Total No. of Questions : 4]

SEAT No. :

P1144

[Total No. of Pages : 2

[5017]-4001
T.Y.B.Sc.
MATHEMATICS
MT - 341 : Complex Analysis
(2013 Pattern) (New Course) (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.***

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

a) Find the principal argument, Arg$z$ when $z = \dfrac{i}{-2-2i}$.

b) Use definition of limit to prove that $\lim\limits_{z\to o}\dfrac{\overline{z}^2}{z} = 0$.

c) Find all values of z such that $e^z = -2$.

d) Find the principal value of i^i.

e) Evaluate the integral $\int_1^2 \left(\dfrac{1}{t} - i\right)^2 dt$.

f) Show that, if $\lim\limits_{n\to\infty} z_n = z$ then $\lim\limits_{n\to\infty} |z_n| = |z|$.

g) Find the residue at $z = 0$ of the function $\dfrac{1}{z+z^2}$.

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

a) Suppose that $f(z) = u(x,y) + iv(x,y)$ and $f'(z)$ exists at a point $z_o = x_o + iy_o$. Then show that the first order partial derivatives of u and v must exist at (x_o, y_o) and they must satisfy the Cauchy - Riemann equations $u_x = Vy$, $u_y = -v_x$ there. Also, show that $f'(z_o) = u_x + iv_x$, where the partial derivatives are to be evaluated at (x_o, y_o).

P.T.O.

b) If a function $f(z)$ is continuous and nonzero at a point z_o then show that $f(z) \neq 0$ throughout some neighborhood of that point.

c) Find all roots of $(-8i)^{\frac{1}{3}}$ in rectangular coordinates, exhibit them as vertices of certain regular polygon.

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

a) Show that, if a function f that is analytic at a point z_o has a zero of order m there if and only if there is a function g, which is analytic and nonzero at z_o, such that $f(z) = (z-z_o)^m g(z)$.

b) Find all zeros of $\sin hz$ and $\cos h\, z$.

c) $f(z)$ is defined by the equations

$$f(z) = \begin{cases} 1 & when\ y < 0 \\ 4y & when\ y > 0 \end{cases}$$

and C is the arc from $z = -1 - i$ to $z = 1 + i$ along the curve $y = x^3$. Find $\int_c f(z)\, dz$.

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

a) i) Prove that, if a function is analytic at a point then its derivatives of all orders exist at that point, moreover those derivatives are analytic there.

ii) Find the Maclaurin series expansion of $f(z) = \dfrac{z}{z^4 + 9}$.

b) i) State and prove Morera's theorem.

ii) Show that the function $u(x,y) = 2x(1-y)$ is harmonic in some domain and find it's harmonic conjugate $v(x,y)$.

Total No. of Questions : 4]

SEAT No. :

P1145

[Total No. of Pages : 3

[5017]-4002
T.Y. B.Sc.
MATHEMATICS
MT - 342 : Real Analysis-II
(2013 Pattern) (Paper-II) (Semester-IV) (New Course)

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

Instructions to the candidates:

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

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

a) Suppose $f(x) = 5, 0 \le x \le 3$. If σ is a subdivision of [0, 3], then compute U[f, σ] and L[f, σ].

b) Show that every finite subset of $\mathbb{R}$ is of measure zero.

c) Let $f_n(x) = \dfrac{x^n}{1+x^n}, 0 \le x \le 1$. Show that $\{f_n(x)\}_{n=1}$ converges pointwise on [0, 1].

d) Discuss the convergence of $\int_1^{\infty} \dfrac{1}{x^3+1} dx$.

e) Let $g_n(x) = \dfrac{1}{n} e^{-nx} (0 \le x < \infty)$. Find N $\in$ I such that $|g_n(x) - 0| < \dfrac{1}{2016}$ for all $n \ge N$ and for all $x \in [0, \infty)$ simultaneously.

f) Find the Cauchy principal value of $\int_{-\infty}^{\infty} \dfrac{x}{x^2+a^2} dx$.

g) Evaluate: $\lim\limits_{n\to\infty} \dfrac{1}{n}\left[\sin\left(\dfrac{\pi}{n}\right) + \sin\left(\dfrac{2\pi}{n}\right) + \cdots + \sin\dfrac{n\pi}{n}\right]$.

P.T.O.

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

a) If $f \in \mathrm{R}[a, b], \lambda \in \mathbb{R}$, then prove that $\lambda f \in \mathrm{R}[a, b]$. Also prove that $\int_a^b \lambda f = \lambda \int_a^b f$.

b) Let f be a bounded function defined on a closed and bounded interval $[a, b]$. Prove that $f \in \mathrm{R}[a, b]$ if and only if far every $\in < 0$ there exists a subdivision σ of $[a, b]$ such that $\mathrm{U}[f, \sigma] - \mathrm{L}[f, \sigma] < \in$.

c) If f is continuous on $[a, b]$ and if $\mathrm{F}(x) = \int_a^x f(t)dt \ (a \le x \le b)$, prove that F is continuous on $[a, b]$.

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

a) Let $\sum_{k=1}^{\infty} u_k$ be a series of real-valued functions on a set E. If there exist positive numbers $\mathrm{M}_1, \mathrm{M}_2, \ldots$ with $\sum_{k=1}^{n} \mathrm{M}_k < \infty$ such that

$\sum_{k=1}^{\infty} u_k(x) < \sum_{k=1}^{\infty} \mathrm{M}_k \ (x \in \mathrm{E})$, then prove that $\sum_{k=1}^{\infty} u_k$ converges uniformly on E.

b) Let $\{f_n\}_{n=1}^{\infty}$ be a sequence of real valued functions on a set E. Prove that $\{f_n\}_{n=1}^{\infty}$ is uniformly convergent on E if and only if given E > 0 there exists N ∈ I such that $|f_m(x) - f_n(x)| < \mathrm{E}$ for all $m, n \ge \mathrm{N}; x \in \mathrm{E}$.

c) If the series $\sum_{n=0}^{\infty} a_n$ converges and $f(x) = \sum_{n=0}^{\infty} a_n x^n \ (-1 < x < 1)$, prove that f is continuous on (–1, 1).

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

a) i) Let $\{f_n\}_{n=1}^{\infty}$ be a sequence of real-valued functions on a metric space M which converges uniformly to the function f on M. If each f_n is continuous at $a \in \mathbf{M}$, then prove that f is continuous at a.

ii) Let $\sum_{k=1}^{n} u_k$ be a series of functions in R[a, b] which converges to f on [a, b]. Then prove that $f \in R[a, b]$. Also prove that

$$\int_a^b f(x)dx = \sum_{k=1}^{\infty} \int_a^b u_k(x)dx$$

b) i) Prove that improper integral $\int_{\pi}^{\infty} \frac{\sin x}{x} dx$ converges conditionally.

ii) Discuss the convergence of the integral $\int_0^2 \frac{x}{1-x} dx$.

●●●●●

Total No. of Questions :4]

SEAT No. :

P1146

[Total No. of Pages :3

[5017] - 4003

T.Y.B.Sc.

MATHEMATICS

MT - 343 : Problem Course Based on MT - 341 and MT - 342

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

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

Instructions to the candidates:

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

SECTION - I

(Complex Analysis)

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

i) Solve the equation $z^2 + z + 1 = 0$ where $z = (x, y)$.

ii) Show that the limit of the function $f(z) = \left(\frac{z}{\bar{z}}\right)^2$ as z tends to 0 does not exist.

iii) Show that Log $(-ei) = 1 - \frac{\pi}{2} i$.

iv) By finding antiderivative evaluate the integral $\int_0^{\pi+2i} \cos\left(\frac{z}{2}\right) dz$ where the path is any contour between the indicated limits of integration.

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

i) Show that $|\exp(z^2)| \leq \exp(|z|^2)$

ii) Evaluate the integral $\int_c \frac{5z-2}{z(z-1)} dz$ where C is the circle $|z| = 2$, described counterclockwise.

P.T.O.

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

a) Determine where $f'(z)$ exists and find its value when $f(z) = x^2 + iy^2$.

b) Give two Laurent series expansions in powers of z for the function $f(z) = \frac{1}{z^2(1-z)}$ and specify the regions in which those expansions are valid.

c) Let C denote the positively oriented boundary of the square whose sides lie along the lines $x = \pm 2$ and $y = \pm 2$. Evaluate the integral

$$\int_c \frac{\tan\frac{z}{2}}{(z - x_0)^2}\, dx \quad (-2 < x_0 < 2)$$

SECTION - II

(Real Analysis - II)

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

i) If $0 \le x \le 1$, then show that $\frac{1}{3\sqrt{2}} \le \int_0^1 \frac{x^2}{\sqrt{1+x}}\, dx \le \frac{1}{3}$.

ii) Discuss the convergence of $\int_1^\infty \sin x dx$.

iii) Show that the series $\sum_{n=1}^{\infty} \frac{1}{n^2 + x^2}$ $(0 \le x \le \infty)$ converges uniformly.

iv) Let $f_n(x) = \frac{x}{n} e^{-\frac{n}{x}}$ $(0 \le x < \infty)$. Show that there does not exist N$\in$ I such that $|f_n(x) - 0| < \frac{1}{10}(n \ge N)$ and for all $x \in [0, \infty)$ simultaneously.

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

i) Discuss the convergence of $\int_0^1 \frac{\sin x}{x^{3/2}}\,dx.$

ii) By using the integral test, show that the series $\sum_{n=1}^{\infty} n\,e^{-n^2}$ is convergent.

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

a) i) If f is continuous on $[a, b]$, if $f(x)>0$ $(a\le x\le b)$, and if $F(x)=\int_a^x f(t)\,dt$ $(a\le x\le b)$, then prove that F is strictly increasing on $[a, b]$.

ii) Let $f(x)=x$ $(0\le x\le 1)$, let $\sigma = \left\{0, \frac{1}{3}, \frac{2}{3}, 1\right\}$ be a subdivision of [0, 1]. Compute U $[f, \sigma]$ and L $[f, \sigma]$.

b) By examining $f(x)=\lim_{n\to\infty} f_n(x)$ for $0\le x<\infty$ where $f_n(x)=\frac{1}{1+x^n}$, prove that $\{f_n\}_{n=1}^{\infty}$ does not converge uniformly on $[0,\infty)$.

c) Show that the series $\sum_{n=1}^{\infty} \frac{nx^2}{n^3+x^2}$

is uniformly convergent on [0, A] for any A > 0.

Total No. of Questions :4]

SEAT No. :

P1147

[Total No. of Pages :2

[5017] - 4004

T.Y.B.Sc.

MATHEMATICS

MT - 344 : Ring Theory

(2013 Pattern) (New Course) (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.***

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

a) Show that every field F is an integral domain.

b) Let evaluation homomorphism be $\phi_3 : Z_7[x] \to Z_7$.

Then compute $\phi_3\left[\left(x^4 + 2x\right)\left(x^3 - 3x^2 + 3\right)\right]$.

c) Show that a ring homomorphism $\phi : R \to R'$ is one - to - one map if and only if ker $\phi = \{0\}$.

d) Define associate in a ring and write different associates of $2x - 7$ in $Z[x]$.

e) Show that 6 does not factor uniquely into irreducibles in $Z\left[\sqrt{-5}\right]$.

f) Write the characteristic of following rings.

i) $2Z$

ii) $Z_3 \times Z_4$.

g) Is $Q[x] / < x^2 - 6x + 6 >$ a field? Justify.

P.T.O.

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

a) Show that $a^2 - b^2 = (a + b)(a - b)$ for all a and b in a ring R if and only if R is commutative.

b) Prove that, the cancellation laws hold in a ring R if and only if R has no divisors of zero.

c) Let D be an integral domain and S be a subset of D × D given by $S = \{(a, b) / a, b \in D, b \neq 0\}$. Two elements (a, b) and (c, d) in S are equivalent, denoted by $(a, b) \sim (c, d)$ if and only if $ad = bc$. Then show that the relation $\sim$ on the set S is an equivalence relation.

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

a) Let F be a field. Show that F[x] is principal ideal domain.

b) State and prove Eisenstein criterion.

c) Find the sum and product of the given polynomials in Z_6 [x].

$f(x) = 2x^2 + 3x + 4, \quad g(x) = 3x^2 + 2x + 3.$

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

a) i) Divide $f(x) = x^4 - 3x^3 + 2x^2 + 4x - 1$ by $g(x) = x^2 - 2x + 3$ in Z_5 [x] and find quotient and remainder.

ii) Show that every principal ideal domain is unique factorization domain.

b) i) Show that the ring Z[i] is an integral domain.

ii) If p is a prime, then show that Z_p has no divisors of zero.

Total No. of Questions : 4]

SEAT No. :

P1148

[Total No. of Pages : 2

[5017]-4005
T.Y.B.Sc.
MATHMATICS
MT - 345 : Partial Differential Equations
(New Course 2013 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) Attempt any five of the following **[10]**

a) Show that the differential equation

$yzdx - zxdy - y^2dz = 0$ is integrable.

b) Solve $ydx + xdy + 2zdz = 0$

c) Find the integral curves of $\frac{dx}{z-y} = \frac{dy}{x-z} = \frac{dz}{y-x}$.

d) Obtain the partial differential equation by eliminating arbitrary constants a and b from $(x-a)^2 + (y-b)^2 + z^2 = 1$.

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

f) Find a complete integral of $p^2 + q^2 = x + y$.

g) Define Pfaffian differential equation in three variables and write vector form of Pfaffian differential equation.

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

a) Prove that a necessary and sufficient condition that the Pfaffian differential equation $\overline{X}.d\overline{r} = 0$ should be integrable is that $\overline{X}.\text{Curl}\,\overline{X} = 0$.

P.T.O.

b) Find the integral curves of $\frac{dx}{x^2\left(y^3-z^3\right)}=\frac{dy}{y^2\left(z^3-x^3\right)}=\frac{dz}{z^2\left(x^3-y^3\right)}$.

c) Solve $zy^2dx+zx^2dy-x^2y^2dz=0$.

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

a) Explain the method of solving the following first order partial differential equations.

i) $f(p,q) = 0$

ii) $g(x,p) = h(y,q)$

b) Find the general integral of $z(xp–yq) = y^2–x^2$.

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

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

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

ii) Find a complete integral of $z^2 – pqxy = 0$ by Charpit's method.

b) i) Prove that a necessary and sufficient condition for the compatibility of $f(x,y,z,p,q) = 0$ and $g(x,y,z,p,q) = 0$ is

$$[f,g]\equiv\frac{\partial(f,g)}{\partial(x,p)}+p\frac{\partial(f,g)}{\partial(z,p)}+\frac{\partial(f,g)}{\partial(y,q)}+q\frac{\partial(f,g)}{\partial(z,q)}=0.$$

ii) Solve $z^2+zu_z-u_x^2-u_y^2=0$, by Jacobi's method.

Total No. of Questions : 4]

SEAT No. :

P1149

[Total No. of Pages : 2

[5017]-4006
T.Y.B.Sc.
MATHEMATICS
MT - 346 : Problem Course Based on MT - 344 and MT - 345
(Semester - IV) (2013 Pattern) (Paper - VI) (New Course)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
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) Find all units of $Z \times Z$.

ii) Show that the polynomial $2x^{10} - 25x^3 + 10x^2 - 30$ is irreducible over Q.

iii) Find the gcd of 49, 349 and 15,555 in Z.

iv) Write any two Maximal ideals of the ring of integers.

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

i) Find all generators of the cyclic Multiplicative group of units of the field Z_{17}.

ii) Write addition and multiplication tables for 2Z/8Z. Are 2Z/8Z and Z_4 isomorphic rings?

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

a) Find the order of the ring $M_2(Z_2)$ and list all units.

b) Find gcd of $8 + 6i$ and $5 - 15i$ in $Z[i]$.

c) Let the evaluation homomorphism be $\phi_5 : Q[x] \to R$. Find six elements in the Kernel of homomorphism ϕ_5.

P.T.O.

SECTION - II

(Partial Differential Equations)

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

i) Find the integral curves of the equations.

$$\frac{dx}{y+1}=\frac{dy}{x+1}=\frac{dz}{z}.$$

ii) Solve

$(y + z)dx + dy + dz = 0.$

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

iv) Find the general solution of

$yzp + xzq = xy.$

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

i) Verify that the differential equation $(y^2 + z^2)\,dx + xydy + xzdz = 0$ is integrable and find its primitive.

ii) Find the complete integral of the equation

$zpq - p - q = 0.$

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

a) Solve by Jacobi's method

$z + 2u_2 - (u_x + u_y)^2 = 0.$

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

c) Show that the equations.

$xp - yq - x = 0$

$x^2p + q - xz = 0$

are compatible and has one parameter family of common solutions.

Total No. of Questions : 4]

SEAT No. :

P1150

[Total No. of Pages : 3

[5017]-4007
T.Y.B.Sc.
MATHEMATICS
MT - 347 (A) : Optimization Techniques
(Semester - IV) (2013 Pattern) (New Course)

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

Instructions to the candidates:

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

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

a) Define:

i) Saddle point

ii) Optimal strategies

b) Write any two assumptions of a sequencing problem.

c) Distinguish between CPM and PERT.

d) Define two person zero sum game and fair game.

e) In a game of matching coins, player A wins Rs. 2 if there are two heads, wins nothing if there are two tails and looses Re. 1 when there is one head and tail. Determine the pay off matrix.

f) State any two rules of construction of the project network.

g) Examine the following function for extreme points:

$f(x) = x^4 + x^2$.

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

a) There are 5 jobs each of which must go through the two Machines M_1 and M_2 in the order M_1 - M_2. Processing times are given below in the table:

Job	:	1	2	3	4	5
Machine M_1	:	5	1	9	3	10
Machine M_2	:	2	6	7	8	4

Determine the optimal job sequence and total elapsed time.

P.T.O.

b) An electromechanical equipment has a purchase price of Rs. 7000. Its running cost per year and resale value per year are given below:

Year	:	1	2	3	4	5	6	7
Running Cost (Rs.)	:	2000	2050	2300	2600	3000	3500	4100
Value (Rs.)	:	4000	3000	2200	1600	1400	700	700

Determine at what age its replacement is due?

c) Explain the principle of Dominance in Game Theory and solve the following:

		Player B		
		B_1	B_2	B_3
Player A	A_1	1	7	2
	A_2	6	2	7
	A_3	5	2	6

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

a) Task A, B, C, ..., H, I constitute a project. The precedence relationships are A < D; A < E; B < F; D < F ; C < G; C < H; F < I; G < I.

Draw a network to represent the project.

b) Solve the following game using graphical method. The pay off is for player A.

		Player B			
		B_1	B_2	B_3	B_4
Player A	A_1	4	–2	3	–1
	A_2	–1	2	0	1

c) Find the optimum solution of the following constrained multivariable problem:

Minimize $z = x_1^2 + (x_2 + 1)^2 + (x_3 - 1)^2$

Subject to the constraint: $x_1 + 5x_2 - 3x_3 = 6$.

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

a) Given the following information:

i) Draw a network for this project.

ii) Find a critical path and project completion time.

Activity	Immediate Predecessor (S)	Duration
A	-	2
B	-	3
C	A, B	4
D	B	1
E	A	5
F	C	3
G	E, F	2
H	D, F	7
I	G, H	6
J	I	3

b) Information on the activities required for a project are as follows:

Name:	A	B	C	D	E	F	G	H	I	J	K
Activity: Node	1-2	1-3	1-4	2-5	3-5	3-6	3-7	4-6	5-7	6-8	7-8
Duration: (days)	2	7	8	3	6	10	4	6	2	5	6

Draw the network and calculate the earliest and latest start and finish times of each of the activities. Also determine the critical path.

Total No. of Questions : 4]

SEAT No. :

P1151

[Total No. of Pages : 2

[5017]-4008
T.Y.B.Sc.
MATHEMATICS
MT - 347 (B) : Differential Geometry
(2013 Pattern) (New Course) (Paper - VII) (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 a parametrization of the level curve $y^2 - x^2 = 1$.

b) Find the arc length along the cycloid $\gamma(t) = a(t - \sin t, 1 - \cos t)$, $0 \le t \le 2\pi$.

c) Show that $\gamma(t) = (t, \cos ht)$, $-\infty < t < \infty$ is regular.

d) Define curvature of a curve in $\mathbb{R}^3$.

e) Show that every plane in $\mathbb{R}^3$ is a smooth surface.

f) State Frenet - Serret equations.

g) Is the map from the circular half cone $x^2 + y^2 = r^2, z > 0$, to the xy plane given by $(x, y, z) \to (x, y, 0)$ an isometry? Justify.

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

a) Find the equation of the tangent plane of the surface patch $\sigma(u, v) = (u, v, u^2 - v^2)$ at (1, 1, 0).

b) Let γ be a unit - speed curve in $\mathbb{R}^3$ with constant curvature and zero torsion. Then prove that γ is a (part of) a circle.

c) Show that the length $l(\gamma)$ and the area A (int (γ)) are unchanged by applying a rigid Motion to γ

P.T.O.

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

a) Find the first fundamental form of the surface $\sigma(u, v) = (u - v, u + v, u^2 + v^2)$.

b) With usual notations, show that $\|\sigma_U \times \sigma_V\| = (EG - F^2)^{\frac{1}{2}}$.

c) Prove that transition maps of a smooth surface are smooth.

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

a) i) If $\gamma(t) = \sigma(u(t), v(t))$ is a unit - speed curve on a surface patch σ, then prove that its normal curvature is given by $K_n = L\dot{u}^2 + 2M\dot{u}\dot{v} + N\dot{v}^2$ Where $Ldu^2 + 2Mdudv + Ndv^2$ is the second fundamental form of σ.

ii) Find the torsion of the circular helix $\gamma(\theta) = (a\cos\theta, a\sin\theta, b\theta)$.

b) i) By applying the isoperimetric inequality to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, prove that $\int_0^{2\pi} \sqrt{a^2 \sin^2 t + b^2 \cos^2 t}\, dt \geq 2\pi\sqrt{ab}$ with equality holding if and only if $a = b$.

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

Total No. of Questions : 4]

SEAT No :

P1152

[Total No. of Pages : 2

[5017]-4009
T.Y.B.Sc.
MATHEMATICS
MT - 347(C) : C - Programming - II
(2013 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) Expalin the meaning of the following declaration int *p(int a);

b) Write an appropriate declaration which declares a pointer to a floating - point quantity, and a pointer to a double - precision quantity.

c) Explain the following declaration:

```
Union id {
char colour [12];
int size;
} Shirt, Pant;
```

d) What is the purpose of the library function feof?

e) Let a and b be unsigned integer variables whose values are Ox6db7 and Oxa726, respectively compute a & b.

f) In the following enumeration declaration, determine the value of each member.

enum compass {North = 2, South, East = 1, West};

g) Write a macro called MAX that utilizes the conditional operator (? :) to determine the maximum of a and b, where a and b are integer quantities and are expressed as arguments.

P.T.O.

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

a) Write a note on passing pointers to functions.

b) Write a C program to multiply two complex numbers using structures.

c) Write a short note on command line arguments.

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

a) Write a short note on macros in C.

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

c) Write a short note on passing structures to functions.

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

a) i) Write a short note on External (Global) variables.

ii) Define a structure named point having two members of the type float. Write a program to accept a,b,c and check whether the point (x,y) given by the user lies on the line ax + by + c = 0.

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

ii) A C program contains the following declaration static int x[8] = {10,20,30,40,50,60,70,80};

1) What is the meaning of x?

