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T.Y. B.Sc. (Sem. – IV) Examination, 2010
ELECTRONIC SCIENCE (Paper – IV) (2004 Pattern)
EL-344 : Physics of Electronic Materials

Time: 2 Hours Max. Marks: 40

Note : *i) Attempt **all** questions.*
*ii) Draw **neat** diagram **wherever** necessary.*
*iii) Numbers to the **right** indicate **full** marks.*
(Given : 1 eV = 1.6×10^{-19} J, $m_e = 9.1\times10^{-31}$ kg,
$c = 3\times10^{8}$ m/s, $h = 6.6\times10^{-34}$ Js)

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

a) What is photon ? **1**

b) What is Fermi Energy ? **1**

c) What is intrinsic semiconductor ? **1**

d) Give the statement of Stefan's law of black body radiation. **1**

e) In copper what is the speed of the conduction of electron's if fermi energy is 7.0 eV. **2**

f) How p-n junction is formed ? **2**

g) Calculate energy of photon having wavelength 450 nm. **2**

h) Comment 'p-n junction does not emit radiation while LED does'. **2**

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

a) What are matter waves ? Obtain an expression for their wavelength. **4**

b) Explain 'effective mass of an electron'. **4**

c) Write short note on optical absorption. **4**

P.T.O.

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

a) With the help of time independent Schrondinger equation. Obtain energy eigen value $E_n = \frac{n^2 h^2}{8ma^2}$ for a particle in one dimensional infinite well of size a (symbols have their usual meaning). **4**

b) With the suitable energy diagram, explain significance of fermi energy in metal contact. **4**

c) Explain the formation of schottky junction between metal and a n-type semiconductor where work function of metal is greater than semiconductor. **4**

4. a) An electron has speed of 6000 m/s, with an accuracy of 0.05% calculate the uncertainty with which the position of electron can be located. **4**

b) Calculate the fermi energy of copper at O.K. The density of Cu is 8.96 gm/cc and relative atomic weight is 63.5 (Avagdro's number = 6.02×10^{23}) **4**

c) An n type semi conductor containing 10^{16} phosphorous (donor) atoms per cm^3 has been doped with 10^{17} boron (acceptor) atoms per cm^3. Calculate electron and hole concentrations in this semiconductor.

(Given $n_i = 1.45 \times 10^{10}$ cm^{-3}). **4**

OR

4. a) Explain the terms spontaneous emission, stimulated emission and photon amplification. **6**

b) Explain with diagram the thermionic electron emission in vacuum tube. Draw the current voltage characteristic of vacuum diode. State Richardson - Dushman equation. **6**

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T.Y. B.Sc. (Sem. – IV) Examination, 2010
ENVIRONMENTAL SCIENCE – III (2004 Pattern)
EN-343 : Environmental Chemistry

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. Attempt the following in **1-2** lines **each** : **10**
   a) Give any one reason of ozone depletion in stratosphere.
   b) Write any one importance of phosphorus in soil.
   c) Give an example of physical weathering.
   d) Define wetland.
   e) What is meant by ion-exchange ?
   f) Define lithosphere.
   g) What is meant by chemical sink ?
   h) What is meant by solubility product ?
   i) Mention any two substitutes for CFC.
   j) Define eutrophication.

2. Write short notes on **any two** of the following : **10**
   a) Euphotic zone
   b) Redox effects
   c) Acidification.

3. Attempt **any two** of the following : **10**
   a) Discuss solubilization and ionic acids
   b) Explain ultra violet protection
   c) Describe biological pump.

4. Attempt **any one** of the following : **10**
   a) Write an account on catalytic destruction of ozone.
   b) Write an account on composition of lithosphere.

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T.Y. B.Sc. (Sem. – IV) Examination, 2010
PHYSICS (Paper – III) (2004 Pattern)
PH-343 : Thermodynamics and Statistical Mechanics

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) Define phase space.

   b) What do you mean by molecular speed ?

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

   d) Explain postulate of equal priori probability.

   e) Define thermodynamic probability.

   f) Write Rayleigh Jean's law.

   g) Define thermal conductivity of a gas.

   h) Write Planck's formula.

   i) Define inversion temperature. Give relation between Boule temperature and inversion temp.

   j) Write Wien's law of displacements.

2. Attempt **any two** :

   a) Explain thermal interaction and mechanical interaction between two systems. **5**

   b) Prove $\overline{E} = \dfrac{h\nu}{e^{\frac{h\nu}{kT}} - 1}$ where symbols have their usual meanings. **5**

   c) What do you mean by transport of matter ? And obtain expression for coefficient of viscosity. **5**

P.T.O.

3. Attempt **any two** :

   a) Explain four thermodynamics relations U, H, F and G. **5**

   b) Compare Maxwell Boltzmann and Bose-Einstein statistics. **5**

   c) Consider a microstate which has 21 microstates. The velocities corresponding to micorstates are given in following table.

No. of Microstates	Velocity in m/s
5	7
7	8
9	11

Calculate average velocity. **5**

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

   a) i) What is Joule Thomson effect ? Obtain expression for Joule Thompson coefficient. **4**

   ii) Explain Adiabatic Demagnetisation. **4**

   b) Obtain Maxwells law of distribution of molecular speeds in the form

$$dN = 4\pi N\left(\frac{m}{2\pi KT}\right)^{3/2} e^{\frac{-mv^2}{2kT}} V^2 dv\,.$$ **8**

   B) Attempt **any one** :

   i) A bag contain 11 red balls, 9 black balls and 8 white balls. If a ball is drawn from the bag what is the probability that it is either red or black. **2**

   ii) Calculate mean free path of a molecules of a gas which has molecular diameter of 3×10^{-10}m and molecular density 2×10^{25} mole/m^3. **2**

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T.Y. B.Sc. (Semester – IV) Examination, 2010

GEOGRAPHY – V (2004 Pattern)

Gg.345 : Geography of Soils

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.

a) Define soil science.

b) What is leaching ?

c) Define lithosols.

d) Mention various methods of soil management.

e) What do you understand by sheet erosion ?

f) Mention various methods of soil Conservation.

g) What is Elluviation ?

h) Mention the states in India affected by soil degradation.

i) What do you understand by gully erosion ?

j) Mention various types of soil erosion. **10**

P.T.O.

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

   a) Write an explanatory note on soil degradation.

   c) What do you understand by azonal soils ?

   d) What do you understand by the term Laterisation ? **10**

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

   a) Podzolization

   b) Effects of deforestation

   c) Basis of soil classification. **10**

4. Write in detail factors responsible for soil formation.

   OR

   Write a geographical essay on ‘soil as a resource’. **10**

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T.Y. B.Sc. (Semester – IV) Examination, 2010
MICROBIOLOGY (Paper – IV) (2004 Pattern)
MB-344 : Immunology

Time : 2 Hours Max. Marks : 40

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

1. A) Match the following and rewrite : **5**

i) CD_8 molecules	a) Primary immune response
ii) β_2-microglobulin	b) Immunosuppression
iii) IgM	c) Tc cell
iv) Corticosteroids	d) ELISA
v) HIV test	e) HLA class I molecule

B) State **true** or **false** : **5**

i) Killed vaccines are processed by cytosolic (CD_8) pathway.

ii) T_H1 cells produce IL-2 cytokine to activate Tc cells.

iii) Exposure to hidden antigens leads to autoimmunity.

iv) The genotype of Bombay phenotype individual is Hh.

v) As per immunization schedule MMR vaccine is given in first month after birth.

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

A) Illustrate diagrammatically – T_H and B cell interaction.

B) Compare in tabular form – Immediate and delayed hypersensitivities.

C) Explain – ABO inheritance.

P.T.O.

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

   A) Mixed lymphocyte reaction

   B) Antibody related disorders

   C) Rh antibodies.

4. Describe **any one**: **10**

   A) Antigen presenting cells

   B) Production of antitoxin.

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T. Y. B.Sc. (Semester – IV) Examination, 2010
DEFENCE AND STRATEGIC STUDIES (Paper – VII) (2004 Pattern)
DS. 347 (A) : Maratha Art of War and Military System

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** or **4** sentences **each**. **16**
   1) Why the war between Tarabai and Sahu took place ?
   2) What was the gain for Maratha from battle of Bhopal ?
   3) What do you know about Khanoji Angre ?
   4) State the basic reason for Anglo-Maratha wars.
   5) What was the aim of Maratha for battle of Palkhed ?
   6) What do you understand by the term "Peshwa" ?
   7) Which warfare it was introduced by Shivaji ?
   8) What do you know about Rajaram ?

2. Answer in **8** to **10** sentences **(any two)**. **8**
   1) Write few lines on "Sambhaji".
   2) Explain in brief Shivaji as a "Master of Guerrilla Tactics".
   3) What were the implications of Third Anglo-Maratha war on contemporary Maharashtra ?

3. Write short notes on **(any two)** : **8**
   1) Shivaji as a military leader.
   2) Third Battle of Panipat – As a decisive battle.
   3) First Anglo-Maratha war.

4. Answer in **18** to **20** sentences **(any one)**. **8**
   1) Analyse the causes of downfall of Maratha power.
   2) Highlight on the Military leadership of "Bajirao – I".

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P.T.O.

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T. Y. B.Sc. (Semester – IV) Examination, 2010
DEFENCE AND STRATEGIC STUDIES (Paper – VII) (2004 Pattern)
DS. 347 (B) : International Organisation

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** to **4** sentences **each** : **16**
   1) Write any two fundamental objectives of the U.N.O.
   2) Write the name of the Great powers who were the members of the League of Nations.
   3) How many principal organs are there in the U.N.O. ?
   4) Write the name of five founding members of the U.N.O.
   5) State the meaning of 'Human Rights'.
   6) Explain the meaning of specialised agencies.
   7) Write the full form of UNHCR.
   8) In which year the U.N. Development Programme (UNDP) was established ?

2. Answer in **8** to **10** sentences **each (any two)** : **8**
   1) Explain UN Conference on Trade and Development (UNCTAD).
   2) Write a note on International Atomic Energy (IAEA).
   3) Discuss the UN International Children Emergency Fund (UNICEF).

3. Write short notes on **(any two)** : **8**
   1) World Health Organisation (WHO).
   2) International Monetary Fund (IMF).
   3) International Court of Justice (ICJ).

4. Write in **16** to **20** sentences **each (any one)**. **8**
   1) Discuss the structure, functions and achievements of the UNESCO.
   2) Describe the social welfare and humanitarian activities of the United Nations.

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T. Y. B.Sc. (Semester – IV) Examination, 2010
DEFENCE AND STRATEGIC STUDIES (Paper – VII) (2004 Pattern)
DS. 347 (C) : Evaluation of Western Art of War

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) By whom the "Tank" it was invented ?
   2) State the names of axis countries during world war second.
   3) Write the durations of World War – I.
   4) State the basic aim of Psychological Warfare.
   5) When the first "Nuclear Bomb" was dropped ?
   6) By whom "Operation Barbarossa" was launched ?
   7) Where was "Trench Warfare" fought ?
   8) What was the aim of North African campaign ?

2. Answer in **8** to **10** sentences **(any two)**. **8**
   1) Why Japanese attacked on Pearl Harbor during World War – II ?
   2) Explain the "Blitezkrieig Tactics" of Germany during World War – II.
   3) Write in brief failure of first use of tank during World War – I.

3. Write short notes on **(any two)** : **8**
   1) Strategic Bombing during World War – II.
   2) Marshal Foch.
   3) Rise of Japan as a Military Power during inter war period.

4. Answer in **18** to **20** sentences **(any one)**. **8**
   1) Explain in detail 'Tank Warfare' during World War – I.
   2) Describe the original Schhiffen plan of Germany and highlight on causes of its failure.

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T. Y. B.Sc. (Semester – IV) Examination, 2010
INDUSTRIAL CHEMISTRY (Paper – V)
VOC-IND-CH 345 : Inorganic and Organic Based Industries – II
(Vocational Course) (2004 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) Define vulcanisation.

b) How is citronellol prepared ?

c) How are fibers classified ?

d) Give significance of $\overline{M}n$ and $\overline{M}w$.

e) Mention any two points, distinguishing between soaps and detergents.

f) Give structure of polyvinyl chloride.

g) Define mordant dyes with an example.

h) Define antacids. Give examples of it.

i) Give properties of thermosetting resins.

j) Define Glue and mucilage with their special uses.

