[4317] – 404

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
MATHEMATICS (Paper – IV)
MT-344 : Ring Theory
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

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

1. Attempt **any five** of the following : **10**

   a) Let a belong to a ring R. Let $S = \{x \in R \mid ax = 0\}$. Show that S is a subring of R.

   b) List all zero-divisors in $\mathbb{Z}_{13}$.

   c) Find all maximal ideals in $\mathbb{Z}_{12}$.

   d) Show that the function $f : \mathbb{Z}_5 \to \mathbb{Z}_{10}$ given by f(x) = 3x is not a homomorphism.

   e) Find zeros of $x^2 + 3x + 2$ in $\mathbb{Z}_6$.

   f) Determine whether the polynomial $x^4 + 3x + 3$ is irreducible over $\mathbb{Q}$. Justify.

   g) Show that in the ring $\mathbb{Z}[i]$; 13 is reducible element.

2. Attempt **any two** of the following : **10**

   a) Prove that a finite integral domain is a field.

   b) Let R = {0, 2, 4, 6, 8} under addition and multiplication modulo 10. Write addition and multiplication table for R. Is R is a field ? Explain.

   c) Prove that the only ideals of a field F are {0} and F itself.

P.T.O.

3. Attempt **any two** of the following : **10**

   a) Let R be a ring with unity e. Then show that the mapping $\phi : \mathbb{Z} \to R$ given by $n \to ne$ is a ring homomorphism.

   b) Let ϕ be a ring homomorphism from a commutative ring R onto a cummutative ring S and let A be a prime ideal of S. Then show that $\phi^{-1}(A) = \{x \in R / \phi(x) \in A\}$ is a prime ideal in R.

   c) Let F be a field. Then show that F[x] is a principal ideal domain.

4. Attempt **any one** of the following :

   a) i) In a principal ideal domain prove that an element is an irreducible if and only if it is a prime. **7**

   ii) If a, b are associates in an integral domain D. Then prove that <a> = <b>, where <a> denotes the ideal generated by a. **3**

   b) i) Prove that in a principal ideal domain, any strictly increasing chain of ideals $I_1 \subset I_2 \subset$ ....must be finite in length. **5**

   ii) Show that the polynomial $x^{p-1} + x^{p-2} + ... + 1$ is irreducible over $\mathbb{Q}$. **5**

———————

[4317] – 407

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
MATHEMATICS (Paper – VII) (Ele. – II)
MT – 347 : Computational Geometry
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt **any five** of the following : **10**

   i) An object is rotated through angle 90° about the point [4 3]. Obtain the transformation matrix.

   ii) Write any two properties of Bezier curve.

   iii) If we apply transformation matrix T = $\begin{bmatrix} 3 & 1 \\ 2 & 2 \end{bmatrix}$ on a square, then we get a parallelogram of area 64 cm^2. Find the length of each side of the original square.

   iv) Find the angle $\delta\theta$ to generate 11 equidistant points on the parabolic segment $y^2 = 4x$, $2 \leq y \leq 4$.

   v) Define Dimetric projection. Find the angle θ about X axis if $f_z = \frac{1}{2}$.

   vi) Write down the transformation matrix T if we want to expand the size of the cube four times the unit cube.

   vii) Obtain the transformation matrix to create the top view of the object.

2. Attempt **any two** of the following : **10**

   i) If the line y = mx + h is transformed onto the line $y^* = m^*x^* + h^*$ under the matrix T = $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ then prove that $m^* = \frac{b + dm}{a + cm}$ and $h^* = h\left(\frac{ad - bc}{a + cm}\right)$.

P.T.O.

ii) Reflect the triangle ABC through the line y = 5 where A[13], B[2 4] and C[3 5].

iii) Obtain the concatenated matrix of the following transformations. Translate in x, y and z directions by – 1, 2, 1 units respectively. Rotate about z-axis by 90°. Reflect in XY plane. Apply the concatenated matrix on the point A[3 2 1].

3. Attempt **any two** of the following : **10**

i) Obtain the transformation matrix for the trimetric projection formed by rotation about Y-axis through an angle $\phi = 30°$ followed by rotation about X-axis through $\theta = 45°$ and then orthographic projection on Z = 0 plane. Also determine the principal foreshortening factors.

ii) Obtain an algorithm to generate uniformly spaced n points on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.

iii) Obtain the combined transformation matrix of the following transformations.

Reflection through the line y = – x, shearing in X and Y directions by 3, – 4 units resp. Translation in X and Y directions by – 1, 2 units respectively. Apply on point P[3 – 8].

4. Attempt **any one** of the following : **(10)**

i) a) Generate 8 points on the circle $(x – 2)^2 + (y – 4)^2 = 25$. **6**

b) Perform the perspective projection onto the z = 0 plane of the standard unit cube from the center of projection at z_c = 10 on z-axis. **4**

ii) a) Find the cabinet projection of the object represented by matrix X with a horizontal inclination $\alpha = 25°$.

$$X = \begin{bmatrix} 1 & 2 & 1 \\ 3 & 4 & -1 \\ -1 & -2 & 1 \\ 2 & 1 & 1 \end{bmatrix}$$ **5**

b) Write the parametric equation of a Bezier curve determined by control points B_0[1 1], B_1[2 3], B_2[4 3] and B_3[3 1]. Find the position vector of a point corresponding to t = $\frac{1}{2}$. **5**

———————

[4317] – 408

Seat No.	

T.Y.B.Sc. (Semester – IV) Examination, 2013
MATHEMATICS (Paper – VII) (Ele. – II)
MT-347 : Optimization Techniques
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*

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

1. Attempt **any five** of the following : **10**

   i) State the 'No Passing Rule' in a sequencing problem.

   ii) Explain the three time estimates used in the context of PERT.

   iii) What is a float ? What are the different types of floats ?

   iv) Player A and player B play a game in which each has 3 coins – a 5p, a 10 p and a 20p. Each selects a coin without the knowledge of the other's choice. If the sum of the coins is an odd amount, then A wins B's coin; but if the sum is even then B wins A's coin. Determine the payoff matrix for player A.

   v) Write any two assumptions of a sequencing problem.

   vi) Consider the function $f(x) = x_1 + 2x_2 + x_1x_2 - x_1^2 - x_2^2$. Determine the maxima and minima of the function (if any)

   vii) Define :

      a) Saddle Point

      b) Optimal strategies.

P.T.O.

2. Attempt **any two** of the following : **10**

i) Machine A costs Rs. 45,000/- and the operating costs are estimated at Rs. 1,000/- for the first year increasing by Rs. 10,000/- per year in the second and subsequent years. Machine B costs Rs. 50,000/- and operating costs are Rs. 2,000/- for the first year, increasing by Rd. 4,000/- in the second and subsequent years. If we now have a machine of type A, should we replace it with B ? If so when ? Assume that both machines have no resale value and future costs are not discounted.

ii) Using graphical method, obtain the optimal strategies for both players and the value of the game for two-person zero-sum game whose payoff matrix is given as follows :

Player A	**Player B**	
	B_1	**B_2**
A_1	–6	7
A_2	4	–5
A_3	–1	–2
A_4	–2	5
A_5	7	-6

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

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

3. Attempt **any two** of the following : **10**

i) Determine the optimal sequence of jobs that minimise the total elapsed time based on the following information. Processing time on machines is given in hours. Also compute the minimum time and ideal time for each machine. (Processing order is AB).

Job	I	II	III	IV	V	VI	VII
Machine A	3	12	15	6	10	11	9
Machine B	8	10	10	6	12	1	3

ii) Construct a network of project whose activities and their precedence relationships are as given below :

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

iii) 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

$x_1 + 5x_2 - 3x_3 = 6$.

4. Attempt **any one** of the following : **10**

i) A small project consists of seven activities, the details of which are as given below :

Activity	**Duration (days)**			**Immediate Predecessor**
	Most likely	**Optimistic**	**Pessimistic**	
A	3	1	7	-
B	6	2	14	A
C	3	3	3	A
D	10	4	22	B, C
E	7	3	15	B
F	5	2	14	D, E
G	4	4	4	D

a) Draw network diagram for this project.

b) Compute the expected project completion time.

ii) A project schedule has the following characteristics :

Activity	**1-2**	**1-3**	**2-4**	**3-4**	**3-5**	**4-9**	**5-6**	**5-7**	**6-8**	**7-8**	**8-10**	**9-10**
Duration (days)	4	1	1	1	6	5	4	8	1	2	5	7

a) Draw the network and find the critical path.

b) Find project completion time.

c) Determine the total float and free float of each non-critical activity.

———————

[4317] – 409

Seat No.	

T.Y.B.Sc. (Semester – IV) Examination, 2013
MATHEMATICS (Paper – VII) (Ele. – II)
MT-347 : Improper Integrals and Laplace Transforms
(New) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*

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

1. Attempt **any five** of the following : **10**

a) Prove that $\int_0^\infty e^{-x}dx$ is convergent.

b) Find Cauchy's Principal Value of $\int_{-\infty}^{\infty} \frac{1}{x^3}dx$.

c) Prove that $\int_1^\infty \frac{Sinx}{x^2}\,dx$ is absolutely convergent.

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

e) Classify the following integrals according to the types of improper integrals :

$(\alpha)\ \int_0^1 \frac{Sinx}{x}\,dx$ $(\beta)\ \int_1^3 \frac{dx}{(x^2-4)}$

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

g) If C_1 and C_2 are any two constants and $L\{F_1(t)\} = f_1(s)$, $L\{F_2(t)\} = f_2(s)$; then prove that $L\{C_1F_1(t) + C_2F_2(t)\} = C_1f_1(s)+C_2f_2(s)$.

P.T.O.

2. Attempt **any two** of the following : **10**

   i) Show that the improper integral $\int_a^{\infty} \frac{1}{x^p}\,dx$ converges if $p > 1$ and diverges if $p \leq 1$.

   ii) Prove that $\int_1^{\infty} e^{-x^2}\,dx$ is convergent.

   iii) Prove that $\int_0^1 \frac{dx}{\sqrt{x}(1-x)}$ is convergent.

3. Attempt **any two** of the following : **10**

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

   ii) If $L^{-1}\{f(s)\} = F(t)$, then prove that $L^{-1}\{e^{-as}f(s)\} = G(t)$, where $G(t) = \begin{cases} F(t-a), & t > a \\ 0, & t < a \end{cases}$

   iii) Discuss the convergence of $\int_0^1 x^{n-1} \log x\,dx$.

4. Attempt **any one** of the following : **10**

   i) State and prove the convolution theorem .

   ii) Solve :

   a) $Y'' + 9Y = \text{Cos}2t : Y(0) = 1, Y\left(\pi/2\right) = -1.$

   b) Evaluate $\int_0^{\pi/2} \frac{d\theta}{\sqrt{\tan\theta}}$.

[4317] – 410

Seat No.	

T.Y.B.Sc. (Semester – IV) Examination, 2013
MATHEMATICS (New Course) (Paper – VII) (Ele. – II)
MT-347 : C PROGRAMMING – II
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: i)* ***All*** *questions are* ***compulsory****.*

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

1. Attempt **any five** of the following : **10**

   i) What does the statement : int s = sizeof (struct point) ; do ?

   ii) Write C statement that defines a pointer to another pointer that points to an integer value.

   iii) State **True/False.**

   Bitwise operators only work on limited types : int and char (and variations of int)

   iv) Explain the use of #undef.

   v) Justify **True/False**

   A variable of register storage type is always stored in the computers Random Access Memory (RAM).

   vi) Explain the use of feof() function.

   vii) What does the following C statement define ?

   char *name [10];

2. Attempt **any two** following : **10**

   i) Define a structure called point having two members of type int indicating the pair (x, y). Write a C program that translates this point by a value 'v' to obtain a new point. Display the x and y values of the translated point.

   ii) Explain the concept of passing parameters to a function by reference. Write C function void swap (int *x, int *y) that swaps the values of variables x and y.

   iii) What are bitwise operators ? Explain any four bitwise operators.

P.T.O.

3. Attempt **any two** of the following : **10**

   i) Write a C program to display the sum of diagonal elements of a square matrix. Accept the matrix form the user.

   ii) Explain the fprint () and fscanf() functions with the help of examples.

   iii) Explain the auto and extern storage class with the help of examples.

4. Attempt **any one** of the following : **10**

   i) a) Trace the output of the following piece of C code

```
#include<stdio.h>
#define A 4 – 2
#define B 3 – 1
int main () {
int ratio=A/B;
printf (“%d”, ratio);
return 0;
}
```

   b) Write a short note on pointer arithmetic.

   ii) a) Trace the output of the following piece of C code

```
void main ()
{
   int i = 4, j = 3;
   xyz (&i, &j);
   printf (“%d, %d”, i, j);
}
void xyz (int *i, int*j)
{
   *i = *i * *i;
   *j = *j * *j;
```

   b) What is a union ? Differentiate between a union and a structure data type.

———————

[4317] – 411

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
MATHEMATICS (Paper – VII)
MT 347 : Dynamics (Ele. – II)

Time : 2 Hours Max. Marks : 40

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

1. Attempt **any five** of the following : **10**

a) A particle moves along the curve r = b cos pti – c sin ptj where b, c, p are positive constants. Show that the acceleration is directed towards the origin.

b) A body having mass 0.25 kg starts from rest with uniform acceleration and travels 8 meters in 2 seconds. Find the force acting on it.

c) If the maximum horizontal range of a particles is R, show that the greatest height attained is $\frac{1}{4}R$.

d) If a particle is projected up an inclined plane with inclination α with initial velocity u. Determine the time when the particle will come to instantaneous rest.

e) The pedal equation of an ellipse referred to focus as pole is

$$\frac{b^2}{p^2} = \frac{2a}{r} - 1$$

Find the law of force if the particle is moving along this ellipse.

f) A body whose true weight is 13 kg appeared to weigh 12 kg by means of a spring balance in a moving lift. What was the acceleration of the lift at the time of weighing ?

g) If the angular velocity of a moving particle about a fixed origin be constant, show that its transverse acceleration varies as its radial velocity.

P.T.O.

2. Attempt **any two** of the following : **10**

   a) Obtain tangential and normal components of velocity and acceleration.

   b) The sum of two weights of an Atwood's machine is 16 kg. The heavier weight descends 24.5 meters in 4 seconds. What is each weight ?

   c) A particle is projected vertically upwards with a velocity u m/sec and after t seconds, another particle is projected upwards from the same point and with the same velocity. Prove that the particles will meet at a height $\frac{4u^2 - g^2t^2}{8g}$ meters after a time $\left(\frac{t}{2} + \frac{u}{g} \right)$ seconds from the start.

3. Attempt **any two** of the following : **10**

   a) A particle of mass m is projected from a fixed point with velocity u in the horizontal plane, in a direction making an angle α with the horizontal. Obtain the equation of the trajectory.

   b) Prove that the work done in stretching an elastic string AB, of natural length l and modulus of elasticity λ, from tension T_1 to tension T_2 is $\frac{l}{\lambda}\left(T_2^2 - T_1^2\right)$.

   c) Show that for a given velocity of projection, the maximum range down a plane of inclination α is greater than that up the plane in the ratio $(1 + \sin\alpha) : (1 - \sin\alpha)$.

4. Attempt **any one** of the following : **10**

   a) i) For a particle describing a central orbit, derive the equation

   $$F = h^2u^2\left[u + \frac{d^2u}{d\theta^2}\right]$$

   ii) To a man walking at the rate of 4 km/hr, rain appears to fall vertically. If actual velocity of rain is 8 km/hr, find its actual direction.

   b) i) State Kepler's Laws of planetary motion. Also, state Newton's law of Gravitation.

   ii) A particle is projected with a velocity of 60 m/sec at an angle 60° with the horizontal, from the foot of an inclined plane of inclination 30° with the horizontal. Find the time of flight and the range of the particle on the inclined plane.

———————

[4317] – 416

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
PHYSICS (Paper – IV)
PH-344 : Nuclear Physics
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt **all** of the following (**1** mark **each**) : **10**

   a) Define the term – Packing fraction.

   b) State any two properties of β rays.

   c) Find the amount of energy released, when a milligram of mass is converted into energy.

   d) Define Half life of a radioactive substance.

   e) State any two limitations of shell model of nuclear structure.

   f) Which type of material is used for ionization in solid state counters ?

   g) Define threshold energy of the projectile in nuclear reaction.

   h) Define effective multiplication factor for chain reaction in the nuclear reactor.

   i) What is meant by heterogeneous reactor ?

   j) What is dead time in the GM counter ?

2. Attempt **any two** of the following :

   a) What are mesons ? Explain in brief Meson theory of nuclear forces. **5**

   b) What is nuclear reactor ? Explain swimming pool type reactor. **5**

   c) Show that the Q value is given by **5**

$$Q = \left(1+\frac{m_4}{m_3}\right)E_4 - \left(1-\frac{m_1}{m_3}\right)E_1 - \frac{2\sqrt{m_1 m_4 E_1 E_4}}{m_3}\cos\theta$$

P.T.O.

3. Attempt **any two** of the following :

   a) Calculate the binding energy and binding energy per nucleon in the case of $_{29}Cu^{64}$ whose mass is 63.9297 amu

   Give m_p = 1.007825 a.m.u.

   m_n = 1.008665 a.m.u. **5**

   b) What thickness of cadmium sheet would absorb 99 percent of the thermal neutrons incident on it ? The thermal neutron cross section of Cd^{112} is 2537 barn, density of Cd is 8.6 g/cm^3. **5**

   c) A cyclotron has a magnetic field of 1.5 Wb/m^2. The extraction radius is 0.5 m. Calculate (i) the frequency of oscillator for accelerating the deuterons (ii) the energy of the extracted beam. **5**

4. A) Attempt **any one** of the following :

   a) Describe the shell model of nuclear structure with reference to assumptions and evidences. **8**

   b) Give theory of successive disintegration of radioactive substance. Explain what is radioactive equilibrium ? **8**

   B) Attempt **any one** of the following :

   a) Compute the mass of 1 curie of C^{14}. The half life of C^{14} is 5700 yrs. **2**

   b) Define the terms : Mass defect and Binding Energy. **2**

———————

[4317] – 418

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
PHYSICS (Paper – VI) (Elective – II)
PH-346 (1) : Electro Acoustics and Entertainment Electronics
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt **all** of the following (**one** mark **each**) : **10**

a) Give frequency theory of hearing.

b) Draw a diagram showing construction of condenser microphone. Give its equivalent circuit.

c) What is articulation test ?

d) What is meant by dynamic range ?

e) What is volume expander ?

f) Define directivity factor for a microphone.

g) Give two advantages of folded horns.

P.T.O.

h) What is an equalizer ?

i) What do you mean by articulation score ?

j) Give place theory of hearing.

2. Attempt **any two** :

a) Explain how is the required output power of an amplifier, to be installed in an auditorium, calculated ? **5**

b) Give strengths of medical ultrasonography. **5**

c) Distinguish between monophonic and stereophonic sound reproducing systems. **5**

3. Attempt **any two** :

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

b) On a level detector type reverberation time measuring instrument, the upper and lower levels are 2.1 volts and 1.1 volts respectively. If the time elapsed between the two levels is 0.11 sec, determine the reverberation time. **5**

c) A condenser 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 250 V. **5**

4. A) Attempt **any one** :

a) Discuss acoustics of hearing mechanism in humans. **8**

b) Compare variable area and variable density motion picture sound recording systems. **8**

B) Attempt **any one** :

a) Distinguish between voiced and unvoiced sounds. **2**

b) Sketch the super cardioid and hyper cardioid polar response of microphones. **2**

[4317] – 418

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
PHYSICS (Paper – VI)
PH-346 (2) : Renewable Energy Sources (Elective – II)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) ***Use*** *of log tables and calculators are* ***allowed****.*

1. Attempt **all** of the following (**one** mark **each**) : **10**

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

   b) Define the terms of 'Air Mass'.

   c) What is meant by Zenith ?

   d) State the advantages of renewable energy sources.

   e) Define the term efficiency of solar cell.

   f) What is meant by OTEC ?

   g) State the two factors affecting bio-digestion.

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

   i) What is Photosynthesis ?

   j) The radius of sun surface is 6.960×10^8 m and the mean earth-sun distance is 1.5×10^{11} m. Find angular divergence.

2. Attempt **any two** :

   a) State the Limitations of Photovoltaic cell efficiency. **5**

   b) Explain the term solar radiation at the earth surface. **5**

   c) Explain the term Biogas from plant wastes. **5**

3. Attempt **any two** :

   a) The solar radiation intensity leaving the surface of the sun is 5.961×10^7 W/m^2 and radius of sun surface is 6.960×10^8 m. If the sun emits radiation isotropically, then determine the radiant flux crossing the surface. [Given : mean earth – sun distance = 1.5×10^{11} m) **5**

   b) Explain I-V characteristics of solar cell. Define fill factor. **5**

   c) Write short note on Energy Audit. **5**

4. A) Attempt **any one** :

      a) What is gasifier ? Explain working of 'Downdraft gasifier'. **8**

      b) Describe the construction and working of solar air heater and solar water heater (Natural circulation type). **8**

   B) Attempt **any one** :

      a) What is the function of Wind mill ? **2**

      b) A monoergetic radiation beam having a wavelength of one micrometer. Calculate the energy of a single Photon. [Given : h = 6.6256×10^{-34} J.S ; C = 3×10^8 m/s]. **2**

———————

[4317] – 418

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
PHYSICS (Paper – VI) (New)
PH-346 (3) : Physics of Nanomaterials (Elective – II)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt **all** (**one** mark **each**) : **10**

   a) What is surface plasmon resonance ?

   b) Write the expression for energy of a particle in one-dimensional box.

   c) Name any one milestone in the development of nanotechnology.

   d) Which detectors are typically used in UV-Vis-NIR spectrometer ?

   e) What are different types of carbon nanotubes ?

   f) Name the scientist who delivered the historical talk “There’s plenty of room at the bottom”.

   g) Name any one nanomaterial prominently used in cosmetics.

   h) Range of interplaner distances is of the order wavelength of which electromagnetic radiation ?

   i) What is meant by ‘nano’ ?

   j) State hazardous effects of nanomaterials.

2. Attempt **any two** :

   a) Write a note on UV-Vis-NIR spectroscopy. **5**

   b) Define density of states and illustrate density of states for i) 1-D solid ii) 2-D potential box iii) Particle in a 3-D potential box. **5**

   c) State and explain Debye-Scherrer equation. What is its significance in the analysis of nanoparticles ? **5**

3. Attempt **any two** :

   a) Write about the applications of nanomaterials in the field of medicine, electronics and energy. **5**

   b) Compare magnetic properties of bulk and nanomaterials. **5**

   c) Describe the formation of porous silicon. **5**

4. A) Attempt **any one** :

      a) What is electron microscopy ? Describe scanning electron microscope with diagram. **8**

      b) Write a detailed note on (i) High energy ball milling method
      ii) Chemical vapour deposition. **8**

   B) Attempt **any one** :

      a) What are aerogels ? **2**

      b) What happens to the melting point and electrical conductivity as the materials obtain size in nano regime ? **2**

———————

[4317] – 418

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
PHYSICS (Paper – VI)
PH – 346(4) : Lasers (Elective – II)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) ***Use*** *of log table and calculator is* ***allowed****.*

1. Attempt **all** of the following (**1** mark **each**) : **10**

   a) What is stimulated absorption ?

   b) Define gain coefficient.

   c) What is critical population inversion ?

   d) State any two important characteristics of Laser.

   e) State types of Lasers.

   f) State any two applications of laser.

   g) State advantage of laser cutting.

   h) Define transition life-time.

   i) State condition for steady state oscillations in optical resonator.

   j) What is line shape-broadcasting ?

