Total No. of Questions :4]

SEAT No. :

P794

[Total No. of Pages :2

[5017]-401
T.Y.B.Sc.
MATHEMATICS
MT-341: Metric Spaces
(2008 Pattern) (Paper - I)(Semester - IV)

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

Instructions to the candidates:

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

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

a) Find

i) B(0, 1) in $\langle \mathbb{R}, d_1 \rangle$ where $d_1(x, y) = |x - y|$.

ii) B((0,0)1), in $\langle \mathbb{R}^2, d_2 \rangle$ where $d_2((x_1, y_1), (x_2, y_2)) = \sqrt{(x_2 - x_1)^2, (y_2 - y_1)^2}$.

b) Is every cluster point a limit point? Justify your answer.

c) State nested interval theorem.

d) Is union of two connected sets connected? Justify your answer.

e) Show that the absolute value function $|\ |: \mathbb{R} \to \mathbb{R}$ is continuous.

f) Give an example of metric space which is complete, closed, bounded but disconnected.

g) Find the set of all boundary points of Q in $\mathbb{R}$.

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

a) Let X be a non-empty set. A function $d : XXX \to \mathbb{R}$ is defined as

$d(x, y) = 0$ if $x = y$

$= 1$ if $x \neq y$

Show that *d* is metric on X.

b) Show that the closed ball B [*x*, *r*] is closed in metric space X, where $x \in X$ and $r > 0$.

c) Show that a metric space X is connected if and only if every continuous function $f : X \to \{-1, +1\}$ is a constant function.

P.T.O.

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

a) Let X and Y be metric spaces. Show that a function $f : X \to Y$ is continuous if and only if for every open set $V \subseteq Y$, its inverse image $f^{-1}(V)$ is open in X.

b) Show that any discrete metric space is complete.

c) Prove that a compact subset of metric space X is bounded. Give an example of metric space which is bounded but not compact.

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

a) i) If every open cover of a metric space X has a finite subcover, prove that X is complete and totally bounded.

ii) If A and B are two non-disjoint connected subsets of metric space X, show that $A \cup B$ is connected.

OR

b) i) If *f* and *g* are continuous functions from metric space X to metric space Y, show that the set $\{x \in X \,/\, f(x) = g(x)\}$ is closed in X.

ii) Show that every Cauchy sequence in a metric space X is bounded.

EEE

Total No. of Questions :4]

SEAT No. :

P795

[Total No. of Pages :2

[5017] - 402

T.Y.B.Sc.

MATHEMATICS

MT - 342 : Complex Analysis

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

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

Instructions to the candidates:

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

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

a) Show that $f(z) = e^{-z}$ is an entire function.

b) Show that $f(z) = \bar{z}$ is nowhere analytic.

c) Let $z(\theta) = \cos\theta + i\sin\theta, \theta \in [0, \pi]$. Is z ($\theta$) a smooth arc? Justify.

d) Show that sin$z$ = sin$x$ coshy +i cos$x$ sinhy for z = x+iy.

e) Evaluate $\int_c \frac{z^2}{z^2 - 5z + 6} dz$, where C is positively oriented circle |z|=1.

f) Find the Talyor series of $\frac{1}{1+z}$ when $|z|<1$.

g) Give an example of a function having essential singularity.

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

a) If $f(z)$ is differentiable at z_0 then prove that $f(z)$ is continuous at z_0. Is converse true? Justify.

b) Prove that a function $f(z) = u+iv$ is analytic in a domain D if and only if V is harmonic conjugate of u in D .

c) Find all zeros of sinhz.

P.T.O.

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

a) If $f(z)$ is analytic over and inside region bounded by two simple closed contours C_1 and C_2 with same direction, than prove that

$\int_{C_1} f(z)dz = \int_{C_2} f(z)dz$.

b) If $f(z)$ is piecewise continuous function on a contour C, then prove that

$\left|\int_C f(z)dz\right| \leq ML$, where L= length of C and $M = \sup_{z \in C} |f(z)|$.

c) Write the two Laurent series in powers of z that represent the function

$f(z) = \frac{1}{z(1+z^2)}$ in certain domains, and specify those domains.

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

a) i) State and prove Cauchy integral formula.

ii) Evaluate $\int_c \frac{z+1}{z^2-2z} dz$, where C is positively oriented circle $|z|=4$.

b) i) Suppose that $f(z)$ is analytic at z_0. Prove that $f(z)$ has a zero of order m at z_0 if and only if there exist a function $g(z)$, which is analytic and non zero at z_0 such that $f(z) = (z-z_0)^m g(z)$.

ii) Using residues evaluate $\int_o^\infty \frac{x^2}{x^6+1} dx$

Total No. of Questions : 4]

SEAT No. :

P796

[Total No. of Pages : 2

[5017]-403
T.Y.B.Sc.
MATHEMATICS
MT - 343 : Problem Course Based on MT - 341 and MT - 342
(2008 Pattern) (Paper - III) (Semester - 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) ***Answers to the two sections should be written in separate answer books.***
4) ***Tie answer books of both sections together.***

SECTION - I
(Metric Spaces)

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

i) A function $d : \mathbb{R} \times \mathbb{R} \to \mathbb{R}$ is defined as $d(x, y) = |x + y|$.

Is d a metric on $\mathbb{R}$? Justify your answer.

ii) Let D and D' be dense in a metric space X. Is $D \cap D'$ dense in X? Justify your answer.

iii) If f is a continuous real valued function on a metric space X, show that the set $\{x \in X / f(x) \leq 0\}$ closed in X.

iv) Is the set $\{x \in \mathbb{R} / |x| > 2\}$ connected in $\mathbb{R}$? Justify.

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

i) Show that a sequence (x_n, y_n) in product metric space X × Y converges to point (x, y) of X × Y if and only if $x_n \to x$ in X and $y_n \to y$ in Y.

ii) Show that any compact space is totally bounded.

P.T.O.

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

a) If $f: \mathbb{R}^2 \to \mathbb{R}$ is continuous, show that the function $g: \mathbb{R}^2 \to \mathbb{R}$ given by, $g(x, y) = f(x + y, x - y)$ is continuous.

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

c) Show that the circle $\{(x, y) \in \mathbb{R}^2 / x^2 + y^2 = 1\}$ is connected.

SECTION - II

(Complex Analysis)

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

i) Show that $\cos h^2 z - \sin h^2 z = 1$.

ii) Evaluate $\exp(2 \pm 3\pi i)$.

iii) Evaluate $\int_C \frac{e^{-z} + \cos iz}{z - \left(\frac{i\pi}{2}\right)} dz$, where C is positively oriented circle $|z| = 2$.

iv) Find $\operatorname{Res}_{z=0} \exp\left(-\frac{1}{z}\right)$.

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

i) Is $f(z) = 2 \sin z + \cos z$, a bounded function on $\mathbb{C}$? Justify.

ii) Derive the Taylor series representation.

$$\frac{1}{1-z} = \sum_{n=0}^{\infty} \frac{(z-i)^n}{(1-i)^{n+1}}, \left(|z-i| < \sqrt{2}\right).$$

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

a) Show that $f(z) = \sin x \cos hy + i \cos x \sin hy$, is an entire function.

b) Evaluate $\int_C \frac{3z^3 + 2}{(z-1)(z^2+9)} dz$ where C is positively oriented circle $|z| = 5$.

c) Using residues, evaluate $\int_0^{\infty} \frac{dx}{x^4 + 1}$.

Total No. of Questions : 4]

SEAT No. :

P797

[Total No. of Pages : 2

[5017]-404
T. Y. B. Sc.
MATHEMATICS
MT - 344 : Ring Theory
(2008 Pattern) (Paper - IV) (Semester - IV)

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

Instructions to the candidates:

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

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

a) Show that a ring that is cyclic under addition is commutative.

b) List all zero divisors in $\mathbb{Z}_{30}$.

c) Let x and y belong to an integral domain of prime characteristic p. Show that $(x + y)^p = x^p + y^p$.

d) Show that the ideal $\langle x^2 + 1 \rangle$ is not prime ideal in $\mathbb{Z}_2[x]$.

e) If an ideal I of a ring R contains a unit, show that I = R.

f) Show that the direct sum of two integral domains is not an integral domain.

g) Show that the ring $2\mathbb{Z}$ is not isomorphic to the ring $3\mathbb{Z}$.

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

a) If R is an integral domain, then prove that R[x] is also an integral domain.

b) Let $f(x) \in \mathbb{Z}[x]$. Prove that, if $f(x)$ is reducible over $\mathbb{Q}$, then it is reducible over $\mathbb{Z}$.

c) Prove that the ring $\mathbb{Z}\left[\sqrt{-5}\right]$ is integral domain but not unique factorization domain.

P.T.O.

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

a) Let R be a finite commutative ring with unity. Prove that every nonzero element of R is either a zero divisor or a unit.

b) Let R be a ring and let A be a subring of R. Prove that the set of cosets $\{r+A \mid r \in R\}$ is a ring under the operations, $(s + A) + (t + A) = s + t + A$ and $(s + A)(t + A) = st + A$ if and only if A is an ideal of R.

c) Show that $\mathbb{R}[x] \Big/ \langle x^2+1 \rangle$ is a field.

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

a) i) If R is a ring with unity and the characteristic of R is $n > 0$, then prove that R contains a subring isomorphic to $\mathbb{Z}_n$.

ii) Let F be a field and let

$I = \{a_n x^n + a_{n-1} x^{n-1} + ... + a_0 \mid a_n, a_{n-1}, ..., a_0 \in F$ and $a_n + a_{n-1} + ... + a_0 = 0\}$.

Show that I is principal ideal of F [x]. Also, find the generator for I.

b) i) Let F be a field and $p(x) \in F[x]$. Then prove that the ideal $\langle p(x) \rangle$ is maximal ideal in F[x] if and only if $p(x)$ is irreducible over F.

ii) Let $\mathbb{Z}[i]=\{a+bi \mid a,b \in \mathbb{Z}\}$. For $a + bi \in \mathbb{Z}[i]$, define $d(a + bi) = a^2 + b^2$. Show that $d(xy) = d(x)\, d(y)$, for any $x, y \in \mathbb{Z}[i]$

Total No. of Questions : 4]

SEAT No. :

P798

[Total No. of Pages : 2

[5017]-405
T.Y.B.Sc.
MATHEMATICS
MT - 345 : Partial Differential Equations
(2008 Pattern) (Paper - V) (Semester - IV)

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

Instructions to the candidates:

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

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

a) Find the integral curves of the equation

$$\frac{dx}{x\left(y^2-z^2\right)}=\frac{dy}{y\left(z^2-x^2\right)}=\frac{dz}{z\left(x^2-y^2\right)}$$

b) Solve the equation $a^2 y^2 z^2 dx+b^2 x^2 z^2 dy+c^2 x^2 y^2 dz=0$ by variables separable method.

c) Obtain the partial differential equation by eliminating arbitrary function f from $z = xy + f(x^2 + y^2)$.

d) Find the general solution of $xp + yq = z$.

e) Find the complete integral of Clairaut's partial differential equation $z = px + qy + p^2 q^2$.

f) Show that the differential equation $yzdx - zxdy - y^2 dz = 0$ is integrable.

g) Find the complete integral of $p + q - pq = 0$.

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

a) Find the integral surface of $x(y^2 + z)p - y(x^2 + z)q = (x^2 - y^2)z$ which contains a line $x + y = 0$ and $z = 1$.

b) Explain Natani's method of solving pfaffian differential equation $Pdx + Qdy + Rdz = 0$.

c) Verify that the differential equation $ydx + xdy + 4zdz = 0$ is integrable and find its primitive.

P.T.O.

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

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

b) Find the orthogonal trajectories of the surface $x^2 + y^2 + 2fyz + d = 0$ of its curves of intersection with planes parallel to the plane XOY.

c) Find the general solution of $x^2p + y^2q = (x+y)z$.

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

a) i) Explain Charpit's method for solving partial differential equation $f(x, y, z, p, q) = 0$.

ii) Solve the differential equation $u_x x^2 - u_y^2 - \alpha u_z^2 = 0$ by Jacobi's method.

b) i) Explain Jacobi's method for solving the partial differential equation $f(x, y, z, u_x, u_y, u_z) = 0$.

ii) Find the complete integral of $p^2 + q^2 = x+y$.

Total No. of Questions : 4]

SEAT No. :

P799

[Total No. of Pages : 3

[5017]-406
T. Y. B. Sc.
MATHEMATICS
MT - 346 : Problem Course based on MT - 344 and MT - 345
(2008 Pattern) (Paper - VI) (Semester - 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) ***Answers to the two sections should be written in separate answer books.***
4) ***Tie answer books of both sections together.***

SECTION - I

(Ring Theory)

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

i) Describe all zero divisors of $\mathbb{Z} \oplus \mathbb{Q} \oplus \mathbb{Z}$.

ii) Show that the polynomial $21x^3 - 3x^2 + 2x + 9$ is irreducible over $\mathbb{Q}$.

iii) If p is a prime, then show that

$$x^{p-1} - 1 = (x-1)(x-2).....(x-(p-1)) \text{ in } \mathbb{Z}_p[x].$$

iv) Determine all ring homomorphisms from $\mathbb{Z}_6$ to $\mathbb{Z}_6$.

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

i) Let m and n be positive integers and k be the least common multiple of m and n. Show that $m\mathbb{Z} \cap n\mathbb{Z} = k\mathbb{Z}$.

ii) If R is a commutative ring without zero divisors, then show that the characteristic of R is O or prime.

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

a) If n is a positive integer, show that $\langle n \rangle = n\mathbb{Z}$ is a prime ideal of $\mathbb{Z}$ if and only if n is prime.

P.T.O.

b) Let $R=\left\{\begin{bmatrix} a & b \\ b & a \end{bmatrix} \middle| a,b\in\mathbb{Z}\right\}$ and let $\phi:\mathrm{R}\to\mathbb{Z}$ be the mapping defined by

$\phi\left(\begin{bmatrix} a & b \\ b & a \end{bmatrix}\right)=a-b$.

i) Show that ϕ is a ring homomorphism.

ii) Determine the Kernel of ϕ.

iii) Show that $\mathrm{R}/\mathrm{Ker}(\phi)$ is isomorphic to $\mathbb{Z}$.

iv) Show that $\mathrm{Ker}(\phi)$ is prime ideal but not maximal ideal.

c) If $f(x)=a_nx^n+a_{n-1}x^{n-1}+...+a_0\in\mathbb{Z}[x]$, with $a_n\neq 0$ and if r and s are relatively prime integers such that $f\left(\frac{r}{s}\right)=0$, then prove that r divides a_0 and s divides a_n.

SECTION - II
(Partial Differential Equations)

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

i) Find the primitive of the differential equation $2xzdx+zdy-dz=0$.

ii) Find the complete integral of the Clairaut's partial differential equation $\mathrm{Z}=px+qy+\frac{p^4+q^4}{pq}$.

iii) Eliminate the arbitary constants a and b from the equation $z=(x+a)(y+b)$ and find the corresponding partial differential equations.

iv) Find the integral curves of the equations $\frac{dx}{yz}=\frac{dy}{xz}=\frac{dz}{xy}$.

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

i) Show that the differential equation $yzdx+xzdy+xydz=0$ is integrable and find its integral.

ii) Find the orthogonal trajectories on the cone $x^2+y^2=z^2\tan^2\alpha$ of its intersections with the family of planes parallel to $z=0$.

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

a) Find the complete integral of the equation $\left(p^2+q^2\right)y=qz$ by Charpit's method.

b) Find a complete integral of the equation $Z+2u_z-(u_x+u_y)^2=0$ by Jacobi's method.

c) Find the integral surface of $x^2p+y^2q+z^2=0$, which passes through the hyperbola $xy=x+y, z=1$.

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Total No. of Questions : 4]

SEAT No. :

P800

[Total No. of Pages : 3

[5017]-407
T.Y.B.Sc.
MATHEMATICS
MT - 347 : Elective (F) : Computational Geometry
(2008 Pattern) (Paper - VII) (New Course) (Semester - 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 is allowed.***

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

a) A segment AB where A[4 –3] and B[–5 7] is transformed to A*B* by the transformation [T] = $\begin{bmatrix} 3 & -2 \\ 2 & 5 \end{bmatrix}$, obtain the slope of A*B*.

b) Identify the transformation given by the transformation Matrix

$$[T]=\begin{bmatrix} 0 & 0 & 0 & -0.25 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}.$$

c) The line with direction ratios 2, –3, 4 to be made coincide with Z-axis, find the angles of rotations about X-axis and Y-axis.

d) Write the iterative formula to generate equally spaced points on the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$.

e) Write the transformation matrix to obtain the left view of the unit cube.

f) Explain the terms:

i) Perspective projection.

ii) Affine transformation.

P.T.O.

g) Write the value of angles of rotation θ and ϕ about X-axis and Y-axis respectively in isometric projection and hence write the transformation matrix of it. $(\theta>0, \phi>0)$.

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

a) Prove that if a 2 × 2 transformation matrix $[T]=\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ is applied to transform the segment AB to segment A*B*, then the same transformation transforms the midpoint of segment AB to midpoint of segment A*B*.

b) Reflect the object [X] through the plane $y = -6$ where $[X]=\begin{bmatrix} 2 & -1 & 3 \\ -4 & 3 & 2 \end{bmatrix}$.

c) Find the concatenated transformation matrix for rotation about the point [4 6] by an angle 38°. Apply the rotation on the triangle ABC with the vertices A[–2 3], B[3 5] and C[–1 2].

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

a) Find the transformation matrix for translation in x and y directions by –3, 4 units respectively, followed by rotation about X-axis through –40°, followed by orthographic projection onto $y = 0$ plane. Apply it on a point P[0 6 –2].

b) Write the algorithm to reflect an object [X] through the line $y = mx + c$.

c) Obtain the transformation matrix for trimetric projection formed by 50° rotation about Y-axis, followed by 75° rotation about X-axis and then parallel projection onto $z = 0$ plane. Apply it on the object

$$[X]=\begin{bmatrix} 1 & 0 & 1 \\ 4 & -1 & -1 \\ 0 & 3 & -1 \end{bmatrix}.$$

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

a) i) Generate uniformly spaced 8 points on the circle

$(x - 4)^2 + (y + 5)^2 = 36$.

ii) Perform a single point perspective projection onto the $y = 0$ plane of the object represented by the position vector matrix [X] from a center of projection of $y_c = 12$ where $[X]=\begin{bmatrix} 1.5 & 0 & -2 \\ -4 & 3 & 1.2 \end{bmatrix}$.

b) i) Find a cabinet projection and Caralier projection of the object [X] with the horizontal indination $\alpha = -53^o$ where $[X]=\begin{bmatrix} 2 & -3 & 1 \\ -4 & 0 & 2 \\ 3 & -1 & 3 \end{bmatrix}$.

ii) Find the parametric equation of a Be'zier curve determined by Be'zier polygon $B_0[2\ \ 1]$, $B_1[4\ \ 3]$, $B_2[6\ \ 0.5]$. Further compute the position vectors of the points corresponding to parameter values $t = 0.345, 0.7$.

Total No. of Questions : 4]

SEAT No. :

P801

[Total No. of Pages : 4

[5017]-408
T.Y.B.Sc.
MATHEMATICS
MT - 347 (A) : Optimization Techniques
(Semester - IV) (2008 Pattern) (Paper - VII) (Elective - II)

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

Instructions to the candidates:

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

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

a) Represent following by suitable network:

Activity C starts after completion of activities A and B and activity D starts after completion of activity A.

b) Show that $x = 0$ is minimum point of $f(x) = x^4 + x^2$.

c) Solve the following game

		Player B			
		I	II	III	IV
	I	8	–2	9	–3
Player A	II	6	5	6	8
	III	–2	4	–9	5

d) Define two person zero sum game and saddle point.

e) Obtain optimum sequence of jobs on a certain machine.

Job	:	A	B	C	D	E	F
Processing Time	:	7	6	8	4	3	5

f) Write two conditions when optimal solution to the given problem of scheduling jobs with their processing time on three machines, can be obtained if either or both conditions hold.

g) Explain types of failures in replacement decisions.

P.T.O.

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

a) Draw a network to represent following project:

Activity	Precedence
A	-
B	-
C	-
D	A
E	A
F	B, D
G	C
H	C
I	F, G

b) Determine the optimum sequence of jobs that will minimize the total elapsed time in hours. Also find idle time for machine B.

Job	: 1	2	3	4	5	6	7
Machine A	: 3	12	15	6	10	11	9
Machine B	: 8	10	10	6	12	1	3

c) The data collected in running a machine are given below:

Year :	1	2	3	4	5
Resale Value :	42,000	30,000	20,400	14,400	9,650
Cost of spares :	4,000	4,270	4,880	5,700	6,800
Cost of labour :	14,000	16,000	18,000	21,000	25,000

Purchasing cost of machine is Rs. 60,000. Determine the optimum period for replacement of the machine.

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

a) Solve following game by dominance principle.

		Player B			
		B_1	B_2	B_3	B_4
	A_1	3	2	4	0
Player A	A_2	3	4	2	4
	A_3	4	2	4	0
	A_4	0	4	0	8

b) Solve following game by graphical method.

		Player B	
		B_1	B_2
	A_1	6	5
	A_2	3	8
Player A	A_3	8	4
	A_4	7	–1

c) Determine extremum value of the function.

$f(X) = x_1 + 2x_3 + x_2 x_3 - x_1^2 - x_2^2 - x_3^2$.

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

a) A project schedule has following activities:

Activity	Time (weeks)
1-2	4
1-3	1
2-4	1
3-4	1
3-5	6
4-9	5
5-6	4
5-7	8
6-8	1
7-8	2
8-10	5
9-10	7

Construct the project network and final critical path hence project duration.

b) A small project involves seven activities and their estimates are listed in the following table. Activities are identified by their beginning (i) and ending (j) node numbers.

Activity	Expected duration		
($i - j$)	Optimistic	Most Likely	Pessimistic
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 network diagram of the activities in the project.

ii) Find the expected duration and variance for each activity. What is the expected project length?

iii) Calculate the variance and standard deviation of the project length.

Total No. of Questions : 4]

SEAT No. :

P802

[Total No. of Pages : 2

[5017]-409
T.Y.B.Sc.
MATHEMATICS
MT - 347 (B) : Improper Integrals and Laplace Transforms
(Semester - IV) (Paper - VII) (Elective - II) (2008 Pattern)

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

Instructions to the candidates:

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

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

a) Define improper integral of first and second kind.

b) Test for convergence: $\int_0^\infty \frac{1}{\sqrt{x}}\,dx$.

c) By using integral test prove $\sum_{n=1}^{\infty} \frac{1}{n^2+1}$ is convergent.

d) Find Cauchy principal value of $\int_{-\infty}^{\infty} \sin x\,dx$.

e) Prove that $\int_0^1 \frac{\sin x}{x^2}\,dx$ is diverges.

f) Find $L\{e^{-2t} \sin 4t + \cos t\}$.

g) Find $L^{-1}\left\{\frac{1}{(s-1)(s-2)}\right\}$.

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

a) Evaluate $L^{-1}\left\{\frac{1}{s^3(s^2+1)}\right\}$.

P.T.O.

b) Prove that $\int_0^1 x^{m-1}(1-x)^{n-1}\,dx$ converges if and only if $m, n > 0$.

c) If L[F(t)] = F (s), then prove that

L[t^n F(t)] = $(-1)^n \frac{d^n}{ds^n}$[F(s)], n = 1, 2, 3, ...

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

a) If $0 \le f(x) \le g(x)$ for all $x \in [a, \infty)$ and, $f(x)$ and $g(x)$ are the Riemann integrable on $[a, \infty)$, then, if $\int_a^\infty g(x)dx$ converges, then $\int_a^\infty f(x)dx$ converges.

b) The improper integral $\int_a^b \frac{dx}{(x-a)^p}$ converges if $p > 1$ and diverges $p \le 1$.

c) Show that $\int_0^\infty \frac{1}{x^2+\sqrt{x}}\,dx$ is convergent.

Q4) Attempt any one of the following: **[1 × 10 = 10]**

a) i) State and prove the convolution theorem.

ii) Solve : Y'' – 3Y' + 2Y = $4e^{2t}$, Y(0) = –3, Y'(0) = 5.

b) i) Prove that $\int_0^\infty e^{-x^2}\,dx$ is convergent.

ii) If $f(x)$ is continuous in $(-\infty, \infty)$ and if $\int_{-\infty}^\infty f(x)dx$ converges to A, then C.P.V. $\int_{-\infty}^\infty f(x)dx = A$.