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

a) Define anaesthetic. Name its types with an example each.

b) How is methyl orange prepared ?

c) Describe any two methods for isolation of essential oils.

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

a) Qualities of good dye.

b) What are nitro musks ? Give one example.

c) Give uses of adhesives.

P.T.O.

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

   a) Synthetic penicillins.

   b) Manufacture of aspirin with flow sheet.

   c) Special soaps.

4. A) Discuss the classification of drugs. **6**

   OR

   A) Describe the manufacture of SBR with a neat flow sheet.

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

      a) Discuss the configuration of polymers.

      b) Give the preparation of benzocaine.

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T.Y. B.Sc. (Sem. – IV) Examination, 2010
SEED TECHNOLOGY (2004 Pattern)
(Vocational) Paper – VI : Seed Farm Management and Marketing

Time : 2 Hours Max. Marks : 40

***Instructions**: a) **All** questions are **compulsory**.*
*b) Figures to the **right** indicate **full** marks.*
*c) Sketch **neat** labelled diagrams **wherever** necessary.*

I. Answer the following : **(10×1=10)**

a) Write one basic principle in farm management.

b) What is a foundation seed ?

c) What is the role of seed market ?

d) What is the advantage of multiple cropping ?

e) Mention any one method adopted for maintaining the fertility of soil.

f) Enlist any two seed markets in India.

g) What are farm records ?

h) Give any two methods of irrigation.

i) Mention any two methods of plant protection.

j) Enlist any two methods of threshing.

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

a) Write an account on dry land farming.

b) Explain any two factors affecting profit and economic size of farm.

c) Give an account of working of seed market.

P.T.O.

III. Write short notes on **any two** : **(2×5=10)**

a) Seed pricing.

b) Field efficiency of a machine.

c) Farm efficiency measures.

IV. Write an account on decision making approaches based on production, cost and capital investment in a farm. **10**

OR

Explain any two operations employed in a crop production.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
MATHEMATICS (Paper – VII) (2004 Pattern)
MT – 347 (A) : Operations Research – II
MT – 347 (B) : Lattice Theory
MT – 347 (C) : Computational Mathematics – II
MT – 347 (D) : Computational Geometry

Time: 2 Hours Max. Marks: 40

***Note** : 1) Candidates are advised to see the **relevant question paper** and solve the **same**.*
*2) Use of logarithmic table and calculators is **allowed**.*
*3) Graph paper will be supplied on **demand**.*
*4) **All** questions are **compulsory**.*
*5) Figures to the **right** indicate **full** marks.*

MT – 347 (A) : Operations Research – II

1. Attempt **each** of the following : **10**
   i) What is meant by Fair game ?
   ii) Explain when game is called two person zero sum game.
   iii) Define the term critical path.
   iv) State any one rule of dominance principle.
   v) What are the three time estimates used in the context of PERT ?
   vi) Distinguish between float and slack.
   vii) State any two assumption of sequencing problem.
   viii) State any two differences between CPM and PERT.
   ix) State any two assumptions of the replacement policy.
   x) Describe the maxmin and minimax principles of game theory.

2. Attempt **any two** of the following : **10**
   i) We have seven jobs each of which has to go through the machines M_1 and M_2 in the order $M_1 – M_2$ processing time (in hours) are given as

Jobs :	J_1	J_2	J_3	J_4	J_5	J_6	J_7
Machine M_1 :	3	12	15	6	10	11	9
Machine M_2 :	8	10	10	6	12	1	3

   Determine a sequence of these jobs that will minimize the total elapsed time T. Also find the idle time for machine M_2.

   ii) A project has the following activities and their duration.

P.T.O.

Activity	A	B	C	D	E	F	G	H	I
Predecessor (s)	–	–	–	A	A	B, D	C	B	F, G
Duration	23	8	20	16	24	18	19	4	10

Construct a project network.

iii) A firm wishes to know when to replace their machines whose cost price is Rs. 12,200. The scrap value is only Rs. 200. The maintenance cost are found from experience to be as follows :

Year (t) :	1	2	3	4	5	6	7	8
Maintenance Cost (Rs.) :	200	500	800	1200	1800	2500	3200	4800

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

i) Solve the following game using graphical method.

The pay off is for player **A**

		B			
		B_1	**B_2**	**B_3**	**B_4**
A	**A_1**	1	4	– 2	– 3
	A_2	2	1	4	5

ii) Using dominance rule, find the optimal strategies for player A and player B in the following game. Also obtain the game value.

		B			
		I	**II**	**III**	**IV**
	I	19	6	7	5
	II	7	3	14	6
A	**III**	12	8	18	4
	IV	8	7	13	– 1

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

		B	
		B_1	**B_2**
A	**A_1**	– 7	6
	A_2	7	– 4
	A_3	– 4	– 2
	A_4	8	– 6

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

i) A project has the following characteristics.

Activity	**Immediate Predecessor (s)**	**Duration**
A	–	6
B	–	2
C	A	3
D	A	5
E	A	3
F	C	2
G	D	3
H	B, E	4
I	H	2
J	F, G, I	2

a) Draw a network for this project.

b) Find a critical path and project completion time.

ii) The data for a PERT network is given in the following table.

Time estimates

Activity	Optimistic	Most likely	Pessimistic
10-20	4	8	12
20-40	8	12	16
40-50	0	0	0
50-70	3	6	9
60-100	4	6	8
80-90	2	5	8
20-30	1	4	7
30-50	3	5	7
40-60	3	6	9
50-80	4	8	6
70-90	4	8	12
90-100	4	10	16

a) Draw a network for the project.

b) Compute the expected project completion time.

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MT – 347 (B) : Lattice Theory

Time: 2 Hours Max. Marks: 40

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

1. Attempt **each** of the following : **10**

i) Define a principal ideal.

ii) True or False ? Justify.

Every chain is a lattice.

iii) Show that the union of two ideals of a lattice L may not be an ideal of L.

iv) Write Jordan - Dedekind condition.

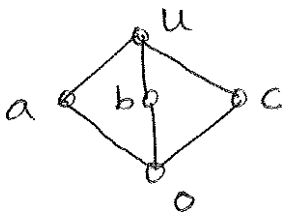
v) Explain why the set {2, 3, 4, 6} under divisibility is not a lattice.

vi) Define an atom of a lattice.

vii) Prove that in a lattice, meet homomorphism preserves the order.

viii) Draw the circuit represented by the Boolean function $f = a \wedge (b \vee c)$.

ix) Show that the following lattice is not distributive.



x) If L is a finite lattice with 10 elements, then what is the total number of ideals in L ?

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

i) Show that in a lattice L, for all a, b, c, $\in$ L $(a \wedge b) \vee (b \wedge c) \vee (c \wedge a) \leq (a \vee b) \wedge (b \vee c) \wedge (c \vee a)$.

ii) Draw the diagram of the lattice of positive factors of 20 under divisibility and show that it is same as that of the product of two chains with three and two elements.

iii) Prove that an ideal is a sublattice. Is the converse true ? Justify.

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

   i) Prove that the homomorphic image of a modular lattice is modular.

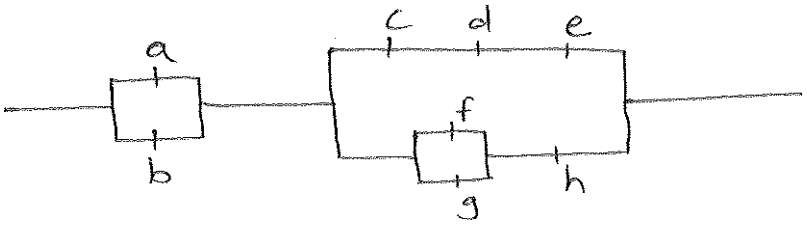
   ii) Define a distributive lattice. If L is a distributive lattice, then prove that the equations $a \wedge c = b \wedge c$ and $a \vee c = b \vee c$ imply $a = b$ for all $a, b, c \in L$.

   iii) Prove that a lattice L is a chain if and only if all ideals in L are prime.

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

   i) a) Let B be a Boolean algebra. Show that $(a \vee b)' = a' \wedge b'$ for all $a, b, \in B$. Also write its dual.

   b) Find the function f that represents the following circuit and then find its complement.



   ii) a) Prove that every chain is a distributive lattice.

   b) Write the conjunctive normal form of the following Boolean function :

$$f(x, y, z) = \left[(x \wedge y')' \vee z'\right] \wedge (x' \vee z)'$$

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MT – 347 (C) : Computational Mathematics – II

Time: 2 Hours Max. Marks: 40

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

1. Attempt **each** of the following : **10**

i) Explain the meaning of the following declaration :

float a[3] = {2.1, 3.2, 4.3} ;

ii) Explain the meaning of the following declaration :

int i = 1, * pi = &i ;

iii) Find the error in the following function definition :

```
int f = (int i) ;
{
return ( 2 * i) ;
}
```

iv) Write a function to find the length of a string.

v) What is the use of library function fputc ( ) ?

vi) Declare an array of strings whose initial values are “Male” and “Female”.

vii) Find the output of the following :

```
char n [ ] = “Ishant” ;
printf (“%S”, n+3) ;
```

viii) Write a function for swapping two integers.

ix) Define a structure for storing a telephone list.

x) Explain the meaning of following declaration :

FILE * fp ;

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

   i) Write a program for multiplication of two matrices.

   ii) Write a short note on structures.

   iii) Write a short note on dynamic memory allocation.

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

   i) Write a short note on two dimensional arrays .

   ii) Write a short note on storage classes.

   iii) Write a C program to check whether the given string is substring of another string.

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

   i) a) Write a program to copy a text file to another file.

      b) Write a note on pointer arithmetic.

   ii) a) Write a program to add two numbers by using command line arguments.

      b) Write a short note on pointers.

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MT – 347 (D) : Computational Geometry

Time: 2 Hours Max. Marks: 40

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

1. Attempt **each** of the following : **10**

i) If a circle of area $10cm^2$ is scaled uniformly by a factor $\frac{1}{2}$, then what is the area of transformed figure ?

ii) Define a trimetric projection.

iii) Find the angle through which the line $4x + 2y + 1 = 0$ is to be rotated so that it coincides with x-axis.

iv) Write the transformation matrix which is required to transform the plane $x = -1$ to the plane $x = 0$.

v) Write the transformation matrix for a cavalier projection, if the horizontal angle $\alpha = 30°$.

vi) What is the effect of the transformation matrix $\begin{bmatrix} 1 & 0 \\ -2 & 1 \end{bmatrix}$ on a two dimensional object ?

vii) Find the concatenation of the transformations reflection about x-axis followed by shearing in y-direction proportional to x by the factor-3.

viii) Find a transformation matrix which produces translations in x and y directions by the units-2 and 1 respectively.

ix) Define a foreshortening factor of an orthographic projection.

x) If a line L with slope 2 is transformed to a line L* under the transformation matrix $\begin{bmatrix} 10 & -13 \\ 5 & 4 \end{bmatrix}$, find the slope of L*.

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

i) If A is the area of a plane figure S, and if S is transformed to S* under a 2 × 2 transformation matrix [T], prove that the area of S* is A × |det[T] |.

ii) Find the concatenation of the following sequence of transformations.

a) Reflection about the line y = x.

b) Scaling in y – co-ordinate by the factor $\frac{3}{5}$.

c) Shearing in x – direction proportional to the y – co-ordinate by the factor – $\frac{1}{2}$.

d) Rotation about the origin through 85°.

iii) If P*Q* is the rotation of the line segment PQ about the point (–1, 3) through 30°, find P* and Q*, where P (5, 2) and Q (3, 4).