2. Attempt **any two** of the following **(5 each)** : **10**

   a) Give brief history of Lasers.

   b) Explain population inversion.

   c) Explain three level pumping scheme.

3. Attempt **any two** of the following **(5 each)** : **10**

   a) Explain Doppler broadening in detail.

   b) Explain super market scanners.

   c) Obtain the Einstein relation for absorption and emission coefficients.

4. A) Attempt **any one** of the following : **8**

   a) Describe He-Ne Laser (construction and working). State its applications.

   b) i) Explain use of Laser in isotope separation.

      ii) Distinguish between ordinary light and Lasers.

   B) Attempt **any one** of the following : **2**

   a) What do you mean by threshold gain ?

   b) Determine intensity of laser beam having wavelength 7000 Å and power of 0.8 mW.

———————

[4317] – 418

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
PHYSICS (Paper – VI) (New)
PH-346 (5) : Microcontrollers (Elective – II)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt **all** of the following (**1** mark **each**) : **10**

   a) Explain the pin-function of RXD pin in 8051.

   b) Convert 03FFH hex number into decimal.

   c) How negative numbers are represented in 8-bits ?

   d) Explain PSW (Program Status Word) register in 8051.

   e) What is the address range for ON-CHIP RAM and ROM in 8051 ?

   f) Which port in 8051 needs pull-up resistors ?

   g) Explain the difference is ACALL and LCALL ?

   h) What is Half-duplex serial data transfer ?

   i) Give the ASCII codes for '0' (Zero) and 'A'.

   j) What is the size of DPTR (Data Pointer) register ?

2. Attempt **any two** of the following :

   a) How the instructions in 8051 are grouped according to their functions ? Explain each group with suitable example. **5**

   b) What are various addressing modes in 8051 ? Explain each with suitable example. **5**

   c) Write a short note on serial data transfer in 8051. **5**

3. Attempt **any two** of the following :

   a) Convert a packed BCD (0101 0111) into ASCII using an assembly language program for 8051. Store ASCII codes in R0, R1 registers. **5**

   b) Write an assembly language program for dividing two eight bit nos. stored in R2 and R3 registers. Store the quotient in R0 and the remainder in R1. **5**

   c) Write an assembly language program to find the largest number from the given set (an array) of numbers. **5**

4. A) Attempt **any one** of the following :

      a) Draw the block diagram of 8051 microcontroller, explain on-chip memory section in it. **8**

      b) Write a note on serial data communication in 8051 with stress on SBUF and SCON registers. **8**

   B) Attempt **any one** of the following :

      a) What are Assembler Directives ? Explain DB, ORG. **2**

      b) What are Labels ? How Label names are formed in assembly language ? **2**

———————

[4317] – 421

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
CHEMISTRY (Paper – III)
CH-343 : Organic Chemistry (New)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

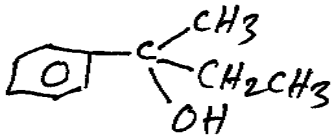
***N.B.**: i) **All** questions are **compulsory**.*
*ii) Figures to the **right** indicates **full** marks.*
*iii) Draw structures and neat diagrams **if** necessary.*
iv) IR, NMR and UV spectroscopic data is given in Tables – 1, 2 and 3, respectively.

1. Answer the following : **10**
   i) State "Isoprene rule".
   ii) Express the $\lambda_{max} = 900$ nm in cm^{-1}.
   iii) Write any four advantages of TMS.
   iv) What is disconnection ? Explain with one example.
   v) How many sets of protons are present in P-Xylene ?
   vi) Arrange the following carbanions in decreasing order of their stability.

   $R_3\overset{\ominus}{C}$, $R_2\overset{\ominus}{C}H$, $R\overset{\ominus}{C}H_2$, $\overset{\ominus}{C}H_3$

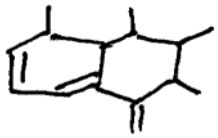
   vii) Calculate the fundamental modes of vibrations for C_2H_6 molecule.
   viii) Explain $\pi \rightarrow \pi^*$ transition with suitable example.
   ix) Nitrobenzene does not undergo Friedel-Crafts acylation reaction.
   x) How will you prove the presence of $>C = C<$ in citral ?

2. A) Attempt **any two** of the following : **6**
   i) Write the synthesis of cyclobutyl methyl ketone starting from acetoacetic ester.
   ii) Write the retrosynthesis and synthesis for

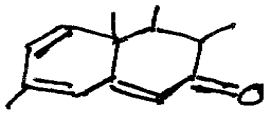


   iii) What is nitration ? Discuss mechanism of nitration of Benzene.

   B) Calculate UV λ_{max} for followings. **4**

i) 

OR

ii) 

B) i) Write a note on Cross-Aldol condensation reaction. **2**

ii) What do you mean by activating and deactivating group ? **2**

3. Attempt **any two** of the following :

A) i) Give the synthesis of Ephedrine from benzaldehyde. **3**

ii) How will you distinguish the following by IR spectroscopy ? **2**

$CH_3 - CH_2 - \overset{\overset{O}{\|}}{C} - OH$ and $CH_3 - CH_2 - \overset{\overset{O}{\|}}{C} - H$

B) i) Define spin-spin coupling and write its rules. **3**

ii) How will you prove the presence of secondary –OH in ephedrine ? **2**

C) i) Write applications of NMR in organic chemistry. **3**

ii) What are diazo-coupling reactions ? Discuss the mechanism of coupling reaction with primary aromatic amines. **2**

4. A) Propose structures for the compounds from the following spectroscopic data. Justify your answer (**any two**) : **6**

i) MF – $C_5H_{10}O$
UV : λ_{max} = 255 nm, 305 nm
IR : 1720 cm^{-1}
NMR : a) Triplet, 1.05 δ (6H)
b) Quartet, 2.5 δ (4H)

ii) MF – $C_9H_{13}N$
UV : 256 nm
IR : 1600, 751 cm^{-1}
NMR : a) 2.2 δ (S, 6H)
b) 3.4 δ (S, 2H)
c) 7.3 δ (S, 5H)

iii) MF – $C_3H_5Cl_3$
UV : Transparent
IR : 2950, 780 cm^{-1}
NMR : a) 2.2 δ, singlet (3H)
b) 4.02 δ, singlet (2H)

B) i) Aniline shows blue shift in acidic medium. Explain. **2**

ii) What are terpenoids ? Give their classification. **2**

OR

B) Attempt **any two** of the following : **4**

i) Explain synthon and synthetic equivalent.
ii) What are the important features of acylation reaction ?
iii) Write a note on “Claisen – Ester condensation”.

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_2 C = 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)		3200 – 3550	(broad)
	OH (alcohols, phenols, hydrogen bonded)		2500 – 3000	(very broad)
	OH (carboxylic acids, hydrogen bonded)			
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, $R_2\overset{\overset{R}{\|}}{C}=C-CH_3$	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	$R-\overset{\overset{O}{\|}}{C}-CH_2-$	2.4 δ
		$R-\overset{\overset{O}{\|}}{C}-\overset{\overset{H}{\|}}{CH}-$	2.5 δ
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[a]		
Carboxylic, $RC(=O)OH$	10 – 13[a]		
Phenolic, ArOH	4.5 – 7.7[a]		
Amino $R-NH_2$	1.0 – 5.0		

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

TABLE – 3

U.V. Absorption rules for diene chromosphores

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

U.V. Absorption rules for Enone System

1) Parent	215 nm (207 nm for aldehyde) (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	β 30 nm
b) Alkyl group at β	12 nm		β 85 nm
c) Alkyl group at γ, δ & higher	18 nm		β 95 nm
5) Exocylic double bond	05 nm		

[4317] – 423

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
CHEMISTRY (Paper – V)
CH-345 : Industrial Chemistry
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Draw ***neat*** *diagrams and flow sheets* ***wherever*** *necessary.*

1. Answer the following : **10**
   1) What are the raw material required for portland cement ?
   2) What is a glass ?
   3) Explain the term “chromogens”.
   4) What are anionic surfactants ?
   5) What are the advantages of gaseous fuels ?
   6) What are antibiotics ? Give one example.
   7) Explain the term “reinforced concrete”.
   8) What is vitrification of glass ?
   9) What is cleansing powder ?
   10) Explain the term “antacids”.

2. A) Answer the following (**any two**) : **6**
      1) Explain in detail the annealing of glass.
      2) What are advantages and disadvantages of detergents ?
      3) Distinguish between High Temperature Carbonisation (HTC) and Low Temperature Carbonisation (LTC).

   B) Answer the following (**any two**) : **4**
      1) What are advantages of dry process over wet process ?
      2) Explain the terms bathochromic shift and hypsochromic shift.
      3) Give the synthesis and uses of fluorescein.

P.T.O.

3. Attempt **any two** of the following : **10**
   1) Discuss the manufacture of glass with special reference to fourcault process.
   2) Give the synthesis and uses of
      1) Phenolphthalein.
      2) Alizarin.
   3) Give the synthesis and uses of
      1) Aspirin.
      2) Benzocaine.

4. A) What are ceramics ? How they are classified ? What are the properties of ceramics ? **6**

   OR

   A) What is coal tar ? Describe distillation of coal tar and use of different products of coal tar distillation.

   B) What are detergent builders ? Give important functions of following compounds as builders. **4**
      1) Sodium phosphate.
      2) Sodium silicate.

   OR

   B) What are drugs ? How they are classified ?

———————

[4317] – 423

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
CHEMISTRY (Paper – V)
CH-345 : Industrial Chemistry
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Draw ***neat*** *diagrams and flow sheets* ***wherever*** *necessary.*

1. Answer the following : **10**
   1) What are the raw material required for portland cement ?
   2) What is a glass ?
   3) Explain the term “chromogens”.
   4) What are anionic surfactants ?
   5) What are the advantages of gaseous fuels ?
   6) What are antibiotics ? Give one example.
   7) Explain the term “reinforced concrete”.
   8) What is vitrification of glass ?
   9) What is cleansing powder ?
   10) Explain the term “antacids”.

2. A) Answer the following (**any two**) : **6**
      1) Explain in detail the annealing of glass.
      2) What are advantages and disadvantages of detergents ?
      3) Distinguish between High Temperature Carbonisation (HTC) and Low Temperature Carbonisation (LTC).

   B) Answer the following (**any two**) : **4**
      1) What are advantages of dry process over wet process ?
      2) Explain the terms bathochromic shift and hypsochromic shift.
      3) Give the synthesis and uses of fluorescein.

P.T.O.

3. Attempt **any two** of the following : **10**
   1) Discuss the manufacture of glass with special reference to fourcault process.
   2) Give the synthesis and uses of
      1) Phenolphthalein.
      2) Alizarin.
   3) Give the synthesis and uses of
      1) Aspirin.
      2) Benzocaine.

4. A) What are ceramics ? How they are classified ? What are the properties of ceramics ? **6**

   OR

   A) What is coal tar ? Describe distillation of coal tar and use of different products of coal tar distillation.

   B) What are detergent builders ? Give important functions of following compounds as builders. **4**
      1) Sodium phosphate.
      2) Sodium silicate.

   OR

   B) What are drugs ? How they are classified ?

———————

[4317] – 426

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
BOTANY (Paper – II)
BO-342 : Plant Pathology (New)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer the following : **10**

a) Define infection.

b) What is symptom ?

c) Define pathogen.

d) Give the name of causal organism of leaf spot of turmeric.

e) Give any two symptoms of grassy shoot disease of sugarcane.

f) What is suscept ?

g) Cite the name of any two diseases caused by nematodes.

h) Give any two control measures for citrus canker.

i) Give use of EMS.

j) What is biological control ?

2. Attempt **any two** of the following : **10**

a) Describe disease forecasting.

b) Explain eradication.

c) Give an account of vaccines in plants.

P.T.O.

3. Write notes on **any two** of the following : **10**

   a) Serological test.

   b) Contribution of Prof. B.B. Mundkur.

   c) Methods of pure culture.

4. What is defence mechanism ? Describe structural and biochemical types of defence mechanisms. **10**

   OR

   Give an account of downy mildew of grapes and little leaf of brinjal with reference to causal organism, symptoms and control measures. **10**

———————

[4317] – 430

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
BOTANY (Paper – VI)
BO-346 : Pharmacognosy
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

Instructions : *i)* ***All*** *questions are* ***compulsory****.*
ii) Draw ***neat*** *labelled diagram* ***wherever*** *necessary.*
iii) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Answer the following : **10**

   a) Define Pharmacognosy.

   b) What is Aroma therapy ?

   c) What is Bhasma ?

   d) Give the microchemical test for glycosides.

   e) What is the objective of drug evaluation ?

   f) What is palisade ratio ?

   g) What is the plantation material used in Coriandrum ?

   h) What is the active ingredient of Ephedra ?

   i) Give medicinal uses of Aloe.

   j) Mention any two branches of Ethnobotany.

2. Attempt **any two** of the following : **10**

   a) Comment on concept of active principle.

   b) Give an account of preparation of Asava and Arishta.

   c) Describe two microscopic methods of drug evaluation.

P.T.O.

3. Write short notes on **any two** of the following : **10**

   a) Neutraceuticals.

   b) Collection of crude drugs.

   c) Ethnobotanical account of Aegle.

4. Give an account of source, cultivation methods, microscopic characters, chemical constituents and medicinal uses of clove. **10**

   OR

   Give source, microscopic characters, chemical constituents and medicinal uses of Tinospora. **10**

———————

[4317] – 432

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
ZOOLOGY (Paper – II)
ZY-342 : Mammalian Physiology and Endocrinology
(New) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt the following : **10**

   1) Define digestion.
   2) What is an impulse ?
   3) Define hormone.
   4) What are catecholamines ?
   5) What is transamination ?
   6) What is diastole ?
   7) What is arterial hypoxia ?
   8) Define gluconeogenesis.
   9) What is active transport ?
   10) What is parturation ?

2. Attempt **any two** of the following : **10**

   i) Describe the process of glycolysis.
   ii) Describe hormonal control of lactation.
   iii) Explain the role of pancreatic hormones.

P.T.O.

3. Write short notes on **any two** of the following : **10**
   a) Cardiac cycle.
   b) Ultrastructure of striated muscle.
   c) Menstrual cycle.
   d) Selective reabsorption.

4. Explain the origin and conduction of nerve impulse. **10**

   OR

   What is respiration ? Explain the mechanism of transport of carbon dioxide during respiration. **10**

———————

[4317] – 433

Seat No.	

T.Y.B.Sc. (Semester – IV) Examination, 2013
ZOOLOGY (Paper – III)
ZY-343 : Molecular Biology
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt the following. **10**

1) Define lagging strand.

2) What are histones ?

3) State the functions of r-RNA.

4) What is Nucleotide ?

5) Define Intron.

6) What is nucleosome ?

7) Define – Annealing.

8) Explain the role of ligase enzyme.

9) Mention 2 stop codons.

10) Define plasmid.

2. Explain **any two** of the following : **10**

i) Explain photorepair mechanism in DNA damage.

ii) Semiconservative type of DNA replication.

iii) Describe RNA polymerase.

P.T.O.

3. Write notes on **any two** of the following : **10**

   a) Characteristic of genetic code

   b) Supercoiling of DNA

   c) Attenuation

   d) SORNPS.

4. What is regulation of gene activity ? Explain the phenomenon with the help of Lac operan. **10**

   OR

   Describe the process of conjugation and transduction to prove DNA as genetic material. **10**

———————

[4317] – 434

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
ZOOLOGY (Paper – IV)
ZY-344 : Organic Evolution
(New) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: i)* ***All*** *questions are* ***compulsory****.*
ii) Neat labelled diagrams must be drawn ***wherever*** *necessary.*
iii) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Attempt the following : **10**
   1) Define cosmic evolution.
   2) What is hybrid sterility ?
   3) In which realm Kangaroo found ?
   4) Define species.
   5) Define proto cells.
   6) Who proposed the mutation theory of evolution ?
   7) What is deam ?
   8) Define animal distribution.
   9) Enlist any two factors influencing speciation.
   10) Explain Geological time scale.

2. Attempt **any two** of the following : **10**
   1) Allopatric speciation.
   2) Describe anatomical evidences for evolution.
   3) Explain discontinuous animal distribution.

P.T.O.

3. Write notes on **any two** : **10**

   1) Origin of reproductive isolation.

   2) Oriental realm.

   3) Cosmic theory.

   4) Palaeozoic era.

4. Give an account of Lamarks theory of organic evolution. State its merits and demerits. **10**

   OR

   What is antiquity of man ? Describe the salient features of Neanderthal man. State probable causes of its extinction. **10**

———————

[4317] – 437

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
GEOLOGY (Paper – I)
GL-341 : Metamorphic Petrology (New)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2-3** lines. **10**

a) Define retrograde metamorphism.

b) What is optalic metamorphism ?

c) What is mortar structure ?

d) Define gneissosity.

e) What is Leptynite ?

f) What is greisening ?

g) What is the concept of the crystalloblastic series ?

h) Name any two metamorphic minerals.

i) What is schistose structure ?

j) Give two chemical evidences of metasomatism.

2. Answer **any two** of the following : **10**

a) Difference between metamorphic recrystallization and Igneous crystallization.

b) Aureoles of thermal metamorphism.

c) Stress and solubility of minerals.

P.T.O.

3. Answer **any two** of the following : **10**

   a) Charnockite series.

   b) Significance of inclusions in metamorphic crystals.

   c) Lineation.

4. Describe the effects of Regional metamorphism on the calcareous sediments. **10**

   OR

   Describe the effects of thermal metamorphism on basic Igneous rocks. **10**

———————

[4317] – 438

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
GEOLOGY (Paper – II)
GL-342 : Environmental Geology (New)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Define/Explain/Answer the following in 2/3 lines. **10**
   a) Types of resources.
   b) Alkalinity of soil.
   c) Avalanches.
   d) Focus and epicenter.
   e) Biological environment.
   f) Badland topography.
   g) Mining hazards.
   h) Hazard zonation maps.
   i) Soil pollution.
   j) Biogeochemical cycle.

2. Answer the following (**any two**) : **10**
   a) Define earthquake. Describe the effects of earthquakes on human life and habitation.
   b) Define flood. Describe the causes of floods.
   c) What are causes of water pollution ? Add a note on fluorosis at Bhandara, Maharashtra.

P.T.O.

3. Answer the following (**any two**) : **10**

   a) Explain the causes and preventive measures of desertification.

   b) The nitrogen cycle.

   c) Natural hazard zones and impact assessment.

4. Define mass movement. Describe the causes and types of mass movement. **10**

   OR

   What do you mean by coastal hazard ? Explain the causes and impacts of coastal erosion. **10**

———————

[4317] – 439

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
GEOLOGY (Paper – III)
GL-343 : Economic Geology (New)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in 2/3 lines. **10**

a) What is tenor ?

b) What are residual deposits ?

c) Give three stages of coalification.

d) State the important copper belts in India.

e) What is evaporation ?

f) What are radioactive minerals ?

g) What is fly ash ?

h) Define epithermal deposits.

i) Give the chief ore minerals of iron.

j) What are industrial minerals ?

2. Answer **any two** of the following : **10**

a) Early magmatic deposits.

b) Geopressurized zones.

c) Requirements for supergene enrichment.

P.T.O.

3. Answer **any two** of the following : **10**
   a) Wall rock alterations.
   b) Mineralogy and uses of aluminium.
   c) Classification of non-metalliferous deposits.

4. Explain the process of mechanical concentration. **10**

   OR

   Explain the origin of petroleum and gas. Describe Bombay High Oil Field in India.

———————

[4317] – 440

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
GEOLOGY (Paper – IV)
GL-344 : Geotectonics
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2-3** line. **10**
   a) What is plate boundary ?
   b) Define CRM.
   c) What is geosyncline ?
   d) Define conservative boundary.
   e) What is climate ?
   f) Define palaeomagnetism.
   g) What is magnetograph ?
   h) Define the term Hillock.
   i) Give the lasted average span of normal and reversed magnetic field.
   j) What is Benioff zone.

2. Write notes **(any two)** : **10**
   a) Subduction zone
   b) Old concept of origin of mountains
   c) Magnetic reversal.

3. Write notes **(any two)** : **10**
   a) Lithosphere and Biosphere.
   b) Hot plume and hot spot
   c) Relict mountains.

4. Give the deficiencies of the plate tectonic theory. **10**

   OR

4. Describe the life cycle of mountains.

———————

[4317] – 442

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
GEOLOGY (Paper – VI)
GL-346 : Applied Geology– II
(Engineering Geology, Geohydrology and Prospecting)
(2008 Pattern)

Time : 2 Hours Max. Marks :40

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

1. Answer the following in **2**/**3** lines : **10**

   a) What are highway aggregates ?

   b) Explain the term spillway.

   c) Give two examples of tunnels in India.

   d) Name types of dams.

   e) Define aquifuge.

   f) Name two major zones of ground water.

   g) Name two methods of artificial recharge of groundwater.

   h) What are geophones ?

   i) What is mineralogical prospecting ?

   j) What are lithologic guides ?

2. Write notes (**any two**) : **10**

   a) Unconfined aquifer

   b) Gravity dam

   c) Geochemical prospecting.

P.T.O.

3. Write notes (**any two**) : **10**

   a) Principles of geophysical prospecting

   b) Hydrologic cycle

   c) Tunnels in folded rocks

4. Explain vertical distribution of ground water. Add a note on conservation of groundwater. **10**

   OR

   Explain in detail lithological and structural criteria for prospecting. **10**

———————

[4317] – 444

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
STATISTICS (Principal) (Paper – II)
ST-342 : Testing of Hypotheses
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

Instructions : *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.

1. a) In **each** of the following cases, choose the correct alternative : **1 each**

i) Rejecting null hypothesis H_0 when alternative hypothesis H_1 is true leads to

A) Level of significance B) Type I error

C) Type II error D) Power of a test

ii) The originator of sequential tests is

A) Neyman B) Wald

C) Pearson D) Wilcoxon

iii) In case of Bernoulli distribution, the UMP critical region for testing $H_0 : \theta = \frac{1}{2}$ against $H_1 : \theta > 1/2$ is of the form

A) $\sum_1^n X_i < C$ B) $\sum_1^n X_i^2 < C$

C) $\sum_1^n X_i^2 > C$ D) $\sum_1^n X_i > C$

iv) The following non-parametric test is used for testing hypothesis of goodness of fit of a distribution.

A) Sign test B) Run test

C) Kolmogorov-Smirnov test D) Mann-Whitney test

P.T.O.

b) State whether the given statement is **true** or **false** in each of the following : **1 each**

i) Likelihood ratio test can be used for testing a composite null hypothesis against an composite alternative hypothesis.

ii) MP test is always a UMP test.

c) Define **each** of the following : **1 each**

i) A test of hypothesis

ii) Type II error

d) Explain **each** of the following : **1 each**

i) Observed level of singnificance (p-value)

ii) Power function of a test

2. Attempt **any two** of the following : **(5 each)**

a) Let $X_1, X_2, ..., X_n$ be a random sample (r.s) from a Poisson distribution with parameter m. Find the best critical region (b.c.r) of size α for testing $H_0 : m = m_0$ against $H_1 : m = m_1$ $(m_1 > m_0)$.

b) Construct SPRT of strength (α, β) for testing $H_0 : \theta = 4$ against $H_1 : \theta = 3$ for an exponential distribution where $f(x, \theta) = \theta e^{-\theta x}$; $x \geq 0$.

c) X is a continuous r.v. with p.d.f.

$$f(x; \alpha, \beta) = \frac{\alpha^{\beta}}{\lceil \beta} e^{-\alpha x} x^{\beta-1}, \quad 0 \leq x < \infty, \ \alpha, \beta > 0$$
$$= 0 \quad \text{otherwise}$$

It is required to test the null hypothesis $H_0 : \alpha = 1, \beta = 1$ against the alternative $H_1 : \alpha = 1, \beta = 2$ on the basis of a single observation from the distribution of X. Find the b.c.r, if the probability of type I error is 0.05.