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

3) what is the value of *x?

4) What is the value of (*x + 2)?

5) What is the value of *(x + 2)?

✡ ✡ ✡

Total No. of Questions : 4]

SEAT No. :

P1153

[Total No. of Pages : 3

[5017]-4010
T.Y.B.Sc.
MATHEMATICS
MT - 347 (D) : Graph Theory
(2013 Pattern) (New Course) (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) Define complete graph and complete bipartite graph.

b) Draw the graph having following matrix as its adjacency matrix.

$$\begin{bmatrix} 0 & 1 & 2 & 3 \\ 1 & 0 & 3 & 2 \\ 2 & 3 & 0 & 1 \\ 3 & 2 & 1 & 0 \end{bmatrix}$$

c) Prove that any tree with atleast two vertices is bipartite graph.

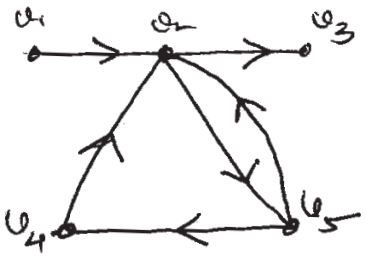
d) Give an example of simple connected graph with 7 vertices having a cut vertex '*v*' such that number of connected components in G - *v* is 6 and each connected component of G - *v* is an isolated vertex.

e) Draw a connected graph with atleast four vertices which is neither Eulerian nor Hamiltonian.

f) Define i) Weakly connected diagraph

ii) Strongly connected diagraph

g) Find outdegree and indegree for each vertex of the following diagraph.



P.T.O.

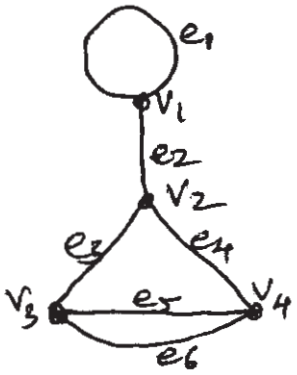
Q2) Attempt any two of the following: **[10]**

a) For any graph G with 'e' edges and n vertices v_1, v_2, v_3 .....v_n, prove that $\sum_{i=1}^{n} d(v_i) = 2e$.

Further prove that, in any graph G there is an even number of odd vertices.

b) Prove that if a graph G is a self complementary graph with n vertices then n is either $4k$ or $4k + 1$ for some integer k.

c) Write down the adjacency matrix and incidence matrix for the following graph.

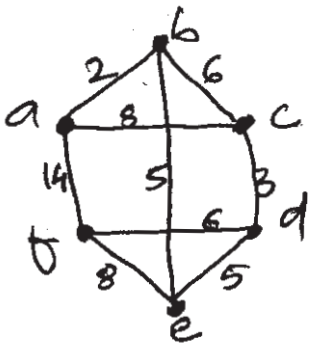


Q3) Attempt any two of the following: **[10]**

a) If G is a connected graph with n vertices and n–1 edges then prove that G is a tree.

b) Let G be a simple graph with exactly one spanning tree. Prove that G is a tree.

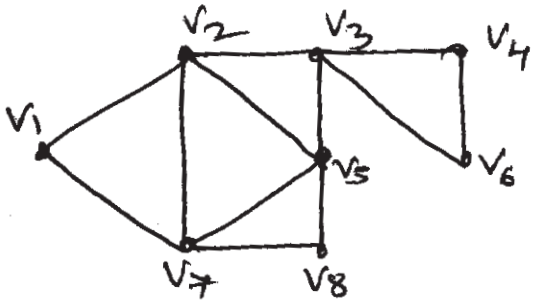
c) Using Dijkstra's algorithm, find the length of shortest path from vertex 'a' to each of the other vertex in following graph.



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

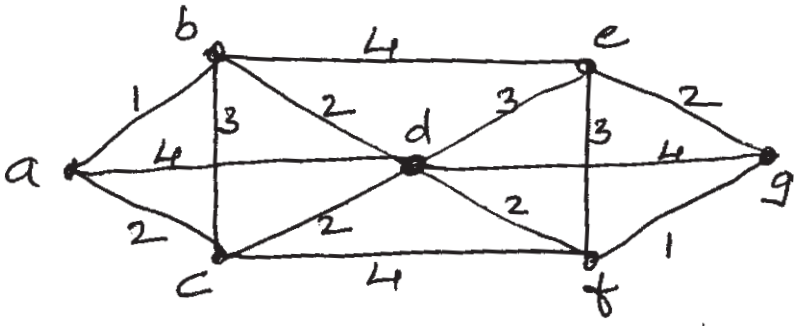
a) i) Let G be a graph in which the degree of every vertex is atleast two . Prove that G contains a cycle.

ii) Using the Hopcroft and Tarjan algorithm, find a strongly connected orientation for the following graph.



b) i) Prove that a simple graph G is Hamiltonian if and only if its closure C(G) is Hamiltonian.

ii) Solve the Chinese postman problem for the following graph.



Total No. of Questions : 4]

SEAT No. :

P1154

[Total No. of Pages : 2

[5017]-4011
T.Y.B.Sc.
MATHEMATICS
MT - 347(E) : Lebesgue Integration
(New Course) (2013 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? If G is an open subset of $[a, b]$ and $|G| = 0$ then $G = \phi$.

b) If E is measurable subset of $[a, b]$ then prove that E' is also measurable.

c) True or False? The union of uncountably many measurable subsets of $[a, b]$ must be measurable.

d) Does there exist a nonmeasurable fucntion on $[a, b]$?

e) Give an example of a bounded function that is Lebesgue integrable but not Riemann integrable.

f) If $f(x) = \frac{1}{2} + \sin x (0 \le x < 2\pi)$ find f^+.

g) Show that if f is an odd fucntion then $\int_{-\pi}^{\pi} f(x)\,dx = 0.$

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

a) If $E \subset [a, b]$ then prove that E is measurable if and only if $\bar{m}\,E + \bar{m}\,E' \le b - a.$

b) Let E_1 and E_2 are subsets of $[a, b]$. Prove that if the symmetric difference of E_1 and E_2 has measure zero and E_1 is measurable then E_2 is measurable.

c) Show that the subset E of $[a, b]$ is measurable if and only if its characteristic function χ_E is measurable.

P.T.O.

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

a) Let $\{f_n\}_{n=1}^{\infty}$ is a sequence of measurable fucntions on [a, b] such that the sequence $\{f_n(x)\}_{n=1}^{\infty}$ is bounded for each $x \in [a,b]$. Let M(x) = lub{$f_1(x)$, $f_2(x)$ -----} $x \in [a,b]$. Prove that the fucntion M is measurable.

b) If f is a bounded function in L[a, b] and if g is a bounded function on [a, b] such that $f(x) = g(x)$ almost everywhere ($a \le x \le b$) then prove that g$\in$ L [a, b] and $\int_a^b g = \int_a^b f$.

c) If f is a bounded measurable function on [a, b] and $\int_a^b [f(x)]^2 \, dx = 0$ prove that $f(x) = 0$ for almost all x in [a, b].

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

a) i) Let $f \in$ L[a, b]. Prove that for given $\in > 0$ there exists $\delta > 0$ such that $\left|\int_E f\right| < \in$ whenever E is a measurable subset of [a, b] with mE $< \delta$.

ii) If f is non negative - valued measurable function on [a, b] and if $f(x) \le g(x)$ ($a \le x \le b$) where $g \in$ L[a, b] prove that $f \in$ L[a, b].

b) i) If E is measurable subset of [a, b] then prove that $\int_E 1 = m$E.

ii) Find the Fourier series for $f(x) = x - \Pi \le x \le \Pi$.

Total No. of Questions : 4]

SEAT No. :

P1155

[Total No. of Pages : 2

[5017]- 4012
T.Y.B.Sc.
MATHEMATICS
MT - 347(F) : Computational Geometry
(New - 2013 Pattern) (Semester - IV) (Paper - VII) (Elective (F))

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) If the line $y = 5x - 2$ is transformed under $[T]=\begin{bmatrix} 15 & -1 \\ 7 & 2 \end{bmatrix}$. Find the slope of transformed line.

b) Write the transformation matrix to shear in z - coordinate proportional to x - coordinate by a factor 2 and proportional to y - coordinate by a factor 3.

c) Find the value of $\delta\theta$ to generate 11 points on the parabolic segment $y^2 = 4x$, $2 \le y \le 4$.

d) If $z = -5$ is the given plane, find the transformation matrix which when applied on the given plane transforms the plane to $z = 0$ plane.

e) Determine foreshortening factors f_y and f_z of matrix

$$[T] = \begin{bmatrix} 0.5 & 0.43 & 0 & 0 \\ 0 & 0.7 & 0 & 0 \\ 0.3 & 0.4 & 0 & 0 \\ 1 & 1 & 0 & 1 \end{bmatrix}.$$

f) Show that rotation is a solid body transformation.

g) Write any two properties of Bezier curves.

P.T.O.

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

a) Prove that mid point of the line segment AB is transformed to the midpoint of segment A*B* under any 2 × 2 transformation matrix [T].

b) Find the concatenated transformation matrix for the following sequence of transformations.

i) Reflection through the line $y = x$.

ii) Shearing in x and y directions by –3 and 2 units respectively.

iii) Translate in x and y directions by 1 and –2 units respectively.

Apply it onto the point [4, –2].

c) If an object [X] is reflected through the plane $z = 3$ then find the transformed object where $[X] = \begin{bmatrix} 2 & 2 & 4 \\ 4 & -5 & 1 \end{bmatrix}$ using concatenated transformation matrix.

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

a) Write an algorithm for rotation about an arbitrary point in plane.

b) Find the cavalier projection with $\alpha = 30^o$ and cabinate projection with $\alpha = 25^o$ of the object represented by the matrix $X = \begin{bmatrix} 0 & 0 & 1 & 1 \\ 1 & 0 & 1 & 1 \end{bmatrix}$.

c) Rotate the line segment AB where A[3 3 3], B[5 5 5] about the local axis passing through P[2 3 1] about an angle 75^o.

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

a) i) State general parametric equation of Be′zier curve and also obtain matrix representation of Be′zier cubic curve.

ii) Generate uniformly spaced 4 points on the hyperbolic segment in the first quadrant for $3 \le y \le 6$ where equation of hyperbola is $\frac{x^2}{9} - \frac{y^2}{25} = 1$.

b) i) Generate uniformly spaced 6 points on the circumference of the circle $(x - 1)^2 + (y + 2)^2 = 9$.

ii) Write an algorithm of an object for reflection through the line $y = mx + c$.

Total No. of Questions : 4]

SEAT No :

P1156

[Total No. of Pages : 2

[5017]-4013
T.Y.B.Sc.
PHYSICS
PH - 341 :Classical Electrodynamics
(2013 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 log tables and calculators is allowed.***

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

a) Define the term : surface charge density.

b) State Gauss's law in dielectrics.

c) What is a polar molecule?

d) Define : magnetic permeability.

e) What is current density (J)? Give its S.I. unit.

f) State Lenz's law.

g) What do you mean by linear polarization?

h) What is displacement current?

i) State Poynting theorem.

j) What is electromagnetic induction?

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

a) State Gauss's law in electrostatics. Obtain its integral and differential form.

b) What is meant by circular polarization? Derive the expression for

i) Elliptically polarized and

ii) Circularly polarized wave.

c) State and explain Ampere's force law.

P.T.O.

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

a) Two spheres of charges +10C and +40C are placed 9cm apart. Find the position of the point between them, where the intensity is zero.

b) Two point charges kept in a dielectric medium of K = 5.2, interact with each other with a force of 8.6×10^{-3} N. What would be the force if the charges were in free space?

c) The current density in a wire of circular cross section of radius '*a*' is proportional to the distance from the axis. Show that the total current(I) through the wire is proportional to 'a^3'.

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

i) State Biot-Savart's law. Obtain an expression for magnetic field produced by infinitely long straight conductor carrying a current I at a point which is at a perpendicular distance '*x*' from center of the conductor.

ii) State Maxwell's equations for good conductors; in differential form. Show that, for an electromagnetic wave in free space,

$$\nabla^2\vec{E} = \mu_0\varepsilon_0 \frac{\partial^2\vec{E}}{\partial t^2} \quad \text{and} \quad \nabla^2\vec{H} = \mu_0\varepsilon_0 \frac{\partial^2\vec{H}}{\partial t^2}$$

b) Attempt any one of the following (Two Marks) **[2]**

i) Find the electric potential and intensity at a point situated at a distance of 8 cm from the point charge $q = 1.6 \times 10^{-12}$C.

ii) Calculate the velocity of propagation 'c' in free space, if $\mu_0 = 4\pi \times 10^{-7}$ Wb/Am and $\varepsilon_0 = 8.85 \times 10^{-12} C^2/\text{Nm}^2$.

✡ ✡ ✡

Total No. of Questions : 4]

SEAT No. :

P1157

[Total No. of Pages : 2

[5017]-4014
T.Y. B.Sc.
PHYSICS
PH - 342 : Quantum Mechanics
(2013 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 calculator & log-table is allowed.***

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

a) State de Broglie hypothesis.

b) What is wave packet?

c) State normalisation condition for wave function.

d) State Ehrenfest's first theorem.

e) State any two applications or uses of tunneling effect.

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

g) Define degeneracy.

h) Prove that $[\hat{A}, \hat{B}+\hat{C}]=[\hat{A}, \hat{B}]+[\hat{A}, \hat{C}]$.

i) State the parity of functions $f(x)=x^3$ & $f(x)=x^2+2$.

j) Calculate the wavelength of electron which is acted by potential of 54 volt in Davison & germer experiment.

Q2) Attempt Any Two of the following (5 marks each): **[10]**

a) State & prove Heisenberg's uncertainty principle.

b) Obtain Schrodinger's time dependent equation.

c) What is rigid rotator? Apply Schrodinger's equation to solve rigid rotator free axis to obtain eigen values & eigen functions.

P.T.O.

Q3) Attempt Any Two of the following (5 marks each): **[10]**

a) By Mathematical induction, show that $[x, p^n] = i\hbar n\, p^{n-1}$.

b) The wave function for particle in infinite potential well is $\psi_n(x) = \text{A} \sin\left(\frac{n\pi}{a}x\right)$, where $0 \le x \le a$, then find $\langle x \rangle$.

c) Normalise the wave function

$$\psi(x) = xe^{-\infty x^2}$$

in the range $-\infty$ to $+\infty$.

Q4) a) Attempt Any One of the following: **[8]**

i) Show that the particle in one dimensional potential well will have discrete energy states. Plot first three eigen functions.

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

b) Attempt Any One of the following: **[2]**

i) The velocity of ripple waves is $\sqrt{\frac{2\pi \text{T}}{\rho\lambda}}$, where T is surface tension, λ is wave length & ρ is density of liquid. Find group velocity.

ii) Using operaters L_x, L_y & L_z prove that $[\text{L}_x, \text{L}_y] = i\hbar \text{L}_z$.

●●●●●

Total No. of Questions :4]

SEAT No. :

P1158

[Total No. of Pages :3

[5017] - 4015

T.Y.B.Sc.

PHYSICS

PH - 343 : Thermodynamics and Statistical Physics

(2013 Pattern) (Semester - IV) (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 logtable and calculator is allowed.***

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

a) Define mean free path of molecules of a gas.

b) Define coefficient of thermal conductivity of a gas.

c) Define Transfer phenomena of the gas molecule.

d) What is Joule - Thomson effect?

e) State the Four thermodynamic Functions.

f) Define Temperature inversion.

g) Define the probability of an event.

h) What is Binomial distribution?

i) What is meant by canonical ensemble.

j) Define partition function.

P.T.O.

Q2) Attempt any TWO (Five marks each): **[10]**

a) Derive an expression for the viscosity (η) of a gas - interms of mean free path of its molecules. Show that it is independent of pressure but depends upon the temperature of the gas.

b) State Maxwell's Four thermodynamic relations and hence find second Tds equation.

c) Define Boltzmann canonical distribution and obtain an expression for probability P_r as

$$P_r = \frac{e^{-\beta E_r}}{\sum e^{-\beta E_r}} .$$

Q3) Attempt any TWO (Five marks each): **[10]**

a) For a metallic copper disc at 300K, the following values are known $C_p = 24.5$ J/mole.K, $\alpha = 50.4 \times 10^{-6} K^{-1}$, isothermal compressibility (K) $= 7.78 \times 10^{-12}$ N/m^2, V = 7.06 cm^3 / mole. Determine C_v.

b) A system is composed of nine identical particles having different velocities. The velocity distribution among the particles is given as follows.

Number of particles	Velocity in m/s
2	5
3	6
2	2

Calculate the average velocity.

c) Find the height at which the atmospheric pressure is $1/100^{th}$ that of sea level. Assume that the atmosphere is at a constant temperature 300 K, mass of an air molecule is 4.81×10^{-26}kg. and Botzmann constant (K) = 1.38×10^{-23}J/K.

Q4) a) Attempt any ONE: **[8]**

i) Obtain an expression for mean value of n_1 and mean square deviation $\overline{(\Delta n_1)^2}$ for the random walk problem.

ii) Distinguish between Fermi - Dirac and Bose - Einstein statistics. Obtain the expression for the distribution law of Maxwell and Boltzmann $\overline{n_r} = \frac{Ne^{-\beta E_r}}{\sum_r e^{-\beta E_r}}$.

b) Attempt any ONE: **[2]**

i) Define mean free path. Show that mean free path of the molecule of a gas is inversely proportional to the density of the gas.

ii) When a card is drawn from a well shuffled pack of 52 cards. What is the probability of the card to be either a king or a queen?

Total No. of Questions : 4]

SEAT No. :

P1159

[Total No. of Pages : 2

[5017]-4016
T.Y.B.Sc.
PHYSICS
PH - 344 : Nuclear Physics
(2013 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 (one mark each) **[10]**

a) What is stellar energy?

b) What is quark?

c) What is chain reaction?

d) What are endoergic and exoergic reactions?

e) What is scintillation counter?

f) What is spin dependence of nuclear force?

g) What is carbon dating?

h) Define specific activity.

i) What is spectroscopic term for L = 1, S = 1, I = 0.

j) What is mass defect?

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

a) What is threshold energy of projectile? Obtain an expression for threshold energy.

b) What are mesons? Explain meson theory of nuclear forces.

c) Explain half life of a radioactive element and derive expression for it. Calculate decay constant of radium if its half life is 1590 yrs.

P.T.O.

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

a) Calculate Q-value for the reaction

$$_{83}Bi^{209} + p \longrightarrow {}_{83}Bi^{208} + {}_{1}H^{2}$$

Given: Mass of $_{83}Bi^{209}$ = 208.980394 a.m.u.
Mass of P = 1.007825 a.m.u.
Mass of $_{83}Bi^{208}$ = 207.979731 a.m.u.
Mass of $_{1}H^{2}$ = 2.014102 a.m.u.

b) Compute the mass of 1 Curie of C^{14}. The half life of C^{14} is 5700 yrs.

c) Energy released per fission of U^{235} atom is 200 meV. Calculate the energy released during the fission of 1gm of U^{235}.

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

i) State and explain 4 basic properties of nucleus.

ii) With neat diagram explain construction and working of G.M.counter.

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

i) Explain in brief saturation and short range nuclear force.

ii) State essential components of nuclear reactor.

Total No. of Questions : 4]

SEAT No. :

P1160

[Total No. of Pages : 4

[5017]-4017
T.Y. B.Sc.
PHYSICS
PH-345 (A) : Electronics
(2013 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.***
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) State any two applications of LED.

b) Define differential amplifier.

c) State any two characteristics of an ideal op-amp.

d) Draw the symbol for n-channel JFET.

e) Define duty cycle in astable multivibrator.

f) What are the types of counter?

g) What is meant by maxterm?

h) Find the output pulse width of monostable multivibrator for $R_A = 20\ k\Omega$ and $C = 0.1\ \mu F$.

i) What are sequential circuits?

j) What is regulation in power supply?

Q2) Attempt Any Two (Five marks each): **[10]**

a) Design and construct half adder using k-map.

b) Explain R-S flip-flop using logic diagram and truth table.

c) Draw and explain circuit diagram of integrator circuit. Derive the expression for it.

P.T.O.

Q3) Attempt Any Two (Five marks each): **[10]**

a) When VGS of JFET changes from 2.2V to 2.1V, the drain current raises from 1.1 mA to 1.4 mA. Find the value of transconductance.

b) A 5-bit asynchronous counter begins with 00000 state. What will be the state of a counter after 144 pulses?

c) Explain positive voltage regulator using IC 78XX.

Q4) a) Attempt Any One (Eight marks): **[8]**

i) Explain cross over distortion in push pull amplifier. Draw the circuit diagram for class-B push pull amplifier. How is it eliminated?

ii) What is multiplexer and demultiplexer? Draw logic diagram for 4:1 multiplexer.

b) Attempt Any One (Two marks): **[2]**

i) Define optocoupler. Draw optocoupler circuit.

ii) Map the standard expression on a k-map.

$\bar{A}\bar{B}C+\bar{A}B\bar{C}+AB\bar{C}+ABC$

●●●●●

Total No. of Questions :4]

P1160

[5017]-4017
T.Y. B.Sc.
PHYSICS
PH-345 (B): Advanced Electronics
(2013 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.***
3) ***Draw neat diagrams wherever necessary.***
4) ***Use of log tables and calculators is allowed.***

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

a) Temperature of a material is 100°C. Express this temperature in °F.

b) State the principle of bimetal strip thermal sensors.

c) What do you mean by population inversion?

d) State the balancing condition for simple dc wheatstones bridge.

e) What is slew rate?

f) State the peltier effect in thermocouple.

g) What is controlled variable?

h) Give the classification of filters.

i) State the different types of accelerometers.

j) Calculate the velocity of EM radiations in glass having refracting index of 1.5.

Q2) Attempt Any Two of the following:

a) Explain the principle and working of photoconductive detector. **[5]**

b) Explain op-amp as voltage to current converter. **[5]**

c) Describe the first order active low pass filter with neat circuit diagram. **[5]**

Q3) Solve Any Two of the following:

a) A He-Ne laser with an exit diameter of 0.2 cm, power of 7.5 mW and divergence of 1.7×10^{-3} rad is to be used with a detector 150 meters away. Find the power of the laser light if the detector area is 5×10^{-4} m^2. **[5]**

b) What is data acquisition system? Explain it's hardware with the help of suitable diagram. **[5]**

c) Explain the application of a bridge circuit in process control signal conditioning. **[5]**

Q4) a) Attempt Any One of the following:

i) Draw the block diagram of process control loop. Explain each block in brief. **[8]**

ii) What is instrumentation amplifier? State important features of instrumentation amplifier. Obtain the expression for differential gain. **[8]**

b) Attempt Any One of the following:

i) Draw a circuit diagram of low pass and high pass RC filters. **[2]**

ii) Draw the block diagram of analog to digital converter. **[2]**

●●●●●

Total No. of Questions :4]

SEAT No. :

P1161

[Total No. of Pages :12

[5017]-4018
T.Y. B.Sc.
PHYSICS
PH-346 (G): Medical Electronics
(2013 Pattern) (Paper-VI) (Elective-II) (Semester-IV) (New)

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

Instructions to the candidates:

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

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

a) State uses of spectrophotometry.

b) What are the specification of medical instrumentation system?

c) What is diastolic pressure?

d) What is polarization?

e) What is phonocardiogram?

f) What are the different types of ultrasonic blood flow meter?

g) Give any two limitations of differential amplifier.

h) Write any two advantages instrumentation amplifier in Biomedical field.

i) State principle of inductive sensor.

j) What do you mean by ECG?