Total No. of Questions : 4]

SEAT No :

P803

[Total No. of Pages : 2

[5017]-410
T.Y.B.Sc.
MATHEMATICS
MT - 347(C) : C - Programming - II
(2008 Pattern) (Semester - IV)(Paper - VII)

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

Instructions to the candidates:

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

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

a) Explain in short the use of operator bitwise OR(|)

b) Define 'x' as an array of 50 pointers to int.

c) Explain the use of function : fgetc.

d) State the meaning of the following declaration.
char $*$a[10].

e) Can the period operator (•) be used with an array of structures? Explain.

f) Write a macro cube(a) to find cube of a number.

g) What is the purpose of fclose function?

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

a) What is the purpose of a static variable in a single file program? What is its scope?

b) Define a function swap to interchange two integers.

c) Describe the bitwise operators : | and $\wedge$

P.T.O.

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

a) When parameters are passed to program from the command line, how is the program execution initiated? Where do the parameters appear?

b) Write a program to find sum of two rational numbers. Define rational number using structure.

c) Summarize the rules governing the use of the fopen function. Describe the information that is returned by this function.

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

a) A C program contains the following declaration. int x[8]={2,4,6,9,8,10,3,0};

i) What is the meaning of x?

ii) What is the meaning of (x+2)?

iii) What is the value of ∗x+2?

iv) What is the value of ∗(x+2)?

v) What is the value of ∗x+4?

b) i) What is a structure? How does a structure differ from an array?

ii) Trace the output if program is correct.

```
# include <stdio.h>
int main( ) {
    char ∗p = “program”;
    while(∗p)
    printf(“%s \n”, p++);
    }
```

✡ ✡ ✡

Total No. of Questions : 4]

SEAT No. :

P804

[Total No. of Pages : 2

[5017]-411
T.Y.B.Sc.
MATHEMATICS
MT - 347 - (D) : Dynamics
(2008 Pattern) (Semester - IV) (Paper - VII) (Elective - II)

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

Instructions to the candidates:

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

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

a) Find magnitude and direction of $\vec{u}+\vec{v}$, if $|\vec{u}|=3$, $|\vec{v}|=4$ and angle between $\vec{u}$ and $\vec{v}$ is $\alpha = 30^{o}$.

b) A ball is thrown vertically upwards with velocity 60 meter/sec. How high will it go?

c) Show that the force $\vec{F} = xi + yj + zk$ is conservative and find associated potential function.

d) If pedal equation central orbit is $P^2 = ar$ with focus is center force, find the law of force.

e) State the Kepler's first and second laws of motion.

f) A particle perform S.H.M. along X - axis with its equation of motion as $\frac{d^2x}{dt^2} = -\mu^2 x$. Show that the period of S.H.M. is $T = \frac{2\pi}{\mu}$.

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

a) A load W is to be raised by a rope, from rest to rest through a height h. The greatest tension which the rope can safely bear is nW. Show that the least time in which the ascent can be made is $\sqrt{\frac{2nh}{(n-1)g}}$.

P.T.O.

b) If particle perform S.H.M. along X - axis with amplitude '*a*' and period 'T'. Prove that $\int_0^T v^2 dt = \frac{2\pi^2 a^2}{T}$.

where *v* is speed of the particle at any time *t.*

c) Prove that the path of projectile in a vacuum is a parabola.

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

a) If particle describes a curve $r = a(1 + \cos\theta)$ under the action of a central force directed towards the origin. Find the law of force for the particle.

b) Show that for a given velocity of projection the maximum range down a plane of inclination α is greater than that of up the plane in the ratio $\frac{1+\sin\alpha}{1-\sin\alpha}$.

c) Prove that the work done against the tension in stretching a light elastic string is equal to the product of extension and mean of initial and final tensions.

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

i) a) A particle is thrown over a triangle from one end of a horizontal base and grazing the vertex falls on the other end of the base. If A and B be the base angles and α the angle of projection, prove that $\tan\alpha = \tan A + \tan B$.

b) If particle is projection in vertical plane from origin with velocity *u* and making angle α with horizontal X -axis then prove that velocity of particle at any point (x, y) is given by $v = \sqrt{u^2 - 2gy}$.

ii) a) If position vector of a particle which describes an orbit has constant a real velocity then show that accelaration of the particle is directed towards the center.

b) If the orbit of a particle is an equiangular spiral

$r = a \subset \alpha^{\cot\theta}$ the show that

$$F\alpha\frac{1}{r^3}.$$

Where F is force acting on the particle.

Total No. of Questions : 4]

SEAT No. :

P805

[Total No. of Pages : 2

[5017]-412
T.Y.B.Sc.
MATHEMATICS
MT - 347(E) : Lebesgue Integration
(2008 Pattern) (Semester - IV) (Paper - VII)

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

Instructions to the candidates:

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

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

a) True or False? Justify:

If G is an open subset of $[a, b]$ and $|G| = 0$, then $G = \phi$.

b) Does there exist a non - measurable function on $[a, b]$? Justify.

c) If E is a subset of $[a, b]$ of measure zero, then show that $\int_E 1 = 0$.

d) If $f(x) = x^3 - 1$, $(-2 \le x \le 2)$, then find f^+ and f^-.

e) State Lebesgue Dominated convergence Theorem.

f) Find the Fourier series of the function $f(x) = \sin 2x + \cos x$.

g) Let $E = \left\{\frac{1}{n} : n \in \mathbb{N}\right\}$. Find the measure of E.

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

a) Show that $E \subseteq [a,b]$ is measurable if and only if given $\varepsilon > 0$, there exist open sets $G_1 \subseteq E$ and $G_2 \supseteq E'$ such that $|G_1 \cap G_2| < \varepsilon$.

b) Given an example of a function which is not Riemann integrable, but Lebesgue integrable. Justify your answer.

c) Let $f(x) = \frac{1}{2x+1}$, $0 < x < 1$, $f(0) = 7$, $f(1) = 5$. Show that f is measurable on [0, 1].

P.T.O.

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

a) If f and g are measurable functions on $[a, b]$, then prove that f.g is measurable on $[a,b]$.

b) If $f(x) = \frac{1}{3\sqrt{x}}$ on (0,1] and $f(0) = 0$, then find $\int_0^1 f$.

c) Give an example of an uncountable set of measure zero.

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

a) i) If E_1 and E_2 are subsets of $[a, b]$, such that symmetric difference of E_1 and E_2 has measure zero and E_1 is measurable, then prove that E_2 is measurable.

ii) Find the Fourier series of the following fucntion :

$f(x) = 0$, $x \in [-\pi, 0]$ and $f(x) = 1$, $x \in [0,\pi]$.

b) i) If E_1 is measurable subest of $[a, b]$, then prove that χ_E is measurable.

ii) For a positive integer n, let

$$f_n(x) = 2n \qquad \left(\frac{1}{2n} \le x \le \frac{1}{n}\right)$$

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

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

Show that Fatou's lemma applies but the Lebesgue Dominated convergence theorem does not.

Total No. of Questions :4]

SEAT No. :

P806

[Total No. of Pages :2

[5017] - 413

T.Y.B.Sc.

PHYSICS

PH - 341 : Solid State Physics

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

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

Instructions to the candidates:

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

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

a) What is co-ordination number?

b) Define the term 'Miller Indice's.

c) What is mean free path?

d) What is mobility?

e) What is photoelectric effect?

f) State any two uses of thermal gravimetric analysis technique.

g) State Fermi-Dirac distribution function.

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

i) What are advantages of powder diffraction method?

j) What do you mean by Curie temperature?

Q2) Attempt any two (five marks each): **[10]**

a) A FCC crystal has an atomic radius of 1.246Å. Find the interplaner spacing for the set of parallel planes having Miller indices (111) and (220).

b) Calculate the distance between two lattice planes, which give first order diffraction at 26.42^{o} with X-rays of wavelength 0.75Å .

P.T.O.

c) An n-type semiconductor (Ge) has a donor density of $10^{15}/cm^3$. It is arranged in a Hall effect experiment where magnetic field $B_z = 0.5\ Wb/m^2$ is applied and a current density of $j_x = 500\ A/m^2$ results. What will be the Hall voltage if the specimen is 4mm thick.

Q3) Attempt any two (five marks each): **[10]**

a) Show that the BCC lattice is the reciprocal of the FCC lattice.

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

c) Calculate for silver the energy at which the probability that a conduction electron state will be occupied is 90%. Assume $E_F = 5.52$ eV for silver and temperature t = 800 K.

Q4) a) Attempt any one (eight marks): **[8]**

i) Obtain expressions for density of states in three dimensions and average energy of an electron at absolute zero temperature.

ii) What is superconductor? Describe Type-I and Type - II superconductors?

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

i) Find the value of packing fraction for BCC crystal structure.

ii) Find the longest wavelength that can be analysed by a crystal of spacing 2.55 Å in the third order.

Total No. of Questions :4]

SEAT No. :

P807

[Total No. of Pages :2

[5017]-414
T.Y.B.Sc.
PHYSICS
PH -342:Quantum Mechanics
(2008 Pattern) (Paper - II)(Semester - IV)

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

Instructions to the candidates:

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

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

a) Calculate deBroglie wavelength of an electron moving with speed $\frac{1}{10}$ of velocity of light, h = 6.63 × 10^{-34} Js, c = 3× 10^{8} m/s, m = 9.1 × 10^{-31} kg.

b) State two applications of uncertainty principle in physics.

c) State Ehrenfest's first theorem.

d) State requirements of good wave function.

e) State the nature of energy spectrum of free particle.

f) State correspondence principle.

g) On which quantum numbers eigen value & eigen function depend?

h) What do you mean by degeneracy of the level?

i) What is operator in quantum mechanics?

j) Prove that $[\hat{A}, \hat{B}] = -[\hat{B}, \hat{A}]$.

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

a) Prove that $V_g = V_p + k\frac{dV_p}{dk}$ & $V_g = V_p - \lambda\frac{dV_p}{d\lambda}$.

b) Prove that $[L_z, L_+] = \hbar L_+$.

c) Normalise the function $\psi(x) = e^{-\alpha x^2}$ in the range $-\infty$ to ∞.

P.T.O.

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

a) Calculate expectation value of potential energy in the ground state of hydrogen atom if $\psi_{100} = \frac{1}{\sqrt{\pi a_0^3}} e^{-r/a_0}$ & $V = -\frac{1}{4\pi\varepsilon_0}\frac{e^2}{r}$.

b) State & prove uncertainty principle.

c) Apply Schrodinger's eq^n to particle in three dimensional rigid box & separate the functions.

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

i) Write down steady state Schrodinger's equation for one dimensional harmonic oscillator & obtain $E_n = \left(n + \frac{1}{2}\right)\hbar w$.

ii) Obtain equation of continuity & give its physical significance.

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

i) What are matter waves? Obtain expression for wavelength of matter waves.

ii) State parity of following functions.

$f(x) = x^3$, $f(x) = B\cos x$.

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Total No. of Questions : 4]

SEAT No. :

P808

[Total No. of Pages : 3

[5017]-415
T.Y.B.Sc.
PHYSICS
PH - 343 : Thermodynamics and Statistical Physics
(Semester - IV) (2008 Pattern) (Paper - III)

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

Instructions to the candidates:

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

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

a) What are Fermions?

b) Define Microcanonical ensemble.

c) State 1st law of thermodynamics.

d) What is Boyle temperature?

e) Define phase space.

f) If $p=q=\frac{1}{2}$ and the total number of possibilities are N = 100, Find mean number $(\bar{n}_1)$.

g) What do you mean by the Transport phenomena in gases?

h) Define Partition function.

i) Write latent heat equation. Explain effect of pressure on Melting point of liquid.

j) Discuss the dependence of coefficient of thermal conductivity on pressure.

P.T.O.

Q2) Attempt any two:

a) Derive an expression for thermal conductivity (K) of a gas on the basis of kinetic theory of gases. Show that the thermal conductivity varies directly as the square root of the absolute temperature. **[5]**

b) Deduce the expression for Joule-Thomson coefficient

$$\mu = \frac{1}{c_p}\left[T\left(\frac{\partial V}{\partial T}\right)_P - V \right].$$ **[5]**

c) Obtain binomial distribution equation using random walk problem. **[5]**

Q3) Attempt any two:

a) For a metallic copper disc at 300°K the following values are known.

c_p = 24.5 J/mol °k

α = 50.4 × 10^{-6} K^{-1}

isothermal compressibility K = 7.78 × 10^{-12} N/m^2

specific volume V = 7.06 cm^3/mol.

Determine specific heat at constant volume C_V. **[5]**

b) Consider four particles a, b, c and d. List the different ways in which they can be distributed in two identical halves of a box. What are the probabilities of different distributions? **[5]**

c) The mean free path of a gas molecule at a pressure 'P' and Temperature'T' is 1.2 × 10^{-6} m. What will be the mean free path at a pressure 2P and temperature T/4? **[5]**

Q4) a) Attempt any one:

i) Distinguish between classical statistics, Fermi-Dirac statistics and Bose-Einstein statistics. **[8]**

ii) 1) Derive any two thermodynamic potentials. **[4]**

2) What do you mean by enthalpy 'H' and Gibbs function 'G'.

Show that $\left(\frac{\partial H}{\partial T}\right)_p = G$. **[4]**

b) Attempt any one:

i) Obtain First Tds equation. **[2]**

ii) Calculate the mean free path of a gas molecule of diameter 3-2 $\mathring{A}$.
The number of molecules per unit volume is 2.5×10^{25} m^{-3}. **[2]**

Total No. of Questions : 4]

SEAT No. :

P809

[Total No. of Pages : 2

[5017]-416
T.Y.B.Sc.
PHYSICS
PH - 344 : Nuclear Physics
(2008 Pattern) (Semester - IV) (Paper - IV)

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

Instructions to the candidates:

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

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

a) State law of radioactive disintegration.

b) What are hadrons?

c) State the basic properties of the nucleus (any four).

d) If half life period is 1590 years for a particular element. Calculate its decay constant.

e) What are magic numbers?

f) What is nuclear reaction?

g) What is cyclic accelerator?

h) What is threshold voltage?

i) What is nuclear fusion?

j) Define even parity.

Q2) Attempt any two of the following :

a) Obtain an expression of mean life in terms of its decay constant and half life. **[5]**

b) State and explain important features of Nuclear forces. **[5]**

P.T.O.

c) The mass of deuteron ($_1H^2$) nucleus is 2.013553 amu. Calculate the mass defect, packing fraction, binding energy and binding energy per nucleon. **[5]**

Given : Mass of Proton = 1.007825 amu and

Mass of Neutron = 1.008665 amu

Q3) Attempt any two of the following :

a) The thermal power level of the reactor is 100 MW. The reactor uses U^{235} as fuel. Calculate the number of nuclei of U^{235} that will be fissioned in one year.The energy of 200 MeV is liberated per fission of U^{235}. **[5]**

b) What is mean binding energy? Draw the mean binding energy curve and state its features. **[5]**

c) Derive the expression $R = \frac{\lambda_2}{\lambda_2 - \lambda_1}\left[1 - e^{-(\lambda_2 - \lambda_1)t}\right]$ where symbols have their usual meanings. **[5]**

Q4) a) Attempt any one of the following :

i) Describe the principle and working of a linear acceleator and show that the total length of the accelerator is proportional to the wavelength λ, of the radio frequency signal. **[8]**

ii) State the assumptions of liquid drop model and obtain an expression for Weizsacher's semi-empirical mass formula. **[8]**

b) Attempt any one of the following :

i) Define specific activity and give its unit. **[2]**

ii) State limitations of shell model. **[2]**

Total No. of Questions :4]

SEAT No. :

P810

[Total No. of Pages :4

[5017] - 417

T.Y.B.Sc.

PHYSICS

PH - 345 (A): Electronics

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

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

Instructions to the candidates:

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

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

a) State the advantages of LEDs over in candenscent lamps.

b) If the amplifier has an output power of 15 mW and input power of 15 μ W. Calculate the power gain of an amplifier.

c) Draw the symbol of N- channel and P - channel JFETs.

d) Define CMRR.

e) Find the value of resistor R_A of mono stable multivibrator if period of pulse is 0.825 ms and capacitor is 0.1 μ F.

f) What are the basic blocks of power supply.

g) Draw the structure of 2- variables k - map.

h) What is meant by maxterm?

i) Draw the symbol of D - type flip - flop.

j) State any two parameters of an ideal OP - AMP.

Q2) Attempt any two:

a) Explain positive voltage regulalor using IC78XX. **[5]**

b) Explain working of JFET as an electronic switch. **[5]**

c) Explain instrumentation amplifier with three op - amps, giving necessary equations and block diagram. **[5]**

P.T.O.

Q3) Attempt any two:

a) A 5 - bit asynchronous counter begins with 00000 state. What will be the state of a counter after 80 input pulses? **[5]**

b) Determine the frequency of oscillation for the astable multivibrator using IC 555.

Given; $R_A = R_B = 10\ k\ \Omega$ and $C = 0.01\ \mu F$. **[5]**

c) Draw the circuit diagram of 4 - bit synchronous counter and explain its working. **[5]**

Q4) a) Attempt any one:

i) What is the difference between combinational and sequential logic. What are multiplexers and demultiplexers? Draw the diagram for 4 input multiplexer. **[8]**

ii) Draw circuit diagram of integrator and differentiator using OP - AMP and explain working of differentiator. **[8]**

b) Attempt any one:

i) Draw the logic diagram of JK flip flop with NAND gates. **[2]**

ii) State four application of LED. **[2]**

Total No. of Questions :4]

P810

[5017] - 417
T.Y.B.Sc.
PHYSICS
PH - 345 (B): Advanced Electronics
(2008 Pattern) (Semester - IV) (Paper - V)

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

Instructions to the candidates:

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

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

a) State Peltier effect in thermocouples.

b) State the operating principle of an accelerometer.

c) Draw the circuit symbols for 'NO' and 'NC' switches.

d) What are the types of RC filters?

e) Draw the circuit symbol for a solenoid valve.

f) What do you mean by critical frequency for a RC filter circuit?

g) What is linearization of signal?

h) What is the difference between PTC and NTC type thermistors?

i) State the principle of current balance bridge.

j) Give the symbolic representation of a solar cell.

Q2) Attempt any two:

a) Explain the principle, construction and working of bimetal strip thermal sensor. **[5]**

b) State and explain various performance parameters of DAC. **[5]**

c) Draw a neat - labelled block diagram for the filter back washing control unit in a water tretment plant. **[5]**

Q3) Attempt any two:

a) Explain how 'chemical dosage control' is executed in a water treatment plant. **[5]**

b) Discuss in brief: Damped and cyclic response criteria for a controlled variable at transient and setpoint change. **[5]**

c) Discuss the common software functions used in a PLC; in brief. **[5]**

Q4) a) Attempt any one:

i) Explain the principle, construction and working of a broad band (total radiation) pyrometer. **[8]**

ii) Draw a neat - labelled diagram for ON / OFF control system used to control cooling or heating of a medium and discuss its operation in short. **[8]**

b) Attempt any one:

i) What is a relay sequencer? **[2]**

ii) State the objectives of a process cotrol system. **[2]**

Total No. of Questions :4]

SEAT No. :

P811

[Total No. of Pages :10

[5017]-418
T.Y.B.Sc.
PHYSICS
PH-346 (F): Renewable Energy Sources
(2008 Pattern) (Paper - VI) (Elective - II) (Semester - IV)

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

Instructions to the candidates:

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

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

a) Define the term air mass.

b) Define diffuse radiations.

c) Define photovoltaic effect.

d) Give any one limitation of solar cooker.

e) State factors which affect the nature of the wind at a place close to the surface of earth.

f) What is the difference between biomass and biogas?

g) Give any one advantage of anaerobic digestion.

h) Define solar collector.

i) State any one advantage of floating type gas plant.

j) What are conventional sources of energy?

Q2) Attempt any two:

a) Draw and explain solar spectrum outside the earth atmosphere. **[5]**

b) Explain solar photo-voltaic system used for electric power generation. **[5]**

c) Explain box type solar cooker with neat diagram. **[5]**

P.T.O.

Q3) Attempt any two:

a) Explain in detail the classification of wind machines. **[5]**

b) State advantages and disadvantages of fixed dome type plant. **[5]**

c) Calculate the efficiency of solar cell using following data:

V_{oc} = 450 mV

I_{sc} = 35 mA

FF = 0.7

Input power = 78.7 mW. **[5]**

Q4) a) Attempt any one:

i) With neat diagram explain construction and working of 'Downdraft gasifier'. **[8]**

ii) Explain biomass conversion technologies. **[8]**

b) Attempt any one:

i) Explain energy audit. **[2]**

ii) Draw the neat diagram of solar water still. **[2]**

EEE

Total No. of Questions :4]

P811

[5017]-418
T.Y.B.Sc.
PHYSICS
PH-346 (G): Physics of Nanomaterials
(2008 Pattern) (Paper - VI) (Semester - IV)

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

Instructions to the candidates:

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

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

a) Give the applications of nanomaterials in Automobiles.

b) What is meant by 'nano'?

c) Name any one high-point in the development of Nanotechnology.

d) Name any one chemical method of synthesis of nanoparticles.

e) Which electromagnetic radiation is having wavelength of the order of interplaner distances?

f) State any one characterization technique of nano-particles with its function.

g) What is an exciton?

h) Give an example of carbon nanostructure.

i) Give an example of application of nanomaterials in sports.

j) Write the expression for energy of a particle in 1-D box.

Q2) Attempt any two (five marks each): **[10]**

a) Explain

i) atomic scattering factor, and

ii) crystal structure factor.

b) State and prove Bragg's law. Determine the angle for first and second order X-ray diffraction.

(Given: Wavelength of X-rays (λ) = 1.5Å, d = 30 nm)

c) Write a note on UV - Vis - NIR spectroscopy.

Q3) Attempt any two (five marks each): **[10]**

a) Write about the applications of nanomaterials in the field of medicine, electronic and energy.

b) Define density of states and illustrate density of states for

i) 1-D quantum wire,

ii) 2-D potential box, and

iii) particle in 3-D potential box.

c) State and explain Debye - Scherrer equation. What is its significance in the analysis of nanomaterials?

Q4) a) Attempt any one (eight marks): **[8]**

i) Write a detailed note on electron microscopy.

ii) Describe the synthesis, properties and applications of carbon nanotubes.

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

i) Name any two parameters on which the properties of nanomaterials depend.

ii) What are aerogels?

EEE

Total No. of Questions :4]

P811

[5017]-418
T.Y.B.Sc.
PHYSICS
PH-346 (H): Microcontrollers
(2008 Pattern) (Paper - VI) (Semester - IV)

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

Instructions to the candidates:

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

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

a) Enlist four features of 8051.

b) Explain use of CLR instruction.

c) What is the use of stack?

d) Explain bit operation in brief.

e) State different modes of addressing.

f) State function of TXD in 8051.

g) Which registers are used in LCD module.

h) Convert hex number (8AFA) into decimal.

i) To indicate end-of-conversion, which pin of ADC 0804 is used.

j) Which largest hex value can be moved into 8-bit register?

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

a) Write Assembly language program to find 2's complement of a number.

b) Write Assembly language program to find smallest of the numbers from given list.

c) Explain following instructions

RETI, AJMP, POP, SETB & ACALL.

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

a) Draw interfacing diagram for 4×4 keyboard of 8051 & explain it in brief.

b) Explain internal memory organisation of 8051.

c) Write Assembly language program to add first 50 natural numbers.

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

i) Draw block diagram of 8051 microcontroller & explain each block in brief.

ii) Draw the interfacing of LCD module of 8051 & explain it with example.

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

i) Find period of machine cycle of 8051 based system if crystal frequency is 32 Hz.

ii) Explain use of DA instruction with the help of addition example.

EEE

Total No. of Questions :4]

P811

[5017]-418
T.Y.B.Sc.
PHYSICS
PH-346 (I): Electro- Acoustics and Entertainment Electronics
(2008 Pattern) (Paper - VI) (Elective - II) (Semester - IV)

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

Instructions to the candidates:

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

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

a) Sketch intensity level verses frequency curves representing threshold of audibility and threshold of feeling.

b) Give the place theory of hearing.

c) What is the significance of cut-off frequency in case of an exponential form?

d) What is meant by Hi-fi?

e) What is volume compressor?

f) Define directivity factor for a microphone.

g) What do you mean by articulation score?

h) Give the expression for sensitivity of a carbon microphone.

i) What is reverberation?

j) Give two advantages of folded horn.