3. Attempt **any two** of the following : **(5 each)**

a) Describe one tailed and two tailed sign test procedure for testing about the location parameter of the distribution of a r.v.

b) 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 $N(\mu, \sigma^2)$ distribution where σ^2 is known.

c) The following sequence shows the rise (R) and fall (F) in the price of share for 16 consecutive days. Test for the randomness of the sequence at 5% level of significance.

RRRFRFFRFFRFFRFR

4. Attempt **any one** of the following : **(5+5)**

a) i) Let a r.v. X follow 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 U.M.P level α test for testing H_0 against H_1.

ii) Let X be a r.v. with p.m.f. under H_0 and H_1 as given below :

X	0	1	2	3	4	5
P.m.f. under H_0	·02	·03	·05	·05	·35	·5
P.m.f. under H_1	·04	·05	·08	·12	·41	·3

Find critical regions of size 0.05. Also state which one is best ? Why ?

b) i) Construct SPRT of strength (α, β) for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1 \ (\theta_1 > \theta_0)$ for a distribution having p.d.f.

$$f(x, \theta) = \frac{x}{\theta} e^{-x^2/2\theta} \quad , \quad x > 0$$

ii) Test whether the following sample can be regarded as taken from the distribution having p.d.f $f(x) = 4x^3 \quad 0 \leq x \leq 1$

$= 0$ O.W.

·9307, ·8533, ·9397, ·9819, ·8279. Use $\alpha = ·05$. **(5+5)**

[4317] – 445

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
STATISTICS (Principal) (Paper – III)
ST-343 : Statistical Process Control (Off-line Methods)
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

***Instructions**: 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Use of scientific calculator and statistical tables is **allowed**.*
4) Symbols and abbreviations have their usual meanings.

1. a) In **each** of the following cases, choose the correct alternative : **(1 each)**

i) In case of acceptance sampling with lot quality p

A) AOQ is always bigger than p

B) AOQ is always smaller than p

C) AOQ is always equal to p

D) There is no order relation between AOQ and p

ii) If a system consists of 3 independent components connected in parallel with individual reliabilities 0.9, 0.95 and 0.8, then the reliability of the system is

A) 0.99 B) 0.998 C) 0.999 D) 0.8

iii) If X is a cut vector of a coherent system, then

A) $\phi(X) = 0$ B) $\phi(X) = 1$

C) $0 < \phi(X) < 1$ D) None of the above

iv) In a single sampling plan, exact probability of acceptance of a lot is calculated by using

A) Poisson distribution B) Normal distribution

C) Binomial distribution D) Hypergeometric distribution

b) In **each** of the following cases, state whether the given statement is **true** or **false**. **(1 each)**

i) In case of single sampling plan ATI always lies between n and N.

ii) Acceptance number is defined as minimum number of defectives allowable in the sample.

c) Define the following terms : **(1 each)**

i) DFR distribution

ii) A coherent system.

d) i) Explain the terms AQL and LTFD. **1**

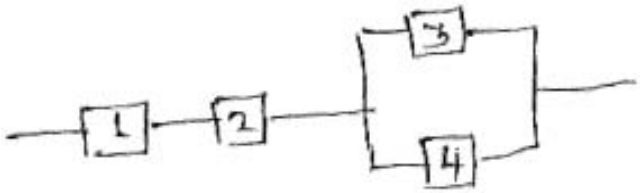
ii) Define hazard rate and interpret it. **1**

2. Attempt **any two** of the following : **(5 each)**

a) Explain : normal, reduced and tightened inspection.

b) Obtain an expression of ASN for a double sampling plan.

c) Find the structure function for a system with the following reliability block diagram and also obtain minimal cut vectors.



3. Attempt **any two** of the following : **(5 each)**

a) Write a note on ISO.

b) Show that hazard rate of a series system of components having independent life times is the sum of component hazard rates.

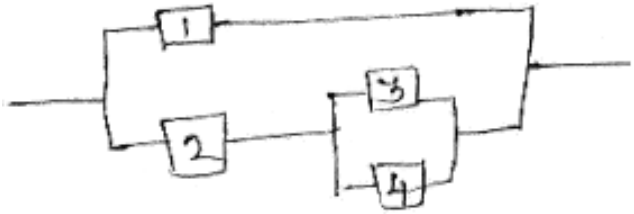
c) For a double sampling plan with $n_1 = 50$, $n_2 = 100$, $c_1 = 0$ and $c_2 = 2$, compute producer's risk if AQL is given to be 0.01.

4. Attempt **any one** of the following :

a) i) Define reliability h(p) of a binary system. Describe 'S' shapedness property of h(p) with the help of appropriate graph. **5**

ii) Define IFR. Prove that exponential distribution belongs to IFR class. **5**

b) i) For the following reliability block diagram, draw the fault tree diagram. **4**



ii) For a single sampling plan with N = 10,000, n = 100, c = 2, obtain ATI if p = 0.02. **4**

iii) Write any two advantages of a double sampling plan over a single sampling plan. **2**

[4317] – 450

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
STATISTICS (Principal) (Paper – VI) (Ele – II)
ST 346 (C) : Statistical Computing Using R Software
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

Instructions: *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 printouts of your work to the answer book supplied to you.*

1. Attempt **each** of the following :

a) Create a vector of numbers between 1 and 100, which are divisible by 7.

b) Draw a random sample of size 5 from a binomial distribution with n = 10 and p = 0.4 .

c) Find median and mode of following numbers.

12, 13, 11, 10, 9, 11, 14, 11, 7, 11, 10, 15, 16, 11

d) Draw a rod plot for the following data :

x	2	4	6	8	10
f	7	11	27	42	15

e) Simulate an experiment of tossing a coin 100 times and prepare its frequency distribution.

f) Let X~N ($\mu = 50$, $\sigma^2 = 20$). Find P [$20 \leq X \leq 90$].

g) Draw SRWOR of size 8 from a population of 50 units.

h) Create a data frame of employee name and his department for 10 employees.

i) Let X ~ P (m = 2.5) find P[$X \leq 7$] and P [X > mean of X].

j) Draw a box plot of following observations

7, 13, 42, 61, 50, 32, 25, 6, 17,19, 25, 38, 47, 52 **(1 each)**

P.T.O.

2. Attempt **any two** of the following :

   a) Draw histogram and frequency polygon for the following data :

Length of screw (cms)	0–2	2–4	4–6	6–8	8–10
No. of screws	3	12	19	6	4

   b) Compute arithmetic mean, geometric mean and harmonic mean of following observations 5, 7, 12, 14, 19, 27, 3, 6, 15, 18.

   Also verify the relation between them.

   c) The heights of 10 students in a certain college are found to be

   57, 61, 54, 56, 59, 58, 62, 61, 64, 67 inches. Can we conclude that the average height of a student of the college is more than 55 inches ? Use 5% level of significance. **(5 each)**

3. Attempt **any two** of the following :

   a) Fit a straight line Y = a + bx to the following data :

X	12	17	19	25	32	38	43
Y	65	78	82	92	90	97	100

   Also estimate Y when X = 35.

   b) Draw a Pie Chart for the following data

Section	I	II	III	IV	V
No. of workers	220	370	190	70	250

   c) Compute mean deviation about mean for the following data :

Weight (Kg)	50–55	55–60	60–65	65–70	70-75
No. of employees	12	27	38	23	4

(5 each)

4. Attempt **any one** of the following :

a) i) A group of 50 boys and 40 girls was asked to give their preferences between two brands of mobile hand sets. The result obtained are as follows :

	Brand A	**Brand B**
Boys	24	26
Girls	27	13

Test at 5% level of significance whether preference to a particular brand is independent of sex.

ii) Draw a simple bar diagram for the following data :

Year :	2007	2008	2009	2010	2011
Sales : ('000 Rs.)	35	49	52	50	45

(5+5)

b) i) Fit a Poisson distribution to the following data :

x	0	1	2	3	4	5
f	3	9	12	27	4	1

Also test the adequacy of model.

ii) Using the following data carry out one-way ANOVA

Fertilizer	**Observations**
A	9, 5, 7, 3, 2, 8
B	4, 8, 3, 6
C	9, 10, 8, 5, 7

(5+5)

———————

[4317] – 451

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
STATISTICS (Principal) (Paper – VI)
ST-346 (C) : Statistical Computing using "R" Software
(2008 Pattern) (New Course) (Ele. – II) (Batch No. 3)

Time : 2 Hours Max. Marks : 40

Instructions *: 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.

1. a) Create a vector of even numbers between 1 and 100.

   b) Obtain lower and upper quartile of following observations :

   2, 21, 9, 16, 7, 24, 8, 13, 12, 10

   c) Let $X \sim N(\mu = 20, \sigma^2 = 9)$. Find P(X > 17) and P(X < 25).

   d) Draw a rod plot for the following data :

x	1	2	3	4	5	6
f	7	13	22	9	2	1

   e) Access data BOD from resident data sets and find its summary statistics.

   f) Draw a SRSWR of size 5 from a population of following 15 units.

   9, 4, 81, 2, 67 , 6, 3, 23, 7, 14, 17, 72, 58, 46, 55

   g) Create a data frame of item name and its price for 5 items.

   h) Let X ~ P(m = 5) find P(X < var(x)).

   i) Draw a random sample of size 8 from a binomial distribution with parameters n = 10 and p = 0.7.

   j) Simulate an experiment of tossing a die 75 times and prepare its frequency distribution. **(1 each)**

P.T.O.

2. Attempt **any two** of the following :

a) Draw a pie diagram for the following data :

Area of work experience	**No. of students**
Photography	6
Clay modelling	30
Kitchen gardening	45
Doll making	20
Book binding	22

b) Frequency distribution of expenditure (in Rs.) on medicine for no. of households is given below :

Expenditure (in Rs.)	**No. of households**
0 – 200	3
200 – 400	12
400 – 600	27
600 – 800	10
800 – 1000	2

Compute coefficient of variation for the above data.

c) Compute geometric mean and harmonic mean for the following data.

Marks	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
No. of students	3	23	16	9	2

(5 each)

3. Attempt **any two** of the following :

   a) Draw less than ogive curve for the following data :

Length of screw (cm)	No. of screws
2.0 – 2.5	16
2.5 – 3.0	34
3.0 – 3.5	52
3.5 – 4.0	20
4.0 – 4.5	8

   b) Fit a second degree curve to the following data :

Year (X)	2005	2006	2007	2008	2009
Sales (Y) ('000 Rs.)	9	13	27	16	8

   Also estimate Y for each given X.

   c) Find Karl Pearson's coefficient of skewness of following observations :

   13, 12, 9, 8, 17, 26, 31, 10, 24, 27. **(5 each)**

4. Attempt **any one** of the following :

   a) i) Following are the data on scores made by two batsmen A and B in 7 innings.

A	15	35	16	22	18	23	12
B	14	22	40	9	33	8	20

   Test whether the variation in scores for two batsmen is same.

ii) Following are data on number of persons according to their sex and smoking habits

	Smokers	**Non-smokers**
Male	67	13
Female	20	45

Test whether smoking habit is independent of sex. **(5+5)**

b) i) Fit a binomial distribution to the following data :

x :	0	1	2	3	4	5
f :	2	9	23	32	7	1

Also test the adequacy of model.

ii) Carry out one-way ANOVA for the following data :

Treatment	**Observations**
A	13, 9, 18, 7
B	6, 22, 8, 4, 5
C	2, 8, 13, 16

(5+5)

———————

[4317] – 452

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
GEOGRAPHY (Paper – I)
Gg.341 : Principles and Techniques of Watershed Management
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

***N.B.**: 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Diagrams and maps must be drawn **wherever** necessary.*
*4) Use of map stencils is **allowed**.*

1. Answer the following questions in **one** or **two** sentences : **10**

   a) What is the full form of WARASA ?

   b) What is water harvesting ?

   c) List two features specified in the active methods of water conservation.

   d) What is meant by landscape restoration ?

   e) What are self help groups ?

   f) Define cost sharing.

   g) What is PRA ?

   h) Name two best conservation grasses.

   i) Define food security.

   j) What is vegetative filter strip ?

2. Write short answers (**any two**) : **10**

   a) Comment on the importance of watershed planning for rural and integrated development.

   b) Comment on the principles of watershed management.

   c) Discuss the hindrances in watershed development programs.

P.T.O.

3. Write short notes (**any two**) : **10**
   a) Check dams
   b) Drainage line treatment.
   c) Resource mapping

4. Give an account of the various methods used for soil conservation. **10**

   OR

   Give an account of the surveys carried out for resource appraisal.

———————

[4317] – 453

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
GEOGRAPHY (Paper – II)
Gg 342 : Geography of Travel and Tourism
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Diagrams and Maps must be drawn ***wherever*** *necessary.*
4) ***Use*** *of Maps Stencils is* ***allowed****.*

1. Answer the following questions in **one** or **two** sentences : **10**

   a) What are yatri bhavans ?

   b) What is yachting ?

   c) Name two types of water adventure tourism.

   d) State one impact of tourism on soil.

   e) State one impact of tourism on local people's lifestyle.

   f) In which state in Bodh Gaya located ?

   g) Name two important beach resorts in Maharashtra.

   h) What is indirect expenditure in the tourism sector ?

   i) Name two areas where water transport is important in India.

   j) What is agro tourism ?

2. Write short answers **(any two)** : **10**

   a) Importance of sustainable tourism development.

   b) Significance of national parks.

   c) Ecotourism.

P.T.O.

3. Write short notes **(any two)** : **10**

   a) Historical tourism.

   b) Factors influencing the choice of transport in tourism.

   c) Agra.

4. Discuss the social and cultural impacts of tourism. **10**

   OR

   Discuss the role of accommodation in tourism industry.

———————

[4317] – 455

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
GEOGRAPHY (Paper – IV)
Gg – 344 : India – A Geographical Study (2008 Pattern)

Time : 2 Hours Max. Marks : 40

***N.B.**: 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Diagrams and maps must be drawn **wherever** necessary.*
*4) Use of maps stencils is **allowed**.*

1. Answer the following questions in **one** or **two** sentences : **10**

   a) Name two non metallic minerals.

   b) What is Haematite ?

   c) State one important industrial use of coke.

   d) Name two areas were Gondwana coal is found in India.

   e) Name two offshore oil fields in India.

   f) What is white revolution ?

   g) Name two factors affecting the location of the automobile industry in India.

   h) Name one salient feature of road transport in India.

   i) Name any two regions with moderate population density in India.

   j) Name two political factors affecting migration.

2. Write short answers (**any two**) : **10**

   a) Importance of thermal power in India.

   b) Importance of Railway transport in India.

   c) Liberalisation and its impact on industrial development.

P.T.O.

3. Write short notes (**any two**) : **10**
   a) Impact of the size of land holdings on agricultural development.
   b) Salient features of the blue revolution in India.
   c) Development and distribution of the fertilizer industry in India.

4. Highlight the importance of conventional sources of energy in India. **10**

   OR

   Discuss the significance of the green revolution in the agricultural development of India.

———————

[4317] – 457

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
GEOGRAPHY (P – VI)
Gg. 346 : Fundamentals of Geoinformatics – II
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Diagrams and maps must be drawn **wherever** necessary.*
*4) **Use** of map stencils is **allowed**.*

1. Answer the following questions in **one** or **two** sentences. **10**

   a) What is MSS ?

   b) What is the spatial resolution of SPOT 5 colour data ?

   c) What are the advantages of Microwave satellite ?

   d) What is temporal resolution ?

   e) Give any two advantages of multispectral images.

   f) What is 'spectral resolution' ?

   g) What is panchromatic image ?

   h) State the major characteristics of LANDSAT satellite.

   i) What is GSLV ?

   j) What do you mean by Band ?

2. Write short answers **(any two)** : **10**

   a) What is radar image ?

   b) How satellite data can be useful in mineral exploration ?

   c) Describe annotation strip on satellite image.

P.T.O.

3. Write short notes **(any two)** : **10**

   a) Interpretation key of satellite data

   b) Thermal infrared images

   c) SPOT.

4. Give a comparative account of Geostationary and sun Synchronous Satellites. **10**

   OR

   Give an account of IRS data applications.

———————

[4317] – 463

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
MICROBIOLOGY (Paper – VI)
MB – 346 : Soil and Agricultural Microbiology
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

***N.B.**: 1) **All** questions are **compulsory**.*
*2) **All** questions carry **equal** marks.*
*3) Draw **neat**, labeled diagram **wherever** necessary.*

1. Attempt the following : **10**

   a) Define :
      i) Co-metabolism
      ii) Nitrification.
   b) Give any two applications of biogas.
   c) Name any one pesticide degrading bacterium.
   d) Give symptoms of Smut disease of plants.
   e) Enlist types of soil.
   f) State true or false : Antibiotics can be used in the control of plant diseases.
   g) Give any two carriers used in bioinoculant preparation.
   h) _____ is specialized cell where nitrogen fixation in blue green algae takes place.
   i) Give any one advantages of bioinoculant.

2. Write short notes on **any two** of the following : **10**

   a) Cellulose degradation.
   b) Cultivation of methanogens.
   c) Role of Rhizosphere microflora.

P.T.O.

3. Attempt **any two** of the following : **10**

   a) Explain Covellite leaching of copper.

   b) Diagrammatically represent Carbon cycle.

   c) Describe Bioaugmentation of pesticide polluted sites.

4. Attempt **any one** of the following : **10**

   a) Draw schematically the structure of Nitrogenase enzyme. Add a note on protection of nitrogenase.

   b) Describe Rust disease of plants with respect of causative agent, plant affected and control measures.

———————

[4317] – 465

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
ELECTRONIC SCIENCE (Paper – II)
EL-342 : Embedded Systems
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt **all** the following :

   a) Packed BCD is more preferable than ASCII – **True** / **False.** **1**

   b) State which data type you would use for indicating temperature. **1**

   c) Before transmission of byte of a data serially, where it is placed ? **1**

   d) How many address lines are required to interface 8 KB external RAM to 8051 micro controller ? **1**

   e) Find the value of P2 after execution of the following : P2 = 0 × 39 < < 2. **2**

   f) What are the advantages of using C for 8051 micro controller programming ? **2**

   g) What number should be loaded into TH register using model to get 2 ms delay ? Assume X TAC = 11.0592 MHz ? **2**

   h) State voltage levels used for binary 0 and 1 in Rs. 232. **2**

2. Attempt **any two** of the following :

   a) Interface DC Motor and write C program to rotate the DC motor for a given speed by applying PWM signal **4**

   b) Write an 8051 C program to send values of – 3 to + 3 to port P1. **4**

   c) Write C program for 8051 to transfer message 'ELECTRONICS' serially at 9600 baud, 8 bitdeta, 1 stop bit continuously. **4**

P.T.O.

3. Attempt **any two** of the following :

   a) Draw and explain the connection of 8051 micro controller to Rs. 232 using line driver MAX 232 Chip. **4**

   b) Write an 8051 C program to convert ASCII digits '9' and '7' to packed BCD and display them on port P1. **4**

   c) Explain the purpose of target board for 8051 microcontroller. List the different components used on it. **4**

4. Attempt **any two** of the following :

   a) Discuss the case study of frequency counter. **6**

   b) Interface suitable RTC to 8051 and explain its address map. **6**

   c) State two ways to create a time delay in 8051 C. Explain three factors that can affect the delay size. **6**

OR

4. Attempt **all** the following :

   a) Interface LCD to 8051. Explain its necessary commands. **4**

   b) Assume that we have 4 bytes of hexadecimal data 25, 62, 3F and 52

      i) Find the check sum byte.

      ii) Perform the check sum operation to ensure data integrity and

      iii) If the second byte 62 H has changed to 22 H, show how check sum detects the error ? **4**

   c) Assume that 1 H2 external clock is being fed into pin TIC (P3.5). Write C program for counter 1 in mode 2 to count up and display the state of TLI count on P1. State the count at OOH. **4**

———————

[4317] – 466

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
ELECTRONIC SCIENCE (Paper – III)
EL 343 : Power Electronics
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *i)* ***All*** *questions are* ***compulsory****.*
ii) ***Neat*** *diagrams must be drawn* ***wherever*** *necessary.*
iii) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Attempt **all** of the following.

   a) What is the role of reverse recovery time of diode ? **1**

   b) Draw the circuit symbol and I-V characteristics of MOSFET. **1**

   c) State the applications of IGBT. **1**

   d) What is spike guard ? **1**

   e) Explain concept of thyristor turn-off. **2**

   f) What is meant by thermal protection ? **2**

   g) A boost regulator has input voltage V_s = 5 V. The average output voltage V_a = 15 V, L = 150 μH and C = 220 μf. Determine duty cycle K. **2**

   h) The capacitance of reverse bias junction in thyristor is 20 pf and charging current to turn on thyristor is 16 mA. Determine dv/dt. **2**

2. Attempt **any two** of the following.

   a) Explain the working of single phase bridge rectifier with resistive load. Draw input and output waveforms. Obtain an expression for efficiency, form factor and ripple factor. State the advantages of it. **4**

   b) State the concept of switching mode regulator. Explain Buck regulator with the help of circuit diagram and waveform. What are its limitations ? **4**

   c) What is meant by Invertor ? Explain the working principle of Invertor. State its applications. **4**

P.T.O.

3. Attempt **any two** of the following :

   a) What is semi-convertor ? Explain the working of single phase semi-converter with circuit diagram and I/P-O/P waveforms. Obtain an expression for average output voltage. **4**

   b) Explain clamp on meter. **4**

   c) Why voltage control of Inverter is needed ? State voltage control techniques used in single phase inverter. Explain any one of them. **4**

4. Attempt **any two** of the following :

   a) What is UPS ? Explain in detail on-line and off-line UPS. What are selection criteria for batteries used in it ? **6**

   b) What are the advantages of static switches ? Explain how DC switch is used for automotive powering system with the help of proper diagram. State the applications of DC switches. **6**

   c) i) Distinguish between single phase and three phase signal. Draw phasor diagram for three phase. **3**

      ii) Write S,chockley equation of diode. Define the term thermal voltage. State the operating regions of diode. **3**

———————

[4317] – 472

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – III)
DS – 343 : Disaster Management
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** to **4** sentences **each** : **16**
   1) What do you mean by Disaster Management ?
   2) Write the meaning of Self Government action.
   3) Write the meaning of Natural Disaster.
   4) State the meaning of Manmade Disaster.
   5) What do you mean by Global warming ?
   6) Define Nuclear war.
   7) What do you mean by Medical Alteration ?
   8) State the meaning of sustainable development.

2. Answer in **8** to **10** sentences **each (any two)** : **8**
   1) Explain structure of Disaster Management in India.
   2) Explain types of Manmade Disaster.
   3) Discuss importance of pre disaster plan.

3. Write short notes on **(any two)** : **8**
   1) Remedial Measures.
   2) Post disaster Emergency phase.
   3) Role of the Local Bodies.

4. Answer in **18** to **20** sentences **(any one)** : **8**
   1) Explain relationships between the study of national security and disaster.
   2) Write a note on Disaster management and sustainable development.

———————

[4317] – 475

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – VII)
DS-347 A : Military Psychology (Optional) (Ele. – VII)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** to **4** sentences **each** : **16**
   1) Define Psychology.
   2) Define Military Psychology.
   3) What is Soldiering ?
   4) Define War.
   5) Define Motivation.
   6) Define Morale.
   7) What is War Neurosis ?
   8) Define Propaganda.