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

i) Find the concatenation of the following sequence of transformations.

a) Reflection about the plane y = 0.

b) Rotation about y-axis through 25°.

c) Shearing in z-direction proportional to x by the factor –1.

ii) If B_0 [1 1], B_1 [2 3], B_2 [4 3] and B_3 [3, 1] are the vertices of a Bezier polygon, find the Bezier curve with these control points.

iii) Find the cabinet projection of an object represented by the following position vector [X] with horizontal inclination angle $\alpha = 25°$.

$$[X] = \begin{bmatrix} 1 & 2 & 1 \\ 3 & 4 & -1 \\ -1 & -2 & 1 \\ 2 & 1 & 1 \end{bmatrix}$$

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

i) Find the transformation matrix which produces reflection about the plane $x + 2y + z = 0$.

ii) Generate 5 uniformly spaced points on the hyperbolic segments in the first quadrant for $4 \leq x \leq 8$, where the hyperbola is given by

$$\frac{x^2}{4} - \frac{y^2}{16} = 1$$

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T.Y. B.Sc. (Semester – IV) Examination, 2010
CHEMISTRY – IV
CH – 344 : Analytical Chemistry (2004 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*** *diagram must be drawn* ***wherever*** *necessary.*

1. Answer the following : **10**

1) Name the components of typical HPLC unit.

2) State Snell's law.

3) Define the term electrophoresis.

4) What is working principle of diffraction gratting ?

5) Mention the factors affecting angle of specific rotation.

6) What do you mean by half wave potential ?

7) Define the term molecular ion in mass spectrometer.

8) Give the principle of zone electrophoresis.

9) Define the term over potential in electrogravimetry.

10) State Faraday's second law of electrolysis.

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

1) Explain moving boundary electrophoresis.

2) A solution of L-Leuicine had an observed rotation + 1.78° in 20 cm. polarimeter tube for a concentration of 60 gms /liter. Calculate specific rotation and molar rotation of L-Leuicine. (Given mol. Wt = 131.0).

3) The diffusion current flowing through polarographic cell containing solution of Cd^{2+} ions was found to be 12.0 μA when drop rate is 4.4 second and rate of falling mercury is 2×10^{-3} gms/sec. The concentration of Cd^{2+} ions is 1.532 milimole per liter. Calculate the diffusion coefficient of Cd^{2+} ions.

P.T.O.

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

1) What are the advantages of HPLC ?

2) What is ring rule for interpretation of mass spectra ?

3) Write note on optical activity.

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

1) Discuss various applications of HPLC.

2) What is the principle of mass spectrometry ? Discuss it's applications in qualitative and quantitative analysis.

3) Discuss the technique of electrolytic separation of metals with controlled cathode potential.

4. A) Give the statement of Beer's law. Draw schematic diagram of single beam spectrophotometer and explain essential parts of it in brief. **6**

OR

Describe the construction of DME. What are it's advantages and disadvantages.

B) The refractive index of carbon tetrachloride is 1.4575 and it's density is 1.597 gms/cc. Calculate molar refraction (Given : Mol.Wt = 154) **4**

OR

A coloured solution absorbs 12.5 % of the incident light. What will be the percentage of light transmitted by the same if it's concentration and path length both are doubled ?

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T.Y. B.Sc. (Semester – IV) Examination, 2010
ZOOLOGY
Paper – II : ZO – 342 : Physiology and Endocrinology of Mammals

Time: 2 Hours Max. Marks: 40

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

1. Attempt the following : **10**
   1) What is cardiac output ?
   2) What is rigor mortis ?
   3) Define BMR.
   4) Define oystrous cycle.
   5) What is glycogenesis ?
   6) Define peristalsis.
   7) What is negative feed back control of hormone secretion ?
   8) What is passive transport ?
   9) Define anabolism.
   10) What is gigantism ?

2. Attempt **any two** of the following : **10**
   i) Explain the ultrastructure of striated muscle.
   ii) Explain the roles of ovarian hormones.
   iii) Explain the process of selective reabsorption in nephron.

3. Write notes on **any two** of the following : **10**
   a) Ventilation of lungs.
   b) Cardiac cycle.
   c) Functions of glucocorticoids.
   d) Hormonal control of lactation.

4. Describe the process of β.oxidation of fatly acids. **10**

OR

Explain the mechanism of synaptic transmission of nerve impulse.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
MATHEMATICS (Paper – V)
(2004 Pattern)
MT – 345 : Differential Equations

Time : 2 Hours Max. Marks : 40

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

1. Attempt **each** of the following : **10**

i) Define the simultaneous differential equation of the first order and the first degree in three variables with example.

ii) Show that the direction ratios of the tangent line to $3x^2 + 2y^2 + z^2 = 1$; $x + y + z = 1$ are proportional to $(2y – z ; z – 3x ; 3x – 2y)$.

iii) Solve $a^2y^2z^2\,dx + b^2z^2x^2\,dy + c^2x^2y^2\,dz = 0$.

iv) Write vector form of Ptaffian differential equation.

v) Eliminate constants a and b from the equation $ax^2 + by^2 + z^2 = 1$.

vi) Define the non-linear partial differential equations of the first order.

vii) Show that the differential equation $yzdx + 2xz\,dy – 3xydz = 0$ is integrable.

viii) Find the complete integral of the equation $z = p^2 = q^2$.

ix) Find the integral curves of the equation $\dfrac{xdx}{y^2z} = \dfrac{dy}{xz} = \dfrac{dz}{y^2}$.

x) Write Jacobi's auxiliary equations for $f(x_1, x_2, x_3, p_1, p_2, p_3) = 0$.

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

i) Explain the method of solving the equation $P\,dx + Q\,dy + R\,dz = 0$, where P, Q, R are homogeneous functions of the same degree in x, y, z.

ii) Find the integral curve of the equation

$$\frac{dx}{y(x+y)+az} = \frac{dy}{x(x+y)-az} = \frac{dz}{z(x+y)}$$

iii) Solve the differential equation
$z(z + y)\,dx + z(z + x)\,dy – 2xydz = 0$.

P.T.O.

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

i) Show that the equations f (x, y, p, q) = 0, g (x, y, p, q) = 0 are compatible if

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

Verify that the equations p = P (x, y) ; q = Q (x, y) are compatible if

$$\frac{\partial P}{\partial y} = \frac{\partial Q}{\partial x}$$

ii) Solve by Jacobi's method the differential equation $p^2x + q^2y = z$.

iii) Explain the method of solving the following first order partial differential equations :

a) f (z, p, q) = 0

b) z = px + qy + f (p, q).

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

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

b) Find the general integrals of the linear partial differential equation $(y + zx) p - (x + yz) q = x^2 - y^2$.

ii) a) Find orthogonal trajectories on the sphere $x^2 + y^2 + z^2 = a^2$ of its intersection is with the parabola is xy = cz.

b) Find the integral surface of the linear partial differential equation :

$x (y^2 + z) p - y (x^2 + z) q = (x^2 - y^2)z$, which contains the straight line x + y = 0, z = 1.

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T.Y.B.Sc. (Semester – IV) Examination, 2010
MATHEMATICS (Paper – VIII) (2004 Pattern)

MT 348 (A) : Lebesgue Integration
MT 348 (B) : Differential Geometry – II
MT 348 (C) : Computational Mathematics – IV
MT 348 (D) : Astronomy – II

Time: 2 Hours Max. Marks: 40

Note : *i) Candidates are advised to see the relevant question paper and solve the same.*
*ii) **Use** of logarithmic tables and calculators is **allowed**.*
*iii) **All** questions are **compulsory**.*
*iv) Figures to the **right** indicate **full** marks.*

MT – 348 (A) Lebesgue Integration

1. Attempt **each** of the following : **10**

i) Give an example of an uncountable set of measure 0.

ii) State true or false, justify : The union of uncountably many measurable subsets of [a, b] is measurable.

iii) Does there exist a function which is not measurable ? Justify.

iv) Give an example of a function which is not Lebesgue integrable.

v) Find the Fourier series expansion of f (x) = 1 + sin2x, $-\pi \le x \le \pi$.

vi) Let $f : [0, \pi] \to \mathbb{R}$ be defined by f (x) = 1 + x + sinx and $E = \{x \mid 0 \le f(x) < 1\}$. Show that E is a measurable set.

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

P.T.O.

viii) If E is a measurable subset of [a, b] such that $mE = \frac{1}{2}$, find $\int_E 1$

ix) State true or false, justify : If $f \in z[a, b]$ then $f^2 \in z[a, b]$.

x) Let $f(x) = \frac{1}{\sqrt[3]{x}}$. If $0 < x \leq 1$, find ^2f.

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

i) If $E \subseteq [a, b]$ then prove that E is measurable if and only if $\overline{mE} + \overline{mE'} \leq b - a$.

ii) If E_1, E_2, E_3, ... are measurable subsets of [a, b] and if $E_1 \supseteq E_2 \supseteq E_3 \supseteq$ ...., then show that $\bigcap_{n=1}^{\infty} En$ is measurable and $m\left(\bigcap_{n=1}^{\infty} E_n\right) = \lim_{n \to \infty} mE_n$

iii) If $f(x) = \frac{1}{x} (0 < x < 1)$

$f(0) = 4$

$f(1) = 7$

Prove that f is measurable.

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

i) If f and g are measurable functions on [a, b] then show that f + g is a measurable function on [a, b].

ii) If f is a bounded function in L [a, b] and g is a bounded function [a, b] such that f (x) = g (x) almost everywhere $a \leq x \leq b$, then prove that

$g \in L[a, b]$ and $\int_a^b f = \int_a^b g$.

iii) If $f(x) = \frac{1}{x^p} (0 < x \leq 1)$, prove that $f \in z[0,1]$ if p < 1 and that $\int_0^1 f = \frac{1}{1-p}$.

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

i) a) If f is a bounded function in L [a, b] such that $f(x) \geq 0$ almost everywhere $(a \leq x \leq b)$ and if $\int_a^b f\ 0$, then show that f (x) = 0 almost everywhere.

b) Find the Fourier series of the function.

$$f(x) = \begin{cases} 0 & \text{if} \quad -\pi \leq x < 0 \\ 1 & \text{if} \quad 0 \leq x \leq \pi \end{cases}$$

ii) a) Given that the Fourier series of $f(x) = |x|, -\pi \leq x \leq \pi$ at the point x = 0 converges to f (0), prove that $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + ... = \frac{\pi^2}{8}$

b) If E_1 and E_2 are measurable subsets of [a, b] prove that the symmetric difference of E_1 and E_2 is also measurable.

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MT – 348 (B) : Differential Geometry – II

Time : 2 Hours Max. Marks : 40

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

1. Attempt **each** of the following : **10**

i) Explain, what you mean by umbilics ?

ii) Write the formulae for normal curvature and redius of normal curvature.

iii) State Euler's theorem.

iv) Define Dupin's indicatrix.

v) Find E, F, G for the surface z = f (x, y).

vi) State Joachimsthal's theorem.

vii) Write a differential equation of the principal directions.

viii) Define 'Asymptotic lines'.

ix) Write the canonical equation for geodesics.

x) Find the metric for the paraboloid $\bar{r} = (u, v, u^2 - v^2)$.

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

i) With usual notation, deduce the formulae.

$$H\overline{N} \times \overline{N}_1 = M\bar{r}_1 - L\bar{r}_2$$

and $$H\overline{N} \times \overline{N}_2 = N\bar{r}_1 - M\bar{r}_2$$

ii) Calculate the fundamental magnitudes for the right helicoid. x = u cosv, y = u sinv, z = cv.

iii) Prove that, the line of curvature are parametric curves if and only if F = 0, M = 0.

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

i) Prove that the lines of curvature of the surface xy = az are

$$\sinh^{-1}\left(\frac{x}{a}\right) \pm \sinh^{-1}\left(\frac{y}{a}\right) = A.\,(\text{constant})$$

ii) Show that if L, M, N vanish at all points on a surface then the surface is part of a plane.

iii) Prove that the indicatrix at every point of the helicoid $z = c \tan^{-1}(y/x)$ is a rectangular hyperbola.

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

i) a) Prove that the curves of the family $v^3/u^2 = c$ are geodesics on a surface with metric

$v^2du^2 - 2uvdudv + 2u^2dv^2$; $(u > 0, v > 0)$

b) If k_n and k are the curvatures of the normal and oblique sections through the same tangent line and θ is the angle between these sections, then prove that $k_n = k \cos\theta$.

ii) Prove that a necessary and sufficient condition for a surface to be a developable surface is that its Gaussian curvature is zero.

