2

[5315] - 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) Define commissure.

b) Give one example of Hemichordata.

c) State the name of organ of aquatic respiration in Pila.

d) State the function pectin in calotes.

e) Define heterodont dentition.

f) Define mesonephros kidney.

g) Define Oligopyrine sperm.

h) State the function of mantle.

i) Define astevation.

j) Give two names of scale in calotes.

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

a) Eye of calotes.

b) Sketch and lable brain of frog.

c) Describe the heart of calotes.

P.T.O.

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

a) Radula.

b) Accessory respiratory organs in fishes.

c) Hyoid apparatus.

Q4) Describe male reproductive system of Pila. **[10]**

OR

Describe the digestive system of calotes.

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Total No. of Questions :4]

SEAT No. :

P743

[Total No. of Pages : 1

[5315]-332
T.Y.B.Sc.
ZOOLOGY
ZY -332 : Mammalian Histology
(2013 Pattern) (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 crypts of Liberkuhn?.
b) State the names of lingual papillae.
c) What is Graafian follicl?
d) What are PEYER's patches?
e) State the name of any two layers of adrenal cortex.
f) State the names of any two layers of epidermis.
g) Define vasa vasorum.
h) Define stratified epithelium.
i) State the name of voluentry muscles.
j) State the names of any two types of cells in adenohypophysis.

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

a) Sketch and label T.S. of tesis.
b) Describe the histological structure of thyroid gland.
c) Describe fluid connective tissue.

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

a) Nervous tissue.
b) Histology of pancreas.
c) Histology of sublingual salivary gland.

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

OR

Describe histological structure of Kidney.

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Total No. of Questions : 4]

SEAT No. :

P744

[Total No. of Pages :2

[5315]-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 isoenzymes.

b) Define covalent bonds.

c) State two Properties of Water.

d) What is Vmax of an enzyme catalysed reaction?

e) Define monosaccharides.

f) Name the Protein Possessing α - helical structure.

g) What are allosteric enzymes?

h) Define hypoglycemia.

i) What is AKU?

j) What is atherosclerosis?

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

a) Describe the Structure of water molecule.

b) Explain reversible enzyme inhibition.

c) Explain Secondary Structure of protein.

P.T.O.

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

a) Mutarotation

b) Buffering capacity

c) Effect of temperature on enzyme reaction.

Q4) What are amino acids? Give an account of classification of amino acids based on structure with suitable examples. **[10]**

OR

What are lipids? Describe classification of lipids with suitable examples.

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Total No. of Questions :4]

SEAT No. :

P745

[Total No. of Pages : 1

[5315]-334
T.Y.B.Sc.
ZOOLOGY
ZY -334 Environmental Biology and Toxicology
(2013 Pattern) (Semester-III) (Paper - IV)

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

Instructions to the candidates:

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

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

a) Define environmental biology.
b) Define noise pollution.
c) What is meant by vulnerable species?
d) What is atmosphere?
e) Define producers.
f) What is industrial waste?
g) What is water pollution?
h) What is LC 50?
i) Enlist soil pollutants.
j) Define food web.

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

a) Forest conservation.
b) Explain sources of air pollution.
c) Population explosion.

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

a) Describe wildlife conservation.
b) Explain different types of toxicants.
c) Non-renewable resources.

Q4) What are pollutants? Describe in detail any three types of environmental pollutants. **[10]**

OR

Define ecosystem, Describe biotic and abiotic components of ecosystem with their relationship.

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Total No. of Questions :4]

SEAT No. :

P746

[Total No. of Pages :2

[5315] - 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 obligatory parasite.

b) Give any two symptoms of Typhoid.

c) Write the habitat of W. bancrofti.

d) Define helminthology.

e) State any one control measure of malerial parasite.

f) Define symbiosis.

g) Define definitive host.

h) What is facultative parasite.

i) Define reservoir host.

j) Define mutualism.

P.T.O.

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

a) Describe bladderworm in Taenia Solium.

b) Explain parasitological significance of Toxoplasmosis.

c) Describe structural specificity.

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

a) Intermediate host.

b) Control measures of arthropod vector of Dengue.

c) Pathogenicity and control measures of Entamoeba histolytica.

Q4) Give an detail account of life cycle, mode of infection and control measures of Tick.

OR

Describe habit, habitat, moda of infection, pathogenicity and control measures of Ascaris Lumbricoides. **[10]**

Total No. of Questions : 4]

SEAT No. :

P747

[Total No. of Pages : 2

[5315] - 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) Define autopsy.
b) What is clinical pathology?
c) Define hyperemia.
d) What is Calcification?
e) What is pigmentation?
f) Define benign tumour.
g) Define primary healing.
h) Define thrombus.
i) State two examples of viral diseases.
j) Define gas gangrene.

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

a) Describe liver function test.
b) Give an account of causes of necrosis.
c) Describe fatty degeneration.

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

a) Embolism.
b) Ischaemia.
c) Cardinals of inflammation.

Q4) Define Neoplasia. Explain benign and malignant tumour. **[10]**

OR

What is Gangrene? Describe various types of gangrene.

Total No. of Questions : 4]

P747

[5315] - 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 endocytosis?
b) Define prokaryotic cell.
c) What are membrane receptors?
d) Give functions of Micro tubules.
e) Define necrosis'.
f) F_1 particles.
g) What is unit membrane.
h) Mention effects of free radicals on cell.
i) Give significance of crossing over.
j) What are carcinogens?

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

a) Describe functions of plasma membrane.
b) Mention composition and functions of nucleolus.
c) Enlist the characteristics of cancer cell.

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

a) Somatic mutation.
b) Intra and extra cellular changes during cellular ageing.
c) Significance of meiosis.

Q4) Describe the ultrastructure and functions of Lysosome and Golgi complex. **[10]**

OR

Define cell cycle. Describe various phases of cell cycle. Add a note on significance of mitotic cell division

Total No. of Questions : 4]

SEAT No. :

P748

[Total No. of Pages : 2

[5315] - 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) ***Neat labelled diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

Q1) Answer in 2/3 lines: **[10]**

a) What is pleochroism?

b) Give names of any two tektosilicate minerals.

c) What is sign of elongation?

d) What are refractory minerals?

e) What is biaxial mineral?

f) Give chemical composition of monazite.

g) What is optic normal?

h) What are accessory plates?

i) What is relative retardation?

j) What are orthopyroxenes?

Q2) Write notes on (Any two) **[10]**

a) Structure and composition of amphibole.

b) Composition and properties of clay minerals.

c) Determination of Interference colours.

P.T.O.

Q3) Write notes on (Any two) **[10]**

a) Physical properties and uses of sulphates.

b) Properties of diamond, ruby and sapphire as precious stones.

c) Composition and uses of calcite and paragenesis of apatite.

Q4) Give silicate structure, chemical and optical properties, paragenesis and alteration products of OLIVINE mineral group or GARNET mineral group. **[10]**

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Total No. of Questions :4]

SEAT No. :

P749

[Total No. of Pages : 1

[5315]-338
T.Y.B.Sc.
GEOLOGY
GL -332 :Igneous Petrology
(2013 Pattern) (New) (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 in 2-3 lines. **[10]**

a) Define primary magma.
b) Define petrographic province.
c) Give mineral composition of peridotite.
d) What is inter granular texture?
e) What is the basis for classification of igneous rocks according to IUGS?
f) Define corona/ Reaction rim.
g) Which minerals are usually found in the rock Anorthosite?
h) Define Vesicular and Amygdoidal structure.
i) Name the rock that usually exhibits columnar structure.
j) Name any two derivative magmas.

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

a) Describe Graphic texture & flow structure.
b) Flow differentiation.
c) Significance of rock kindreds.

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

a) Generation of magmas in different tectonic settings.
b) Contaminated Granites.
c) Origin and mineral composition of Basalts.

Q4) Describe CIPW classification of Igneous rocks. **[10]**

OR

Describe in detail the crystallisation of Ab-An-D+system &its significance.

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Total No. of Questions :4]

SEAT No. : ____

P750

[Total No. of Pages :2

[5315]-339
T. Y. B. Sc.
GEOLOGY
GL-333: Sedimentary Petrology
(2013 Pattern) (Semester-III)(Revised) (paper III)

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

Instructions to the candidates :

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

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

a) What is epigenetic deposit?

b) Which sedimentary rocks are suitable for hydrocarbon Prospecting?

c) Name two oxides which do not undergo mobility.

d) What are heavy minerals?

e) Define selective abrasion.

f) Which Process operates for the Size reduction of Sedimentary particles?

g) Who Proposed phi scale?

h) Name any two physical parameters for Sedimentary environmental analysis.

i) What do you mean by Stylolites?

j) Name any two heavy minerals which indicate I'gheous Provenance.

Q2) Answer in short (any two) **[10]**

a) Explain the methodology for Studying Sedimentary rocks in laboratory.

b) Compare grade-scales of Udden and Went worth.

c) Explain the climatic control on Sedimentation.

P.T.O.

Q3) Answer in short (any two) **[10]**

a) Describe with the help of example the mobility of oxides.

b) Describe the process of progressive dilution.

c) What is Provenance of Sediments. Describe the Provenance with the help of heavy minerals.

Q4) Describe the classification of depositional sedimentary environments **[10]**

OR

Define texture. Enumerate the factors controlling texture of Sedimentary rocks.Distinguish between elastic and Non-elastic textyres **[10]**

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Total No. of Questions :4]

SEAT No. :

P751

[5315]-340

[Total No. of Pages : 2

T.Y.B.Sc.
GEOLOGY
GL -334 :Structural Geology
(2013 Pattern) (Semester-III) (Paper IV)

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 in 2/3 lines. **[10]**

a) Axis of folds.
b) Any two applications of structural Geology.
c) Shear fractures.
d) Gravity faults.
e) Flexture -slip folding
f) Factors controlling rock deformation.
g) Types of forces.
h) Mullion structure.
i) Segregation banding.
j) Plastic deformation.

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

a) Balanced and unbalanced forces.
b) Flutey's classification of folds.
c) Stoess-strain ellipsoid.

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

a) Mechanics of faulting.
b) Slaty cleavage and bedding cleavage.
c) Intergranular and Intragranular movements.

P.T.O.

Q4) Describe the concept and mechanics of folding. Add a note on Ramsay's Classification of folds. **[10]**

OR

Define lineations. Explain with suitable examples primary and secondary lineations. Add a note on lineations related to major structures.

Total No. of Questions :4]

SEAT No. :

P752

[Total No. of Pages :2

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T.Y.B.Sc.

GEOLOGY

GL - 335 : Precambrian Startigraphy 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 diagrams must be drawn wherever necessary.***

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

a) Name the tectonic elements of oceans.

b) Give lithology of chalk Hills.

c) Name the three physiographic divisions of India.

d) Name any two important acidic intrusives found on singhbhum - Odisha craton.

e) Name the two cratons which form the Aravalli craton.

f) Give tectonic subdivisions of Himalaya.

g) Give the lithostratigraphic subdivisions of cuddapah supergroup.

h) Give economic importance of Aravalli craton.

i) Which geological time is represented by Aryan Era of Sir T.H. Holland?

j) What is CITZ?

P.T.O.

Q2) Write Notes on (Any Two) **[10]**

a) Sausar Group.

b) Current classification of Archaean formations of India.

c) Precambrians of Central Lesser Himalayas.

Q3) Write Notes on (Any two) **[10]**

a) World Precambrian History.

b) Stratigraphic Succession of chhattisgarh Supergroup.

c) Stratigraphic succession and lithology of Bhilwara supergroup.

Q4) Give detailed general stratigraphy of Dharwar Craton in a tabular form.

OR

Give the geographic distribution, classification with stratigraphic succession, lithology and economic importance of Vindhyan supergroup. **[10]**

Total No. of Questions : 4]

SEAT No. :

P753

[Total No. of Pages : 2

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T.Y.B.Sc.

GEOLOGY

GL - 336 : Applied Geology - I

(Geomorphology, Remote Sensing & Field Geology)

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

Q1) Define/Answer/ Explain the following 2/3 lines: **[10]**

a) Field correlation.

b) Attitude of an outcrop.

c) Give the significance of stefan-Boltzmann's law.

d) Factors controlling Relief displacement in an aerial photo.

e) Atmospheric windows.

f) Stereo-pair.

g) What do the terms "RADAR" & "LIDAR" stand for?

h) Geo-stationary satellites.

i) What is meant by "Buffer analysis" in GIS.

j) Alluvial fan.

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

a) Role of lithology in land form development.

b) Atmospheric scattering.

c) Geometrical characteristics of an aerial photograph.

P.T.O.

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

a) Give applications of Oceansat-1 satellite.

b) Discuss the photocharacters of horizontally bedded shale.

c) Explain the Raster data model used in GIS?

Q4) a) Enlist the different photo-recognition elements and describe any four. **[10]**

OR

b) Discuss the aims, objectives and uses of Geological surveying.

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Total No. of Questions : 4]

SEAT No. :

P754

[Total No. of Pages : 3

[5315] - 343

T.Y.B.Sc.

STATISTICS (Principal)

ST- 331 : Distribution Theory

(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 $X \sim W(\alpha, \beta)$ then the distribution of $Y=(X/\alpha)^{\beta}$ is

1) Exponential with mean α
2) Exponential with mean α / β
3) Exponential with mean β
4) Exponential with mean 1

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

1) $a + e^{\mu + \frac{\sigma^2}{2}}$ 2) $a + \mu + \sigma^2$

3) $a + e^{\mu + \sigma^2}$ 4) $a + \mu + \frac{\sigma^2}{2}$

iii) If $X \sim \beta_1$ (m=2, n=2) then mode of X is

1) 2 2) 4

3) 0.5 4) 1/5

P.T.O.

iv) Let X be a continous 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 1st order statistic $X_{(1)}$ is

1) $\left[1-F_X(x)\right]^n$ 2) $\left[F_X(x)\right]^n$

3) $1-\left[1-F_X(x)\right]^n$ 4) $n*\left[F_X(x)\right]^{n-1}$

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

i) If $X \sim L(\mu,\lambda)$ then distribution of X is symmetric and leptokurtic.

ii) If $X \sim C(\mu,\lambda)$ then distribution of X^2 is also $C(\mu,\lambda)$.