Q2) Attempt any two:

a) Explain how to calculate the required output power of an amplifier to be installed in an auditorium. **[5]**

b) Write a note on bass reflex cabinet. **[5]**

c) Give strengths of medical ultrasonography. **[5]**

Q3) Attempt any two:

a) The frequency of mechanical response of a cone speaker is 60 Hz. The stiffness of the cone system is 1.85×10^3 N/m. Determine radiation reactance if total mass of the diaphragm and voice coil is 11 gm. **[5]**

b) Find the reverberation time of an office which has a volume of 1600 m^3 and a total sound absorption of 100 metric sabines. What sound absorption will be required for an optimum reverberation time of 1.2 sec? **[5]**

c) Determine the cut-off frequency of an exponential horn having a flare constant of 4.9 on being used outdoors at a temperature of 40°C. **[5]**

Q4) a) Attempt any one:

i) Explain acoustics of hearing mechanism in humans. **[8]**

ii) Explain working of monophonic magnetic tape recording and reproducing system using a block diagram. **[8]**

b) Attempt any one:

i) Distinguish between voiced and unvoiced sounds. **[2]**

ii) Write a note on audio delay. **[2]**

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Total No. of Questions :4]

P811

[5017]-418
T.Y.B.Sc.
PHYSICS
PH-346 (J): Lasers
(2008 Pattern) (Paper - VI) (Semester - IV)

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

Instructions to the candidates:

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

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

a) What is the typical wavelength of ruby laser.

b) Define population density.

c) What is pumping?

d) Define gain coefficient.

e) State any one example of homogeneous broadening.

f) Define gain bandwidth.

g) What is beam radiance?

h) Give two advantages of gas laser over solid state laser.

i) Give any two applications of liquid laser.

j) State any two applications of laser in optical science field.

Q2) Attempt any two of the following:

a) What do you mean by coherence? Explain temporal and spatial coherence. **[5]**

b) Write a short note on lineshape broadening. **[5]**

c) What is laser light? Explain interaction of light with matter. **[5]**

Q3) Solve any two examples of the following:

a) Calculate temperature at which rate of spontaneous emission is equal to rate of stimulated emission for the wavelength of beam 5500 Å? **[5]**

b) What will be the reflectivity of first cavity mirror if reflectance of second mirror is 97%? The length of the cavity is 15 cm. and gain factor of the laser material is 0.0005 per cm. **[5]**

c) Fluorescent tubelight emit visible light of wavelength in the range of 4000 Å to 7000 Å with an average wavelength of 5000 Å. Calculate coherence length and time. **[5]**

Q4) a) Attempt any one of the following:

i) Explain with neat diagram the construction and working of CO_2 gas laser. Also give its applications. **[8]**

ii) What is hologram? Describe in short how a hologram is generated. **[8]**

b) Attempt any one of the following:

i) State the relation between Einstein coefficients. **[2]**

ii) Distinguish between spontaneous and stimulated emission. **[2]**

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Total No. of Questions :4]

SEAT No. :

P812

[Total No. of Pages :3

[5017] - 419

T.Y.B.Sc.

CHEMISTRY

CH - 341 : Physical Chemistry

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of logarithmic table and calculator is allowed.***
4) ***Actual calculations must be shown while solving problems.***

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

a) Define the term specific conductance.

b) Define the term isobars with suitable example.

c) Write Schrödinger wave equation and explain the terms involved in it.

d) Write the cell reaction of the following cell

$Cd \mid Cd^{2+}_{(a=1)} \parallel KCl_{(1N)}, Hg_2Cl_{2\ (s)} \mid Hg$

e) Define the term half life.

f) Define single electrode potential.

g) Define transport number of ions.

h) What is meant by dead time of G.M. Counter.

i) State Heisenberg's uncertainty principle.

j) Define the term electrolytic cell.

P.T.O.

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

i) State and explain 'Kohlrausch's law of independent migration of ions.

ii) Write briefly on : Gas electrode with respect to its.

1) Construction.

2) Representation.

3) Working

iii) What is radioactivity? Explain alpha and beta decay with suitable examples.

b) Calculate the mass defect, binding energy and mean binding energy of $^{31}_{15}P$. **[4]**

Given mass of $^{31}_{15}P$ = 30.9840 a.m.u.

m_H = 1.0078 a.m.u.

m_n = 1.0086 a.m.u.

OR

b) Find the wavelength of carbondioxide molecule at a velocity of 440 ms^{-1}. **[4]**

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

a) Explain the construction and working of calomel electrode.

b) Describe moving boundary method to determine transport number of ions.

c) Explain how N/Z ratio affects the nuclear stability.

Q4) a) Sketch the plot for the probability density $(\psi)^2$ versus displacement co-ordinate for the first four energy levels for particle in one dimensional box. Comment on the nature of the plots. **[6]**

OR

a) Explain Asymmetric effect and Electrophoretic effect.

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

i) At 25°C the equivalent conductances at infinite dilution of NH_4Cl, NaOH and NaCl are 129.8, 217.4 and 108.9 ohm^{-1} cm^2. Calculate equivalent conductance at infinite dilution of NH_4OH. If equivalent conductance of 0.001 N solution of NH_4OH at 25°C is 9.33. Calculate the degree of dissociation of NH_4OH at this concentration.

ii) Calculate the e.m.f. of the cell at 25°C $Cd\,|Cd^{2+}\,||KCl_{(1N)}, Hg_2Cl_{2\,(s)}\,|Hg$ given the standard oxidation potential of E^o_{cd} = 0.40 volt. and Ecalomel = -0.28 volt.

Total No. of Questions : 4]

SEAT No. :

P813

[Total No. of Pages : 2

[5017]-420
T.Y.B.Sc.
CHEMISTRY
CH-342: Inorganic Chemistry
(2008 Pattern) (Paper II) (Semester-IV)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right side indicate full marks.***
3) ***Actual calulations must be shown while solving the problems.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Use of log table and calculator is allowed.***

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

a) What is symbol of the element which having atomic number 203 ?

b) Which is the most stable oxidation state exhibited by lanthanides.

c) Which metal is present in chlorophyll ?

d) Give biological role of Mg.

e) Give one example of organometalic compound.

f) What type of conductivity shown by Graphite?

g) Draw N(E) curve for semiconductor.

h) What is unit cell?

i) What is voids?

j) How many unpaired electrons are present in d^8 octahedral field?

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

i) What are actinides elements ? Give their electronic configuration.

ii) Write note on myoglobin.

iii) Give the examples of pi-acid ligand

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

i) Explain Nio show n-type of Semiconductivity.

ii) Distinguish between conductor and semiconductor.

iii) Give the application of Born- Haber cycle.

P.T.O.

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

a) Discuss catalytic cycle for Monsanto process for acetic acid synthesis.

b) Explain n-and p-type of semiconductor with the help of suitable example.

c) What are superconductors? How they are prepared? Give its application.

Q4) a) What are transuranic elements ? Give the general method for synthesis of transuranic elements. **[6]**

OR

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

i) What is cobalmin and cynocobalmin.

ii) Draw the structure of the following metal carbonyls,

1) $Fe(CO)_5$

2) $Cr(CO)_6$

3) $Ni(CO)_4$

b) Calculate limiting radius rotio for coordination number four. **[4]**

OR

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

i) Calculate C.F.S.E. for d^7 ion in strong and weak octahedral field.

ii) Write the equation to callulate the crystal radii. Give its significance.

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Total No. of Questions : 4]

SEAT No. :

P814

[Total No. of Pages : 7

[5017]-421
T.Y.B.Sc.
CHEMISTRY
CH - 343 : Organic Chemistry
(Semester - IV) (2008 Pattern) (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 structures and diagrams if necessary.***
4) ***IR, NMR and UV spectroscopic data is given in Tables 1, 2 and 3 respectively.***

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

a) Express the $\lambda_{max} = 750\,nm$ in cm^{-1}.

b) Define Target molecule (TM) in retrosynthesis with suitable example.

c) Arrange the following carbanion in decreasing order of their stability.
$R_3\overset{\ominus}{C}$, $R\overset{\ominus}{C}H_2$, $\overset{\ominus}{C}H_3$, $R_2\overset{\ominus}{C}H$,

d) How many sets of proton are present in p-Xylene?

e) What is spectroscopy?

f) What is betaine intermediates?

g) Write Ingolds linking rule of naturally occuring terpenoids.

h) Nitrobenzene does not easily undergo friedel craft acylation reaction.

i) Calculate the fundamental modes of vibration for the BF_3 molecule.

j) How will you prove the presence of benzene ring in epidrine?

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

i) Write the retrosynthesis & synthesis for

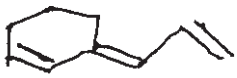
P.T.O.

ii) How will you prepare α- Methyl succinic acid from diethyl malonate?

iii) Explain with energy profile diagram. Kinetic ISO-topic effect in nitration of benzene.

b) Calculate UV λ_{max} for the following: **[4]**

i) 

ii) 

OR

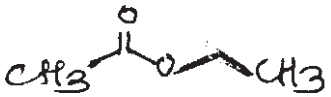
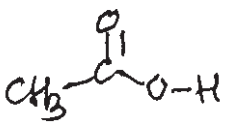
b) i) Write claisen ester reaction with suitable example. **[2]**

ii) Write disconnection approach & synthon for cinnamaldehyde. **[2]**

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

a) i) Write the properties and Nagai synthesis of ephedrine.

ii) How will you distinguish following by IR spectroscopy?

 and 

b) i) Explain deshielding in alkene and shielding in acetylenic protons.

ii) Write a note on finger print region in IR spectroscopy.

c) i) Explain the diazo coupling reaction for N-methyl aniline.

ii) Give the applications of IR spectroscopy.

Q4) a) Propose structure for the compound from the following spectropic data. Justify your answer (any two). **[6]**

i) Mol. Formula :- C_8H_{10}

UV:- 255 nm

IR :- 1600, 750 cm^{-1}

NMR :- a) 1.5 δ (Triplet, 3H)

b) 2.3 δ (Quartet, 2H)

c) 7.3 δ (Singlet, 5H)

ii) Mol. Formula :- $C_9H_{11}Br$

UV λ_{max} :- 255 nm

IR :- 1500, 1600 cm^{-1}

NMR :- a) Singlet 7.2 δ (5H)

b) doublet 2.4 δ (2H)

c) Multiplet 3.5 δ (1H)

d) doublet 1.1 δ (3H)

iii) Mol. Formula :- $C_3H_5Cl_3$

UV:- Transparent

IR :- 2950, 780 cm^{-1}

NMR :- a) 2.2 δ, singlet (3H)

b) 4.2 δ, singlet (2H)

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

i) Aniline shows the blue shift in acidic medium explain.

ii) What are terpenoids? Give their classification.

OR

i) Explain Disconection and FGI.

ii) What are limitations of F.C. acylation reaction?

TABLE – 1
Characteristic Infrared Absorptions of Functional Groups

	GROUP			FREQUENCY RANGE cm^{-1}	INTENSITY
A.	Alkyl				
	C–H (stretching)			2853–2962	(m – s)
	Isopropyl – $CH(CH_3)_2$			1380 – 1385	(s)
			and	1365 – 1370	(s)
	tert – Butyl – $C(CH_3)_3$			1385 – 1395	(m)
				and – 1365	(s)
B.	Alkenyl				
	C–H (stretching)			3010 – 3095	(m)
	C = C (stretching)			1620 – 1680	(v)
	R–CH = CH_2			985 – 1000	(s)
			and	905 – 920	(s)
	$R_2C = CH_2$	(out of plane		880 – 900	(s)
	cis – RCH = CHR	C–H bendings)		675 – 730	(s)
	trans – RCH = CHR			960 – 975	(s)
C.	Alkynyl				
	≡ C–H (stretching)			– 3300	(s)
	C ≡ C (stretching)			2100 – 2260	(v)
D.	Aromatic				
	Ar – H (stretching)			– 3030	(v)
	Aromatic substitution type				
	(C–H out-of-plane bendings)				
	Monosubstituted			690 – 710	(very s)
			and	730 – 770	(very s)
	o – Disubstituted			735 – 770	(s)
	m – Disubstituted			680 – 725	(s)
			and	750 – 810	(very s)
	p – Disubstituted			800 – 840	(very s)
E.	Alcohols, Phenols, Carboxylic Acids				
	OH (aicohols, phenols, dilute solutions)				
	OH (alcohols, phenols, hydrogen bonded)			3200 – 3550	(broad)
	OH (carboxylic acids, hydrogen bonded)			2500 – 3000	(very broad)

F.	Aldehydes, Ketones, Esters and Carboxylic Acids			
	C = O stretch		1630 – 1780	(s)
	aldehydes		1690 – 1740	(s)
	ketones		1680 – 1750	(s)
	esters		1735 – 1750	(s)
	carboxylic acids		1710 – 1780	(s)
	amides		1630 – 1690	(s)
G.	Amines			
	N – H		3300 – 3500	(m)
H.	Nitriles			
	C ≡ N		2220 – 2260	(m)
I.	$-\overset{\vert}{\underset{\vert}{C}}-O$ stretch (alcohol, ether, phenol)		1000 – 1300	(s)
J.	Nitro N = O		1550 – 1350	(s)
K.	Halides	F	1400 – 1000	(s)
		Cl	785 – 540	(s)
		Br	<667	(s)

TABLE – 2

Approximate Proton Chemical Shifts in NMR

TYPE OF PROTON	CHEMICAL SHIFT, DELTA, PPM (δ)		
1° Alkyl, RCH_3	0.8 – 1.0		
2° Alkyl, RCH_2R	1.2 – 1.4		
3° Alkyl R_3CH	1.4 – 1.7	Ester $R-\overset{\overset{O}{\|}}{C}-O-CH_2-R$	4 to 4.5
Allylic, $R_2C=C(R)-CH_3$	1.6 – 1.9		
Benzylic, $ArCH_3$	2.2 – 2.5		
Alkyl chloride RCH_2Cl	3.6 – 3.8		
Alkyl bromide, RCH_2Br	3.4 – 3.6		
Alkyl iodide, RCH_2I	3.1 – 3.3		
Ether, $ROCH_2R$	3.3 – 3.9		
Alcohol, $HOCH_2R$	3.3 – 4.0		
Ketone, $RCCH_3$ (O)	2.1 – 2.6	$R-\overset{\overset{O}{\|}}{C}-CH_2-$	2.4 δ
		$R-\overset{\overset{O}{\|}}{C}-\underset{\|}{CH}-$	2.5 δ
Aldehyde, RCH (O)	9.5 – 9.6		
Vinylic, $R_2C=CH_2$	4.6 – 5.0		
Vinylic $R_2C=CH(R)$	5.2 – 5.7		
Aromatic, ArH	6.0 – 9.5		
Acetylenic, $RC\equiv CH$	2.5 – 3.1		
Alcohol hydroxyl, ROH	0.5 – 6.0[a]		
Carboxylic, RCOH (O)	10 – 13[a]		
Phenolic, ArOH	4.5 – 7.7[a]		
Amino R– NH_2	1.0 – 5.0		

[a]The chemical shifts of these groups vary in different solvents and with temperature and concentration.

TABLE – 3

U.V. Absorption rules for diene chromosphores

1)	Parent	215 nm	6) – halogen	5 nm
2)	Each extra conjugation	30 nm	7) – SR	30 nm
3)	Homoannular	39 nm	8) – NR_2	60 nm
4)	Exocylic double bond	05 nm	9) – OH, – OR	5 nm
5)	Each alkyl (R) substituent directly attached to double bonded carbon	05 nm		

U.V. Absorption rules for Enone System

1)	Parent	215 nm	(207 nm for aldehyde)	(202 nm for five member ring)	
2)	Each extra conjugation	30 nm	6) – Cl	α	15 nm
3)	Homoannular	39 nm	7) – OH, – OR	β	12 nm
4)	Substituents		8) – SR	α	35 nm
	a) Alkyl group at α	10 nm	9) – NR_2	β	30 nm
	b) Alkyl group at β	12 nm		β	85 nm
	c) Alkyl group at γ, δ and higher	18 nm		β	95 nm
5)	Exocylic double bond	05 nm			

Total No. of Questions : 4]

SEAT No. :

P815

[Total No. of Pages : 2

[5017]-422
T. Y. B. Sc.
CHEMISTRY
CH - 344 : Analytical Chemistry
(2008 Pattern) (Semester - IV) (Paper - IV)

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

Instructions to the candidates:

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

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

a) Define the term diffusion current in palarography.

b) Give the principle of partition chromatogrphy.

c) Define the term ionization in MS.

d) What is the temperature maintained in SFC.

e) Give any two applications of paper chromatography.

f) Define bas peak in MS.

g) What is the principle of ion exchange chromatography.

h) Define the term retention volum in GC.

i) What are the applications of electrophoresis.

j) Give any two applications of MS.

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

i) What is the difference between GLC and GSC.

ii) Discuss the standard addition method used in polarography.

iii) Explain the construction and working of glass electrode.

P.T.O.

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

i) Explain the working of Faraday's cup detector used in MS.

ii) Find H^+ concentration if pH of the solution is 2.5.

iii) Write note on adsorption chromatography.

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

a) What is the principle of HPLC? Explain the working of HPLC and how are the columns prepared in HPLC.

b) Give the principle of mass spectrometry. Explain mass spectrum and terms involved in analysis.

c) What is electrophoresis. Explain gel electrophoresis and give its advantages.

Q4) a) What is chromatography. Give the classification of chromatography on the basis of stationary phase and mobile phase with name of method. **[6]**

OR

i) What are the applications of GC. **[3]**

ii) Write note on electron capture detector used in GC. **[3]**

b) The diffusion coefficient of Ni^{++} having concentration 4×10^{-3} mol/lit is $0.25 \times 10^{-5} cm^2/sec$. If the capillary characteristics are t = 5 sec. and m = 3 mg/sec. Calculate the diffusion current for Nickel. **[4]**

OR

In a experiment of paper chromatographic separation, the solvent moves 20cm, while the metals P, Q and R were moves 12.5, 10.9 and 8.8 cm respectively. What is Rf value of these metals.

Total No. of Questions : 4]

SEAT No. :

P816

[Total No. of Pages : 2

[5017]-423
T.Y.B.Sc.
CHEMISTRY
CH - 345 : Industrial Chemistry
(Semester-IV) (Paper-V)(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) ***Draw neat diagram and flowsheet wherever necessary.***

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

a) Explain the term clinker.

b) What is the role of retardar in cement.

c) Explain the term chromogen.

d) What are anionic surfactants.

e) Explain the term firepoint.

f) What are analgesics?

g) What is cullet.

h) State disadvantages of detergents.

i) What is safety glass.

j) Explain the term antipyretics.

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

i) Explain cleaning action of detergent.

ii) Explain in detail annealing of glass.

iii) Explain high temperature carbonisation of coal.

P.T.O.

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

i) Write a note on setting of cement.

ii) Explain hypsochromic shift with suitable example.

iii) Give the synthesis and use of methyl orange.

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

a) State the physical and chemical properties of glass.

b) Give the synthesis and uses of

i) Phenolphthalein.

ii) Alizarin.

c) Give synthesis and uses of

i) Sulphanilamide.

ii) Aspirin.

Q4) a) Discuss the manufacture of ceramic articles by soft plastic forming and slip casting methods. **[6]**

OR

What is LPG? Give its composition. Give advantages of gaseous fuel.

b) Discuss with flowsheet the manufacture of soap. **[4]**

OR

What are qualities of good drugs.

✓ ✓ ✓

Total No. of Questions : 4]

SEAT No. :

P817

[Total No. of Pages : 10

[5017]-424
T.Y. B.Sc.
CHEMISTRY
CH-346 (A): Nuclear Chemistry (613 A_4)
(2008 Pattern) (Paper-VI) (Elective-II) (Semester-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 the diagrams whenever necessary.***

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

a) State Joliot - Curie's experiment on discovery of nuclear fission.

b) Which are the two coolants used in nuclear reactor?

c) State the principle of Vande-Graft accelerator.

d) State the principle of detection & measurement of nuclear radiation.

e) State one method for the preparation of ^{131}I.

f) What are the prompt and delayed neutrons?

g) Define reproduction factor K.

h) Which radioisotope is used to determine age of water sample?

i) State the principle of cyclotron.

j) Which are the two safety precautions taken while handling radioactive substance?

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

i) State the classification of nuclear reactor.

ii) Explain the principle and working of semiconductor detector.

iii) Write short notes on probing by isotopes.

P.T.O.

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

i) Explain safety standards and safe working methods for radioactive substance.

ii) Write short notes on fission energy.

iii) Write short notes on Szilard-Chalmer reaction.

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

a) Discuss four factor formula.

b) Define scintillator. State different types of scintillator used in scintillation counter. Discuss the principle and working of scintillation counter.

c) Explain the principle and working linear accelerator.

Q4) a) Describe the process of nuclear fission. Explain mass distribution curve for fission fragment. What is the effect of neutron energy on the nature of the curve? **[6]**

OR

State the principle of radiometric titration. Explain radiometric titration with one example. What are the advantages of radiometric titration.

b) Calculate the energy released in the following nuclear reaction

$${}^{12}_{6}C + {}^{4}_{2}He \rightarrow {}^{16}_{8}O$$

Given:

The atomic masses are ${}^{12}_{6}C = 12.00381$ amu

${}^{4}_{2}He = 4.00387$ amu

${}^{16}_{8}O = 16.000$ amu **[4]**

OR

Explain the principle and working of Cock-Croft Walton accelerator.

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Total No. of Questions :4]

P817

[5017]-424
T.Y.B.Sc.
CHEMISTRY
CH-346 (B): Polymer Chemistry
(2008 Pattern) (Paper - VI) (Semester - IV)

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

Instructions to the candidates:

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

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

a) Define the term: Thermal degradation of polymer.

b) What is meant by synthetic polymer?

c) Explain the term thermoplastics.

d) Define the term: finishing of fibre.

e) The glass transition temperature of polycarbazole is 150°C.

f) Give important IR peaks in polyvinyl ketone.

g) What is meant by fibre spinning?

h) 'Cross linked polymers has low softening temperature'. State whether the statement is true or false.

i) Write the correct structure of polystyrene.

j) Give two important uses of polycarbonate.

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

i) Discuss in brief the effect of molecular weight in glass transition temperature.

ii) What are atactic polymers? Draw the atactic structure of polypropylene.

iii) Describe the factor affecting on crystallinity of polymers.

b) Answer the following (Any Two): **[4]**

i) How will you distinguish polyvinyl alcohol and polyacrylonitrile by using IR spectroscopy.

ii) Write note on mechanical degradation of polymers.

iii) T_g of polystyrene is 100°C while T_g of poly-α-methy styrene is 170°C. Explain.

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

a) Give a detailed account of thermally stable polymers.

b) Give method of preparation, properties and uses of following polymers.

i) Polychloroprene ii) Phenol formaldehyde

c) Describe mechanical and electrical properties of polymers. Give their physical testing with related properties.

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

i) Describe the calendering process in polymer technology.

ii) Explain the foaming process in detail.

iii) Write a note on: Crosslinking of polymers.

b) Explain the term fibre. Discuss the details of melt spinning process in fibre technology. **[4]**

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Total No. of Questions :4]

P817

[5017]-424
T.Y.B.Sc.
CHEMISTRY
CH-346 (C): Inroduction to Biochemistry & Molecular Biology
(2008 Pattern) (Paper - VI)(Semester - 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 structures and neat diagrams wherever necessary.***

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

a) Name the enzyme that synthesises DNA from RNA.

b) What is the significance of urea cycle?

c) Define Anabolism.

d) Show decarboxylation reaction of an amino acid.

e) Where does TCA cycle occur in Eukaryotic cell.

f) What is Ori C?

g) Give the significance of Initiation Codon.

h) Name two restriction enzymes.

i) List out two examples of high energy compounds.

j) Name the pyrimidine base seen in RNA but not in DNA.

Q2) a) Attempt Any Two of the following: **[4]**

i) Give the antiparallel DNA strand of 5′ AAGCATGACT 3′.

ii) Differentiate between Nucleoside and Nucleotide with example.

iii) Write note on Transamination reactions of amino acids.

b) Answer Any Two of the following: **[6]**

i) Write the fate of pyruvate in aerobic and anaerobic conditions.

ii) Give the features of DNA polymerase I, II, III.

iii) How are fattyacids transported into mitochondria?