Q2) Attempt Any Two of the following:

a) Explain Electrode-electrolyte interface. **[5]**

b) Explain laser Doppler Blood flowmeter with suitable examples. **[5]**

c) Explain any one method of patient monitoring safety system. **[5]**

P.T.O.

Q3) Attempt Any Two of the following:

a) Calculate the maximum audiofrequency of a doppler ultra sonic blood flowmeter that has a carrier frequency of 7 MHz, a transducer angle of 45°, a blood velocity of 15° cm/s, and an acoustic velocity of 1500 m/s. **[5]**

b) Explain laser doppler blood° flow meter with suitable examples. **[5]**

c) Describe in detail isolation amplifier with circuit diagram. **[5]**

Q4) a) Attempt Any One of the following:

i) Draw block diagram of basic medical instrumentation system. Explain in detail basic medical instrumentation system with suitable examples. **[8]**

ii) Describe principle, construction and working of calorimeter. **[8]**

b) Attempt Any One of the following:

i) What is the principle of resistive sensor. **[2]**

ii) Explain any one electrodes of EEG. **[2]**

●●●●●

Total No. of Questions :4]

P1161

[5017]-4018
T.Y. B.Sc.
PHYSICS
PH-346 (H): Physics of Nanomaterials
(2013 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 neat diagrams wherever necessary.***
4) ***Use of log tables and calculators is allowed.***

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

a) What is meant by 'nano'?

b) State the classes of nanomaterials on the basis of origin.

c) State disadvantages of bottom-up processing.

d) State any two mechanical methods of preparation of nanomaterials.

e) What is sol?

f) What is Beer-lambert law?

g) What are the types of spectrometers?

h) Draw the graph for particle size Vs. band gap energy for nanomaterial.

i) Define term 'Quantum Dots'.

j) State any two applications of nanomaterials in space.

Q2) Attempt Any Two (Five marks each): **[10]**

a) Give the classification of nanomaterials according to their dimensions.

b) Write a detailed note on transmission electron microscopy.

c) Explain any five properties of carbon nanotubes.

Q3) Attempt Any Two (Five marks each): **[10[**

a) Explain the significance of nano-size.

b) State the advantages and disadvantages of SEM.

c) Write a detailed note on optical properties of nanoparticles.

Q4) A) Attempt Any One:

a) Describe the physical vapour deposition method for the preparation of nanomaterials. **[8]**

b) i) What is bottom-up processing? State the advantages of it. **[4]**

ii) Explain how nanomaterials are useful in cosmetic industry. **[4]**

B) Attempt Any One (Two marks): **[2]**

a) What are the limitations of TEM technique?

b) What are the multi-walled nanotubes?

●●●●●

Total No. of Questions :4]

P1161

[5017]-4018
T.Y. B.Sc.
PHYSICS
PH-346 (I): Microcontroller
(2013 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 (1 mark each): **[10]**

a) What does the term embedded system mean?

b) What is the size of program counter in 8051?

c) Out of 128 bytes of RAM in the 8051, how many bytes are bit addressable?

d) Mnemonic ACALL stands for what?

e) Upon POWER-UP, which register bank is selected?

f) How many timers do we have in the 8051?

g) What is the use of C/T bit in TMOD register?

h) Define Baud rate in the 8051.

i) In the 8051, what is the size of the stack pointer?

j) Define machine cycle for the 8051.

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

a) Describe memory structure of the 8051 microcontroller.

b) Explain PSW register in 8051.

c) Explain the difference between microprocessor and microcontroller.

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

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

b) Write assembly language program to add first ten natural numbers.

c) Explain PSW register in 8051.

Q4) a) Attempt Any One of the following: **[8]**

i) Draw internal block diagram of 8051. Explain internal RAM structure in detail.

ii) List the timers of 8051 and their associated registers. Explain different modes of 8051 timers.

b) Attempt Any One of the following: **[2]**

i) Distinguish between full duplex and half duplex mode.

ii) If crystal frequency is 11.0592 MHz, then find the period of machine cycle of 8051.

●●●●●

Total No. of Questions :4]

P1161

[5017]-4018
T.Y. B.Sc.
PHYSICS
PH-346 (J): Electroacoustics and Entertainment Electronics
(2013 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 (1 mark each): **[10]**

a) Give typical frequency response of a carbon microphone.

b) What is volume compressor?

c) What is reverberation?

d) What do you mean by articulation score?

e) Define directivity factor for a microphone.

f) Give two advantages of folded horn.

g) Give the frequency theory of hearing.

h) Draw equivalent circuit for a direct radiator loud speaker.

i) What is the significance of cut-off frequency in case of an exponential horn?

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

Q2) Attempt Any Two (Five marks each):

a) Give acoustic characteristics of the outer ear. **[5]**

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

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

Q3) Attempt Any Two (Five marks each):

a) On a level detector type reverberation time measurment, the upper and lower levels are 2.1 volts and 1100 mV respectively. If the time elapsed between the two levels is 0.11 sec, determine the reverberation time. **[5]**

b) A condensor microphone diaphragm of radius 0.01 m is stretched to a tension of 2×10^4 N/m. If the spacing between the diaphragm and the backing plate is 4×10^{-5} m, determine the open circuit voltage response for a polarizing voltage of 230 V. **[5]**

c) Find the reverberation time of a office which has a volume of 1800 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]**

Q4) a) Attempt Any One (Eight marks):

i) Discuss the effect of voice coil parameters on the acoustic output of direct radiator loudspeakers. **[8]**

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

b) Attempt Any One (Two marks):

i) Distinguish between frame and sector of a digital audio CD. **[2]**

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

●●●●●

Total No. of Questions :4]

P1161

[5017]-4018
T.Y.B.Sc.
PHYSICS
PH-346 (K): Lasers
(2013 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 (1 mark each): **[10]**

a) Who and when investigated first LASER?

b) Define population density.

c) Define metastable state in LASER.

d) What are the various techniques of pumping in LASER?

e) Define round trip gain.

f) State the condition for critical population inversion.

g) Define FWHM.

h) State two types of coherence.

i) State any two types of gas lasers.

j) State various application of LASER beam in mechanical industries.

Q2) Attempt Any Two of the following: (5marks each): **[10]**

a) Explain the various characteristics of LASER beam in brief.

b) What is a Lineshape broadening? Explain homogeneous and inhomogeneous broadening.

c) Obtain Einstein coefficient relations in LASER action.

Q3) Attempt Any Two of the following: (5marks each): **[10]**

a) What will be the reflectivity of other cavity mirror if reflectance of first mirror is 100%? The length of the cavity is 15 cm and gain factor of LASER material is 0.0005 per cm.

b) The half - width of gain profile of He-Ne laser material device is 0.002 nm having length of cavity is 10 cm. Calculate emitted wavelength of laser in order to single mode of oscillation having refractive index of material is 1.

c) Light from a He-Ne laser, which is the traditional monochromatic source, has coherence length of about 100 m and wavelength 6328 $\mathring{A}$. Calculate bandwidth of He-Ne laser.

Q4) a) Attempt Any One of the following: **[8]**

i) Describe construction and working of Ruby LASER. Also give its applications.

ii) What is a hologram? Describe inshort how hologram is generated.

b) Attempt Any One of the following: **[2]**

i) Draw the block diagram for optical resonator and label it.

ii) Draw diagram for 4-level optical pumping and label it.

●●●●●

Total No. of Questions :4]

P1161

[5017]-4018
T.Y.B.Sc.
PHYSICS
PH-346 (L): Radiation Physics
(2013 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 neat diagrams wherever necessary.***

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

a) Give any two properties of gamma radiations.

b) Give any two applications of X-rays in medical field.

c) Give the relation between rad and gray.

d) Define one curie activity of source.

e) What is RBE factor?

f) What is dosimeter?

g) Define attenuation coefficient of radiation.

h) What is LET?

i) Define one electron volt energy.

j) State law of Radioactivity.

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

a) Explain different types of cosmic radiations and their energies.

b) Discuss the principle and methods of production of characteristic X-rays.

c) Explain the different types of interactions of gamma radiations with matter.

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

a) 10 MeV alpha particle enters into the ionization detector and deposit energy into the detector. The average energy needed to create one electron-ion pair in air medium of detector is 35 eV. Calculate the total number of ion-pairs created and total charge generated in the detector.

(Given: $e = 1.6 \times 10^{-19}$ C).

b) Discuss the applications of radioactive isotopes in medical diagnosis.

c) Explain exposure dose and absorbed dose of radiations.

Q4) a) Attempt Any One of the following: **[8]**

i) Discuss the principle, construction and working of scintillation detector with diagram.

ii) Discuss different materials for radiation shielding and guide lines of Government for radiation protection and safety rules.

b) Attempt Any One of the following: **[2]**

i) Explain photo-electric effect for gamma radiations.

ii) Define activity of radioactive substance.

●●●●●

Total No. of Questions : 4]

SEAT No :

P1162

[Total No. of Pages : 3

[5017]-4019
T.Y.B.Sc.
CHEMISTRY
CH - 341 : Physical Chemistry
(2013 Pattren)(Semester - IV) (Paper - I)

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

Instructions to the candidates:

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

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

a) Define 'Heat of crystalization?

b) What is zero point energy.

c) Define the term isotope. Give its one example.

d) Sketch 100 plane in F.C.C. crystal lattice.

e) Write the cell reaction for the following cell

$Z_n \mid Z_nSO_4 \parallel CuSO_4 \mid Cu$

f) Complete the following nuclear reaction

$^{238}_{92}U \rightarrow {}^{234}_{90}Th$+----

g) Define 'Concentration cell'

h) Define : unit cell.

i) Formulate the cell for the following cell reaction

$Zn(s)+Hg_2SO_4(s) \rightleftharpoons 2Hg(l)+ZnSO_4$

j) What is dead time of the counter?

P.T.O.

Q2) a) Answer any two of the following **[06]**

i) State time independent Schrodinger wave equation. Explain the terms involved in it.

ii) Explain the construction and working of standard hydrogen electrode.

iii) Describe laue method for the determination of crystal structure.

b) Solve Any One of the following: **[04]**

i) Culculate the EMF of the following cell at 25°C

$$^{\ominus}Zn|\ Zn^{++}(a=0.01)||Cd^{++}(a=0.05)|Cd^{\oplus}$$

[Given : $E^0Zn = 0.76$ volt and $E^0Cd = 0.44$ volt as oxid^n potentials]

ii) Find the binding energy and mean binding energy of the nuclide $^{60}_{28}Ni$

Given : At. mass of Ni= 59.935528 amu.

$M_p = 1.007828$ amu.

$M_n = 1.008665$ amu.

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

a) Write briefly on : Weiss and Miller indices.

b) What are thermodynamic conditions of reversible cell? Explain reversible and irreversible cell with suitable example.

c) Discuss the stability of the nucleus with respect to neutron to proton ratio and odd -even nature of protons and neutrons.

Q4) a) Sketch the plot for the wave function (Ψ) and the probability density (Ψ^2) Vs displacement coordinates for the first four energy levels for a particle in one dimentional box. **[06]**

OR

a) What is emf? How it is determined experimentally by Pogendroffs compensation principle.

b) Solve Any One of the following. **[04]**

i) Potassium metal has B.C.C. structure. The density of metal is 0.856 g/cm^3. Calculate the length of unit cell.

Given : At. wt of K= 39.102

ii) The emf of the cell

Pt | SCE || weak acid, quinhydrone |Pt, at 25°C is 0.292 Volts. Calculate pH of the weak acid.

Given : $E^{o}_{SCE(oxi)} = -0.242$ Volts

$E^{o}_{q(oxi)} = -0.6997$ Volts.

✡ ✡ ✡

Total No. of Questions : 4]

SEAT No. :

P1163

[Total No. of Pages : 2

[5017]-4020
T.Y. B.Sc.
CHEMISTRY
CH - 342 : Inorganic Chemistry
(2013 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) ***Neat diagram must be drawn wherever necessary.***
4) ***Actual calculations must be shown while solving the problems.***
5) ***Use of log-table and calculator is allowed.***

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

a) Define the transuranic elements.

b) Give the common oxidation state of lanthanides.

c) What is Bio-inorganic chemistry?

d) Which protein is involved in iron transport?

e) Give the limitation of heterogeneous catalysts.

f) Why diamond is an insulator?

g) What is the coordination number of an ionic solid having radius ratio 0.235 to 0.410.

h) Define superconductors.

i) Give the types of homogeneous catalysts.

j) Give Born-Lande equation for calculation of lattice energy.

Q2) a) Write note on Any Two of the following: **[6]**

i) Nuclear fusion fuels.

ii) Bio-inorganic role of calcium and magnesium metal.

iii) P-type semiconductors.

P.T.O.

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

i) Explain heavy ion bombardment method with suitable example.

ii) What is effect of addition of impurities on conductivity of metals and semiconductors?

iii) Draw a structure of vitamin B-12.

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

a) Discuss the mechanism of polymerization of ethylene by Ziegler-Natta catalyst.

b) What is Born-Haber cycle? Describe the use of Born-Haber cycle for calculating the lattice energy of sodium chloride.

c) What are lanthanides? Give their name, symbol, atomic number and electronic configuration.

Q4) a) "Non-stoichiometric defects in the crystals produce n-type and p-type semiconducting character". Explain with suitable example. **[6]**

OR

Answer the following: **[6]**

i) Explain in short the synthesis of benzoic acid from toluene.

ii) Discuss the essential properties of homogeneous catalysts.

b) What is close packing? Explain types of closed packed structures. **[4]**

OR

Explain synthesis of P-aminophenol from nitrobenzene using Pt/C catalyst. **[4]**

●●●●●

Total No. of Questions :4]

SEAT No. :

P1164

[Total No. of Pages :5

[5017] - 4021

T.Y.B.Sc.

CHEMISTY

CH - 343 : Organic Chemistry

(2013 Pattern) (Semester - IV) (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 structure 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) Calculate the fundamental modes of vibration for NH_3.

b) How will you prove presence of benzene ring in ephedrine.

c) Define spectroscopy.

d) What do you mean by reactive methylene group.

e) Define disconnection with suitable example.

f) How many sest of protons present in $CH_3 - CH_2 - O - CH_2 - CH_3$.

g) In which rearrangement reaction soda - azide and acyl halide are used.

h) Give molecular structure and source of citral.

i) Define hyperchromic and hypsochromic shift.

j) Define coupling constant (J).

P.T.O.

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

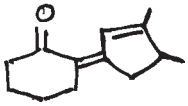
i) Write the synthesis of succinic acid starting from diethyl malonate.

ii) Write retrosynthesis and synthesis of acetophenone.

iii) Write a note on 'Claisen rearrangement.'

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

i) 

ii) 

OR

i) Cyclopentadiene forms carbanion readily. Explain.

ii) P - nitrophenol shows red shift in basic medium. Explain.

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

a) i) Give the synthesis of Ephedrine from benzaldehyde. **[3]**

ii) How will you distinguish the following pair by IR spectroscopy. **[2]**

b) i) Explain 'Pinacol - Pinacolone' rearrangement with suitable example. **[3]**

ii) How IR spectroscopy is useful for the determination of hydrogen bonding in a molecule? **[2]**

c) i) Define spin - spin coupling and write its rule. **[3]**

ii) Write note on 'wittig' reaction. **[2]**

Q4) a) Propose structures for the compounds from the following spectroscopic data. Justify your answer (any <u>two</u>) **[6]**

i) M.F. - $C_5H_{10}O$

UV: λ_{max} = 255 nm, 305 nm.

IR : 1720 cm^{-1}

NMR : 1) Triplet, 1.05 δ (6 H)

2) Quartet, 2.5 δ (4 H)

ii) M . F. – C_4H_9Br

NMR : 1) Doublet, 1.04 δ (6 H)

2) Multiplet, 1.95 δ (1 H)

3) Doublet, 3.33 δ (2 H)

iii) M . F. – C_7H_8O

IR : 3500, 1600, 1500 cm^{-1}

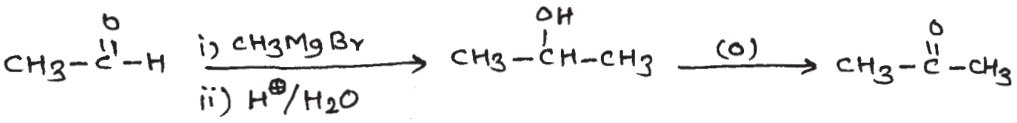
NMR : 1) Singlet, 3.7 δ (1 H)

2) Singlet, 4.4 δ (2 H)

3) Singlet, 7.2 δ (5 H)

b) i) Aniline shows blue shift in acidic medium. Explain. **[2]**

ii) How will you follow the following course of reaction by IR spectroscopy. **[2]**



OR

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

i) Define synthon and synthetic equivalent.

ii) Write note on Perkin reaction.

iii) Types of coupling.

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 (alcohols, 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.	–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, $R_2C=\overset{\overset{R}{\|}}{C}-CH_3$	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, $RC(=O)CH_3$	2.1 – 2.6	$R-\overset{\overset{O}{\|}}{C}-CH_2-$	2.4δ
		$R-\overset{\overset{O}{\|}}{C}-\overset{\overset{R}{\|}}{CH}-$	2.5δ
Aldehyde, $RC(=O)H$	9.5 – 9.6		
Vinylic, $R_2C=CH_2$	4.6 – 5.0		
Vinylic $R_2C=\overset{\overset{R}{\|}}{CH}$	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*		
Carboxylic, $RC(=O)OH$	10 – 13*		
Phenolic, ArOH	4.5 – 7.7*		
Amino R– NH_2	1.0 – 5.0		

*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) (202nm 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) – NR2	α 30 nm
	b) Alkyl group at β	12 nm		β 85 nm
	c) Alkyl group at γ, δ & higher	18 nm		γ & β 95 nm
5)	Exocylic double bond	05 nm		

Total No. of Questions : 4]

SEAT No. :

P1165

[Total No. of Pages : 2

[5017]-4022
T.Y.B.Sc.
CHEMISTRY
CH : 344 : Analytical Chemistry
(Paper-IV) (2013 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 log table and calculator is allowed.***

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

a) Define distribution ratio.

b) Define the term " Retardation factor".

c) What is the stationary phase and mobile phase in TLC?

d) What is the role of mobile phase in chromatography.

e) What is SFC?

f) What is HETP.

g) State the principle of electrophoresis.

h) What is the migration velocity in electrophoresis.

i) Give the principle of turbidimetry.

j) At what angle the radiant power of scattered radiation is measured in Nephelometry.

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

i) Explain in brief the chromatographic seperation of amino acids.

ii) Discuss various applications of HPLC.

iii) Explain the injection port in GC.

P.T.O.

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

i) Draw a block diagram of HPLC.

ii) Calculate distribution ratio when concentration of solute in organic layer is 0.325M and in aqueous layer is 0.0375M.

iii) Calculate the turbidance of chloride ion at 415nm. gave a transmittance of 0.6215.

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

a) Explain factors affecting solvent extraction.

b) Explain the thermal conductivity detector in GC.

c) Sketch schematic diagram of HPLC and explain its various components.

Q4) a) What is " Counter Current extraction"? When it is used? Explain the technique with craig apparatus. **[6]**

OR

a) i) Give the principle of Nephelometry. **[3]**

ii) Explain in brief moving boundary electrophoresis. **[3]**

b) 300 mg of solute in 100 ml of water has a distribution ratio '10' Calculate the amount of solute extracted after two successive extraction with 50ml of an organic solvent. **[4]**

OR

b) In the experiment of paper chromatographic seperation, silver, lead and mercury. The solvent front was 30 cm. While from due to these metals were 24,20 and 9cm. respectively. Calculate R_f values of these metals. **[4]**

✓ ✓ ✓

Total No. of Questions : 4]

SEAT No. :

P1166

[Total No. of Pages : 2

[5017]-4023
T.Y.B.Sc.
CHEMISTRY
CH - 345 : Industrial Chemistry
(2013 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) ***Draw neat diagrams and flow sheet wherever necessary.***

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

a) Define the term copolymer.

b) What are chromophores?

c) What is Coffey's still?

d) What are micelles?

e) Define the term drug.

f) What is sugar boiling.

g) Define elastomers.

h) Write the structure of phenolphthalein.

i) What are cosmetics?

j) What is atom efficiency?

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

i) Give the preparation of nylon 6.

ii) Write note on washing action of soap.

iii) Write note on fermentation.

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

i) What are oxygenated solvents? Give two examples.

ii) What are agonist drugs? Explain.

iii) Explain the term waste minimization.

P.T.O.

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

a) What are synthetic rubbers? What are important properties and uses of synthetic rubbers?

b) What are dyes? What are qualities of good dyes?

c) Give the synthesis and uses of paracetamol and aspirin.

Q4) a) What are surfactants? Discuss the various types of surfactants. **[6]**

OR

a) Describe manufacturing of raw sugar from sugar cane with flow sheet and special reference to multiple effect evaporator. **[6]**

b) Give synthesis and application of Alizarin. **[4]**

OR

b) Write note on: **[4]**

i) Lagoon

ii) Ziegler - Natta Catalyst.

Total No. of Questions : 4]

SEAT No. :

P 1167

[Total No. of Pages :2

[5017] - 4024
T. Y. B.Sc.
CHEMISTRY
CH - 346(A) : Nuclear Chemistry
(2013 Pattern) (Elective-II) (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 diagrams wherever necessary.***
4) ***Use of log-tables and calculator is allowed.***

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

a) State Joliots and Savitch experiment on discovery of nuclear fission.

b) Which are the two fuels used in nuclear reactors?

c) State the Principle of linear accelerator.

d) What are the advantages of semiconductor detector?

e) Give one example of cow and milk system.

f) The loss in mass in fission process is 1.1173amu. Calculate the fission energy.

g) Which is the moderator in natural uranium reactor?

h) What do you mean by probing by isotopes?

i) State the principle of Isotope dilution analysis.

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

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

i) Write short note on fission energy.

ii) Explain the working of Fast Breeder Test Reactor at Kalpkkam.

iii) Write a short note on Szilard-Chalmer reaction.

P.T.O.

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

i) Discuss the principle of Radiometric titration.

ii) What are biological effects of radiations?

iii) Explain India's nuclear energy programme.

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

a) Explain the principle and working of Vande Graft accelerator.

b) Define Reproduction factor (K). Write an expression of four factor formula and explain the terms involved in it.

c) Explain the principle of Neutron Activation Analysis. State its applications. What are the advantages of the method.

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

OR

Discuss the principle of scintillation counter. Discuss different types of scintillators with its working.

b) Explain the principle and working of semiconductor detector. **[4]**

OR

Compute the energy released in the following fission

$$^{239}_{94}\text{Pu} + \text{n} \rightarrow {}^{108}\text{Pd} + {}^{129}\text{Xe} + 3\text{n}$$

Given : $^{239}\text{Pu} = 239.0522$ amu, $^{108}\text{Pd} = 107.9039$ amu.

$^{129}\text{Xe} = 128.9048$ amu and $\text{n} = 1.00897$ amu.