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

i) Bi-variate normal distribution.

ii) Beta distribution of second kind.

d) Attempt the following: **[1 each]**

i) If $X \sim W(\alpha,\beta)$ then state the distribution function of X.

ii) If $X \sim \beta_2(m,n)$ then state variance of X.

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

a) If $X \sim L(\mu,\lambda)$ then find MGF of X.

b) If $X \sim W(\alpha,\beta)$ then obtain the distribution of $Y=X^C$, $c>0$.

c) Let $X_1, X_2, X_3, \ldots, X_n$ be a random sample of size n is drawn from U(0,1) distribution. Obtain the distribution of n^{th} order statistic $X_{(n)}$.

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

a) Let X and Y be two i.i.d r.v.s having G(1,1) distribution. If U=X+Y and $V=\frac{x}{(x+y)}$ then find $P\left(U>1, V>\frac{1}{2}\right)$.

b) If (X,Y) ~ BN$(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$ then find conditional distribution of X given Y=*y*. Further state the mean of the conditional distribution.

c) Let X and Y be two i.i.d r.v.s having $\beta_1(1,1)$ distribution. Obtain the distribution of U=X+Y.

Q4) Attempt any one of the following:

a) i) If X ~ $\beta_2(m,n)$ then find harmonic mean of X. **[3]**

ii) Let X ~ C(0,1). Derive the distribution of $\frac{1}{X}$ and X^2. **[7]**

b) i) If X and Y are i.i.d LN $(0, \mu, \sigma^2)$ variates. State the p.d.f of U=XY and $V=\frac{X}{Y}$. Further obtain $P\left[U > e^{2\mu}\right]$ and P[V>1]. **[5]**

ii) If X ~ L(μ, λ) then obtain inter quartile range of X. **[5]**

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Total No. of Questions : 4]

SEAT No. :

P755

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T.Y.B.Sc.

STATISTICS (Principal)

ST- 332 : Theory of Estimation

(2013 Pattern) (Semester - III) (Paper - II) (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 meaning.***

Q1) Attempt each of the following:

a) In each of the following cases, choose the correct alternative: **[1 each]**

i) If $X_1, X_2, \ldots\ldots, X_n$ is a random sample from a population with variance σ^2 and $S^2 = \frac{1}{n}\sum_{i=1}^{n}\left(X_i - \bar{X}\right)^2$ then

A) S^2 is unbiased estimator of σ^2

B) $\frac{nS^2}{n-1}$ is an unbiased estimator of σ^2

C) S is an unbiased estimator of σ

D) S^2 is inconsistent estimator of σ^2

ii) If $X_1, X_2, \ldots\ldots, X_n$ is a random sample from beta distribution of first kind with parameters $(\theta, 1)$ then ..... is a sufficient statistic of θ.

A) $\sum_{i=1}^{n} X_i$ B) $\prod_{i=1}^{n} X_i$

C) $X_{(n)}$ D) $X_{(1)}$

P.T.O.

iii) T_n is said to be a consistent estimator of θ if

A) $P(|T_n - \theta| \geq \in) = 1$ for every $n \geq 1$

B) $\lim_{n\to\infty} P(|T_n - \theta| \geq \in) = 1$

C) $\lim_{n\to\infty} P(|T_n - \theta| < \in) = 1$

D) $P(|T_n - \theta| < \in) = 1$ for every $n \geq 1$

iv) If $(X_{(r)}, X_{(s)})$, $r<s$ is the confidence interval for population median then the confidence coefficient associated with $(X_{(r)}, X_{(s)})$ is .....

A) $\sum_{i=1}^{n} {}^nC_i \left(\frac{1}{2}\right)^n$ B) $\sum_{i=r}^{s} {}^nC_i \left(\frac{1}{2}\right)^n$

C) $\sum_{i=r}^{n} {}^nC_i \left(\frac{1}{2}\right)^n$ D) $\sum_{i=r}^{s-1} {}^nC_i \left(\frac{1}{2}\right)^n$

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

i) If T is an unbiased estimator of θ then T^2 is also an unbiased estimator of θ^2.

ii) Minimum variance unbiased estimator (MVUE) is unique if it exists.

c) Define the following terms with one illustration each: **[1 each]**

i) Fisher information function $I_X(\theta)$.

ii) Pivotal quantity.

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

i) Distinguish between estimator and estimate.

ii) Explain the concept of sufficient statistic with one illustration.

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

a) If $X_1, X_2, ..., X_n$ is a random sample from $U(\theta, \theta+1)$ find the estimator of θ using the method of moments.

b) If $X_1, X_2, \ldots\ldots, X_n$ is a random sample from $N(\mu, \sigma^2)$ μ known, find C such that $T = C\sum_{i=1}^{n} |x_i - \mu|$ is an unbiased estimator of σ.

c) If $X_1, X_2, \ldots\ldots, X_n$ is a random sample from beta distribution of first kind with parameter $(\theta, 1)$ find the maximum likelihood estimator (MLE) of θ.

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

a) If $X \rightsquigarrow$ Poisson (λ) find the Fisher information function $I_X(\lambda)$.

b) If $X_1, X_2, \ldots\ldots, X_n$ is a random sample from Bernoulli distribution with parameter p, find the sufficient statistic of p.

c) If $X_1, X_2, \ldots\ldots, X_n$ is a random sample from $N(\mu, \sigma^2)$ construct a $(1-\alpha)100\%$ confidence interval for σ^2 when μ is unknown.

Q4) Attempt any one of the following:

a) State and prove Cramer-Rao inequality. Derive the condition when equality holds. **[10]**

b) i) State and prove Chebychev's inequality for continuous distribution. **[5]**

ii) Suppose T_n is a biased estimator of θ. If the bias and $\text{var}(T_n)$ both tend to zero as n tends to infinity then show that T_n is a consistent estimator of θ. **[5]**

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Total No. of Questions : 4]

SEAT No. :

P756

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T.Y.B.Sc.

STATISTICS (Principal)

ST- 333 : Sampling Methods

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

Q1) Attempt each of the following:

a) Choose correct alternatives in each of the following: **[1 each]**

i) In simple random sampling without replacement (SRSWOR), variance of sample mean is

A) $\left(\frac{N-n}{Nn}\right)S^2$ B) $\left(\frac{n-N}{Nn}\right)S^2$

C) $\left(\frac{N-1}{Nn}\right)S^2$ D) $\left(\frac{N-n}{N}\right)S^2$

ii) In case of stratified random sampling with proportional allocation, the sample size from i^{th} stratum is

A) nW_i B) $n\frac{W_iS_i}{\Sigma_{i=1}^{k}W_iS_i}$

C) nW_iS_i D) $\frac{W_iS_i}{\Sigma_{i=1}^{k}W_iS_i}$

P.T.O.

iii) The ratio estimator of the population mean ($\bar{Y}$)is

A) $\bar{y}$ B) $\frac{\bar{x}}{\bar{y}}\bar{X}$

C) $\frac{\bar{y}}{\bar{x}}\bar{X}$ D) $\frac{\bar{x}\cdot\bar{y}}{\bar{x}}$

iv) In case of SRSWOR, probability that specified unit is included in the sample is

A) $\frac{n}{N}$ B) $\frac{1}{n}$

C) $\frac{1}{\binom{N}{n}}$ D) $\frac{1}{N^n}$

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

i) For proportional allocation variance of an estimator $\left(\bar{Y}_{st}\right)_{prop}$ of population mean is smaller than that $\left(\bar{Y}_{st}\right)_{Ney}$ in case of Neyman's allocation.

ii) Regression estimator is biased estimator of population mean.

c) Define the following terms: **[1 each]**

i) Sampling unit.

ii) Stratification.

d) i) State an unbiased estimator of population mean in systematic sampling. **[1]**

ii) State one real life situation where ratio method of estimation can be used. **[1]**

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

a) In SRSWOR, show that sample mean sum of square is an unbiased estimator of population mean sum of square.

b) Describe the proportional allocation method and derive an expression for standard error of unbiased estimator of population mean.

c) A population consists of 550 units. By total count, it was found that population mean is 49 and population mean square is 46 under SRSWOR, how many sampling units should be chosen to estimate $\bar{X}_N$ with permissible margin of error 10% of population mean and 95% confidence coefficient?

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

a) With usual notation prove that systematic sampling is more efficient than SRSWOR if $\rho \leq -\frac{1}{N-1}$ where ρ is intra class correlation coefficient.

b) Given the following data, determine the sample size n_1, n_2, n_3 by using Neyman's allocation if total sample size is n=12

Sr.No	Ni	Si
1	4000	3
2	2000	5
3	3000	2

Also find variance of an estimator of population mean in case of Neyman's allocation.

c) For SRSWOR method for attribute, derive an expression for an unbiased estimator of variance of sample proportion.

Q4) Attempt any one of the following:

a) i) Explain reliability and validity test of questionnaire by using internal consistency method with the help of Kuder Rechardson coefficient. **[5]**

ii) Define ratio estimator of population mean and compare its efficiency with SRSWOR estimator. **[5]**

b) i) Prove that in SRSWR, sample mean is an unbiased estimator of population mean and also derive an expression for variance of sample mean. **[5]**

ii) Explain in brief characteristics of good questionnaire. **[5]**

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Total No. of Questions : 4]

SEAT No. :

P757

[Total No. of Pages : 3

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T.Y.B.Sc.

STATISTICS (Principal)

ST-334: Design of Experiments

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of scientific calculator and statistical tables is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following:

A) Choose the correct alternative in each of the following: **[1 each]**

a) The principle of local control is not used in

i) RBD ii) CRD

iii) LSD iv) CRD and LSD

b) For a RBD with error degrees of freedom 12, with 4 blocks, the required number of treatments would be

i) 5 ii) 4

iii) 6 iv) 3

c) The expected value of error component in a design of experiment is assumed to be

i) 1 ii) 2

iii) 0 iv) 0 or 1

P.T.O.

d) The main purpose of carrying out confounding in a factorial experiment is to reduce the size of

i) blocks ii) replicates

iii) treatments iv) experimental units

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

a) For carrying out analysis of LSD, the required number of experimental units would be square of an integer.

b) All factorial effects of a 2^3 factorial experiment are linear orthogonal contrasts.

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

a) Experimental error.

b) Treatment.

D) a) Write the expression for intraction effect AB for a 2^2 factorial experiment with factors A and B. **[1]**

b) State the test statistic for testing the equality of any two treatment effects using critical difference for CRD with 't' treatments, each replicated $n_i (i = 1, 2, ... t)$ times. **[1]**

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

a) State the mathematical model used in RBD with 't' treatments each replicated 'b' times with the underlying assumptions. Also obtain least squares estimates of parameters involved.

b) i) Compute relative efficiency of LSD over corresponding CRD with the following information:

Treatment. S. S = 98.4

Row S. S = 121.3

Column S. S = 103.1

Error S.S = 111.8

degrees of freedom for total S.S. = 24.

ii) Identify the confounded effect in the following replicate divided into 2 blocks.

(a)	(b)	(c)	(abc)
(b)	(ac)	(bc)	(1)

c) Test for the significance of regression coefficient β in RBD with ANOCOVA for 't' treatments arranged in 'b' blocks.

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

a) Describe the basic principles randomization and local control in a design of experiment.

b) Obtain the expression for the expectation of mean sum of squares due to error for CRD.

c) Explain what is ANOCOVA with one real life situation. Also state the least squares estimates of parametrs for a CRD.

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

a) i) Explain the concept of confounding in factorial experiments, by differentiating between total and partial confounding.

ii) Give the ANOVA table for a 2^3 factorial experiment with 4 replicates, where all interaction effects are confounded in each of the replicates divided into 2 blocks of size 4 each.

[4+6]

b) i) Describe Scheffe's method for comparing treatment contrasts in RBD.

ii) Explain yate's procedure to obtain factorial effect totals in a 2^3 factorial experiment.

[5+5]

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Total No. of Questions :4]

SEAT No. :

P758

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T.Y.B.Sc.

STATISTICS (Principle)

ST - 335 : C - Programming (Turbo C)

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

Q1) Attempt each of the following:

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

a) The following is not valid identifier **[1]**

i) area ii) tax-rate

iii) 12*b* iv) *x*22

b) Which of the following is not arithmetic operator **[1]**

i) * ii) /

iii) & iv) %

c) The function, Which compares the two strings is **[1]**

i) strcpy ii) strcmp ( )

iii) strlen iv) strcat ( )

d) If a = 6, b = 5, then the expression a +b/2 results in value **[1]**

i) 8 ii) 7

iii) 8.5 iv) 1

P.T.O.

B) State whether each of the following statement is True or False:

i) Character constants are coded using double quotes. **[1]**

ii) The modula operator (%) can be used only with integers. **[1]**

C) i) Write an expression in c for the following arithmetic expression.

$$m\left[ah + \frac{V^2}{2}\right]$$ **[1]**

ii) Give the syntax with an illustration of getchar( ). **[1]**

D) i) What will be the value of *x* when the following segment is executed?

int x =10, y = 15;

$x = (x < y)? (y + x) : (y - x);$ **[1]**

ii) Give the syntax of if -else. **[1]**

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

a) Explain the syntax and one illustration for each of the following:

i) print f ( ).

ii) for ( ).

b) Draw a flowchart to check whether the integer is prime or not.

c) Write a C program to obtain arithmetic mean and variance of given n observations.