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

a) Explain the steps involved in Hershey and chase experiment.

b) Discuss the process of translation.

c) Elaborate on the concepts of chemiosmotic hypothesis.

Q4) a) Describe the formation of TCA cycle intermediates. **[6]**

OR

Elaborate on the steps leading to RNA synthesis from DNA.

b) Write note on vectors in gene cloning. **[4]**

OR

Give the energetics of β-oxidation of fatty acids.

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Total No. of Questions :4]

P817

[5017]-424
T.Y.B.Sc.
CHEMISTRY
CH-346 (D): Environmental Chemistry
(2008 Pattern) (Paper - VI) (Semester - IV)

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

Instructions to the candidates:

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

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

a) Define the term Floccutation.

b) Define the term soil profile.

c) Define mobile phase in G.C.

d) Define Gasohol.

e) What is sink of CO_2.

f) What is the altitude of ozone layer?

g) What is wet oxidation in tertiary waste treatment?

h) Give any two organic components in soil.

i) NDIR used to monitor which gas.

j) What is mean by biogas.

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

i) Explain Ion exchange method in purification of water.

ii) Explain Biodegration of polymers and plastics.

iii) Sample injection system in G.C.

b) Write short note on Any Two: **[4]**

i) Green house coefficient.

ii) Coal.

iii) Glass electrode.

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

a) Explain in detail pyrolysis.

b) Principle and working of Ion selective electrodes.

c) Principle and working of HPLC.

Q4) a) Explain secondary waste water treatment. Give its important features. **[6]**

OR

Explain principle and working of dihydrogendioxygen fuel cell.

b) Write short note on Any One: **[4]**

i) Chloroflurocarbons.

ii) Creation of ozone layer.

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Total No. of Questions :4]

P817

[5017]-424
T.Y.B.Sc.
CHEMISTRY
CH-346 (E): Dairy Chemistry
(2008 Pattern) (Old Course) (Paper - VI) (Elective - II) (Semester - IV)

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

Instructions to the candidates:

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

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

a) What is the real acidity in the milk?

b) What is skimming of milk?

c) What is cheese?

d) Give advantages of standardized milk.

e) Give uses of milk.

f) Give basic principle of cream separation.

g) Give objects of pasteurisation of milk.

h) How is starch defected in the milk sample?

i) Give advantages of homogenisation.

j) What do you mean by curdling?

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

i) Milk is an ideal food. Justify the statement.

ii) Explain cultured butter milk flow sheet.

iii) Write the properties and uses casein.

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

i) Write properties and uses of Ascorbic acid.

ii) Explain sterilization of milk.

iii) How will you detect sucrose and salicyclic acid in the milk?

Q3) Attempt Any Two: **[10]**

a) Discuss about milk and public health.

b) Give classification of proteins in detail.

c) Give importance, properties and uses of lactose.

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

i) What do you mean adultration? Give any two methods of detection of adultrants.

ii) Explain cultured milk.

iii) Give the flow sheet for the manufacture of ice-cream powder.

b) Attempt Any Two: **[4]**

i) Comment on growth of micro-organisms in milk.

ii) Explain about packaging of milk.

iii) Give flow sheet of manufacture of whey powder.

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Total No. of Questions : 4]

SEAT No. :

P818

[Total No. of Pages : 2

[5017]-425
T.Y.B.Sc.
BOTANY
BO - 341 : Plant Physiology and Biochemistry
(Semester - IV) (2008 Pattern) (Paper - I)

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

Instructions to the candidates:

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

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

a) Give any two causes of seed dormancy.

b) Define Xenobiotic stress.

c) What is mean by translocation of solutes.

d) State the law of thermodynamics.

e) Give any two functions of secondary metabolites in plants.

f) What are polysaccharides.

g) Write the function of granna of chloroplast.

h) Define non-protein amino acids.

i) Give any two properties of lipids.

j) What are enzyme inhibitors.

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

a) Describe the methods of overcoming seed dormancy.

b) Explain the reactions of EMP pathway.

c) Describe competitive and uncompetitive enzyme inhibitors.

P.T.O.

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

a) Classification of carbohydrates.

b) Classification of lipids.

c) CAM pathway.

Q4) What is light reaction? Explain cyclic and non-cyclic photophosphorylation in detail. **[10]**

OR

What are secondary metabolites? Explain the production of secondary metabolites through malonic acid and shikimic acid pathway. Add a note on its functions in plants.

Total No. of Questions : 4]

SEAT No. :

P819

[Total No. of Pages : 2

[5017]-426
T.Y. B.Sc.
BOTANY
BO - 342 : Plant Pathology
(2008 Pattern) (Paper-II) (Semester-IV) (Old)

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

a) What is pathogen?

b) Define etiology.

c) What is resistance?

d) Define necrosis.

e) What is mildew?

f) What do you mean by non-infectious plant diseases?

g) Give the name of book written by B. B. Mundkar.

h) Give the name of causal organism of mycoplasma plant disease.

i) Give any two control measures for nematodal plant diseases.

j) What are symptoms of TMV disease?

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

a) What is pathogen dispersal? Describe active dispersal of plant pathogen.

b) Give causal organism and symptoms of club root of crucifers.

c) Describe fungi as plant pathogens.

P.T.O.

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

a) Cytoplasmic defence reaction.

b) Pure culture.

c) Serological test.

Q4) What is biological control? Explain any two methods with suitable example. **[10]**

OR

Give an account of citrus canker and tikka disease of groundnut with reference to causal organism, symptoms and control measures.

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Total No. of Questions : 4]

SEAT No. :

P820

[Total No. of Pages : 2

[5017]-427
T.Y.B.Sc.
BOTANY
BO - 343 : Pteridophytes, Gymnosperms and Palaeobotany
(Paper - III) (2008 Pattern) (Semester - 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: **[10]**

a) Name any two genera from pteridophytes.

b) What is synangium?

c) Name the types of Pallengrains present in Pinus.

d) Give two salient features of Psilopsida.

e) Define alternation of generations in pteridophytes.

f) What are bulbils?

g) Name the types of roots present in cycas.

h) What is coal ball?

i) Give any two salient features of Pentoxylon.

j) Define gymnosperms.

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

a) Describe the external morphology of Calamites.

b) Describe external morphology of male cone of gnetum.

c) Describe T.S. of Pinus needle.

P.T.O.

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

a) Ovule of cycas.

b) External morphology of selaginella.

c) External structure of Rhynia.

Q4) Describe external and internal structure of sporophyte of psilotum. **[10]**

OR

Describe external and internal morphology of Lyginopteris oldhamia.

Total No. of Questions : 4]

SEAT No. :

P821

[Total No. of Pages : 2

[5017]-428
T.Y.B.Sc.
BOTANY
BO - 344 : Plant Biotechnology
(2008 Pattern) (Semester - IV) (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 **[10]**

a) Write any two difference between the traditional & modern biotechnology.

b) Define Beer's law.

c) Enlist four major data base links.

d) Name any two symbiotic nitrogen fixers.

e) Define hybridoma.

f) What is proteomics?

g) What are Nod gens?

h) What is ICGEB?

i) Define plant tissue culture.

j) Enlist four data retrival tools.

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

a) Explain tissue culture in Forestry.

b) Give the benefits of biofertilizers.

c) Write a short note on BLAST.

P.T.O.

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

a) Genomics.

b) Edible antibiotics.

c) Use of bioinformatics tools in analysis.

Q4) What is biological nitrogen fixation describe mechanism of nitrogen fixation in root nodules of Leguminous plant. **[10]**

OR

What is Gel Permiation? Briefly explain the process of Gel permiation and write its Applications. **[10]**

Total No. of Questions : 4]

SEAT No. :

P822

[Total No. of Pages : 2

[5017]-429
T.Y.B.Sc.
BOTANY
BO - 345 : BOTANICAL TECHNIQUES
(Semester-IV) (2008 Pattern)(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) What is numerical aperture?

b) Define centrifugation.

c) Mention types of camera lucida.

d) What are radioisotopes?

e) Define resolving power of microscope.

f) What is squash?

g) Give chemical nature of safranin.

h) What is acetolysis?

i) Define pH.

j) Give any two advantages of digital camera.

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

a) Describe advantages of microtome.

b) Explain reference electrode.

c) Describe the method of caliberation of ocular micrometer.

P.T.O.

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

a) Rotorod air sampler.

b) Dissecting microscope.

c) Paraffin infiltration.

Q4) What is chromatography? Describe the technique of paper chromatography. **[10]**

OR

What is spectroscopy? Explain working and applications of spectrophotometer.

✓ ✓ ✓

Total No. of Questions : 4]

SEAT No. :

P823

[Total No. of Pages : 2

[5017]-430
T.Y.B.Sc.
BOTANY
BO-346: Pharmacognosy
(2008 Pattern) (Paper-VI)(Semester-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: **[10]**

a) Define pharmacognosy.

b) What are nutraceuticals.

c) Give any two factors affecting cultivation of herbal drugs.

d) Enlist two root drugs.

e) Give any two medicinal uses of Asparagus.

f) What is Unani system of medicine?

g) Define 'Piffa'?

h) What is 'Prabhava'?

i) Enlist 'Panchamaha bhutas'.

j) Define crude drugs.

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

a) Describe any two methods of chemical drug evaluation.

b) Give an account of preparation of Churna & Bhasma.

c) Write about concept of active principle.

P.T.O.

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

a) Ethnobotanical account of Ficus benghalensis.

b) Packing and storage of drugs.

c) Scope of pharmacognosy.

Q4) Give an account of Source, cultvation, microscopic characters, Chemical constituents and medicinal uses of Coriandrum sativum. **[10]**

OR

Give an account of source, cultivation, microscopic characters, chemical constituents and medicinal uses of Tinospora cordifolia.

✓ ✓ ✓

Total No. of Questions : 4]

SEAT No. :

P824

[Total No. of Pages : 2

[5017]-431
T.Y.B.Sc.
ZOOLOGY
ZY - 341 : Biotechnology
(Semester - IV) (2008 Pattern) (Paper - I)

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

Instructions to the candidates:

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

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

a) Define Plasmids.

b) What is Somatic cell fusion?

c) Define monoclonal antibodies.

d) Give any two advantages of tissue culture.

e) What is nanotechnology?

f) Define Bioreactor.

g) What is PCR?

h) Give any two natural pesticides.

i) Explain Chimeric animal.

j) What is laminae flow hood?

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

a) Give an account of Pharmaceutical application of animal cell culture.

b) Describe artificial intelligence.

c) Give an account of cloning vectors.

P.T.O.

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

a) Western blotting.

b) Bio sensors.

c) Organ culture.

Q4) What are stem cells? Describe different types of stem cells and add a note on their applications. **[10]**

OR

What is Fermentation technology? Describe the method of production of Penecillin.

Total No. of Questions : 4]

SEAT No. :

P825

[Total No. of Pages : 2

[5017]-432
T.Y. B.Sc.
ZOOLOGY
ZY - 342 : Mammalian Physiology & Endocrinology
(2008 Pattern) (Paper-II) (Semester-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) State the role of liver in digestion.

b) State the significance of color doppler.

c) Define arterial hypoxia.

d) State the significance of dialysis.

e) Give the names of any two proteins present in striated muscle.

f) What is saltatory conduction?

g) State the names of any two hormones secreted by pituitary gland.

h) Give the names of any two pacemakers of myogenic heart.

i) State the significance of EEG.

j) What is reproduction?

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

a) Describe response of muscle to a single threshold stimulus.

b) Describe origin of nerve impulse.

c) Describe stages of parturation.

P.T.O.

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

a) Significance of transamination reaction.

b) Glycogenolysis.

c) Chloride shift.

d) Tubular secretion.

Q4) Describe the hormonal control of uterus during pregnancy. **[10]**

OR

Explain the concept of negative feedback mechanism with suitable example.

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Total No. of Questions : 4]

SEAT No. :

P826

[Total No. of Pages : 2

[5017]-433
T. Y. B.Sc.
ZOOLOGY
ZY - 343 : Molecular Biology
(Paper - III) (2008 Pattern) (Old Course) (Semester - 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) Attempt the following: **[10]**

a) What is meant by Okazaki fragments?

b) What is central dogma of molecular biology?

c) Define complimentary base pairing.

d) What is Phosphodiester bonding?

e) Define Eukaryotic cell.

f) Role of ribosomes in protein synthesis.

g) What is transcription?

h) Define Cistron.

i) What is DNA gyrase?

j) What is genetic code?

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

a) Distinguish between B-form and Z-form of DNA.

b) Describe the ultrastructure of nucleosome.

c) Describe Wobble's hypothesis.

P.T.O.

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

a) Structure of DNA.

b) Prokaryotic chromosome structure.

c) Semiconservative DNA replication.

d) Photorepair of DNA.

Q4) What is bacterial transformation? Explain the process with the help of Griffith's experiment. **[10]**

OR

Define gene regulation in prokaryotes. Describe it with the Lac-Operon model.

Total No. of Questions : 4]

SEAT No. :

P827

[Total No. of Pages : 2

[5017]-434
T.Y.B.Sc.
ZOOLOGY
ZY - 344 : Organic Evolution
(2008 Pattern) (Semester - IV) (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) What is coacervate?

b) Who was Lamarck?

c) What is palaentology?

d) Define eukaryotic cell.

e) What are mitochondria?

f) Which era was golden age of reptiles?

g) Define speciation.

h) What is zoogeography?

i) What are symbionts?

j) Give two characters of Homo sapiens.

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

a) Describe post zygotic isolating mechanisms.

b) Describe any two realms with reference to geographic range and fauna.

c) Describe mutation theory of organic evolution.

P.T.O.

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

a) Neo Darwinism.

b) Homo erectus.

c) Geological time scale.

d) Patterns of Distribution.

Q4) What is organic evolution? Explain in detail modern synthetic theory of organic evolution. **[10]**

OR

What is organic evolution? Explain physiological and biochemical evidences supporting it.

Total No. of Questions :4]

SEAT No. :

P828

[Total No. of Pages :4

[5017] - 435

T.Y.B.Sc.

ZOOLOGY

ZY - 345 (a) : Public Health and Hygiene

(2008 Pattern) (Old Course) (Elective - II) (Semester - IV) (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 W.H.O?

b) Give names of any two methods of food preservations.

c) Define ventilation.

d) What is sewage?

e) Mention the effects of cats on human health.

f) What is rhumatic heart disease?

g) Define occupational disease?

h) What is radiation?

i) What is menthal hygiene?

j) State causative agent of Influenza.

P.T.O.

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

a) Describe method of water purification on large scale.

b) Give an account of composition of soil.

c) What is refuse? Explain methods of refuse disposal.

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

a) Effects of drugs on human health.

b) Standards for hospitals.

c) Natural ventilation systems.

d) Composition of air.

Q4) Describe mode of transmission, prevention and control measure of measels. **[10]**

OR

Define food. Explain necessity of food and add a note on diseases caused due to food deficiencies.

Total No. of Questions :4]

P828

[5017] - 435
T.Y.B.Sc.
ZOOLOGY
ZY - 345 (b) : Biodiversity
(2008 Pattern) (Semester - IV) (Paper - V)

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

Instructions to the candidates:

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

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

a) Define genetic diversity.

b) Write any two examples of insects found in lake.

c) Write any two adaptations in desert insects.

d) Write the meaning of term population dynamics.

e) What are apterygotan insects?

f) Define parasitoides.

g) State any two servival strategies in insects.

h) State the name of association between ant - butterfly.

i) What are sangvivorous insects?

j) What is mortality?

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

a) Describe social organisation in termites.

b) Explain the diversity in nest building in insects.

c) Write taxonomic characters and examples of order orthoptera.

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

a) Diversity of food in insects.

b) Significance of social organisation in insects.

c) Adaptation in forest insects.

d) Endopterygotan insects.

Q4) Write distinguishing features, examples and significance of order coleoptera and Lepidoptera. **[10]**

OR

Explain the effect of changing climate and human interference on insect diversity.

Total No. of Questions : 4]

SEAT No. :

P829

[Total No. of Pages : 2

[5017]-436
T.Y.B.Sc.
ZOOLOGY
Zy-346: Genetics and Developmental Biology
(2008 Pattern) (Paper-VI)(Semester-IV)

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

Instructions to the candidates:

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

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

a) Define 'cistron'.

b) State 'Hardy-Weinberg' law.

c) Define euthenics.

d) What is plasmid?

e) What is restriction endonucleases?

f) Define apoptosis.

g) What is blastula?

h) Define vitellogenesis

i) Define centrolecithal egg.

j) What is epiboly?

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

a) Explain steps involved in genetic engineering.

b) Describe regeneration in Hydra.

c) Describe characteristic features of 24 hours chick embryo.

P.T.O.

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

a) Spontaneous mutation.

b) Cytoplasmic inheritance.

c) Primitive streak stage chick embryo.

d) Gastrulation in chick.

Q4) Explain the genetics of inbreeding and outbreeding. **[10]**

OR

What is fertilization? Explain the process of fertilization in sea urchin.

✓ ✓ ✓

Total No. of Questions : 4]

SEAT No. :

P830

[Total No. of Pages : 2

[5017]-437
T. Y. B. Sc.
GEOLOGY
GL - 341 : Metamorphic Petrology
(Semester - IV) (2008 Pattern) (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) ***Neat diagrams must be drawn wherever necessary.***

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

a) What is reckle's principal?

b) What is foliation?

c) What are charnockites?

d) Name any two Metamorphic minerals.

e) What is mozaic structure?

f) State the lower limits of metamorphism.

g) What is aureol of thermal metamorphism?

h) What is metamorphic differentiation?

i) State depth zones of regional metamorphism.

j) What is Mylonite?

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

a) Stress and solubility of minerals.

b) Explain Scapolitization and autometamorphism.

c) Describe habits of metamorphic crystals.

P.T.O.

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

a) What are Barrovian zones of metamorphism.

b) Explain crystal growth under stress.

c) Describe diagnostic structures of thermally metamorphosed rocks.

Q4) Define and explain general characteristics of Blutonic metamorphism and write a note on eclogite. **[10]**

OR

Describe the process of attainment of chemical equilibrium in thermal metamorphism.

☛ ☛ ☛

Total No. of Questions : 4]

SEAT No. :

P831

[Total No. of Pages : 1

[5017]-438
T.Y. B.Sc.
GEOLOGY
GL - 342 : Environmental Geology
(2008 Pattern) (Paper-II) (Semester-IV)

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) Environmental Geology.

b) Natural resources.

c) Hazard and disaster.

d) Tsunami.

e) Desertification.

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

a) Causes of soil pollution. Add a brief note on soil conservation.

b) Physical and biological environment.

c) Causes of mass movement.

Q3) Answer the following (Any Two): **[10]**

a) Minamata disease.

b) Causes of flood.

c) Causes and predictability of earthquakes.

Q4) Explain the types of volcanic activity. Describe volcanic hazard. **[10]**

OR

Explain the crises faced by mankind with regards to conventional and non-conventional energy resources.

●●●●●

Total No. of Questions : 4]

SEAT No. :

P832

[Total No. of Pages : 2

[5017]-439
T. Y. B. Sc.
GEOLOGY
GL - 343 : Economic Geology
(Paper - III) (Semester - IV) (2008 Pattern)

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

Instructions to the candidates:

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

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

a) Define the term gangue.

b) What are residual deposits?

c) Where is the first oil field in India located?

d) What is the lustre and crystal system of gold?

e) What is evaporation?

f) What are radioactive minerals?

g) What is overburden?

h) Give two ore minerals of manganese.

i) Define vug.

j) Define hypothermal deposits.

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

a) What are late magnetic deposits? Explain residual liquid segregation and injection.

b) Describe wet and dry steam.

c) Explain saddle reef and stockwork.

P.T.O.

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

a) Indigenous and transported limonite.

b) Mineralogy and uses of silver.

c) Classification of metalliferous deposits.

Q4) Explain in detail the process of mechanical concentration. **[10]**

OR

What are the surface indicators of oil? Explain various types of oil traps.

Total No. of Questions : 4]

SEAT No. :

P833

[Total No. of Pages : 2

[5017]-440
T.Y.B.Sc.
GEOLOGY
GL - 344 : Geotectonics
(2008 Pattern) (Semester - IV) (Paper - IV)

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

Instructions to the candidates:

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

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

a) What is subduction zone?

b) What is epeirogenesis?

c) What is magnetograph?

d) Give last average span of normal and reverse magnetic field.

e) What is plate boundary?

f) Name any two important discontinuties of Earth.

g) What are ISO magnetic charts?

h) What is meant by Magnetic declination?

i) What are causes of plate motion?

j) What is orogenesis?

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

a) Mature stage of life cycle of mountains.

b) Subduction zone.

c) Causes and effects of magnetic reversals.

P.T.O.

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

a) Hot plume and hot spot.

b) Uses of geomagnetic time-scale.

c) Relict Mountains.

Q4) What is meant by sea-floor spreading? Explain in detail how magnetic data supports sea-floor spreading. Add a note on contradictions of this theory. **[10]**

OR

Describe the life cycle of mountains.

Total No. of Questions :4]

SEAT No. :

P834

[Total No. of Pages :2

[5017] - 441

T.Y.B.Sc.

GEOLOGY

GL - 345 : Phanerozoic Stratigraphy of India and Palaeontology

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***
3) ***Neat diagrams must be drawn wherever necessary.***

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

a) Give the type area for Cambrian System.

b) Give Index Fossils for Ordovician System.

c) Give classification of the plant fossil that characterizes the Upper Gondwanas.

d) What are Lameta beds?

e) Give the age of marine rocks of Cavery basin.

f) Explain the term 'Carboniferous'.

g) Give any two characteristics of Marine Transgressions.

h) Give geographical distribution of Karewas.

i) Give economic importance of Damuda Group.

j) What is the age of Old Red Sandstones?

P.T.O.

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

a) Palaeozoic era.

b) Bagh Beds.

c) Stratigraphy of Maharashtra in brief.

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

a) Climate and life during Gondwana Supergroup.

b) Causes of Mass Extinction.

c) Krishna Godavari Basin.

Q4) Give geographical distribution, stratigraphic succession, lithology and main fossils of Siwaliks. **[10]**

OR

Give geographical distribution, petrological characters and classification of Deccan Volcanic Province. **[10]**

Total No. of Questions : 4]

SEAT No. :

P835

[Total No. of Pages : 2

[5017]-442
T.Y.B.Sc.
GEOLOGY
GL-346: Applied Geology-II
Engineering Geology, Geohydrology and Prospecting
(2008 Pattern) (Semester-IV) (Paper-VI)

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

Instructions to the candidates:

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

Q1) Answer the following in 4-6 lines. **[10]**

a) What does RCC stands for in civil engineering?

b) Name the largest gravity dam in India, with river & state.

c) Define the term "aquiclude" and give one example.

d) What are stratigraphic guides?

e) Name the different types of spill-ways.

f) Name the igneous rocks having primary porosity.

g) What are "ladder veins"?

h) What is meant by "Geophysical Criteria"?

i) What is an "influent stream"?

j) Define the term permeability.

Q2) Write notes on any TWO of the following. **[10]**

a) Compressive strength of rocks.

b) Types of aggregates.

c) Hydrologic cycle.

P.T.O.

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

a) Significance of geology in civil engineering.

b) Tunnels in folded rocks.

c) Principles of self-potential method of geophysical prospecting.

Q4) Explain the geotechnical investigations carried out for selection of a reservoir site. **[10]**

OR

Describe the movement of ground water with the help of Darcy's law.

✓ ✓ ✓

Total No. of Questions : 4]

SEAT No. :

P836

[Total No. of Pages : 3

[5017]-443
T.Y.B.Sc.
STATISTICS (Principal)
ST - 341 : Distribution Theory - II
(2008 Pattern) (Paper - I) (Semester - 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 calculators and statistical tables is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) a) Choose the correct alternative in each of the following: **[1 each]**

i) If X ~ C(0, 1), the coefficient of skewness is

A) 1 B) 0

C) ½ D) –1

ii) If (X, Y) ~ BN (3, 1, 9, 4, 0.75), the correlation coefficient between $-\frac{2}{3}X$ and 4Y is

A) 1 B) 0.75

C) 0 D) –0.75

iii) If X ~ LN (0, 0, 1) then mean of X is

A) e^{-1} B) e^{2}

C) $e^{½}$ D) e

iv) The row sum of a stochastic matrix is

A) 0 B) –1

C) 2 D) 1

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

i) Laplace distribution with parameters μ and λ is symmetric distribution.

ii) Mean of truncated Poisson distribution truncated at X = 0 with parameter λ is less than λ.