2. Answer in **8** to **10** sentences **each** (**any two**) : **8**
   1) What are the uses of military psychology ?
   2) Explain the Maslow theory of motivation.
   3) Write about the operations of psychological warfare.

3. Write short notes on (**any two**) : **8**
   1) Significance of Morale in Armed Forces
   2) Military Leadership
   3) Rumours

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Justify, why mental toughness is indispensable during war.
   2) Explain about the psychological view of war and soldiering.

P.T.O.

[4317] – 475

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – VII) (Ele. VII)
DS-347 B : Defence Journalism and National Security (Optional)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

Instructions *:1)* ***All*** *questions are* ***compulsory****.*

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

1. Answer in **2** to **4** sentences **each** : **16**
   1) Define NEWS.
   2) What is meant by Editorial ?
   3) What is meant by Column ?
   4) Define National Security.
   5) Write about the significance of Military to Society.
   6) What is meant by AFSPA ?
   7) Write the role of Spokesperson/PRO
   8) What is meant by Press-Conference ?

2. Answer in **8** to **10** sentences **each** (**any two**) : **8**
   1) As a reporter, how will you ensure secrecy in defence reporting ?
   2) You are interviewing Indian Defence Minister, ask ten questions on defence preparedness.
   3) Write about the current trends in Indian Defence Journalism.

3. Write short notes on (**any two**) : **8**
   1) War Correspondence Course.
   2) Indian War Reporting.
   3) Fair and Unbiased Reporting.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) As a journalist, how will you encourage a debate on the subject “National Defence and Security”?
   2) Discuss the problems and prospects in defence journalism.

[4317] – 475

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – VII) (Ele. – VII)
DS-347 C : Defence Preparedness of India (II) (Optional)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** to **4** sentences **each** : **16**

   1) Define Army.

   2) Define Navy.

   3) Define Air Force.

   4) Define Para Military Forces.

   5) What is air-land Battle ?

   6) What is amphibious warfare ?

   7) Introduce Aerospace Command.

   8) What is AWACS ?

2. Answer in **8** to **10** sentences **each** (**any two**) : **8**

   1) Discuss about the responsibility of southern naval command.

   2) Discuss about the responsibility of western air command.

   3) Discuss about the responsibility of army training command.

3. Write short notes on (**any two**) : **8**

   1) Air to air refueling

   2) Blue water navy

   3) Modernization of Infantry

4. Answer in **16** to **20** sentences (**any one**) : **8**

   1) Make a comparison of Indo-Pak war potential.

   2) Discuss about India's nuclear capability.

———————

[4317] – 481

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
ENVIRONMENTAL SCIENCE (Paper – IV)
ENV 344 : Issues in Environmental Science
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt the following in **1-2** lines **each** : **10**

   a) Define sustainable development.

   b) Give the full form of GIS.

   c) Who initiated the Narmada Bachao Andolan ?

   d) Define rainwater harvesting.

   e) What is meant by desertification ?

   f) Define environmental modelling.

   g) What is meant by occupational health ?

   h) Define acid rain.

   i) Give any one effect of global warming.

   j) Define soil erosion.

2. Write a short note on (**any two**) : **10**

   a) Green house gases and their sources.

   b) Bhopal gas tragedy.

   c) Strategies of sustainable development.

P.T.O.

3. Answer **any two** from the following : **10**

   a) What are the environmental problems of slum area ?

   b) What are the merits and demerits of interlinking of rivers ?

   c) Explain cost benefit analysis.

4. Attempt **any one** of the following : **10**

   a) Define eutrophication. Explain the causes and restoration of eutrophic lakes.

   b) Explain the process of desertification and its mitigation measures.

———————

[4317] – 482

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
ENVIRONMENTAL SCIENCE (Paper – V)
(New Course)
ENV-345 : Environmental Governance and Equity : EMS and ISO-14000
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt the following in **1-2** lines **each**. **10**

   a) Write full form for 'BIS'.

   b) What is the main function of 'Technical Committee' ?

   c) What is the standard limit of BOD for effluent to be discharged on inland surface water ?

   d) Write full form for 'ESR'.

   e) What is meant by 'Impact' ?

   f) What is the standard limit of DO for class A quality water ?

   g) Mention any two functions of WHO.

   h) Mention any two benefits related with renewable energy.

   i) What is meant by 'Ship Recycling' ?

   j) What is the Constitutional provision related with Article 51-A(g) ?

2. Write a short note on **(any two)** : **10**

   a) Environmental Education

   b) Environmental Standards

   c) Environmental Audit

P.T.O.

3. Answer **any two** from the following : **10**

   a) What are the salient features of ‘National Environmental Policy’ ?

   b) What are the issues involved in environmental protection ?

   c) Explain the various steps involved in ‘Environmental Impact Assessment’.

4. Attempt **any one** of the following : **10**

   a) What is EMS ? Discuss the benefits of ISO-14000 and add a note on PDCA cycle.

   b) Explain in detail about environmental governance and regulation in India.

———————

[4317] – 487

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
(Vocational) (Paper – V)
ELECTRONIC EQUIPMENT AND MAINTENANCE
Entrepreneurship Development
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer the following : **(3×4=12)**

   a) Answer the following : **(4×1=4)**

      i) Give the definition of ‘small scale industry’.

      ii) Define the term ‘entrepreneurship’.

      iii) What is meant by ‘service industry’ ?

      iv) What is cash flow ?

   b) Comment on the following : **(2×2=4)**

      i) Small scale industries are more susceptible to change in socio-economic conditions.

      ii) Business means the state of being busy.

   c) Answer the following : **(2×2=4)**

      i) State two differences between entrepreneur and manager.

      ii) State any two problems faced by small scale industries.

2. Answer **any two** of the following : **(2×4=8)**

   a) How does entrepreneurship development affect economic status of the country ?

   b) Explain different modes of employment.

   c) Explain the term working capital. Why is it important ?

P.T.O.

3. Answer **any two** of the following : **(2×4=8)**
   a) Define the term ‘partnership’. Explain its features and limitations.
   b) Explain the term market segmentation.
   c) State and explain different types of entrepreneur.

4. Answer **any two** of the following : **(2×6=12)**
   a) Explain types and characteristics of small scale industries.
   b) Explain in detail what is ‘marketing mix’ ?
   c) Explain the Entrepreneurship as a career option.

OR

4. Write short notes on the following : **(3×4=12)**
   a) Patent rule
   b) Role of M.S.F.C
   c) Costing and Pricing.

———————

[4317] – 488

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
(Vocational) (Paper – V)
Computer Hardware and Network Administration
ENTREPRENEURSHIP DEVELOPMENT
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt **all** of the following : **(10×1=10)**

   i) Which Tax is applicable for a Trading Firm ?

   ii) Entrepreneurship Development Program of India is carried out under which Ministry ?

   iii) Is 'Product' one of the important factors of Marketing Mix.

   iv) Who is an Entrepreneur ?

   v) What is a Project ?

   vi) Why do we go to Pollution Control Board ?

   vii) Give any one Mode of Employment.

   viii) Explain the term 'Break Even Point'.

   ix) What is the role of SIDBI ?

   x) What is a 'Liability' ?

2. Attempt **any two** of the following : **(2×5=10)**

   a) Explain the importance of any five Funding Agencies in our Country.

   b) What are the different types of Entrepreneurs ?

   c) What is the role of HRD Department in Entrepreneurship Development Program of India ?

3. Attempt **any two** of the following : **(2×5=10)**

   a) What are the different forms of Business Organizations ?

   b) Explain the main four elements of Marketing Mix.

   c) What are the merits of a Proprietary Firm ?

4. Attempt **any one** of the following : **(1×10=10)**

   a) What are the De-merits of a Co-operative Organization ? What are the Merits of a Partnership Firm ?

   OR

   b) Explain why do we go to the following ?

      1) MIDC
      2) SIDBI
      3) DIC
      4) SISI
      5) Commercial and Co-operative Banks.

———————

[4317] – 491

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
INDUSTRIAL CHEMISTRY (Vocational)
Inorganic and Organic Based Industries – II (Paper – VI)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer the following questions. **10**

   a) What is saponification ?

   b) What is amphipathic structure ?

   c) What are cleansing powders ?

   d) What are diuretics ? Give one example.

   e) Define the term “functional drugs”.

   f) What is rubber ?

   g) Define degree of polymerisation.

   h) Define the term “Vehicals”.

   i) What is red shift ?

   j) What is Gutta percha ?

2. A) Answer **any two** of the following : **6**

      a) What are sulpha drugs ? Explain the synthesis of sulphanilamide.

      b) What are surfactants ? Give their classification.

      c) What is artificial musk ? Give different types of it.

   B) Answer **any two** of the following : **4**

      a) Explain the synthesis of alizarine.

      b) Explain different properties of synthetic fibre.

      c) Give synthesis and uses of paracetamol.

P.T.O.

3. Write notes on **any two** of the following : **10**

   a) Preparation, properties and uses of polyethene.

   b) Antibiotics : synthesis and application.

   c) Manufacturing of detergent with the help of flow-sheet diagram.

4. A) What are detergent builders ? Give the functions of, i) Sodium phosphate, ii) Sodium carbonate, iii) Zeolites. **6**

OR

4. A) Describe briefly classification as per their chemical constitution and mode of dying. **6**

4. B) Answer **any one** of the following : **4**

   a) What is soap ? Discuss the manufacturing of soap by kettle full-boiled process.

   b) Write a note on synthetic penicillins.

———————

[4317] – 494

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
ELECTRONIC EQUIPMENT AND MAINTENANCE
(Vocational) EEM (Paper – VI)
Medical Instrumentation
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

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

1. a) Answer the following : **(4×1=4)**
   i) State full forms of
      a) ENG b) EMG
   ii) State two main considerations for bioelectric recorder amplifier.
   iii) What is SA node ?
   iv) Which ion selective electrode is used as reference electrode ?

   b) Answer the following : **(2×2=4)**
   i) Name two main organs in CNS.
   ii) State any four components of reflex arc.

   c) Answer the following : **(2×2=4)**
   i) State two general senses and 2 special senses.
   ii) What are the two types of shock hazards ?

2. Answer **any two** : **(2×4=8)**
   i) Give the features of four EEG waves.
   ii) Discuss electrodes for electrical stimulation of tissues.
   iii) Write a short note on direct writing system.

P.T.O.

3. Answer **any two** : **(2×4=8)**

   i) Discuss physiological effects of electric current.

   ii) Give practical hints on using biopotential electrodes.

   iii) Explain the electrical activity of excitable cells.

4. Answer **any two** : **(2×6=12)**

   i) Explain protection aspect with respect to equipment design in medical instrumentation.

   ii) Explain filter photometer in clinical laboratory.

   iii) Give an account on sources of external noise in medical instrumentation.

OR

4. Answer the following : **(3×4=12)**

   i) State various types of amplifiers used with recorders and explain any one.

   ii) Discuss spectrophotometer.

   iii) Write a short note on EMG.

———————

[4317] – 401

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
MATHEMATICS (Paper – I)
MT-341 : Metric Spaces (New Course)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

I. Attempt **any five** of the following : **10**

1) Let $(\mathbb{R}, d)$ be a discrete metric space and $x \in \mathbb{R}$. Find the following :
   i) B(x, 1/2) ii) B(x, 3)

2) Find the interior of following subsets of $\mathbb{R}$ with usual metric :
   i) $\mathbb{Q}$ ii) (0, 1]

3) Is the set $\mathbb{Z}$ of integers closed in $\mathbb{R}$ with usual metric ? Justify.

4) Let E be a subset of a metric space. Show that any $x \in E$ is a limit point of E.

5) Let (X, d) be a metric space. Show that any Cauchy sequence $\{x_n\}_{n=1}^{\infty}$ in X is bounded.

6) Give an example of :
   i) an open dense set in $\mathbb{R}$ which is not connected.
   ii) a closed set in $\mathbb{R}$ which is neither compact nor connected.

7) Show that [0, 1] is not homeomorphic to (0, 1) in $\mathbb{R}$, with usual metric.

P.T.O.

II. Attempt **any two** of the following : **10**

1) Let X be a nonempty set. Define d(x, y) = 0 if x = y and d(x, y) = 1 if $x \neq y$. Show that d is a metric on set X.

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

3) Show that a subset E of a metric space (X, d) is closed if and only if E contains all its limit points.

III. Attempt **any two** of the following : **10**

1) Let X be a metric space. Let A and B be two connected subsets of X such that $A \cap B \neq \phi$. Show that $A \cup B$ is connected.

2) Show that any compact subset K of a metric space (X, d) is closed and bounded.

3) Let $f, g : [0, 1] \to \mathbb{R}$ be continuous functions. Assume that $f(x) \in [0, 1]$ for all x and g(0) = 0 and g(1) = 1. Show that f(x) = g(x) for some $x \in [0, 1]$.

IV. Attempt **any one** of the following : **10**

1) a) Let X be a connected metric space and $g : X \to Y$ be a continuous map. Then show that g(X) is connected.

b) Let X = (0, 1) be a metric space with the standard metric. Show that the sequence $\{x_n\}_{n=1}^{\infty} = \left\{\frac{1}{n}\right\}_{n=1}^{\infty}$ is a Cauchy sequence in X but not convergent in X.

2) a) Let (X, d) be a complete metric space and $E \subseteq X$. Then show that E is closed in X if and only if (E, d) is a complete metric space.

b) Show that the family $\left\{\left(\frac{1}{n}, 1\right) : n \in \mathbb{N}, n \geq 2\right\}$ is an open cover of (0, 1) which admits no finite subcover of (0, 1).

———————

[4317] – 402

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
MATHEMATICS (Paper – II)
MT – 342 : Complex Analysis
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

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

1. Answer **any five** of the following : **10**

a) Show that f (z) = e^z is an entire function.

b) Show that f (z) = $|z|^2$ is not differentiable at z = 5 + 7i.

c) Let $z(t) = \begin{cases} t + it & \text{if } 0 \le t \le 1 \\ t + i & \text{if } 1 \le t \le 2 \end{cases}$

Show that z (t) is not a smooth arc.

d) Show that $\text{Log}(1-i) = \frac{1}{2}\ln 2 - \frac{\pi}{4}i$.

e) Evaluate $\int_C \frac{z+2}{z}\,dz$, where C is given by $z(t) = 2e^{it}$ $(0 \le t \le 2\pi)$.

f) State Cauchy-Riemann equations in polar form.

g) Find the residue at z = 1 of the function $f(z) = \frac{z}{(z-1)(z-1)^2}$.

2. Answer **any two** of the following : **10**

a) If a function f (z) = u (x, y) + iv (x, y) is analytic in a domain D, then prove that its component functions u and v are harmonic in D.

b) State and prove Liouville's theorem.

c) Using definition of limit, prove that $\lim_{z \to 0} \frac{z^{-2}}{z} = 0$.

P.T.O.

3. Answer **any two** of the following : **10**

   a) If a function f is analytic throughout a simply connected domain D and C is any closed contour lying in D, then prove that $\int_C f(z)\,dz = 0$.

   b) Derive the Laurent series representations of $f(z) = \frac{1}{z^2(1-z)}$ in the domain

      i) $0 < |z| < 1$

      ii) $1 < |z| < \infty$.

   c) Let C_R denote the circle $|z| = R\ (R > 0)$, taken in the counter-clockwise direction. Show that $\left| \int_{C_R} \frac{\text{Log}z}{z^2}\,dz \right| \le 2\pi\left(\frac{\pi + \ln R}{R}\right)$.

4. Answer **any one** of the following : **10**

   a) i) If a function f is analytic everywhere in the finite plane except for a finite number of singular points interior to a positively oriented simple closed contour C, then prove that $\int_C f(z)\,dz = 2\pi i \underset{z=0}{\text{Res}}\left[\frac{1}{z^2} f\left(\frac{1}{z}\right)\right]$.

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

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

      ii) Find the Cauchy principal values of $\int_{-\infty}^{\infty} \frac{x^2}{(x^2+1)(x^2+4)}\,dx$.

———————

[4317] – 403

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
MATHEMATICS (Paper – III)
MT-343 : Problem Course Based on MT-341 and MT-342
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

SECTION – I

(Metric Spaces)

1. A) Attempt **any three** of the following : **6**

a) Show that the set $U = \{(x, y) \in \mathbb{R}^2 : y \neq x^2\}$ is open in $\mathbb{R}^2$ with the usual metric.

b) Show that the set $A = [3, 4)$ is not closed in $\mathbb{R}$ with the usual metric.

c) Give an example of a metric space which is connected but not complete and an example of a compact metric space which is not connected.

d) Give example of two sets A and B which are connected subsets of a metric space X but $A \cup B$ is not connected.

B) Attempt **any one** of the following : **4**

a) Show that $D \subset X$ is dense in the metric space (X, d) if and only if its closure $\overline{D} = X$.

b) Let $S^1 = \{(x, y) \in \mathbb{R}^2 : x^2 + y^2 = 1\}$ be the unit circle in $\mathbb{R}^2$. Show that S^1 is connected.

P.T.O.

2. Attempt **any two** of the following : **10**

   a) Let A be a nonempty subset of a metric space (X, d). Define $d_A(x) = \inf\{d(x,a) : a \in A\}, x \in X$. Then show that d_A is continuous on X.

   b) Show that any closed subset of a compact set in a metric space X is compact.

   c) Show that any bounded subset of $\mathbb{R}$ is totally bounded.

SECTION – II

(Complex Analysis)

3. A) Attempt **any three** of the following : **6**

   a) Find the principal value of $(-i)^i$.

   b) Evaluate $\int_C (z-1)\,dz$, where C is the arc from z = 0 to z = 2 consisting of the semicircle $z = 1 + e^{it}, (\pi \le t \le 2\pi)$.

   c) Find the residue at z = 0 of $f(z) = z\cos\left(\frac{1}{z}\right)$.

   d) Show that $\left|\exp(z^2)\right| \le \exp\left(|z|^2\right)$.

   B) Attempt **one** of the following : **4**

   a) Show that the function $u(x, y) = 2x - x^3 + 3xy^2$ is harmonic and find its harmonic conjugate.

   b) If z = x + iy, then prove that $|\sinh y| \le |\sin z| \le \cosh y$.

4. Attempt **any two** of the following : **10**

   a) Show that when $0 < |z| < 4$,

   $$\frac{1}{4z - z^2} = \frac{1}{4z} + \sum_{n=0}^{\infty} \frac{z^n}{4^{n+2}}$$

   b) Find the value of the integral $\int_C \frac{3z^3 + 2}{(z-1)(z^2+9)}\, dz$, where C is the circle $|z - 2| = 2$ oriented positively.

   c) Show that $\lim_{z \to 0} \left(\frac{z}{\bar{z}} \right)^2$ does not exist.

[4317] – 405

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
MATHEMATICS (Paper – V)
MT-345 : Partial Differential Equations
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

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

1. Answer **any five** of the following : **10**

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

   b) Show that the equation $\frac{xdx - ydy}{x^2 + y^2} - 2zdz = 0$ is exact.

   c) Obtain the partial differential equation by eliminating the arbitrary constants from the equation $ax^2 + by^2 + z^2 = 1$.

   d) Verify the condition of integrability for $yzdx - zxdy - y^2dz = 0$.

   e) Find the complete integral of the partial differential equation $pqz = p^2(xq + p^2) + q^2(yp + q^2)$.

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

   g) State the type of the differential equation $(x^2 + z^2)p - xyq = (x^2 + y^2)z^2$. Also find its order.

2. Answer **any two** of the following : **10**

   a) If X is a vector such that X. curl X = 0 and μ is an arbitrary function of x, y, z then prove that μ X. curl(μ X) = 0.

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

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

P.T.O.

3. Answer **any two** of the following : **10**

   a) Explain Nataru's method of solving Pfaffian differential equation

      $Pdx + Qdy + Rdz = 0$.

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

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

4. Answer **any one** of the following : **10**

   a) 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

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

   ii) Find the complete integral of $p^2x + q^2 y = z$ by using Charpit's method.

   b) i) Show that there always exist an integrating factor for a Pfaffian differential equation in two variables.

   ii) Find the integral surface of $(2xy – 1) p + (z – 2x^2) q = 2(x – yz)$ passing through the line $x_0(s) = 1$, $y_0(s) = 0$, $z_0(s) = s$.

———————

[4317] – 406

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
MATHEMATICS (Paper – VI) (2008 Pattern)
MT – 346 : Problem Course Based on MT – 344 and MT – 345

Time : 2 Hours Max. Marks : 40

N.B. : *1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Use** separate answer book for **each** Section.*
*4) Tie answer books of **both** Sections together.*

SECTION – I

(Ring Theory)

1. A) Attempt **any three** of the following : **6**

   i) Let R be a commutative ring with unity and U (R) denote the set of units of R. Prove that U (R) is a group under the multiplication of R.

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

   iii) Show that the ideal $< x^2 + x + 1 >$ is not a maximal ideal in the ring $\mathbb{Z}_3 [x]$.

   iv) Is the ring $3\mathbb{Z}$ isomorphic to $5\mathbb{Z}$? Justify you answer.

   B) Attempt **any one** of the following : **4**

   i) Let $f(x) = 5x^4 – 3x^3 + 1$ and $g(x) = 3x^2 + 2x + 1$ in $\mathbb{Z}_7 [x]$. Determine the quotient and remainder upon dividing f (x) by g (x).

   ii) Show that ideal $< x >$ is a prime ideal in $\mathbb{Z} [x]$ but not maximal ideal.

2. Attempt **any two** of the following : **10**

   a) Determine all units in $\mathbb{Z} [i]$. Justify your answer.

   b) Let F be a field and let p (x), $a_1 (x)$, $a_2 (x_2)$ . . ., $a_k (x) \in F [x]$ where p (x) is irreducible over F. If p (x) divides $a_1 (x)$, $a_2 (x)$ . . . $a_k (x)$ then show that p (x) divides some $a_1 (x)$, where $1 \leq i \leq k$.

   c) Prove that $\mathbb{Z}\left|\sqrt{5}\right|$ is not a unique factorization domain.

P.T.O.

SECTION – II

(Partial Differential Equations)

3. A) Answer **any three** of the following : **6**

   i) Show that the differential equation $2xzdx + zdy – dz = 0$ is integrable.

   ii) Obtain the partial differential equation by eliminating the arbitrary function F from the equation $F(x – z, y – z) = 0$.

   iii) Find the general integral of $yzp + xzq = xy$.

   iv) Find the complete integral of the partial differential equation $zpq – p – q = 0$.

   B) Answer **any one** of the following : **4**

   i) Show that a complete integral of $f(u_x, u_y, u_z) = 0$ is $u = ax + by + cz + d$, where $f(a, b, c) = 0$. Hence find the complete integral of $u_x + u_y + u_z – u_x u_y u_z = 0$.

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

4. Answer **any two** of the following : **10**

   a) Find the complete integral of $p^2x + qy – z = 0$ and derive the equation of the integral surface containing the line $y = 1, x + z = 0$.

   b) Solve the equation $(y + z)\,dx – (z + x)\,dy + (x + y)\,dz = 0$, by the method of reduction of order.

   c) Show that the equations $f = p^2 + q^2 – 1 = 0$, $g = (p^2 + q^2)\,x – pz = 0$ are compatible. Also find the one parameter family of common solutions.

———————

[4317] – 412

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
MATHEMATICS (Paper – VII) (Ele. – II)
MT-347 : Lebesgue Integration

Time : 2 Hours Max. Marks : 40

N.B. : *i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Attempt **any five** of the following : **10**

i) Is the following statement true or false ? Justify.