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

a) Define one dimensional array. Give the syntax and one illustration of declaration and initialization of one dimensional array.

b) Write a C program to convert decimal number to equivalent binary number.

c) Write a C program to check whether a given string is palindrome or not.

(Palindrome e.g. malayalam).

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

a) i) What is recursion? Write a C program to find GCD of two integers using recursive function. **[7]**

ii) Write a C program to convert the temperature from °C to °F. **[3]**

b) i) Write a C program to fit Binomial (n, p) distribution to given sample data (x_i, f_i), $i = 1,2,....k$ **[7]**

ii) define 'Pointer'. Give one illustration. How it is declared and assigned? **[3]**

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Total No. of Questions : 4]

SEAT No. :

P759

[Total No. of Pages : 3

[5315] - 348

F.Y.B.Sc.

STATISTICS (Principal)

ST-336: Introduction to Regression Analysis

(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 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) The estimate of the variance of residuals in multiple regression model involving K regressors is given by:

i) $\frac{SS_{Res}}{n-k-1}$ ii) $\frac{SS_{Res}}{n-1}$

iii) $\frac{SS_{R}}{n-k}$ iv) $\frac{SS_{T}}{n-(k-1)}$

b) In a regression model, if σ^2 is proportional to $[E(y)]^3$ then the suitable variance stabilizing transformation is:

i) Arcsin ii) Reciprocal square root

iii) Reciprocal iv) Square root

c) The sum of the residuals weighted by the corresponding value of the regressor is always:

i) Positive ii) Negative

iii) Zero iv) 1

P.T.O.

d) Suppose a regression model with three regressors (X_1, X_2, X_3) is fitted to a data set containing 25 observations. If one wishes to test whether X_1 is significant, the degrees of freedom associated with t - test is:

i) 20 ii) 21

iii) 25 iv) 19

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

a) The hat matrix maps the vector of observed values into a vector of fitted values.

b) An outlier is indicated by a large value of MS_{Res}.

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

a) Deviance statistic D.

b) Studentized residual.

D) Answer the following: **[1 each]**

a) Consider the simple linear regression model $\gamma = \beta_0 + \beta_1 x + \varepsilon$, with E(ε) = 0, Var (ε) = σ^2 and ε uncorrelated. Show that $\hat{\beta}_1$ is linear combination of the observations y_i, i = 1, 2 ....n.

b) State multiple linear regression model with k regressors. Also state the assumptions.

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

a) Write a short note on the backward elimination method for regression model.

b) Explain the procedure to fit a multiple linear regression model $\gamma = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \varepsilon$.

c) State logistic regression model with single regressor. Discuss logit transformation.

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

a) Consider the simple linear regression model $\gamma = \beta_0 + \beta_1 x + \varepsilon$. Obtain the least square estimator of β_0 and β_1.

b) Write a short note on method of weighted least squares for fitting linear regression models.

c) Write a short note on plot of residuals against the fitted values.

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

a) i) In multiple linear regression model derive $100(1-\alpha)$ percent confidence interval for regression coefficient $\beta_j, j = 0,1,2...k$. Also explain the notations used in it. **[5]**

ii) In a simple linear regression problem with sample size of 25, the slope was estimated to be 1.12 and standard error estimate $(\hat{\sigma})$ is equal to 8.65. The quantity $\sum x_i^2 - n(\bar{x})^2 = 327.52$. Find the standard errror of the regression coefficient (β_1). Also test whether the regression coefficient is different from zero at a significance level 0.05. **[5]**

b) i) Consider a multiple linear regression model with *k* regressors $\gamma = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + ... + \beta_k x_k + \varepsilon$ obtain an estimate of σ^2. **[5]**

ii) What are outliers? How do they affect regression coefficients? Discuss how outliers are to be treated in regression analysis. **[5]**

EEE

Total No. of Questions : 4]

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P760

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T.Y.B.Sc.

GEOGRAPHY

Gg-331 : FUNDAMENTALS OF HUMAN GEOGRAPHY

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***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) What is neodeterminism?

b) Who gave the concept of stop-and-go-determinism?

c) Name any two contemporary approaches.

d) Name any two branches of settlement geography.

e) Name the major human races in the world.

f) List the human race known for its unique physical trait.

g) Which two countries contribute to most of world's population?

h) Give reasons-river valleys are highly populated.

i) Define migration.

j) Name the countries with highest Human Development Index.

k) Define Probabilism.

l) What is cultural diffusion.

m) Name the minor cultural realms of the world.

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

a) Branches of Human Geography.

b) Human Development Index (HDI).

c) Population policies of India and China.

d) Hagerstrand's model of diffusion.

P.T.O.

Q3) Answer the following questions in 100 words (any two): **[10]**

a) Explain the nature of Human Geography.

b) Differentiate between determinism and possibilism.

c) Describe the trends in the growth of population of developing countries.

d) Explain the economic & political factors affecting population density.

Q4) Answer the following questions in 200 words (any one): **[10]**

Describe the Griffith Taylor's migration zone theory of evolution of human races.

OR

Explain the world distribution of population.

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Total No. of Questions :4] **SEAT No. :**

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[5315]-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) ***Draw neat diagram and sketches wherever necessary.***
4) ***Use of map stencils is allowed.***

Q1) Answer the following questions in one or two sentences (any ten).**[10]**

a) What is tourism?

b) Define absolute location.

c) Name any two UNESCO word heritage sites in Maharashtra.

d) In which State is the Sundarbans National park located?

e) Name any two hill stations in Himachal pradesh.

f) Name any two beaches in North Goa.

g) What are summer resorts?

h) Name any two sea forts of Maharashtra.

i) In which state are the Khajuraho Temples located?

j) In which state is Kanyakumari located.

k) Name any two historical places in Rajasthan.

l) Name any two Waterfalls in India.

m) Name any two traditional types of accommodation.

P.T.O.

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

a) Locational factors in tourism.

b) Man- made attractions.

c) Seaside resorts in India.

d) National parks and sancturies.

Q3) Answer the following questions in 100 words (any two). **[10]**

a) Explain the role of tourism as a regional resource.

b) Describe the climatic factors affecting tourism.

c) What is the difference between travel and tourism?

d) Describe the cultural diversity of India.

Q4) Answer the following questions in 200 words (any one). **[10]**

a) Explain the physical factors affecting tourism.

b) Describe the importance of beaches & islands in tourism with reference to India.

Total No. of Questions :4] SEAT No. :

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[5315]-351
T.Y.B.Sc.
GEOGRAPHY
Gg-333 : Fundamentals of Geo-Informatics (Part-I)
(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) ***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) Mention any two components of GIS.

b) Give any two methods of manipulation techniques in GIS.

c) Define remote sensing.

d) State any two data sources in GIS.

e) What is aspatial data?

f) What is meant by raster data model?

g) Mention any two GIS tasks.

h) What is data generation?

i) Mention the features of a vector data model.

j) Give any two disadvantages of vector data format.

k) Give any two applications of remote sensing in Earth science.

l) What is meant by SQL?

m) Name any two input devices in GIS.

P.T.O.

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

a) Importance of Geo-informatics.

b) Satellite data as a major data source in GIS.

c) Vector data model.

d) Spatial information technology.

Q3) Answer the following questions in 100 words (any two) **[10]**

a) Explain in brief the functions of Geoinformatics.

b) Describe the non-spatial data in GIS.

c) Explain the raster data analysis in GIS.

d) Discuss the role of GIS in urban planning.

Q4) Answer the following questions in 200 words (any one) **[10]**

a) Give an account of GIS applications in soil resource management.

b) Explain in detail the differentiating characteristics of raster and vector data models in GIS.

Total No. of Questions :4] SEAT No. :

P763 [Total No. of Pages : 2

[5315]-352
T.Y.B.Sc.
GEOGRAPHY
Gg-334 : Geography of India (Part-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 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 two or three sentences (any ten): **[10]**

a) What is the total length of land frontier of India's mainland?

b) List any two minerals found along the Indian coast.

c) Name any two rivers originating in Himalayas.

d) Define Tarai plain.

e) Which is the highest peak in Sahyadri?

f) Name any four tributaries of Indus river.

g) List any two east flowing rivers of India.

h) Name any two highest peaks along shiwalik range.

i) List any two mountain ranges of Eastern ghats.

j) Mention any two characteristics of Retreating monsoon.

k) List any two type of soils found in peninsular India.

l) In which states of India, laterite soil is found?

m) Which type of natural vegetation is found in Maharashtra?

P.T.O.

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

a) Indo -China political relationship.

b) Bramhaputra River system.

c) Types of Natural vegetation in India.

d) Summer season in India.

Q3) Answer the following questions in 100 words (any two): **[10]**

a) What is the political significance of Indian Ocean?

b) Describe the Factors affecting the mechanism of monsoon.

c) Explain the Peninsular river system.

d) Discuss the type of soils in India.

Q4) Answer the following questions in 200 words (any one): **[10]**

Discuss the Physiography of coastal lowlands and islands in India.

OR

Define soil degradation Explain the factors responsible for soil degradation.

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Total No. of Questions :4]

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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) ***Use of map stencils is allowed.***
4) ***Draw neat diagrams and sketches wherever necessary***

Q1) Answer the following questions in two or three sentences (any ten). **[10]**

a) What are peds?

b) Name the horizons of the soil profile.

c) What is 'Illuviation'

d) Write the types of clay minerals.

e) What is Montmorilonite?

f) Give the methods of mechanical analysis of soils?

g) Define gravitational water.

h) Define Intrazonal soils.

i) What is redox potential?

j) Write the types of soil erosion.

k) Define Biological weathering.

l) What is water holding capacity of soils.

m) Write the types of Azonal soils.

P.T.O.

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

a) Importance of soil studies.

b) Components of soils.

c) Alkalization.

d) Cation Anion Exchange

Q3) Answer the following questions in 100 words (any two) **[10]**

a) Define pedology and explain the brief history of pedology.

b) Explain how weathering affects the soil structure and texture.

c) Write chemical processes of oxidation- Reduction and Hydrogen ion concentration.

d) Give an account of zonal soil classification.

Q4) Answer the following questions in 200 words (any one) **[10]**

a) Draw a neat sketch of ideal soil profite and explain the factors affecting on soil profile development.

b) Explain any five pedogenetic processes.

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Total No. of Questions :4] SEAT No. :

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T.Y.B.Sc.
GEOGRAPHY
Gg-336 : Fundamentals 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 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 two to three sentences (any ten): **[10]**

a) Mention any two applications of remote sensing.

b) What do you mean by the term ellumination.

c) Define Wavelength.

d) What are framing cameras.

e) What do you understand by the term tilt in an aerial photography.

f) What is meant by swing of aircraft.

g) What is principal point.

h) What is meant by the term sortie number.

i) What is meant by flight line.

j) What do you understand by non-selective scattering.

k) What is meant by FCC?

l) What do you understand by vertical aerial photography.

m) Give the spectral range for microwave region.

P.T.O.

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

a) Application of remote sensing in Geology.

b) Electromagnetic radiation.

c) Strip cameras.

d) Oblique photographs

Q3) Answer the following in 100 words (any two): **[10]**

a) Explain visible and spectral range of the electromagnetic radiation.

b) Give the importance of remote sensing in ocean and coastal monitoring.

c) Explain the types of scattering.

d) Describe in brief about steropairs.

Q4) Answer the following in 200 words (any one): **[10]**

a) Give an account of types of films used in remote sensing.

b) Explain in detail the process of remote sensing.

Total No. of Questions : 4]

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P766

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T.Y.B.Sc.

MICROBIOLOGY

MB-331 : MEDICAL MICROBIOLOGY - I

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***
3) ***Draw neat labelled diagram wherever necessary.***

Q1) Attempt the following

A) Match the following **[5]**

a)	Vibrio	i)	Prostate gland secretions
b)	Mycobacterium	ii)	Opportunistic pathogen
c)	Cardiolipin antigen	iii)	Darting motility
d)	Pseudomonas	iv)	Acid fast bacillus
e)	Male reproductive system	v)	VDRL

B) State true or false **[3]**

a) The cells of clostridium tetani are of drumstick appearance.

b) Kupffer cells are present in brain.

c) E.coli can be the cause of intestinal infections in humans.

C) Fill in the blanks. **[2]**

a) Time/ place/ Person distribution is examined in ..... studies.

b) Pneumococci are normal inhabitants of human ..... system.

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

a) Diagramatically Represent: Anatomy of kidney.

b) Explain the role of carriers in transmission of disease.

c) Comment on: Acinetobacter is on opportunistic pathogen.

P.T.O.

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

a) Pathogens and diseases of central nervous system.

b) Laboratory diagnosis of typhoid.

c) Cultivation of Rickettsia.

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

a) Describe epidemiology, laboratory diagnosis and treatment of leprosy.

b) Describe various virulence factors and diseases caused by staphylococci.

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Total No. of Questions : 4]

SEAT No. :

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T.Y.B.Sc.

MICROBIOLOGY

MB-332 : Genetics & Molecular Biology - I

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

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

Instructions to the candidates:

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

Q1) Answer the following

A) Match the following **[5]**

a)	Ori C gene	i)	Removal of primers
b)	–10 sequence	ii)	N-formyl Methionine
c)	DNA pol I	iii)	r-RNA synthesis
d)	All G codon	iv)	Replicon
e)	RNA Pol I	v)	Pribnow box

B) Attempt the following **[5]**

a) DNA- B is a _____

i) Primase ii) Polymerase

iii) Helicase iv) Ligase

b) The protein required for Bacterial transcription initiation is

i) α ii) β

iii) Rho iv) Sigma

c) Eukaryotic mRNA's have

i) 5' tail & 3' Cap ii) 5' Cap & 3' tail

iii) 5' Cap & 3' OH iv) 5' p & 3' tail

P.T.O.

d) Define - Map Unit.

e) State True or False - Agarose gel electrophoresis is usually employed for the separation, identification and characterisation of proteins.