P.T.O.

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

i) Markov chain.

ii) n-step transition probabilities.

d) i) State the additive property of Cachy distribution. **[1]**

ii) State the relation between normal distribution and log normal distribution. **[1]**

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

a) Let (X, Y) ~ BN ($\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho$). Obtain the conditional distribution of X given Y = y.

b) Let X ~ B(n, p) truncated at X = 0. State the pmf of the resulting distribution and find its mean and variance.

c) Let X ~ LN(a, μ, σ^2). Obtain r^{th} moment about X = a, hence find its variance.

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

a) Let X ~ C (μ, λ). Obtain the distribution function and hence find first and third quartiles. Also find quartile deviation.

b) Let X ~ L (μ, λ) distribution. Obtaining moment generating function and cumulant generating function of X.

c) Let (X, Y) ~ BN (0, 0, 1, 1, ρ). Show that $U = \frac{X}{Y}$ follows Cauchy distribution.

Q4) Attempt any one of the following:

a) i) Let $\{X_n, n \geq 0\}$ be a Markov chain with state space S = {0, 1, 2} with one-step transition probability matrix

$$P = \begin{bmatrix} 0.1 & 0.5 & 0.4 \\ 0.6 & 0.2 & 0.2 \\ 0.3 & 0.4 & 0.3 \end{bmatrix}$$

and initial probability distribution

$P[X_0 = i] = 1/3$ for $i = 0, 1, 2$.

Compute:

1) $P[X_2 = 2 \mid X_0 = 0]$

2) $P[X_2 = 1, X_1 = 0, X_0 = 2]$ **[6]**

ii) Let $X \sim LN(0, \mu, \sigma^2)$

Obtain the distribution of X^{α} $(\alpha > 0)$ **[4]**

b) i) Let $X \sim N(\mu, \sigma^2)$ distribution truncated to the left at $x = a$ where a is a constant. Obtain the pdf and mean of the resulting distribution. **[6]**

ii) Determine the parameters of the following bivariate normal distribution.

$$f(x,y) = C \exp\left[-\frac{2}{3}\left\{ \frac{(x-7)^2}{4} - \frac{(x-7)(y-4)}{6} + \frac{(y-4)^2}{9} \right] \right. \quad \textbf{[4]}$$

Total No. of Questions : 4]

SEAT No. :

P837

[Total No. of Pages : 3

[5017]-444
T.Y. B.Sc.
STATISTICS (Principal)
ST - 342 : Testing of Hypotheses
(2008 Pattern) (Paper-II) (Semester-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: **[1 each]**

A) In each of the following cases, choose the correct alternative:

a) Rejecting null hypothesis H_0 when alternative hypothesis H_1 is true leads to

i) Level of significance ii) Type I error

iii) Type II error iv) Power of a test

b) The following non-parametric test is used for testing hypothesis of goodness of fit of a distribution.

i) Sign test ii) Run test

iii) Kolmogorov-Smirnov test iv) Mann-Whitney test

c) In a SPRT of strength (α, β)

i) $A = \frac{1-\beta}{\alpha}$ and $B = \frac{\beta}{1-\alpha}$ ii) $A = \beta/\alpha$ and $B = \alpha/\beta$

iii) $A = \frac{\alpha}{1-\beta}$ and $B = \frac{1-\alpha}{\beta}$ iv) $A = \frac{1-\beta}{\alpha}$ and $B = \frac{1-\beta}{1-\alpha}$

P.T.O.

d) In Likelihood ratio test, $\lambda(x)$ is defined as

i) $\dfrac{\sup L(\theta_0 / x)}{\sup L(\theta_1 / x)}$ ii) $\dfrac{\sup L(\theta_0 / x)}{\sup L(\theta / x)}$

iii) $\dfrac{\sup L(\theta_0 / x)}{Inf\ L(\theta_0 / x)}$ iv) $\dfrac{\sup L(\theta_1 / x)}{\sup L(\theta_0 / x)}$

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

a) Likelihood ratio test can be used for testing a composite null hypothesis against a composite alternative hypothesis.

b) In SPRT sample size is variable.

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

a) Critical region.

b) Composite hypothesis.

D) Attempt Each of the following: **[1 each]**

a) State one advantage of nonparametric test.

b) Is the sum of probabilities of type I and type II errors always 1? Justify your answer.

Q2) Attempt Any Two of the following: **[5 each]**

a) Let X be a r.v. with probability mass function f_0 under the null hypothesis and f_1 under the alternative hypothesis.

X	1	2	3	4	5	6	7
f_0	0.01	0.02	0.03	0.05	0.07	0.05	0.77
f_1	0.03	0.09	0.10	0.10	0.20	0.18	0.30

i) Write all critical regions of size $\alpha = 0.10$.

ii) Among all critical regions listed in (i), which one has the maximum power?

b) Construct SPRT of strength (α, β) for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1 (\theta_1 > \theta_0)$ for an exponential variate with mean $1/\theta$.

c) Describe Wilcoxon's signed rank test.

Q3) Attempt Any Two of the following: **[5 each]**

a) Construct likelihood ratio test of level of significance α for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta \neq \theta_0$, where θ is parameter of exponential distribution.

b) A random sample of size 12 is drawn from $N(0, \sigma^2)$ distribution. Determine UMP level α test for testing $H_0 : \sigma^2 = 4$ against $H_1 : \sigma^2 < 4$.

c) A single observation is drawn from $U(0, \theta)$. It is required to test $H_0 : \theta = 1$ against $H_1 : \theta = 2$. H_0 is rejected iff the observation lies between 1 and 1.5. Calculate the probabilities of the errors of two kinds. Also find power of the test.

Q4) Answer Any One of the following:

a) i) Construct SPRT of strength (α, β) for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1$ $(\theta_1 > \theta_0)$ for a bernoulli distribution. **[5]**

ii) The following sequence of ups 'U' and downs 'D' in the price of gold for 18 consecutive days are observed. Test for the randomness of the sequence at 5% level of significance.

UUUDUDDUDDUDDUDUUU. **[5]**

b) i) Let $X_1, X_2, ..., X_n$ be a random sample of size *n* from a distribution with density $f(x) = \theta\, x^{\theta-1}; 0 < x < 1$. **[5]**

Find B.C.R. for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1$ $(\theta_1 < \theta_0)$.

ii) Make a critical comparison between likelihood ratio test and uniformly most powerful test. **[5]**

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Total No. of Questions : 4]

SEAT No. :

P838

[Total No. of Pages : 3

[5017]-445
T. Y. B. Sc.
STATISTICS (Principal)
ST - 343 : Statistical Process Control (Offline Methods)
(Paper - III) (2008 Pattern) (Semester - 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) a) In each of the following cases, choose the correct alternative: **[1 each]**

i) For a single sampling plan, the exact probability of acceptance of a lot is calculated by using

A) Normal distribution

B) Exponential distribution

C) Hypergeometric distribution

D) Poisson distribution

ii) The cut set of the three component parallel system is

A) {1, 2, 3} B) {2, 3}

C) {1, 3} D) {3}

iii) In a single sampling plan $n = 10$, N = 100, ATI = 20, probability of acceptance of lot is

A) 0.8 B) 0.9

C) 8/9 D) 1/9

iv) Survival function of a random variable is

A) Non-decreasing B) Non-increasing

C) Constant D) Decreasing

P.T.O.

b) In each of the following cases, state whether the given statement is true or false: **[1 each]**

i) For a series system, system reliability can not exceed component reliabilities.

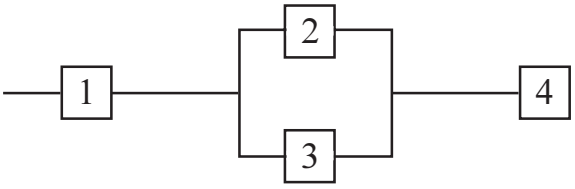
ii) A fault tree diagram is a logical diagram corresponding to system functioning.

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

i) Consumer's risk.

ii) Lot tolarance fraction defective (LTFD).

d) i) Obtain structure function of the system with following reliability block diagram. **[1]**



ii) State the rule of shifting to tightened inspection from normal inspection. **[1]**

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

a) Obtain expression for AOQ for single sampling plan.

b) Draw the reliability block diagram and fault tree diagram for the system with structure function.

$$\phi(\underline{x}) = X_1 X_2 (1-(1-X_3)(1-X_4))$$

c) Describe working plan of double sampling plan.

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

a) Find producer's risk for a single sampling plan N = 10,000 n = 50 c = 2 given AQL = 0.06.

b) Write a note on ISO 9001-2000.

c) Define IFR and DFR. Prove that exponential distribution belongs to IFR and DFR class of distributions.

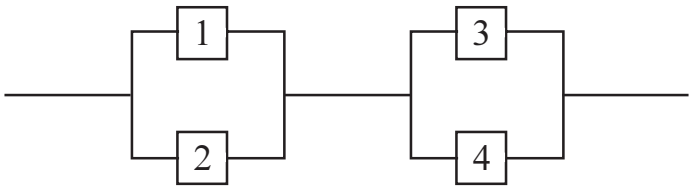
Q4) Attempt any one of the following:

a) i) Define reliability h(p) of a binary system. Describe 'S' shapedness property of h(p) with the help of appropriate graph. **[5]**

ii) For a double sampling plan with N = 2000, n_1 = 15, n_2 = 10, c_1 = 0, c_2 = 1, obtain ASN. Also obtain probability of accepting a lot of quality p = 0.02. **[5]**

b) i) Derive an expression for average total inspection (ATI) for double sampling plan. **[5]**

ii) Find cut vectors, path vectors, minimal path vectors of the following reliability block diagram. **[5]**



Total No. of Questions : 4]

SEAT No. :

P839

[Total No. of Pages : 3

[5017]-446
T. Y. B. Sc.
STATISTICS (Principal)
ST - 344 : Sampling Methods
(2008 Pattern) (Semester - IV) (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 table is allowed.*
4) *Symbols and abbreviations have their usual meanings.*

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

a) Choose the correct alternative in each of the following

i) Sampling frame is a list of

A) elements in a sample.

B) elements in a population.

C) questions in a questionnaire.

D) none of the above.

ii) Total number of possible samples of size n, drawn from a population of size N by SRSWR is

A) n B) N^n

C) n^N D) $\binom{N}{n}$

iii) In Stratified random sampling, under proportional allocation $V(\bar{y}_{st})$ is

A) $\frac{(N-n)}{Nn}\sum_1^k P_i^2 S_i^2$ B) $\left(\frac{1}{n}-\frac{1}{N}\right)\sum_1^k P_i S_i$

C) $\left(\frac{1}{n}-\frac{1}{N}\right)\sum_1^k P_i S_i^2$ D) $\left(\frac{1}{n}-\frac{1}{N}\right)\sum_1^k (P_i S_i)^2$

P.T.O.

iv) The ratio estimator of population mean $\left(\overline{Y}\right)$ is given by

A) $\frac{\overline{X}}{\overline{x}\,\overline{y}}$ B) $\frac{\overline{x}}{\overline{y}} \times \overline{X}$

C) $\frac{\overline{y}}{\overline{x}} \times \overline{X}$ D) $\frac{\overline{x} \times \overline{y}}{\overline{X}}$

b) State whether each of the following statement is true or false. **(1 each)**

1) Neyman allocation gives better estimates than that of SRSWOR without stratification.

2) SRS is always better than systematic sampling.

c) Define the following terms: **(2 each)**

1) sampling interval in systematic sampling.

2) questionnaire.

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

a) Derive an expression for the standard error of an unbiased estimator of the population mean in case of SRSWR.

b) State the requirements of a good questionnaire.

c) Explain the method of systematic sampling. Obtain an unbiased estimator of the population mean under systematic sampling.

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

a) State an unbiased estimator of population mean under stratified random sampling. Obtain the expression for its standard error under proportional allocation.

b) Define the ratio and regression estimators of population mean. Also state the expression for variances of these estimators and compare them.

c) Consider a population S = {1, 2, 3, 4}, list all the samples of size 2 selected under SRSWOR. Show that sample mean is unbiased estimator of population mean. Further show that sample mean square is unbiased for population variance.

Q4) Attempt any one of the following

a) i) If population consists of linear trend, then show that $\text{Var}(\bar{y}_{st}) \leq \text{Var}(\bar{y}_{sys})$. **[6]**

ii) The units in a population are classified into two clases C and C′. Determine the size of a sample in case of SRSWOR such that $P\left[|p - P| \geq d\right] = \alpha$ where $d = 0.05, \alpha = 0.05, N = 1500, \hat{P} = 0.4$. **[4]**

b) i) Show that in stratified sampling with given cost function **[6]**

$C = C_o + \sum_{i=1}^{n} C_i n_i$, $\text{Var}(\bar{y}_{st})$ is minimum if $n_i \alpha \frac{N_i S_i}{\sqrt{C_i}}$.

ii) The values $\{(x_i, y_i),\ i = 1,2,3,4\}$ in a sample of size 5 are **[4]**

x_i	:	1	2	4	5	7
y_i	:	8	4	7	4	1

The population total of 200 observations of X is known to be 800. Obtain the ratio and regression estimates of population total Y.

Total No. of Questions :4]

SEAT No. :

P840

[Total No. of Pages :4

[5017] - 447

T.Y.B.Sc.

STATISTICS (Principal)

ST - 345 : Operations Research

(2008 Pattern) (Semester - IV) (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) a) Choose the correct alternative in each of the following: **[1each]**

i) To solve linear programming problem (LPP) by graphical method, the number of decision variables should be

1) < 2 2) 2

3) 3 4) 4

ii) If objective function in LPP is of maximization type, then a unique optimum solution is reached when for all non - basic variables.

1) $z_j - c_j \geq 0$ 2) $z_j - c_j > 0$

3) $z_j - c_j \leq 0$ 4) $z_j - c_j < 0$

iii) While solving a transportation problem (TP) the method that does not consider the costs c_{ij} is

1) Least cost method 2) Vogel's approximation method

3) North West corner method 4) MODI method

P.T.O.

iv) In an assignment problem of order n, optimal assignment is reached when minimum number of horizontal and vertical lines covering all zeroes is

1) n – 1 2) n – 2

3) n 4) n + 1

b) State whether each of the following statements is True or False. **[1each]**

i) The dual of a dual is primal.

ii) A TP is balanced if it has equal number of rows and columns.

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

i) Surplus variable

ii) Total elapsed time in a sequencing problem.

d) i) Explain the canonical form of a LPP. **[1]**

ii) Define the idle time of a machine in case of a sequencing problem. **[1]**

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

a) Solve the following LPP by graphical method.

$$\text{maximize } z = 6x_1 + 11x_2$$

Subject to

$$2x_1 + x_2 \leq 104$$

$$x_1 + 2x_2 \leq 76$$

$$x_1 \geq 0,\ x_2 \geq 0$$

b) A firm manufactures trucks and buses. Inputs available are 720 man - years, 900 machine weeks and 1900 tonnes of steel. Production of a truck requires 1 man - year, 3 machine - weeks and 5 tonnes of steel. Production of a bus requires 2 man - years, 1 machine week and 4 tonnes of steel. Profit by selling one truck is Rs. 10,000 and by selling one bus is Rs. 8,000.

Formulate the above problem as L.P.P.

c) A book binder has one printing press, one binding machine and manuscripts of 7 different books. The times required for printing and binding for different books are shown below.

Book	A	B	C	D	E	F	G
Printing time (hours)	20	90	80	20	120	15	65
Binding time (hours)	25	60	75	30	90	35	50

Determine a sequence of processing books so as to minimize total elapsed time. Obtain idle time for each machine.

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

a) i) Explain the use of slack variable and artificial variable in solving LPP by simplex method with an illustration.

ii) Explain the following terms with respect to LPP.

1) Basic feasible solution.

2) Infeasible solution.

3) Degenerate solution.

b) Explain Monte Carlo method of simulation with the help of one illustration.

c) Write the dual of the following LPP.

$$\text{Maximize } z = 2x_1 + x_2 + 3x_3$$

Subject to

$$2x_1 + 3x_2 + 5x_3 \leq 2$$

$$3x_1 + x_2 + 7x_3 = 3$$

$$x_1,\ x_2, x_3 \geq 0$$

Q4) Attempt any ONE of the following:

a) i) Give the mathematical formulation of a transportation problem. **[2]**

ii) Goods have to be transported from sources S_1, S_2 and S_3 to destinations D_1, D_2 and D_3. The transportation cost per unit, capacities of sources and requirements of the destinations are given in the following table.

Destination / Source	D_1	D_2	D_3	Supply
S_1	8	5	6	120
S_2	15	10	12	80
S_3	3	9	10	80
Demand	150	80	50	

Obtain initial basic feasible solution by Vogel's approximation method. Check whether the solution is optimum. **[8]**

b) i) What do you mean by an unbalanced TP? Explain how to convert it into a balanced TP, giving an illustration. **[3]**

ii) State the relationship of assignment problem with TP. **[3]**

iii) Solve the following assignment problem so as to minimise the cost. **[4]**

Machine / Job	A	B	C	D
1	4	5	6	7
2	5	5	7	7
3	7	6	7	9
4	8	9	10	10

Total No. of Questions :4]

SEAT No. :

P841

[Total No. of Pages :6

[5017]-448
T.Y.B.Sc.
STATISTICS (Principal)
ST-346(A): Medical Statistics
(2008 Pattern) (Paper - VI) (Semester - 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) In each of the following cases, choose the correct alternative: **[1each]**

a) Pharmaco-kinetics (Pk) is the study of the time course of

i) absorption ii) distribution

iii) Metabolism and excretion iv) all above

b) In epidemiology, logit function of probability π is given by

i) $\ln[(1-\pi)/\pi]$ ii) $\ln[\pi/(1-\pi)]$

iii) $\ln[\pi(1-\pi)]$ iv) $\ln[\pi/(1+\pi)]$

c) A study that begins with tests on animals is called as:

i) Preclinical study ii) Phase I study

iii) Phase II study iv) Phase III study

d) The most popular model used to represent the tendency of a population to reach a plateau is

i) linear ii) exponential

iii) sigmoidal iv) logarithmic

P.T.O.

B) In each of the following cases, state whether the given statement is true or false: **[1each]**

a) Correlation does not imply causation.

b) A control is a treatment that is useful as a standard for comparison.

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

a) 75/75 rule for assessment of bioequivalence.

b) Placebo

D) a) State the role of CRO. **[1each]**

b) Explain the term relative risk.

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

a) Write a short note on 'Crossover design' used in clinical trails.

b) Discuss the discoveries in epidemiology giving any two illustrations.

c) Given the following table which relates to the number of animals of a certain species at age x:

x	0	1	2	3	4	5
lx	1000	850	760	360	25	0

Prepare life-table containing columns d_x, q_x, L_x, T_x e_x.

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

a) Suppose μ_C and μ_T denote the mean responses of two formulations control (C) and test (T) with known variance. Explain how you test H_0: $\mu_T = \mu_C$ against H_1: $\mu_T > \mu_C$. Assuming equal sample sizes for both the test groups, find the expression of sample size of each group to get power $1 - \beta$.

b) Define survival function and write down interpretation of S(x). Also, state the properties of S(x).

c) Explain Mc Nemar's test for testing the hypothesis for symmetry of 2X2 contingency table with help of an illustration.

Q4) Attempt any one of the following:

a) i) Explain in brief Phase II study in clinical trails. **[5]**

ii) Given below are caffeine concentration values after taking a dose.

Estimate C_{max}, T_{max}. Also calculate $AUC_{(0,180)}$ **[5]**

Time (in minutes)	10	30	60	90	120	180
Concentration (microgram/ml)	4	3	1	0.75	0.55	0.3

b) i) Write a short note on 'Bioavailability'. **[5]**

ii) Explain Simpson's paradox with help of an illustration from medical study. **[5]**

EEE

Total No. of Questions :4]

P841

[5017]-448
T.Y.B.Sc.
STATISTICS (Principal)
ST-346(B): Statistical Ecology
(2008 Pattern) (Paper - VI) (Semester - 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) A) In each of the following cases, choose the correct alternative: **[1each]**

a) In Gompertz model the growth rate $\frac{dNt}{dt}$ is maximum at

i) $\frac{k}{2}$ ii) $\frac{e}{k}$

iii) $\frac{k}{e}$ iv) $2k$

b) For a logistic growth model stable equilibrium is

i) $N_t = 0$ ii) $N_t = k$

iii) $N_t = 2k$ iv) $N_t = \frac{k}{e}$

c) Peterson's estimator of population size (N) in single recapture is

i) $\frac{n_1 n_2}{m_2}$ ii) $\frac{m_2 n_1}{n_2}$

iii) $\frac{n_1 m_2}{n_2}$ iv) $\frac{n_1 m_1}{n_2}$

d) The time at which population gets doubled in exponential model is

i) $k \log_e 2$ ii) $\frac{\log_e 2}{k}$

iii) $2\log_e k$ iv) $\frac{\log_e k}{2}$

Here K is intrinsic rate of increase.

B) In each of the following, state whether the given statement is true or false: **[1each]**

a) In capture - recapture method with single recapture Peterson's estimator is not m.l.e.

b) In logistic growth model carrying capacity is equal to $2k$.

C) a) Define closed population. **[1each]**

b) Define stable equilibrium.

D) a) Explain two kinds of parameters in Leslie Matrix Model (LMM). **[1each]**

b) In removal method if two successive removals are. $n_1 = 40$ and $n_2 = 20$ then find Zippin's estimator of N.

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

a) Derive the expression for logistic growth model.

b) Describe line transact method for estimating animal population in a forest. What is rational behind using exponential detection function?

c) Given the following projection matrix $M = \begin{bmatrix} 0 & 2 \\ 0.2 & 0 \end{bmatrix}$. Obtain stable population structure and comment on the growth of the population.

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

a) What is meant by point to individual nearest neighbour distance (nnd) in Poisson forest? Derive m.l.e. of parameter (λ) in it.

b) Fit a linear growth model to the following data:

t :	0	1	2	3	4
N_t:	13	23	31	45	58

c) Describe capture-recapture method. Derive Peterson's estimation of population size (N) for single recapture in closed population.

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

A) a) Describe the method of quadrat sampling to estimate the population density in a forest. Also discuss the scope and limitations of quadrat sampling method.

b) Define Simpson's index (λ) for diversity. Compute λ for the following data: **[5+5]**

Species	1	2	3	4	5	6
N.of individuals	6	4	3	5	2	1

B) a) Describe states of equilibria in Gompertz model.

b) Related to LMM, state the following:

i) assumption made.

ii) mathematical model.

iii) matrix notation. **[5+5]**

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Total No. of Questions :4]

SEAT No. :

P842

[Total No. of Pages :4

[5017]-449
T.Y.B.Sc.
STATISTICS (Principal)
ST-346(C): Statistical Computing using 'R' Software
(2008 Pattern) (Paper - VI)(Semester - 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) ***Each question is to be solved using R software installed on your computer.***
4) ***Attach computer printout of your work to the answer book supplied to you.***

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

a) Create a vector X of following numbers:

7, 9, 15, 12, 30, 45, 22, 16, 19, 21.

Using vector X, create a vector Y with values greater than 20.

b) Simulate an experiment of tossing a coin 100 times and prepare its frequency distribution.

c) Draw a rod plot for the following data:

x	3	5	7	9	11	13
f	6	10	14	18	12	8

d) Draw a random sample of size 8 from a Poisson distribution with parameter m = 6.5.

e) Obtain lower and upper quartile of following observations:

4, 17, 37, 15, 11, 24, 42, 55, 16, 34.

f) Create a data frame of roll number and marks obtained by 6 students.

g) Let $X \sim N(\mu = 12, \sigma^2 = 4)$. Find $P(6 \leq \times \leq 14)$.

P.T.O.

h) Draw a simple random sample without replacement of size 8 from a population 50 units.

i) Draw a box plot of the following observations:

8,4, 11, 13, 1, 4, 9, 7, 10, 14, 15, 18, 21, 12, 16.

j) Access data CO_2 and obtain its summary statistics.

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

a) Draw a simple bar diagram for the following data:

Year	2010	2011	2012	2013	2014
Profit (in lakhs)	12.1	12.8	13.2	14.6	14.4

b) Compute A.M. G.M. and H.M. of the following observations:

1.2, 1.8, 1.7, 2.2, 1.9, 2.6, 3.2, 5.4, 3.6, 2.8.