☆ ☆ ☆ ☆

Total No. of Questions : 4]

SEAT No. :

P 1168

[Total No. of Pages :2

[5017] - 4025
T.Y.B.Sc.
CHEMISTRY
CH - 346 (B) : Polymer Chemistry
(2013 Pattern New) (Semester - IV) (Paper - VI)

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

Instructions to the condidates :

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

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

a) Define the term : Thermosetting.

b) What is meant by graft co-polymer?

c) 'Polyphenylene is soluble in n-hexane'. Explain.

d) Define the meaning of the term : Scouring of fibre.

e) Draw the geometrical structure of interpenetrating coil structure of polymer.

f) Give the important IR peaks of polyamide polymer.

g) 'Naturally occuring polymers from plants are biodegradable'. State whether the statement is true or false.

h) 'Kevlar (aramides) has very high melting points. Explain.

i) Give an important applications of teflon.

j) What is meant by lubrication of fibre?

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

i) Write a note on : Photodegradation of polymers.

ii) Give a brief account on importance of glass transition temperature (GTT).

iii) Discuss the factors affecting on crystallizability of polymers.

P.T.O.

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

i) How will you distinguish linear and branched polymers?

ii) Explain the optical properties of polymers.

iii) 'Polyethylene has T_g - 125°C while nylon 6.6 has 50°C'. Explain.

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

a) Give a detailed account of biodegradable polymers.

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

i) polyvinyl chloride.

ii) Urea formaldehyde resin.

c) Discuss in detail the spectroscopic methods for testing and analysis of polymers.

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

i) Describe the calendering technique polymer porocessing.

ii) Write a note on : Vulcanization.

iii) Explain the thermo forming technique in detail.

b) What is meant by fibre? Give the detailed account of dry spinning process in fibre technology. **[4]**

☆ ☆ ☆ ☆

Total No. of Questions : 4]

SEAT No. :

P 1169

[Total No. of Pages :2

[5017] - 4026
T.Y.B.Sc.
CHEMISTRY
CH - 346(C) : Introduction to Biochemistry and Molecular Biology
(2013 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 : **[10]**

a) Give two examples of vectors.

b) What is an Initiation Codon?

c) Name the key enzymes that helps in synthesis of RNA from DNA.

d) Define a nucleotide.

e) Which DNA Polymerase is involved in RNA Primer removal function?

f) List out the ketone bodies produced in liver.

g) Define catabolism.

h) Give two examples of inhibitors of mitochondrial ETC.

i) Name two coenzymes of Pyruvate dehydrogenase complex .

j) What is decarboxylation reaction of aminoacid? Give example.

Q2) a) Attempt <u>any two</u> of the following: **[4]**

i) Show the central dogma of molecular biology.

ii) Give the steps involved in formation of Triacylglycerol.

iii) List out four features of genetic code.

P.T.O.

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

i) Write note on chemiosmotic hypothesis.

ii) Give the types and features of Restriction Endonucleases.

iii) What are Promoter sequences? Give their significance.

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

a) Discuss the steps involved in Glycolysis with energetics.

b) Describe Messelson and Stahl experiment and its interpretation.

c) Explain β- oxidation of fatty acids with energetics.

Q4) Answer the following :

a) Elaborate on the steps involved in Translation Process **[6]**

OR

a) Describe the reactions of Urea cycle

b) Write note on Lac operon. **[4]**

OR

b) Show the fate of Pyruvate, in anaerobic conditions.

☆ ☆ ☆ ☆

Total No. of Questions : 4]

SEAT No. : ____

P1170

[Total No. of Pages : 2

[5017]-4027

T.Y.B.Sc. (Semester - IV)

CHEMISTRY

CH-346D :Environmental and Green Chemistry

(2013 Pattern)(Paper - VI) (Elective - II)

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]**

i) Define Ultrafiltration

ii) What is meant by soil profile.

iii) Define Chemiluminescence

iv) What is the role of glass electrode in Potentiometry.

v) In which region carbondioxide is absorb.

vi) What is the hybridization of oxygen atom in water molecule.

vii) What is chelating agent.

viii) How much energy is stored by C-H bond

ix) Define the term 'retention time' in Gas Chromatography.

x) Define reverse Osmosis

P.T.O.

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

i) Radiant energy from the sun

ii) Explain important properties of water

iii) Explain Non Dispersive Infra Red (NDIR)

b) Write short notes on Any Two **[4]**

i) Municipal Water Treatment

ii) Wastes and Pollutants in soil

iii) Green House Coefficient

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

i) Explain in detail Preliminary Waste Treatment

ii) Give Principle of AAS. Explain in detail Atomic Absorption Spectrophotometry

iii) Explain living organisms in water

Q4) a) Explain in detail Renewable energy sources **[6]**

OR

Explain Acid - base & Ionic reactions in soil and PH of soil **[6]**

b) Write notes on Any One **[4]**

i) Mechanism & Role of CO_2

ii) Weak acid from sky

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

P1171 **[Total No. of Pages : 2**

[5017] - 4028

T.Y.B.Sc. (Semester - IV)

CHEMISTRY

CH-346(E) : Dairy Chemistry

(2013 Pattern)(Paper -VI)(Elective - II)

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

Instructions to the candidates:

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

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

a) What is Curdling of Milk?

b) Define Flavoured Milk?

c) Give uses of Minerals.

d) What is meant by Platform Test?

e) How will you detect presence of Starch in Milk?

f) Define cream.

g) What is Standardisation of Milk?

h) Define Skimmed Milk.

i) Give nutritive value of Ice-Cream Milk Powder?

j) Give uses of Whey Powder.

P.T.O.

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

i) What are advantages and disadvantages of Pasturised Milk?

ii) Comment on Colour of Milk.

iii) Compare Gravity method and Centrifugal method of Cream Separation

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

i) Comment on fats of milk.

ii) Draw flowsheet diagram of manufacture of flavoured milk.

iii) Give the importance of Proteins in the Milk.

Q3) a) Define whey Powder.Give flow sheet diagram for manufacture of whey Powder **[5]**

OR

Write a note on 'Milk and Public Health' **[5]**

b) Give importance of Lactose. **[5]**

OR

Define Butter, Give flowsheet diagram of manufacture of Butter,Give its food and nutritive value of uses. **[5]**

Q4) a) Attempt Any Two **[6]**

i) Discuss different nutrients Present in Milk.

ii) Define Ice-Cream Powder. Give its flow sheet diagram.

iii) Give the uses of Preservatives.

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

i) Write Properties and uses of Vitamin C.

ii) Give different methods of Preservation,

iii) Give objects of Sterilization.

Total No. of Questions : 4]

SEAT No. :

P1172

[Total No. of Pages : 2

[5017] - 4029

T.Y.B.Sc. (Semester - IV)

BOTANY

BO - 341: Plant Physiology and Biochemistry

(2013 Pattern)(Paper - I)

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

Instructions to the candidates:

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

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

a) Define Photophosphorylation.

b) Write first Stable Compound in C_3 Cycle.

c) What are Proteins?

d) Give any two roles of Secondary Metabolites

e) Write the elements of Phloem

f) What are triglycerides?

g) Write any two examples of amino acids.

h) Define abiotic Stress.

i) Write types of respiration

j) What is induced fit Theory?

P.T.O.

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

a) Write the salient features of C_4 Plants.

b) Give the effect of stresses on Plant Growth

c) Write the Mechanism of Synthesis of amino acids.

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

a) Ultra Structure of Chloroplast

b) Enzyme Inhibitors

c) Munch Hypothesis

Q4) Give Classification, Properties and functions of Carbohydrates. **[10]**

OR

Explain the reactions of glycolysis in detail.

Total No. of Questions : 4]

SEAT No. :

P1173

[Total No. of Pages : 2

[5017] - 4030

T.Y.B.Sc. (Semester - IV)

BOTANY

BO-342: Plant Ecology and Biodiversity

(2013 Pattern)(Paper - II)

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 remote sensing?

b) Define ecology.

c) Give any one cause for desertification.

d) State the term Economics.

e) Write any two applications of remote sensing in ecology.

f) What is Endemism?

g) Mention any two objectives of biodiversity.

h) What is meant by genetic diversity?

i) Define Biodiversity monitoring.

j) What is In-Situ conservation?

P.T.O.

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

a) Give the objectives of Environmental Impact Assessment (EIA)

b) Explain the concept of Man and Biosphere

c) Discuss the necessity of monitoring biodiversity.

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

a) Global Warming.

b) Chipko Movement.

c) Genetic Drift.

Q4) a) What is Ex-Situ Conservation? Explain any two methods of Ex-Situ Conservation **[10]**

OR

What is air pollution? Describe the causes, prevention and control measures of Air Pollution.

Total No. of Questions : 4]

SEAT No. : [ ]

P1174

[Total No. of Pages : 2

[5017] - 4031

T.Y.B.Sc. (Semester - IV)

BOTANY

BO-343: Plant Pathology

(2013 Pattern)(Paper - III)

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

Instructions to the candidates:

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

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

a) Define Predisposition.

b) What is Inoculum?

c) Define disease.

d) What is ICRISAT?

e) Give the names of any two diseases caused by Mycoplasma.

f) Give the name of causal organism of black arm of cotton disease.

g) What is Microbial Pesticide?

h) Enlist abiotic causes of plant diseases

i) What is Molecular Diagnostics?

j) Give any two control measures for TMV disease.

P.T.O.

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

a) Explain reasons for decline of epidemics.

b) Give the importance of disease fore casting.

c) Describe fungi as plant pathogen.

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

a) Koch's Postulates.

b) Citrus canker disease.

c) Contribution of B.B Mundkar

Q4) Give an account of club root of crucifers and tikka disease of groundnut with reference to causal organism, symptoms and control measures. **[10]**

OR

What is defence Mechanism? Explain Pre-existing structural and biochemical defence Mechanism.

Total No. of Questions : 4]

SEAT No. : ____

P1175

[Total No. of Pages : 2

[5017] - 4032

T.Y.B.Sc. (Semester - IV)

BOTANY

Medicinal and Economic Botany

(2013 Pattern)(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) What is Churna.

b) Give the name of Flower Drug.

c) Define Unani System of Medicine.

d) Define Ethanobotany.

e) Define Biopharmaceutics.

f) Define Economic Botany.

g) Give any uses of Sugercane.

h) What is Harvesting.

i) Give any two Medicinal uses of Shilajit.

j) Give any two therapeutic uses of Strychnusnux Vomica

P.T.O.

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

a) Explain Morphological Evaluation of Drug.

b) Give scope and Importance of Economic Botany.

c) Give method of Preparation of Asava.

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

a) Applications of Clinical Pharmacokinetics.

b) Non Wood Forest Products (NWFPs)with relation to gums.

c) Storage of Crude Drugs.

Q4) Give the origin, evolution Source and uses of Sugarcane. **[10]**

OR

Give occurance,distribution Cultivation,Microscopic Characters of Ephedra.

Total No. of Questions : 4]

SEAT No. : ____

P1176

[Total No. of Pages : 2

[5017] - 4033

T.Y.B.Sc. (Semester - IV)

BOTANY

BO - 345 Plant Biotechnology

(2013 Pattern)(Paper - V)

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

Instructions to the candidates:

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

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

a) What is intellectual Property Right?

b) Define Bioinformatics.

c) What is Cold Storage?

d) What is FASTA?

e) What are Diazotrophs?

f) Enlist the types of Proteomics.

g) What are Bioplastics?

h) What is Ex-Situ germplasm Conservation?

i) Give any two examples of GM foods..

j) What is explant?

P.T.O.

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

a) Write the applications of Bioinformatics.

b) Explain the concept of Proteomics.

c) Advantages of Cryopreservation.

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

a) Edible Vaccines.

b) Difference between in-situ and ex-situ Conservation

c) Give the outline for the Production of Secretory antibody in plant.

Q4) a) What is Nitrogen Fixation? Explain the Mechanism of Nitrogen Fixation **[10]**

OR

Define protoplast Explain various method of protoplast fusion and application of protoplast culture.

Total No. of Questions : 4]

SEAT No. :

P1177

[Total No. of Pages : 2

[5017] - 4034

T.Y.B.Sc. (Semester - IV)

BOTANY

BO - 346 : Plant Breeding and Seed Technology

(2013 Pattern)(Paper - VI)

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

Instructions to the candidates:

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

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

a) Define plant breeding.

b) What is induced Mutation?

c) What is Pedigree Method?

d) Give any two characteristics evaluated for pest tolerance.

e) What is abiotic Stress in Plant?

f) Define Seed Marketing

g) Give long form of "ODV" test.

h) What is Seed Certification?

i) Define nucleus seed

j) What is seed processing?

P.T.O.

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

a) Describe the process of Clonal Selection.

b) Give general principles and requirements of germination testing.

c) Describe moisture testing by air oven method.

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

a) Breeding for resistance

b) Methods of obtaning Polyploids.

c) Give Principles of Seed Processing

Q4) a) What is Selection? Describe mass selection with Advantages. **[10]**

OR

Give need of Seed Storage and Describe factors affecting on seed storage.

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

P1178 **[Total No. of Pages : 2**

[5017] - 4035

T.Y.B.Sc. (Semester - IV)

ZOOLOGY

ZY -341: Biological Techniques

(2013 Pattern)(Paper-I)

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

Instructions to the candidates:

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

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

a) Define Normality.

b) What is Affixation?

c) What is Microscopy?

d) Define Honing.

e) Enlist the types of microtome knives.

f) State Lambert's Law.

g) Define Vital Staining.

h) What is Cytochemistry.

i) Enlist various types of Centrifuge.

j) What is Bone Marrow?

P.T.O.

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

a) Explain the principle and working of phase contrast microscope.

b) Give the classification of Fixatives.

c) Describe vibrating Microtome.

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

a) Agarose gel Electrophoresis

b) Feulgen Reaction

c) Bleeding Time

Q4) What is Microtechnique? Give an account of clearing and alcoholising agent. **[10]**

OR

Explain the technique of total count of RBCs. State its Significance.

Total No. of Questions : 4]

SEAT No. :

P1179

[Total No. of Pages : 2

[5017] - 4036

T.Y.B.Sc. (Semester - IV)

ZOOLOGY

ZY -342: Mammalian Physiology and Endocrinology

(2013 Pattern) (Paper-II)

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

Instructions to the candidates:

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

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

a) What is coronary Bypass?

b) Define pulmonary respiration.

c) State the Significance of Dialysis.

d) Define simple muscle twitch.

e) Define stimulus.

f) State the reason for cretinism.

g) State the function of salivary amylase in physiology of digestion.

h) Define cardiac output.

i) What is oxyhaemoglobin.

j) Define oestrous cycle.

P.T.O.

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

a) Describe the process of selective reabsorption during urine formation.

b) Describe transmission of nerve impulse across a synapse.

c) Describe the characteristics of an individual with goiter.

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

a) Role of liver and pancreas in digestion.

b) Cardiac cycle.

c) Respiratory Quotient

Q4) Describe in detail hormonal control of pasturation. **[10]**

OR

What is excretion ? Describe in detail physiology of urine formation.

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

P1180 **[Total No. of Pages : 2**

[5017] - 4037

T.Y.B.Sc

ZOOLOGY (Semester - IV)

ZY-343: GENETICS AND MOLECULAR BIOLOGY

(2013 Pattern) (Paper-III)

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

Instructions to the candidates:

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

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

a) Define crossing over.
b) What are mutagenic agents?
c) Define gene pool.
d) State Hardy weinberg law.
e) What is bacterial transformation?
f) Define euchromatin.
g) Define translation.
h) What is Tag DNA polymerase?
i) Elaborate the term VNTRs.
j) what is meant by primer.

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

a) Describe the regulation of lac operon.
b) Give an account of restriction enzymes.
c) Give the significance of gene poolin mendelian population.

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

a) Incomplete linkage.
b) Recombination.
c) Heterochromatin.

P.T.O.

Q4) What is mutation? Describe different types of mutations. **[10]**

OR

Define DNA replication. Explain in detail the semiconservative method of DNA replication.

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

P1181 **[Total No. of Pages : 2**

[5017] - 4038
T.Y. B.Sc.
ZOOLOGY (Semester - IV)
ZY - 344: Organic Evolution
(2013 Pattern) (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 are Plastids?
b) Give any one Palaeontological evidence of organic evolution.
c) What is Zoogeography?
d) Who was Lamarck?
e) State any one factor influencing speciation?
f) What is mesozoic era?
g) Give two characters of ostralopithicus.
h) Define speciation.
i) Define protenoid microsphere.
j) What is isolation?

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

a) Give salient features of modern synthetic theory of organic evolution.
b) Describe patterns of animal distribution.
c) Describe Nearctic and palearctic realms with reference to geographic range and fauna.

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

a) Prezygotic isolating mechanism.
b) Types of speciation.
c) Homo sapiens.

P.T.O.

Q4) What is organic evolution? Explain physiological and biochemical evidences supporting it? **[10]**

OR

What is organic evolution ? Explain in detail Darwin's theory of organic evolution.

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

P1182 **[Total No. of Pages : 2**

[5017] - 4039

T.Y.B.Sc

ZOOLOGY (Semester - IV)

ZY-345: GENERAL EMBRYOLOGY

(2013 Pattern) (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 germ plasm theory?.
b) What is regeneration?.
c) Define centrolecithal egg.
d) What is organogenesis?
e) What is fertilization cone
f) Define spiral cleavage
g) What are somites?
h) What are tertiary egg membranes?.
i) What is Polar body?
j) what are gynogamories?

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

a) What is cleavage ? Describe different types of planes in cleavage.
b) Describe yolk sac.
c) Explain pangenesis theory of embryonic development..

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

a) Acrosome reaction.
b) Coeloblastula.
c) Gastrula of frog..

P.T.O.

Q4) What is spermatogenesis? Describe the process of spermatogenesis. **[10]**

OR

Describe the development of chick up to primitive streak stage.

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

P1183 **[Total No. of Pages : 4**

[5017] - 4040

T.Y.B.Sc.

ZOOLOGY (Semester - IV)

ZY - 346 (a): Public Health and Hygiene

(2013 Pattern) (Elective-II) (Paper-VI)

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

Instructions to the candidates:

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

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

a) Give any two environmental factors affecting health.
b) What are disadvantages of tea on the health?
c) Define sanitation.
d) Give two properties of drinking water.
e) Mention two symptoms of tuberculosis
f) What is rhumatic heart disease?
g) Write two physical properties of the soil.
h) Give the objectives of epidemiology
i) Mention the causative agent of Leprosy.
j) Name the disease caused due to deficiency of Vit-C.

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

a) Explain community health.
b) Describe methods of sampling.
c) Describe qualities of water for human consumption.

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

a) Causes of accidents at home.
b) Effects of radiation on human body.
c) Importance of beverages.

P.T.O.

Q4) Explain signs, symptoms, mode of transmission and control measures of Swine Flue. **[10]**

OR

Describe various methods of human waste disposal.

Total No. of Questions : 4]

P1183

[5017] - 4040

T.Y.B.Sc.

ZOOLOGY (Semester - IV)

ZY - 346 (b): Medical Entomology

(2013 Pattern) (Paper-VI)

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

Instructions to the candidates:

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

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

a) Define veterinary entomology.
b) Define interspecific association.
c) Write any two methods on the control of ants.
d) Write any two diseases spread by flea.
e) State the order of house fly.
f) Write the names of any two agricultural pests.
g) Write names of any two head appendages in insects.
h) Give any two control methods of Blister beetle.
i) Write any two adaptations in mosquito.
j) What are plant bodyguards?

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

a) Describe the effects of Bedbng on host.
b) Give an account of blood Sncking Fleas of veterinary importance.
c) Describe social organisation in wasps.

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

a) Agricultural entomology.
b) Male reproductive system of insect.
c) Social organisation in insects.

Q4) Describe life cycle of silver fish in brief and add a note on its distribution, damage and control measures. **[10]**

OR

Describe life cycle of house fly. Add a note on disease spread by it and its control measures.

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

P1184 **[Total No. of Pages : 2**

[5017] - 4041

T.Y.B.Sc

GEOLOGY (Semester - IV)

GL-341: METAMORPHIC PETROLOGY

(2013 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) ***Neat diagrams must be drawn wherever necessary***
4) ***Figures to the right side indicate full marks.***

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

a) Enlist any four types of metamorphic facies.

b) What is injection metamorphism?.

c) Enlist the chemically active fluids in thermal metamorphism.

d) What is the relation between stress and solubility of the minerals?

e) What is mylonite?

f) Give 2 characters of metamorphism.

g) What is lineation?

h) What is regional metamorphism?.

i) What is ACF diagram?

j) Give 2 evidences of metamorphic recrystallization in charnockites?

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

a) Barrovian zones of regional metamorphism.

b) Diagnstic structures of thermally metamorphosed rocks.

c) Stress and solubility of minerals.

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

a) Significance of inclusions in metamorphic crystals.

b) Difference between metamorphic recrystallization and Igneous Crystallization.

c) Foliation.

P.T.O.

Q4) Describe the effects of regional metamorphism on calcareous sediments.

[10]

OR

Describe the different types of pneumatolytic processes.

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

P1185 **[Total No. of Pages : 2**

[5017] - 4042

T.Y.B.Sc

GEOLOGY (Semester-IV)

GL-342: ENVIRONMENTAL GEOLOGY

(2013 Pattern) (Paper-II)

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

Instructions to the candidates:

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

Q1) Define Answer the following in 2, 3 lines each : **[10]**

a) Earthquakes.
b) Badland topography.
c) Pyroclastic flow.
d) Soil degradation.
e) Non renewable resource.
f) Cause of bhopal gas disaster.
g) Biogeochemical cycle.
h) Mine restoration.
i) Physical environment.
j) Hazard and disaster.

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

a) Types of mass movements.
b) Causes of flood.
c) Causes of land subsidence.

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

a) What are the causes of water pollution.
b) Describe disaster profile of India.
c) Explain the mitigation measures for earthquakes.

P.T.O.

Q4) Define volcano. Explain in detail the volcanic hazards related to lava flows and Lahars. Add a note on the prediction of a volcanic eruptions. **[10]**

OR

Explain the causes of desertification. Describe the mitigation and preventive measures to combat desertification.

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

P1186 **[Total No. of Pages : 2**

[5017] - 4043

T.Y.B.Sc (GEOLOGY)

GL-343: ECONOMIC GEOLOGY

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

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

Instructions to the candidates:

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

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

a) Metali ferous deposits.
b) Supergene minerals.
c) State the ore minerals of chromium.
d) Mesothermal deposits.
e) Shale gas.
f) Fly ash.
g) Where is the first oil field located in India.
h) Name the two minerals which form bronze alloy.
i) Define coal and give its composition.
j) Give the name of double sulphide of copper and iron.

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

a) What do you mean by Residual Liquid Segregation?
b) Geological and geographical distribution of copper deposits of India.
c) Describe surface indicators of oil.

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

a) Give the uses of Uranium & thorium.
b) Describe mineral deposits from hot springs.
c) Describe theories of origin of coal.

P.T.O.

Q4) What is geothermal energy? Explain different types of geothermal energy. **[10]**

OR

Give the mineralogy, geological and geographical distribution and uses of Lead and zinc mineral deposits.

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

P1187 **[Total No. of Pages : 2**

[5017] - 4044

T.Y.B.Sc. (GEOLOGY)

GL-344: GEOTECTONICS (Paper-IV)

(2013 Pattern) (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 each : **[10]**

a) Define CRM.
b) Define the term craton.
c) Define polar wandering.
d) Define plate boundary.
e) Define the term shield.
f) Define magnetic declination.
g) Define the term platform.
h) Define the term Geodynamo.
i) Define mobile belts.
j) Define Palaeomagnetism.