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

a) Replication fork.

b) Western blot technique.

c) Cloverleaf structure of t-RNA.

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

a) Potential uses of Recombinant DNA technology.

b) Northern blot technique.

c) Role of Ribosomes in translation.

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

a) What is Tetrad analysis? How is it done? Explain in detail mapping of Chromosome by Tetrad analysis.

OR

b) What is Post transcriptional modification? Explain in detail the mechanism of post transcriptional modifications in case of Eukaryotic mRNA?

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Total No. of Questions :4]

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[5315] - 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

1)	Covalent modification	i) 'Coenzyme A'
2)	Pyrurate dehydrogenase	ii) Glycogen phosphorylase
3)	Ammonium sulfate	iii) Carboxy methyl Cellulose
4)	Pantothenic acid	iv) Multienzyme complex
5)	Cation exchanger	v) Diralent salt

b) Draw the structure of Nicotinic acid **[01]**

c) Name any 2 ligands used in affinity Chromatography **[01]**

d) State True or False **[02]**

1) PDH is an example of an isoenzyme

2) In Competitive inhibition inhibitor binds to both free enzyme and bound enzyme.

e) What is turn over number of an enzyme **[01]**

P.T.O.

Q2) Attempt any 2 of the following **[10]**

a) Write short note on SDS-PAGE

b) Explain the concept of isoenzymes with suitable example

c) Explain the use of radioisotope technique in enzyme assay.

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

a) Derive the equation for Line Weaver Plot.

b) Explain structure,occurance and biochemical role of Thiamin.

c) Explain the concept of 'salting in' and salting out' in enzyme purification.

Q4) Attempt any one of the following

a) Explain principle, working and applications of Ion Exchange chromatography. **[10]**

b) Explain the concept of allosterism with suitable example.

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Total No. of Questions :4] SEAT No. :

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[5315]-358
T.Y.B.Sc.
MICROBIOLOGY
MB-334 : Immunology-I
(2013 Pattern) (Semester-III) (Paper - IV)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***
3) ***Draw neat Labelled Diagrams wherever necessary.***

Q1) a) Match the following and rewrite:- **[5]**

1)	Primary Lymphoid organ	i)	Repetitive epitopes
2)	Properdin pathway	ii)	CTL
3)	T independent antigens	iii)	Thymus
4)	Granzymes	iv)	Booster dose of vaccine
5)	Secondary immune response	v)	Factor B
		vi)	Spleen

b) State true or false:- **[2]**

i) Normal flora is important in first line of defense.

ii) IC-2 plays important role in differentiation of T cells.

c) Attempt the following:- **[3]**

i) Write an example of superantigen.

ii) Enlist domains of light chain.

iii) Define - antigenic determinants.

P.T.O.

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

a) Illustrate diagramatically : antigen processing pathways.

b) Compare in tabular form: innate and acquired immunities.

c) Comment on: molecular basis of heavy chain diversity.

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

a) Types of grafts.

b) Mucous Associated Lymphoid Tissues.

c) Biological properties of immunoglobulins.

Q4) Attempt (any one): **[10]**

a) Describe macrophages w.r.t formation, distribution and various functions carried out by them.

b) Explain factors affecting immunogenicity with examples.

Total No. of Questions :4]

SEAT No. :

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[5315] - 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) Answer the following.

a) i) Bioassay. **[2]**

ii) Analogue resistant mutant.

b) State True or False. **[3]**

i) Sham test is used for pyrogen testing.

ii) Protoplast fusion technique is used for mutant selection.

iii) Revertants do not show characters of wild type.

c) Match the following and write correct pairs. **[5]**

A		B	
1)	Centrifugation	i)	Media optimization
2)	Use of restriction endonucleases	ii)	Recurring
3)	RSM	iii)	Periodicity of fermentation products
4)	Expenses on electricity	iv)	Separation of Biomass
5)	Shelf life	v)	r DNA technology
		vi)	Scale up

P.T.O.

Q2) Short Answers (Any Two): **[10]**

a) Explain criteria of scale-up.

b) Describe methods of cell disruption.

c) Compare Batch and continuous sterilization.

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

a) What is strain improvement? Explain the method of isolation of altered permeability mutant.

b) Describe in brief Liquid-liquid extraction.

c) List various approaches of media optimization and explain any one.

Q4) Write Any One. **[10]**

a) Enlist various methods of quantification of fermentation products, explain enzymatic method of quantification

OR

b) Enlist different quanlity tests for fermentation product and explain pyrogen test.

Total No. of Questions :4] SEAT No. :

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[5315]-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 wherever necessary.***

Q1) Attempt the following:

a) Match the following: **[5]**

1)	Alcaligens viscolactics	i)	Methylene blue
2)	Clostridium perfringens	ii)	Intrinsic factor
3)	Water activity	iii)	Ropiness
4)	Dye reduction test	iv)	Extrinsic factor
5)	Temperature of storage	v)	Stormy fermentation

b) Fill in the blanks: **[2]**

i) The full form of NDDB is _____.

ii) Blue colour defect in milk is due to _____organism.

c) List any two applications of recombinant dairy enzymes. **[1]**

d) Define: **[2]**

i) Semi-perishable foods.

ii) F-Value.

P.T.O.

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

a) Food grade Bio-preservatives.

b) Brucella ring test.

c) Sources of food spoilage microorganisms.

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

a) Give significance of fermented foods.

b) Describe briefly food poisoning by Sraphylococcus aurous.

c) Define milk and add a note on types of milk.

Q4) Attempt any one: **[10]**

a) Enlist different methods of food preservation and explain principles of food preservation by chemicals.

b) Describe succession of microorganisms in milk leading to spoilage.

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Total No. of Questions : 4]

SEAT No. :

P772

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T.Y.B.Sc.

ELECTRONIC SCIENCE

EL-331 - ADVANCED DIGITAL SYSTEM DESIGN

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

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

Instructions to the candidates:

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

Q1) Attempt all of the following.

a) List different variables used for state machine. **[1]**

b) Write the role of input buffers in PLA. **[1]**

c) What is meaning of 'forever' loop used in verilog? **[1]**

d) List components of a verilog module. **[1]**

e) Write two advantages of ASIC. **[2]**

f) What is concatenation operator? **[2]**

g) List four advantages of PLD. **[2]**

h) List four data types used in verilog. **[2]**

Q2) Attempt any two of the following.

a) Write a program in verilog for 4 bit full adder using data flow operators. **[4]**

b) Explain 'for' loop in verilog with suitable example. **[4]**

c) Compare synchronous and asynchronous sequential machines. **[4]**

Q3) Attempt any two of the following.

a) Write various symbols used in ASM diagram and explain them in brief. **[4]**

b) Write short note on complex programmable Logic Devices. **[4]**

c) Write verilog code for 4 bit ripple counter using four T-Flipflops. **[4]**

P.T.O.

Q4) Attempt any two of the following:

a) Draw the block diagram of 'Automatic Tablet Filling System'. Describe its working. **[6]**

b) i) A combinational logic is given by x=AB+ $A\overline{B} + \overline{A}\overline{B}$. Draw diagram of programmed PAL. **[3]**

ii) Describe Mealy model with block diagram. **[3]**

c) i) Explain in verilog multiway branching with example. **[3]**

ii) State 3 ways of specifying delays in continuous assignment statements and explain any one with example. **[3]**

OR

Q4) Answer all of the following.

a) Find the compatible state using merger graph **[4]**

Present State	Next State			
	00	01	10	11
A	C/0	–/–	A/0	–/–
B	–/–	E/0	B/0	D/1
C	D/0	B/1	–/–	–/–
D	C/0	A/1	E/0	–/–
E	B/0	–/–	A/0	E/1

b) Write short note on 'SPLD'. **[4]**

c) Explain continuous assignments statements in verilog. **[4]**

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Total No. of Questions : 4]

SEAT No. :

P773

[Total No. of Pages : 2

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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 RAM of 8051 μC? **[1]**

b) If A = 31 H, what will be the content of register A after 'SWAP A' operation? **[1]**

c) What is 'compiler'? **[1]**

d) Write two merits of LCD over LED. **[1]**

e) List 16-bit registers used in 8051. **[2]**

f) Identify addressing modes of instructions **[2]**

i) MOV A, R

ii) MOV A, # 50H

g) List the tools used in program designing. **[2]**

h) What do you mean by 16×2 LCD? **[2]**

Q2) Attempt any two of the following:

a) Write note on 'PSW'. **[4]**

b) Which are the different addressing modes of 8051? Explain any two modes with proper example. **[4]**

c) Draw the interfacing diagram of stepper motor with 8051. Explain it in brief. **[4]**

P.T.O.

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

a) Explain interrupt system of 8051. **[4]**

b) Write assembly language program to add two 16 bit numbers. **[4]**

c) Draw the diagram to interface single digit 7-segment display to 8051. **[4]**

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

a) Draw and explain internal block diagram of 8051 μC. **[6]**

b) With proper diagram and example, distinguish between the instructions 'RRA and RRC A'. **[6]**

c) Interface 8 - bit DAC to 8051 μC. Write assembly language program to generate a square wave. **[6]**

OR

Attempt <u>all</u> of the following:

a) Write full note on 'Stack'. **[4]**

b) With proper example, explain 'DAA' instruction of 8051 μC. **[4]**

c) Give brief explanation of **[4]**

i) Editor and

ii) Assembler

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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) Define the term "output offset voltage of op-amp". **[1]**

b) State the advantage of precision rectifier. **[1]**

c) Draw the output characteristic of ideal band pass filter. **[1]**

d) Write the number of three terminal voltage regulator IC for +5V. **[1]**

e) "For no load voltage (V_{NL}),value of load resistance (R_L)is zero". Comment. **[2]**

f) Write the equation for 'T_{charge}' for astable multivibrator designed using op-amp. **[2]**

g) "Ideal integrator circuit is nothing but low pass filter". Comment. **[2]**

h) "In astable multivibrator using IC-555, if $R_A = R_B$ then output square wave is symmetric".Comment. **[2]**

Q2) Attempt any two of the following.

a) Explain with proper diagram sample and hold circuit using op-amp. **[4]**

b) With the help of circuit diagram, explain offset compensation of op-amp. **[4]**

c) Explain working of monostable multivibrator using op-amp. **[4]**

P.T.O.

Q3) Attempt any two of the following .

a) Draw and explain the working of "Regulated duel power supply using IC 7812 and IC 7912". **[4]**

b) Draw the circuit diagram of antilog amplifier using op-amp and diode as log element. Derive expression for output voltage. **[4]**

c) With the help of circuit diagram, explain working of second order low pass filter using op-amp. **[4]**

Q4) Attempt any two of the following.

a) Draw the circuit diagram of full wave precision rectifier using op-amp having 4 equal value resistors. Derive the expression for output voltage.**[6]**

b) With the help of circuit diagram, explain working of "ON-OFF controller using op-amp". **[6]**

c) Draw internal block diagram of phase lock loop (PLL) and explain its working. Also state its characteristics. **[6]**

OR

Attempt all of the following.

a) For astable multivibrator using timer IC-555 ,Given R_A=10kΩ ,R_B=10kΩ and C=0.01 μF. Determine its frequency and duty cycle. **[4]**

b) Design a second order low pass filter having lower cut off frequency of 10kΩ . **[4]**

c) Determine frequency of VCO by using IC-566 if V_C=10V,C_1=0.1 μF, R_1=5kΩ and supply voltage V_{CC}=+12V. **[4]**

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T.Y.B.Sc.
ELECTRONIC SCIENCE
EL-334 : Principles of Semiconductor Devices
(2013 Pattern) (Semester-III) (Paper - IV)

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

Instructions to the candidates:

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

Q1) Attempt all of the following.

a) Define Lattice. **[1]**

b) Draw symbol of JFET. **[1]**

c) Which are the different types of semiconductors? **[1]**

d) Define co-ordination number. **[1]**

e) What is epitaxy? **[2]**

f) What is amplification? **[2]**

g) What is HEMT? **[2]**

h) What do you mean by crystalline solids? **[2]**

Q2) Attempt any two of the following.

a) Explain working of JFET. **[4]**

b) Explain vapour phase epitaxy. **[4]**

c) Explain direct and indirect semiconductors. **[4]**

Q3) Attempt any two of the following .

a) What is ohmic contact? Explain in detail. **[4]**

b) Explain working of NPN Transistor. **[4]**

c) Explain pinch-off and saturation in case of JFET **[4]**

P.T.O.

Q4) Attempt any two of the following.

a) Explain construction and working of MOSFET **[6]**

b) With the help of diagram Explain metal, semiconductor, and insulator. **[6]**

c) With proper diagram Explain simple cubic (sc),body centred cubic (bcc) and face centred cubic (fcc) structures in detail. **[6]**

OR

Attempt all of the following.

a) Explain fermi energy and fermi level. **[4]**

b) What is avalanche breakdown in 2ener diode. **[4]**

c) Explain current voltage characteristics of MOSFET. **[4]**

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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) Write the general form of initialization of arrays. **[1]**

b) State the function of getchar ( ). **[1]**

c) What is pointer? **[1]**

d) Give the general form of do - while statement. **[1]**

e) Define an algorithm. Give its properties. **[2]**

f) State meaning of strlen ( ) function. **[2]**

g) What is difference between prefix and post fix operator? **[2]**

h) Give the basic structure of a C program. **[2]**

Q2) Attempt Any Two of the following.

a) Write an algorithm to arrange number in ascending order using bubble sort method. **[4]**

b) Explain function with no arguments but return value. **[4]**

c) Explain with example relational and logical operators in 'C'. **[4]**

P.T.O.