Also, verify the relation between them.

c) Fit a second degree parabola to the following data:

Year (X)	2004	2005	2006	2007	2008	2009
Sales(Y) ('000 Rs.)	12	18	26	22	16	8

Also, estimate Y for each given X.

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

a) Draw less than and more than ogive curves for the following data:

Marks	0-20	20-40	40-60	60-80	80-100
No.of (students)	3	10	50	28	6

b) A health club advertised a weight readucing program and claimed that on the average participant in the program loses weight during 6 months. To test the claim weights (in pounds) before and after the program for 10 selected participants were as follows:

Participant No.	1	2	3	4	5	6	7	8	9	10
Weight (before)	120	124	109	112	123	119	124	128	130	118
Weight (after)	111	118	100	104	116	111	116	117	122	110

Do the above data support the claim?

c) Fit a binomial distribution to the following data:

x	0	1	2	3	4	5
f	8	12	30	42	20	5

Also, find expected frequencies and plot observed and expected frequencies.

Q4) Attempt any one of the following:

a) i) The monthly expenditure (in '000 Rs.) of 3 families A, B and C were recorded as follows:

A	18,	17,	15,	16,	12
B	13,	18,	16,	14, 20,	18
C	14,	10,	12,	11	

Carry out the analysis of variance.

ii) A die is tossed 126 times and the following results are obtained:

Number turned up	1	2	3	4	5	6
Frequency	28	22	21	14	25	16

Test the hypothesis that the die is unbiased.

[6+4]

b) i) A random sample of 10 boys had the following Intelligent Quotients (I.Q).

110, 108, 106, 93, 98, 112, 108, 116, 120, 115.

Do these data support the assumption that the population mean I.Q. is 105? Use $\alpha = 0.05$.

ii) Two machines A and B were tested according to the time required to complete a particular job.

A	28	26	29	30	32		
B	25	35	33	31	26	28	29

Test the variability in time required by two machines using F - test.

[5+5]

EEE

Total No. of Questions : 4]

SEAT No. :

P843

[Total No. of Pages : 2

[5017]-452
T. Y. B. Sc.
GEOGRAPHY
Principles and Techniques of Watershed Management
(Semester - IV) (2008 Pattern) (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 and maps wherever necessary.***
4) ***Use of map-stencils is allowed.***

Q1) Answer the following questions in one or two sentences. **[10]**

a) Define watershed planning.

b) What is drainage divide?

c) List any two importance of watershed planning in conservation of resources.

d) What do you mean by capacity building?

e) What do you mean by water conservation?

f) What is IRDP?

g) What is rainwater harvesting?

h) Give any two importance of cost sharing.

i) What are check dams?

j) What do you understand by rainfed agriculture?

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

a) Describe the need of watershed planning.

b) Discuss various traditional methods of water conservation.

c) Explain Dry land Farming in India.

P.T.O.

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

a) Techniques of rainwater harvesting.

b) Objectives of afforestation.

c) Integrated watershed development plans in India.

Q4) Describe the importance of watershed planning. **[10]**

OR

Describe various methods of soil conservation.

Total No. of Questions : 4]

SEAT No. :

P844

[Total No. of Pages : 2

[5017]-453
T.Y.B.Sc.
GEOGRAPHY
Gg 342 : Geography of Travel & Tourism
(Part-II) (2008 Pattern) (Paper -II)(Semester-IV)

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

Instructions to 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 followings in one or two sentences. **[10]**

a) What is 'Geo-tourism?

b) Mention any two benefits of adventure tourism.

c) What is 'Balance of payment'?

d) Give any two examples of water- transport tourism.

e) What is transaction multiplier?

f) State any four environmental impacts of tourism.

g) Provide any one example of sustainable tourism.

h) State any two effects of foreign elements on indigenous culture.

i) Name the states where Ooty and Bodhgaya are located.

j) Mention any two attractions of kaziranga.

Q2) Write short answer (Any Two): **[10]**

a) Camping and caravan tourism.

b) Economic impact of tourism.

c) Ajanta and Ellora.

P.T.O.

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

a) Yatri bhavan and dharamshala.

b) Methods of deriving tourism myltiplier.

c) Impact of tourism on health.

Q4) Discuss, with suitable examples, factors influencing the choice of transport. **[10]**

OR

Describe Kerala and Goa as places of beach tourism.

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Total No. of Questions : 4]

SEAT No. :

P845

[Total No. of Pages : 2

[5017]-454
T.Y.B.Sc.
GEOGRAPHY
Gg. 343 : Fundamentals of Geoinformatics
(2008 Pattern) (Paper - VI) (Semester - 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 sketches and diagrams wherever necessary.***
4) ***Use of map stencils is allowed.***

Q1) Answer the following questions in one or two sentences: **[10]**

a) What is Digital Image Processing?

b) What do you understand by RGB?

c) What is Pixel?

d) Mention any two standard image processing techniques.

e) Define Georeferencing.

f) What is image enhancement?

g) Mention any four types of spatial analysis.

h) What is DEM?

i) Define query.

j) What is low pass filtering?

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

a) Explain BIP format.

b) What is multi-criteria analysis?

c) Explain spatial query.

P.T.O.

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

a) RGB format.

b) Band Ratioing.

c) Unsupervised classification.

Q4) Give an account of topographic analysis in GIS. **[10]**

OR

What is image classification? Explain supervised classification technique.

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Total No. of Questions : 4]

SEAT No. :

P846

[Total No. of Pages : 2

[5017]-455
T.Y.B.Sc.
GEOGRAPHY
Gg - 344 : India - A Geographical Analysis
(2008 Pattern) (Semester - IV) (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.***
3) ***Diagrams and Maps must be drawn wherever necessary.***
4) ***Use of Maps stencils is allowed.***

Q1) Answer the following questions in one or two sentences: **[10]**

a) Mention any two non-metallic minerals.

b) What is siderite?

c) State any two important factors for Hydel power generation.

d) Name any two places of Atomic power stations in India.

e) What is white revolution?

f) Give any one salient feature of water transport in India.

g) State any one important factor affecting location of automobile industry in India.

h) Name the state with highest population density in India according to the 2011 census.

i) State any two problems related to urbanization in India.

j) What is coastal shipping?

Q2) Write short answers (any two) **[10]**

a) Explain the problems encountered in India due to Green Revolution.

b) Write briefly about dry farming in India.

c) Describe the impact of liberalization on industrial development of India.

P.T.O.

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

a) Salient features of Blue revolution.

b) Land reforms in India.

c) Importance of ports in India.

Q4) Discuss the advantages and disadvantages of Green Revolution in India. **[10]**

OR

Give an account of Iron and Steel industry in India.

Total No. of Questions :4]

SEAT No. :

P847

[Total No. of Pages :2

[5017] - 456
T.Y.B.Sc.
GEOGRAPHY
Gg - 345 : Geography of Soils
(2008 Pattern) (Semester - 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) ***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. **[10]**

a) What is overgrazing?

b) Define 'eluviations'.

c) Write importance of organic material.

d) Write two characteristics of Oxisols?

e) How the relief affect on soil formation.

f) Define 'Igneous rock'.

g) Write two effects of soil degradation?

h) What is contour bunding?

i) Define 'Reforestation'.

j) Write sources of SOM?

P.T.O.

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

a) How the time factor affect on soil profile.

b) Write the effects of salinization process on soils fertility.

c) Write Jenny's contribution in the study of soil development.

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

a) Podzolization Process.

b) Causes of soil deforestation.

c) Laterite soil.

Q4) Write formation of humus biochemical compounds. **[10]**

OR

Explain how climate and vegetation cover affect on soil development.

Total No. of Questions : 4]

SEAT No. :

P848

[Total No. of Pages : 2

[5017]-457
T.Y.B.Sc.
GEOGRAPHY
Gg - 346 : Fundamentals of Geoinformatics
(Semester-IV) (Paper-XII) (2008 Pattern)(Part-II)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Diagrams and Maps must be drawn wherever necessary.***
4) ***Use of Maps stencils is allowed.***

Q1) Answer the following questions in one or two sentences: **[10]**

a) What is Geostationary satellite?

b) Define the term 'Spectral resolution'.

c) What is MSS?

d) Mention the spatial resolution of IRS LISS IV image.

e) What are IR scanners?

f) Mention the spectral resolution of Landsat Tm 5 image.

g) Mention any one characteristics of Radar image.

h) State any two types of INSAT series images.

i) What is push broom scanner?

j) What is a Band?

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

a) Explain the major characteristics of Landsat images.

b) Discuss briefly the applications of satellite data in water pollution studies.

c) What information can be derived from the annotation strip on a satellite image?

P.T.O.

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

a) Elements of image interpretation.

b) Ideas about DIP.

c) Thermal IR images.

Q4) What are sensors? Explain the types of sensors used in IRS series of satellites.

OR

Discuss the applications of various types of satellite images.

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Total No. of Questions : 4]

SEAT No. :

P849

[Total No. of Pages : 2

[5017]-458
T.Y.B.Sc.
MICROBIOLOGY
MB - 341 : Medical Microbiology - II
(Semester - IV) (2008 Pattern) (Paper - I)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***
3) ***Draw neat labelled diagrams wherever necessary.***

Q1) Attempt the following:

a) Match the following: **[5]**

i)	Influenza	1)	Retrovirus
ii)	Dengue fever	2)	Hepatitis B virus
iii)	AIDs	3)	Hepatitis A virus
iv)	Polio	4)	Arbovirus
v)	Serum hepatitis	5)	Picornavirus
		6)	Orthomyxovirus

b) State true or false: **[5]**

i) Oral thrush is caused by candida species.

ii) Polymyxin B is antiviral drug.

iii) Nalidixic acid inhibits nucleic acid synthesis.

iv) Man is the definitive host of malarial parasite.

v) The feeding stage of E.histolytica is trophozoite.

P.T.O.

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

a) Comment on the treatment of Malaria.

b) Draw and label the structure of HIV.

c) Explain in short any one mechanism of drug resistance in bacteria.

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

a) Cryptococcosis.

b) MIC.

c) Mode of action of Actinomycin D.

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

a) Discuss the morphology and antigenic variations of influenza virus.

b) Explain antifungal drugs.

Total No. of Questions : 4]

SEAT No. :

P850

[Total No. of Pages : 2

[5017]-459
T. Y. B.Sc.
MICROBIOLOGY
MB-342: Genetics and Molecular Biology - II
(2008 Pattern) (Paper-II) (Semester-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.***
4) ***In question 1 all sub-questions are compulsory.***

Q1) A) Attempt the following: **[5]**

i) Define - Cistron.

ii) Give the full form of CCC.

iii) Transformation was discovered by _____

iv) Define -stringent plasmids.

v) Conjugation using F^1 is called as _____

B) Match the following. **[5]**

A		B	
i)	Breakage and Reunion	a)	Hfr cells
ii)	E. coli DNA ligase	b)	Kary Mullis
iii)	PCR technique	c)	Antibiotic resistance
iv)	Site Specific Recombination	d)	NAD
v)	R factors	e)	Holliday model.

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

a) Explain the various applications of Northern blot technique.

b) Comment on- use of Linkers and Adaptors in Recombinant DNA technology.

c) Explain the phenomenon of " Plasmid In-Compatibility".

P.T.O.

Q3) Draw neat labelled diagrams of any two of the following. **[10]**

a) Southern blot technique.

b) Structure of a typical YAC Vector.

c) $F^+ \times F^-$ Mating

Q4) a) Explain the single strand assimilation in bacterial Recombination. Give the role of Rec A and Rec BCD in homologous recombination ? **[10]**

OR

b) What is Generalised Transducton? What are Generalised transducing phage particles? Explain the mechanism with the help of bacteriophage P_{22}.

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Total No. of Questions : 4]

SEAT No. :

P851

[Total No. of Pages : 2

[5017]-460
T. Y. B.Sc.
MICROBIOLOGY
MB - 343 : Metabolism
(2008 Pattern) (Paper - III) (Semester - IV)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***All questions carry equal mark.***
3) ***Draw neat labelled diagrams whenever necessary.***

Q1) A) **[3]**

a) Define - Diffusion.

b) List monomers of peptidoglycan.

c) Give types of amylases.

B) True or false: **[2]**

a) Shine dalgarno sequences are present on mRNA.

b) Eucaryotic cells have 30S and 50S ribosomes.

C) Match the pairs: **[5]**

A		B	
a)	Transpeptidase	i)	Water splitting enzymes
b)	Ionophore	ii)	Primer
c)	Oxygenic photophosphorylation	iii)	Gramicidin
d)	RNA primer	iv)	Penicillin
e)	Glycogenin	v)	DNA synthesis

P.T.O.

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

a) Diagrammatically represent initiation of protein synthesis.

b) Write pathway for β-oxidation of fatty acid.

c) List enzymes and proteins involved in DNA replication, give their significance.

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

a) Pathway of starch synthesis.

b) What is active transport mechanism? Explain it with suitable example.

c) Explain with example substrate level phosphorylation for ATP generation.

Q4) Attempt any one: **[10]**

a) State second law of thermodynamics. Explain in detail ATP as high energy compounds.

b) Define photosynthesis. Explain the mechanism of cyclic and non-cyclic photophosphorylation.

Total No. of Questions : 4]

SEAT No. :

P852

[Total No. of Pages : 2

[5017]-461
T. Y. B. Sc.
MICROBIOLOGY
MB - 344 : Immunology - II
(2008 Pattern) (Semester - IV) (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) Attempt the following

A) Match the following **[5]**

a)	B.C.A regions	i)	CD4
b)	TH	ii)	anticancerous
c)	TNF	iii)	CD8
d)	TC	iv)	MHC II
e)	DP DQ DR regions	v)	MHC I

B) State true or false **[2]**

a) Rh positive individual can donate blood to Rh negative individual.

b) B cells are involved in humoral immune response.

C) Fill in the blanks by choosing the correct option **[2]**

a) Father's blood group is 'AB'. Mothers blood group is 'O'. The child can not be _____

i) A ii) O iii) B iv) none of these

b) Immune sera in Rabies provides _____ immunity

i) Active natural ii) Active artificial

iii) Passive artificial iv) Passive natural

D) Define : Xenograft **[1]**

P.T.O.

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

a) Elaborate on ADCC.

b) Give comparative account of attenuated and inactivated vaccines.

c) Explain the polymorphism of MHC molecules.

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

a) Response to super antigens.

b) Immediate hypersensitivity.

c) Interleukins.

Q4) Attempt any one **[10]**

a) Describe the functions carried out by a blood bank. Elaborate on the medicolegal applications of blood groups.

b) Describe the processing and presentation of endogenous antigens.

Total No. of Questions :4]

SEAT No. :

P853

[Total No. of Pages :2

[5017] - 462

T.Y.B.Sc.

MICROBIOLOGY

MB - 345 : Fermentation Technology - II

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***
3) ***Draw neat labelled diagrams wherever necessary.***

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

a) Define microbial transformation.

b) Match the following:

i)	SO_2	Vitamin B_{12}
ii)	$CoCl_2$	Lipase
iii)	Triglycerides	Polio vaccine
iv)	Salk	Grape must

c) Define biological control. Name two biocontrol agents.

d) State true or false.

i) 6 - APA is required in the synthesis of semisynthetic penicillins.

ii) Koji fermentation process is one of the method of citric acid production.

e) Fill in the blanks.

i) Glutamic acid is used as _____in foods.

ii) SOP stands for _____.

P.T.O.

Q2) Write short notes on <u>any two</u> of the following: **[10]**

a) Production of tetanus toxoid.

b) Steps in cheese making.

c) Manufacturing of Baker's yeast.

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

a) Describe briefly production of fungal amylase.

b) Describe the method of recovery of lactic acid.

c) Draw a flowsheet of riboflavin production.

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

a) Describe the method of production of ethanol.

b) Describe streptomycin production in detail.

Total No. of Questions : 4]

SEAT No. :

P854

[Total No. of Pages : 2

[5017]-463
T.Y.B.Sc.
MICROBIOLOGY
MB - 346 : Soil and Agricultural Microbiology
(2008 Pattern) (Semester-IV) (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 diagram wherever necessary.***

Q1) Attempt the following.

a) Define: **[2]**

i) Rhizosphere

ii) Biological control

b) Fill in the blank. **[1]**

i) _____ Spp. of Rhizobium grows in root nodules of lupin group.

c) State true or false. **[2]**

i) Nitrogen fixation is an aerobic process.

ii) Antibiotics are used for control of plant diseases.

d) What is IPM? **[1]**

e) Name two organisms involved in iron leaching. **[1]**

f) Name the enzyme involved in complete degradation of pectin. **[1]**

g) Name the carrier used for bioinoculant preparation. **[1]**

h) Write the name of the ore used for iron leaching. **[1]**

P.T.O.

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

a) Explain the mechanism of nonsymbiotic nitrogen fixation.

b) Describe the microbial leaching of copper.

c) Give the role of microorganisms in humus formation.

Q3) Comment on any two: **[10]**

a) Raw materials for biogas production.

b) Bioagumentation

c) Degradation of hemicellulose.

Q4) Attempt any one: **[10]**

a) Enlist various microbial diseases of plants. Describe the symptoms of any two plant diseases.

b) Describe in detail " Carbon Cycle".

✓ ✓ ✓

Total No. of Questions :4]

SEAT No. :

P855

[Total No. of Pages :2

[5017] - 464

T.Y.B.Sc.

ELECTRONIC SCIENCE

EL - 341 : Advanced Communication Systems

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

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

Instructions to the candidates:

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

Q1) Attempt all of the following.

a) Define directivity of antenna. **[1]**

b) Write one disadvantage of third method for side band suppression. **[1]**

c) State two basic functions of RF tuned amplifier in radio receiver. **[1]**

d) What is Quadrature Amplitude shift keying modulation? **[1]**

e) Write two advantages of BFSK modulation technique. **[2]**

f) Write classification of digital communication system. **[2]**

g) "Balanced modulator provides SSB modulated signal at its output" comment. **[2]**

h) How much current does an antenna draw when radiating 100W power, if it has radiation resistance of 50Ω. **[2]**

Q2) Answer any two of the following.

a) Describe working of PCM receiver with help of proper block diagram. **[4]**

b) Explain following terms regarding antenna- **[4]**

i) Beam width

ii) Polarization

c) Draw simplified block diagram of radio transmitter. Explain its working. **[4]**

P.T.O.

Q3) Attempt any two of the following.

a) Explain working of quadrature detector using suitable circuit diagram. **[4]**

b) Describe construction and working of Klystron Microwave Amplifier. **[4]**

c) What is aliasing error? Explain how to eliminate aliasing error. **[4]**

Q4) Attempt any two of the following.

a) i) Write short notes on resonant and non-resonant antenna. **[3]**

ii) Explain construction of Half wave dipole antenna. Plot its voltage - current distribution and radiation pattern. **[3]**

b) Explain working of radio detector using suitable circuit diagram. Discuss how radio detector provide amplitude limiting action. **[6]**

c) State various types of Doppler Radar. Explain any one type in detail using its block diagram. **[6]**

Total No. of Questions : 4]

SEAT No. :

P856

[Total No. of Pages : 2

[5017]-465
T. Y. B.Sc.
ELECTRONIC SCIENCE
EL 342 : Embedded Systems
(Semester-IV) (2008 Pattern) (Old Course) (Paper-II)

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

Instructions to candidates:

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

Q1) Attempt All the following:

a) Which data type is useful to declare number of months in a year. **[1]**

b) What voltage level is used for binary '0' in RS 232? **[1]**

c) Write magnitude of signed char. **[1]**

d) List the factors that affects the speed of DC motor. **[1]**

e) What do you mean by 20×2 LCD ? **[2]**

f) Find the value of TMOD register to operate timer 1 in mode 0. **[2]**

g) List the advantages of using 'C' for 8051 proramming. **[2]**

h) Find the content of P2 after P2 =0×3>>> 4. **[2]**

Q2) Attempt any two of the following

a) Write an 8051 C program to used values - 3 to + 3 to port 1. **[4]**

b) Explain microcontroller based water level control system with suitable diagram. **[4]**

c) Explain factors that affects time delay length in 8051 times. **[4]**

P.T.O.

Q3) Attempt any <u>two</u> of followig:

a) Write a 'C' Programm for 8051 to transfer "XYZ" serially at 9600 baud, 8 bit data, 1 start, 1 stop bit. **[4]**

b) What is RS 485 converter? Explain its use. **[4]**

c) Draw the block diagram of temperature measurment system using 8051, and explain its action. **[4]**

Q4) Attempt any <u>two</u> of following:

a) Interface 16 k bytes of RAM to 8051 microcontroller. Give its memory map. **[6]**

b) Discuss the case study of object counter. **[6]**

c) Explain bit wise logical operators in 8051 C, with suitable example. **[6]**

OR

Q4) Attempt <u>All</u> of the following.

a) Interface suitable RTC to 8051 and explain its address map. **[4]**

b) Write an 8051 C program to toggle all bits of P1 a every 200 ms. **[4]**

c) Write 8051 C program to generate square ware of Frequency 1 kH_2. **[4]**

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Total No. of Questions : 4]

SEAT No. :

P857

[Total No. of Pages : 2

[5017]-466
T. Y. B. Sc.
ELECTRONIC SCIENCE
EL - 343 : Power Electronics
(Paper - III) (Semester - IV) (2008 Pattern)

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

Instructions to the candidates:

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

Q1) Attempt all of the following:

a) State applications of Power MOSFETs. **[1]**

b) Draw Phasor diagram of three phase A.C. **[1]**

c) Draw circuit symbols and steady state characteristics of thyristor. **[1]**

d) What is the role of snubber circuit? **[1]**

e) What are advantages of GTO over SCR? **[2]**

f) What is meant by thermal protection? **[2]**

g) What are the advantages of free wheel diode in controlled rectifier circuits? **[2]**

h) Define dc choppers & State their types. **[2]**

Q2) Attempt any two of the following:

a) Classify power diodes based on reverse recovery characteristics and explain their parameters. **[4]**

b) State different voltage control methods of inverter and explain any one of them. **[4]**

c) Explain working of single phase full wave rectifier with centre tapped transformer. Draw input-output waveforms. Obtain expression for efficiency and ripple factor. **[4]**

P.T.O.

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

a) What is power meter? Explain construction and working of it. **[4]**

b) Explain the principle of phase angle control used in AC voltage controller along with input-output waveforms. Obtain expression for output voltage. **[4]**

c) What is semiconverter? Explain the working of single phase semiconverter with circuit diagram and input-output waveforms. Obtain expression for average output voltage. **[4]**

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

a) Draw block diagram of ON-line UPS and OFF-line UPS. Explain its working. Give any two applications. **[6]**

b) i) Write a note on clamp on meter. **[3]**

ii) Write Schockley diode equation. Define the term thermal voltage. Draw reverse recovery characteristics of it. **[3]**

c) What is dv/dt and di/dt protection of SCR? **[6]**

Total No. of Questions : 4]

SEAT No. :

P858

[Total No. of Pages : 2

[5017]-467
T.Y. B.Sc.
ELECTRONIC SCIENCE
EL - 344 : Electronic Materials and Devices
(2008 Pattern) (Old Course) (Semester - IV) (Paper - IV)

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 side indicate full marks.***

Q1) Attempt all of the following

a) Define polarization vector $\overline{P}$. **[1]**

b) What is polar and non-polar molecules? **[1]**

c) What is Fermi energy level? **[1]**

d) What is working principle of photodiode? **[1]**

e) What is dielectric breakdown? **[2]**

f) What is pinch off voltage of JFET? **[2]**

g) What is ohmic contact? **[2]**

h) Define depletion layer capacitance. **[2]**

Q2) Attempt any TWO of the following:

a) List different capacitor constructions. Explain special characters of thin film capacitor. **[4]**

b) Explain the phenomenon of doping in semiconductor. Draw energy diagram for **[4]**

i) intrinsic

ii) n-type and

iii) p-type semiconductor

c) Explain conducting polymers. What are its applications in electronic devices? **[4]**

P.T.O.

Q3) Attempt any TWO of the following:

a) Explain hysteresis characteristic of magnetic materials. **[4]**

b) What is nanotube? Explain chiral angle ψ. **[4]**

c) Explain Laser action in semiconductor Laser diode. **[4]**

Q4) Attempt any TWO of the following:

a) Explain the built - in potential barrier in pn junction with **[6]**

i) zero bias

ii) forward bias and

iii) reverse bias

b) Explain Quartz Oscillator. Draw equivalent LCR circuit diagram and its physical significance. **[6]**

c) Explain fullerance with its special feature as electronic devices. **[6]**

Total No. of Questions :4]

SEAT No. :

P859

[Total No. of Pages :3

[5017] - 468

T.Y.B.Sc.