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

a) Describe the mechanics of sea floor spreading.
b) Describe the older concept of origin of mountains.
c) Describe the characteristic properties of P & S waves.

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

a) Describe the concept of plate tectonic theory.
b) Describe the term Neotectonics.
c) Describe the concept of Triple junctions.

P.T.O.

Q4) Describe the origin of meteorites add a note on its classification. **[10]**

OR

Explain the Divergent boundary as a constructive plate boundary with examples.

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

P1188 **[Total No. of Pages : 2**

[5017] - 4045

T.Y.B.Sc

GEOLOGY (Paper-V)

GG-345: Phanerozoic Stratigraphy Of India and Palaeontology

(2013 Pattern) (Semester IV)

Time : 2 Hour] ***[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 each : **[10]**

a) Give type locality for Carnlorian system.

b) Which Era is known as 'Age of mammals'?.

c) Name the Cenozoic Orogeny.

d) What are laterites

e) What is mass extinction?

f) Give lithostratigraphic subdivisions of Cretaceous of Cauvery/ Kavery basin.

g) Where do you find Varkala. Sandstones? Give their age.

h) Give systematic classification of glossopteris.

i) Give lithology of karewas of kashmir.

j) Name the oil bearing Formations of Tertiary of Assam.

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

a) Precambrian - Cambrian Boundary.

b) Ordovician System/Period.

c) Lithostratigraphic classification with age of gendwana Sequence.

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

a) Krishna - Godavari Basin.

b) Life and Climate during deposition of Siwaliks.

c) Modes of preservation of plants through geologic ages.

P.T.O.

Q4) Give geographic distribution lithostratigraphic succession lithology and life of jurassic of kachchh.

[10]

OR

Give geographic distribution lithostratigraphic classification, petrological characters and age of deccan volcanic province.

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

P1189 **[Total No. of Pages : 2**

[5017] - 4046

T.Y.B.Sc

GEOLOGY (Semester IV)

GL-346: Applied Geology - II

Engg. Geology, Geohydrology and Prospecting

(2013 Pattern) (Paper-VI)

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

Instructions to the candidates:

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

Q1) Answer the following in 2, 3 lines each : **[10]**

a) Name any two tunnels in Deccan Traps.

b) Explain the term spillway.

c) Give uses of rock aggregates.

d) What are target rings?

e) What is gravimeter?

f) Name any two important underground mines in India.

g) Define Aquifer.

h) What is Connate water?.

i) What is water table?

j) Define engineering geology.

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

a) Write on confined aquifer.

b) Write on applications of seismic methods of prospecting.

c) Write about tensile strength and elasticity of rocks.

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

a) Write about considerations during construction of tunnels through folded rocks.

b) Describe arch dam and earthern dam.

c) Explain the significance of geology in Civil Engineering.

P.T.O.

Q4) Write on principles and applications of electrical resistiv` ity method along with its measured parameters, types of electrode arrangement and name of the instrument used.

[10]

OR

Describe the movement of groundwater withe the help of darly's law. Add a note on any two methods of artificial recharge of ground water.

Total No. of Questions : 4]

SEAT No. :

P1190

[Total No. of Pages : 3

[5017]-4050

T.Y. B.Sc.

STATISTICS (Principal)

ST - 341 : Actuarial Statistics

(2013 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 scientific calculator and statistical tables is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following :

a) Choose the correct alternative for each of the following : **[1 each]**

i) The present value of annuity certain immediate, at the rate of 1 unit per annum for n years is given by

A) $\frac{1-V^n}{d}$ B) $\frac{1-V^n}{i}$

C) $\frac{1-V^n}{\delta}$ D) $\frac{1+V^n}{d}$

ii) The rate of discount is

A) iV B) i + V

C) i – V D) $\frac{i}{V}$

iii) In equivalence principle, premium P is found such that

A) E(Z) = P E (Y) B) $E(Z) = \frac{E(Y)}{P}$

C) E(Z) = E(Y) D) $E(Z) = E(P^2Y)$

iv) Discount function V and instantaneous rate of interest δ is related as :

A) $V = e^{\delta}$ B) $V = e^{-\delta}$

C) $V = \log^{\delta}$ D) $V = -\log^{\delta}$

P.T.O.

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

i) Speculative risk is covered by insurance company.

ii) Insurance work on the principle of sharing losses and pooling risk.

c) Explain each of the following terms : **[1 each)**

i) $A^{1}_{x:\overline{n}|}$

ii) $\ddot{a}_{\overline{n}|}$

d) Explain the following concepts : **[1 each]**

i) Policy

ii) Loss function

Q2) Attempt <u>any two</u> of the following : **[5 each]**

a) State any two properties of survival function S(x). Derive the expression for $\mu(x)$ (i.e. force of mortality) in terms of the survival function S(x).

b) On May 6, 1996, (67) bought Rs. 1,00,000. Whole life insurance policy with benefit payable at the end of the year of death. The policy paid by means of annual premium payable at the start of each year. The policy holder dies on August 6, 2003 and loss to the insurer was Rs. 30,000. If i = 0.06, obtain the annual premium paid.

c) The survival model of a species of birds is as :

X	0	1	2	3	4	5
P_x	0.9	0.8	0.6	0.4	0.2	0

For a radix of lo = 800, obtain the columns of lx and dx. Obtain the limiting age.

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

a) Explain the term 'Annuity' with an illustration. Explain.

i) Annuity certain due

ii) Annuity certain immediate

b) Explain the concept of utility function U(w). If G is onetime premium and X is loss r.v. with E(X) = μ then prove that G $\geq \mu$.

c) Define curtate future lifetime r.v. K(x) and find it's probability mass function (p.m.f)

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

a) i) Explain, with an illustration, each of the following : **[5]**

A) N year term insurance

B) Whole life insurance

ii) If for the annuity certain the payments are made regularly at the beginning of the year then Derive that **[5]**

$$\ddot{S}_{\overline{n}|} = (1+i)^n \ \ddot{a}_{\overline{n}|}$$

b) i) If effective rate of interest is 7.5% per annum, then obtain **[6]**

A) Accumulate value of Rs. 36,000 at the end of 5^{th} year,

B) Present value of Rs. 35,000 due at the end of third year.

ii) A 20 year endowment policy with benefit of Rs. 1,00,000 is issued to (30). Level premiums are payable annually in advance throughout the term of the policy or until death, whichever is earlier. Calculate the level premium P on the basis of the information below : **[4]**

$$A_{30:\overline{20}|} = 0.2595, \quad \ddot{a}_{30:\overline{20}|} = 13.081$$

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

P1191 **[Total No. of Pages : 3**

[5017]-4051

T.Y. B.Sc.

STATISTICS (Principal)

ST - 342 : Testing of Hypotheses

(2013 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.***
3) ***Use of scientific calculator and statistical tables is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following :

a) In each of the following cases, choose the correct alternative : **[1 each]**

i) Let X be a random variable with p.d.f. $f(x,\theta)$. If $H_0 : \theta = \theta_0$ and $H_1 : \theta \neq \theta_0$, then

A) H_0 and H_1 are both simple hypotheses.

B) H_0 and H_1 are both composite hypotheses.

C) H_0 is simple hypothesis and H_1 is composite hypothesis

D) H_0 is composite hypothesis and H_1 is simple hypothesis.

ii) In SPRT with strength (0.05, 0.05) the values of A and B are

A) $19, \frac{1}{19}$ B) $\log 19, \log \frac{1}{19}$

C) 5, 95 D) log 5, log 95

iii) Which of the following is used for testing goodness of fit?

A) Sign test

B) Mann-Whitney U test

C) Kolmogorov - Smirnov test

D) Run test

P.T.O.

iv) In LRT, $\lambda(x)$ is defined as

A) $\frac{\text{Sup L}(\theta_0 / x)}{\text{SupL}(\theta_1 / x)}$ B) $\frac{\text{SupL}(\theta_0 / x)}{\text{SupL}(\theta / x)}$

C) $\frac{\text{Sup L}(\theta_0 / x)}{\text{Inf L}(\theta_0 / x)}$ D) $\frac{\text{Sup L}(\theta_1 / x)}{\text{Sup L}(\theta_0 / x)}$

b) In each of the following cases, state whether the given statement is true or false : **[1 each]**

i) In Wald's SPRT, sample size is fixed.

ii) UMP test does not exist for testing the mean of a normal distribution, when the alternative hypothesis is two sided.

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

i) Run and length of run.

ii) Critical region.

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

i) State the asymptotic distribution of $-2 \log_e \lambda(x)$

ii) 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) A random variable X follows binomial distribution with parameters n = 10 and p. It is required to test H_0 : p = 0.4 against H_1 : P > 0.4. Construct a uniformly most powerful test of level α based on a random sample of size n.

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 distribution with mean $1/\theta$.

c) Describe Kolmogorov-Smirnov test for one sample problem.

Q3) Attempt <u>any two</u> of the following : **[5 each]**

a) Construct likelihood ratio test of level of significance α for testing $H_0 : \mu = \mu_0$ against $H_1 : \mu \neq \mu_0$ where μ is the mean of N (μ, σ^2) distribution where σ^2 is known.

b) Let $X_1, X_2, \ldots\ldots\ldots\ldots, X_{12}$ be a random sample from Poisson distribution with mean θ. The hypothesis $H_0 : \theta = 0.5$ is rejected in favour of $H_1 : \theta = 0.3$ if $\sum X_i \leq 2$. Find probabilities of type I error and type II error.

c) Following is a sample drawn from the continuous population in the order in which the observations are made :

79, 13, 138, 129, 59, 76, 75, 53, 122, 98, 38, 57, 84, 110, 76, 58, 98, 70, 24, 52.

Test the hypothesis of randomness of the sample. Use 5% level of significance.

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

a) i) Let $X_1, X_2, \ldots\ldots\ldots\ldots, X_n$ denote the random sample of size n from normal distribution with mean μ and S.D. 10. It is required to test the null hypothesis $H_0 : \mu = 75$ against $H_1 : \mu = 80$. The best test procedure is to reject H_0 when the sample mean $\overline{X} \geq C$, where C is a constant. Find n and C such that the probability of type I error is 0.05 and that of type II error is 0.01. **[6]**

ii) Explain what is meant by the most powerful test for testing a simple null hypothesis against a simple alternative hypothesis giving briefly the procedure of obtaining it. **[4]**

b) i) Construct SPRT of strength $\alpha = 0.1$ and $\beta = 0.2$ for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1$ $(\theta_1 < \theta_0)$ where θ is the mean of Poisson distribution. **[5]**

ii) The weights (in gms) of 12 rats after treated with certain diet are as follows :

146, 102, 73, 71, 137, 90, 82, 120, 143, 70, 135, 132.

Use Wilcoxon's signed rank test to test whether the diet has increased the average weight of rats about 95 gms. **[5]**

● ● ●

Total No. of Questions : 4]

SEAT No. :

P1192

[Total No. of Pages : 3

[5017]-4052

T.Y. B.Sc.

STATISTICS (Principal)

ST - 343 : Statistical Quality Control

(2013 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 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) A process is said to be in statistical control if

A) It's free from defective

B) It's free from defect

C) It's free from assignable cause

D) It's free from chance cause

ii) When process standard deviation σ is not known, it is estimated by

A) $\bar{R}/D_2$ B) $\bar{R}/d_2$

C) $\bar{R}/D_3$ D) $\bar{R}/d_1$

iii) Which of the following limits are not determined directly by using sample observations?

A) Probability limits

B) 3σ limits

C) Natural tolerance limits

D) Specification limits

iv) For a single sampling plan N = 1000, n = 50, c = 2, Average Sample Number (ASN) is given by

A) 50 B) 100

C) 1000 D) 200

P.T.O.

b) In each of the following, state whether the given statement is true or false: **[1 each]**

i) Average Total Inspection (ATI) of double sampling plan always lies between n and N.

ii) Cause and effect diagram gives idea about which causes are important.

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

i) k-σ limits

ii) Lot tolerance fraction defective (LTFD).

d) i) Give interpretation of "low spot" on c-chart. **[1]**

ii) State any two advantages of sampling inspection. **[1]**

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

a) State the modern and traditional definition of quality. Also explain the online methods in statistical process control with an illustration.

b) Define C_{pk} indices for a stable process. Also interpret the following :

i) $C_p = C_{pk}$

ii) $C_{pk} = 0$

iii) $C_{pk} = 1.33$

c) $\bar{X}$ and R charts with sample size n = 4 are used to monitor a normally distributed quality characteristic X. it is observed that $\bar{R}$ = 20.59 mm and $\bar{\bar{X}}$ = 800 mm. Both charts exhibit statistical control. The process average shifts to 790 mm. Obtain the probability that the shift will be caught on Second sample after the shift.

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

a) State the seven PC tools. Explain pareto diagram.

b) Explain the construction and interpretation of p-chart by using stabilized control limits when subgroup sizes n_i are different and process fraction defective is not known.

c) For single sampling plan with n = 100, C = 3, the lot size is large as compared to sample size. Find the value of average outgoing quality (AOQ) if lots of quality p = 0.04 are submitted for inspection.

Q4) Attempt any one of the following :

a) i) The following is a record of the number of point defects per unit for metal disk equipment painted by dipping.

6, 5, 7, 5, 4, 6, 8, 7

Draw a suitable control chart and comment on it.

ii) Distinguish between a defect and a defective.

[7 + 3 = 10]

b) i) Derive an expression for AOQ in case of double sampling plan.

ii) Write a note on acceptance sampling with rectification.

[5 + 5 = 10]

Total No. of Questions : 4]

SEAT No. :

P1193

[Total No. of Pages : 4

[5017]-4053

T.Y. B.Sc.

STATISTICS (Principal)

ST - 344 : Operations Research

(2013 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 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) In solving Linear Programming Problem (LPP) for maximization of objective function when all net evaluations $(z_j - c_j)$ are greater than or equal to zero, it indicates that LPP has

A) Unbounded solution
B) Degenerate solution
C) Optimum solution
D) Infeasible solution

ii) To test optimality of solution of Transportation Problem (TP) with 4 origins and 5 destinations, the number of basic cells should be

A) 8 B) 19
C) 9 D) 2

iii) If primal problem has an infeasible solution, then solution of dual problem is

A) infeasible B) degenerate
C) unbounded D) feasible

iv) Every basic feasible solution of an Assignment Problem (AP), having a square pay-off matrix of order n should have assignments equal to

A) n B) n + 1
C) 2n D) n – 1

P.T.O.

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

i) In a transportation problem, the least cost method is used to find an alternate solution.

ii) Primal and dual form of LPP has the same objective function.

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

i) Surplus variable

ii) Total float

d) i) Explain the concept of critical path in Critical Path Method (CPM). **[1]**

ii) Write the standard form of LPP. **[1]**

Q2) Attempt any <u>two</u> of the following : **[5 each]**

a) Describe in brief a transportation problem (TP). Explain the terms balanced and unbalanced TP. How to convert unbalanced TP into a balanced TP?

b) A company manufactures two types of machines. Machine A requires 15 hours of labour 8 hours of testing and gives and yields a profit of Rs. 1000. Machine B requires 12 hours of labour and 4 hours of testing and gives a profit of Rs. 800/-. There are 400 hours of labour and 300 hours of testing available each month. A marketing forecast has shown that the monthly demand for machine B is to be more than 100. Formulate above problem as LPP so as to maximize the profit.

c) Jobs A, B, C are to be assigned to three machines X, Y, Z. The processing costs (in '00 Rs.) are given below. Find the allocation that minimizes the overall processing cost.

	Machine		
Job	X	Y	Z
A	19	28	31
B	11	17	16
C	12	15	13

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

a) In simplex method to solve LPP for maximization of objective function, state the criterion for identifying each of the following :

i) optimum solution

ii) infeasible solution

iii) unbounded solution

iv) alternate solution

v) degenerate solution

b) Write a short note on Monte Carlo method of simulation using a suitable example.

c) Write the dual of the following LPP.

Minimize $Z = 2x_2 + 5x_3$

Subject to $x_1 + x_2 \geq 2$

$2x_1 + x_2 + 6x_3 \leq 6$

$x_1 - x_2 + 3x_3 = 4$

$x_1, x_2, x_3 \geq 0$

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

a) i) Explain the following terms related to an activity in a network : **[5]**

A) Free float B) Independent float

C) Optimistic time D) Pessimistic time

E) Most likely time

ii) A small project is composed of 7 activities whose time estimates are listed in the table below.

Activity	Predecessor	Estimated duration (weeks)		
		Optimistic	Most likely	Pessimistic
A	-	1	1	7
B	-	1	4	7
C	-	2	2	8
D	A	1	1	1
E	B	2	5	14
F	C	2	5	8
G	D, E	3	6	15
H	F, G	1	2	3

Draw the project network and determine expected project completion time. **[5]**

b) i) What are pseudo random numbers? Explain linear congruential method of generating random numbers. **[2]**

ii) A company has three production facilities P_1, P_2, P_3 with production capacity 7, 9 and 18 units (in 100 s) respectively. These units are to be shipped to 4 warehouses W_1, W_2, W_3, W_4 with requirements of 5, 6, 7 and 14 units (in 100 s) respectively. The transportation costs (in Rs.) per unit are given below.

	W_1	W_2	W_3	W_4
P_1	19	30	50	10
P_2	70	30	40	60
P_3	40	8	70	20

Obtain initial basic feasible solution using Vogel's approximation method. Check whether the solution is optimum. **[8]**

Total No. of Questions : 4]

SEAT No. :

P1194

[Total No. of Pages : 6

[5017]-4054

T.Y. B.Sc.

STATISTICS (Principal)

ST - 345 (A) : Reliability and Survival Analysis

(2013 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 abbrivations have their usual meaning.***

Q1) Attempt each of the following :

a) In each of the following cases choose the correct alternative : **[1 each]**

i) Series system of *n* components has _____ minimal path sets.

A) n B) 1

C) 2^n D) ${}^nC_k$

ii) For a parallel system of two independent components having 0.7 reliability each, the reliability of the system is _____.

A) 0.91 B) 0.09

C) 0.49 D) 0.51

iii) If F belongs to Increasing Failure Rate (IFR) class of life distributions then for $x \geq 0$ _____.

A) hazard rate r(t) decreases in t.

B) $P[T > t_2 + x \mid T > t_2] > P[T > t_1 + x \mid T > t_1]$ for $0 \leq t_1 \leq t_2 < \infty$

C) $P[T > t_2 + x \mid T > t_2] \leq P[T > t_1 + x \mid T > t_1]$ for $0 \leq t_1 \leq t_2 < \infty$

D) $\frac{r(t)}{t}$ decrease in t.

P.T.O.

iv) If the life of a certain component has hazard rate r(t) = 5 then the mean residual life function is _____.

A) 5 B) $e^{-5t} + \frac{1}{5}$

C) $\frac{1}{5} - e^{-5t}$ D) $\frac{1}{5}$

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

i) An amplifier and a speaker in sound system are connected in series.

ii) For Gamma family with shape parameter greater than one, failure rate function r (t) decreases in t.

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

i) What is the concept of censoring in survival analysis?

ii) State the relative importance of components of the parallel system.

d) Define the following terms : **[1 each]**

i) Coherent system

ii) Decreasing Mean Residual Life (DMRL) class of the life distributions.

Q2) Attempt <u>any two</u> of the following : **[5 each]**

a) For a 2-out-of-3 : G system obtain.

i) Structure function of the system.

ii) Minimal path sets.

iii) Minimal cut sets.

b) If $\phi(x)$ is the structure function of a coherent system then show that

$$\prod_{i=1}^{n} x_i \le \phi(x) \le \coprod_{i=1}^{n} x_i .$$

c) Define Increasing Failure Rate Average (IFRA) class of life distributions. Show that if F belongs to IFR class then F belongs to IFRA class.

Q3) Attempt <u>any two</u> of the following : **[5 each]**

a) Prove that dual of a parallel system is series system.

b) Let the lifetime (in hours) distribution of a component be Weibull distribution with scale parameter equal to 9×10^{-4} and shape parameter equal to one.

Find

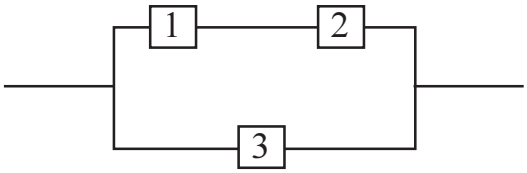
i) Median failure time.

ii) Probability that the component operated for 400 hours, will operate another 600 hours.

c) Derive an expression for confidence band of survival function $\bar{F}(x)$.

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

a) i) Consider a system of three independent components with reliability block diagram as shown in following figure.



Find P_3, if $P_1 = 0.8$, $P_2 = 0.4$ and system has to achieve system reliability of 0.76, where P_i is the reliability of the i^{th} component.

ii) Prove that if F belongs to New Better than Used (NBU) class of life distributions then it belongs to New Better than Used in Expectations (NBUE) class of life distributions.

b) i) If a component has hazard rate $3 + 2\,e^{5t}$; $t > 0$

Find

A) Cumulative hazard function R(t).

B) $\bar{F}(t)$

C) f(t)

ii) The following failures and censored times were recorded on 12 turbine vanes :

152, 330^+, 355, 570^+, 815, 1140, 1730^+, 2490, 4000^+, 4110, 4500, 6000.

'+' denote the censored times.

Obtain Kaplan-Meier estimates for this life time distribution of turbine vanes.

iii) A system consist of 5 independent and identical components connected in series. What must be the reliability of each of the component if overall reliability of the system is 0.95?

● ● ●

Total No. of Questions : 4]

P1194

[5017]-4054

T.Y. B.Sc.

STATISTICS (Principal)

ST - 345 (B) : Introduction to Stochastic Processes

(2013 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 calculators and statistical tables is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following :

a) Choose the correct alternative in each of the following : **[1 each]**

i) If two states of a Markov Chain are such that each is accessible from other then the two states are

A) communicable B) persistent

C) reducible D) aperiodic

ii) The intervals between successive occurences of a poisson process with mean λt follow exponential distribution with mean.

A) λt B) λ

C) $1/\lambda$ D) λ/t

iii) A Markov Chain is aperiodic if its every state is

A) periodic B) irreducible

C) persistent D) aperiodic

iv) A persistent state is null persistent if the mean recurrence time is

A) finite B) infinite

C) 0 D) 1

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

i) A compound Poisson process is called a jump process.

ii) The row sum of transition probability matrix need not be equal to 1.

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

i) A Markov Chain

ii) First return probability

d) i) Distinguish between persistent state and transient states of a Markov Chain. **[1]**

ii) Explain absorbing state of a Markov Chain with suitable illustration. **[1]**

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

a) Explain ergodic state in a Markov Chain with suitable illustration.

b) State and prove Chapman-Kolmogorov equation.

c) Let $\{X_n, n \geq 0\}$ be a Markov Chain with three states 0, 1, 2 and transition probability matrix.

$$P = \begin{bmatrix} \frac{3}{4} & \frac{1}{4} & 0 \\ \frac{1}{4} & \frac{1}{2} & \frac{1}{4} \\ 0 & \frac{3}{4} & \frac{1}{4} \end{bmatrix}$$

and initial distribution

$$P\left[X_0 = i\right] = \frac{1}{3} \qquad i = 0,1,2$$

Compute

i) $P\left[X_2 = 2, X_1 = 1 \mid X_0 = 2\right]$

ii) $P\left[X_3 = 2, X_2 = 0, X_1 = 1, X_0 = 2\right]$

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

a) Suppose that the probability of a dry day (No rain day) followed by rainy day is α and the probability of a rainy day followed by a dry day (No rain day) is β.