Q3) Attempt any TWO of the following.

a) What are formal and Actual arguments in functions? Give example. **[4]**

b) Explain getc( ) and putc ( ) functions in file handling. **[4]**

c) Explain switch statement with suitable example. **[4]**

Q4) Attempt any TWO of the following.

a) Explain f print f ( ) and f scan f( ) functions in file handling. Give example. **[6]**

b) Write algorithm to accept city name from user and check given city is available or not, using linear search algorithm. **[6]**

c) Write a program using one dimensional array to evaluate the following expressions. **[6]**

$$\text{Total} = \sum_{i=1}^{10} x_i^2$$

OR

Q4) Answer all of the following.

a) What is a function? Give its prototype in 'C' language, and state types. **[4]**

b) Explain while loop with suitable example. **[4]**

c) Explain break and continue statements in 'C'. **[4]**

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T.Y.B.Sc.

ELECTRONIC SCIENCE

EL - 336 (A) : Fiber Optic Communication (Optional)

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of log table and calculator is allowed.***

Q1) Attempt all of the following.

a) Define the term acceptance angle. **[1]**

b) What do you mean by absorption loss in fiber. **[1]**

c) State total internal reflection phenomena. **[1]**

d) Define the term quantum efficiency. **[1]**

e) List the factors due to which connector losses occur. **[2]**

f) Why optical amplifiers are needed in fiber optic communication system? **[2]**

g) Compare between single mode and multimode fiber. **[2]**

h) 'Semiconductor photodetectors are preferred in fiber optic communication system', comment. **[2]**

Q2) Attempt any Two of the following.

a) Explain the working principle of LED. Draw the structures of surface emitter LED and edge emitter LED. State its response. **[4]**

b) Explain the method for measurement of attenuation of fiber cable. **[4]**

P.T.O.

c) Explain the propogation of light through step index single mode and multimode fiber with the help of index profile and ray diagram. State its characteristics and disadvantages. **[4]**

Q3) Attempt any two of the following.

a) Write a note on Advanced fibers. **[4]**

b) Explain scattering losses in optical fiber. **[4]**

c) Explain optical transmitter system with suitable diagram and list its design specifications. **[4]**

Q4) Attempt any Two of the following.

a) Explain working principle of Avalanche photodiode with suitable diagram. State its advantages and parameters. **[6]**

b) Write short note on short haul and long haul communication system. **[6]**

c) i) State the advantages of fiber optic communication system over wireless system. **[3]**

ii) Explain bending loss in optical fiber. **[3]**

OR

Attempt all of the following.

a) Compute the numerical aperature, acceptance angle, and the critical angle of the fiber having core refractive index 1.50 and refractive index of the cladding is 1.45. **[4]**

b) Calculate the quantum efficiency of detecor having responsivity 9.6×10^{-3}A/W at 0.8 μm.

(Given: planck constant = 6.63×10^{-34}

Velocity of light = 3×10^{8}

Charge on electron = 1.6×10^{-19}) **[4]**

c) The mean optical power launched into an 8km length of fiber is 120 μw and mean optical power at the fiber output is 3 μw . Calculate signal attenuation in dB per unit (km) length. **[4]**

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Total No. of Questions :4]

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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 diagrams must be draw wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) Attempt all of the following.

a) State any two types of co-operative societies. **[1]**

b) What is meant by decision? **[1]**

c) What is maintainability of electronic product? **[1]**

d) Define the term pricing. **[1]**

e) What is techno-commercial feasibility of a product? **[2]**

f) Explain the term incentive for small business development. **[2]**

g) State objectives of entrepreneurship development. **[2]**

h) State merits of partnership firm. **[2]**

Q2) Attempt any two of the following.

a) State the steps for registration of partnership firm. **[4]**

b) Explain the basic problems of women entrepreneurship. **[4]**

c) An electronic circuit that uses 4-resistors, 1-transistor, 2- capacitors, 1-power transformer and 2- diodes with failure rates 0.6, 0.62, 0.61 0.18 and 0.2 respectively per 10^6 hours. Calculate MTBF for the circuit. **[4]**

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

a) Explain any four points of sole proprietership. **[4]**

b) Explain the steps for electronic product design with neat diagram. **[4]**

c) Explain break event point analysis. **[4]**

Q4) Attempt any <u>two</u> of the following.

a) Explain the terms:

i) Fund flow. **[3]**

ii) Features of co-operative society. **[3]**

b) State merits and demerits of joint stock company. **[6]**

c) State and explain different sources of finance for starting business. **[6]**

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T.Y.B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS. NO. : 301 - INDIA'S FOREIGN & DEFENCE POLICY

(2013 Pattern) (Semester - III) (Core/ Compulsory Paper) (Paper - I)

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

Instructions to the candidates:

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

Q1) Answer in 2 or 4 sentences each. **[16]**

a) Define "Foreign policy".
b) What do you mean by Defence policy?
c) What do you mean by "Look East Policy"?
d) Write any two characteristics of India's foreign policy.
e) Why India conducted Nuclear Test in 1974?
f) State the meaning of Panchsheel.
g) What do you understand by "Nuclear Doctrine"?
h) Write the basic objective of India's defence policy.

Q2) Answer in 8 to 10 sentences [Any Two] **[8]**

a) Explain in brief concept of Foreign policy.
b) Write a few lines on P.N.E. of 1974.
c) Why India declare her "Nuclear Doctrine" in 1998?

Q3) Write short notes on [Any Two] **[8]**

a) Concept of Defence Policy.
b) Principles of Foreign Policy.
c) Nuclear Doctrine of India.

Q4) Answer in 16 to 20 sentences [Any One] **[8]**

a) Evaluate the India's Nuclear policy since 1974 to onwards.
b) Explain in brief the determinant factors of Defence policy.

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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)(Paper-II)

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

Instructions to the candidates:

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

Q1) Answer in 2 to 4 Sentences each: **[16]**

a) Define Defence Budget.

b) Write any two trends of India's defence spending.

c) Write any two foreign sources of war finance.

d) Write any two characteristics of war time economy.

e) Define mobilization of national defence.

f) Write full form of DPSU.

g) What do you mean by defence vs development?

h) Write any two domestic sources of war finance.

Q2) Answer in 8 to 10 Sentences each (any two): **[8]**

a) Explain economic consequences of war.

b) Describe elements of war potential.

c) Explain concept of public good.

P.T.O.

Q3) Write short notes on (any two): **[8]**

a) Determinants of Defence Expenditure.

b) Rational of armament production in India.

c) Analyses India's defence spending during 1960's.

Q4) Answer in 18 to 20 sentences (Any one): **[8]**

a) Write a note on relationship between war and economy.

b) Describe relationship between industrial power and war.

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Total No. of Questions : 4] SEAT No. :

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T.Y.B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS:-303 : Research Methodology
(2013 pattern) (Semester-III) (paper-III)

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

Instructions to the candidates:

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

Q1) Answer in 2 to 4 Sentences each: **[16]**

a) What do you mean by Social Science Research?
b) What is scientific inquery?
c) Define hypothesis.
d) What do you mean by Research design?
e) State the meaning of secondary data.
f) What do you mean by fundamental Research?
g) What is Research problem?
h) Write any two differences between research methods and methodology?

Q2) Answer in 8 to 10 Sentences each (any two) **[8]**

a) Explain objectives of research.
b) Describe relationship between research and Scientific method.
c) Explain conceptualization in research survey of literature.

Q3) Write short notes on (Any two) **[8]**

a) Features of good research design.
b) Criteria for selecting a sample design.
c) Criteria for good research.

Q4) Answer in 18 to 20 sentences (any one) **[8]**

a) Explain scope of research in security studies.
b) Describe Research process in flow chart.

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Total No. of Questions : 4] SEAT No. :

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T.Y.B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS-304 : Science, Technology and National Security
(2013 pattern) (Semester-III) (paper-IV)

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

Instructions to the candidates:

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

Q1) Answer in 2 to 4 Sentences each: **[16]**

a) Define Science.
b) Write full form of C4ISR.
c) State the meaning of armament technology.
d) What do you mean by accidental nuclear war?
e) State the meaning of Battlefield information system.
f) Write the meaning of surprise first strike.
g) Write any two characteristics of submarine.
h) What do you mean by Revolution in Military Affairs?

Q2) Answer in 8 to 10 Sentences each: (Any two) **[8]**

a) Explain impact of submarine in Naval Warfare.
b) Describe Role of private sector in India's Defence production.
c) Examine role of military technology in making foreign policy.

Q3) Write short notes on: (Any two) **[8]**

a) Science and armament technology.
b) Transfer of technology and its economic impact.
c) Impact of science on weapon development.

Q4) Answer in 18 to 20 sentences: (Any one) **[8]**

a) Explain impact of major technological breakthrough on society.
b) Describe relationship between science and national security.

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Total No. of Questions :4]

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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) Write the meaning of effective defence management.

b) Define team building.

c) Define strategic perspectives.

d) State the meaning of military industrial complex.

e) State the meaning of Battlefield dynamism.

f) Define military leadership.

g) Write the meaning of supply chain management.

h) Write any two principles of logistics.

Q2) Answer in 8 to 10 Sentences each (any two). **[8]**

a) Discuss scope of defence management.

b) Describe human resource management in the armed forces.

c) Explain role of military leadership in defence management.

P.T.O.

Q3) Write short notes on (Any two) **[8]**

a) Team building in the armed forces.

b) Structure of Department of Defence production.

c) Elements of war potential.

Q4) Answer in 18 to 20 Sentences (Any one). **[8]**

a) Explain application of war principles in corporate management.

b) Describe applications of war principles in supply chain management.

Total No. of Questions : 4]

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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) Define defence journalism.
b) Write the meaning of ethics in journalism.
c) Define professional Defence journalism.
d) Define research hypothesis.
e) Write any two steps of scientific inquiry.
f) Write any two characteristics of writing report.
g) Define mass communication.
h) State the meaning of main body of the report.

Q2) Answer in 8 to 10 Sentences each (any two): **[8]**

a) Explain types of journalism.
b) Discuss challenges to defence journalism.
c) Describe laws in defence journalism.

Q3) Write short notes on (any two): **[8]**

a) Ingredients of defence journalism.
b) Evolution of defence journalism.
c) Essential information for defence journalism.

Q4) Answer in 18 to 20 Sentences (any one): **[8]**

a) Explain role of media in maintaining national security.
b) Describe nature and scope of defence journalism.

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Total No. of Questions : 4]

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T.Y.B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS:-306(B) : Armed Conflict and Human Rights (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) What are fundamental rights?
b) Define international conflicts.
c) Define directive principles.
d) Define ethnic conflict.
e) Define terrorism.
f) Define equality.
g) What do you mean by human value?
h) State the meaning of peace making force.

Q2) Answer in 8 to 10 Sentences each (any two): **[8]**

a) Explain scope of human rights.
b) Discuss relationship between equality and liberty.
c) Write a note on Armed Forces Special Power Act (AFSPA).

Q3) Write short notes on (any two): **[8]**

a) Military Intervention.
b) Asymmetric warfare.
c) Classification of human rights.

Q4) Answer in 18 to 20 Sentences (any one): **[8]**

a) How do human rights work? Explain.
b) Describe relationship between armed conflict and human rights.

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Total No. of Questions : 4] SEAT No. :

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T.Y.B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS-307(A) : Disaster Management
(2013 Pattern) (Semester-III) (Paper-VII)

Time : 2Hours] *[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 disaster management.
b) Define Biological warfare.
c) Define Environmental disaster.
d) What are the limitations of Disaster management?
e) What do you mean by disaster policy perspectives?
f) Write any two importance of pre-disaster plan.
g) What do you mean by industrial disaster?
h) Define Sustainable development.

Q2) Answer in 8 to 10 Sentences each: (any two) **[8]**

a) Explain characteristics of manmade disaster.
b) Discuss contributive factors to vulnerability.
c) Describe Global warming and its impact on society.

Q3) Write short notes on (any two) **[8]**

a) Disaster due to weapons of mass destructions.
b) Latur Earthquake and relief operations.
c) 26/11 Mumbai terror attack and Rescue operations.

Q4) Answer in 18 to 20 sentences (Any one) **[8]**

a) Explain role of social scientist in pre-disaster management.
b) Describe relationship between disaster and national security.

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Total No. of Questions : 4]

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T.Y.B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS-307(B) : Global Security-I
(2013 Pattern) (Semester-III) (Paper-VII)

Time : 2Hours] ***[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 "Global warming".

b) State any two causes of "Terrorism".

c) What do you mean by "Taliban"?

d) What do you mean by "Terrorism"?

e) What was the basic cause for India-China war of 1962.

f) State any one Example of "Ethnic problem".

g) In which year the first Arab -Israel war task place?

h) Why the Iraq was the subject of American attack in 1990-91?

Q2) Answer in 8 to 10 Sentences (Any two). **[8]**

a) Explain The Nature of India-China border dispute.

b) Highlight on the various causes of Global warming.

c) Explain the causes of conflict between North Korea & South Korea.

Q3) Write short notes on (Any Two) **[8]**

a) Ethnicity:- As a source of conflict.

b) Concept of global security.

c) Preventive measures against global warming.

Q4) Answer in 16 to 20 sentences (Any one) **[8]**

a) Explain how "Afghanistan" is an escalation point?

b) Analyse the Arab-Israel conflict with special reference to the role of super powers in it.