'If F is a closed subset of [a, b];

and |F| = 0, then F = ϕ ?

ii) If $E \subseteq [a, b]$ and $\overline{m}E = 0$, prove that E is measurable and mE = 0.

iii) Prove that if E is a measurable subset of [a, b], then its characteristic function χ_E is measurable.

iv) Find f^+ if $f(x) = \frac{1}{2} + \text{Sin}x; 0 \le x \le 2\pi$.

v) State Lebesgue Dominated Convergence Theorem.

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

vii) Let f be a bounded function on [a, b]. Define Lebesgue upper integral and Lebesgue Lower integral of f over [a, b].

2. Attempt **any two** of the following : **10**

i) Let G be an open subset of [a, b]. Prove that G is measurable and m(G) = |G|.

ii) If E_1 and E_2 are subsets of [a, b], prove that

$\overline{m}E_1 + \overline{m}E_2 \ge \overline{m}(E_1 \cup E_2) + \overline{m}(E_1 \cap E_2)$ and

$\underline{m}E_1 + \underline{m}E_2 \le \underline{m}(E_1 \cup E_2) + \underline{m}(E_1 \cap E_2)$.

P.T.O.

iii) Find the Fourier series for

$f(x) = -1, \quad -\pi \le x \le 0$

$= \quad 1, \quad 0 \le x \le \pi$.

3. Attempt **any two** of the following : **10**

i) If f and g are measurable functions on [a, b], prove that f + g is also a measurable function on [a, b].

ii) If f is a bounded measurable function on [a, b], then prove that $f \in L[a, b]$.

iii) Let E_1, E_2, ..., E_n be measurable subsets of [0, 1]. If each point of [0, 1] belongs to atleast three of these sets, show that atleast one of the sets has measure $\ge \frac{3}{n}$.

4. Attempt **any one** of the following : **10**

i) a) Let E be any measurable subset of [a, b]. If $f \in L[a, b]$, $g \in L[a, b]$ and if f(x) = g(x) almost everywhere $(x \in E)$, then prove that $\int_E g = \int_E f$.

b) If $f(x) = \log \frac{1}{x}, \; 0 < x \le 1$

$= \quad 0 \quad , x = 0;$

find ^2f.

ii) a) If f is a bounded function in $L[a, b]$ and if a < c < b, then prove that

$f \in L[a, c], f \in L[c, b]$ and $\int_a^b f = \int_a^c f + \int_c^b f$.

b) For $n \in I$, let

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

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

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

[4317] – 413

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
PHYSICS (Paper – I)
PH – 341 : SOLID STATE PHYSICS
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt **all** of the following (**1** mark **each**) : **10**

   a) The minimum angle of rotation for a certain crystal structure which leave it invariant is 120°. Find fold n_0 (n).

   b) What is Fermi energy level ?

   c) Determine the number of atoms per unit face centred cubic cell.

   d) What are the Miller indices of a plane having intercepts (1, ∞ , ∞) on three x, y and z axes ?

   e) What do you mean by 'domains' in ferromagnetic materials ?

   f) State Fermi-Dirac distribution function.

   g) Give any two examples of ferrimagnetic materials.

   h) What is photoelectric effect ?

   i) In Bragg's diffraction condition if d = 1.5 A°, then what is upper limit of λ for obtaining first order reflection ?

   j) What is mobility ?

2. Attempt **any two** :

   a) Describe the crystal structures (i) NaCl and (ii) CsCl with the help of neat diagrams. **5**

   b) Using Ewald's construction, show that diffraction condition in reciprocal lattice is exactly equivalent to $2d\sin\theta = n\lambda$ in direct lattice. **5**

   c) What are ferrites ? Give any two examples and six applications of ferrites. **5**

P.T.O.

3. Attempt **any two** :

   a) Calculate the Miller indices of crystal planes, which cut through the crystal axes at (i) $\left(\frac{3}{2}a, 2b, c\right)$ and (ii) $(2a, -3b, -3c)$ **5**

   b) How many atoms per meter^2 surface area are there in (110) plane for copper which has FCC structure and a lattice constant a = 3.61×10^{-10} m ? **5**

   c) The Fermi energy of copper is 7.1 eV. Assuming that it is the maximum kinetic energy of electrons in copper, find the number of atoms per unit volume in copper

   (Given : Mass of electron = 9.1×10^{-31} kg,

   Planck's constant (h) = 6.62×10^{-34} Joule-sec) **5**

4. A) Attempt **any one** :

   1) Obtain an expressions for the Bragg's diffraction conditions in direct and reciprocal lattices. **8**

   2) What is Meissner effect ? Describe Type – I and Type – II superconductors. **8**

   B) Attempt **any one** :

   1) Determine the lattice parameter (a) of face centered cubic (FCC) crystal, having atomic radius of 1.246 A°. **2**

   2) Calculate the interplaner spacing between two lattice planes which give first order diffraction at an angle of 26.42 A° with X-rays of wavelength 0.71 A°. **2**

———————

[4317] – 415

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
PHYSICS (Paper – III)
PH- 343 : Thermodynamics and Statistical Physics
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt **all** of the following (**one** mark **each**) : **10**
   a) What are bosons ?
   b) Define the density of states.
   c) What are symmetric wave functions ?
   d) What are fermions ?
   e) Calculate the volume of a phase space in μ -space.
   f) Discuss the dependence of coefficient of viscosity on temperature.
   g) Define grand canonical ensemble.
   h) What are transport phenomena ?
   i) Define most probable speed.
   j) Define probability.

2. Attempt **any two** :

   a) Obtain Maxwell's expression for mean free path $\lambda = \frac{1}{\sqrt{2}\pi\sigma^2 n}$, where symbols have their usual meanings. Discuss the dependence of mean free path on pressure and temperature. **5**

   b) Obtain binomial distribution equation using random walk problem. **5**

   c) Prove the J-T coefficient for Vander Waal's gas $\mu = \frac{1}{Cp}\left[\frac{2a}{RT} - b\right]$, where symbols have their usual meanings. **5**

P.T.O.

3. Attempt **any two** :

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

   b) Find the mean free path frequency of collisions and the molecular diameter of nitrogen from the following data :

   Coefficient of viscosity (η) = 1.69×10^{-7} NSm^{-2}

   R.M.S. velocity of molecule (C) = 4.5×10^{2} m/s

   Density of nitrogen (ρ) = 1.25 kg/m^3 and number of molecule per m^3 (η) = 2.7×10^{25} **5**

   c) Prove the relations :

   i) $F = U + T\left(\frac{\partial F}{\partial T}\right)_V$

   ii) $G = H + T\left(\frac{\partial G}{\partial T}\right)_P$ **5**

4. A) Attempt **any one** :

   a) Compare B.E. and F.D. statistics. Show that in F.D. statistics

   $$\overline{n_r} = \frac{1}{e^{\beta(\epsilon r - \mu)} - 1}$$

   where symbols have their usual meanings. **8**

   b) i) Derive any two thermodynamic potentials. **4**

   ii) Explain 'thermal interaction' and 'mechanical interaction' between two systems. **4**

   B) Attempt **any one** :

   a) 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 ? **2**

   b) If $p = q = \frac{1}{2}$ and total number of possibles are M = 200. Find the root mean square deviation. **2**

———————

[4317] – 420

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
CHEMISTRY (Paper – II)
CH – 342 : Inorganic Chemistry
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) Actual calculations must be shown.
iv) Marks are reserved for neat and labelled diagrams.
v) ***Use*** *of log table and calculator is* ***allowed****.*
vi) Atomic numbers : Ag (47), Ca (20), Al (13), Re (75).

1. Answer the following : **10**

i) What is the IUPAC name of the element with atomic number 199 ?

ii) Define transuranic elements.

iii) What is Bio-inorganic chemistry ?

iv) What is synergism ?

v) Draw the solid state structure of $[Mo(CO)_6]$.

vi) Arrange Ag, Ca and Al in decreasing order of their electrical conductivity.

vii) State Born-Lande equation for calculation of Lattice energy.

viii) What is effect of addition of impurities on conductivity of Metals ?

ix) Draw face centred cubic structure.

x) How many unpaired electrons are present in high spin d^6 octahedral complex ?

2. A) Write short notes on **any two** of the following : **6**

i) Oxidation states of Lanthanides.

ii) Biological role of M_g^{2+}.

iii) Voids in closest packed structure.

P.T.O.

B) Answer **any two** of the following : **4**

i) Distinguish between Schottky and Frenkel detects.

ii) Calculate the total number of electrons in $[CH_3 Re (CO)_5]$.

iii) Calculate CFSE for d^8 octahedral complex.

3. Answer **any two** of the following : **10**

i) What are Semiconductor ? Give type of semiconductors. Discuss P-type semiconductors with suitable example.

ii) What are Lanthanides ? Discuss the ion exchange method for separation of Lanthanides.

iii) Discuss Monsanto process for synthesis of acetic acid.

4. A) "Non stoichiometric defects in the crystals produce semiconducting character". Explain with reference to cation and anion vacancy in lattice. **6**

OR

A) Answer the following : **6**

i) Explain heavy ion bombardment method for preparation of transuranic elements.

ii) Write short note on Vitamin B_{12}.

B) Pauling's univalent radius of C_a^{2+} is 1.18 $\mathring{A}$ and that of O^{2-} is 1.76 $\mathring{A}$. Calculate the crystal radius. **4**

OR

B) Answer the following : **4**

i) Define homogeneous and heterogeneous catalysis.

ii) Draw the crystal field splitting diagrams for tetrahedral and octahedral complexes.

———————

[4317] – 420

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
CHEMISTRY (Paper – II)
CH – 342 : Inorganic Chemistry
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) Actual calculations must be shown.
iv) Marks are reserved for neat and labelled diagrams.
v) ***Use*** *of log table and calculator is* ***allowed****.*
vi) Atomic numbers : Ag (47), Ca (20), Al (13), Re (75).

1. Answer the following : **10**

i) What is the IUPAC name of the element with atomic number 199 ?

ii) Define transuranic elements.

iii) What is Bio-inorganic chemistry ?

iv) What is synergism ?

v) Draw the solid state structure of $[Mo(CO)_6]$.

vi) Arrange Ag, Ca and Al in decreasing order of their electrical conductivity.

vii) State Born-Lande equation for calculation of Lattice energy.

viii) What is effect of addition of impurities on conductivity of Metals ?

ix) Draw face centred cubic structure.

x) How many unpaired electrons are present in high spin d^6 octahedral complex ?

2. A) Write short notes on **any two** of the following : **6**

i) Oxidation states of Lanthanides.

ii) Biological role of M_g^{2+}.

iii) Voids in closest packed structure.

P.T.O.

B) Answer **any two** of the following : **4**

i) Distinguish between Schottky and Frenkel detects.

ii) Calculate the total number of electrons in $[CH_3 Re (CO)_5]$.

iii) Calculate CFSE for d^8 octahedral complex.

3. Answer **any two** of the following : **10**

i) What are Semiconductor ? Give type of semiconductors. Discuss P-type semiconductors with suitable example.

ii) What are Lanthanides ? Discuss the ion exchange method for separation of Lanthanides.

iii) Discuss Monsanto process for synthesis of acetic acid.

4. A) "Non stoichiometric defects in the crystals produce semiconducting character". Explain with reference to cation and anion vacancy in lattice. **6**

OR

A) Answer the following : **6**

i) Explain heavy ion bombardment method for preparation of transuranic elements.

ii) Write short note on Vitamin B_{12}.

B) Pauling's univalent radius of C_a^{2+} is 1.18 $\mathring{A}$ and that of O^{2-} is 1.76 $\mathring{A}$. Calculate the crystal radius. **4**

OR

B) Answer the following : **4**

i) Define homogeneous and heterogeneous catalysis.

ii) Draw the crystal field splitting diagrams for tetrahedral and octahedral complexes.

———————

[4317] – 422

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
CHEMISTRY (Paper – IV)
CH-344 : Analytical Chemistry
(New) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer the following : **10**

1) Define the term diffusion current in polarography.

2) Define the term supporting electrolyte.

3) Write down electrode reaction for calomel electrode.

4) Define the term electrophoresis.

5) Give formula for number of theoretical plates in GC.

6) Define the term Demineralised water.

7) How HPLC superior to other chromatographic techniques ?

8) Name the component of typical HPLC unit.

9) Define base peak in mass spectroscopy.

10) Define Resolution in mass spectrometer.

2. A) Answer **any two** of the following : **6**

1) Discuss applications of electrophoresis.

2) Explain thermal conductivity detectors in GC.

3) What are advantages and disadvantages of glass electrode ?

P.T.O.

B) Answer **any two** of the following : **4**

1) What is oxygen interfering nuisance in polarographic techniques ?

2) Find OH^- ion concentration if PH is 3.84.

3) Calculate the number of sites of unsaturation in compound C_8H_9No.

3. Attempt **any two** of the following : **10**

1) Give principle of column chromatography. Discuss column chromatographic technique in detail.

2) Explain the applications of gas chromatography.

3) What is principle of HPLC ? Sketch schematic diagram of HPLC instrument. Explain various component in brief.

4. A) What is principle of mass spectrometry ? Draw schematic diagram of mass spectrometry. Explain its working with suitable examples. **6**

OR

A) 1) What are limitations of DME ? **3**

2) Explain any three applications of HPLC. **3**

B) In a polarographic measurement m = 1.25 mg. sec^{-1} and solution of concentration $1x10^{-3}$ mole. lit^{-1} gave diffusion current of 6 µ A. If 607 n $D^{1/2}$= 4. What is drop time of DME. **4**

OR

B) In a experiment of paper chromatographic separation of mercury, lead and silver the solvent front was 32 cm while front due to these metals were 8.9, 18 and 24.2 cm respectively.

What is Rf value of these metals ? **4**

[4317] – 424

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
CHEMISTRY (Paper – VI)
CH – 346 (A) : Nuclear Chemistry (Ele – II)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*

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

3) Draw the diagrams ***whenever*** *necessary.*

1. Answer the following : **10**

a) State Fermi's experiment on discovery of nuclear fission.

b) What are the prompt and delayed neutrons ?

c) State the principle of linear accelerator.

d) State different types of nuclear accelerator.

e) What is the importance of reproduction factor (K) in the functioning of nuclear reactor ?

f) Which are the two coolant used in nuclear reactor ?

g) State the principle of radiometric titration.

h) State the principle of semi conductor detector.

i) What is the use of Szilard-Chalmer reaction ?

j) State two safety precautions taken while handling radio active substance.

P.T.O.

2. A) Attempt **any two** of the following : **6**

   a) Explain the principle of neutron activation analysis. State its two applications.

   b) Give the classification of nuclear reactor.

   c) Write short notes on cow and milk system.

   B) Answer **any two** of the following : **4**

   a) Write short notes on fission energy.

   b) What are the biological effects of radiations ?

   c) Compute the energy released in the following nuclear reaction.

   $^{239}Pu + n \rightarrow {}^{155}Gd + {}^{81}Br + 4n$

   The atomic masses are

   $^{239}Pu = 239.0522$ amu

   $n = 1.0087$ amu

   $^{155}Gd = 154.9220$ amu

   $^{81}Br = 80.9163$ amu

3. Answer **any two** of the following : **10**

   a) Discuss four factor formula.

   b) Explain the principle and working of Vande-Graft accelerator.

   c) State the principle of isotope dilution analysis. State its two applications. What are the advantages of it ?

4. A) Describe the process of nuclear fission. Explain mass distribution curve for fission fragments. What is the effect of neutron energy on the nature of the curve ? **6**

OR

A) Discuss the principle of scintillation counter. Discuss different types of scintillators. Discuss the working of scintillation counter. **6**

B) Discuss the method of preparation of the following radioisotope. **4**

1) Sulphur – 35
2) Carbon – 14

OR

B) Write short notes on Radio chemical principles in the use of tracers. **4**

———————

[4317] – 424

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
CHEMISTRY (Paper – VI)
CH – 346 (B) : Polymer Chemistry (Ele – II)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

Instructions *: i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) Draw diagrams ***wherever*** *necessary.*

1. Answer the following : **10**

i) Define the term-polymer decay.

ii) What is meant by co-polymer ?

iii) Explain the effect of temperature on solid polymeric material.

iv) Define the term – fibre.

v) Write the correct structure of teflon.

vi) Give the important IR-peaks of polyvinyl acetate.

vii) Explain the term-dyeing.

viii) What is meant by compounding ?

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

Cross-linked polymer has very high softening temperature.

x) Give two important uses of silicone polymers.

2. A) Attempt **any two** of the following : **6**

i) Explain the role of plastisizers in lowering the glass transition temperature.

ii) Give a brief account of random, alternating and block copolymers.

iii) Write a note on-mechanical degradation of polymers.

B) Answer the following (**any two**) : **4**

i) Explain the stress-strain properties in polymeric materials.

ii) Give the importance of glass transition temperature.

iii) Write in brief the effect of crystallinity on polymer properties.

3. Attempt **any two** of the following : **10**
   i) Give in detail the methods used for polymer testing and analysis.
   ii) Describe the method of preparation, properties and uses of
      a) Polyisoprene
      b) Epoxypolymers
   iii) Write a detailed account of biodegradable polymers.

4. A) Attempt **any two** of the following : **6**
      i) Describe the die-casting technique in polymer technology.
      ii) Write short note on-reinforcement.
      iii) Give an account of extrusion technique in polymer processing.

   B) Give a detailed account of wet-spinning process in fibre technology. **4**

———————

[4317] – 424

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
CHEMISTRY (Paper – VI) (Ele – II)
CH – 346 (C) : Biochemistry and Molecular Biology
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

Instructions *: i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) Neat diagrams must be drawn ***wherever*** *necessary.*

I. Answer the following : **10**

1) What is a nucleotide ? Give example.
2) Define transamination reaction. Give example.
3) Name the enzyme that helps in synthesis of DNA from RNA.
4) What is catabolism ? Give its significance.
5) Give the significance of urea cycle.
6) Write the fate of pyruvate in anaerobic glycolysis.
7) Where does glycolysis occur in the cell ?
8) What is the role of helicase in DNA replication ?
9) List out two uses of ATP.
10) What are termination codons ?

II. A) Attempt **any two** of the following : **4**

1) What is the role of carnitine in fatty acid oxidation ?
2) List out the enzymes and coenzymes involved in conversion of pyruvate to Acetyl-CoA.
3) Show the decarboxylation reaction of histidine and give the significance of the product.

B) Answer **any two** of the following : **6**

1) Write note on central dogma of molecular biology.
2) Differentiate between DNA polymerase I, II, III.
3) What are restriction enzymes ? Give their significance.

III. Answer the following (**any two**) : **10**

1) Explain reactions of glycolysis with energetics.

2) Elaborate on steps involved in transcription.

3) Discuss the experiment that proved DNA as genetic material.

IV. 1) Describe the steps involved in β -oxidation of palmitic acid with energetics. **6**

OR

1) Explain the steps involved in gene cloning.

2) Write note on **(any one)** : **4**

a) Features of genetic code

b) Electron transport chain

———————

[4317] – 424

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
CHEMISTRY (Paper – VI)
CH – 346 (D) : Environmental Chemistry (Ele – II)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

Instructions *: i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) Neat diagrams must be drawn ***wherever*** *necessary.*
iv) Flow sheet/block diagrams and reactions must be given ***wherever*** *necessary.*

1. Answer the following in short : **10**
   i) What is purpose of preliminary treatment in waste water treatment ?
   ii) What is meant by soil horizon ?
   iii) What is role of carrier gas in GC ?
   iv) Mention source and sinks of CO_2.
   v) Give reaction involved in the estimation of ammonia.
   vi) Define nuclear fission reactions.
   vii) Give reaction involved in dihydrogen-dioxygen fuel cell.
   viii) Give any two uses of chlorofluoro carbon (CFCs)
   ix) Mention any two applications of AAS in environmental analysis.
   x) Define term “Green house coefficient”.

2. a) Attempt **any two** of the following : **6**
      i) ‘Synthane gasifier’. Explain.
      ii) ‘Ozone layer acts as protective layer for life on earth’. Explain.
      iii) ‘Reverse Osmosis’. Explain.
   b) Write short notes on (**any two**) : **4**
      i) Treatments of drinking water supply
      ii) Pyrolysis.
      iii) Non conventional energy sources.

3. Attempt **any two** of the following : **10**
   i) Explain electrodialysis method in purification of water.
   ii) Describe principle and working of glass electrode.
   iii) Describe working of NDIR analyser used in monitoring atmospheric CO.

4. a) Describe **any two** types of detectors used in GC. **6**

   OR

   a) Describe aerobic biological method for treatment of purification of waste water.

   b) Write short note on (**any one**) : **4**
      i) Effect of ozone depletion
      ii) Green house effect

———————

[4317] – 424

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
CHEMISTRY (Paper – VI) (Ele – II)
CH – 346 (E) : Dairy Chemistry
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer the following : **10**

   a) Draw the structure of Lactose.

   b) What is skimming of milk ?

   c) Write the formula to calculate % of SNF in cream.

   d) Which pigments are present in the milk ?

   e) Define churning of cream.

   f) Define milk adulterants.

   g) How vacuum pasteurization of milk is carried out ?

   h) Define srikhand powder and give its uses.

   i) Give any two advantages of dried milk products.

   j) Define flavoured milk.

2. a) Attempt **any two** of the following : **6**

   i) Define ice-cream. Give flow sheet diagram of manufacture of ice-cream.

   ii) Draw flow sheet diagram of manufacture of homogenized milk.

   iii) State the factors which influence the growth of micro-organisms in milk.

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

i) Describe the manufacture of pasteurized milk with the help of flow sheet.

ii) Give composition, food and nutritive value of cheese powder.

iii) Write the properties and uses of casein.

3. A) Define 'butter'. Give its classification. Give flow sheet diagram of manufacture of butter. Give uses of butter. **5**

OR

A) Give flow sheet diagram for the manufacture of whey powder and give its composition, food and nutritive value. **5**

B) Define market milk. State constituents of milk. Explain factors affecting composition of milk. **5**

OR

B) Give structure, properties and uses of Thiamine. **5**

4. a) Answer **any two** of the following : **6**

i) How will you test the presence of

a) Salicylic acid

b) Sucrose in the milk

ii) Discuss the factors affecting fat percentage of cream.

iii) Define proteins, give their classification.

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

i) Which compounds are used to increase density of milk ?

ii) "Milk is almost an ideal food'. Justify the statement.

iii) Give advantages and disadvantages of sterilized milk.

———————

[4317] – 425

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
BOTANY Paper – I
BO-341 : Plant Physiology and Biochemistry
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *i)* ***All*** *questions are* ***compulsory****.*
ii) Draw ***neat*** *labelled diagrams* ***wherever*** *necessary.*
iii) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Answer the following. **10**

   a) Define photosynthesis.

   b) What are Cristae ?

   c) What is phloem loading ?

   d) Give any two causes of seed dormancy.

   e) What are xenobiotic stresses ?

   f) Define free energy.

   g) Define non-protein amino acids.

   h) What are polysaccharides ?

   i) Define glycolipids.

   j) What are enzyme inhibitors ?

2. Attempt **any two** of the following. **10**

   a) Explain methods used to break seed dormancy.

   b) Explain mitochondrial electron transport system.

   c) Give properties of enzymes.

P.T.O.

3. Write notes on **any two**. **10**

   a) Munch hypothesis.

   b) Synthesis of starch.

   c) Shikimic acid pathway.