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MT – 348 (C) : Computational Mathematics – IV

Time : 2 Hours Max. Marks : 40

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

1. Attempt **each** of the following : **10**
   i) Define a stack.
   ii) Define a binary search tree.
   iii) State any two advantages of a singly linked list over an array.
   iv) Find the value of the postfix expression 2 3 4 – *.
   v) Construct a binary search tree if the following numbers are given in the order : 7, 5, 6, 4, 8.
   vi) Sort the integers 2, 7, 1, 4, 3 using Bubble sort algorithm.
   vii) Write an algorithm to add an element at the head of a linked list.
   viii) State any two advantages of a doubly linked list over a singly linked list.
   ix) Convert the infix expression a*b – c*d/x/y to a postfix expression.
   x) Write an algorithm to traverse a binary tree using prefix traversal.

2. Attempt **any two** of the following : **10**
   i) Write an algorithm to add a node at the tail of a doubly linked list.
   ii) Write an algorithm to remove a node from the tail of singly linked list.
   iii) Write a function to reverse a singly linked list.

3. Attempt **any two** of the following : **10**
   i) Write an algorithm to add a new element in binary search tree.
   ii) Write a program to print a binary tree using inorder traversal.
   iii) Write an algorithm to sort integers using count sort.

4. Attempt **any one** of the following : **10**
   i) a) Write an algorithm to search an element using binary search.
      b) Write a function to search an element using sequential search.
   ii) a) Write an algorithm to search an element in singly linked list.
      b) Convert the following infix expression to postfix. Show all stack steps. a – (b + (c * d – x)).

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MT – 348 (D) : Astronomy – II

Time : 2 Hours Max. Marks : 40

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

1. Attempt **each** of the following : **10**

i) State Kepler's third law of planetary motion.

ii) Define mean anomaly and true anomaly.

iii) State the phases of moon.

iv) Define Nutation.

v) Define elongation of a planet.

vi) What is the equation of time ?

vii) What is meant by independent day number ?

viii) Define Perihelion and Aphelion.

ix) Define synodic period.

x) Explain briefly retrograde motion of a planet.

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

i) Derive Kepler's equation in the form $E = m + e\sin E$.

ii) If v_1 and v_2 are the linear velocities of a planet at perihelion and aphelion respectively, prove that $(1 - e)v_1 = (1 + e)\, v_2$

iii) Prove that the equation of time due to obliquity of ecliptic is maximum when longitude Θ of the sun is given by

$$\sin \Theta = \frac{1}{\sqrt{2}} \sec\left(\frac{\in}{2}\right)$$

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

i) Explain geocentric motion of a planet.

ii) If E is the elongation of a planet from the sun at the moment when the planet is stationary and if the orbits of earth and the planet are circular and coplanar and of radii a and b respectively, show that

$$\frac{b}{a} = \frac{1}{2}\tan^2 E + \frac{1}{2}\tan E\sqrt{4+\tan^2 E}$$

iii) Write a note on seasons.

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

i) Obtain the expression for the precession in right ascersion and dedination.

ii) a) Assuming that the earth and venus move in circular orbits at distances a and b from the sun, prove that when the brightness of venus as seen from the earth is a maximum,

$$\cos^2 E + \frac{4}{3}\left(\frac{b}{a}\right)\cos E = \frac{4}{3}$$

where E is the elongation of the venus as seen from the earth.

b) If P, K are the poles of the equator and the ecliptic and X is a star, such that angle K × P is 90°, show that X has no precession in right ascension.

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T.Y.B.Sc. (Semester – IV) Examination, 2010
CHEMISTRY – III
CH – 343 : Organic Chemistry (2004 Pattern)

Time: 2 Hours Max. Marks: 40

N.B. *: i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) Draw structures and neat diagrams if ***necessary****.*
*iv) Spectroscopic data is given in Table-****1****,* ***2*** *and* ***3****.*

1. Answer the following : **10**

i) What is cannizzaro reaction ?
ii) Explain the term 'chemical shift'.
iii) Calculate the fundamental modes of vibrations for carbon dioxide molecule.
iv) Explain the term synthon with example.
v) Write the preparation of pyridinium chlorochromate.
vi) Give the molecular formula, source and use of ephedrine.
vii) Indicate the different sets of protons for the molecule.

$CH_3 - O - CH_2 - CH_3$.

viii) What is primary metabolism ?
ix) Arrange the following carbonions in decreasing order of their stability.

$(CH_3)_2\overset{\ominus}{C}H$, $CH_3\overset{\ominus}{C}H_2$, $\overset{\ominus}{C}H_3$, $(CH_3)_3\overset{\ominus}{C}$

x) Convert λ = 745 nm in cm.

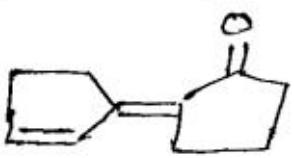
2. A) Attempt '**any two**' of the following : **6**

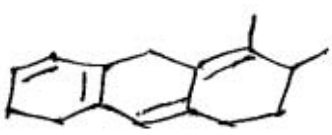
i) What is reduction ? Discuss the mechanism of reduction of propanone by $NaBH_4$.
ii) Write retrosynthesis and synthesis of

$$CH_3 - CH_2 - CH_2 - \underset{\underset{C\equiv N}{|}}{CH} - OH$$

iii) How will you prepare propanoic acid from malonic ester ?

2. B) Calculate the λmax for the following : **4**

i) 

ii) 

OR

B) i) What is aldol condensation ? Explain with suitable example. **2**

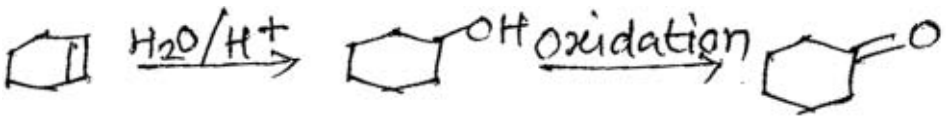
ii) Explain use of ylides for synthesis of alkene with suitable example. **2**

P.T.O.

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

a) i) How will you prove the presence of benzene ring in ephedrine.

ii) How will you follow the following sequence of reaction by using IR spectroscopy ?



b) i) Write the reaction to explain the aldehydic nature of carbonyl group in citral. Write Barbier and Bouvealt synthesis of citral.

ii) Why TMS is used as an internal standard in NMR spectroscopy ?

c) i) Explain Vicinal and Geminal coupling with example.

ii) How does the mesomeric effect affect the reactivity of carbonyl group ? Explain with suitable example.

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

i) Mol.formula : $CgH_{11}Br$

NMR : a) triplet at 3.38 δ (2H) b) quintet at 2.15 δ (2H)
c) triplet at 2.75 δ (2H) d) singlet at 7.22 δ (5H)

ii) Mol.formula : $CgH_{10}O_2$

IR :1750 cm^{-1}

NMR : a) singlet at 2.1δ (3H) b) singlet at 5.1δ (2H)
c) singlet at 7.3 δ (5H)

iii) Mol. formular : $C_4H_5O_2N$.

IR : 2250 cm^{-1}, 1750 cm^{-1}

NMR : a) singlet at 3.5 δ (10mm) b) singlet at 3.8δ (15 mm)

4. B) i) Trans cinnamic acid shows absorption at longer wavelength than cis cinnamic acid. Why ? **2**

ii) Explain any one method for extraction and purification of terpenoids from plant. **2**

OR

B) Predict the product with justification.

i) $CH_3-\overset{O}{\overset{\|}{C}}-CH_2-\overset{O}{\overset{\|}{C}}-OC_2H_5 \xrightarrow[ii)\ Br-CH_2-\underset{O}{\overset{\|}{C}}-OC_2H_5]{i)\ NaOC_2H_5} (A) \xrightarrow[ii)\ \Delta/-CO_2]{i)\ H_2O/H^+} (B)$

4

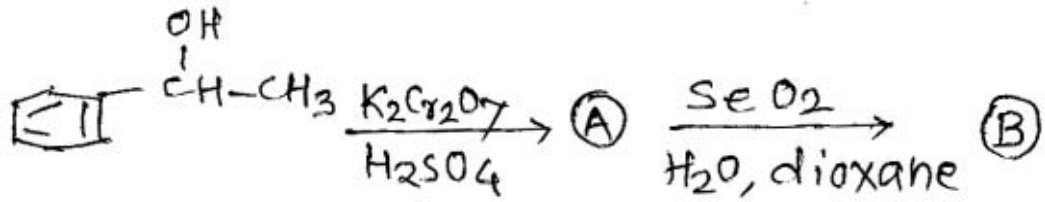
ii) 

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)				
	OH (alcohols, phenols, hydrogen bonded)			3200 – 3550	(broad)
	OH (carboxylic acids, hydrogen bonded)			2500 – 3000	(very broad)
F.	Aldehydes, Ketones, Esters and Carboxylic Acids				
	C = O stretch			1630 – 1780	(s)
	aldehydes			1690 – 1740	(s)
	ketones			1680 – 1750	(s)
	esters			1735 – 1750	(s)
	carboxylic acids			1710 – 1780	(s)
	amides			1630 – 1690	(s)
G	Amines				
	N – H			3300 – 3500	(m)
H.	Nitriles				
	C ≡N			2220 – 2260	(m)
I.	$-\overset{|}{\underset{|}{C}}-O$ stretch (alcohol, ether, phenol			1000 – 1300	(s)
J.	Nitro N = O			1550 – 1350	(s)
k.	Halides	F		1400 – 1000	(s)
		Cl		785 – 540	(s)
		Br		< 667	(s)

TABLE – 2

Approximate Proton Chemical Shifts in NMR

TYPE OF PROTON	CHEMICAL SHIFT, DELTA, PPM (δ)		
1° Alkyl, RCH_3	0.8 – 1.0		
2° Alkyl, RCH_2R	1.2 – 1.4		
3° Alkyl R_3CH	1.4 – 1.7	Ester $R-\overset{\overset{O}{\|}}{C}-O-CH_2-R$	4 to 4.5
Allylic, $R_2C=\overset{\overset{R}{\|}}{C}-CH_3$	1.6 – 1.9		
Benzylic, $ArCH_3$	2.2 – 2.5		
Alkyl chloride RCH_2Cl	3.6 – 3.8		
Alkyl bromide, RCH_2Br	3.4 – 3.6		
Alkyl iodide, RCH_2I	3.1 – 3.3		
Ether, $ROCH_2R$	3.3 – 3.9		
Alcohol, $HOCH_2R$	3.3 – 4.0		
Ketone, $RC(=O)CH_3$	2.1 – 2.6	$R-\overset{\overset{O}{\|}}{C}-CH_2-$	2.4δ
		$R-\overset{\overset{O}{\|}}{C}-\overset{\|}{C}H-$	2.5δ
Aldehyde, $RC(=O)H$	9.5 – 9.6		
Vinylic, $R_2C=CH_2$	4.6 – 5.0		
Vinylic $R_2C=\overset{\overset{R}{\|}}{C}H$	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		

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T.Y.B.Sc. (Semester – IV) Examination, 2010
(Paper – V) CHEMISTRY
CH – 345 : Industrial Chemistry (2004 Pattern)

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 flowsheet* ***wherever*** *necessary.*

1. Answer the following : **10**

1) Explain the term “Clinker”.
2) What is a Cullet ?
3) Explain the term “Bathochronic shift”.
4) What is a cleansing powder ?
5) Give the advantages of gaseous fuels.
6) Define the term Anesthetics with suitable example.
7) Magnesia (Mgo) content in cement should not exceed 5%, Explain why ?
8) Write any two physical properties of a glass.
9) What are soaps ?
10) What is meant by chemotherapy ?

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

1) Discuss in brief the special types of glasses.
2) What are surfactants ? How they are classified ?
3) Describe the Low Temperature Carbonisation (LTC) of coal.

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

1) Write a note on “Reinforced concrete”.
2) Explain the Otto Witt’s theory of colour.
3) Write a note on Methyl alcohol fuel cell.

P.T.O.

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

   1) Describe the construction and working of tank furnace with special reference to chemical reactions involved in the manufacture of a glass.

   2) Give the synthesis and uses of

      i) Alizarin

      ii) Fluorescein

   3) What are antipyretics ? Describe the manufacture of aspirin with the help of flow sheet.

4. A) What is portland cement ? Discuss the manufacture of portland cement by wet process with special reference to burning operation in rotary kiln. **6**

   OR

   A) What is a coal tar ? Discuss the distillation of coal far. Give the uses of different products of coal far distillation.