$\{X_n, n \geq 1\}$ denotes the weather condition on n^{th} day, either dry (No rain) or rainy, which is two state Markov Chain.

If $\alpha = 0.7$ and $\beta = 0.4$, calculate the probability that it will rain four days from today given that it is raining today.

b) State and prove additive property of poisson process.

c) Let $\{X_n, n \geq 1\}$ be a Markov Chain having state space S = {1, 2, 3, 4} and transition probability matrix

$$P = \begin{bmatrix} 1/3 & 2/3 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 1/2 & 0 & 1/2 & 0 \\ 0 & 0 & 1/2 & 1/2 \end{bmatrix}$$

Show that states 3 and 4 are transient.

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

a) i) Explain Poisson process with suitable illustration. **[5]**
Also, explain the three poshtulates of poisson process.

ii) A machine goes out of order whenever a component part fails. The failure of this part is in accordance with a poisson process with mean rate 1 per week. Find the probability that the machine will not go out of order in three weeks. **[3]**

iii) Consider a Markov Chain with state space S = {0, 1, 2, 3} and transition probability matrix **[2]**

$$P = \begin{bmatrix} 1/2 & 1/2 & 0 & 0 \\ 1/2 & 1/2 & 0 & 0 \\ 1/4 & 1/4 & 1/4 & 1/4 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

Identify closed sets of states in the above Markov Chain.

b) i) Discuss Gambler's ruin problem. **[5]**

ii) A person has 4 pairs of socks labelled 1, 2, 3, 4 which he changes every day.
Each day he randomly chooses a pair of socks which is not worn the previous day.
Let Xn : label of the pair of socks worn on n^{th} day. Write the transition probability matrix of this Markov Chain.
If
P [He forgets the label of the pair of socks he had worn the previous day] = ½, write the corresponding transition probability matrix.**[5]**

● ● ●

Total No. of Questions : 4]

SEAT No. :

P1195

[Total No. of Pages : 4

[5017]-4055

T.Y. B.Sc.

STATISTICS (Principal)

ST - 346 : Statistical Computing Using 'R' Software

(2013 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) ***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 : **[1 each]**

a) Write a R program script to obtain minimum of two numbers using if, else statement.

b) Let $X \sim N(\mu = 40, \sigma^2 = 25)$. Find $P(30 \le X \le 50)$

c) Draw a random sample of size 8 from binomial distribution with n = 12 and p = 0.6.

d) Draw a rod plot of the following data :

x	2	4	6	9	11	13
f	6	11	20	24	13	8

e) Create a file in MS-Excel containing item name and its price, save it as a text file and read this file using read table command for 3 items.

f) By using for statement, find the sum of numbers one to ten.

g) Create a data frame of name of the student and 4 subjects combination of 5 students using edit command.

h) Compute geometric mean and harmonic mean of the following observations.

27, 32, 46, 21, 24, 29, 54, 35, 42, 38

P.T.O.

i) Find mean and median of the following observations :
8, 11, 17, 15, 12, 14, 18, 20, 22, 16.

j) Create a vector *x* of the following observations using scan function.
49, 68, 71, 95, 22, 35, 48, 62.

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

a) Data on countrywise production of sugar is given below :

Country	Production of sugar in lakh quintals
Cuba	320
Australia	300
Japan	50
Jawa	10
India	200

Draw a Pie diagram for the above data.

b) Frequency distribution of duration of advertisements on television is as follows :

Duration (in seconds)	30-35	35-40	40-45	45-50	50-55
No. of Advertisements	6	20	28	15	8

Compute coefficient of variation for the above data.

c) Height of 100 students of a senior college is recorded as follows :

Height (in cm.)	No. of students
145 - 150	02
150 - 155	04
155 - 160	17
160 - 165	28
165 - 170	31
170 - 175	14
175 - 180	2
180 - 185	2

Calculate Bowley's coefficient of skewness.

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

a) Fit a Poisson distribution to the following data :

x	0	1	2	3	4	5	6
f	320	164	65	17	11	3	1

b) Frequency distribution of monthly expenditure on mobile recharge of 100 students from a college is given below :

Expenditure	No. of students
0 - 15	10
50 - 100	21
100 - 150	25
150 - 200	30
200 - 250	9
250 - 300	5

Draw histogram and frequency polygen for the above data.

c) Use the following data to test whether the attributes condition of home and condition of child are independent.

Condition of child	Condition of home	
	Clean	Dirty
Clean	70	50
Fairly clean	80	20
Dirty	35	45

Q4) Attempt any one of the following :

a) i) Use Kolmogorv-Smirnov test to test whether the following random sample comes from binomial distribution with parameters n = 10 and p = 0.6.

1, 6, 5, 4, 0, 2, 3, 1, 7, 8, 5, 4, 9, 2

ii) The following data represent the number of hours that a rechargeable hedge trimmer operates before a recharge is required.

1.6, 2.3, 0.8, 1.5, 2.2, 1.8, 2.1, 1.7, 2.3, 1.4, 1.8

Use Wilcoxn's signed rank test to test the hypothesis that this particular trimmer, operates with a median of 1.9 hours before requiring a recharge.

iii) Two horses A and B were tested according to the time (in seconds) to run a particular track gave the following results :

Horse A : 30 28 33 32 31 29 34

Horse B : 29 28 32 31 30 28

Test whether the two horses have the same average running capacity. Take $\alpha = 0.05$.

b) i) Carry out one-way ANOVA for the following data by verifying the assumptions. (Write R-program)

Treatment	Observations
A	10, 12, 13, 11, 10, 14, 15, 13
B	9, 11, 10, 8, 12
C	11, 12, 14, 15, 13, 12

ii) Three methods P, Q and R are tested to see whether their outputs are equivalent. The following observations of output are obtained.

P	14	10	15	17	16	13	12
Q	16	18	9	15	14		
R	19	17	10	16	18	15	

Use Kruskal Wallis test for testing whether there is difference among mean output of 3 methods.

[5 + 5]

Total No. of Questions : 4]

SEAT No. :

P1196

[Total No. of Pages : 2

[5017]-4056

T.Y. B.Sc.

GEOGRAPHY

Gg - 341 : Fundamentals of Human Geography (Part - II)

(2013 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.***
3) ***Draw neat sketches and diagrams wherever necessary.***
4) ***Use of map stencils is allowed.***

Q1) Answer the following questions in two or three sentences (any ten) : **[10]**

a) What is conurbation?

b) Which is the most urbanized continent in the world?

c) What are transport nodes?

d) According to Weber's theory what are weight - gaining of industries?

e) Give examples of crops grown in plantation agriculture in India.

f) Define globalization.

g) Name the different types of sex ratio. What is the sex ratio of Maharashtra according to census 2011.

h) Define Birth Rate.

i) Define Balance of Payments.

j) When was WTO established? What is its major function?

k) What is crop rotation? Give examples.

l) Name two factors effecting International Trade.

m) Name two features of Modern Urbanization.

P.T.O.

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

a) Relevance of Mathusian theory.

b) Methods of Age Structure Analysis.

c) Characteristics of urban-rural fringe.

d) Commercial agriculture in the USA.

Q3) Answer the following questions in 100 words each. (any two) : **[10]**

a) Characteristics of unland.

b) Importance of sex ratio in demographic studies.

c) Intensive Agriculture.

d) Hunger and malnutrition.

Q4) Answer the following questions in 200 words (any two) : **[10]**

a) Explain how availability of resources affects trade.

b) Explain the Demographic transition theory.

Total No. of Questions : 4]

SEAT No. :

P1197

[Total No. of Pages : 2

[5017]-4057

T.Y. B.Sc.

GEOGRAPHY (Paper - IV)

Gg - 342 : Geography of Travel and Tourism

(2013 Pattern) (Semester - IV) (Part - II)

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

Instructions to the candidates:

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

Q1) Answer the following questions in one or two sentences. **[10]**

a) What do you mean by agro-tourism?

b) List any four factors that influence mode of transport.

c) What are dormitories?

d) What do you mean by Eco-tourism?

e) What are direct expenditures in tourism?

f) State any two social impacts of tourism.

g) State any two hill stations located in Maharashtra.

h) List any two places of adventure tourism in India.

i) Name any two famous temples located in Maharashtra.

j) In which state is Kullu located?

k) What is the impact of tourism on the life style of local people?

l) What do you mean by employment multipliers?

m) Give any two demerits of railway as a mode of transport in tourism?

P.T.O.

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

a) Cultural Tourism

b) Sustainable tourism development

c) Beach resorts in Indian

d) E-Magazines used by tourists

Q3) Answer the following in 100 words (any two) : **[10]**

a) Explain religious tourism in India.

b) Discuss role of transportation in tourism sector.

c) Elaborate different types of expenditures used by tourists.

d) Discuss the impacts of tourism on the environment of any tourist place.

Q4) Answer the following in 200 words (any one) : **[10]**

a) Explain the role of tourism in national economy.

b) Discuss the impacts of tourism on historic places.

● ● ●

Total No. of Questions : 4]

SEAT No. :

P1198

[Total No. of Pages : 2

[5017]-4058

T.Y. B.Sc.

GEOGRAPHY

Gg - 343 : Fundamentals of Geo-informatics (Part - II)

(2013 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 sketches and diagrams wherever necessary.***
4) ***Use of map-stencils is allowed.***

Q1) Answer the following questions in two or three sentences (any ten) : **[10]**

a) Mention any two methods of digitization.

b) What is GIS?

c) Define DBMS (Data Base Management System)

d) What is contiguity?

e) What is TIN?

f) What is non-spatial data?

g) What do you understand by Topology?

h) Mention any two types of GPS.

i) Define foreign key.

j) What is overlay analysis?

k) Define query.

l) What is DTM?

m) Write any two uses of GPS?

P.T.O.

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

a) Locational errors.

b) DEM.

c) Dissolve.

d) Survey data as input in GIS.

Q3) Answer the following question in 100 words (any two) : **[10]**

a) Discuss various types of data input in GIS.

b) Difference between spatial and non-spatial query.

c) Explain overlay analysis.

d) Describe types of GPS.

Q4) Answer the following question in 200 words (any one) : **[10]**

a) Give an account of topographic analysis in GIS.

b) Discuss the recent trends in GIS and GPS technology

● ● ●

Total No. of Questions : 4]

SEAT No. :

P1199

[Total No. of Pages : 2

[5017]-4059

T.Y. B.Sc.

GEOGRAPHY

Gg - 344 : Geography of India (Part - II)

(2013 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.***
3) ***Diagram and Maps must be be drawn wherever necessary.***
4) ***Use of map-stencils is allowed.***

Q1) Answer in two or three sentences each (any ten) : **[10]**

a) Name any two iron ore types found in India.

b) State any two regions in India where copper mines are located.

c) Mention any two points of significance of agriculture in Indian economy.

d) What is 'blue revolution'?

e) State any two benefits of poly-house agriculture.

f) State any two states of the India union with highest population density.

g) What is 'Composition of population'?

h) State any two remedies of over population.

i) What is 'regional planning'?

j) Mention any two factors responsible for industrialization of W. Maharashtra.

k) State any two places in India, where atomic power plants are located.

l) What is cloud burst?

m) Mention any two factors which influence location of windfarms in India.

P.T.O.

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

a) Energy crisis in India.

b) Significance of horticulture in India.

c) Ecological impact of green revolution.

d) Flood-hit areas of India.

Q3) Answer in 100 words (any two) : **[10]**

a) Live-stock resources of India.

b) Landslides in W^n. Ghats.

c) Coal reserves in India.

d) Dry farming in India.

Q4) Answer in 200 words (any one) : **[10]**

Discuss the impact of green revolution on the agriculture of India.

OR

"Droughts in Maharashtra is a man-induced disaster" - Comment on the statement with suitable examples.

Total No. of Questions : 4]

SEAT No. : [ ]

[Total No. of Pages : 2

P1200

[5017] - 4060

T.Y.B.Sc

GEOGRAPHY (Paper - X)

Gg 345 Geography of Soils (Part - II)

(2013 Pattern) (Semester - IV)

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

Instructions to the candidates :

1) ***All questions are compulsory***
2) ***Figures to the right indicates full marks***
3) ***Draw neat sketches and diagrams wherever necessary***
4) ***Use of map stencils is allowed***

Q1) Answer the following questions in two to three sentences (any ten) **[10]**

a) State process of 'removal (losses)' in soil formation

b) What do you understand by translocation?

c) State the mechanism of process of soil transformations

d) What do you understand by the process of Eluviation?

e) State the consecutive stages of soil formation

f) State any two factors affecting soil organic matter

g) What do you understand by organic colloids?

h) Mention any two roles of organic matter in enhancement of soil quality

i) What is adsorption of water?

j) What is soil alkalinity?

k) What do you understand by crop management factor?

l) Mention methods of soil classification

m) What do you understand by gully erosion?

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

a) Organic carbon

b) Major soil types in Maharashtra

c) Methods of soil survey

d) Methods of soil conservation

P.T.O.

Q3) Answer the following questions in 100 words (**any two**) **[10]**

a) What is the process of leaching?

b) What are the factors affecting organic matter

c) Explain the process of decomposition of organic matter

d) What are the major types of soil erosion?

Q4) Answer the following questions in 200 words (**any one**) **[10]**

a) Give an account of Land capability classification

b) Discuss the need of soil conservation and management in India

Total No. of Questions : 4]

SEAT No. : ____

[Total No. of Pages : 2

P1201

[5017] - 4061

T.Y.B.Sc

GEOGRAPHY (Paper - XII)

Gg - 346:Fundamentals of Geo-informatics (Part - II)

(2013 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) ***Draw neat sketches and diagrams wherever necessary.***
4) ***Use of map stencils is allowed.***

Q1) Answer the following questions in two to three sentences (any ten) **[10]**

a) What is orbit?

b) What do you understand by the term 'Geosynchronous'?

c) What do you understand by active sensor?

d) What is the abbreviation ERTS stands for?

e) Mention any two types of platforms.

f) Give any two advantages of Landsat images.

g) What is Radar?

h) What is MSS?

i) What is radiometric resolution?

j) State the major characteristics of LANDSAT satellite.

k) What do you understand by DIP?

l) What is image Enhancement?

m) Mention any two satellites of IRS series.

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

a) Polar orbit satellites

b) SPOT

c) INSAT

d) Satellite imaging

P.T.O.

Q3) Answer the following questions in 100 words (**any two**) **[10]**

a) Discuss major characteristics of IKONOS image.

b) Explain advantages of multispectral images.

c) What is temporal resolution?

d) What is the process of filtering?

Q4) Answer the following questions in 200 words (**any one**) **[10]**

a) Give an account of Elements of interpretation of satellite image.

b) Give an account of DIP (Digital Image Processing)

Total No. of Questions : 04]

SEAT No. : ____

P1202

[Total No. of Pages : 2

[5017] - 4065

T.Y. B.Sc.

MICROBIOLOGY (Paper - I)

MB - 341 : Medical Microbiology - II

(2013 Pattern) (Semester - IV)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***
3) ***Draw neat labeled diagrams wherever necessary.***

Q1) Attempt the following: **[2]**

a) State true or false

i) Viruses contain only one type of nucleic acid

ii) Deep seated human infections caused by fungi are called mycosis.

b) Fill in the blanks: **[2]**

i) _____ cell lines are used for cultivation of viruses

ii) Hepatitis is transmitted by _____

c) Define : MIC **[1]**

d) Match the following: **[5]**

	I		II
i)	Poliovirus	a)	Hemorrhagic fever
ii)	Ebola	b)	Cattle
iii)	Hepatitis virus	c)	Swine flu
iv)	H_1N_1 virus	d)	Liver damage
v)	Rinderpest	e)	Salk vaccine

P.T.O.

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

a) Explain the action of Zidovudine against retrovirus.

b) Illustrate diagrammatically life cycle of Entamoeba.

c) Describe the role of griseofulvin in the treatment of fungal infections

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

a) Mode of action of streptomycin

b) Candidiasis

c) Pathogenesis of FMD Virus

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

a) Write principles of chemotherapy and elaborate on each principle in brief

b) Describe laboratory diagnosis and epidemiology of AIDS

Total No. of Questions : 4]

SEAT No. : ____

[Total No. of Pages : 2

P1203

[5017] - 4066

T.Y.B.Sc

MICROBIOLOGY (Paper - II)

MB-342:Genetics & Molecular Biology - II

(2013 Pattern) (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.***

Q1) a) Attempt the following : **[5]**

i) Define - Plasmid

ii) Define - Cistron

iii) Full form of PRE

iv) Transformation is affected by factors like _____ and _____.

v) Give the formula for Transformation frequency percentage.

b) Match the following : **[5]**

A		B	
i)	Benzer	a)	Eco R_1
ii)	T_4 DNA ligase	b)	F Plasmids with few bacterial genes
iii)	Conditional lethal mutants	c)	Deletion mapping
iv)	Pallindromic sequence	d)	Amber mutants
v)	F'factors	e)	ATP

P.T.O.

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

a) What is F Plasmid? Give its structure and the various genes found on it

b) Comment on "Competence is a prerequisite for the process of transformation"

c) Enlist the different methods to transfer Recombinant DNA into the host cells. Explain in brief any two.

Q3) Draw neat lebelled diagrams of any two of the following : **[10]**

a) Structure of a typical cosmid vector

b) Specialized transduction in phage λ

c) Joining DNA molecules using DNA ligase.

Q4) What is genetic Complementation? How is it carried out? Explain different types of complementation with examples? Give its applications? **[10]**

OR

Explain different DNA damages affecting bacterial DNA? With the help of a labelled diagram explain nucleotide excision repair mechanism?

Total No. of Questions : 4]

SEAT No. : ____

[Total No. of Pages : 2

P1204

[5017] - 4067

T.Y.B.Sc

MICROBIOLOGY (Paper - III)

MB-343:Metabolism

(2013 Pattern) (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.***

Q1) a) Attempt the following : **[5]**

i) Define - Facilitated transport

ii) List enzymes of glycogen degradation

iii) Write an example of non-sulfur bacterium

iv) State third law of thermodynamics

v) Write chemical structure of phospholipid.

b) Match the following : **[5]**

A		B	
a)	Osmosis	i)	Peptidoglycan crosslink
b)	UDP - NAG	ii)	Transport of water due to densities difference
c)	Pentaglycine	iii)	Member of electron transport chain (ETC)
d)	Uncoupler of electron transport	iv)	Monomer of peptidoglycan
e)	CoQ (Quinones)	v)	2,4, Dinitrophenol

P.T.O.

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

a) Pathway of fatty acid synthesis

b) Explain group translocation of sugars

c) Describe in brief ETC

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

a) Describe urea cycle

b) Write pathway for starch synthesis

c) Explain CO_2 fixation by RUBISCO

Q4) Attempt any one : **[10]**

a) Define free energy. List various types of high energy compounds and explain thioester, acyl phosphates, and endic phosphate compounds as high energy compounds

b) What is photophosphorylation? Explain cyclic and non-cyclic photophosphorylations.

Total No. of Questions : 4]

SEAT No. : ____

[Total No. of Pages : 2

P1205

[5017] - 4068

T.Y.B.Sc

MICROBIOLOGY (Paper - IV)

MB 344 Immunology - II

(2013 Pattern) (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 labeled diagram wherever necessary.***

Q1) Attempt the following : **[5]**

A) Match the following

a)	Rh incompatibility	i)	Bombay blood group
b)	Autoimmune disease	ii)	Cell to cell interaction
c)	Interleukins	iii)	'O' blood group
d)	A, B, H antibodies	iv)	Hemolytic disease of new born
e)	A, B antibodies	v)	Rheumatoid Arthritis

B) State true or false **[2]**

a) Attenuated vaccines are more likely to induce cell mediated immunity than killed vaccines.

b) MHC Class II molecules bind to longer peptides than class I MHC Molecules.

C) Fill in the blanks using the correct option **[3]**

a) T_H Cells recognise the antigen peptide complexed with _____ molecules on APC.

i) Calnexin ii) MHC II

iii) MHC I iv) TAP

P.T.O.

b) Father's blood group is 'AB' Mothers's blood group is 'A' The child can not be _____

i) O ii) A

iii) B iv) none of these

c) Localised form of _____ is characterised by wheal and flare reaction.

i) Type I hypersensitivity ii) Type II hypersensitivity

iii) Type II hypersensitivity iv) Type IV hypersensitivity

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

a) Explain the principle and propagation of hybridoma for monoclonal antibodies production.

b) Illustrate diagrammatically : Type III hypersensitivity reaction.

c) Explain microcytotoxicity test for MHC typing.

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

a) Biotin Avidin system

b) Inactivated vaccines

c) Interleukins

Q4) Attempt any one : **[10]**

a) Explain the following techniques for visualization of antigen antibody complexes.

i) Radio immuno assay

ii) Indirect ELISA

b) Describe ABO and Rh blood group systems

w.r.t i) Inheritance of A, B, H antigens

ii) Medicolegal applications of blood groups.

Total No. of Questions : 4]

SEAT No. : [ ]

[Total No. of Pages : 2

P1206

[5017] - 4069

T.Y.B.Sc

MICROBIOLOGY (Paper - V)

MB-345:Fermentation Technology - II

(2013 Pattern) (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.***

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

a) Enlist the substrates utilized as raw materials in solid state fermentations.

b) Match the following :

i)	Distiller's yeast	Mushroom
ii)	Spawn	Citric acid
iii)	Corynebacterium simplex	Grape must
iv)	Aspergillus niger	Prednisolone

c) What are immunesera? Give two examples

d) State true or false

i) In microbial transformation, the compounds are not utilized for growth

ii) Production of Baker's yeast is an anaerobic process

e) Fill in the blanks :

i) _____ is an edible mushroom fungus

ii) _____ bacterium is used to produce vinegar.

P.T.O.

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

a) Cheese manufacturing

b) L-lysine production by dual fermentation

c) Recovery of lactic acid

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

a) Draw flow sheet of streptomycin production

b) Describe production of salk polio vaccine

c) Enlist producers of riboflavin. Explain the method for recovery of riboflavin.

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

a) Describe brewing with respect to mashing, kettle boil, fermentation and flow sheet

b) Describe large scale production of protease.

Total No. of Questions : 4]

SEAT No. : ____

[Total No. of Pages : 2

P1207

[5017] - 4070

T.Y.B.Sc

MICROBIOLOGY (Paper - VI)

MB-346:Agricultural and Environmental Microbiology

(2013 Pattern) (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 labeled diagram wherever necessary.***

Q1) Attempt the following : **[5]**

a) Define

i) Biochips

ii) Bioterrorism

iii) Bioagumentation

iv) Biosorption

v) Diazotrophy

b) Name the method used for copper leaching **[1]**

c) State true or false **[1]**

Enzyme dinitrogenase reductase is sensitive to oxygen

d) Write the application of bio fuel cell **[1]**

e) What is iron chelation? **[1]**

f) What is biodegradable plastic **[1]**

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

a) Bioleaching of manganese

b) Use of genetically modified microorganisms in bioremediation

c) RNAi in controlling plant diseases

P.T.O.