4. What is photophosphorylation ? Explain cyclic and non-cyclic photophosphorylations. **10**

   OR

   What are amino acids ? Explain synthesis of amino acids by reductive amination and transamination. **10**

[4317] – 427

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
BOTANY (Paper – III) (New)
BO – 343 : PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

***Instructions** : i) **All** questions are **compulsory**.*
*ii) Draw **neat** labelled diagrams **where** necessary.*
*iii) Figures to the **right** indicate **full** marks.*

1. Answer the following : **10**

   a) Which era is considered as age of pteridophytes ?

   b) Give any two salient features of pteridophyta.

   c) Define Heterospory.

   d) Enlist classes of Gymnosperms as per the classification of chamberlin (1934).

   e) What is polyembryony ?

   f) Define pyenoxylic wood.

   g) Give any two salient features of pentoxylae.

   h) What do you mean by Actinostele ?

   i) Define Fossil.

   j) Write any two economic importance of Gymnosperms.

2. Attempt **any two** of the following : **10**

   a) Draw and describe the structure of Lepidocarpon.

   b) Sketch, label and describe the T.S. of Equisetum stem.

   c) Describe internal structure of Gnetum leaf.

P.T.O.

3. Write notes on **any two** of the following : **10**

   a) Compression

   b) Ovule of Cycas

   c) Salient features of Lycopsida.

4. With the help of labelled diagram, describe external and internal morphology of Pinus male and female cone. **10**

   OR

   Describe the external and internal structure of sporocarp of Marsilea. **10**

———————

[4317] – 429

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
BOTANY (Paper – V)
BO-345 : Botanical Techniques
(New) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *i) **All** questions are **compulsory**.*
*ii) Draw **neat** labelled diagrams **wherever** necessary.*
*iii) Figures to the **right** indicate **full** marks.*

1. Answer the following : **10**

   a) Define wavelength.

   b) Write any two factors affecting rate of sedimentation.

   c) Define aeropalynology.

   d) What is whole mount ?

   e) Give optic principle of compound microscope.

   f) Name the any two mounting media used in micrometry.

   g) Define X-ray microanalysis.

   h) What is micrometry ?

   i) Write principle of pH measurement.

   j) Give any two uses of SLR camera.

2. Answer **any two** of the following : **10**

   a) Explain concept of resolution and magnification.

   b) Describe process of paraffin infiltration in microtomy.

   c) Explain working of camera lucida.

P.T.O.

3. Write notes on **any two** of the following : **10**

   a) Acetolysis

   b) Stereoscopic microscope

   c) Measurement technique of radioactivity.

4. What is spectroscopy ? Explain working and applications of spectrophotometer. **10**

   OR

   Describe the technique of TLC and add note on its advantages. **10**

———————

[4317] – 431

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
ZOOLOGY (Paper – I)
ZY-341 : Biotechnology (New)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *i)* ***All*** *questions are* ***compulsory****.*
ii) ***Neat*** *labelled diagrams must be drawn* ***wherever*** *necessary.*
iii) Figures to ***right*** *indicate* ***full*** *marks.*

1. Attempt the following. **10**

   1) What is Western blotting ?

   2) Define organ culture.

   3) What is polyclonal antibody ?

   4) What is HAT medium ?

   5) Define hydroponics.

   6) Give any two importance of animal tissue culture.

   7) What is Cosmid ?

   8) What is biosensor ?

   9) What is embryonic stem cell ?

   10) What is bioreactor ?

2. Attempt **any two** of the following. **10**

   i) Write a short note on Air-lift fermenter.

   ii) Explain ideal membrane used in Southern blotting technique.

   iii) Write a short note on Biopesticide.

P.T.O.

3. Write short notes on **any two** of the following. **10**

   a) Feeder layer.

   b) Multiple cloning site.

   c) Hetero Karyon.

   d) Chimeric animal.

4. Write advantages and disadvantages of tissue culture. **10**

   OR

   Write in detail the technique of Southern hybridization. **10**

[4317] – 435

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
ZOOLOGY (Paper – V) (Elective – II)
ZY-345(a) : Public Health and Hygiene
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *i)* ***All*** *questions are* ***compulsory****.*
ii) ***Neat****, labelled diagrams must be drawn* ***wherever*** *necessary.*
iii) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Attempt the following. **10**

   1) Define health.

   2) Enlist natural methods of purification of air.

   3) Name deficiency disease due to protein deficiency.

   4) Name any two methods for small scale water purification.

   5) Enlist the diseases spread by soil.

   6) Which day is celebrated as World Health Day ?

   7) Explain the term diabetes.

   8) Explain the role of pets in human health.

   9) Define occupational disease.

   10) Enlist the sources of radiation.

2. Attempt **any two** of the following. **10**

   1) Describe rain as source of water.

   2) Give an account of alcoholic beverages.

   3) Explain artificial methods of ventilation.

P.T.O.

3. Write notes on **any two**. **10**

   1) Accidents.

   2) Communicable diseases.

   3) Standards of hospitals.

   4) Effects of tobacco.

4. Explain the signs, symptoms, mode of transmission and control methods of influenza. **10**

   OR

   Describe in detail the sewage treatment plant. **10**

[4317] – 435

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
ZOOLOGY (Paper – V) (Elective – II)
ZY-345(b) : Biodiversity (New)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt the following. **10**

   1) Write the meaning of term biodiversity.

   2) Enlist the examples of forest insects.

   3) Write any two adaptations in agricultural insects.

   4) Write any two factors affecting on population dynamics in insect.

   5) State the difference between Exopterygota and Endopterygota.

   6) Write any two characters of social insects.

   7) What are saprophagous insects ?

   8) Give any two examples of nest building insects.

   9) What is mutualistic association ?

   10) Enlist any two survival strategies used by insects.

2. Attempt **any two** of the following. **10**

   i) Explain how temperature affects population dynamics in insects.

   ii) Write taxonomic characters and examples of order Hemiptera.

   iii) Describe social organisation in wasps.

3. Write note on **any two** : **10**

   a) Parental care in insects.

   b) Selection and diversity of food among insects.

   c) Significance of social organisation in insects.

   d) Diversity in insect association.

4. Write distinguishing features, examples and significance of order orthoptera and diptera. **10**

   OR

   Explain the impact of global changes on diversity of insects. **10**

———————

[4317] – 436

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
ZOOLOGY (Paper – VI)
ZY-346 : Genetics and Developmental Biology
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

N.B. : *i)* ***All*** *questions are* ***compulsory****.*
ii) Neat, labelled diagrams must be drawn ***wherever*** *necessary.*
iii) Figures to ***right*** *indicate* ***full*** *marks.*

1. Attempt the following : **10**

   1) Explain the term euthenics.

   2) Describe morula.

   3) Define the term muton.

   4) Define gastrula.

   5) Explain the term outbreeding.

   6) Define spermatogenesis.

   7) Define multiple allele.

   8) Enlist any two morphogenic movements.

   9) What is artificial mutation ?

   10) What is isolecithal egg ?

2. Attempt **any two** of the following : **10**

   i) Explain significances of Hardy-Weinberg equilibrium.

   ii) Describe meroblastic cleavage.

   iii) Explain regeneration in planneria.

P.T.O.

3. Write notes on **any two** : **10**

   1) Prisamptive area in frog

   2) Ribonuclease

   3) Shell coiling in limnaea

   4) Transgenic animal.

4. Explain the process of fertilization in sea urchin. Add a note on activation of egg metabolism. **10**

   OR

   Describe the process of gene cloning with the help of plasmid vectors.

———————

[4317] – 441

Seat No.	

T.Y.B.Sc. (Semester – IV) Examination, 2013
(Paper V) GEOLOGY
GL345 Phanerozoic Stratigraphy of India and Palaeontology
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer the following in **2/3** lines. **10**

   a) Give type area of Permian system.

   b) What are Intertrappeans ?

   c) What are Lameta group of rocks ?

   d) Name the oil bearing formation of tertiary of Assam.

   e) Name two palaeozoic orogenies.

   f) Give lithology of karewas of Kashmir.

   g) Give systematic classification of Glossopteris.

   h) Which era is known as ‘Age of Reptiles’.

   i) Name the index fossils of ordovician system.

   j) Name the important flora of Lower Gondwanas.

2. Write notes on **(any two)** : **10**

   a) Tectonics during OR classification of phanerozoic Eon.

P.T.O.

b) Conditions and modes of preservation of plants through geologic ages.

c) Economic importance of Gondwana supergroup.

3. Write notes on **(any two)** : **10**

a) Lithostratigraphic classification of Siwalik system

b) Laterite

c) Mass extinctions.

4. What are marine transgressions ? Give their characteristics. Give detailed account of Gretaceous of Cauvery Basin.

OR

Answer the following.

a) Classification and palaeoclimate of Gondwanas.

b) Classification and age of Deccan Traps.

———————

[4317] – 443

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
STATISTICS (Principal) (Paper – I)
ST – 341 : Distribution Theory – II
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

***Instructions**:* *1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Use** of scientific calculator and statistical table is **allowed**.*
4) Symbols and abbreviations have their usual meanings.

1. a) Choose the correct alternative in **each** of the following :

i) If $X \sim c(\mu, \lambda)$ then Bowley's coefficient of skewness is

A) $\frac{\mu + \lambda}{2}$ B) λ C) μ D) 0

ii) If $X \sim L(\mu = 4, \lambda = 2)$ then mean deviation about mean is

A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) 0 D) $\frac{1}{8}$

iii) If (X, Y) ~ BN (3, 1, 9, 4, 0.5) then E (Y/X = 6) is

A) 1 B) 2 C) 6 D) 0

iv) If X ~ LN (0, 0, 1) then mean of X is

A) $e^{0.5}$ B) e^{-1} C) e^{2} D) e **(1 each)**

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

i) Cauchy distribution is a particular case of t-distribution.

ii) Laplace distribution with parameters μ and λ is positively skewed. **(1 each)**

c) Define

i) Finite Markov chain.

ii) State space of a sequence of discrete random variables. **(1 each)**

d) i) State Chapmann Kolmogorov equations.

ii) State additive property of Cauchy distribution. **(1 each)**

P.T.O.

2. Attempt **any two** of the following :
   a) Let $X \sim c(\mu, \lambda)$. Obtain distribution function of X and hence find median of X.
   b) Let $X \sim L(\mu, \lambda)$. Obtain moment generating function of X.
   c) Let $(X, Y) \sim BN(0, 0, 1, 1, \rho)$ show that $U = \frac{X}{Y}$ has Cauchy distribution.

(5 each)

3. Attempt **any two** of the following :
   a) Let $X \sim L(0, 1)$ find $P(X < 2)$ and $P(|X| < 1)$.
   b) Let $X \sim LN(a, \mu, \sigma^2)$. Obtain r^{th} moment about X = a. Hence find its mean and variance.
   c) Let $(X, Y) \sim BN(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$. Obtain the distribution of aX + bY + c where a, b and c are constants. **(5 each)**

4. Attempt **any one** of the following :
   a) i) Let $\{X_n, n \geq 0\}$ be a Markov chain with state space S = {0, 1, 2} and initial probability distribution is given by $P(X_0 = i) = \frac{1}{3}$ i = 0, 1, 2.

   If one-step transition probability matrix P of above Markov chain is given by

$$P = \begin{bmatrix} 3/4 & 1/4 & 0 \\ 1/4 & 1/2 & 1/4 \\ 0 & 3/4 & 1/4 \end{bmatrix}$$

   Compute :

   A) $P(X_2 = 1/X_0 = 0)$ and

   B) $P(X_2 = 1, X_0 = 0)$. **5**

   ii) State and prove relation between Cauchy and uniform distribution. **5**

   b) i) Let $X \sim N(\mu, \sigma^2)$. If the distribution of X is truncated below X = a, find the expression for mean of the truncated variate. **6**

   ii) Let $X \sim LN(0, \mu, \sigma^2)$. Obtain the distribution of $X^{\alpha} (\alpha > 0)$. **4**

———————

[4317] – 446

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
STATISTICS (Principal) Paper – IV
ST 344 : Sampling Methods
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

Instructions : *1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Use** of scientific calculator and statistical tables is allowed.*
4) Symbols and abbreviations have their usual meanings.

1. Attempt **each** of the following : **(1 each)**

a) Choose correct alternative in each of the following :

i) Let the population is S = {1, 3, 7, 8, 4} and sample size is 2, then the probability that a specified unit is included in the sample is

a) $\frac{1}{5}$ b) $\frac{1}{8}$ c) $\frac{2}{5}$ d) $\frac{5}{8}$

ii) $Var(\bar{y}_n)_{SRSWR}$ is

a) $\frac{N-1}{N}S^2$ b) $\frac{N-1}{nN}S^2$ c) $\frac{N-n}{nN}S^2$ d) $\frac{N-n}{N}S^2$

iii) In Stratified random sampling, under proportional allocation $V(\bar{y}_{st})_{prop}$ is

a) $\left(\frac{1}{n}-\frac{1}{N}\right)\sum_{i=1}^{k}P_iS_i$ b) $\left(\frac{1}{n}-\frac{1}{N}\right)\sum_{i=1}^{k}P_iS_i^2$

c) $\left(\frac{N-n}{Nn}\right)\sum_{i=1}^{k}P_i^2S_i^2$ d) $\left(\frac{1}{n}-\frac{1}{N}\right)\left(\sum P_iS_i\right)^2$

iv) In stratified random sampling with k strata the size of subsample (n_i) from i^{th} stratum using proportional allocation

a) ni α Nisi b) ni α Ni c) ni α NiCi d) None of these

P.T.O.

b) State whether **each** of the following statement is **true** or **false**. **(1 each)**

1) SRSWOR is an equal probability sampling scheme.

2) Systematic sampling is always better than SRS.

c) Define the following terms : **(1 each)**

1) Sampling variance.

2) Random Sample.

d) i) State two merits of stratified random sampling. **(1 each)**

ii) Define sampling interval in systematic sampling.

2. Attempt **any two** of the following : **(5 each)**

a) Find the bias and variance of the regression estimator for estimating population total.

b) Discuss the methods to control non-sampling errors.

c) Find $V(\bar{y}_n)$ in SRSWR case.

3. Attempt **any two** of the following : **(5 each)**

a) Discuss the bias of ratio estimator for estimating population mean.

b) Consider a population S = {1, 2, 3, 4, 5}, let the sample size is 2. Show that sample mean is an unbiased estimator for the population mean. Similarly show that sample mean square is unbiased for population variance.

c) For estimating population mean, margin of error and confidence coefficient are given. Obtain the sample size required.

4. Attempt **any one** of the following : **(10 each)**

a) i) If population consists of linear trend then show that $Var(\bar{y}_{st}) \leq Var(\bar{y}_{sys})$.

ii) Obtain mean and variance of the sample proportion in case of SRSWR and SRSWOR.

b) i) Show that in stratified random sampling with given cost function $C = C_o + \sum_{i=1}^{n} C_i n_i$ $Var(\bar{y}_{st})$ is minimum if $n_i \propto \frac{N_i S_i}{\sqrt{C_i}}$.

ii) Discuss the Hansen and Hurwitz technique for non response.

———————

[4317] – 447

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
STATISTICS (Principal) (Paper – V)
ST 345 : Operations Research
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

***Instructions**: 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Use** of scientific calculator and statistical tables is **allowed**.*
4) Symbols and abbreviations have their usual meanings.

1. a) Choose the correct alternative in each of the following :

i) To solve a LPP by graphical method the number of decision variables should be

A) 2 B) 3

C) less than 2 D) more than 3

ii) In an assignment problem, decision variable can take values.

A) either 0 or 1 B) either –1 or 0

C) either –1 or 1 D) either 1 or 2

iii) In a simplex method, a variable which is subtracted from the left side of greater than or equal to type constraint is

A) slack variable B) surplus variable

C) artificial variable D) none of above

iv) Optimum solution to a transportation problem is obtained by using

A) North-west corner method

B) Least cost method

C) Vogel's approximation method (VAM)

D) Modified distribution method (MODI). **(1 each)**

P.T.O.

b) In each of the following, state whether the given statement is True or False :

i) Every sequencing problem must have unique optimum solution

ii) The value of objective function is same for primal and dual problem. **(1 each)**

c) Define each of the following :

i) An artificial variable

ii) Degenerate solution to a transportation problem. **(1 each)**

d) i) Explain the standard form of an LPP.

ii) Explain an idle time of a machine in a sequencing problem. **(1 each)**

2. Attempt **any tw**o of the following :

a) What are pseudo random numbers ? Explain linear congruential generator. Generate five random numbers using it.

b) Solve the following LPP by graphical method.

Maximise $z = 40x_1 + 80\ x_2$

subject to $2x_1 + 3x_2 \leq 48$

$x_1 \leq 15$

$x_2 \leq 10$

$x_1 \geq 0, x_2 \geq 0.$

c) A department of a company has five employees with five jobs to be performed. The time (in hrs) that each man takes to perform each job is given in the following matrix.

Employee / Job	I	II	III	IV	V
A	10	5	13	15	16
B	3	9	18	13	6
C	10	7	2	2	2
D	7	11	9	7	12
E	7	9	10	4	12

How should job be allocated, one per employee so as to minimise total man hours ? **(5 each)**

3. Attempt **any two** of the following

a) Explain Least-cost method of obtaining IBFS for a transportation problem.

b) Obtain the dual of following LPP.

Maximise $Z = 3x_1 + 5x_2 + 7x_3$

subject to $x_1 + x_2 + x_3 \leq 6$

$4x_1 - x_2 + 2x_3 \geq 15$

$x_1, x_2 \geq 0$, x_3 unrestricted.

c) A machine operator has to perform three operations A, B and C in the order ABC. The time required to perform these operations on number of different jobs is given below.

Job	A	B	C
1	6	16	26
2	24	12	28
3	10	8	18
4	4	12	24
5	18	6	16
6	22	2	26

Determine the order in which the jobs should be processed so as to minimise total time required to perform all jobs. Also obtain idle times for three operations. **(5 each)**

4. Attempt **any one** of the following :

a) Solve the following LPP by simplex method.

Maximise $z = 3x_1 + 2x_2$

Subject to $0.5x_1 + 0.3x_2 \leq 1600$

$0.3x_1 + 0.3x_2 \leq 1400$

$0.2x_1 + 0.4x_2 \leq 1200$

$x_1 \geq 0, x_2 \geq 0.$

b) Obtain IBFS of following transportation problem using VAM.

Pit	Plant Location			Availability
	A	B	C	
X	8	16	16	152
Y	32	48	32	164
Z	16	32	48	154
Requirement	144	204	82	–

Is the solution optimal ? If not obtain optimum solution. **(10 each)**

———————

[4317] – 448

Seat No.	

T.Y.B.Sc. (Semester – IV) Examination, 2013
STATISTICS (Principal) Paper – VI
ST 346 (A) : Statistical Ecology (Ele. – II)
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

***Instructions** : i) **All** questions are **compulsory**.*
*ii) Figures to the **right** indicate **full** marks.*
*iii) Use of calculator and statistical table is **allowed**.*
iv) Symbols and abbreviations have their usual meanings.

1. a) Choose the correct alternative in **each** of the following :

i) The time at which population gets doubled in exponential model is

A) $k \log_e 2$ B) $2e^k$ C) $\frac{\log_e 2}{k}$ D) $2 \log_e k$

ii) For logistic growth model stable equilibrium is

A) $N_t=0$ B) $N_t=k$ C) $N_t = \frac{k}{2}$ D) $N_t = \infty 1$

iii) In Gompertz model growth rate is maximum at

A) $\frac{k}{e}$ B) $\frac{k}{2}$ C) $\frac{2}{k}$ D) $\frac{e}{k}$

iv) Peterson's estimator of population size N for single recapture is

A) $\frac{n_1 n_2}{m_2}$ B) $\frac{n_1 m_2}{n_2}$ C) $\frac{n_2 m_2}{n_1}$ D) $\frac{m_2}{n_1 n_2}$ **(1 each)**

b) In **each** of the following, State whether the given statement is **true** or **false**.

i) The regular forest is generally a result of competition between the species for nutrients in the soil.

ii) In logistic growth model carrying capacity is equal to k. **(1 each)**

P.T.O.

c) Define each of the following :

i) Closed population

ii) Aggregated forest. **(1 each)**

d) i) Explain in brief rarefraction curves.

ii) Explain individual to individual nearest neighbour distance. **(1 each)**

2. Attempt **any two** of the following :

a) Derive the expression for logistic growth model.

b) Explain the method of quadrat sampling to estimate population density in a forest. Also discuss scope and limitations of this method.

c) Given the following projection matrix

$$M = \begin{bmatrix} 0 & 2 \\ 0.2 & 0 \end{bmatrix}$$

Obtain stable population structure and comment on the growth of the population. **(5 each)**

3. Attempt **any two** of the following :

a) Describe line transact method for estimating animal population in forest. What is rational behind using exponential detection function ?

b) For a Gompertz model determine the maximum growth rate.

c) Describe capture-recapture method.Derive Peterson's estimator of population size (N) for single recapture in case of closed population. **(5 each)**

4. Attempt **any one** of the following :

a) i) In Leslie matrix model state assumptions made, two kinds of parameters, model and its matrix representation.

ii) Discuss the states of equilibria in Gompertz growth model. **(5+5)**

b) What is meant by point to individual nearest neighbour distance in Poisson forest ? Derive maximum likelihood estimator of parameter λ. Is this estimator unbiased ? If not, obtain its bias and also give unbiased estimator of λ. **(10)**

———————

[4317] – 448

Seat No.	

T.Y.B.Sc. (Semester – IV) Examination, 2013
STATISTICS (Principal) Paper – VI
ST 346 (B) : Medical Statistics (Ele. – II)
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Use of scientific calculator and statistical tables are **allowed**.*
4) Symbols and abbreviations have their usual meaning.

1. Attempt **each** of the following :

a) In each of the following cases, choose the correct alternatives : **(1 each)**

i) In epidemiology, logit function of probability π is given by

A) $\ln[(1-\pi)/\pi]$ B) $\ln[\pi/(1-\pi)]$

C) $\ln[\pi(1-\pi)]$ D) $\ln[\pi/(1+\pi)]$

ii) In Phase-I of clinical trials

A) Rats are used B) Humans are used

C) Rabbits are used D) Dogs are used

iii) Pharmacokinetics is

A) Effect of drug on the body

B) What body does with drug

C) Elimination of drug in the body

D) Metabolism of drug in the body

iv) Pharmacodynamics is

A) Absorption of drug in the body

B) distribution of drug in the body

C) What drug does to the body

D) What body does with drug

b) In each of the following cases, state whether the given statement is **true** or **false** : **(1 each)**

i) Bioavailability is the rate and extent to which the active ingradient of the drug is absorbed and becomes available to the body.

ii) Humans are used in preclinical trials.

c) Define the following terms : **(1 each)**

i) C_{max} ii) T_{max}

d) i) What is the under the curve (AUC) ?

ii) What is elimination half time ? **(1 each)**

2. Attempt **any two** of the following : **(5 each)**

a) Explain the difference among inclusion and exclusion criteria.

b) What is non-compliance to protocol ? How to overcome this non-compliance problem ?

c) What are the advantages of adaptive designs in clinical trials ?

3. Attempt **any two** of the following : **(5 each)**

a) What are the ethical issues in clinical trials ?

b) Explain the meaning of pharmacokinetics and pharmacodynamics. How do you measure area under curve (AUC) of plasma concentration and elimination half life ($t_{1/2}$).

c) Derive the test procedure for testing null hypothesis, $H_0: \mu_T - \mu_R \leq -\Delta$ or $\mu_T - \mu_R \geq \Delta$ vs $H_1: -\Delta < \mu_T - \mu_R < \Delta$ based on Schuirmann's two one-sided tests procedure where $\Delta = 0.2\mu_R$.