   B) Give synthesis and uses of

      i) Benzocaine ii) Paracetamol **4**

   OR

   B) Explain the terms

      i) Micelles

      ii) Amphipathic structure

      iii) Emulsification

      iv) Wetting.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
Paper – IV : BOTANY (2004 Pattern)
BO – 344 : Genetics and Plant Breeding

Time : 2 Hours Max. Marks : 40

Instructions *: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) What is monohybrid cross ?
   b) Define multiple alleles.
   c) Enlist any two sex-linked characters.
   d) What is polygenic inheritance ?
   e) Define linkage.
   f) What are monosomics ?
   g) Define autopolyploids.
   h) What is plant introduction ?
   i) Define mutation breeding.
   j) What is heterosis ?

2. Answer **any two** of the following : **10**
   a) Explain complementary gene interaction with a suitable example.
   b) Explain the mechanism of quantitative inheritance with a suitable example.
   c) What is clonal selection ? Give its merits and demerits.

3. Write notes on (**any two**) : **10**
   a) Dihybrid cross.
   b) Blalance concept of sex determination in Drosophila.
   c) Dominance hypothesis of heterosis.

4. Explain deletion and duplication types of structural changes in chromosomes with respect to origin and effects. **10**

   OR

   Describe various steps involved in the procedure of hybridization. **10**

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[3817] – 426

T.Y. B.Sc. (Semester – IV) Examination, 2010
BOTANY (Paper – VI) (Optional Paper) (2004 Pattern)
BO : 346 (A) : Mushroom Technology

Time : 2 Hours Max. Marks : 40

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

1. Answer the following : **10**
   a) Give the botanical name of paddy straw mushroom.
   b) Enlist the methods of spawn production.
   c) Give nutritional composition of button mushroom.
   d) Enlist the mushroom diseases.
   e) Give any one control measure of bacterial disease.
   f) Give any two names of any recipes of mushroom.
   g) Which substrate is used for cultivation of oyester mushroom ?
   h) Sketch and labelled diagram of paddy straw mushroom.
   i) What is meant by pasteurization ?
   j) Enlist pests of mushroom.

2. Attempt **any two** of the following : **10**
   a) Write morphology of oyester mushroom.
   b) Explain shiitake mushroom.
   c) Give medicinal importance of mushroom.

3. Write short notes on **any two** of the following : **10**
   a) Preservation and processing of mushroom.
   b) Mushroom receipies
   c) Methods of spawning.

4. Give the various steps involved in cultivation of paddy straw mushroom. **10**

   OR

   Describe grading, packing, harvesting and transport of mushroom.

P.T.O.

T.Y. B.Sc. (Semester – IV) Examination, 2010
BOTANY (Paper – VI) (Optional Paper)
BO : 346 (B) : Polyhouse Technology

Time : 2 Hours Max. Marks : 40

Instructions: *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) Give the names of any two diseases of carnation.
   b) Define polyhouse cultivation.
   c) Mention any two limitations of polyhouse technology.
   d) Enlist the nutritional requirements of Gerbera.
   e) What is FYM ?
   f) Write about grading in Simla mirch.
   g) Name the root media suitable for polyhouse cultivation.
   h) Give any two criteria used for selection of root media components.
   i) Write two varieties of carnation used for polyhouse cultivation.
   j) Give spacing and planting distance for Gerbera in polyhouse.

2. Answer **any two** of the following : **10**
   a) Explain risk factors related to polyhouse culture.
   b) Write about chemicals used for sterilization of root media.
   c) Describe preplanting preparations required in polyhouse for Gerbera cultivation.

3. Write notes on **any two** of the following : **10**
   a) Financial assistance from government for polyhouse construction.
   b) Transport of carnation flowers.
   c) Organic matter in root media.

4. Describe the various steps involved in cultivation of tomato in polyhouse. **10**

   OR

   Explain scope and importance of polyhouse technology with its advantages. **10**

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T.Y. B.Sc. (Semester – IV) Examination, 2010
BOTANY (Paper – VI) (Optional Paper)
BO : 346 (C) : Medicobotany

Time : 2 Hours Max. Marks : 40

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

1. Answer the following : **10**
   a) Define pharmacognosy.
   b) Give any two uses of Asawa.
   c) Give two advantages of macroscopic evaluation.
   d) What are alkaloids ?
   e) Give any two therapeutic uses of Ephedra.
   f) Give botanical source of Terminalia chebula.
   g) Write two traditional medicinal uses of Centella asiatica.
   h) Enlist medicinal importance of Claviceps.
   i) Define herbal cosmetics.
   j) Write any two methods of ex-situ conservation.

2. Attempt **any two** of the following : **10**
   a) Write the procedure of Kadha and give its medicinal importance.
   b) Describe therapeutic uses and administration of liquorice.
   c) Enlist traditional medicinal uses of Phyllanthus niruri and Ricinus Communis.

3. Write notes on **any two** of the following : **10**
   a) Therapeutic uses and administration of Digitalis
   b) Sacred grooves
   c) Methods of extraction of essential oil.

4. Give botanical source, ethnomedicinal and traditional uses of Tinospora Cordifolia and Tribulus Terrestris. **10**

   OR

   Mention cultivation practices with reference to season, soil, propagation, harvesting and medicinal uses of Acorus Calamus. **10**

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T.Y. B.Sc. (Semester – IV) Examination, 2010
Paper – I : ZOOLOGY (2004 Pattern)
ZO – 341 : Genetics

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) Define muton.
   2) What is rDNA ?
   3) Define homozygous condition.
   4) What are mutagenic agents ?
   5) What is gene interaction ?
   6) What is complete linkage ?
   7) Name any two syndromes.
   8) What are co-dominant alleles ?
   9) What are somatic mutations ?
   10) What is genetic drift ?

2. Attempt **any two** of the following : **10**
   i) Describe in brief life cycle of neurospora.
   ii) Give an account of Restriction Endonuclease.
   iii) Describe the mechanism of crossing over.

3. Write notes on **any two** of the following : **10**
   a) Heterosis
   b) Gene mapping
   c) Law of independent assortment
   d) Transgenic animals.

4. Define Mendelian population and gene pool. Describe the factors responsible for conservation of gene frequency in a population. **10**

   OR

   What is inbreeding ? Describe in detail phenotypic effects of inbreeding. **10**

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T.Y.B.Sc. (Semester – IV) Examination 2010
Paper – III : ZOOLOGY
ZO – 343 : Zoogeography, Palaeontology and Evolution (2004 Pattern) (Old and New)

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) What is biogenesis ?
   2) Name any two existing apes.
   3) Define cosmic evolution.
   4) State the law of superposition.
   5) Define mimic.
   6) Name any two physical barriers responsible for reproductive isolation.
   7) What are analogous organs ?
   8) Define speciation.
   9) What are interspecific struggles ?
   10) Define deme.

2. Attempt **any two** of the following : **10**
   i) Describe principle of Uranium-Lead dating method.
   ii) Enlist salient features of Homo erectus.
   iii) Describe faunal peculiarities of the Australian realm.

3. Write notes on **any two** of the following : **10**
   a) Allopatric speciation.
   b) Unaltered fossils.
   c) Mullerian mimicry.
   d) Process of fossilization.

4. What is organic evolution ? Explain how physiological and biochemical evidences support organic evolution. **10**

   OR

   Give an account of Lamarck's theory organic evolution and state it's merits and demerits. **10**

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T. Y. B.Sc. (Semester – IV) Examination, 2010
STATISTICS (Paper – IV) (Principal)
ST – 344 : Design of Experiments
(2004 Pattern)

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 from the alternatives A to D. **(1 each)**

i) In CRD, the following principles of design of experiments are applied :

A) randomisation and replication

B) randomisation and local control

C) replication and local control

D) randomisation, replication and local control

ii) The error degree of freedom in Latin Square Design is 12. Hence degrees of freedom for treatment is

A) 2 B) 4 C) 3 D) 5

iii) The total number of main effects and interaction effects in a 2^3 factorial experiment is

A) 17 B) 4 C) 8 D) 10

iv) In a Randomised Block Design, which of the following is an unbiased estimator of σ^2 (error variance) ?

A) Error sum of squares

B) Treatment sum of squares

C) Treatment mean sum of squares

D) Error mean sum of squares

P.T.O.

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

i) RBD is always preferable to CRD.

ii) In case of 2^2 factorial experiments the main effects and interaction effects are mutually orthogonal contrasts.

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

i) Local control

ii) Linear treatment contrast.

d) i) Explain the concept of partial confounding . **1**

ii) In a 2^3 factorial experiment, interaction ABC is totally confounded in the 5 replicates. Find the value of error degrees of freedom. **1**

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

a) Obtain the expectation of the error sum of squares in case of RBD.

b) Describe the principles of design of experiments.

c) What is RBD ? Give layout of an RBD with five treatments arranged in each of the four blocks. State the hypothesis and also give ANOVA table for RBD.

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

a) Derive the expression for efficiency of LSD over corresponding RBD when columns are used as blocks.

b) Explain a real life situation where split plot Design is applicable. Give its layout.

c) What is meant by the main effect and interaction effect in a 2^2 factorial experiment ? Derive the expression for interaction effect.

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

a) i) What is 'ANOCOVA' ? Explain in brief the technique of analysis of covariance in C.R.D. **5**

ii) Complete the following ANOVA in L.S.D. **5**

Source of Variation	**d.f**	**S.S**	**M.S.S.**	**F**
Rows	-	72	-	2
Columns	-	-	36	-
Treatments	-	180	-	-
Error	6	-	12	
Total	-	-		

4. b) i) Using the following data obtain efficiency of L.S.D. over C.R.D. **5**

Sum of squares due to treatments = 1372.1225

Sum of squares due to rows = 259.5375

Sum of squares due to columns = 155.2725

Sum of squares due to error = 156.37

Number of treatments are 4.

ii) Explain Yale's procedure to obtain factorial effect totals in 2^2 factorial experiments. **5**

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T.Y. B.Sc. (Semester – IV) Examination, 2010
STATISTICS (Principal) (Paper – VI)
ST-346 (A) : C++ Programming
(2004 Pattern)

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 meaning.

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

i) The mechanism of deriving a new class from an existing old class is called

A) Overloading B) Inheritance
C) Polymorphism D) Constructor

ii) When a member function is defined inside a class it is treated as

A) inline function B) friend function
C) main function D) virtual function

iii) A member of a class in C++ is accessed by operator

A) + B) *
C) . D) : :

iv) Which of the following operator cannot be overloaded ?

A) > B) = =
C) : : D) %

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

i) Derived class inherits the properties of base class

ii) By default class members are public.

P.T.O.

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

i) this pointer

ii) container class

d) i) What is inheritance ? **(1 each)**

ii) State the syntax of friend function.

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

a) Write a C++ program to find mean and variance of n numbers.

b) Write a C++ program to find factorial of an integer number.

c) Explain the following manipulator functions giving their syntax, usage and example.

endl, ends, setw, setfill, setprecision

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

a) Write a C++ program to find minimum of n numbers.

b) Describe in brief characteristics of object oriented programming (OOP).

c) Write a C++ program to find sum of first 10 terms of series

$1+\frac{1}{2}+\frac{1}{3}+.....$

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

a) i) Write a C++ program to illustrate the use of destructor.

ii) Write C++ program to find coefficient of variation of n numbers. **(5+5)**

b) i) What is constructor ? What are the rules governing the declaration of constructor ?

ii) Write a C++ program to find the sum of digits of an integer # n. **(5+5)**

[3817] – 444

T.Y. B.Sc. (Semester – IV) Examination, 2010
STATISTICS (Principal) (Paper – VI)
ST-346(B) : Statistical Ecology
(2004 Pattern)

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 meaning.