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T.Y.B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 308 (A): Indian Military Strategy (1857-1947)

(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 to 4 sentences each: **[16]**

a) Define "Military History".
b) What do you mean by military strategy?
c) State any two sources of Indian Military History.
d) What do you mean by Limited war?
e) Why Indian Army entered in Mesapstamia during world war-I.
f) State any one example of Total war of 20th century.
g) Who was the first supreme commander of Azad Hind Fouj?
h) State the durations of world war - II.

Q2) Answer in 8 to 10 sentences (Any Two). **[8]**

a) Why the study of Military History is necessary for us?
b) Write a few lines on Battle of El-Alamein during world war-II.
c) Write about Indian National Army.

Q3) Write short notes on (Any Two). **[8]**

a) Concept of Total War.
b) Travelling Account: As a source of Indian Military History.
c) Concept of strategy.

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 Burma campaign of world war-II.

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T.Y.B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 308 (B): Maratha 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 (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. :

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T.Y.B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 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 to 4 sentences each: **[16]**

a) What do you mean by OPEC?
b) Who was the chief organizer of NATO?
c) State the long form of CENTO.
d) What do you understand by SAFTA?
e) When the "SAARC" came into existence?
f) State the aim of NAFTA.
g) Write the long form of ASEAN.
h) State the aim of SAARC.

Q2) Answer in 8 to 10 sentences (Any Two). **[8]**

a) Explain the concept of Regional Security system.
b) Write a fewlines on "WARSAW".
c) Explain in brief objectives of W.T.O.

Q3) Write short notes on (Any Two). **[8]**

a) Causes of managing of SEATO.
b) Problems of SAARC.
c) European Union.

Q4) Answer in 16 to 20 sentences (Any one). **[8]**

a) Explain the significance of "OPEC" With special reference to "oil politics".
b) Highlight on effects of W.T.O. on Third World Countries.

Total No. of Questions : 4]

P786

[5315] - 375

T.Y.B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 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 to 4 sentences each: **[16]**

a) State the meaning of littoral countries.
b) What do you mean by Maritime threat?
c) State the meaning of power Rivalry.
d) Write any four names of litteral countries of Indian Ocean.
e) Where the Andaman & Nicobar Islands situated?
f) Through which route terrorist came for Mumbai attack of 26/11.
g) What do you mean by Maritime Security?
h) To whom we called nose of Indian sub-continant?

Q2) Answer in 8 or 10 sentences (Any Two). **[8]**

a) Explain in brief Indias Indian Ocean policy.
b) Write in short concept of Indian Ocean as a zone of peace.
c) Write in brief Indias Maritime strategy.

Q3) Write short notes on (Any Two). **[8]**

a) Naval strategy of China.
b) Concept of litteral countries.
c) B.I.O.T.

Q4) Answer in 16 to 20 sentences (Any one). **[8]**

a) Highlight on strategic consideration enjoying by U.S.A from Diego Garcia Islands.
b) First & second world war was fought in Atlantic pacific? Medeterrian Ocean but if third world takes place then certainly it will be in Indian Ocean. Do you agree? Justify your answer.

Total No. of Questions : 4]

SEAT No. :

P787

[Total No. of Pages : 2

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T.Y.B.Sc.

ENVIRONMENTAL SCIENCE

ENV-301 : Terrestrial Ecosystems and Management

(2008 & 2013 Pattern) (Semester - III) (Paper - I) (92413)

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 "Edge Effect"?

b) Mention any two species found in Tundra biome.

c) How habitat restoration is useful in conservation of species?

d) What is commensalism?

e) Write any two applications of GIS in ecosystem management.

f) Mention any two ways to control forest fires.

g) What is the significance of quadrate method of sampling?

h) Write any two objectives of Joint Forest Management.

i) Mention any two objectives of ecotourism.

j) What is meant by "Carbon Pool"?

Q2) Write a short note on ANY TWO of the following: **[10]**

a) General Structure of Terrestrial Communities.

b) Ecosystem Services.

c) Biogeocycles.

P.T.O.

Q3) Answer ANY TWO questions from the following: **[10]**

a) Discuss the species composition of tropical grasslands.

b) What are the ways involved in sustainable management of natural resources?

c) Explain any two methods of vegetation sampling with environmental significance.

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

a) Write an account on various approaches involved in ecodevelopment programme and community based forest management.

b) What are hotspots of biodiversity? Discuss in detail on

i) Western Ghats.

ii) Eastern Himalaya.

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Total No. of Questions : 4]

SEAT No. :

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[Total No. of Pages : 2

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T.Y.B.Sc.

ENVIRONMENTAL SCIENCE

ENV-302: Wildlife Biology

(2008 &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) What is meant by 'Wildlife' as per Wildlife Act?

b) Mention any two characteristics of Bryophytes.

c) What is meant by 'Radio tagging'?

d) What is environmental significance of wetlands?

e) Write scientific names of any two angiosperms.

f) What are hotspots of biodiversity?

g) Mention any two characteristics arid zones.

h) Write any two objectives of camera trapping.

i) Give an example of simple marine food chain.

j) What are applications of diversity indices?

Q2) Write a short note on ANY TWO of the following: **[10]**

a) Conservation of Genetic Resources.

b) Methods of plant Diversity Assessment.

c) Diversity of vertebrates.

P.T.O.

Q3) Answer ANY TWO questions from the following: **[10]**

a) Discuss in detail on ecological values of mangrove ecosystem.

b) Write an account on applications of RS and GIS in wildlife management.

c) Discuss the importance of terrestrial ecosystems as habitats for wildlife.

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

a) Write a detailed account on various threats associated with wildlife destruction.

b) Discuss on various population assessment techniques with reference to birds and mammals.

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Total No. of Questions : 4] SEAT No. :

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[5315]-378
T.Y.B.Sc.
ENVIRONMENTAL SCIENCES
ENV-303: Water Quality
(2008 & 2013 pattern)(New course)(Paper - III) (Semester-III)
(92433)

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

Instructions to the condidates:

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

Q1) Attempt the following in 1-2 lines each **[10]**

a) Define chemical weathering of rocks.

b) What is meant by water vector habitat disease.

c) Enlist two water borne disease.

d) What is anionic detergent.

e) Write full form of BIS.

f) Enlist two advance water treatment.

g) Define COD.

h) What is ballast water?

i) Write full form of UASB.

j) What is hard water.

Q2) Write short note on(Any two) **[10]**

a) Solubility of gases in water.

b) Biotransformation of heavy metals.

c) Oil spills in marine environment.

P.T.O.

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

a) Which factor determines the movements and distribution of pollutants in water.

b) Explain the role of indian legislation in water crisis.

c) What are the effects of eutrophication.

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

a) Explain the concept of oxygen demand. Briefly write the BOD analysis Procedure.

b) What are the impact of thermal pollution on aquatic life .

Total No. of Questions : 4] SEAT No. :

P790 [Total No. of Pages : 2

[5315]-379
T.Y.B.Sc.
ENVIRONMENTAL SCIENCE
ENV-304: Issues in Environmental Science -I
(2008 & 2013 pattern)(Paper - IV) (Semester-III) (92443)

Time : 2Hours] *[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) Write the full form of 'CDM'.

b) Define 'sustainable development'.

c) Write examples of Green house gases.

d) What is LCA?

e) Mention effects of GM plants.

f) What is pastoralism?

g) Give examples of E-waste.

h) Mention causes of chernobyl Disaster.

i) What is Eco-journalism?

j) Write reasons of water crisis in India.

Q2) Write a short note on ANY TWO of the following. **[10]**

a) Issues of degraded land.

b) Objectives of Sustainable development.

c) Eco- terrorism.

P.T.O.

Q3) Answer ANY TWO questions from the following. **[10]**

a) Explain in brief LCA methodology.

b) Discuss role of community in Environment conservation.

c) Discuss impacts of population explosion on Environment.

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

a) What is Global Warming? Explain causes & effects of Green house gas emissions. Add a note on Mitigation measures of it.

b) Define carbon sequestration. Discuss methods of carbon sequestration. Add a note on benefits of it.

Total No. of Questions :4]

SEAT No. :

P791

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T.Y.B.Sc.

ENVIRONMENTAL SCIENCE

ENV - 305 : Environmental Governance and Equity Law and Ethics

(2008 & 2013 Pattern) (Semester - III) (Paper - V) (92453)

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 Green Tribunal?

b) Write statement of Art S1 A (g).

c) Enlist powers of pollution control board under Air Act, 1981.

d) What is CCC?

e) Write any two International obligations of India.

f) Mention objectives of National Forest policy.

g) What is public liability?

h) Give any two elements of Environmental governance.

i) Write objective of Motor vehicle regulation in India.

j) Write any two principles of 'stock holm declaration'.

P.T.O.

Q2) Write a short note on ANY TWO of the following. **[10]**

a) Ecomark Scheme.

b) Biodiversity Act, 2002.

c) PIL

Q3) Answer ANY TWO questions from the following. **[10]**

a) Discuss salient features of Environment (protection) Act, 1986.

b) Explain Role of public in Environment governance.

c) Discuss outcomes of the Earth summit, 1992.

Q4) Attempt ANY ONE of the following. **[10]**

a) Explain concept of Environmental Ethics. Add a note on challenges of world Environmental ethics.

b) Discuss functions and powers of pollution control board under the water (Prevention & control of Pollution) Act, 1974.

Total No. of Questions : 4]

SEAT No. :

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T.Y.B.Sc.

ENVIRONMENTAL SCIENCE

ENV-306 : Environmental Biotechnology - I

(2008 & 2013 Pattern) (Semester - III) (Paper - VI) (92463)

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

Instructions to the candidates:

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

Q1) Attempt the following in 1-2 lines each: **[10]**

a) Enlist the types of composting technology.

b) Define allomones.

c) Write any two microorganisms in biofuels.

d) What is full form of 'PSM'.

e) What is sustainable agriculture.

f) Define micro propogation.

g) Define bioleaching.

h) What is C/N ratio in composting is desirable.

i) Define in situ bioremediation.

j) Enlist any two organisms used in biofertilizers.

Q2) Write a short note on ANY TWO of the following: **[10]**

a) Gasification of biomass.

b) Bactarial pesticides.

c) Ethanol production.

P.T.O.

Q3) Answer ANY TWO questions from the following: **[10]**

a) Explain the manufacturing procedure for bactarium biopesticides.

b) Elaborate the risk associated with GMO'S.

c) What are the process factors influencing vermi composting.

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

a) Discuss in detail 'Neem pesticide' with special emphasis on their mode of action.

b) Briefly explain the biosafety guidelines in India.

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Total No. of Questions : 4] SEAT No. :

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[5315]-383
T.Y.B.Sc.
BIOTECHNOLOGY (Vocational)
(VOC-BIOTECH-335) Plant and Animal Biotechnology
(2013 Pattern) (Semester-III)

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

Instructions to the candidates:

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

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

a) Define callus.

b) What is meant by organogenesis?

c) What is the role of insulin?

d) Name two physical gene transfer methods in plants?

e) What is meant by somatic embryogenesis?

f) Give two applications of stem cells.

g) What are vaccines?

h) Name a few cell lines used in animal cell culture.

i) Define cell fusion.

j) What is meant by haploids?

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

a) Explain production of transgenic mice using stem cells.

b) Comment on the causes of somaclonal variation.

c) Define androgenesis.Give applications of haploids.

P.T.O.

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

a) In-vitro fertilization.

b) Somatic embryogenesis.

c) Cell fusion.

Q4) Explain production of monoclonal antibodies. **[10]**

OR

Explain Agrobacterium mediated gene transfer in plants.

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Total No. of Questions : 4] **SEAT No. :** [ ]

P1721 **[Total No. of Pages : 2**

[5315]-384

T.Y.B.Sc. (Semester - III)

PHOTOGRAPHY AND AUDIO VISUAL PRODUCTION

Video Recording and Playback Systems (Vocational) (Paper-V)

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

Instructions to the candidates:-

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

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

a) State the difference between audio and video signals.

b) Explain the term contrast of a TV picture.

c) A CCD sensor has higher power consumption than a CMOS sensor. Comment.

d) State the bandwidth of TV signal used in India.

e) State the horizontal and the vertical scanning frequency used in India.

f) What is 'drop out' in a VCR?

g) State any two adjustments required before using a video camera.

h) Explain the function of synchronizing pulses in a TV receiver.

i) State any two types of TV camera tubes.

j) State two advantages of LCD TV over CRT TV.

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

a) Explain the interlaced scanning pattern used in India.

b) How is electrical signal recorded on a magnetic tape?

c) Explain the need for rotating head mechanism in a VCR. Give track survey of a typical video tape.

P.T.O.

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

a) Explain the working of ACD player. What is the sampling frequency used for digital audio?

b) Explain the layout and equipment available in a OB van. What are its applications?

c) What do you mean by photoconductivity? How is this principle used in Vidicon camera tube? Draw a neat labelled diagram of Vidicon tube.

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

a) Describe the record and replay electronics in a VCR.

b) i) Explain the working of record electronics in a VCR.

ii) Compare the performance of a film camera with a digital camera. What does CCD mean?

Total No. of Questions : 4]

SEAT No. :

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[5315]-385
T.Y.B.Sc.(Vocational)
ELECTRONIC EQUIPMENT MAINTENANCE
Troubleshooting & Repair of Audio and video Equipment
(2013 pattern) (Semester-III)(Paper - V)

Time : 2Hours] *[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) In LCD monitor inky Stain Slowly spreads across the LCD screen. What may be the cause? **[1]**

b) What are the types of backlight sources used in laptop screen? **[1]**

c) What is 'motor boating' in a radio receiver? **[1]**

d) State mechanical problems that can occur in a CD player. **[1]**

e) State two advantages of plasma TV. **[2]**

f) What is the cause of 'excessive hum' is a PA system? **[2]**

g) In an FM receiver 'high fidelity is degraded'.Comment. **[2]**

h) A laser printer produces distorted printout. Explain cause. **[2]**

Q2) Attempt any two.

a) Give typical faults in a DVD player and their remedies. **[4]**

b) List the basic tools required for laptop repair. **[4]**

c) Explain the following faults in CRT monitor. **[4]**

i) Text is not visible.

ii) Distortion in display.