Q3) Comment on any two **[10]**

a) Synthesis of nanoparticles using microorganisms

b) Components and types of biosensors

c) Bioremediation of hydrocarbons

Q4) attempt any one **[10]**

a) Explain the biological control of plant diseases with examples

b) Describe the symbiotic nitrogen fixation w.r.to

i) Nodule development

ii) Mechanism of nitrogen fixation

Total No. of Questions : 4]

SEAT No. : ____

P1208

[Total No. of Pages : 2

[5017] - 4071

T.Y. B.Sc. (Semester - IV)

ELECTRONIC SCIENCE (Paper - I)

EL - 341 : Advanced Communication Systems

(2013 Pattern)

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

Instructions to the candidates :-

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

Q1) Attempt all of the following.

a) Define directivity of antenna. **[1]**

b) What is vocoder? **[1]**

c) What is low noise amplifier? **[1]**

d) State basic configuration of Horn Antenna. **[1]**

e) List various methods of FM generation. **[2]**

f) Write the effects of frequency multiplier and mixer on FM signal in FM transmitter. **[2]**

g) State two advantages of Adoptive Delta modulation over delta modulation. **[2]**

h) Calculate the critical frequency of E - layer of Ionosphere, if MUF = 3MHz and angle of incidence is 0°. **[2]**

Q2) Attempt any two of the following.

a) Explain working of basic Doppler Radar with block diagram. State its various applications. **[4]**

b) Describe synchronous demodulation with suitable block diagram. State its advantages and disadvantages. **[4]**

c) Explain construction and working of Rhombic Antenna and draw its radiation pattern. **[4]**

P.T.O.

Q3) Attempt any two of the following.

a) Draw simplified block diagram of monochrome television broadcasting transmitter. Explain its working in brief. **[4]**

b) Write short note on "Companding". **[4]**

c) Explain tropospheric scatter propogation. **[4]**

Q4) Attempt any two of the following.

a) What is balanced modulator? Explain working of balanced modulator using FETs. Derive expression for its output voltage. **[6]**

b) Draw block diagram of TDM system and explain it. State advantages and disadvantages of TDM system. **[6]**

c) Explain different feed mechanisms used for parabolic reflectors. State different types of parabolic refectors. **[6]**

Total No. of Questions : 4]

SEAT No. : ____

P1209

[Total No. of Pages : 2

[5017] - 4072

T.Y. B.Sc. (Semester - IV)

ELECTRONIC SCIENCE (Paper - II)

EL - 342 : Microcontroller and Its Applications

(2013 Pattern)

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

Instructions to the candidates :-

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

Q1) Attempt all the following.

a) What is size of EPROM in PIC 18F4580 microcontroller. **[1]**

b) Write magnitude of unsigned char. **[1]**

c) After receiving of byte data serially where it is placed. **[1]**

d) In microcontroller, what does PIC stands for? **[1]**

e) List the advantages of 'C' for 8051 microcontroller programming. **[2]**

f) If TMOD = 0×22, what does it mean? **[2]**

g) "Speed of DC motor can be controlled precisely using times" comment. **[2]**

h) Find the content of Port 1 after execution of following. **[2]**

$$P1 = 0 \times 65 >> 2$$

Q2) Attempt any two of the following.

a) Write down the difference between CISC and RISC architecture. **[4]**

b) Write a C program to toggle bits of P1 continuously forever with some delay. **[4]**

c) Write a short note on interrupts used in 8051 microcontroller. **[4]**

P.T.O.

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

a) Explain in brief the factors that affect time delay length in 8051C. **[4]**

b) Describe the interface between 4 × 4 matrix keyboard to 8051 microcontroller. **[4]**

c) Write in detail note on PIC file register. **[4]**

Q4) Attempt any <u>two</u> of the following.

a) Explain with suitable example bit wise logical operators in 8051 C Programming. **[6]**

b) Draw simplified view of PIC 18 microcontroller and explain it in brief. **[6]**

c) Draw stepper motor interface to microcontroller 8051 write a C program to rotate stepper motor clockwise. **[6]**

OR

Attempt <u>all</u> the following.

a) Write a 8051 C program to convert packed BCD 0×32 to ASCII and display bytes on P1 and P2. **[4]**

b) Write a C program for 8051 to transfer word "SHRI" serially at 9600 band continuously use 8bit data, 1 stop bit. **[4]**

c) Draw interface of DAC to 8051 microcontroller and write a C program to generate square wave of frequency 1KHz. **[4]**

Total No. of Questions : 04]

SEAT No. :

P1210

[Total No. of Pages : 2

[5017] - 4073

T.Y.B.Sc.

ELECTRONIC SCIENCE (Paper-III)

EL - 343: Power Electronics

(2013 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) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of Calculator is allowed.***

Q1) Attempt all of the following.

a) Define power electronics. **[1]**

b) List applications of power electronics **[1]**

c) Draw symbol of UJT & PUT **[1]**

d) What is principle of ON-off control of AC voltage controller **[1]**

e) What are different types of thyristors? **[2]**

f) What is cycloconverter ?Draw I/P and O/P waveforms of single phase cycloconverter **[2]**

g) What are voltage control methods of inverters? **[2]**

h) Draw circuit diagram of flyback converter. **[2]**

Q2) Attempt any two of the following

a) Explain two transistor model of Thyristor **[4]**

b) Explain the principle of step-down chopper with resistive load & derive the expression for output voltage. **[4]**

c) What is UPS? Explain the working of online UPS with the help of block diagram. **[4]**

P.T.O.

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

a) What is BJT base drive circuit during turn on & turn off? Explain it with the help of circuit arrangement. How this circuit increases the switching speed of BJT? **[4]**

b) What are performance parameters of inverters? **[4]**

c) Explain the working of single phase full converter. **[4]**

Q4) Attempt any <u>two</u> of the following

a) What is free wheeling diode? What are different modes of operation of it? Explain it with waveforms and equivalent circuit **[6]**

b) i) Explain the principle of bidirectional controller with resistive load. **[3]**

ii) What is filter? Explain the working of C filter. **[3]**

c) i) What is principle of regenerative braking of dc-dc converter fed dc motor drives? **[3]**

ii) What are the advantages of switch mode power supply? **[3]**

OR

Attempt any <u>two</u> of the following

a) A step up converter has V_s = 220V, the duty cycle is 60%, what is average output voltage of converter? **[4]**

b) A capacitance of reverse biased junction J_2 in thyristor is CJ_2 = 20pf. Limiting value of charging current to turn on thyristor is 16mA. Determine critical value of dv/dt **[4]**

c) If R = 1KΩ, C = 0.1μF, intrinsic stand off ratio of UJT is 0.5. What is frequency of oscillation of sawtooth Oscillator? **[4]**

Total No. of Questions : 04]

SEAT No. :

P1211

[Total No. of Pages : 2

[5017] - 4074

T.Y.B.Sc.

ELECTRONIC SCIENCE (Paper-IV)

EL - 344: FOUNDATION OF NANOELECTRONICS

(2013 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) ***Neat diagram must be drawn wherever necessary.***

Given- i) Mass of electron $m_o = 9.1 \times 10^{-31}$kg

ii) Plank's constant $h = 6.625 \times 10^{-34}$js.

Q1) Attempt all of the following.

a) State pauli's exclusion principle. **[1]**

b) Define skin Depth. **[1]**

c) What is Lithography? **[1]**

d) Write equation of continuity. **[1]**

e) Draw hydrogen atom potential diagram.State necessary mathematical relations. **[2]**

f) What is Top-Down and Bottom-up approach? **[2]**

g) What is tunneling effect? State one application. **[2]**

h) What is elastic and inelastic collision? **[2]**

P.T.O.

Q2) Attempt any two of the following

a) Explain length scales of electron in solid. **[4]**

b) Explain reflection and refraction of EM waves at non-conducting interface . **[4]**

c) What is quantum well? State energy levels and wave function for electron in quantum well. **[4]**

Q3) Attempt any two of the following

a) State Maxwell's equations.Using it explain concept of Displacement vector $\bar{D}$. **[4]**

b) Explain the phenomenon of tunneling in square well potential. **[4]**

c) Explain Fermi-distribution function.Under what conditions FD is close to Boltzmann distribution. **[4]**

Q4) Attempt any <u>two</u> of the following

a) Explain Hall effect for determination of doping concentration of semiconductor slab.Give any two application of hall effect. **[6]**

b) Explain construction of resonant tunneling diode.Also draw and explain its I-V characteristics. **[6]**

c) Explain concept of bounding orbitals of hydrogen and group IV atoms. **[6]**

OR

Attempt all of the following

a) Find De-Broglie wavelength of an electron moving in solid with velocity 10^5 m/s having effective mass of $m_e^* = 0.26\ m_e$. **[4]**

b) For glass interface having $n_1 = 1.55$ and $n_2 = 1.34$.Find Rn and Tn for normal incidence. **[4]**

c) Calculate energy state of a particle of mass 200 times mass of electron, which is free to move in a potential well of length 50^o A. **[4]**

Total No. of Questions : 04]

SEAT No. :

P1212

[Total No. of Pages : 3

[5017] - 4075

T.Y. B.Sc.

ELECTRONIC SCIENCE (Paper - V)

EL - 345: Mathematical Methods and Circuit Analysis Using MATLAB

(2013 Pattern) (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 indicate full marks.***
4) ***Use of calculator is allowed.***

Q1) All questions are compulsory.

a) Explain odd periodic function. **[1]**

b) Write fourier series for even function. **[1]**

c) What will be the output of MATLAB command. **[1]**

```
>> r = [8  12  9  4  23  19  10] ;
>> s = r < = 10
```

d) `>> v = [3  7  10  25  13  14  5]`

Write MATLAB command to assign a new value 60 to the 4^{th} element of vector V. **[1]**

e) Find Laplace transform of 5 u(t). **[2]**

f) Give the general form of fprintf command. **[2]**

g) Give the MATLAB function for sine of angle *x* (*x* in degrees) and sine of angle *x* (*x* in radians). **[2]**

h) State Dirichlet condition for fourier series. **[2]**

P.T.O.

Q2) Answer any two of the following.

a) Explain script file and function file in MATLAB. **[4]**

b) Expand the following function as partial fractions. **[4]**

$$F(s)=\frac{7s+2}{s^3+3s^2+2s}$$

c) What is curve fitting? Find the coefficients of linear least square fit. **[4]**

Q3) Answer any two of the following :

a) Find Laplace transform of cos wt and sin wt. **[4]**

where $\text{coswt} = \frac{e^{jwt}+e^{-jwt}}{2}$

$\text{sinwt} = \frac{e^{jwt}-e^{-jwt}}{2j}$

b) For the following table of values,obtain an appropriate least square fit for the data. **[4]**

x	0	0.5	1	1.5	2	2.5
y	0	1.5	3.0	4.5	6.0	7.5

c) State the general format of 3-D plot in MATLAB and explain in brief. **[4]**

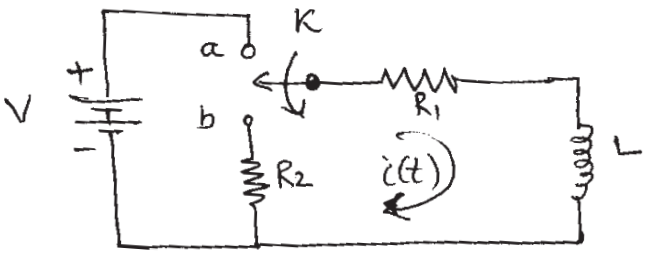
Q4) Attempt any two of the following:

a) A sawtooth wave is given by **[6]**

$f(x) = x, -\pi < x < \pi$

show that $f(x) = 2\sum_{n=1}^{\infty}\frac{(-1)^{n+1}}{n}\sin nx$

b) In the network shown in the figure, the switch K is moved from position a to position b at t = 0, a steady state having previously been established at position a. Solve for the current $i(t)$, using Laplace transformation method. **[6]**



c) Explain while-end loop command in MATLAB with proper example. **[6]**

OR

Answer the following.

a) Determine fourier coefficient a_0 for periodic function $f(x)$ of period 2π. **[4]**

b) Write a script file to calculate the sum of the first 4 terms of the series.

$$P = \sum_{k=1}^{4} \frac{(-1)^k k}{2^k}$$ **[4]**

c) Plot the function $y = 3x^3 - 26x + 10$, and its first and second derivatives, for $-2 \leq x \leq 4$ all in the same plot. Write a script file in MATLAB. **[4]**

Total No. of Questions : 04]

SEAT No. :

P1213

[Total No. of Pages : 4

[5017] - 4076

T.Y. B.Sc.

ELECTRONIC SCIENCE (Paper-VI)

EL - 346(A) : Industrial Automation

(2013 Pattern) (Semester - IV) (Optional)

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

Instructions to the candidates:

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

Q1) Attempt all of the following.

a) What is dead time element? **[1]**

b) What is trans conductance amplifier? **[1]**

c) Define ladder diagram. **[1]**

d) What is proportional band in proportional control mode? **[1]**

e) What is passive transducer? State any two examples of passive transducer **[2]**

f) Explain electrostatic shielding. **[2]**

g) State different contineous controller modes. **[2]**

h) State different characteristics of derivative control mode. **[2]**

Q2) Attempt any two of the following.

a) Explain zero order system with neat diagram. **[4]**

b) Draw and explain OPAMP as an inverting amplifier. **[4]**

c) Explain discrete control system with proper example. **[4]**

P.T.O.

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

a) Draw and explain generalized DAS. **[4]**

b) Describe two position (ON / OFF) controller mode. **[4]**

c) Explain construction and working of LVDT transducer with neat diagram. **[4]**

Q4) Attempt any <u>two</u> of the following.

a) What is thermister? Explain different shapes of thermister with neat diagram. State applications of thermister. **[6]**

b) Explain following control system parameters

i) Error ii) Control parameter range **[6]**

c) Explain Proportional - integral (PI) control mode and state their advantages. **[6]**

Total No. of Questions : 04]

P1213

[5017] - 4076

T.Y. B.Sc.

ELECTRONIC SCIENCE (Paper-VI)

EL - 346 (B) : Consumer Electronics

(2013 Pattern) (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 indicate full marks.***

Q1) Attempt all of the following.

a) State the different types of Microphones. **[1]**

b) What do you mean by OPC drum of LASER jet printer. **[1]**

c) State the names of two switches used for safty in Microwave Oven. **[1]**

d) What is the basic frequency used for Digital clock. **[1]**

e) "Inductive pickup sensor is used in wasting machine" comment **[2]**

f) "Thermal protector used in Microwave oven is nothing but PTC thermister" comment **[2]**

g) "Dot matrix printer can print carbon copy" comment **[2]**

h) "The impartance of Hook Switch in telephone set is to dissconnect the DC power supply of telephone exchange" comment **[2]**

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

a) With the help of neat diagram explain the working principle of moving coil cone type Loud speaker **[4]**

b) What do you mean by GPRS. State any four applications of GPRS **[4]**

c) Explain the working principle of scanner and draw the block diagram of scanner **[4]**

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

a) Why cell phone is called as cell phone. Explain the various specifications of cellphone. **[4]**

b) With the help of neat block diagram. Explain the Monochrome television receiver. **[4]**

c) Draw the block diagram of electronic remote transmitter and explain each block. **[4]**

Q4) Attempt any <u>two</u> of the following.

a) With the help of neat block diagram explain the working of Dot Matrix Printer. State the adventages of DMP over other printer. **[6]**

b) With the help of neat block diagram explain CATV in detail. **[6]**

c) Draw the block diagram of PAS (Public Address System) and explain each block. **[6]**

Total No. of Questions : 04]

SEAT No. :

P1214

[Total No. of Pages : 2

[5017] - 4077

T.Y. B.Sc

DEFENCE AND STRATEGIC STUDIES

DS - 401 : Internal Security of India

(2013 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 State

b) State the meaning of human security.

c) State the meaning of perspective planning.

d) What do you mean by internal security Management?

e) Define economic power.

f) Define Insurgency.

g) State the meaning of SEZ

h) Define ethnic conflict.

Q2) Answer in 8 to 10 Sentences each (any two) : **[8]**

a) Explain elements of the state

b) Discuss role of the state in human security

c) Describe economic dimensions of India's internal security

P.T.O.

Q3) Write short notes on (any two) : **[8]**

a) Kashmir problem

b) Naxalite problem

c) Agitation over SEZ

Q4) Answer in 18 to 20 sentences (Any one) : **[8]**

a) Describe linkages between internal security issues and national power.

b) Discuss current security challenges to Northeast region of India.

Total No. of Questions : 04]

SEAT No. :

P1215

[Total No. of Pages : 2

[5017] - 4078

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 402 : Trends in India's Defence Expenditure

(2013 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) State the concept of Defence economy.

b) What do you mean by strategic defence management?

c) What is strategic planning?

d) Write the meaning of Zero budget.

e) Define performance budget.

f) Write the meaning of dual economy.

g) Define national power.

h) Write the meaning of economic mobilization of national defence.

Q2) Answer in 8 to 10 Sentences each (any two) : **[8]**

a) Explain historical perspectives of defence budget.

b) Discuss role of private sector in defence production.

c) Describe organization of Ministry of defence.

P.T.O.

Q3) Write short notes on (any two) : **[8]**

a) Parliament and Defence expenditure.

b) Characteristics of India's economy.

c) DPSU.

Q4) Answer in 18 to 20 sentences (Any one) : **[8]**

a) Analyses India's defence spending from 1962 to till date.

b) Discuss functions of Defence Research and Development organization (DRDO).

Total No. of Questions : 04]

SEAT No. :

P1216

[Total No. of Pages : 2

[5017] - 4079

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 404 : Information Warfare and Cyber Security

(2013 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) What is meant by Military Security?

b) What is Cyber Security?

c) How modern war has become Hi-Tech?

d) Elaborate the term- Information Warfare.

e) Write the Strategic Aim of Information Warfare.

f) Define Electronic Warfare.

g) What is SCADA?

h) What is meant by Misinformation?

Q2) Answer in 8 to 10 sentences each (any two): **[8]**

a) Write about the application of IW in spreading RUMOUR.

b) How IW is set to revolutionize the Concept of Warfare.

c) Write the concept of Information Technology.

P.T.O.

Q3) Write short notes on (any two): **[8]**

a) Information warfare as a Force Multiplier.

b) Prospects of IW for Maritime Operations.

c) Prospects of IW for Aerospace Operations.

Q4) Answer in 16 to 20 sentences (any one) **[8]**

a) Write the role of Computer in Information System.

b) Develop relation between Information Technology and Information Warfare.

Total No. of Questions : 4]

SEAT No. :

P1217

[Total No. of Pages : 2

[5017] - 4080

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 405 : Defence Production and Logistics in India

(2013 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) What is meant by Joint Venture?

b) Define the term "National development".

c) What is meant by grade of technology?

d) Define technology absorption.

e) Introduce LCA.

f) What is "Obsolescence Factor"?

g) Write the role of Technological Institutions.

h) What is meant by Technological Modifications?

Q2) Answer in 8 to 10 sentences each (any two) : **[8]**

a) Give the status of Make in India and Defence Procurement.

b) Explain the status of Integrated Defence Logistics.

c) Write the significance of dual use technologies?

P.T.O.

Q3) Write short notes on (any two) : **[8]**

a) Mobilization of Logistics element during war.

b) Supply Chain Management.

c) Just in time Concept.

Q4) Answer in 16 to 20 sentences (any one) : **[8]**

a) Explain the role of defence production in National Development.

b) Explain about the Working Principles of Logistics.

Total No. of Questions : 04]

SEAT No. :

P1218

[Total No. of Pages : 4

[5017] - 4081

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 406A : Defence Journalism and National Security

(2013 Pattern) (Semester - IV) (Optional)

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 Editorial.

b) What is meant by News?

c) What is meant by Article?

d) Define National Security.

e) Write about the importance of Military to a nation/State System.

f) What is meant by AFSPA?

g) Write the function of Public Relation Officer.

h) What is the idea 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 Chief of Air Staff; ask ten questions on its status and preparedness.

c) Write about the present progress in Indian Defence Journalism.

P.T.O.

Q3) Write short notes on (any two) : **[8]**

a) Need of War Correspondence Course

b) Problems and prospects in defence journalism

c) Unprejudiced and Impartial Reporting

Q4) Answer in 16 to 20 sentences (any one): **[8]**

a) As a journalist, how will you promote a debate on the subject 'Defence and Development'?

b) Significantly examine the problem and prospects of defence journalism.

Total No. of Questions : 04]

P1218

[5017] - 4081

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 406B : Gender Based Conflicts and Human Rights

(2013 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) What is meant by Gender Equality?

b) Define the term 'Human Rights'.

c) Define 'Women Security'.

d) What is meant by 'Global Peace'?

e) Define 'Fundamental Rights'.

f) What is meant by 'Right to Education'?

g) Define Peace.

h) Why Gender Justice is essential in Society?

Q2) Answer in 8 to 10 sentences each (any two) : **[8]**

a) Write the concept of Women Security.

b) Write about the women empowerment in Saudi Arabia.

c) Write about the women empowerment in Latin America.

Q3) Write short notes on (any two): **[8]**

a) Alternative paradigm for democracy not without women.

b) Measure to stop gender violence.

c) Human Rights to Women.

Q4) Answer in 16 to 20 sentences (any one) : **[8]**

a) Discuss why women empowerment is indispensable in a progressive society?

b) Discuss about new feminist perspective in developing society.

Total No. of Questions : 04]

SEAT No. :

P1219

[Total No. of Pages : 4

[5017] - 4082

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 407(A) : Role of Armed Forces in Disaster Management

(2013 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 disaster.

b) What do you mean by Guideline disaster Management?

c) Define environmental disaster.

d) Write the meaning of weapons of Mass destruction.

e) Define natural disaster.

f) Define strategic planning.

g) Define sustainable development.

h) Write any two limitations of disaster management.

Q2) Answer in 8 to 10 Sentences each (any two) : **[8]**

a) Explain functions of NDRF in disaster management.

b) Discuss role of Local Civil Administration in disaster relief.

c) Describe importance of training in disaster management.

P.T.O.

Q3) Write short notes on (any two) : **[8]**

a) Difficulties in relief operations.

b) Ambegaon (Malin) Pune land slide in 2014.

c) Difficulties in counter terrorism.

Q4) Answer in 18 to 20 sentences (Any one) : **[8]**

a) Describe role of Armed Forces in disaster response.

b) Write a note on the role of armed forces in training of civil Population to manage disaster.

Total No. of Questions : 04]

P1219

[5017] - 4082

T.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS: 407(B) : Global Security - II

(2013 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 containment policy.

b) Define Blue economy.

c) Define power projection Navy.

d) Define super powers.

e) Define global security.

f) Define strategic planning.

g) Define International organization.

h) Define world order.

Q2) Answer in 8 to 10 Sentences each (any two) : **[8]**

a) Explain Chinese interest in Indian Ocean.

b) Discuss role of U.S.A in South Asian politics.

c) Describe importance of Non- nuclear proliferation.

Q3) Write short notes on (any two) : **[8]**

a) Global warming.

b) Human Rights.

c) Ethnicity and global conflict.

Q4) Answer in 18 to 20 sentences (Any one) : **[8]**

a) Describe role of UN in global peace and security.

b) Write a note on the peaceful purposes of nuclear energy.