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

i) In Gompertz model the growth rate $\frac{dNt}{dt}$ is maximum at

A) $\frac{k}{2}$ B) $\frac{e}{k}$

C) $\frac{k}{e}$ D) 2k

ii) For a logistic growth model stable equilibrium is

A) $N_t = 0$ B) $N_t = K$

C) $N_t = 2K$ D) $N_t = \frac{k}{e}$

iii) Peterson's estimator of population size (N) in single recapture is

A) $\frac{n_1 n_2}{m_2}$ B) $\frac{m_2 n_1}{n_2}$

C) $\frac{n_1 m_2}{n_2}$ D) $\frac{n_1 m_1}{n_2}$

iv) The time at which population gets doubled in exponential model is

A) $k \log_e 2$ B) $\frac{\log_e 2}{k}$

C) $2 \log_e k$ D) $\frac{\log_e k}{2}$

b) In **each** of the following, state whether the given statement is **true** or **false** :

(1 each)

i) In capture recapture method with single recapture Peterson's estimator is maximum likelihood estimator.

ii) In logistic growth model carrying capacity is equal to k.

c) i) Define closed population. **(1 each)**

ii) Define stable equilibrium.

d) i) Explain two kinds of parameter in Leslie matrix model (LMM). **(1 each)**

ii) In removal method if two successive removals are $n_1 = 40$ and $n_2 = 20$ then find Zippin's estimator of N.

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

a) Derive the expression for logistic growth model.

b) Describe line transact method for estimating animal population in a forest. What is rational behind using exponential detection function ?

c) Given the following projection matrix $M = \begin{bmatrix} 0 & 3 \\ 0.3 & 0 \end{bmatrix}$

Obtain stable population structure and comment on the growth of the population.

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

a) Fit a linear growth model to the following data :

t	:	0	1	2	3	4
N_t	:	3	13	21	35	48

b) What is meant by point to individual nearest neighbour distance (nnd) in Poisson forest ? Derive m.l.e. of parameter (λ) in it.

c) Describe capture recapture method. Derive Peterson's estimator of population size (N) for single recapture in closed population.

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

a) i) In LMM state **(5+5)**

A) assumption made

B) model

C) matrix notation

ii) Describe states of equilibria in Gompertz model.

b) i) Describe the method of quadrat sampling to estimate the population density in a forest. Also discuss the scope and limitations of quadrat sampling method. **(5+5)**

ii) Define Simpson's index (λ) for diversity. Compute λ for the following data :

Species :	1	2	3	4	5	6
No. of individuals :	5	4	6	3	2	1

T.Y. B.Sc. (Semester – IV) Examination, 2010
STATISTICS (Principal) (Paper – VI)
ST-346(C) : Time Series Analysis
(2004 Pattern)

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) Choose the correct alternative in **each** of the following : **(1 each)**

i) The exponentially smoothed amount (in Rs.) to be provided for expenditure in next month, if the department demanded Rs. 800 in this month and forecasted amount was Rs. 750 for this month, with $\alpha = 0.2$ is

A) 790 B) 760

C) 775 D) 800

ii) Estimate of β_1 in linear trend model $Y_t = \beta_0 + \beta_1 t$, on the basis of observations $Y_1, Y_2, \ldots\ldots, Y_n$ using method of selected points is

A) $\frac{Y_1 + Y_n}{2}$ B) $\frac{Y_1 + Y_n}{n}$

C) $\frac{Y_n - Y_1}{n}$ D) $\frac{Y_n - Y_1}{n-1}$

iii) For a series of 100 observations, if $\sigma_e^2 = 30$ residual sum of squares under AR (z) model is

A) 3000 B) 2970

C) 2940 D) 0.30

iv) Method of moving average is used for measurement of

A) trend B) seasonal variations

C) cyclic fluctuations D) irregular fluctuations

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

i) Monthly price index series is not a time series.

ii) For stationary time series first order differences are 0.

c) Define : **(1 each)**

i) Stationary time series.

ii) Partial auto correlation function (pacf).

d) i) State Box-Cox transformation and its use. **1**

ii) State the difference between 'additive' and 'multiplicative' model of time series. **1**

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

a) Obtain autocorrelation coefficient of lag 2 of the following time series :

t	1	2	3	4	5	6	7	8	9	10
$\mathbf{y_t}$	-1	-3	-4	2	0	1	2	1	-1	3

b) Explain in detail models used in Box-Jenkin's approach.

c) Discuss study of a time series by plots.

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

   a) Following is the data for revenues of a retail store :

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Revenue (in lacs Rs.)	12	10	19	18	14	22	39	30	32	35

   On the basis of run test, would you reject stationary random model ? Use 5% l.o.s.

   b) Discuss 'detrending' of time series.

   c) Write a note on 'double exponential smoothing'.

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

   a) i) Obtain estimate of coefficient ϕ if AR (1) model, $Y_t = \phi Y_{t-1} + e_t$ is fitted to data given below : **6**

t	1	2	3	4	5	6	7	8
$\mathbf{Y_t}$	3.8	4.5	3.4	4.6	5.8	7.1	5.8	5.0

   Interpret the result obtained.

   ii) Explain : 'Rule of thumb' procedure. **4**

   b) i) Following is a trend equation total yearly demand (in lakhs) with origin 2005 :

   $Y_t = 75 + 20\ t$

   A) Describe the model

   B) Obtain trend value for year 2010.

   C) Obtain trend value for month April 2007. **6**

   ii) Explain in brief 'Durbin-Watson test'. **4**

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T.Y. B.Sc. (Semester – IV) Examination, 2010
GEOGRAPHY – I
Gg 341 : Resources and Environment
(2004 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) Diagrams and maps must be drawn ***wherever*** *necessary.*
iv) ***Use*** *of map stencils is* ***allowed****.*

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

a) Name two components of the biotic environment.

b) Mention two evidences of global warming.

c) State two effects of water pollution in human health.

d) State two environmental hazards which are man induced.

e) What is the Leopold Matrix ?

f) Name the types of marine organisms.

g) State two characteristic features of mountain ecosystems.

h) State two types of effects of noise pollution.

i) Where is the ozone layer located ?

j) State two ways by which environment affects man.

P.T.O.

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

   a) Scope of environment studies.

   b) Discuss the salient features of the Ganga Action Plan.

   c) Man environment interrelationship with respect to types of economy.

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

   a) Components of the Environment

   b) Desert Ecosystems

   c) Methods of EIA

4. Give a detailed account of the equatorial ecosystem. **10**

   OR

   Discuss in detail the adverse effects of air pollution and the preventive measures necessary for the control of air pollution.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
GEOGRAPHY (Paper – IV) (2004 Pattern)
Gg-344 :Geography of India

Time : 2 Hours Max. Marks : 40

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

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

3) ***Draw*** *neat diagrams and sketches wherever* ***necessary.***

4) Use of ***map*** *stencils is* ***allowed.***

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

1) State any two regions in India where bauxite mines are located.

2) What is agricultural intensity ?

3) State any two factors of localization of automobile industry in India.

4) What is an industrial complex ?

5) What is meant by composition of population ?

6) What is white revolution ?

7) State any two factors responsible for urbanization in Western Maharashtra.

8) What is golden quadrilateral project ?

9) Mention any two impacts of communication technology on the economy of India.

10) Which river is the national waterway one ?

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

a) Discuss the energy crisis in India.

b) Describe the significance of dry land farming in India.

c) Comment on the distributional aspects of automobile industry in India.

P.T.O.

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

   a) Ecological impact of green revolution.

   b) Balance of trade.

   c) Rural-urban migration.

4. Discuss the locational aspects, development and distribution of textile industry in India. **10**

OR

4. Explain the urbanization in India and the problems associated with it. Support your answer with suitable examples. **10**

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[3817] – 455

T. Y. B.Sc. (Semester – IV) Examination, 2010
MICROBIOLOGY (Paper – V) (2004 Pattern)
MB-345 : Fermentation Technology

Time : 2 Hours Max. Marks : 40

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

1. A) Fill in the blanks :

   i) The Industrial Alcohol Act was passed in the year _____

   ii) The plant pathogen used in the direct fermentation of Riboflavin is _____

   iii) The parent organism of most industrial strains used for streptomycin production is _____

   iv) In glutamic acid fermentation using Micrococcus glutamicus , excess biotin causes _____ to be the principal product instead of glutamic acid.

   v) The most common bacteria for the industrial production of lactic acid is _____

   B) Match the following :

A	B
i) Cunninghamella blakesleena	a) Inactivated vaccine
ii) Citric acid production	b) Saccharomyces cerevisiae
iii) Salk vaccine	c) Steroid transformation
iv) Propionibacteria	d) Aspergillus niger
v) SCP	e) Swiss cheese

P.T.O.

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

   a) Describe the production process of Cheddar Cheese.

   b) Explain the production process of thuricide. Write a note on the mechanism of action of thuricide on lepidoptera.

   c) In brewing of beer, describe the process of Mashing.

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

   a) Explain the production process of industrial alcohol.

   b) Describe the dual fermentation involved in production of C-lysine.

   c) Explain the production process of fungal amylase.

4. Attempt **any one** :

   a) Explain the production of Vitamin B_{12} using streptomyces olivaceus NRRL B-1125. Write a note on recovery of Vitamin B_{12}.

   b) Describe the chemical changes occurring in a typical penicillin fermentation. Write a note on significance of semisynthetic penicillins.

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T.Y. B.Sc. (Sem. – IV) Examination, 2010
ELECTRONIC SCIENCE (Paper – II)
EL – 342 : Process Automation (2004 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *1)* ***All*** *questions are compulsory.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Neat*** *and labelled diagrams must be drawn* ***wherever*** *necessary.*
4) ***Use*** *of non-programmable calculator and log table is* ***allowed****.*

1. Attempt **all** of the following :
   a) Define dynamic variable in process control system. **1**
   b) What is transient in process ? **1**
   c) Define resolution in case of DAC. **1**
   d) List various trends in computer controlled process plants. **1**
   e) State the principle of process control. **2**
   f) Give advantages of intelligent control system. **2**
   g) "The control element in process control operation plays an important role" – Comment. **2**
   h) "Stepping motor has increased importance in process automation". Comment. **2**

2. Attempt **any two** of the following :
   a) List various process characteristics. Explain self regulation in brief. **4**
   b) Which factors must be considered while using divider circuit for conversion of variation of resistance in to voltage ? **4**
   c) How the output of ADC is expressed for bipolar operation ? Explain with suitable example. **4**

P.T.O.

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

   a) What is the output voltage of 10 bit DAC with a 10 V reference, if the input is

      a) OC5H

      b) 2FFH **4**

   b) Draw the architecture of programmable controller and explain each block in brief. **4**

   c) List various electrical actuators. Explain how solenoid converts electrical signal to physical displacement. **4**

4. Attempt the following :

   a) List various controller modes used in process automation. Explain proportional control mode. **6**

   b) What is need for signal conditioning ? How signal conditioning is categorized in general types ? Explain linearization term. **6**

OR

4. Attempt the following :

   a) A controlling variable is a motor speed that varies from 800 to 1750 rpm. If the speed is controlled by 25 to 50 V DC signal. Calculate :

      i) The speed produced by an input of 38 volts.

      ii) Speed calculated as a percent of span. **4**

   b) List the common input output devices used in ladder rung. Draw ladder diagram for $Y_1 = X_1$. AND . X_2 . AND . (NOT . C_1). **4**

   c) Draw the diagram of elements of final control operation. Explain each block in brief. **4**

[3817] – 459

T.Y. B.Sc. (Semester – IV) Examination, 2010
ELECTRONIC SCIENCE (Paper – III) (2004 Pattern)
EL – 343 : Modeling and Simulation : Applications in Electronics

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.*
4) ***Use*** *of non-programmable calculator and log table is* ***allowed****.*

1. Attempt **all** the following:

a) State the need of modeling in electronics. **1**

b) State advantages of Newton-Raphson method over bisection method. **1**

c) State the formula to obtain solution of differential equation using Euler's method. **1**

d) What is an interpolation ? **1**

e) Give unit suffix and scale suffix of resistor in pspice. **2**

f) Give typical statements in pspice to specify independent sources. **2**

g) "In trapezoidal rule the curve is approximated by straight line between the points of integration". Comment. **2**

h) "MATLAB" is the most powerful tool for modeling and simulation of electronic circuits". Comment. **2**

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

a) Explain the equivalent circuit model in brief. **4**

b) Explain the general form of statement used for Fourier analysis in pspice. **4**

c) Explain the Newton-Raphson method to obtain the roots of non linear equation. **4**

P.T.O.