P.T.O.

Q3) Attempt any two.

a) Give the steps for fault diagnosis in a PA system. **[4]**

b) Give the step for troubleshooting a radio receiver. **[4]**

c) Give the procedure to replace SMD IC in LCD monitor. **[4]**

Q4) Answer the following.

a) Explain the faults in dot matrix printer and give their remedies. **[6]**

b) Compare the performance of DVD and blue ray disc. What are wavelengths of laser used in the two players. **[6]**

OR

Answer the following.

a) Discuss faults occuring specially in FM receiver. **[4]**

b) Write a short note on home theater and likely faults in it. **[4]**

c) What is a set-top box? What are its functions? **[4]**

Total No. of Questions : 4]

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[5315]-386
T.Y.B.Sc.(vocational)
INDUSTRIAL MICROBIOLOGY
VOC-IND-MIC-335: Pollution Control Technology
(2013 Pattern) (Semester-III) (Paper-V)

Time : 2Hours] *[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]**

a) State true or false: 'Flow equalization is a preliminary treatment process in wastewater treatment.

b) Define physical process unit of waste water treatment plant.

c) Breakpoint chlorination is crucial for removal of _____ from water.

d) Name any two types of anaerobic digesters used in wastewater treatment.

e) _____ are used in pre-treatmemt of water to remove solid objects.

f) TDS is calculated by _____ TSS _____ TS.

g) Name two pollutants present in an effluent discharged by paint industry.

h) _____ is wastewater that originates from toilet fixtures, dishwashers and food preparation sinks.

i) Grey water ii) Black water

iii) Yellow water iv) Brown water

i) State True or False - 'Activated sludge is an anaerobic process for treating sewage and industrial waste water'.

j) Name two physical characteristics of wastewater.

P.T.O.

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

a) Draw a neat labeled diagram of a rotating biological contactor showing all operational features and explain its functioning.

b) Explain mass balance approach in activated sludge process.

c) Write a detail note on denitrification of wastewater as a process of nutrient removal.

Q3) Write a short note on: (Any two of the following). **[10]**

a) Explain principle of type II settling of particles in a sedimentation tank.

b) Describe working of upflow anaerobic sludge blanket reactor for Wastewater treatment.

c) Write a detail note on phosphate removal from waste water.

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

a) Describe any two problems associated with functioning of activated sludge processes and their remedies.

b) Given the following information, calculate the MCRT.

Influent TSS	400 mg/L
Waste activated sludge total suspended solids	7000 mg/L
Mixed liquor suspended solids	3500 mg/L
Effluent total suspended solids	10mg/L
Influent flow	8.0 mgd
Waste activated sludge flow	0.05mgd
Primary clarifier volume	0.6million gal
Aeration basin volume	1.0 million gal
Secondary clarifier volume	0.3 million gal

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Total No. of Questions : 4]

SEAT No. :

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[5315]-388
T.Y.B.Sc.
SEED TECHNOLOGY(Vocational)
Seed Pathology and Entomology
(2013 Pattern) (Semester-III) (Paper-V)

Time : 2Hours] *[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: **[10×1=10]**

a) Give one example of storage fungi.

b) Give one distinguishing character of order coleoptera.

c) Give one example of seed borne bacteria.

d) Mention one step/ measure for the managment of seed storage structure.

e) Give one example of seed borne viral diseases in plants.

f) What is a pest?

g) Mention one control measure adopted for insect pest of pulses.

h) What is the purpose of seed treatment.

i) What is infestation.

j) What is infection.

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

a) Explain any one method for seed health test .

b) Give a brief history of seed pathology.

c) Explain how the insects act as vectors of plant diseases?

P.T.O.

Q3) Write notes on any two: **[2×5=10]**

a) Seed transmission.

b) Seed Storage and pest problem.

c) History of insect pest.

Q4) Explain the life cycle, damage caused and symptoms due to any one insect pest of cereals or pulses. **[10]**

OR

Describe the various entry points of seed infection.

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Total No. of Questions : 4]

SEAT No. :

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T.Y. B.Sc.

BIOTECHNOLOGY (Vocational)

Microbial Biotechnology and Fermentation

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

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

Instructions to the candidates:

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

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

a) What are the methods used for enzyme immobilization.

b) Define microbial biotechnology.

c) What are acidophiles.Give examples.

d) What are biopolymers.

e) Give two applications of GMO in agriculture.

f) What is SOP?

g) What is the role of impeller ?

h) Name the organism used for production of citric acid ?

i) Name the steps used for recovery of DPT vaccines.

j) Name any two types of fermetors.

Q2) Write short notes on any two of the following: **[10]**

a) Diauxic growth.

b) Strain improvement.

c) Biosensors.

P.T.O.

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

a) Explain with the help of diagram a typical batch fermater.

b) What is screening? Discuss the types of screening employed in formentation.

c) What are thermophiles ? Discuss the adaptations shown by thermophiles.

Q4) Describe in detail Biofertilizer and Biopesticides. **[10]**

OR

Describe in detail the production and recovery of penicillin antibiotic.

Total No. of Questions : 4]

SEAT No. :

P1722

[Total No. of Pages : 2

[5315]-391

T.Y.B.Sc. (Semester - III)

PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION (VOCATIONAL)

Television Software (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 the following . **[10]**

a) Diferentiate between watching a TV programme and watching a movie.

b) When is a compact shot and an extreme close up useful?

c) Discuss : 'Brainstorming'.

d) Discuss the importance of postproduction stage.

e) Which format is used for generating a social message? Why?

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

a) Give suitable examples and explain the concept of 'Following Camera'.

b) Give suitable examples and discuss the use of various camera angles.

c) Give suitable examples and distinguish between "Zoom in and Zoom out".

Q3) Write a script for 30 sec social advertisement on the following theme in the interview format. **[10]**

"Importance of voting in elections".

P.T.O.

OR

Write a script for 30 sec social advertisement on the following theme in the documentary format. **[10]**

"Importance of voting in elections".

Q4) Write short notes on two of the following. **[10]**

a) Docu-Drama format

b) Storyboarding

c) Camera movements

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Total No. of Questions : 4]

SEAT No. :

P798

[Total No. of Pages : 2

[5315] - 392

T.Y. B.Sc. (Vocational)

ELECTRONIC EQUIPMENT MAINTENANCE

Electronic Instrumentation

(2013 Pattern) (Semester-III) (Paper-VI) (New)

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) a) Answer the following: **[4×1=4]**

i) What is event sequence?

ii) What is LDR?

iii) What do you mean by active sensor?

iv) Give one example of null type instruments.

b) Answer the following: **[2×2=4]**

i) Classify- Mercury Thermometer.

ii) Explain the term 'internal relay'

c) Answer the following: **[2×2=4]**

i) Why are null-type instruments more accurate than deflection-type?

ii) Define accuracy as % of true value.

Q2) Answer the following - (any 2). **[2×4=8]**

a) Discuss commissioning of PLC system and testing its inputs and outputs.

b) Explain the DSP with the help of block diagram.

c) Discuss the advantages of digital transducers.

P.T.O.

Q3) Answer any 2: **[2×4=8]**

a) What is ladder diagram? Give the rungs for AND gate and OR gate.

b) Explain optical encoder.

c) Discuss relative and absolute motion devices.

Q4) Answer any 2: **[2×6=12]**

a) Discuss architecture of a PLC processor.

b) Explain basic spectrum analyzer.

c) Write a note on pneumatic load cell.

OR

Q4) Answer the following: **[3×4=12]**

a) R=100 Ω, L=10mH; f=1kHz. Evaluate the branch impedance in complex and polar form.

b) Discuss logic analyzer.

c) Explain the term distortion.

Total No. of Questions : 4]

SEAT No. :

P799

[Total No. of Pages : 2

[5315] - 393

T.Y. B.Sc.

INDUSTRIAL MICROBIOLOGY (Vocational)

VOC-IND-MIC-336 : 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 questions carry equal marks.***
3) ***Draw neat labelled diagrams wherever necessary.***

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

a) What is RAM with respect to PTC?

b) Name any two compounds required for adherence of cells in culture flask.

c) What are plantibodies?

d) Define histotypic culture.

e) Which genes are responsible for maintaining size of plant stem niche?

f) How are animal tissue culture medium sterilized?

g) What is differentiation?

h) State examples of continuous cell lines.

i) In callus formation high concentration of _____ promotes shooting.

j) List examples of primary and secondary metabolites produced from plant tissue culture.

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

a) Comment of callus culture.

b) Explain the concept of synseeds.

c) What is the role of serum in the culture medium used for animal cell culture?

P.T.O.

Q3) Comment on (Any two of the following): **[10]**

a) Generation of haploid plants.

b) Hollow fibre reactor.

c) Role of sodium bicarbonate in ATC medium.

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

a) Explain vector mediated gene transfer method for plants. Draw diagrams wherever required.

b) Discuss in detail the method involved for production of monoclonal antibody production.

Total No. of Questions : 4]

SEAT No. :

P800

[Total No. of Pages : 2

[5315] - 395

T.Y. B.Sc.

SEED TECHNOLOGY (Vocational)

Seed Farm Management, Processing & Storage

(2013 Pattern) (Semester-III) (New)

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 seed grading.

b) Give any one objective of farm management.

c) What is capital limitation.

d) Define seed processing.

e) What is seed marketing.

f) Draw a basic flow pattern in seed processing plant.

g) What is seed conditioning?

h) Enlist methods of seed storage.

i) What is seed cleaning?

j) Give the name of any one equipment used in seed treatment.

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

a) Describe in detail fundamentals of farm management.

b) Write an account on major components of seed marketing.

c) What is seed treatment? Write in detail any one method of seed treatment.

P.T.O.

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

a) Maintenance management of seed processing unit.

b) Scope of farm management.

c) Factors involved in the selection of a farm business.

Q4) What is seed drying? Explain in detail methods of seed drying. **[10]**

OR

What is seed storages ? Explain in detail factors affecting storability of seeds.

Total No. of Questions : 4]

SEAT No. :

P898

[Total No. of Pages : 2

[5315]-501
T.Y. B.Sc.
PHYSICS (Theory)
PH - 333 : Classical Mechanics
(2008 Pattern) (Paper - III) (Semester - III)

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

Instructions to the candidates:

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

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

a) What do you mean by centre of mass of system?

b) Define range of projectile.

c) State kepler's second law of planetary motion.

d) What is meant by central force?

e) What is meant by inelastic collision? Give an examples.

f) Define differential cross section.

g) What are generalized co-ordinator?

h) What is meant by holonomic constraints?

i) What do you mean by inertial frame of reference?

j) State the principle of Galilean invariance.

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

a) Show that the path of charged particle moving with a uniform velocity in transverse electric field is parabola.

b) Explain how a two body problem can be reduced into equivalent one body problem

c) Derive the differential equation for the orbit in central force motion.

P.T.O.

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

a) Two projectiles are projected with same velocity if one is projected at an angle of 30° and other to the horizontal. Find the ratio of maximum heights and range of the projectiles.

b) Explain the effect of coriolis force on cyclone formation.

c) A geostationary satellite is orbiting the earth at a height of 11 Re above the surface of the earth. Where Re is radius of earth. Find the time period of another satellite at height of 5Re from the surface of earth.

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

i) Explain the terms differential cross-section and impact parameter. prove the relation.

$$\sigma(\theta') = \frac{-S}{\sin\theta'}\frac{ds}{d\theta'}$$

ii) State and explain D'Alembert's principle. Obtain lagrange's equation of motion from D'Alembert's principle.

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

ii) What do you mean by degree's of freedom?

ii) Give any two examples of pseudo force.

Total No. of Questions : 4]

SEAT No. :

P899

[Total No. of Pages : 2

[5315]-502

T.Y. B.Sc.

PHYSICS (Theory) (Paper - V)

PH - 335 : C-Programming and Computational Physics

(2008 Pattern) (Semester - III)

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

Instructions to the candidates:

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

Q1) Attempt all. (one mark each) **[10]**

a) What is pixel?

b) What is flow chart?

c) What is use of scan f ( ) function?

d) Write syntax of for statement.

e) Why break statement is used?

f) Define keywards?

g) Give syntax of graphic command arc used in C-program.

h) State difference between ++i and i++.

i) What is conditional operator?

j) What is curve fitting?

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

a) Explain switch statement with suitable example

b) What is algorithm? Explain advantages of algorithm approach while solving the problem.

c) Write C-program to print even integers less than 100.

P.T.O.

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

a) State different operators used in C-language. Give example of each operator.

b) Draw flow chart to print first 100 integers.

c) Explain the difference between while and do ..... while statements with suitable examples.

Q4) A) Attempt any one: **[8]**

a) i) Write C-program to find square and cube of a given integer.

ii) Draw flow chart for newton Raphson method to find solution.

b) i) Find truncation error in the series given below

$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \ldots\ldots\ldots \text{ for}$$

1) First three

2) First five terms with $x = 1/5$

ii) Write C-program to find area of circle.

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

a) Give the syntax for drawing an ellipse and rectangle

b) Explain use of gets() and puts() functions.

Total No. of Questions : 4]

SEAT No. :

P900

[Total No. of Pages : 2

[5315]-503
T.Y. B.Sc.
PHYSICS (Paper - VI)
PH - 336 (E) : Medical Electronics
(2008 Pattern) (Semester - III)

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

Instructions to the candidates:

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

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

a) What is need of electrode paste or electrolyte?

b) Give any two physiological effects of electricity.

c) What is systolic pressure?

d) What are bio-potential electrodes?