4. Attempt **any two** of the following : **(5 each)**

a) An exploratory pharmacokinetic study was conducted in a healthy male volunteer to investigate and compare the drug concentration versus time profiles of two stereo-isomers of a topical ophthalmic medication. One drop per minute of 50/50 mixture of S- and R- isomers was added to each eye for

three minutes. Blood samples were drawn and assayed for each isomer at 12 distinct points during the first 8 hours of dosing immediately prior to treatment, at 5, 10, 15, 30, and 45 minutes and at 1, 1.5, 2,4,6, and 8 hours.

i) Sketch the graph of concentration versus time (in minutes).

ii) Obtain the initial estimate of C_{max}, T_{max}.

iii) Obtain the initial estimate of AUC(0-480).

Time (in minutes) :	5	10	15	30	45	60	90	120	240	360	480
Concentration :	9	12	18	26	28	31	34	33	29	23	17

b) What is crossover design ? When do you carryout crossover design ? What are the limitations of crossover design ?

c) What is the washout period and what are the advantages of washout period ? How much washout period is necessary ?

———————

[4317] – 449

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
STATISTICS (Principal) (Paper – VI)
ST – 346 (C) : Statistical Computing Using "R" Software
(2008 Pattern) (New Course) (Ele – II)
Batch No : I

Time : 2 Hours Max. Marks : 40

***Instructions** : 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.

1. Attempt **each** of the following :

a) Create a vector x of elements 5, 2, – 1, 7, 4, 8, 12 and from it create a vector y containing elements of x > 4.

b) Find mode of the following observation : 5, 12, 7, 3, 2, 3, 6, 3, 4, 8.

c) Let X ~ P (m = 2). Find P [X $\leq$ 3].

d) Draw a box plot of the following observations : 19, 4, 11, 16, 15, 1, 20, 18, 2, 6, 5, 24, 38.

e) Simulate an experiment of tossing a coin 80 times and prepare its frequency distribution.

f) Draw a systematic sample of size 7 from a population of 42 units.

g) Create a data frame of seven days in a week showing minimum temperature (C°) on that day.

h) Let X ~ B (n = 7, p = 0.3). Find K such that P [X > K] = 0.7.

i) Draw a random sample of size 8 from $N\left(\mu = 10, \sigma^2 = 4\right)$ distribution.

j) Access data UK gas from resident data sets and find its summary statistics.

(1 each)

P.T.O.

2. Attempt **any two** of the following : **(5 each)**

a) Draw a subdivided bar diagram for the data given below :

Year	No. of Students	
	Arts	**Commerce**
2008 – 09	700	1450
2009 – 10	725	1625
2010 – 11	800	1750

b) Find A.M., G.M. and H.M. of the observations given below :

24, 16, 9, 11, 22, 27, 5, 3. Verify the relation between them.

c) Calculate mean deviation about mean for the following data.

Weight (in kg)	40 – 45	45 – 50	50 – 55	55 – 60	60 – 65
No. of students	4	9	20	14	3

3. Attempt **any two** of the following : **(5 each)**

a) Frequency distribution of marks in Marathi obtained by the students is given below :

Marks	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
Students	1	14	22	40	31	9	3

Draw a less than ogive curve for the data.

b) Fit a Binomial distribution to the following data :

x	0	1	2	3	4	5
f	2	16	28	12	9	3

Also test the adequacy of model.

c) Fit a second degree parabola $Y = a + b X + cX^2$ to the following data :

X	**1**	**2**	**3**	**4**	**5**
Y	13	14	18	25	36

Estimate Y for X = 6.

4. Attempt **any one** of the following :

a) i) Following data on 300 TV-viewers according to their gender and watching habits are given below :

	News channel	**Entertainment channel**
Male	100	60
Female	45	95

Test whether watching habit and gender are independent. Take $\alpha = .05$. **4**

ii) The students taught by 3 different methods gave the following performance (marks) :

A	19, 9, 12, 16, 7, 14, 11
B	8, 13, 3, 17, 15
C	14, 11, 10, 9, 15, 16

Carry out the analysis of variance. **6**

b) i) A r.s. of 8 bulbs gave the following life time (in hrs.) :

240, 260, 170, 370, 235, 250, 269, 292.

Can we conclude that average life time of such bulb is 275 hours ? **5**

ii) Following are the runs scored by a batsman in 10 consecutive matches :

22, 98, 13, 54, 77, 61, 45, 32, 19, 85.

Compute coefficient of variation. **5**

———————

[4317] – 454

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
GEOGRAPHY (Paper – III)
Gg.343 : Fundamentals of Geoinformatics
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Diagrams and maps must be drawn ***wherever*** *necessary.*
4) ***Use*** *of map stencils is* ***allowed****.*

1. Answer the following questions in **one** or **two** sentences : **10**

   a) What do you mean by image rectification ?

   b) What is geometric correction ?

   c) Define point operation.

   d) What is cubic convolution ?

   e) Write the meaning of spatial frequency.

   f) What is high pass filtering ?

   g) What is unsupervised classification ?

   h) Define a pixel.

   i) List the vector overlay tools.

   j) What is spatio-temporal query ?

2. Write short answers (**any two**) : **10**

   a) Explain in short the various image data formats.

   b) What are radiometric corrections ?

   c) Explain the various derivatives of DEM.

P.T.O.

3. Write short notes (**any two**) : **10**

   a) Raster overlay

   b) Report writing in GIS

   c) Spatial query.

4. What is image enhancement ? Explain the contrast enhancement with suitable example. **10**

   OR

   Discuss difference between supervised and unsupervised classification.

———————

[4317] – 456

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
GEOGRAPHY (Paper – V)
Gg.345 : Geography of Soils – II
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Diagrams and maps must be drawn ***wherever*** *necessary.*
4) ***Use*** *of map stencils is* ***allowed****.*

1. Answer the following questions in **one** or **two** sentences : **10**

   a) What is soil climate ?

   b) What is ulmic acid ?

   c) What is autotrophic bacteria ?

   d) Mention any two effects of overgrazing.

   e) Define Mor humus.

   f) Define mull humus.

   g) Mention the various types of organic matter.

   h) List the organisms converting organic matter into humus.

   i) List the various process of soil formation.

   j) Explain the term ‘Meso Fauna’.

2. Write short answers (**any two**) : **10**

   a) Explain soil as a resource.

   b) Describe the process of soil degradation.

   c) What is humification ?

P.T.O.

3. Write short notes (**any two**) : **10**

   a) Effects of deforestration.

   b) Effects of Overgrazing.

   c) Methods of soil managements.

4. Explain the role of parent rocks, and relief in the soil formation. **10**

   OR

   Write an account of classification of tropical soils.

———————

[4317] – 458

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
MICROBIOLOGY (Paper – I)
MB-341 : Medical Microbiology – II
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

N.B. : *1)* ***All*** *questions are* ***compulsory****.*
2) ***All*** *questions carry* ***equal*** *marks.*
3) Draw ***neat*** *labeled diagrams* ***wherever*** *necessary.*

1. Attempt the following : **(10)**

A) Match the following :

A	B
1) Streptomycin	a) Curling of fungal hyphae
2) Monensin	b) Misreading of m-RNA
3) Griseofulvin	c) Acts on cell membrane
4) Metronidazole	d) Antiviral agent
5) Zidovudin	e) Antiprotozoal agent

B) Choose the most appropriate answer :

i) Direct effect of HIV on the central nervous system causes _____

a) dementia b) meningitis
c) encephalitis d) none of these

ii) Cysts of Entamoeba histolytica are

a) Infective b) Non-infective
c) Supra infective d) none of these

C) State **True** or **False** :

i) FMD is a preventable disease.
ii) *Aspergillus* species is responsible for dermatomycosis.
iii) Hepatitis A virus is transmitted by faecal-oral route.

P.T.O.

2. Attempt **any two** of the following. **(10)**

   A) Discuss antigenic variations in Influenza virus.

   B) Explain the significance of MIC and MBC.

   C) Discuss laboratory diagnosis and modes of transmission of AIDS.

3. Attempt **any two** of the following. **(10)**

   A) Discuss any two mechanisms of drug resistance in bacteria with appropirate examples.

   B) Explain the mode of action of Tetracycline.

   C) Draw and label – Hepatitis B Virus.

4. Attempt **any one** of the following. **(10)**

   A) Explain with the help of a neat labeled diagram the life cycle of *Plasmodium* species.

   B) Describe Poliomyelitis with respect to causative agent, pathogenesis and mode of transmission.

———————

[4317] – 459

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
MICROBIOLOGY (Paper – II)
MB – 342 : Genetics and Molecular Biology – II
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

N.B. : *1) All questions are compulsory.*
*2) **All** questions carry **equal** marks.*
*3) Draw **Neat**, **labeled**, diagram **wherever** necessary.*

I. Attempt the following : **10**

a) Fill in the blanks :

i) The Physiologically receptive state in which a bacterium is able to be transformed is _____.

ii) Gene transfer between bacterial cells by _____ can be carried out using free DNA extracted from the donor.

iii) ***Taq*** polymerase is obtained from _____ bacterium.

iv) The amount of DNA can be increased more than 10^6 fold by _____ technique.

v) A cross is made between streptomycin resistant (Str^r) F^- strain of genotype gal^-, azi^r, $lac^{-'}$, ton^r, xyl^- and the complementary prototrophic Hfr strain. The percentage of each Hfr gene transferred are : 72% ton^s, 27% gal^+, 91% azi^s, 48% lac^+, 0% xyl^+. The order of genes transferred is _____.

b) Match the following :

A	B
i) Isolation of plasmid	a) Colicin
ii) Col plasmid	b) Ethydium bromide
iii) Drug resistance	c) Benzer
iv) Cis-trans test	d) Transformation
v) Competence	e) R plasmid

P.T.O.

2. Draw neat labeled diagrams of **any two** of the following : **10**

   a) Flow-chart of **recombinant DNA** technology

   b) **Cis-trans** test.

   c) **Copy choice model** of recombination.

3. Write short notes on **any two** of the following : **10**

   a) Structure and properties of plasmids.

   b) Gene mapping by **Co-transduction**.

   c) PCR technique and its applications.

4. Attempt **any one** of the following : **10**

   a) Describe in detail the F^+, F^-, Hfr and F' strains of ***Escherichia coli***. Add a note on the process of conjugation.

   b) Describe **Holiday model** and **single strand assimilation** in bacteria.

———————

[4317] – 460

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
MICROBIOLOGY (Paper – III)
MB – 343 : Metabolism
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) ***All*** *questions carry* ***equal*** *marks.*
3) Draw neat labeled diagrams ***wherever*** *necessary.*

1. Attempt the following : **(10)**

a) State **True** or **False** :

i) Bacterial photosynthesis carried out by all bacteria is always oxygenic.

ii) Glycogen and starch are substrates for the enzyme amylase.

iii) When any chemical reaction proceeds to equilibrium then the entropy of the universe decreases.

iv) In prokaryotes, only RNA polymerase produces all the three RNA types.

b) Choose the correct answer :

The main polymerizing enzyme in *Escherichia coli* DNA replication is

i) DNA Pol – I ii) DNA Pol – II
iii) DNA Pol – III iv) DNA ligase

c) What is the long form of 'RUBISCO' ?

d) Write any two components of Complex – I in electron transport chain.

e) Define :

i) Photosynthesis

ii) Standard redox potential

f) Give names of two elongation factors.

P.T.O.

2. Attempt **any two** of the following : **(10)**

   a) Explain 'Non – cyclic photophosphorylation' with suitable diagram.

   b) Explain – Biodegradation of Glycogen.

   c) Define Active transport. Explain Active transport in bacteria with suitable example.

3. Attempt **any two** of the following : **(10)**

   a) Diagrammatically represent Calvin cycle.

   b) Explain the Chemiosmotic hypothesis for ATP formation.

   c) Explain group translocation in bacteria.

4. Attempt **any one** of the following : **(10)**

   a) Describe the process of initiation and elongation of protein synthesis along with diagram.

   b) Enlist the theories of ATP formation and explain how ATP acts as a energy currency of the cell.

———————

[4317] – 461

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
MICROBIOLOGY (Paper – IV)
MB-344 : Immunology – II
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

N.B. : *1)* ***All*** *questions are* ***compulsory****.*
2) ***All*** *questions carry* ***equal*** *marks.*
3) Draw neat labeled diagrams ***wherever*** *necessary.*

1. Attempt the following : **10**

   a) Define :
      i) Mixed lymphocyte reaction
      ii) ADCC
      iii) Secondary immune response.

   b) State **True** or **False** :
      i) Structure of MHC in mouse and man is 90% similar.
      ii) Cell to cell interactions involves cytokines and adhesion molecules.

   c) Match the following :

A	B
i) Antigen presentation	a) Vaccine
ii) Transplantation	b) Antisera
iii) Passive immunization	c) Antibody production
iv) Attenuation	d) Graft rejection
v) T-B cell co-operation	e) MHC molecules

2. Attempt **any two** of the following : **10**

   a) Describe structure and function of MHC class II molecules.

   b) Describe immediate and delayed type of hypersensitivity.

   c) Explain blood transfusion reactions. Give medico-legal applications of blood groups.

P.T.O.

3. Write short notes on **any two** of the following : **10**
   a) Activation and differentiation of T cells.
   b) Immunization schedule in developing countries.
   c) Interluekines.

4. Attempt **any one** of the following : **10**
   a) Describe antigen processing and presentation by MHC class II.
   b) Describe laboratory methods of 'ABO and Rh' blood group typing. Give outline of blood banking practices.

———————

[4317] – 462

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
MICROBIOLOGY (Paper – V)
MB-345 : Fermentation Technology – II
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

1. Attempt the following : **10**

   a) Define :

      i) Ales

      ii) GLP

   b) State **True** or **False** : Lipases are also used for flavour improvement.

   c) Vitamin B 12 is a byproduct of _____ fermentation.

   d) Write any two applications of Esterase.

   e) Match the following :

A	B
i) Corticosteroid	a) *Streptomyces olivaceus*
ii) Restriction enzyme	b) *Dioscorea composite*
iii) Biopesticide	c) Cutting of DNA
iv) Rabies vaccine	d) *Bacillus thuringiensis*
v) Cyanocobalamine	e) Cell culture

2. Attempt **any two** of the following : **10**

   a) Explain the role of sulfur dioxide in Wine making.

   b) Draw flow sheet for Yogurt production.

   c) Explain in brief the production of Baker's yeast.

P.T.O.

3. Attempt **any two** of the following : **10**

   a) Describe the production of Cheddar cheese.

   b) What are Hops ? Write its significance in Beer making.

   c) Draw the flow chart for manufacture of Lactic acid on industrial scale.

4. Attempt **any one** of the following : **10**

   a) Explain with fow chart the production of Vitamin B12 by *Streptomyces olivaceus*.

   b) Describe in detail the large scale production of Penicillin.

———————

[4317] – 464

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
ELECTRONIC SCIENCE (Paper – I)
EL – 341 : Advanced Communication Systems
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

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

1. Attempt **all** of the following :

a) Write two advantages of PCM. **1**

b) What is non-resonant antenna ? **1**

c) Write two advantages of ratio detector. **1**

d) What is the role of RF amplifier in radio receiver ? **1**

e) State four advantages of digital communication. **2**

f) "Balanced modulator is nothing but a mixer". Comment. **2**

g) "DPCM reduces the bandwidth requirement of channel". Comment. **2**

h) Calculate the required length of a half wave dipole antenna for 90 MHz. **2**

2. Attempt **any two** of the following :

a) Explain the working principle of TDM. What are its advantages and disadvantages. **4**

b) Write the Maxwell's equations in differential form and give their physical significance. **4**

c) Explain construction and working of klystron amplifier. **4**

P.T.O.

3. Attempt **any two** of the following :

   a) Draw the simplified block diagram of monochrome television transmitter and explain its working. **4**

   b) Explain various types of quantization errors in delta modulation system. **4**

   c) Explain phase modulation and demodulation using PLL. **4**

4. Attempt **any two** of the following :

   a) With neat diagram and waveforms, explain the working of quadrature detector. **6**

   b) With the help of block diagram, explain the working of speed gun radar. **6**

   c) Write short notes on :

      i) Rhombic antenna and

      ii) Band width and beam width. **6**

———————

[4317] – 467

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
ELECTRONIC SCIENCE (Paper – IV)
EL.344 : Electronic Materials and Devices
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

N.B. : *1) **All** questions are **compulsory**.*
*2) Neat diagrams must be drawn **wherever** necessary.*
*3) Figures to the **right** indicate **full** marks.*
*4) Log tables/calculator is **allowed**.*

1. Attempt **all** of the following :

   a) What is meant by intrinsic semiconductor ? **1**

   b) Draw the symbol of JFET. **1**

   c) State classification of polymers. **1**

   d) Define dielectric constant. **1**

   e) State different soft magnetic alloys. **2**

   f) What is meant by electronic polarization ? **2**

   g) What is Schottky contact ? **2**

   h) What are the types of bonding ? **2**

2. Attempt **any two** of the following :

   a) Explain hysteresis characteristic of magnetic materials. **4**

   b) Describe working principle of LED with energy band diagram. **4**

   c) Explain orientational polarization. **4**

P.T.O.

3. Attempt **any two** of the following :

   a) Classify magnetic materials. Explain any two of them. **4**

   b) Write note on ionic crystals. **4**

   c) Explain working principle of laser. **4**

4. Attempt **any two** of the following :

   a) What are organic semiconductors ? Explain any one in detail. **6**

   b) What is piezo electricity ? Explain it with neat diagram. **6**

   c) Explain working principle of P-M junction with forward bias, reverse bias and no bias conditions. **6**

———————

[4317] – 468

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
ELECTRONIC SCIENCE (Paper – V)
EL 345 : Mathematical Methods and Analysis using MATLAB
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

***N.B.** : 1) **All** questions are **compulsory**.*
*2) **Neat** diagrams must be drawn **wherever** necessary.*
*3) Figures to the **right** indicate **full** marks.*
*4) Log table/calculator is **allowed**.*

1. Answer **all** of the following :

a) What is length (A) function in MATLAB ? **1**

b) Define transfer function for a network. **1**

c) Write Fourier series expansion for odd function. **1**

d) How curve fitting is applied in verification of Ohm's law experiment ? **1**

e) Explain if-end structure in MATLAB. **2**

f) Write the MATLAB program to evaluate inverse Laplace transform of

$$F(s) = \frac{1}{s} + \frac{1}{(s+5)}.$$ **2**

g) How vertical bar plot graph is plotted in MATLAB ? Give one example. **2**

h) Explain the format of ode23 built in function in MATLAB. **2**

P.T.O.

2. Answer **any two** of the following :

   a) Define a Fourier series for a periodic function and state Dirichlet conditions related with it. **4**

   b) Find inverse Laplace transform of $F(s) = \frac{2s+3}{s^2+3s}$. Write MATLAB command to evaluate it. **4**

   c) Plot y = sinx taking 90 linearly spaced points in the interval $0 \leq x \leq 2\pi$. Label the axes and put "sinewave function" on the graph. Use spline to fit the function plot curve. **4**

3. Answer **any two** of the following :

   a) Find roots of an algebraic equation $f(x) = x^2 - 2x - 3$ using MATLAB function roots. Also elaborate use of poly command in MATLAB. **4**

   b) If R = 10 ohm and current through it is increased from 0 to 10 Amp. with increment of 2 Amp; write a MATLAB program to generate a table of current, voltage and power dissipation. Plot graph of current versus voltage. **4**

   c) Find Laplace transform of $f'(t)$. **4**

4. Answer **any two** of the following :

   a) Draw I-V characteristics of a semiconductor junction diode. Write current equation for it. Explain how polyfit function can be used to compute the best fit of set of data for plot of I-V characteristics ? **6**

   b) Write Laplace equation, Poisson equation in 3D using Cartesian co-ordinates. Solve Laplace equation using separation of variable method. **6**

   c) Explain mesh and surface 3D graphical facility provided in MATLAB. Elaborate with creation of grid on the graph. **6**

OR

4. Answer **all** of the following :

a) Determine the Fourier coefficient a_0 for the periodic function f(x) as given by

$$f(x) = 0 , \text{ if } -\pi < x < 0$$
$$= 1, \text{ if } 0 < x < \pi$$

4

b) Explain the format of following MATLAB commands :

i) f plot
ii) legend
iii) title
iv) meshgrid **4**

c) Define Continuous Time (CT) and Discrete Time (DT) signals. Explain how DT signal can be plotted by using stem command in MATLAB. **4**

———————

[4317] – 469

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
ELECTRONIC SCIENCE (Paper – VI) (New Course)
EL-346(A) : Instrumentation
(2008 Pattern) (Optional) (Elective – II)

Time : 2 Hours Max. Marks : 40

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

1. Attempt **all** of the following :

   a) Write the role of modifying input in generalized input output configuration of instrument. **1**

   b) Give one example of second order system. **1**

   c) Why ground loop is a problem in measurement system ? **1**

   d) Write the operating frequency of WWVH station of NIST. **1**

   e) Write any four applications of charge amplifier. **2**

   f) State various applications of DAS. **2**

   g) "Voltage amplifier is nothing but transconductance amplifier". Comment. **2**

   h) "Spectrum analyser is used to plot amplitude verses frequency". Comment. **2**

2. Answer **any two** of the following.

   a) With the neat block diagram, explain the method of opposing inputs. **4**

   b) Write a short note on "sinusoidal transfer function of measurement system". **4**

   c) With the help of block diagram explain simple workshop built spectrum analyser. **4**

P.T.O.

3. Answer **any two** of the following.

   a) Explain ramp response of first order system. **4**

   b) With neat block diagram, explain the functioning of digital transmission system. **4**

   c) Write a note on “slotted line detector”. **4**

4. Answer **any two** of the following.

   a) With suitable diagram, correlate functional elements of a pressure thermometer with elements of generalized measurement system. **6**

   b) Draw circuit diagram of instrumentation amplifier using three op-amps. Derive expression for its output voltage. **6**

   c) What is GPIB ? Explain the basic structure of IEEE-488/GPIB system. **6**

[4317] – 469

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
ELECTRONIC SCIENCE (Paper – VI) (2008 Pattern)
EL-346(B) : Consumer Electronics
(New Course) (Optional) (Elective – II)

Time : 2 Hours Max. Marks : 40

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

1. Attempt **all** of the following.

   a) List the various blocks in PA system. **1**

   b) What is IF for AM receiver ? **1**

   c) State types of colour system. **1**

   d) Which type of modulation is used in TV for audio signal ? **1**

   e) What are the advantages of LCD over conventional picture tube ? **2**

   f) "Mobile phones are called as cell phones", comment. **2**

   g) State specifications of a printer. **2**

   h) State different types of washing machines. How automation is achieved in it ? **2**

2. Attempt **any two** of the following.

   a) What are the advantages and disadvantages of magnetic tape/cassete recorder ? **4**

   b) Draw block diagram of colour TV. Explain its working in brief. **4**

   c) Write short note on GPS navigation system. **4**

3. Attempt **any two** of the following.

   a) With neat sketch diagram explain working of moving coil type speakers. **4**

   b) What are DLP projectors ? List its specifications. Give its advantages over LCD projector. **4**

   c) State working principle of xerox machine. Draw block diagram for it and explain. its working in brief. **4**

4. Attempt **any two** of the following.

   a) State different types of CD's. Explain how digital information is recorded on CD ? **6**

   b) List various specifications for dish washer. Explain its working in brief. **6**

   c) Explain GPRS system in detail. State its various application area. **6**

[4317] – 470

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – I)
DS-341 : Management of Military Technology in India
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** to **4** sentences **each** : **16**
   1) Define the term 'military'.
   2) What is information technology ?
   3) What do you mean by grade of technology ?
   4) Define technology acquisition.
   5) Introduce LCA.
   6) What is technology Life-Cycle ?
   7) How AWACS works ?
   8) What is meant by Technology upgradation ?