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

a) Explain any two output commands to obtain results in pspice simulation. **4**

b) From the table given below,

x	0.10	0.15	0.20	0.25	0.30
y = tan X	0.1003	0.1511	0.2027	0.2553	0.3093

Find tan 0.12 using Newtons interpolation formula. **4**

c) Explain (i) Polyfit and (ii) Polyval functions in MATLAB for curve fitting. **4**

4. Answer the following :

a) Why models are necessary in pspice ? Explain in brief the resistor and capacitor models. **6**

b) Explain Simpsons $\frac{1}{3}$ rule of integration of a function. **6**

OR

4. Answer the following :

a) Use Gauss elimination method to solve ;

$4x + 2y + 2z = 20$

$3x + 2y + 3z = 18$

$2x + 8y + 18z = 32$ **4**

b) Evaluate :

$$I = \int_0^1 \frac{1}{1+x}\,dx$$

Using trapezoidal method, given h = 0.25. **4**

c) The current through the diode for applied voltage V_a is given by the equation,

$$I_D = I_S(e^{qv_a/KT} - 1)$$

Write the MATLAB code to plot the I-V curve $q = 1.6 \times 10^{-19}$, $K = 1.38 \times 10^{-23}$, $T = 300$, $I_S = 20 \times 10^{-6}$ V_a varies from 0.1V to 0.7V in steps of 0.1V. **4**

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[3817] – 470

T. Y. B.Sc. (Sem. – IV) Examination, 2010
DEFENCE AND STRATEGIC STUDIES (Paper – IX) (2004 Pattern)
DS – 349 (A) : Defence Production in India

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** to **4** sentences **each.** **16**
   1) What was the defence expenditure of India during 1963-64 ?
   2) In which year India declared her first industrial resolution ?
   3) In which year DRDO was established ?
   4) Write any two objectives of ordinance factories.
   5) What do you mean by 'Military industrial complex' ?
   6) Explain the meaning of 'National Morale'.
   7) State the meaning of Economic self-sufficiency.
   8) Define perspective planning.

2. Answer in **8** to **10** sentences (**any two**) **8**
   1) Explain need for perspective planning.
   2) Write a note on DRDO.
   3) Discuss the impact of globalisation on defence production in India.

3. Write short notes on (**any two**) **8**
   1) Defence Vs Development.
   2) Development of ordinance factories.
   3) Defence public sector in India.

4. Answer in **16** to **20** sentences (**any one**) **8**
   1) Explain defence production in India.
   2) Examine rationale for arms production in India.

P.T.O.

[3817] – 470

DEFENCE AND STRATEGIC STUDIES (Paper – IX)
DS – 349 (B) : Defence Management in India

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** to **4** sentences **each.** **16**
   1) Define 'Team Building'.
   2) What is 'Forecasting' ?
   3) Define 'Operation Research'.
   4) Define 'Material'.
   5) What is meant by 'life cycle' ?
   6) Define 'War'.
   7) Define 'logistics'.
   8) What is meant by Management by objectives ?

2. Answer in **8** to **10** sentences (**any two**) **8**
   1) Explain about Technological Forecasting.
   2) Explain about Manpower Forecasting.
   3) Explain about Economic Forecasting.

3. Write short notes on (**any two**) **8**
   1) Team Building
   2) Operation Research
   3) Logistics during war.

4. Answer in **16** to **20** sentences (**any one**) **8**
   1) Discuss Integrated concept of defence logistics.
   2) Explain the Management of weapons and equipment.

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[3817] – 471

T. Y. B.Sc. (Semester – IV) Examination, 2010
ENVIRONMENTAL SCIENCE
EN – 341 : Environmental Quality Management (2004 Pattern)
(Paper – I)

Time: 2 Hours Max. Marks: 40

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

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

a) What is meant by frequency of sound ?

b) Give any 2 psychological effects of noise on man.

c) State the difference between sound and noise.

d) On which factors, the quality of unpleasantness of sound waves depends ?

e) What is effective perceived noise level ?

f) What is softening ?

g) What is self purification of water body ?

h) What is entrophication ?

i) State the difference between Aerobic and Anaerobic decomposition.

j) What are Ion exchangers ?

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

a) Noise pollution hazards (effects)

b) Measurement of noise

c) Quality characteristics of water.

P.T.O.

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

   a) How to prevent and control noise pollution ?

   b) What are the physical and social effects of noise ?

   c) Explain the primary waste water treatment processes.

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

   a) Explain the water sampling methods in detail.

   b) Explain in detail activated sludge process.

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[3817] – 475

T. Y. B.Sc. (Semester – IV) Examination, 2010
Paper – V : ENVIRONMENTAL SCIENCE
EN – 345 : Environmental Geoscience
(2004 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

   a) What are minerals ?

   b) State the main objective of Wegener's continental drift theory.

   c) What are Norwesters ?

   d) Enlist any 2 functions of river.

   e) What is plate tectonics ?

   f) Give the difference between snowline and snowfield.

   g) Name any 2 major mines of India causing environmental damage.

   h) What are marines moraines ? Give its type.

   i) Give any 2 examples of Tropical Hot Deserts.

   j) What is Environmentalism ?

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

   a) Earth's internal structure with diagram.

   b) Landforms formed by wind erosion (any 5).

   c) Rainfall characteristics of India.

P.T.O.

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

   a) How to conserve minerals ? Describe its remedial measures.

   b) Describe the fluvial desert land forms with diagram.

   c) Write about transportational and depositional work of glaciers.

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

   a) Describe in detail mature stage landforms of river.

   b) Discuss the evidences given by Wegener and add a note on importance of CDT (Continental Drift Theory).

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[3817] – 402

T. Y. B.Sc. (Semester – IV) Examination, 2010
MATHEMATICS (Paper – II)
MT – 342 : Real Analysis – II
(2004 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *i)* ***All*** *questions are* ***Compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Attempt **each** of the following : **10**

i) Show that the integral $\int_0^1 \frac{\sin x}{x^{3/2}} dx$ is convergent.

ii) Using the definition of convergence of improper integral, show that $\int_1^\infty \frac{1}{x^2} dx$ is convergent.

iii) Find C.P.V. of $\int_{-1}^{1} \frac{1}{x} dx$

iv) For $n \in I, \text{let } f_n(x) = nx(1-x^2)^n, x \in [0,1]$, show that $\left\{\int_0^1 f_n\right\}_{n=1}^{\infty}$ converges $\frac{1}{2}$.

v) Find the limit function of the sequence $\{f_n\}_{n=1}^{\infty}$ where $f_n(x) = nne^{-nx^2}$ $(0 \le x \le 1)$.

vi) Find Bernstein Polynomial B_3 for $f(x) = x$, $x \in [0, 1]$.

vii) Show that for all real x, the series $\sum_{n=1}^{\infty} \frac{\sin nx}{n^2}$ converges uniformly.

P.T.O.

viii) State Weierstrass M – test for uniform convergence of the series $\sum_{n=1}^{\infty} u_n(x)$.

ix) Find the sum function of the series $\sum_{n=0}^{\infty} \frac{x}{(1+x)^n}$ on [0, 1].

x) If $I(a) = \int_0^{\pi/2} \frac{\log(1+\cos a \cos x)}{\cos x} dx$ then find $I'(a)$.

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

i) If $\int_a^{\infty} f(x)dx$ converges absolutely then prove that $\int_a^{\infty} f(x)dx$ converges.

ii) Show that $\int_0^{\infty} \frac{x}{(1+x)^3} dx$ is convergent and also show that $\int_0^{\infty} \frac{x}{(1+x)^3} dx \frac{1}{2} \int_0^{\infty} \frac{1}{(1+x)^2} dx$.

iii) Discuss the convergence of an improper integral $\int_0^1 \frac{dx}{\sqrt{x(1-x)}}$

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

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

ii) Discuss the uniform convergence of the sequence $\{f_n\}_{n=1}^{\infty}$ on [0, 1] where $f_n(x) = \frac{x^n}{1+x^n}$.

iii) Prove that the series $\sum_{n=1}^{\infty} \frac{x}{n(1+nx^2)}$ is uniformly convergent for all $x \in R$.

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

i) a) If u_1, u_2, u_3... are continuous real valued functions on the metric space M and $\sum_{n=1}^{\infty} u_n$ converges uniformly to f on M. Then prove that f is continuous on M.

b) Prove that $\frac{d}{dx}\sum_{n=1}^{\infty}\frac{x^n}{n(n+1)} = \sum_{n=0}^{\infty}\frac{x^n}{n+2}$ for $|x| < 1$

ii) Prove that $\int_0^{\pi/2} \log[a\cos^2\theta + b\sin^2\theta]d\theta = \pi \log\left[\frac{\sqrt{a}+\sqrt{b}}{2}\right] : a, b, > 0.$

[3817] – 403

T.Y.B.Sc. (Semester – IV) Examination, 2010
(2004 Pattern)
MATHEMATICS (Paper – III)
MT – 343 : Problem Course Based on MT – 341 and MT – 342

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 in* ***separate*** *answer books.*

SECTION – I

(Complex Analysis)

1. Attempt **each** of the following : **5**

i) Use definition of the derivative to find $f'(Z)$ where $f(Z) = Z^2$ for all $Z \in \mathbb{C}$.

ii) If e^z is purely real, what restriction is placed on Z ?

iii) State C-R equations in polar form.

iv) Using the Maclaurin series for exp Z, find series expansion of sinh Z.

v) Find the residue at Z = 1 of the function $f(Z) = \dfrac{Z}{(Z-1)(Z+1)^2}$.

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

i) Find an analytic function f(z) whose imaginary part is $V = x^3 - 3xy^2$.

ii) Show that for any two complex numbers z_1 and z_2 ; $2 \sin z_1 . \cos z_2 = \sin(z_1 + z_2) + \sin(z_1 - z_2)$

iii) By using definition of the limit show that $\lim\limits_{z \to 1} \dfrac{iz}{2} = \dfrac{i}{2}$.

3. Attempt **any one** of the following : **5**

i) Evaluate $\int_C \dfrac{z+1}{z^2 - 2z}\, dz$, where C is the circle $|z| = 2$ in the positive sense by using Cauchy residue theorem.

ii) Find a bilinear transformation which maps the vertices $1 + i$, $-i$, $2 - i$ of a triangle T of the Z plane into the point 0, 1, i of the ω plane respectively.

P.T.O.

SECTION – II

(Real Analysis – II)

1. Attempt **each** of the following : **5**

   i) Discuss the convergence of $\int_0^{\pi/4} \frac{1}{\sqrt{\tan x}}\,dx$.

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

   iii) Find limit function of the sequence $\{f_n\}_{n=1}^{\infty}$ where $f_n\{x\} = nx(1-x^2)^n$; $n \in [0, 1]$.

   iv) If $\sum_{n=0}^{\infty} |a_n| < \infty$, then prove that $\sum_{n=0}^{\infty} a_n x^n$ converges uniformly for $0 \le x \le 1$.

   v) If $\int_0^{\pi} \frac{dx}{\alpha - \cos x} = \frac{\pi}{\sqrt{\alpha^2-1}} : \alpha > 1$ then find the value of $\int_0^{\pi} \frac{dx}{(2-\cos x)^2}$.

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

   i) Let $f_n(x) = \frac{x}{n} e^{\frac{-x}{n}}$ $(0, \le x, < \infty)$, show that $\{f_n\}_{n=1}^{\infty}$ converges uniformly on $[0, 500]$.

   ii) By examining sum function f(x) of the series $\sum_{n=0}^{\infty} x(1-x)^n$ $(0, \le x, \le 1)$, discuss its uniform convergence.

   iii) Discuss the convergence of the integral $\int_0^{\infty} \left[x^{n-1} e^{-x}\right] dx$.

3. Attempt **any one** of the following : **5**

   i) Show that $\int_0^{\pi} \left[\sum_{n=1}^{\infty} \frac{n \sin nx}{e^x}\right] dx = \frac{2e}{e^2-1}$.

   ii) Prove that $\int_0^{\infty} \frac{1-e^{-ax}}{x} e^{-x}\,dx = \log(1+a)$.

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T. Y. B.Sc. (Semester – IV) Examination, 2010
MATHEMATICS (Paper – IV)
MT – 344 : Ring Theory (2004 Pattern)

Time : 2 Hours Max. Marks : 40

Instructions : *i)* ***All*** *questions are* ***Compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Attempt **each** of the following : **10**

i) Give an example of a finite field.

ii) Find the characteristic of the ring Z_6.

iii) Mark the following statement true or false ? Justify.