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

f) State nernst equation for bio-potential.

g) What is sensor?

h) State various type of calorimeter

i) What is function of cardiac monitor.

j) State doppler frequency shift relation.

P.T.O.

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

a) Explain construction, working of spectrophotometer with example.

b) Explain an isolation amplifier with block diagram.

c) Give analysis of ECG pattern with a neat diagram.

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

a) If the patient has heart rate 90 beats/min cardiac output 5400 mL/min, systolic pressure 155 mm Hg and diastolic pressure 95mmHg. Then determine

i) Stroke volume

ii) Pulse pressure

iii) What its condition

b) 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.

c) For a 1-c m^2 capacitance sensor, R is 100mΩ. Calculate radius (r), the plate spacing required to pass sound frequency above 20 Hz.

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

i) What do you mean by electrode-electrolyte interface? Describe silver-silver chloride electrode interface.

ii) What do you mean by heart sound? Explain variety of heart sound with cardiac cycle.

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

i) Draw diagram for double beam spectrophotometer.

ii) Give various applications of calorimeter.

Total No. of Questions : 4]

SEAT No. :

P901

[Total No. of Pages : 3

[5315]-504
T.Y.B.Sc. (Principal)
STATISTICS (Theory)
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) Attempt each of the following :

A) Choose the correct alternative in each of the following **[1 each]**

a) $\beta_1(m,n)$ distribution is symetric about $\left(\frac{1}{2}\right)$ if

i) $m > n$ ii) $m < n$

iii) $m = n$ iv) $m = n + 1$

b) If $(X_1, X_2, X_3) \sim MD(12, 0.1, 0.4, 0.5)$, then karl peason's coefficient of correlation between X_2 and X_3 is

i) $-\sqrt{\frac{2}{3}}$ ii) $-\sqrt{\frac{3}{2}}$

iv) $\sqrt{\frac{2}{3}}$ vi) –0.02

c) Mean of $W(\alpha = 3, \beta = 1)$ distribution is

i) 1 ii) 3

iii) 2 iv) $\frac{1}{3}$

d) The cumulative distribution function of 1st order statistic $X_{(1)}$ of a random sample of site n from the distribution of a r.v.x is

i) $[F(x)]^n$ ii) $1-[F(x)]^n$

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

P.T.O.

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

a) If $X \sim \beta_1(5,6)$, then mean of $\left[\frac{1-X}{X}\right]$ is 1. **[1]**

b) If $X \sim W(4,2)$, then $\frac{X^2}{16}$ follows exponential distribution. **[1]**

c) Define convergence in distribution **[1]**

d) State chebychev's inequality. **[1]**

e) State the additive property of cauchy distribution **[1]**

f) Define order statistics **[1]**

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

a) Let $X \sim W(\alpha,\beta)$, obtain the cumulative distribution function of X and hence find first and third quartile of X.

b) Let $X \sim \beta_2(m,n)$, obtain mean and variance of X.

c) State and prove central limit theorem for i.i.d. random variables.

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

a) Obtain the probability distribution of i^{th} order statistic of a random sample of size n drawn from a distribution.

b) Let $(x_1,x_2,x_3) \sim MD(12, 0.4, 0.2, 0.4)$.

Compute

i) $P(x_1 = 2, x_3 = 6)$

ii) Corr $(2x_1 + 3, x_2 + 2)$

c) If X is a random variable with $E(x) = 5$ and $E(x^2) = 34$. Obtain the upper limit for $p[-1 < x < 11]$ using chebychev's inequality.

Q4) Attempt any one of the following:

a) i) Find the expectation of sample median drawn from U(0,1) distribution when sample size n = (2m + 1) where m is non-negative integer.

ii) If $\{X_k\}$ is a sequence of independent r.v. each assuming three values –1,0, 1 with the respective probabilities $P[X_k = -1] = P[X_k = 1] = \frac{1}{k}$ and $P[X_k = 0] = 1 - \frac{2}{k}$. Verify WLLN for this. **[6+4]**

b) i) State and prove the inter relation between $\beta_1(m,n)$ and $\beta_2(m,n)$ distributions.

ii) Eight independent observations are taken on a r.v. X having the p.d.f. $f(x) = \begin{cases} 2x, & 0 < x < 1 \\ 0, & \text{elsewhere} \end{cases}$

Suppose the interval (0,1) is divided into 4 equal parts.
Find the probability that equal number of observations lie in each of these parts. **[6+4]**

Total No. of Questions : 4] **SEAT No. :**

P902 **[Total No. of Pages : 3**

[5315]-505
T.Y. B.Sc.
STATISTICS (Principal)
ST - 333 : Statistical Process Control (Online Methods)
(2008 Pattern) (Semester - III)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of scientific calculator and statistical tables is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following:

A) Choose the correct alternative in each of the following: (1 each)

i) Which of the following process control tool uses 80:20 principle?

a) Pareto Diagram b) Histogram

c) Control Chart d) Check Sheet

ii) Which of the following limits are not determined directly by using sampled observations?

a) 0.001 probability limits

b) 3σ limits

c) Control limits

d) Specification limits

iii) _____ chart shows the centering of the process.

a) X b) R

c) p d) C

iv) Natural tolerance band is always

a) 3σ b) 6σ

c) σ d) 2σ

P.T.O.

B) In each of the following, state whether the given statement is true or false. (1 each)

i) $C_p \geq C_{pk}$ (always)

ii) Pareto diagram is a simple bar diagram of causes.

C) Define the following terms: (1 each)

i) Defective

ii) Modern definition of quality.

D) i) State any two criteria for detecting lack of control situations. **[1]**

ii) State any two disadvantages of variable control chart. **[1]**

Q2) Attempt any two of the following: (5 each)

A) Give justification for the use of 3σ control limits on control charts.

B) Explain the construction of p-chart for fixed sample size when standards are not given.

C) Write a short note on cause and effect diagram.

Q3) Attempt any two of the following: (5 each)

A) A normally distributed quality characteristic is controlled by $\bar{X}$ and R chart and it is found that the process in under control. It is given that for $\bar{X}$ chart and for R chart.

$UCL_{\bar{X}} = 626$	$UCL_R = 18.795$	
$CL_{\bar{X}} = 620$	$CL_R = 8.236$	$n = 4$
$LCL_{\bar{X}} = 614$	$LCL_R = 0$	

i) Find estimate of process standard deviation.

ii) If the specification limits were 610 ± 15, what would be the estimate of process fraction defectives?

B) Distinguish between assignable causes and chance causes of variation.

C) The following is a record of the number of point defects per unit for metal disk equipment painted by dipping 16, 15, 17, 15, 14, 16, 18, 17. Draw a suitable control chart and comment.

Q4) Attempt any one of the following:

A) a) Distinguish Natural tolerance limit and Specification limit. **[4+6]**

b) Define C_p and C_{pk}. Also interprete the following

i) $C_{pk} = 0$

ii) $C_{pk} = 1.33$

B) a) Distinction between CRL and p-chart. **[5+5]**

b) Write note on Online Process Control.

Total No. of Questions : 4]

SEAT No. :

P903

[Total No. of Pages : 7

[5315]-506
T.Y. B.Sc. (Semester - III)
STATISTICS (Principal) (Paper - VI)
ST - 336 (A) : Operations Management
(Ele. - I) (2008 Pattern)

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

Instructions to the candidates:

1) ***All questions are compulsory,***
2) ***Figures to the right indicate full marks.***
3) ***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) For the items that deteriorate gradually,

a) Operating and maintenance costs steadily increase with passage of time, whereas depreciation per year decreases with time

b) optimum replacement interval is the minimum time elapsing between the successive replacements

c) the annual maintenance cost and annual depreciation tend to decrease

d) all of the above

ii) The decision makers knowledge and experience may influence the decision making process when using the criterion of,

a) realism b) maximin

c) maximax d) minimax regret

iii) Economic order quantity results in,

a) equalization of carrying cost and procurement cost

b) minimization of setup cost

c) favorable procurement price

d) reduced chances of stock outs.

P.T.O.

iv) In the context of network, which of the following is not correct?

a) A network is a graphic representation of activities and nodes

b) A project network cannot have multiple initial and final nodes

c) An arrow diagram is essentially a closed network

d) An arrow representing an activity may nor have a length and shape

B) In each of the following cases state whether the given statement is true or false: **[1 Each]**

i) If the unit cost rises, will optimum order quantity increases.

ii) An activity has zero slack, it implies that it lies on critical path.

C) Explain the following terms: **[1 Each]**

i) Lead time.

ii) Critical path.

D) Explain the following terms: **[1 Each]**

i) What is a replacement problem? When does it arise?

ii) Explain any two differences between PERT and CPM.

Q2) Attempt any two of the following: **[5 Each]**

a) The following are the details of estimated times of activities of a certain project

Activity	A	B	C	D	E	F
Predecessor	-	-	A	A	B,C	D, E
Duration (days)	16	20	8	10	6	12

Find the critical path and the expected time of the project. Hence, find total float and free float for each activity.

b) Explain in brief Hurwitz criterion for the decision under uncertainty.

c) The cost of a machine is Rs. 6100/- and its scrap value is Rs. 100/-. The maintenance cost found from past experience are as follows:

Year	1	2	3	4	5	6	7	8
Running cost	100	250	400	600	900	1200	1600	2000

When should the machine be replaced? Justify your answer.

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

a) Derive an expression for the economic lot size model with uniform rate of demand, instantaneous replenishment rate and no shortage.

b) 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. Any unsold copy is a 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 profits will be a maximum.

c) Explain the following terms used in PERT:

i) Pessimistic time

ii) Optimistic time

iii) Most likely time.

Q4) Attempt any one of the following:

a) i) Write a note on VED analysis. **[5]**

ii) A super bazaar must decide on the level of supplies it must stock to meet the needs of its customers during Diwali days. The exact number of customers is not known, but it is expected to be in one of the four categories: 300, 350, 400, or 450 customers. The table below provides these costs in thousands of rupees: **[5]**

	Supplies level			
Customer category	A1	A2	A3	A4
E1	7	12	20	27
E2	10	9	10	25
E3	23	20	14	23
E4	32	24	21	17

Determining the best level of supplies using Laplace criterion.

b) A small project composed of seven activities, whose time estimates are listed in the table as follows: **[10]**

Activity		Estimated duration (weeks)		
i	*j*	Most likely time	Optimistic time	Pessimistic time
1	2	1	1	7
1	3	1	4	7
1	4	2	2	8
2	5	1	1	1
3	5	2	5	14
4	6	2	5	8
5	6	3	6	15

i) Draw the project network.

ii) Find the expected duration and variance of each activity. What is the expected project length?

iii) Calculate the variance and standard deviation of project length. What is the probability that the project will be completed: i) at least 4 weeks earlier than expected? ii) no more than 4 weeks later than expected?

iv) If the project due date is 19 weeks, what is the probability of meeting the due date?

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Total No. of Questions : 4]

[5315]-506
T.Y. B.Sc. (Semester - III)
STATISTICS (Principal) (Paper - VI)
ST - 336 (C) : Time Series Analysis
(2008 Pattern) (Ele : I)

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

Instructions to the candidates:

1) ***All questions are compulsory,***
2) ***Figures to the right indicate full marks.***
3) ***Use of scientific calculators and statistical tables is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following:

A) In each of the following cases, choose the correct alternative. **(1 each)**

i) In Time Series the types of Smoothing relationship is

a) $\hat{Y}_t = (1-\propto)\hat{Y}_{t-1} + a$

b) $\hat{Y}_t = (1-\propto)\hat{Y}_{t-1} + \propto Y_{t-1}, \propto \varepsilon(0,1)$

c) $\hat{Y}_t = (1-\propto)\hat{Y}_{t-1} + \propto Y_{t+1}, \propto \varepsilon R$

d) $\hat{Y}_t = (1-\propto)\hat{Y}_{t-1} + \propto Y_{t-1}, \propto \varepsilon R$

ii) A time series consist of:

a) Short term variation

b) Long term variation

c) Irregular variation

d) All of the above

iii) The data of time series should have time in

a) Weeks

b) Months

c) Years

d) Any unit of time

iv) Box – Cox transformation is

a) $\frac{Y^{\lambda}-1}{\lambda}, \lambda > 1$ b) $\frac{Y^{\lambda}-1}{\lambda}, \lambda < 1$

c) $\frac{Y^{\lambda}-1}{\lambda}, \lambda \neq 1$ d) None of these

B) State whether each of the following statement is **True or False**. **[1 each]**

i) Differencing is used to reduce stationary time series to non-stationary Series.

ii) Moving averages can give estimate of trend for future.

C) Define the following **[1 Each]**

i) Cyclical variation.

ii) Exponential smoothing.

D) i) State Stationary time series. **[1]**

ii) State AR(2) Model. **[1]**

Q2) Attempt any two of the following. **[5 Each]**

a) Explain the components of time series Analysis.

b) Explain in brief Durbin - Watson test.

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) Fit a trend line to the following time series by the least squares methods. Obtain the trend value of production for 2016.

Year(t)	2009	2010	2011	2012	2013
Production (Yt)	12	20	28	32	50

b) Explain the concept of moving averages. Also mention its merits and demerits

c) Write a note on Box — Jenkins time series modeling.

Q4) Attempt any one of the following.

a) i) Explain utility of time series plots. **[5]**

ii) Explain the use of transformation in time series. Explain any one type of transformation. **[5]**

b) i) Write a note on double exponential smoothing **[5]**

ii) Explain any one of the method for deseasonalizing a time series under multiplicative model. **[5]**