2. Answer in **8** to **10** sentences **each** (**any two**) : **8**
   1) Write about the science and technology education in India.
   2) Explain the status of R and D in India.
   3) What are the options of dual use technologies ?

3. Write short notes on (**any two**) : **8**
   1) Technology and air power
   2) Technology and naval power
   3) Technology and land power

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Discuss the application of first grade technology in the weapon system.
   2) Do you think that India is a rising global power ? Give your opinion.

———————

[4317] – 471

Seat No.	

T.Y.B.Sc. (Semester – IV) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – II)
DS-342 : Economic Aspects of War
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** to **4** sentences **each** : **16**
   1) What do you mean by wartime economy ?
   2) Define strategic control of defence.
   3) Write the meaning of contributory elements of war finance.
   4) State the meaning of zero budgets.
   5) What do you mean by War Potential ?
   6) State the meaning of real cost of war.
   7) What do you mean by perspective planning ?
   8) What do you mean by defence programme ?

2. Answer in **8** to **10** sentences each (**any two**) : **8**
   1) Explain merits of war time economy.
   2) Explain determinants of defence expenditure.
   3) Discuss effects of war on industry.

3. Write short notes on (**any two**) : **8**
   1) Demerits of peacetime economy.
   2) Elements of war potential.
   3) Methods of war finance.

4. Answer in **18** to **20** sentences (**any one**) : **8**
   1) Discuss defence budgeting and planning in India.
   2) Write a note on the fundamentals of Government budgeting in India.

———————

[4317] – 473

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – V)
DS – 345 : Information Technology and National Security
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** to **4** sentences **each**. **16**
   1) What do you mean by Surveillance ?
   2) Write the difference between CRT and LCD monitor.
   3) What do you mean by R and D simulator ?
   4) State the meaning computerized Battle Management system.
   5) What do you mean by the storage devices of computer ?
   6) Define operational research.
   7) Write any two features of high level languages.
   8) What do you mean by Missile Defence system.

2. Answer in **8** to **10** sentences **each** (**any two**) : **8**
   1) Explain application of IT in Surveillance.
   2) Discuss application of IT in Target acquisition system.
   3) Discuss application of IT in National development.

3. Write short notes on (**any two**) : **8**
   1) Role of IT in night vision.
   2) Role IT in MDS.
   3) Role IT in Battlefield Information system.

4. Answer in **18** to **20** sentences (**any one**) : **8**
   1) Explain the role of IT and its importance in National security.
   2) Discuss future application of IT in Battle Management system.

———————

[4317] – 474

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
Defence and Strategic Studies
Paper – VI – DS346 (A) : INDIAN MILITARY SYSTEM (II)
(Optional) (Elective – IV)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *1)* ***All*** *questions are* ***compulsory.***

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

1. Answer in **2** or **4** sentences **each**. **16**

1) State the chief weapons of Sultan period.

2) When and between whom the first battle of Panipat was fought ?

3) State any two merits of Mansabdar System of Mughals.

4) Which weapon it was introduced by Babar to Indians ?

5) State the date and year of beginning of third battle of Panipat.

6) What was the basic reason for battle of Haldighat ?

7) State any two military reforms introduced by Ghiyasuddin Balban during Sultan era.

8) State the meaning of Mansabdar.

P.T.O.

2. Answer in **8** or **10** sentences (**any two**) **8**

   1) Write few lines on Allauuddin Khilji.

   2) Explain in brief the significance of first battle of Panipat in Indian Military history.

   3) Highlight on relationship between Maratha and Mughals.

3. Write short notes on (**any two**) : **8**

   1) Babar as a strategian

   2) Sadhashiv Rao Bhau

   3) Mughals Art of warfare.

4. Answer in **16** to **20** sentences (**Any one**) : **8**

   1) Analyse the causes of Maratha defeat at third battle of Panipat.

   2) Evaluate the causes of decline of Mughals.

[4317] – 474

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
Defence and Strategic Studies
Paper – VI – DS346 (B) : MARATHA MILITARY SYSTEM (II)
(Optional) (Elective – IV)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** or **4** sentences **each**. **16**
   1) What was the tactics of Shivaji ?
   2) Who was Tarabai ?
   3) Who was Rajaram ?
   4) What do you know about "Sanad" ?
   5) Why Sambhaji revolt against Soirabai ?
   6) Where was the third Anglo-Maratha War fought ?
   7) What do you know about Kanboji Angre ?
   8) State the reason of battle of Bhopal.

2. Answer in **8** or **10** sentences (**any two**) : **8**
   1) Write few lines on Rajaram.
   2) Explain in brief battle of Bhopal.
   3) Which tactics it was introduced by Santaji and Dhanaji ?

3. Write short notes on (**Any two**) : **8**
   1) Third battle of Panipat
   2) Third Anglo-Maratha war
   3) Sambhaji as a Military leader.

4. Answer in **16** to **20** sentences (**Any one**) : **8**
   1) Evaluate the first Bajirao Peshwa as a Military General.
   2) Highlight on the causes of downfall of Maratha.

———————

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
Defence and Strategic Studies
Paper – VI – DS346 (C) : INDIAN WARS SINCE INDEPENDENCE (II) (Optional) (Elective – IV)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** or **4** sentence **each** : **16**
   1) What do you understand by Mukti Bihini ?
   2) State the duration of Indo-Pak War of 1971.
   3) What was the aim of India for military operation in Sri Lanka ?
   4) When and between whom the Simla Agreement was signed ?
   5) State the long form of I.P.K.F.
   6) What do you mean by L.A.C. ?
   7) State the date and year of Indo-Pak War of 1971.
   8) Why India sent her forces to Maldive ?

2. Answer in **8** or **10** sentences (**any two**) : **8**
   1) Write few lines on “Jai Bangla Hamar Bangla Sonar Bangla”.
   2) Highlight on India’s Military operation in Sri Lanka.
   3) Why India intervene in east Pakistan during 1971 ?

3. Write short notes on (**any two**) : **8**
   1) Background of Indo-Pak War of 1971.
   2) Simla Agreement of 1972.
   3) Impact of Kargil episode of I999 on domestic front of Pakistan.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Explain in detail the implications of Indo-Pak War of 1971 on domestic, regional and global scenario.
   2) Write a note on “Kargil episode of 1999”.

———————

[4317] – 477

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – IX)
DS – 349 A : Management of Defence Production and Logistics in India (Optional) (Ele – IX)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** to **4** sentences **each** : **16**
   1) Write the role of HAL.
   2) Write the role of BEL.
   3) Write the role of BEML.
   4) What is meant by “Industrial Military Complex” ?
   5) Define the motto of “Army Supply Corps”.
   6) Define Management.
   7) What do you mean by Indigenous production ?
   8) What is the concept of “Tail to Teeth” ?

2. Answer in **8** to **10** sentences **each** (**any two**) : **8**
   1) Explain the rationale of defence production in India.
   2) Explain the role of DRDO.
   3) Explain the role of private sector in defence production.

3. Write short notes on (**any two**) : **8**
   1) Structure of Defence Production.
   2) Just in Time Concept.
   3) Management of Integrated Defence Logistics.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Discuss the Principles of Logistics.
   2) Discuss the Mobilization of Logistics Elements during War.

———————

P.T.O.

[4317] – 477

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – IX)
DS – 349 B : Internal Security of India – II (Optional) (Ele – IX)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** to **4** sentences **each** : **16**
   1) Define Insurgency.
   2) Define Terrorism.
   3) What is Naxalism ?
   4) To whom will you name Maoist ?
   5) Define Security.
   6) Relate threats and its abetments.
   7) What is Ethnicity ?
   8) Define Sabotage.

2. Answer in **8** to **10** sentences **each** (**any two**) : **8**
   1) Explain the significance of communal harmony.
   2) Explain the role of Central Govt. in internal security.
   3) Explain the role of Media in internal security.

3. Write short notes on (**any two**) : **8**
   1) Insurgency in Kashmir.
   2) Insurgency in North East.
   3) Cross-Border Terrorism.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Make an assessment of internal security challenges to India.
   2) Discuss the role of State Govt. in internal security.

———————

[4317] – 477

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – IX)
DS – 349 C : India's Maritime Security (II) (Optional) (Ele – IX)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** to **4** sentences **each** : **16**
   1) State the meaning of Maritime Security.
   2) Define strategic environment.
   3) Define Exclusive Economic Zone (EEZ).
   4) State the meaning of maritime trade threats.
   5) Define human trafficking.
   6) Write the meaning of freedom to use the sea.
   7) What do you mean by piracy ?
   8) Write any two elements of sea power.

2. Answer in **8** to **10** sentences **each** (**any two**) : **8**
   1) Explain in brief history of Ocean.
   2) Discuss strategic significance of Indian Ocean.
   3) Describe India in the Oceanic System.

3. Write short notes on (**any two**) : **8**
   1) Policies of Pakistan in the Indian Ocean.
   2) Policies of China in the Indian Ocean.
   3) Policies of Britain in the Indian Ocean.

4. Answer in **18** to **20** sentences (**any one**) : **8**
   1) Explain "Indian Ocean as a Zone of peace". Problems and Dimensions.
   2) 26/11 Mumbai attack and its impact on Indian Security System.

———————

[4317] – 478

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
ENVIRONMENTAL SCIENCE (Paper – I) (New Course)
ENV-341 : Aquatic Ecosystems and Management
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt the following in **1-2** lines **each** : **10**
   a) Define ecotourism.
   b) Differentiate between parasitism and mutualism.
   c) Mention 2 types of plankton communities.
   d) Enlist any two species of mangroves.
   e) What do you mean by sustainable development ?
   f) Define ecodevelopment.
   g) Name any two traditional methods of water conservation.
   h) What is antibiosis ?
   i) Mention the role of producers in marine ecosystem.
   j) What is the meaning of GIS ?

2. Write a short note on (**any two**) : **10**
   a) Restoration of lake Trummen
   b) Aquatic ecosystem services
   c) Impact of tourism

3. Answer **any two** from the following : **10**
   a) Elaborate on cultural and aesthetic benefits of aquatic system.
   b) Discuss the consequences of over-exploitation of water.
   c) Explain the relationship of water with plant functioning.

4. Attempt **any one** of the following : **10**
   a) Discuss the advantages and limitations of various methods of management of aquatic ecosystems.
   b) Explain various types of interactions possible within the species from aquatic ecosystem.

———————

[4317] – 479

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
ENVIRONMENTAL SCIENCE (Paper – II) (New Course)
ENV-342 : Nature Conservation
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt the following in **1-2** lines **each** : **10**
   a) What are Hot-spots ?
   b) Name any 2 National Parks of India.
   c) Write the full form of BNHS.
   d) What is the state bird of Maharashtra ?
   e) What are gene banks ?
   f) Name any 2 personalities in the field of conservation.
   g) What is eco-tourism ?
   h) Name any 2 natural heritage sites of India.
   i) Write the full form of CITES
   j) Sacred-grove is an example of ex-situ conservation (true/false).
2. Write a short note on (**any two**) : **10**
   a) Species approach for nature conservation.
   b) Convention on biological diversity.
   c) International whaling mission.
3. Answer **any two** from the following : **10**
   a) Describe one each of the social, political and economic challenges of nature conservation with examples.
   b) What is meant by traditional/community conservation practise ? Explain.
   c) Describe the concept of captive breeding-reintroduction with example. Give its merits, limitations and challenges.
4. Attempt **any one** of the following : **10**
   a) Describe the role of NGO's in nature conservation through any 5 instances.
   b) Explain In-situ conservation methods with suitable examples. Describe their merits, limitations and challenges.

———————

[4317] – 480

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
ENVIRONMENTAL SCIENCE (Paper – III) (New Course)
ENV 343 : Air and Soil Quality
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt the following in **1-2** lines **each** : **10**
   a) Define soil conservation.
   b) State the difference between Gully and Rill erosion.
   c) What is El Nino phenomena ?
   d) Name any two indoor air pollutants.
   e) Enlist any two functions of micronutrients.
   f) Define soil structure.
   g) What is primary pollutant ? Give one example.
   h) Mention the difference between chlorosis and epinasty.
   i) Define electrical conductivity.
   j) Define : Thermal inversion.
2. Write a short note on (**any two**) : **10**
   a) GIS application for management of soil resources.
   b) Soil temperature and plant growth.
   c) Soil types and their formation.
3. Answer **any two** from the following : **10**
   a) Explain the nitrogen cycle diagrammatically.
   b) Discuss how human activities affect meteorological conditions ?
   c) Describe in brief any five air pollution episodes.
4. Attempt **any one** of the following : **10**
   a) Explain in detail determination of pH of given soil sample with reference to importance of pH in water supply.
   b) Explain the analytical method for sampling and monitoring of particulate matter.

———————

[4317] – 483

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
ENVIRONMENTAL SCIENCES (Paper – VI) (New Course)
ENV 346 : Environmental Biotechnology – II
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt the following in **1-2** lines **each** : **10**

   a) Define 'Biostimulation'.

   b) State whether true or false, Bioleaching is suitable for extractional metal from low grade ore.

   c) What is sludge blanket ?

   d) Give any one name of the pathway employed for degradation of aromatic compounds.

   e) Name the two types of hazardous waste.

   f) Name the microbes employed in bioleaching.

   g) State the two interactions involved between metal and biomass during biosorption.

   h) Name the two plants used for bioremediation purpose.

   i) What is biofilm ?

   j) Enlist limitation of biological treatment.

2. Write a short note on (**any two**) : **10**

   a) Heavy metal removal

   b) Rhizofiltration

   c) COD and BOD

P.T.O.

3. Answer **any two** from the following : **10**

   a) Describe microbial strain improvement program carried out in Environmental biotechnolgy.

   b) Describe UASB treatment of wastewater.

   c) Explain use of immobilised cells or enzymes for treatment of wastewater.

4. Attempt **any one** of the following question : **10**

   a) Enlist and describe the bacterial groups and their interaction involved in biogas generation in conventional treatment.

   b) Discuss the aerobic biological process for treatment of wastewater.

———————

[4317] – 484

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
INDUSTRIAL CHEMISTRY (Vocational) (Paper – V)
Entrepreneurship Development
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer precisely the following : **10**
   a) Who is an entrepreneur ?
   b) State any two qualities possessed by an entrepreneur.
   c) What is the full form of SICOM ?
   d) Define 'Communication'.
   e) What is a service industry ?
   f) What financial assistance the bank provides under entrepreneur scheme ?
   g) Define small-scale industry.
   h) What is working capital ?
   i) What is the full form of NSSIDC ?
   j) Name one market survey technique.

2. A) Answer **any two** of the following : **6**
      a) What are the different sources of business idea ?
      b) What is product innovation ?
      c) Describe the functions involved in human resource management.

   B) Answer briefly **any two** of the following : **4**
      a) State and explain any two types of entrepreneur.
      b) Explain the procedure for registration of SSI.
      c) What is project report ?

P.T.O.

3. Answer **any two** of the following : **10**

   a) State the features of Factory Act.

   b) What are the market survey techniques ? Explain with suitable examples.

   c) Write a note on pricing policies.

4. a) What factors should an entrepreneur consider for product selection ? **6**

   OR

   a) Explain any five bases for market segmentation. **6**

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

      i) What are the advantages of joint stock companies ?

      ii) What is branding ?

———————

[4317] – 485

Seat No.	

T.Y. B.Sc. (Vocational) (Semester – IV) Examination, 2013
BIOTECHNOLOGY (Paper – V)
Voc – Biotech-345 : Entrepreneurship Development
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

Instructions: *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***All*** *questions carry* ***equal*** *marks.*

1. Answer **each** of the following in **1-2** lines. **10**

   a) What is Pricing ?

   b) What is the full form of SISI ?

   c) Name one of the market survey techniques.

   d) What is a sole proprietorship ?

   e) What is SIDBI ?

   f) What is Sales Tax ?

   g) Give the full form of MSFC.

   h) Give a function of the Maharashtra State Electricity Board.

   i) What is the full form of MIDC ?

   j) Define Entrepreneurship.

2. Answer **any two** of the following. **10**

   a) Explain the characteristics of an entrepreneur.

   b) Describe the different forms of business organizations.

   c) Discuss the role of a consultancy organization.

P.T.O.

3. Write short notes on **any two** of the following. **10**

   a) VAT and Service tax

   b) SWOT analysis

   c) Modes of employment

4. Define Marketing ? Explain the four P's of marketing mix in details. **10**

   OR

   Explain Project Formulation in detail.

[4317] – 489

Seat No.	

T.Y.B.Sc. (Semester – IV) Examination, 2013
SEED TECHNOLOGY (Vocational)
Paper – V : Entrepreneurship Development
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

Instructions: *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Sketch ***neat*** *labeled figures* ***wherever*** *necessary.*

1. Answer the following : **(1×10=10)**

   a) Mention the need for entrepreneurship.

   b) Give any one merit in co-operative organisation.

   c) Write full form of DIC.

   d) Name any one funding agency.

   e) What is marketing mix effect ?

   f) What is breakdown point ?

   g) Give the name of any one co-operative bank.

   h) Write the role of consultancy organization.

   i) What is wages payment act ?

   j) Write one demerit in partnership business.

2. Attempt **any two** of the following : **(2×5=10)**

   a) Write an account on any form of business organization.

   b) Explain the role of pollution control board.

   c) Give an account on the preparation of basic financial statements.

P.T.O.

3. Write short notes on **any two** of the following : **(2×5=10)**

   a) Small scale industries.

   b) Training of personnel.

   c) Entrepreneurship and its scope.

4. Write a report on the formulation, technical and economic feasibility of an entrepreneurship development.

   OR

   Describe the barriers in entrepreneurship and means to remove them. **10**

[4317] – 490

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
INDUSTRIAL MICROBIOLOGY (Paper – V)
VOC-IND-MIC-345 : Molecular Biology and Recombinant DNA Technology
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *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.*

1. Answer the following : **10**

   a) Write recognition site and cutting site of Sau 3 AI.

   b) Enlist essential components of PCR.

   c) What is T-DNA ?

   d) Enlist the important features of EMBL3 vector.

   e) Name two DNA sequencing methods.

   f) pBR 3222 was developed by _____ and _____.

   g) What is microinjection ?

   h) Represent diagrammatically only: action of alkaline phosphatase.

   i) Write the principle of autoradiography.

   j) If Hexacutters are used for restriction digestion, the probable size of DNA will be _____.

2. Attempt **any two** of the following : **10**

   a) Justify : Real time PCR is used to quantify amplified DNA.

   b) Describe in detail construction and importance of pBR 322 as a cloning vehicle.

   c) Compare the three types of restriction endonucleases.

P.T.O.

3. Attempt **any two** of the following : **10**

   Comment on :

   a) Factors affecting mobility of DNA in agarose gel electrophoresis.

   b) Recently developed expression vectors.

   c) Importance of converting blunt ends to sticky ends.

4. Attempt **any one** of the following : **10**

   a) Discuss various nucleic acid hybridization methods and their role in selection of desired clones.

   b) What is protein engineering ? Discuss various methods employed and comment on the PCR based method used for site directed mutagenesis.

———————

[4317] – 492

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
BIOTECHNOLOGY (Paper – VI) (Vocational)
Voc - Biotech - 346 : Microbial and Animal Biotechnology
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***All*** *questions carry* ***equal*** *marks.*

1. Answer **each** of the following in **1-2** lines. **10**

   a) Define fermentation

   b) What is gene therapy ?

   c) What is Sufu ?

   d) Define patent

   e) What is cell hybridization ?

   f) Define cell line

   g) Give two advantages of fed-batch fermentation over the other types of fermentation.

   h) What are anciliary operations ?

   i) What are transgenics ?

   j) What is the biological role of Factor VIII ?

2. Attempt **any two** of the following : **10**

   a) What is immobilization ? Elaborate one method with application.

   b) Write a short note on :

      i) tPA ii) PDGF

   c) Describe the properties and types of stem cells.

P.T.O.

3. Attempt **any two** of the following. **10**

   a) Write a short note on solid waste treatment.

   b) Comment on Inoculum development.

   c) Discuss the various methods of purification of products of animal tissue culture.

4. Attempt **any one** of the following. **10**

   a) Define monoclonal antibodies. How are they produced ? Give two important applications of Monoclonal antibodies.

   b) What is Koji ? Describe the process of soy sauce production in detail.

———————

[4317] – 495

Seat No.	

T.Y. B.Sc. (Semester – IV) Examination, 2013
INDUSTRIAL MICROBIOLOGY (Vocational) (Paper – VI)
VOC-IND-MIC-346 : Entrepreneurship Development
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *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.*

1. Answer the following : **10**

Choose the correct option :

i) Which of the following is **not** a Labor Act ?

a) The Factories Act b) Negotiable Instruments Act
c) Shops and Establishment Act d) Industrial Disputes Act

ii) Which of the following gives the correct order of the steps in the market segmentation process ?

a) Targeting; Segmentation; Positioning
b) Segmentation; Positioning; Targeting
c) Segmentation; Targeting; Positioning
d) Positioning; Targeting; Segmentation

iii) Which deduction is allowed while computing the taxable income ?

a) Income tax payment b) Wealth tax
c) Personal expenses d) Bonus to employees

State **true** or **false** :

iv) Wants are basic human requirements such as food or air.

v) Demands are wants for specific products backed by an ability to pay.

vi) A distribution channel includes distributors, wholesalers, retailers and agents that display, sell, or deliver the physical product or service(s) to the buyer or user.

P.T.O.

Fill in the blanks :

vii) The concept of market segmentation is based on the assumption that the markets are _____.

viii) 'SIDBI' stands for _____.

ix) Working capital can be calculated by _____ less _____.

x) The levy of excise duty is connected to _____ of goods.

2. Attempt **any two** of the following : **10**

a) Enumerate any ten characteristics of a successful entrepreneur.

b) What is the main object of The Payment of Wages Act, 1936 (1) ? Enumerate any four main provisions of this Act.

c) Explain any five features of partnership.

3. Attempt **any two** of the following : **10**

a) Explain the concepts of need, wants and demands with examples.

b) Define 'Cost. Enumerate various types of cost. Explain the cost calculation in a merchandising organization.

c) Tabulate any five differences between sole proprietorship and partnership forms of organization.

4. Attempt **any one** of the following : **10**

a) "The balance sheet is a snapshot of the firm's financial position" Explain with sample format of balance sheet and any seven terms used in it.

b) "Products include more than just tangible goods". Explain with examples the other items that are also considered products.

_____

[4317] – 496

Seat No.	

T.Y. B.Sc. Semester IV Examination, 2013
Computer Hardware & Network Administration (Vocational)
(Paper VI) : NETWORK CONCEPTS – II
(New Course)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. a) Attempt **all** of the following : **(10×1=10)**

   i) What is an Antivirus ?

   ii) What is an IDS ?

   iii) Explain Term : Data Encryption.

   iv) Explain "10/100/1000" support for a Network Device ?

   v) What is a LAN ?

   vi) What is a Site ?

   vii) Give one Application of a Proxy Server.

   viii) What is a Shared Printer on Network ?

   ix) Explain the term : Dedicated Leased Line ?

   x) What is a VPN ?

2. Attempt **any two** of the following : **(2×5=10)**

   a) List various Network Attacks. Explain with proper example.

   b) List Advantages of VPN.

   c) Write a note on VOIP.

P.T.O.

3. Attempt **any two** of the following : **(2×5=10)**

   a) Give the Steps to share a printer on Network.

   b) What is a Remote Access VPN ? Give its Applications.

   c) Elaborate Resource planning of Hardware.

4. Attempt **any one** of the following : **(1×10=10)**

   a) Write the Installation Procedure for an Ethernet Card and configuring TCP/IP Protocol in windows XP.

   b) What are the different Data Protection Measures ? Explain any one in detail.

———————