Total No. of Questions : 4]

P1220

SEAT No. :

[Total No. of Pages : 2

[5017]-4083

T.Y. B.Sc. (Semester - IV)

DEFENCE AND STRATEGIC STUDIES

DS - NO : 408(A) Indian Military Strategy (1947-2014)

(2013 Pattern)

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

Instructions to the candidates:-

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

Q1) Answer in 2 or 4 sentences each. **[16]**

a) Define "Grand Strategy"
b) What was the basic reason for Indo pak war of 1947-48.
c) Which one is the major issue between India and China?
d) Why the Indo-Pak war of 1965 was fought?
e) What do you mean by ceasefire?
f) What do you understand by "Muktibaheni"?
g) Which was the basic aim of Kargil episode of 1999.
h) Define Tactics.

Q2) Answer in 8 or 10 sentences (any two) **[8]**

a) Explain the Tashkand Agreement of 1965.
b) Write in brief concept of Strategy.
c) What was the aim of Pakistan for Kargil - 1999?

Q3) Write short notes on (any two) **[8]**

a) Simla Agreement of 1972
b) Causes of "1971- Indo-Pak war"
c) Concept of Grand Strategy.

Q4) Answer in 16 to 20 sentences (any one) **[8]**

a) What were the implications of 1962 war on India?
b) Write an essay on longterm implications of Indo-Pak war of 1971

P.T.O.

Total No. of Questions : 4]

[5017]-4083
T.Y. B.Sc. (Semester - IV)
DEFENCE AND STRATEGIC STUDIES
DS - NO : 408(B) Indian Military Strategy (1680-1818)
(2013 Pattern)

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

Instructions to the candidates:-

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

Q1) Answer in 2 or 4 sentences each. **[16]**

a) What do you mean by Military Strategy?
b) Why sambhaji revolt against Soirabai?
c) What was the strategy of first Bajirao Peshwa?
d) What do you know about Nanasaheb Peshwa?
e) Who was Kanhoji Angre?
f) Between whom the third battle of panipat it was fought?
g) Why the British interface in internal matters of Maratha?
h) Why the Mughals released Sahu?

Q2) Answer in 8 to 10 sentences (any two) **[8]**

a) Write few lines on Rajaram.
b) What were the causes of third battle of Panipat?
c) Explain the causes of first Anglo Maratha war

Q3) Write short notes on (any two) **[8]**

a) Ahmedshaha Abdali
b) Kanhoji Angre
c) Battle of Palkhed

Q4) Answer in 18 to 20 sentences (any one) **[8]**

a) Assess first Bajirao Peshwa as a military leader.
b) Analyse the causes of Decline of Maratha power.

Total No. of Questions : 4]

P1221

SEAT No. :

[Total No. of Pages : 2

[5017]-4084

T.Y. B.Sc. (Semester - IV)

DEFENCE AND STRATEGIC STUDIES

DS - NO : 409(A) United Nation Organisation

(2013 Pattern)

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

Instructions to the candidates:-

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

Q1) Answer in 2 or 4 sentences each. **[16]**

a) What do you understand by veto power?
b) Write basic aim of UN.
c) State the date & year of birth of UN.
d) What do you mean by universal declarations of Human rights?
e) Where the HQ of UN is located?
f) State the meaning of globalization?
g) What do you understand by "Arms Race"?
h) What do you mean by "world parliament"?

Q2) Answer in 8 or 10 sentences (any two) **[8]**

a) Explain the concept of PM - 5 of security council.
b) Write in brief "UN charter"
c) Explain in short trusteeship council of UN.

Q3) Write short notes on (any two) **[8]**

a) Objectives of U.N.
b) Disarmament
c) Concept of Human Rights

Q4) Answer in 16 to 20 sentences (any one) **[8]**

a) Explain the hindrances in effective working of U.N.
b) Discuss the suez canal crises of 1956 with reference to unity for peace resolutions.

P.T.O.

Total No. of Questions : 4]

[5017]-4084
T.Y. B.Sc. (Semester - IV)
Defence and Strategic Studies
DS - NO : 409(B) Indias Maritime Security
(2013 Pattern)

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

Instructions to the candidates:-

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

Q1) Answer in 2 or 4 sentences each. **[16]**

a) What do you mean by "Maritime security"?
b) State any three naval commands of India.
c) Write the long form of B.I.O.T.
d) What do you mean by "Maritime Trade"?
e) What do you understand by "Power vaccum"?
f) State the meaning of littoral countries"
g) To whom we called "Nose" of Indian sub-continent?
h) By whom the "military base" established at diego-garcia Islands?

Q2) Answer in 8 to 10 sentences (any two) **[8]**

a) Explain in brief the limitations of coast Guard
b) Write in short "Continental shelf"
c) Explain in brief the concept of "Human Trafficking"

Q3) Write short notes on (any two) **[8]**

a) Characteristics of Indian Navy
b) Exclusive Economic Zone
c) L.T.T.E.

Q4) Answer in 16 to 20 sentences (any one) **[8]**

a) Critically evaluate the role of Indian Navy for National security with special reference to 26/11 Mumbai attack.
b) Write an essay on "Territonal water"

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

P1222 **[Total No. of Pages : 2**

[5017]-4085

T.Y.B.Sc. (Semester - IV)

INDUSTRIAL CHEMISTRY(Vocational)

Entrepreneurship Development

(Paper - V)(2013 Pattern)

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

Instructions to the candidates:

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

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

a) Define entrepreneurship .

b) What is sole proprietorship?

c) What is marketing mix?

d) What is subsidy?

e) Define fund flow statement.

f) What are soft skills?

g) What are the types of financial assistance the bank provides under the entrepreneur scheme?

h) Give full form of MSFC.

i) What is innovation?

j) What is digital Marketing?

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

a) Give the advantages of sole trading concern..

b) What is the role of training in developing entrepreneurs?

c) Write about maharashtra Industrial. Development corporation(MIDC)

P.T.O.

B) Answer briefly the following (any **two**) **[4]**

a) list out the features of IDBI.

b) What is stress Management?

c) Give two differences between entrepreneur and manager.

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

a) What factors should an entrepreneur consider for product selection?

b) What is the importance of a Project report?

c) State the features of Factory Act.

Q4) **A)** Define the term Company.What are the advantages and disadvantages of Joint Stock Company? **[6]**

OR

What is the circular flow of working capital? **[6]**

B) Answer the following (any **One)** **[4]**

a) Explain any two sales promotion methods.

b) What is marketing research?

Total No. of Questions : 4]

SEAT No. : ____

P1223

[Total No. of Pages : 2

[5017]-4086

T.Y.B.Sc. (Semester - IV)

BIOTECHNOLOGY(Vocational)

Voc- Biotech - 345:Environmental Biotechnology and Bioinformatics

(2013 Pattern)

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

Instructions to the candidates:

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

Q1) Answer each of the following in 1-2 lines. **[10]**

a) Define environmental biotechnology

b) Name two bacteria used in wastewater treatment

c) Give an application of bioinformation in the field of medicine.

d) What is bioleaching?

e) Name the microbe used for biohydrogen production?

f) What is meant by EST?

g) Define biostimulation.

h) What is Prosite?

i) Name two bacteria used in Pesticide degradation?

j) What is meant by scoring matrix?

Q2) Answer any **two** of the following: **[2 x 5 =10]**

a) Describe the bioreactors used in waste water treatment.

b) Explain the Protein sequence databases.

c) Define phyto remediation.Add a note on the various phytoremediation proceses.

P.T.O.

Q3) Write short notes on any **<u>two</u>** of the following **[2 x 5 =10]**

a) Pubmed.

b) Nitrogen fixers

c) EMBL and DDBJ

Q4) Define Biofuels .Give the advantages and limitations of biofuels.Explain any two types of biofuels in detail. **[1×1=10]**

OR

Describe in detail BLAST and FASTA

Total No. of Questions : 5]

SEAT No. :

P2102

[Total No. of Pages : 1

[5017]-4087

T.Y.B.Sc.

PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION (Vocational)

Entrepreneurship Development (Paper - V)

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 a Government can be an entrepreneur. **[10]**

Q2) Discuss the role of venture capital in supporting an Entrepreneur. **[10]**

Q3) Discuss how entrepreneurs can be classified. Give suitable examples to support your answer. **[10]**

Q4) What is a sick industry? What can be the causes for the industrial sickness. **[10]**

Q5) Write short notes on any two of the following **[10]**

a) Small scale industry

b) Professional manager

c) Women entrepreneurs

⊖⊖⊖

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

P1224 **[Total No. of Pages : 2**

[5017]-4088

T.Y. - B.Sc. (Semester - IV)

Electronic Equipment Maintenance

Entrepreneurship Development (Vocational) (Paper - V)

(2013 Pattern)

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

Instructions to the candidates:

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

Q1) Answer all of the following:-

a) Define the term entrepreneurship. **[1]**

b) State two disadvantages of sole propritorship. **[1]**

c) State hours of work for adult female and male workers as per factories Act, 1948. **[1]**

d) What is Vat? **[1]**

e) Modern concept of marketing is consumer centric Comment. **[2]**

f) The breakeven point establishes level of production which evenly breaks the costs and revenues, Comment. **[2]**

g) State any four types of entrepreneur. **[2]**

h) State any two methods of market survey. **[2]**

Q2) Answer any <u>two</u> of the Following:

a) Explain advantages and disadvantages of joint stock Company. **[4]**

b) Explain the scope of small scale industries in economic development of the country. **[4]**

c) Explain the term market segmentation. **[4]**

P.T.O.

Q3) Answer any <u>two</u> of the Following:

a) Explain characteristics of entrepreneur. **[4]**

b) Discuss the functions of district industries centre (DIC). **[4]**

c) Describe how to obtain ideas to start a new business. **[4]**

Q4) Answer any <u>two</u> of the Following:

a) Explain the functions of HRM in modern industry. **[6]**

b) Discuss sources of finance to start a new business. State fascilities provided by M.S.F.C **[6]**

c) Explain the concept of entrepreneurship. **[6]**

OR

Write short notes on the following:

a) Costing and pricing. **[4]**

b) Stress management. **[4]**

c) Digital marketing. **[4]**

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

P1225 **[Total No. of Pages : 2**

[5017]- 4089

T.Y.B.Sc.(Vocational)

INDUSTRIAL MICROBIOLOGY

Molecular Biology and Genetic Engineering

(VOC - IND-MIC-345:)(Theory)

(2013 Pattern)(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 labeled diagrams wherever necessary.***

Q1) **Answer the following.**

a) What is human genome project?

b) Enlist the important features of pUC19.

c) Name two DNA sequencing methods.

d) pBR 3222 was developed by-------&----------.

e) What is Gene gun?

f) Represent diagrammatically only: action of ligase.

g) State whether the following statement is True or False and give reasons for your answer :

Non - radioactive labeling is becoming more popular than radioactive labeling.

h) Write recognition site and cutting site of EcoR1.

i) Write two examples of phage vectors.

j) Write the principle of Real - time PCR.

P.T.O.

Q2) Attempt any **two** of the following:

a) Describe in detail construction and importance of Ti plasmid as a cloning vehicle.

b) Discuss the impact of recombinant DNA technology on detection and diagnosis of pathogens and genetic diseases.

c) Elaborate on Blue white screening.

Q3) **Comment on any two of the following**

a) Pyrosequencing.

b) cDNA library.

c) Microinjection technique.

Q4) Attempt any **One** of the Following:

a) What is PCR? Elaborate on its principle, working and applications.

b) What is nucleic acid hybridization? Mention probes used for nucleic acid hybridization.Write the steps involved in detection of transformants by the Southern blot technique.

Total No. of Questions : 4]

SEAT No. : ____

P1226

[Total No. of Pages : 2

[5017]-4090

T.Y.B.Sc. (Semester - IV)

COMPUTER HARDWARE & NETWORK ADMINISTRATION(Vocational)

Network Concepts - II

(Paper - V)(2013 Pattern)

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

Instructions to the candidates:

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

Q1) Attempt all of the following **[10 × 1=10]**

a) What is a Router

b) What is a NAS?

c) What is Phishing?

d) What is a VOIP?

e) What is a Shared Drive on Network?

f) What is a Broad Band?

g) Give one application of a VPN.

h) What is a IDS?

i) What is Cryptography?

j) What isa Gateway?

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

a) What are different types of Logical Access?

b) Explain the importance of managed switches in complex networks.

c) What are Active Attacks? Name any 4 of them.

P.T.O.

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

a) Explain the importance of an Antivirus.

b) Write a note on Android based Devices.

c) Explain the advantages of VLANs.

Q4) Attempt any **<u>One</u>** of the Following: **[1 × 10=10]**

a) Explain the Concept of :

i) Cold Sites.

ii) Warm Sites

iii) Hot Sites

iv) Mirroring .

v) RAID

b) Write the Installation Procedure for an Graphics Card and configuring TCP/IP Protocol in Windows 7 given IP as 192.168.1.100.

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

P1227 **[Total No. of Pages : 2**

[5017]-4091

T.Y. B.Sc. (Vocational) (Semester - IV)

SEED TECHNOLOGY

Entrepreneurship Development

(2003 Pattern) (Paper - V)

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

Instructions to the candidates:

1) ***All questions are compulsory, and carry equal marks.***
2) ***Figures to right indicate full marks.***
3) ***Draw neat diagrams wherever required.***

Q1) Answer the following **[10×1=10]**

a) Mention any one key element of entrepreneur.
b) Give the full form of SIDBI.
c) What is TDS.
d) Mention one form of business organisation.
e) What is working capital?
f) Mention one criterion for selection of new product.
g) Give the full form of SWOT.
h) What do you mean by “Angel finance”.
i) Write the concept of entrepreneurship.
j) Mention any one barrier in entrepreneurship.

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

a) Give the need and scope entrepreneurship.
b) Write an account on sole Proprietorship and its merits.
c) Give an account on the role of consultancy organisations.

P.T.O.

Q3) Write short notes on any two of following **[2×5=10]**

a) Payment of wages act.
b) Types of small scale industries.
c) Costing and pricing.

Q4) Write an account on the methods for digital marketing. **[10]**

OR

Give the procedure for registration of small scale industries and PAN.

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

P1228 **[Total No. of Pages : 2**

[5017]-4092

T.Y. B.Sc. (Semester - IV)

INDUSTRIAL CHEMISTRY

Basic Chemical Industries - II (Paper - VI)

(Vocational Course), (2013 Pattern)

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

Instructions to the candidates:

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

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

a) What are detergents.
b) Define the term perfumes.
c) Give the meaning of diuretics.
d) Define the term adhesives.
e) Give two charateristics of natural Fibres.
f) Define degree of polymerization.
g) What is vulcanization?
h) Give two uses of polyester resin.
i) Give defination of dye.
j) Write monomer of gutta percha rubber.

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

i) Explain in detail synthesis and uses of alizarin dye.
ii) What are chemotherapeutic drugs? Give the synthesis of benzocaine.
iii) Describe the isolation of essential vegetable oils.

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

i) What are surfactants? Give their classification.
ii) Explain the synthesis of paracetamol.
iii) Discuss the classification of adhesives

P.T.O.

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

a) Outline the manufacturing of perfume and flavouring material.

b) Write a note on synthetic fibres.

c) Discuss the detail elastomers.

Q4) a) What are antipyretics? Describe the manufacturing of aspinigic with flow sheet diagram. **[6]**

OR

Describe the manufacturing of indigo dye. **[6]**

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

i) Give the synthesis and uses of vosaniline.

ii) Write a note on special soaps.

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

P1229 **[Total No. of Pages : 2**

[5017]-4093

T.Y. - B.Sc. (Semester - IV)

Biotechnology (Vocational)

Entrepreneurship Development

(2013 Pattern)

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

Instructions to the candidates:

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

Q1) Answer the following questions in short:- **[10]**

a) What is the purpose of an exit policy?

b) What is sole proprietorship?

c) What is the full form of SISI?

d) What is VAT?

e) What is pricing?

f) Give the full form of SWOT.

g) What is WAC?

h) Give two criteria for selection of new product?

i) Name sources for digital marketing.

j) Name any two private sources for debt finance.

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

a) What are barriers to Entrepreneurship? Enlist means to reduce them.

b) Discuss role of Consultancy Organization.

c) Write a note on CGTSME.

P.T.O.

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

a) Project Report

b) SSI

c) Commercial and Co-operative Banks.

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

a) Discuss marketing with reference to the marketing mix.

OR

b) Discuss role of various government and commercial funding agencies, Add a note on working capital and cash flow.

Total No. of Questions : 6]

P2103

SEAT No. :

[Total No. of Pages : 1

[5017] - 4094
T.Y. B.Sc.
PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION (VOCATIONAL)
Radio Software (Semester - IV) (Paper - VI)

Time : 2 Hour] *[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) Explain with suitable examples the challenges for producing a Radio Programme. **[10]**

Q2) Anchor is an important person in a discussion programme. How? **[10]**

Q3) What is an O.B. programme? What care should be taken to broadcast a live O.B. Programme? **[10]**

Q4) What are the differences between Radio and Print communication? **[10]**

Q5) What is the role of an Interviewer in an Interview programme? **[10]**

Q6) Discuss the importance of the Broadcast code. **[10]**

○○○

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

P1230 **[Total No. of Pages : 2**

[5017]-4095

T.Y. B.Sc. (Vocational)

ELECTRONIC EQUIPMENT MAINTENANCE

Medical Instrumentation (Semester - IV)

(2013 Pattern)(Paper VI)

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

Instructions to the candidates:

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

Q1) (a) Answer the following:- **[4 × 1 = 4]**

i) What is SA node?

ii) State the organ undertest for EEG?

iii) What is ion selective electrode?

iv) State resting potential of excitable cell.

(b) Answer the following in brief: **[4 × 2 = 8]**

i) What are 1) CNS, 2) ECG?

ii) Give two examples of stimulation electrodes for tissues.

iii) Give two disadvantages of suction electrode.

iv) Draw 2 - Dimensional electrode array.

Q2) Answer any 2 **[2×4=8]**

i) Explain with block diagram ‘basic recording system’

ii) Discribe blood cell counter

iii) Discuss isolated power distribution system.

Q3) Answer any 2 **[2×4=8]**

i) Draw standard ECG signal and explain its features.

ii) Give an account of body surface recording electrodes.

iii) State 4 practical hints for using bioelectric electrodes.

P.T.O.

Q4) Answer the following: **[2×6=12]**

i) Discuss microshock hazards
ii) Discuss 3 physiological effects of electric current

OR

Answer the following: **[3×4=12]**

i) Explain 2 main considerations for bioelectric recorder amplifier.
ii) Explain electrical activity of excitable cell.
iii) Discuss internal electrodes.

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

P1231 **[Total No. of Pages : 2**

[5017]-4096

T.Y.B.Sc.(Semester -IV)

INDUSTRIAL MICROBIOLOGY (Vocational)

(VOC-IND-MIC-346) Entrepreneurship Development

(2013 Pattern) (Paper - VI)

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

Instructions to the candidates:

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

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

Choose the correct option:

i) Which of the following skill is needed by an entrepreneur?
   a) Technical skill
   b) Business management skill
   c) Personal entrepreneurial skill
   d) All of the above

ii) The definition of entrepreneurship that focused more stress on innovation was developed by:
   a) Joseph Schumpeter
   b) Abraham Maslow
   c) Peter Drucker
   d) F.A. Walker

iii) SWOT is an acronym for:
   a) Strategy, Working, Opinion, Tactical
   b) Strength, Weaknesses, Oppenness, Tactics
   c) Strength, Weaknesses, Opportunities, Threats
   d) Strategy, Work, Opinions, Toughness

P.T.O.

State whether the following statements are True or False

iv) The three basic ideas in the marketing concept are (1) customer satisfaction. (2) Confining marketing activities to marketing professionals (3) having profit as an objective.

v) Entrepreneurship influences the advancement of industrialization in an economy.

vi) Market segmentation reduces promotion cost.

Fill in the blanks.

vii) _____ is the performance of a business activity that directs the flow of goods and services from producer to consumer.

viii) Dividing a market or a consumer base into pieces and understanding the dynamics of each category is known as _____.

ix) Systematic approach to estimate the strengths and weaknesses of alternatives that satisfy actions or functional requirements of a business is called as _____.

x) ____ is anything that can be offered to a market for acquisition, use or consumption.

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

a) Explain the role of District Industries Centre (DIC) in entrepreneurship development.

b) Write about the technical and economic feasibility of a project.

c) Define the term Entrepreneur. What are the characteristics of an entrepreneur?

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

a) Explain different criteria for selection of a new product.

b) Explain the key elements of entrepreneur.

c) Explain about the Entrepreneurship Development Insitute of India (EDII)

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

a) Entrepreneurs need not necessarily be born but can be developed through well conceived and well directed activities.' Explain the role of national as well as state level training organizations supporting entrepreneurship.

b) 'Entrepreneurial spirit is characterized by innovation and risk taking and an essential component of a nation's ability to succeed in an ever changing and more competitive global market place.' Explain the importance of entrepreneurship for the economy.

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

P1232 **[Total No. of Pages : 2**

[5017]-4097

T.Y. B.Sc. (Vocational)

COMPUTER HARDWARE & NETWORK ADMINISTRATION

Entrepreneurship Development (Semester - IV)

(2013 Pattern) (Paper - VI)

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

Instructions to the candidates:

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

Q1) Attempt all of the following:- **[10 × 1 = 10]**

a) What is SICOM?
b) Who is an Entrepreneur?
c) Explain the Term 'Break Even Point'?
d) What is a PMYR Loan Scheme?
e) Entrepreneur ship Development Program of India is carried out under which Ministry?
f) Which Tax do we pay on our excess income?
g) What is a meaning of SIDBI?
h) Give any one characteristic of an Entrepreneur.
i) What is a 'Capital Investment'?
j) Is 'Place' one of the important factors of Marketing Mix.

Q2) Attempt any <u>two</u> of the Following: **[2×5=10]**

a) What are the different modes of Employment?
b) What are the Merits of a Partnership Firm?
c) What is the Role of Human Resource Department in Entrepreneurship Development program of India?

P.T.O.

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

a) Explain the importance of Softskill development programme.

b) Which funding agencies help Entrepreneurs to grow?

c) Explain the concept of "Angel Finance".

Q4) Attempt any <u>one</u> of the Following: **[2×5=10]**

a) Explain the Roles of following Agencies:
i).MIDC ii). Pollution Control Board iii). DIC iv). SISI v). NEDB

OR

b) Explain the advantages of Digital Marketing Tools given below:
i).SMS Campaign ii). Mailers iii). Facebook iv). Search Engines v). Online Trade

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

P1233 **[Total No. of Pages : 2**

[5017]-4098

T.Y. B.Sc. (Vocational) (Semester -IV)

SEED TECHNOLOGY (Paper - VI)

VOC - SETE - 322: Biotechnology and Intellectual Property Rights.

(2013 Pattern)

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

Instructions to the candidates:

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

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

a) Define Biotechnology.
b) Define PCR.
c) What is gene cloning?
d) Give any two applications of southern Blotting technique.
e) Define synthetic seed.
f) What is BT - Cotton?
g) What is Copyright?
h) Give any two enzymes used in recombinant DNA - Technology.
i) Write any two applications of transgenics.
j) Give any two plant breeders rights.

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

a) Explain in detail RFLP.
b) Comment on protection or IPR.
c) Comment on ICAR.

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

a) Anther culture.
b) World trade organization.
c) SDS - PAGE.

P.T.O.

Q4) Explain in detail the technique of Golden Rice Production. **[10]**

OR

Describe in detail of the DNA Ringer Printing technique. **[10]**