ELECTRONIC SCIENCE

EL 345: Mathematical Methods & Analysis Using MATLAB

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

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

Instructions to the candidates:

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

Q1) Attempt all of the following:

a) What does MATLAB stands for? **[1]**

b) What is descrete signal? **[1]**

c) Define transfer function for a network. **[1]**

d) What is MATLAB command in V (A) * B means? **[1]**

e) Write Fourier Series expression. **[2]**

f) Write Poisson's equation in cartesian coordinate system. **[2]**

g) Find Laplace transform of $f(t) = 1$. **[2]**

h) Write the MATLAB program to evaluate inverse Laplace transform of $F(s) = \frac{4s}{s^2 + 3s}$. **[2]**

P.T.O.

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

a) Explain the MATLAB commands. **[4]**

i) Eye (*m, n*)

ii) Zeros (*m, n*)

iii) Ones (*m, n*)

iv) Diag (*v*).

b) State advantages of Laplace transform. Draw flow diagram of operation in solving network using Laplace transform. **[4]**

c) Explain curve fitting of a straight line function. **[4]**

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

a) Write a MATLAB script file to plot $y = e^{-t}$. Cost with 50 linearly spaced points in the interval $0 \le t < 2\Pi$. Label the axes and give suitable little. **[4]**

b) Find inverse Laplace transform of $F(s) = \frac{1}{s^2 - 4s + 8}$. **[4]**

c) Define odd & even functions for Fourier series. Explain with graphs & examples. **[4]**

Q4) Attempt <u>all</u> of the following:

a) Find Laplace transform of derivative $f'(t)$. **[4]**

b) Obtain Fourier series of a function **[4]**

$f(x) = 0 \quad \text{for} \quad -\Pi \le x \le 0$ &

$f(x) = 1 \quad \text{for} \quad 0 \le x \le \Pi.$

c) Fit a straight line of the form $y = a_0 + a_1 x$ to the data. **[4]**

x :	1	2	3	4	6	8
y :	2.4	3.1	3.5	4.2	5.0	6.0

OR

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

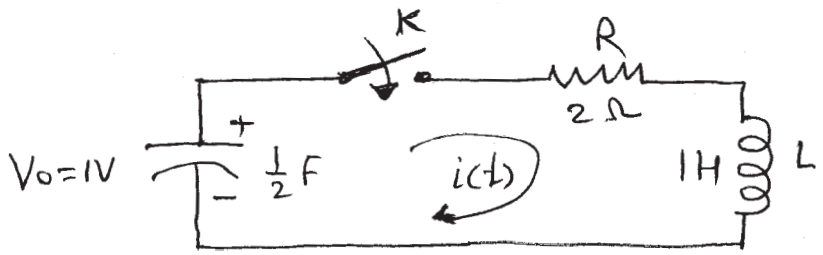
a) Write the MATLAB program to evaluate the sum of the series. **[6]**

$$x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \frac{x^9}{9} \ldots\ldots\ldots\ldots - \frac{x^n}{n}$$

for a given *x* & *n.*

b) Obtain solution of Laplace equation in 3D cartesian coordinate system, using separation of variables. **[6]**

c) In the network given in the Fig. The capacitor is initially charged to V_0. Determine *i* (*t*) using Laplace transform when switch k is closed. **[6]**



Total No. of Questions :4]

SEAT No. :

P860

[Total No. of Pages :4

[5017]-469
T.Y.B.Sc.
ELECTRONIC SCIENCE
EL-346 (A): Instrumentation (Optional)
(2008 Pattern) (Paper -VI)(Semester - IV)

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

Instructions to the candidates:

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

Q1) Attempt all of the following:

a) Write the role of data presentation element in measurement system. **[1]**

b) Define transfer function. **[1]**

c) What do you mean by impulse function? **[1]**

d) State the devices which are responsible for inductive and electrostatic interference. **[1]**

e) Write dimensions of transfer functions for transconductance and transimpedance amplifiers. **[2]**

f) Based on environment, how data acquisition systems are classified. **[2]**

g) List important parameters of antenna. **[2]**

h) Define conversion time and monotonicity of ADC. **[2]**

Q2) Attempt any two of the following:

a) Draw block diagram of generalised input/output configuration of instrumentation system and explain it in detail. **[4]**

b) Describe ramp response of first order system. **[4]**

c) Draw circuit diagram of inverting amplifier using op-amp. Derive expression for closed loop gain. **[4]**

P.T.O.

Q3) Attempt any two of the following:

a) Explain sinusoidal transfer function for the measurement system. **[4]**

b) List types of ADC used in DAS. Write their specifications. On which parameters the selection of ADC in DAS depend. **[4]**

c) Explain basic structure of GPIB system. **[4]**

Q4) Attempt any two of the following:

a) List the bumber of methods for reducing the effect of spurious inputs to the measurement system. Explain any two methods in detail. **[6]**

b) Draw neat block diagram of 'DSO' and explain its working in detail. **[6]**

c) Draw block diagram of data acquisition system. Explain its working in detail. **[6]**

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Total No. of Questions :4]

P860

[5017]-469
T.Y.B.Sc.
ELECTRONIC SCIENCE
EL-346 (B): Consumer Electronics (Optional)
(2008 Pattern) (Old Course) (Paper -VI)(Semester - IV)

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 side indicate full marks.***

Q1) Attempt all of the following:

a) State any two specifications of Microphones. **[1]**

b) What do you mean by MODEM. **[1]**

c) State the frequency range of microwave. **[1]**

d) State the name of printer which prints the carbon copy. **[1]**

e) "FM is chosen for transmission of picture signal" comment. **[2]**

f) "Crystal microphone dose not require bias supply voltage" comment. **[2]**

g) "Microcontrollers are used in washing machine" comment. **[2]**

h) "Two safety switches are used in microwave oven" comment. **[2]**

Q2) Attempt any two of the following:

a) Draw the block diagram of digital recording on video compact disc and explain each block. **[4]**

b) Why crystal microphone dose not require bias supply? Explain the working principle of crystal microphone with neat diagram. **[4]**

c) Draw the block diagram of mobile phone and explain each block. **[4]**

Q3) Attempt any two of the following:

a) Draw the block diagram of flat bed scanner and explain each block. **[4]**

b) Draw the block diagram of hand set of cardless phone and explain each block. **[4]**

c) Compare any four parameters of VCD & DVD. **[4]**

Q4) Attempt any two of the following:

a) Draw the block diagram of Dot Matrix Printer and explain each block. State the importance of head position sensor. **[6]**

b) Draw the block diagram of public address system and explain each block. State its applications. **[6]**

c) Draw the block diagram of microwave oven and explain each block. **[6]**

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Total No. of Questions :4]

SEAT No. :

P861

[Total No. of Pages :2

[5017] - 470

T.Y.B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 341 : Management of Military Technology in India

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

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

Instructions to 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 the term 'military technology'.

b) What is the stealth technology?

c) What do you mean by Phases of technology?

d) Define technology acquisition.

e) Introduce HAL.

f) What is Technology Life-Cycle?

g) How AWACS works?

h) What is meant by 'Fly by Wire'?

Q2) Answer in 8 to 10 sentences each (any two) **[8]**

a) Why rich reservoir of science and technology is essential to India?

b) Explain the contributions of DRDO in India.

c) Why dual use technologies are the need of hour?

P.T.O.

Q3) Write short notes on (any two) **[8]**

a) Air to Air Refueling.

b) Information Technology.

c) Concept of Flying Tank.

Q4) Answer in 16 to 20 sentences (any one). **[8]**

a) Discuss the problems and prospects of Transfer of Military Technology.

b) Do you think that India is a rising Military Power in South Asia? Give your opinion.

Total No. of Questions : 4]

SEAT No. :

P862

[Total No. of Pages : 2

[5017]-471
T.Y.B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS: 342: Economic Aspects of War
(Semester-IV) (2008 Pattern) (Paper-II)

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 peacetime Economy?

b) Define Threat Perception.

c) Write the meaning of contributory Elements of war finance.

d) State the concept of Deficit budget.

e) What do you mean by War potential?

f) State the meaning of Economic cost of war.

g) What do you mean by Perspective planning?

h) What do you mean Defence v/s Development?

Q2) Answer 8 to 10 Sentences each (any two) **[8]**

a) Explain Demerits of war time Economy.

b) Explain relationship between Defence and Development.

c) Discuss Effects of war on society.

Q3) Write short notes on (any two) **[8]**

a) Merits of peacetime Economy.

b) Elements of war potential.

c) Importance of Foreign Aid in war finance.

P.T.O.

Q4) Answer in 18 to 20 Sentences (Any one) **[8]**

a) Analyze India's Defence spending from 1962 to till date.

b) Explain Determinants of Defence expenditure.

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Total No. of Questions : 4]

SEAT No. :

P863

[Total No. of Pages : 2

[5017]-472
T.Y.B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS - 343 : Disaster Management
(Semester - IV) (Paper - III) (2008 Pattern)

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

Instructions to the candidates:

1) ***All Questions are Compulsory.***
2) ***Figures to the Right indicate full marks.***

Q1) Answer in 2 to 4 sentences each: **[16]**

a) What do you mean by follow up actions in disaster management?

b) Write the meaning of self Government action.

c) Write the meaning of phases of disaster management.

d) State the Meaning of Manmade Disaster.

e) What do you mean by disaster response?

f) Define Remedial measures.

g) What do you mean by Medical Alteration?

h) State the meaning of sustainable Development.

Q2) Answer in 8 to 10 sentences each (any two): **[8]**

a) Explain National Disaster Management structure.

b) Explain types of Manmade Disaster.

c) Discuss importance of conducting mock exercises.

P.T.O.

Q3) Write short notes on (any two): **[8]**

a) Process of settlement.

b) Post disaster Emergency phase.

c) Role of the NGO in disaster management.

Q4) Answer in 18 to 20 sentences (Any one): **[8]**

a) Explain the Role of Armed forces in effective disaster management.

b) Write a note on Disaster management and sustainable Development.

Total No. of Questions : 4]

SEAT No. :

P864

[Total No. of Pages : 2

[5017]-473
T.Y.B.Sc.
DEFENCE AND STRATEGIC STUDIES
Information Technology and National Security
(2008 Pattern) (Semester - IV) (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) What do you mean by Night Vision?

b) Write the difference between CRT and LCD monitor.

c) What do you mean by surveillance?

d) State the Meaning of Simulation.

e) What do you mean by the storage devices of computer?

f) Define scientific Approach.

g) Write any two features of Machine language.

h) What do you mean by Missile Defence System.

Q2) Answer in 8 to 10 Sentences each (any two) **[8]**

a) Explain application of IT in decision making.

b) Discuss application of IT in R & D simulator.

c) Discuss application of IT in Night vision.

P.T.O.

Q3) Write short notes on (Any two) **[8]**

a) Role of IT in battlefield command and control.

b) Role IT in Target acquisition system.

c) Role IT in Missile Defence system.

Q4) Answer in 18 to 20 sentences (Any One) **[8]**

a) Explain the Role of IT in National Development.

b) Discuss Future application of IT in Battle Management System.

Total No. of Questions :4]

SEAT No. :

P865

[Total No. of Pages :6

[5017] - 474

T.Y.B.Sc.

DEFENCE & STRATEGIC STUDIES - VI

DS - 346 (A): Indian Military System (II) (Optional)

(2008 Pattern) (Semester - IV)

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

Instructions to the candidates:

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

Q1) Answer 2 or 4 sentences each: **[16]**

a) State the duration of Sultan period.

b) When & where the first battle of Panipat it was fought?

c) What do you know about Maharana Pratap?

d) State the any two names of distinguish ruler during Sultan Period.

e) Write the duration of Mughal Period.

f) What do you mean by Mansabdar?

g) State any two names of Indias Southern Kingdom.

h) When & between whom the actual third battle of Panipat it was fought?

Q2) Answer in 8 or 10 sentences (Any Two): **[8]**

a) Write a few lines on Sultanate Art of warfare.

b) Explain in brief the background of first battle of Panipat.

c) Write in short the battle of Haldighat.

P.T.O.

Q3) Write short notes on (Any Two): **[8]**

a) Ahmedshaha Abdali.

b) Nijib Khan.

c) Demerits of Mansabdar System.

Q4) Answer in 16 to 20 sentences (Any one): **[8]**

a) Describe in detail the military reforms introduced by Allahuddin Khilji during Sultan era.

b) "First battle of Panipat was mitestone in military history of India" Do you agree? Justify your answer.

Total No. of Questions :4]

P 865

[5017] - 474

T.Y.B.Sc.

DEFENCE & STRATEGIC STUDIES - VI

DS - 346 (B): Maratha Military System - II (Optional)

(2008 Pattern) (Semester - IV)

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

Instructions to the candidates:

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

Q1) Answer in 2 or 4 sentences each: **[16]**

a) Which tactics was introduced by Shivaji?

b) State the date & year of third battle of Panipat.

c) What do you know about Bapu Gokhale?

d) Who was Dhanaji?

e) What do you know about Najib Khan?

f) State any four names of warrier family's of contemporary Maharashtra.

g) Why British interfare in internal affairs of Maratha?

h) Between whom the battle of Bhopal it was fought?

Q2) Answer in 8 or 10 sentences (Any Two): **[8]**

a) Write in brief the causes of Anglo - Maratha conflict.

b) Explain in brief Sambhaji as a Military leader.

c) Why security relationship it was established between Maratha & Mughals?

Q3) Write short notes on (Any Two): **[8]**

a) Kanhoji Angre.

b) Santaji.

c) Sadashivrao Bhau.

Q4) Answer in 16 to 20 sentences (Any one): **[8]**

a) Explain the third Anglo - Maratha war & its impact on contemporary Maharashtra.

b) "Shivaji was a great military leader" Do you agree? Justify your answer.

Total No. of Questions :4]

P865

[5017] - 474

T.Y.B.Sc.

DEFENCE & STRATEGIC STUDIES - VI

DS - 346 (C): Indian Wars Since Independence - II (Optional)

(2008 Pattern) (Semester - IV)

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

Instructions to the candidates:

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

Q1) Answer in 2 or 4 sentences each: **[16]**

a) What do you understand by "Jai Bangla Sonar Bangla Hamar Bangla"?

b) State the begining & end of Indo - Pak War of 1971.

c) Who was the Prime Minister of India during Indo - Pak War of 1971?

d) As a result of Indo-Pak war of 1971 which new country came into existence?

e) What do you understand by I.P.K.F.?

f) What do you mean by Ceasefire?

g) By whom we came to know about presence of terrorist in Kargil of 1999?

h) What was the chinese stand on Kargil episode of 1999?

Q2) Answer in 8 to 10 sentences (Any Two): **[8]**

a) Write a few lines on Mukti Bihine during Indo-Pak war of 1971.

b) Explain the American stand on Indo-Pak war of 1971.

c) Write in brief background of Kargil episode of 1999.

Q3) Write short notes on (Any Two): **[8]**

a) Causes of Kargil episode of 1999.

b) End of Indo - Pak war of 1971.

c) Causes of Indias action in Srilanka.

Q4) Answer in 16 to 20 sentences (Any one): **[8]**

a) What were the implications of Kargil episode of 1999 on domestic front of Pakistan? Explain.

b) "Owing to victory during Indo - Pak war of 1971 India regain the power, prestige & status in South Asia which was lost in 1962" Do you agree? Justify your answer.

Total No. of Questions :4]

SEAT No. :

P866

[Total No. of Pages :6

[5017]-475
T.Y.B.Sc.
DEFENCE AND STRATEGIC STUDIES -VII
DS-347 (A): Military Psychology (Optional)
(2008 Pattern) (Semester - IV)

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

Instructions to the candidates:

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

Q1) Answer in 2 to 4 sentences each: **[16]**

a) Define Organizational Psychology.

b) Define Military Psychology.

c) What makes soldiers to tick?

d) Define Combat Stress.

e) Define Fatigue.

f) Define Morale.

g) What is War Neurosis?

h) Define Rumours.

Q2) Answer in 8 to 10 sentences each (any two): **[8]**

a) What are the applications of military psychology?

b) How a soldier goes for self actualization need during war?

c) Give suggestions to avoid the fear of death.

P.T.O.

Q3) Write short notes on (any two): **[8]**

a) Significance of Motivation in Armed Forces.

b) Qualities of Military Officers.

c) Propaganda.

Q4) Answer in 16 to 20 sentences (any one): **[8]**

a) Justify, why psychological toughness is essential during war?

b) Explain about the methods of psychological warfare.

EEE

Total No. of Questions :4]

P866

[5017]-475
T.Y.B.Sc.
DEFENCE AND STRATEGIC STUDIES -VII
DS-347 (B): Defence Journalism and National Security (Optional)
(2008 Pattern) (Semester - IV)

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

Instructions to the candidates:

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

Q1) Answer in 2 to 4 sentences each: **[16]**

a) Define article.

b) What is meant by News?

c) What is meant by Column?

d) Define National Security.

e) Write about the significance of Military to a nation/State System.

f) What is meant by AFSPA?

g) Write the role of Public Relation Officer.

h) What is the concept of Press- Conference?

Q2) Answer in 8 to 10 sentences each (any two): **[8]**

a) As a reporter, how will you ensure secrecy in while covering CIO?

b) You are interviewing Indian Home Minister, ask ten questions on the status of internal security.

c) Write about the present developments in Indian Defence Journalism.

Q3) Write short notes on (any two): **[8]**

a) Need of War Correspondence Course.

b) Problems and prospects in defence journalism.

c) Impartial and Neutral Reporting.

Q4) Answer in 16 to 20 sentences each (any one): **[8]**

a) As a journalist, how will you promote a debate on the subject 'National Defence Preparedness'?

b) Critically examine the Indian War Reporting.

EEE

Total No. of Questions :4]

P866

[5017]-475
T.Y.B.Sc.
DEFENCE AND STRATEGIC STUDIES -VII
DS-347 (C): Defence Preparedness of India (II) (Optional)
(2008 Pattern) (Semester - IV)

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

Instructions to the candidates:

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

Q1) Answer in 2 to 4 sentences each: **[16]**

a) Introduce Artillery.

b) Introduce Army Aviation.

c) What is meant by combat fleet of IAF?

d) What do mean by Power Projection Navy?

e) What is Close Air Support?

f) What is amphibious warfare?

g) Introduce Aerospace Command.

h) What is LCA project?

Q2) Answer in 8 to 10 sentences each (any two): **[8]**

a) Discuss about the responsibility of eastern naval command.

b) Discuss about the responsibility of sourthern air command.

c) Discuss about the responsibility of army central command.

Q3) Write short notes on (any two): **[8]**

a) Modernization and Achievements of IAF.

b) Modernization and Achievements of Indian Navy.

c) Modernization of Artillery.

Q4) Answer in 16 to 20 sentences (any one): **[8]**

a) Make a comparison of Indo-Pak airpower potential.

b) Discuss about India's nuclear competence with China.

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Total No. of Questions : 4]

SEAT No. :

P867

[Total No. of Pages : 6

[5017]-476
T.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS-348 (A) : Refugees Studies (Optional)
(2008 Pattern) (Semester-IV) (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) State the meaning of Repatriation.

b) Define Refugees.

c) What do you mean by Refoulment?

d) State the meaning of National security.

e) Define Asylum.

f) Write the meaning of Public Relief.

g) Write the meaning of Freedom of Movement.

h) What do you mean by Refugee Law.

Q2) Answer in 8 to 10 sentences each (Any Two): **[8]**

a) Explain International Refugee Law.

b) Discuss rights of Refugees.

c) Explain causes of migration.

P.T.O.

Q3) Write short notes on (Any Two): **[8]**

a) 1951 Convention of Refugees.

b) 1967 protocol to the status of refugees.

c) Tibetan Refugees.

Q4) Answer in 18 to 20 sentences (Any One): **[8]**

a) Explain Human Rights issue in Afghanistan.

b) Discuss Refugee problems in South Asia.

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Total No. of Questions : 4]

P867

[5017]-476
T.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS-348 (B) : Study of United Nations (Optional)
(2008 Pattern) (Semester-IV) (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) State any two specialized Agencies of UN.

b) How you would like to define "Disarmament"?

c) Define "Human Rights".

d) State any two principal organs of UN.

e) Write the long form of I.C.A.O.

f) To whom we called as a "World Parliament"?

g) What do you mean by "International Conflict"?

h) What do you understand by Veto?

Q2) Answer in 8 to 10 sentences each (Any Two): **[8]**

a) Write few lines on "Economic & Social Council".

b) Explain the concept of "International Conflict".

c) Write in brief "Provision by UN for dealing with Human Rights".

Q3) Write short notes on (Any Two): **[8]**

a) UNESCO.

b) WHO.

c) IMF.

Q4) Answer in 16 to 20 sentences (Any One): **[8]**

a) Describe the role of UN in the field of disarmament.

b) Highlight on major hindrances in the working of UN.

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Total No. of Questions : 4]

P867

[5017]-476
T.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS-348 (C) : Law of War & Peace (Optional)
(2008 Pattern) (Semester-IV) (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 "Peace".

b) What do you mean by recognition of state?

c) Define "collective security".

d) Who do you understand by right of self defence?

e) State any two theory of recognition of state.

f) What do you mean by Land Warfare?

g) What do you understand by war?

h) Define state.

Q2) Answer in 8 to 10 sentences each (Any Two): **[8]**

a) Explain the concept of "Collective Security".

b) Write in brief basic criteria for recognition of state.

c) Explain in brief the concept of "Intervention".

Q3) Write short notes on (Any Two): **[8]**

a) Laws of Land Warfare.

b) Concept of Disarmament.

c) Settlement of Dispute.

Q4) Answer in 16 to 20 sentences (Any One): **[8]**

a) Explain the "Grounds of Intervention".

b) Describe the laws of Air Warfare with special reference to the Brussels conference of 1874.

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Total No. of Questions : 4]

SEAT No. :

P868

[Total No. of Pages : 6

[5017]-477
T.Y.B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS - 349 A : Management of Defence Production and Logistics in India (Optional)
(Semester - IV) (Paper - IX) (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.***

Q1) Answer in 2 to 4 sentences each. **[16]**

a) Write the role of NAL.

b) Write the role of GTRE.

c) Write the role of Goa Shipyard.

d) What is meant by "Industrial Military Complex"?

e) Define the motto of "Army Supply Corps".

f) Define Defence Management.

g) What do you mean by Indigenous Industrial Backing?

h) What is the concept of "Army Marches on its Belly?"

Q2) Answer in 8 to 10 sentences each (any two): **[8]**

a) Explain the Structure of Defence Production.

b) Explain the role of Defence Production in National Development.

c) Explain the Principles of Logistics.

P.T.O.

Q3) Write short notes on (any two): **[8]**

a) Rationale of defence production in India.

b) Supply Chain Management.

c) Management of DPSU.

Q4) Answer in 16 to 20 sentences (any one): **[8]**

a) Explain how private sector can contribute to defence production?

b) Discuss the role and contribution of Ordinance Factories in meeting the requirements of Armed Forces.

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Total No. of Questions : 4]

P868

[5017]-477
T.Y.B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS - 349 B : Internal Security of India - II (Optional)
(Paper - IX) (Semester - IV) (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.***

Q1) Answer in 2 to 4 sentences each. **[16]**

a) What is secessionist movement?

b) Define Religious Terrorism.

c) What is Red Corridor?

d) How will you differentiate insurgent and terrorist?

e) Define National Security.

f) Relate threats and its abetments.

g) What is Drug Trafficking?

h) Introduce NSG.

Q2) Answer in 8 to 10 sentences each (any two): **[8]**

a) Explain the significance of religious harmony.

b) Explain the role of State Govt. in internal security.

c) Explain the role of NGO's in internal security.

Q3) Write short notes on (any two): **[8]**

a) Naxal problem in India.

b) Illegal Migration from Bangladesh.

c) International Terrorism.

Q4) Answer in 16 to 20 sentences (any one): **[8]**

a) Explain how media can help to security forces in counter insurgency operations?

b) Discuss the role of Central Govt. in internal security.

Total No. of Questions : 4]

P868

[5017]-477
T.Y.B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS - 349 C : India's Maritime Security (II) (Optional)
(Semester - IV) (Paper - IX) (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.***

Q1) Answer in 2 to 4 sentences each. **[16]**

a) State the meaning of Maritime strategy.

b) Define strategic environment.

c) Define maritime boundaries.

d) State the meaning of Threat to maritime trade.

e) Define Organized crime in sea.

f) Write the meaning of freedom to use the sea.

g) Define Terrorism.

h) Write any two resources of sea power.

Q2) Answer in 8 to 10 sentences each (any two): **[8]**

a) Explain India's Maritime strategy.

b) Discuss strategic environment in the Indian Ocean.

c) Describe Indian Ocean as a zone of peace.

Q3) Write short notes on (any two): **[8]**

a) Policies of USA in the Indian Ocean.

b) Policies of China in the Indian Ocean.

c) Policies of Pakistan in the Indian Ocean.

Q4) Answer in 18 to 20 sentences (any one): **[8]**

a) Evaluate new challenges to Maritime Security.

b) 26/11 Mumbai attack and its impact on Indian security System.

Total No. of Questions :4]

SEAT No. :

P869

[Total No. of Pages :2

[5017] - 478

T.Y.B.Sc.

ENVIRONMENTAL SCIENCE

Aquatic Ecosystems and Management

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

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

Instructions to candidates:

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

Q1) Attempt the following in 1-2 lines each. **[10]**

a) Define Limnetic Zone.

b) What is hyper salinity in marine environment.

c) Describe monomitic lakes.

d) Define ecotone.

e) Give any two geomorphological classification of esturies.

f) What are the factors responsible for surface runoff.

g) Define abyssal zone in sea.

h) Give any two +ve species interaction in ecosystem.

i) Classify the organisms on the basis of temperature.

j) What is climax community.

Q2) Write a short note on (any two) **[10]**

a) Significance of wetlands in coastal ecosystem.

b) Stratification in freshwater ecosystem.

c) Aesthetic and cultural benefits of aquatic ecosystem.

P.T.O.

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

a) Classify the lakes on their origin.

b) Briefly write the classification of esturine organisms.

c) How GIS and RS techniques useful in conservation of freshwater resources.

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

a) Explain the role of local peoples and local government in sustainable development programme.

OR

b) What are the traditional methods used in conservation on ecosystem and bioresources.

Total No. of Questions : 4]

SEAT No. :

P870

[Total No. of Pages : 2

[5017]-479
T.Y. B.Sc.
ENVIRONMENTAL SCIENCE
Nature Conservation
(Paper II) (2008Pattern) (Semester-IV)

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

Instructions to candidates:

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

Q1) Attempt the following in 1-2 lines each. **[10]**

a) What are objectives of nature conservation?

b) What is meant by captive breeding?

c) Mention any two functional areas of CPCB.

d) Write names of any two personalities in field of nature conservation.

e) What are functional areas of WWF?

f) What are Crocodile farms?

g) Write any two examples of extreme activism in the field of environmental conservation.

h) What is meant by Ex-situ conservation?

i) Write any two efforts required for sustainable nature conservation.

j) What is meant by habitat conservation?

Q2) Write a short note on Any Two of the following. **[10]**

a) Role of NGO's in Environment Conservation.

b) Protected Area Network in India.

c) International Whaling Mission.

P.T.O.

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

a) Discuss social and political challenges involved in nature conservation.

b) Which are important provisions to protect wildlife under wildlife protection act?

c) Discuss traditional nature conservation methods with suitable examples.

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

a) What is meant by ecotourism? Discuss the objectives and challanges involved in it with reference to India.

b) Discuss any five provisions under Convention on Biological Diversity. Also add a note on international efforts implemented for it.

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Total No. of Questions : 4]

SEAT No. :

P871

[Total No. of Pages : 2

[5017]-480
T.Y.B.Sc.
ENVIRONMENTAL SCIENCE
Air and Soil Quality
(Semester - IV) (2008 Pattern) (Paper - III)

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

Instructions to the candidates:

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

Q1) Attempt the following in 1-2 lines each: **[10]**

a) Which instrumental technique is used in determination of soil pesticides?

b) Define the term "Acid Rain".

c) What is La-Nina Phenomenon?

d) What was the reason behind Bhopal disaster?

e) Write any two health effects of indoor air pollution.

f) Mention any two reasons behind soil erosion.

g) What is meant by ion exchange in relation with soil?

h) Write the name of method used in determination of Phosphate Phosphorous.

i) Write any two types of soils found in India.

j) Differentiate between agroecosystem and natural ecosystem.

Q2) Write a short note on ANY TWO of the following: **[10]**

a) Soil Sickness.

b) Sampling and Monitoring of Particulate Matter.

c) Chernobyl Disaster.

P.T.O.

Q3) Answer ANY TWO questions from the following: **[10]**

a) What is global warming? Discuss effects of it on earth.

b) What are the applications of GIS technology in management of soil resources?

c) What are the health effects associated with sulphur dioxide?

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

a) What are various reactions involved in soil? Add a note on importance of soil fertility.

b) Discuss the status of air pollution in India with suitable examples. Also add a note on 'London Smog'.

Total No. of Questions : 4]

SEAT No. :

P872

[Total No. of Pages : 2

[5017]-481
T.Y.B.Sc.
ENVIRONMENTAL SCIENCE
Issues in Environmental Science - II
(2008 Pattern) (Semester - IV) (Paper - IV)

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

Instructions to the candidates:

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

Q1) Attempt the following in 1-2 lines each **[10]**

a) Who initiated Narmada Bachao Andolan?

b) Give the full form of 'SEZ'.

c) Enlist names of green house gases.

d) What is occupational safety?

e) What is wetland?

f) Enlist causes of natural resource depletion.

g) Write impacts of soil erosion.

h) Write any two applications of GIS.

i) Give any two examples of Fly ash utilization.

j) Write benefits of rain water harvesting.

Q2) Write a short note on ANY TWO of the following: **[10]**

a) Waste land reclaimation methods.

b) Applications of Environmental modelling.

c) Fluorosis.

P.T.O.

Q3) Answer ANY TWO questions from the following **[10]**

a) Discuss effects of Bhopal Gas Tragedy.

b) Explain environmental problems of Urbanization.

c) Discuss methods of solid waste management.

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

a) What is sustainable development? Discuss in detail strategies of sustainable development.

b) Define Eutrophication. Explain the causes and impacts of it. Add a note on restoration of eutrophic lake.

Total No. of Questions :4]

SEAT No. :

P873

[Total No. of Pages :2

[5017] - 482

T.Y.B.Sc.

ENVIRONMENTAL SCIENCE

Environmental Governance and Equity : EMS and ISO 14000

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

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

Instructions to the candidates:

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

Q1) Attempt the following in 1 -2 lines each: **[10]**

a) What is meant by 'Impact'?

b) Mention benefits of EMS.

c) What is PDCA cycle?

d) Write any two objectives of Environment Education.

e) What is constitutional provision of Art 48 (A)?

f) What is ship recycling?

g) Enlist types of renewable energy.

h) Give full form of WHO.

i) Mention any two BIS standard limit for drinking water.

j) Write any two functions of 'technical committee'.

Q2) Write a short note on ANY TWO of the following: **[10]**

a) ISO 14000 family of standards.

b) EIA.

c) Environmental Audit.

P.T.O.

Q3) Answer ANY TWO questions from the following: **[10]**

a) Discuss salient features of National Environmental Policy.

b) Write applications of Environmental status report.

c) Discuss importance of Environment Education.

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

a) Discuss any two national and international efforts for Environment protection.

b) What is EMS? Discuss in detail guidelines of ISO 14001.

Total No. of Questions : 4]

SEAT No. :

P874

[Total No. of Pages : 2

[5017]-483
T.Y.B.Sc.
ENVIRONMENTAL SCIENCE
Environmental Biotechnology - II
(2008 Pattern) (Paper-VI) (Semester-IV)

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

Instructions to the candidates:

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

Q1) Attempt the following in 1-2 line each: **[10]**

a) Define bioremediation.

b) Define bioagumentation.

c) Give the two names of GM plants.

d) What are merits of GM plants.

e) Give full form of CSTR and FBR.

f) Write types of immobilization.

g) Write two names of nitrogen stabilizing microorganisms.

h) Give the two names of petro crops.

i) What is anaerobic digestion.

j) Define bio leaching.

Q2) Write a short note on (any TWO) **[10]**

a) Incineration and pyrolysis.

b) Biomethanation process.

c) Biosorption of metals.

P.T.O.

Q3) Answer any TWO from the following: **[10]**

a) What are the causes of soil acidification?

b) Briefly explain the demerits of MSW dumping in open space.

c) Explain the mechanism of root zone technology.

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

Briefly explain the merits and demerits of GM plants on ecosystem.

OR

Briefly write the principle on working of UASB with neat labelled diagram.

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Total No. of Questions :4]

SEAT No. :

P875

[Total No. of Pages :2

[5017] - 484

T.Y.B.Sc. (Vocational)

INDUSTRIAL CHEMISTRY

Entrepreneurship Development

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

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

Instructions to the candidates:

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

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

a) Define the term working capital.

b) State any two qualities of an entrepreneur.

c) Define 'Communication'.

d) What is a marketing plan.

e) What is a project report?

f) Give the full form of VAT?

g) Define Service Tax.

h) What is seed capital?

i) What are soft skills?

j) What is stress management?

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

i) State the steps involved in marketing research.

ii) List out the features of IDBI.

iii) What are the heads of income under Income Tax Act.

P.T.O.

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

i) What is diversification in business?

ii) How does an entrepreneur generate employment?

iii) What is financial statement?

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

a) Explain the various methods of training.

b) What are the advantages and disadvantages of soft skill.

c) State the characteristics of human resource management.

Q4) a) Explain the deemed assets u/s-4 of the Wealth Tax Act. **[6]**

OR

a) Explain the various types of cost.

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

i) What is branding?

ii) What are the advantages of joint stock companies.

Total No. of Questions :4]

SEAT No. :

P876

[Total No. of Pages :2

[5017] - 485

T.Y.B.Sc. (Vocational)

BIOTECHNOLOGY

Entrepreneurship Development

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

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

Instructions to the candidates:

1) ***Neat diagrams must be drawn.***
2) ***All questions carry equal marks.***
3) ***All questions are compulsory.***

Q1) Answer the following questions in short. **[10]**

a) What is DIC?

b) Explain VAT.

c) Give names of any two funding corporation.

d) What is SSI?

e) Mention two criteria for selection of new product.

f) Define entrepreneur.

g) What is Joint Stock Company?

h) Define incentive.

i) Explain breakeven point?

j) What is SWOT analysis.

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

a) What is the role of funding agencies?

b) Describe the different modes of employment.

c) Comment on market survey as a tool.

P.T.O.

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

a) Role of consultancy organization.

b) Marketing strategy.

c) Communication skills.

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

a) What is entrepreneurship? Describe characteristics of entrepreneurship.

OR

b) Comment upon identification of opportunities for entrepreneurship and ideas to start new business.

Total No. of Questions : 4]

SEAT No. :

P2101

[Total No. of Pages : 1

[5017] -486

T.Y. B.Sc.

PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION (VOCATIONAL)

Entrepreneurship Development (Paper - V)

(2008 Pattern)

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

Instructions to the candidates:

1) ***Question number one is compulsory.***
2) ***Answer any three questions from the remaining questions.***
3) ***Provide suitable examples wherever necessary.***
4) ***Figures to the right indicate full marks.***

Q1) Discuss, by giving suitable examples, how does an entrepreneur help in nation building. **[10]**

Q2) Explain the difference between a small scale industry and a large scale industry. Give suitable examples for support. **[10]**

Q3) What are the administrative traits of an entrepreneur? **[10]**

Q4) What are corporate values? Why are they important? **[10]**

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

a) Qualities of women entrepreneurs.

b) Government as an entrepreneur.

c) Venture capital.

Total No. of Questions :4]

SEAT No. :

P877

[Total No. of Pages :2

[5017] - 487

T.Y.B.Sc. (Vocational)

ELECTRONIC EQUIPMENT MAINTENANCE (EEM)

Entrepreneurship Development

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

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

Instructions:

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

Q1) Answer all of the following:

a) Define the term pricing. **[1]**

b) What is meant by seed money for a business? **[1]**

c) State any two types of small scale industry. **[1]**

d) State two methods of market survey. **[1]**

e) 'Patent rules are important while starting a new business'. Comment. **[2]**

f) 'Communication skills are vital for an entrepreneur'. Comment? **[2]**

g) Marketing does not mean advertising alone. Comment. **[2]**

h) Define the term entrepreneurship. **[2]**

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

a) Explain need and scope of entrepreneurship in modern society. **[4]**

b) Define a joint stock company. Discuss its advantages and limitations. **[4]**

c) Discuss factories act in brief. **[4]**

P.T.O.

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

a) Discuss criteria for selection of a new product or service. **[4]**

b) Explain the functions of M.S.F.C. **[4]**

c) Discuss the term 'market segmentation.' **[4]**

Q4) Answer the following:

a) Discuss four P^{s} of marketing mix in detail. **[6]**

b) Elaborate the role of HRM in modern industry. **[6]**

OR

Write short notes on the following:

a) Stress management. **[4]**

b) Breakeven point analysis. **[4]**

c) Identification of opportunities for entrepreneurship. **[4]**

Total No. of Questions :4]

SEAT No. :

P878

[Total No. of Pages :2

[5017] - 489

T.Y.B.Sc. (Vocational)

SEED TECHNOLOGY

Entrepreneurship Development

(2008 Pattern) (Semester - IV) (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) ***Sketch neat labeled figures wherever necessary.***

Q1) Answer the following. **[10×1=10]**

a) Give any one key element of an entrepreneur.

b) Mention any one barrier in entrepreneurship development.

c) Give the full form of MIDC.

d) Mention any one source for finance.

e) What is market segmentation?

f) What is service tax?

g) Give the name of any one commercial bank.

h) What is factory act.

i) What is Joint Stock Company?

j) Give one merit in co-operative organization.

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

a) Write a note on the different types of entrepreneurs.

b) Give an account on co-operative bank and it's role.

c) Write about any two modes of employment.

P.T.O.

Q3) Write short notes on any two of the following: **[2×5=10]**

a) Costing and pricing.

b) MSEB.

c) Skills for communication.

Q4) Briefly explain the steps involved in the development of entrepreneurship.**[10]**

OR

What is marketing? Give an account on various marketing channels.

Total No. of Questions :4]

SEAT No. :

P879

[Total No. of Pages :2

[5017] - 490

T.Y.B.Sc. (Vocational)

INDUSTRIAL MICROBIOLOGY

VOC - IND - MIC - 345 : Molecular Biology and Genetic Engineering

(Theory) (2008 Pattern) (Paper - V) (Semester - IV)

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

Instructions to 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) What are linkers and adapters?

b) Write recognition site and cutting site of Hind III.

c) Write two examples of genetic disorders.

d) Enlist the important features of expression vector.

e) What is a transgenic animal?

f) Name two modifications of PCR.

g) Represent diagrammatically only: action of Alkaline Phosphatase.

h) State whether the following statement is True or False, and give reasons for your answer:

Vitamin C content of Golden rice is increased by transgenesis.

i) Write the principle of Western blotting technique.

j) Name the vectors developed for cloning in yeast.

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

a) Discuss in brief the techniques used to transfer foreign DNA to animals.

b) What are cosmid vectors? Explain with suitable example.

c) Maxam and Gilbert method of sequencing.

P.T.O.

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

a) Alpha complementation.

b) DNA fingerprinting.

c) Radioactive labeling and its detection by Autoradiography.

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

a) What is site-directed mutagenesis? Discuss Primer extension method of inducing such mutations and its applications.

b) What is c DNA library? Write in detail the steps involved and need to make c DNA library.

Total No. of Questions : 4]

SEAT No. :

P880

[Total No. of Pages : 2

[5017]-491
T.Y.B.Sc.
INDUSTRIAL CHEMISTRY (Vocational)
Inorganic and Organic Based Industries - II
(2008 Pattern) (Semester - IV) (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 questions: **[10]**

a) What is vehicle term?

b) What is acetate rayon?

c) Give the defination of dye.

d) Give two characteristics of artificial fibres.

e) What is the meaning of functional drug?

f) What are detergents?

g) What are elastomers?

h) Define the term vulcanization.

i) Draw the structure of paracetamol.

j) Write the meaning of analgesics.

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

i) Discuss the difference between silicone resin and silicone rubber.

ii) Explain the reactions used in synthesis of plastic with respect to their structure and properties.

iii) What are chemotherapeutic drugs? Give the synthesis of benzocaine.

P.T.O.

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

i) What are surfactants? Give their classification.

ii) Discuss the classification of adhesives.

iii) Explain the synthesis of alizarine.

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

a) Write a note on polymers.

b) Explain synthesis of aspirin with flow sheet diagram.

c) Outline the manufacturing of natural perfumes from flowers and flavours from fruits.

Q4) a) Describe the manufacturing of terylene with flow-sheet diagram. **[6]**

OR

a) Discuss the synthesis of crystal violet and methyl orange. **[6]**

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

i) Explain cleaning action of soap and detergents.

ii) Write a note on celluloic and silicate adhesives.

Total No. of Questions : 6]

SEAT No. :

P881

[Total No. of Pages : 2

[5017]-492
T.Y.B.Sc.
BIOTECHNOLOGY (Vocational)
Microbial Biotechnology & Animal Biotechnology
(2008 Pattern) (Semester - IV) (Paper - VI)

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

Instructions to the candidates:

1) ***Neat diagrams must be drawn.***
2) ***All questions carry equal marks.***
3) ***All questions are compulsory.***

SECTION - I

(Microbial Biotechnology)

Q1) Answer the following in short: **[5]**

a) Define patent.

b) What is COD?

c) Enlist the commercial important products of microbial activity.

d) Name any two popular types of vinegar.

e) What is sufu?

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

a) Describe industrial fermentor.

b) Enlist different types of fermentation and explain any one type.

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

a) Describe the process of production of streptomycin. Add a note on harvesting and recovery of streptomycin.

OR

b) What is cell immobilization? Enlist the methods used in cell immobilization. Describe any two methods.

P.T.O.

SECTION - II

(Animal Biotechnology)

Q4) Answer the following in short. **[5]**

a) What is monolayer culture?

b) Enlist the components of HAT medium.

c) Give any two examples of vaccines.

d) Define stem cells.

e) Explain the term "Finite Cell Line".

Q5) Attempt any One of the following: **[5]**

a) Comment upon the use of growth factors in animal cell culture.

b) Describe Transformed cell lines.

Q6) Answer any One of the following: **[10]**

a) How are monoclonal antibodies produced? Give the applications of monoclonal antibodies.

OR

b) What is down stream processing? How is it carried out?

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Total No. of Questions : 7]

P2104

SEAT No. :

[Total No. of Pages : 1

[5017]-493
T.Y. B.Sc.
PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION (Vocational)
Radio Software (Paper - VI) (Semester - IV)
(2008 Pattern)

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

Instructions to the candidates:

1) ***Attempt any four questions.***
2) ***Give suitable examples wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) What are the important factors involved in writing a script for any radio programme? **[10]**

Q2) What is O.B. programme? What care should be taken to broadcast a live O.B. programme? **[10]**

Q3) Explain any one Broadcast code with suitable examples. **[10]**

Q4) Write a dialogue for three minutes duration on any one of the following situations. **[10]**

a) You are waiting for the traffic signal to turn green. Person behind you wants you to give him way to jump signal.

b) You go for voting at the voting booth. Your name is missing from the list.

Q5) You are invited to deliver a radio talk on 'I will vote'. Discuss how will you begin and illustrate. **[10]**

Q6) Discuss your favourite radio programme. **[10]**

Q7) Select one of the following themes for a special programme on Radio. Suggest three songs and suitable narration. **[10]**

a) One musician

b) Patriotism

c) Mother

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Total No. of Questions : 4]

SEAT No. :

P 882

[Total No. of Pages :2

[5017] - 494
T.Y.B.Sc. (Vocational)
ELECTRONIC EQUIPMENT MAINTENANCE
Medical Instrumentation
(2008 Pattern) (Semester - IV) (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 calculator is allowed.*

Q1) Answer the following :

a) What is ECG? **[1]**

b) State function of SA node. **[1]**

c) What is the cause of epilepsy? **[1]**

d) What is meant by bioelectric potential. **[1]**

e) State the components of reflex arc. **[2]**

f) What is a surface electrode? **[2]**

g) State any two subsystems of human body. **[2]**

h) Draw the waveform of EEG. **[2]**

Q2) Answer any two of the following:

a) Discuss the electrode array. **[4]**

b) What are the necessary characteristics of micro - electrode. **[4]**

c) Write a short note on direct writing electrode. **[4]**

P.T.O.

Q3) Answer any two of the following:

a) Discuss the ion - selective electrode. **[4]**

b) Explain the basic recording system in biomedical instrumentation. **[4]**

c) What is 'Defibrillation? Which electrode is used as defibrillator. **[4]**

Q4) Answer the following:

a) Discuss macro - shock hazards. **[6]**

b) Discuss the noise and bandwidth considerations for bioelectric recorder amplifier. **[6]**

OR

Answer the following: **[12]**

a) Discuss flame photometer.

b) Explain blood - cell counter.

c) Explain physiological effects of electric current.

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Total No. of Questions : 4]

SEAT No. :

P 883

[Total No. of Pages :2

[5017] - 495
T. Y.B.Sc. (Vocational)
INDUSTRIAL MICROBIOLOGY
IND-MIC - 346 : Entrepreneurship Development
(2008 Pattern) (Semester - IV) (Paper - VI)

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

Instructions:

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

Q1) Answer as directed:

State whether the following statements are True or False. **[10]**

a) State Bank of India is dedicated to the tasks of entrepreneurial development.

b) The rate of excise duty is uniform all over India.

Fill in the blanks (c) to (f).

c) Working Capital can be calculated by _____.

d) 'SIDBI' stands for _____.

e) 'MIDC' stands for _____.

f) The concept of market segmentation is based on the assumption that the markets are _____.

i) homogeneous. ii) heterogeneous.

Choose the correct option:

g) Which deduction is allowed while computing the taxable income?

i) Income tax payment.
ii) Wealth tax.
iii) Personal expenses
iv) Bonus to employees.

P.T.O.

h) Which is 'Direct tax'?
   i) Income tax.
   ii) Excise Duty.
   iii) Sales Tax.
   iv) VAT.

i) Choose correct Break Even point (BEP) from the following statements:
   i) BEP is where Marginal cost = Marginal Revenue.
   ii) BEP is where Average cost = Average Revenue.
   iii) BEP is where TOTAL Cost = Total Revenue.

j) Which of the following is not a Labour Act?
   i) The Factories Act.
   ii) Negotiable Instruments Act.
   iii) Shops and Establishment Act.
   iv) Industrial Disputes Act.

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

a) Explain the major activities involved in the physical distribution of products.

b) Define 'Cost'. Explain the cost calculation in a merchandising organization?

c) Write a note on "Sales Tax".

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

a) What are the benefits of training to organization?

b) Explain in detail the merits of consumer market segmentation.

c) Discuss the merits and demerits of small scale industries.

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

a) "A new entrant in the entrepreneurial world has to search for a business opportunity". What are the methods adopted by potential entrepreneur to identify business opportunity?

b) "Products include more than just tangible goods". Explain with examples the other items that are also considered products.

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Total No. of Questions : 4]

SEAT No. :

P 884

[Total No. of Pages :2

[5017] - 497
T. Y. B. Sc. (Vocational)
SEED TECHNOLOGY
Biotechnology and Intellectual Property Rights
(2008 Pattern) (Semester - IV) (Paper - VI)

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

Instructions to the candidates :

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

Q1) Answer in one sentence each: [10]

a) What is denaturation?

b) Define transgenic?

c) What is meant by explant?

d) Define synthetic seeds.

e) Write any two branches of biotechnology.

f) What are restriction enzymes?

g) Write any two applications of ELISA.

h) Mention any two techniques used for Variety Identification.

i) What is Hardening of Plants?

j) What is patent?

Q2) Answer the following (Any two): **[2×5=10]**

a) Explain in detail-PCR.

b) Write the procedure for making synthetic seeds.

c) Comment on Intellectual property Rights.

P.T.O.

Q3) Write Notes on any two of the following: **[2×5=10]**

a) Importance of Transgenic plants.

b) Seed Storage Proteins.

c) World Trade Organization.

Q4) What is RAPDs? Explain it with reference to varietal identification. **[10]**

OR

What is micro propagation? Explain in detail the procedure of embryo culture.

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