There exists an integral domain of characteristic 221.

iv) An element of a ring R is idempotent if $a^2 = a$. Show that a division ring contains exactly two idempotent elements.

v) Find all maximal ideals of Z_6.

vi) Solve the equation $5x = 7$ in Z_{23}.

vii) Find all units in the ring of Gaussian integers Z [i].

viii) Show by an example that a prime element in Z need not be prime in Z[i].

ix) Is every UFD a PID ? Justify.

x) Give an example of a prime ideal in z.

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

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

ii) Show that an intersection of ideals of a ring R is again an ideal of R. Is the union of any two ideals of a ring also an ideal ? Justify.

iii) Prove that an ideal <P> in a PID, D is maximal if and only if P is an irreducible in D .

P.T.O.

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

   i) Describe the field of quotients of the integral subdomain D = $\{n + m\sqrt{2}/n, m \in z\}$ of R.

   What is the field of quotients of Z_5 ? Why ?

   ii) Let $f(x) \in F[x]$ and let $f(x)$ be of degree 2 or 3. Then prove that f(x) is reducible over F if and only if it has a zero in F.

   iii) If R, R' and R'' are rings, and if $\phi : R \to R', \psi : R' \to R''$ are homomorphisms, then prove that the composite function $\psi 0 \phi : R \to R''$ is a homomorphism.

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

   i) a) Let R be a commutative ring with unity. Prove that M is a maximal ideal of R if and only if R/M is a field. **7**

   b) Prove that if P is prime, then $1 + x + x^2 + ... + x^{p-1}$ is irreducible over Q. **3**

   ii) a) Prove that every Euclidean domain is a PID. **7**

   b) Let D be an integral domain and x an indeterminate. Describe the units in D [x]. Hence find the units in Z_7 [x]. **3**

[3817] – 416

T.Y. B.Sc. (Semester – IV) Examination, 2010
CH – 342 : CHEMISTRY – II
Inorganic Chemistry (2004 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 : O = 8, F = 9, Na = 11, Mg = 12, Re = 75.

1. Answer the following : **10**

i) Which metal is used to prevent corrosion of iron in galvanising process ?

ii) Define, 'Passivity'.

iii) What is the IUPAC name of the element having atomic number 500 ?

iv) Complete the following reaction

$$^{239}_{92}U \xrightarrow{-\beta} ?$$

v) Which metal is present in 'cyanocobalmin' ?

vi) Define, 'organometallic compound'.

vii) Draw the solid state structure of $[Fe_2 (CO)_9]$.

viii) Which type of semiconductivity is developed when Germanium is doped with Gallium.

ix) What is the effect of increase in temperature on conductivity of metals ?

x) Define, 'radius ratio'.

2. A) Write short note on **any two** of the following : **6**

i) Hydrogen over voltage

ii) Misch metal

iii) Biological role of Magnesium.

P.T.O.

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

i) Find out valence electron in $[Re_2(CO)_{10}]$. Does it follow the 18 e^- rule.

ii) Distinguish between conductor and insulator.

iii) Give the applications of Lanthanides and their compounds.

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

i) List the factors affecting rate of corrosion. Discuss the following factors in brief :

a) difference in oxygen concentration.

b) purity of metal.

ii) Write catalytic cycle for hydroformylation of olefins.

iii) Give the assumptions for calculating Pauling's univalent radii. Calculate Pauling's univalent radii of Na^+ and F^-. (Internuclear distance in NaF = 2.31 A°, screening constant = 4.5).

4. A) Discuss in detail the band theory of metals with reference to sodium metal. **6**

OR

A) Answer the following : **6**

i) Discuss solvent extraction method for separation of lanthanides.

ii) Discuss the semiconductivity in crystal lattice having cation deficiency.

B) Pauling's univalent radius of Mg^{2+} ion is 0.82 A° and that of O^{2-} is 1.76 A°. Calculate the crystal radius. **4**

OR

B) Distinguish between the following : **4**

i) Haemoglobin and myoglobin.

ii) Lanthanides and actinides.

[3817] – 420

T.Y. B.Sc. (Semester – IV) Examination, 2010
CHEMISTRY – VI
CH – 346 (A) : Nuclear Chemistry (2004 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) Why Joliot-Curie and Savitch did not get the credit for the discovery of nuclear fission ?

b) What are the prompt and delayed neutrons ?

c) State two important limitations of Cock-Croft Walton accelerator.

d) Define reproduction factor (K). What is the value of K at steady state ?

e) State the principle of linear accelerator.

f) How a steady state is maintained in nuclear reactor ?

g) State the principle of radiometric titration.

h) Which radioisotope is used to determine volume of blood ?

i) Show the secular equilibrium between radium and radon.

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

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

a) Write short note on fission energy.

b) Explain the classification of nuclear reactors.

c) Explain the principle and working of Scintillation counter.

P.T.O.

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

a) What are the Szilard-Chalmer reaction ? How they are useful in separation of nuclear isotopes ?

b) What are the biological effects of radiations ?

c) Write short note on cow and milk system.

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

a) Discuss the four factor formula.

b) Explain the principle and working of Vande-Graft accelerator.

c) State the principle of Neutron activation analysis. State two applications of neutron activation analysis. What are the advantages of it ?

4. A) Explain the process of nuclear fission. Explain mass and charge distribution for nuclear fission. **6**

OR

A) Explain the principle and working of semiconductor detector. Which are the different types of semiconductor detector ? What are the drawbacks of semiconductor detector ? **6**

B) Describe the method of preparation of the following radioisotopes : **4**

1) Hydrogen – 3

2) Carbon – 14

3) Iodine –131.

OR

B) Write short note on natural uranium reactor. **4**

[3817] – 420

T.Y. B.Sc. (Semester – IV) Examination, 2010
CHEMISTRY (Paper – VI)
CH – 346 (B) : Polymer Chemistry (2004 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**

   i) Nylon is the best example of polyamide. (State the statement is true or false and rewrite).

   ii) Give the structure of teflon.

   iii) Define the homochain polymer.

   iv) What is syndio-tactic polymer ?

   v) Define the term 'Bales'.

   vi) PET and SBR stands for _____

   vii) Give the important applications of additives in polymer processing.

   viii) Give IUPAC name of $(CH_3O)_2Si(OH)_2$.

   ix) What is repeating unit of polyurathane ?

   x) Give important IR peaks in polystyrene.

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

   i) Explain the role of photostabilizers in polymers.

   ii) Gutta-percha is more crystalline than natural rubber.

   iii) Explain the factors influencing the glass transition temperature (T_g).

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

i) Write a short note on crystallinity.

ii) How will you characterize polyamide and polyvinyl acetate by using IR-spectroscopy ?

iii) Write in brief a note on Differential Thermal Analysis (DTA).

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

i) Discuss the mechanical properties of polymers in detail.

ii) How the substituent groups degrades the polymer ? Explain with suitable examples.

iii) Describe the nature and chemical bonding in silicone polymers. Give important applications of silicone polymers.

4. A) Give the methods of preparation, uses and properties of : **6**

i) Polyacrylonitrile

ii) Polypropylene.

OR

A) Write short notes on : **6**

i) Calendering process

ii) Wet spinning process.

B) Describe in detail blow moulding process. **4**

OR

B) Give a brief account of extrusion moulding process in polymer technology. **4**

[3817] – 420

T.Y. B.Sc. (Semester – IV) Examination, 2010
CHEMISTRY (Paper – VI)
CH – 346 (C) : Biochemistry (2004 Pattern)

Time : 2 Hours Max. Marks : 40

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

I. Answer the following : **10**

1) Define transcription.
2) Give structure of end product of β oxidation of fatty acid.
3) What is anabolism ? Give example.
4) Name the acceptor of amino group in transamination. Give its structure.
5) Give action of DNA pol. I.
6) Name purine nucleotides present in RNA.
7) Give names of fat soluble vitamins.
8) Give coenzyme forms and biochemical role of Niacin.
9) Give significance of termination codon.
10) Name the enzyme which cleaves phosphodiester linkages in nucleic acids.

II. a) Attempt **any two** : **4**

1) How fatty acids are transported into mitochondrial matrix ?
2) Discuss energics of glucose oxidation.
3) Give names of enzymes and coenzymes of pDH complex.

b) Answer the following **(any two)** : **6**

1) Write short account on respiratory chain.

2) Give short account of dideoxy method.

3) Comment on structure and function of RNA polymerase.

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

a) Describe Harshey-Chase experiment.

b) Discuss the structure and significance of Chromatin.

c) Discuss experimental evidence to prove that replication in DNA is semiconservative.

IV. a) What are restriction enzymes ? Discuss their importance in recombinant DNA technology. **4**

OR

a) What is triplet codon ? Comment on termination codons in genetic code.

b) Discuss reactions involved in oxidation of acetyl group of acetyl CoA. **6**

OR

b) Give brief account of RNA biosynthesis in prokaryotes.

[3817] – 420

T.Y. B.Sc. (Semester – IV) Examination, 2010
CHEMISTRY (Paper – VI)
CH – 346 (D) : Environmental Chemistry (2004 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 sheets/block diagrams and reactions must be given ***wherever*** *necessary .*

1. Answer the following in short : **10**

i) What is meant by 'tertiary treatment of waste water' ?

ii) What is sedimentation in waste water treatment ?

iii) What is 'humus' ?

iv) Define : sludge.

v) Mention any two applications of HPLC in environmental analysis.

vi) What do you mean by ion selective electrodes ?

vii) Give the example of single crystal membrane electrode.

viii) Mention commonly used solid stationary phases in GC.

ix) What is solvent refined coal ?

x) What is meant by NPU ?

2. a) Attempt **any two** of the following : **6**

i) Outline the method of 'Anaerobic waste water treatment'.

ii) Describe the process of ultrafiltration used for purification of water.

iii) Explain the terms composition of lithosphere and soil profile.

b) Write short notes on **any two** : **4**

i) Electrodialysis

ii) Aerobic sludge treatment

iii) Pyrolysis.

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

i) Explain the method of determination of mercury spectrophotometrically.

ii) Explain qualitative and quantitative applications of GC.

iii) Explain non-dispersive IR spectrometry for determination of CO.

4. a) Explain principle and instrumentation of HPLC. **6**

OR

a) What is chemiluminescence ? Explain working of chemiluminescent analyser.

b) Answer the following **(any one)** : **4**

i) Describe nuclear fusion and fission fuels.

ii) Write a note on magneto hydrodynamic generator.

[3817] – 420

T.Y. B.Sc. (Semester – IV) Examination, 2010

CHEMISTRY – VI

CH – 346 (F) : Medicinal Chemistry (2004 Pattern)

Time : 2 Hours Max. Marks : 40

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

ii) Figures to ***right*** *indicate* ***maximum*** *marks.*

1. Explain the following terms : **10**

   i) Alkylating agents

   ii) Tuberculosis

   iii) Mitosis

   iv) Drug Synergy

   v) Therapeutic Index

   vi) First generation Cephalosporin

   vii) DNA gyrase

   viii) Na^+/ K^+ Pump

   ix) Hypertension

   x) Hormones.

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

   i) Explain in brief Hansch analysis and its applications.

   ii) What is molecular modelling ? How does it aid in drug designing ?

   iii) Discuss in brief the current methods of drug designing.

   B) Describe the mode of action of **any two** of the following : **4**

   i) Atenolol

   ii) Tetracycline

   iii) Amphotericin B

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

   a) Discuss cancer and carcinogenesis. What are the strategies used to treat cancer ? Explain.

   b) Draw a diagram of Neuron and explain neurotransmission. Discuss the role of neurotransmitters.

   c) Explain in brief the development of cephalosporins or penicillins used in antibacterial therapy.

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

   a) Discuss **any two** of the following diseases and the drugs used to treat them :

   i) Malaria

   ii) Leprosy

   iii) Myocardial infarction

   iv) AIDS

b) Give a brief account of antimetabolites as drugs with examples.

c) Discuss the use of the following drugs and their mode of action **(any 2)** :

i) Diclofenac

ii) Acyclovir

iii) Barbiturates

iv) Mefloquine

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T.Y.B.Sc. (Semester – IV) Examination, 2010
BOTANY (Paper – I)
Biology of Seed Plants – II
BO – 341 : Gymnosperms and Palaeobotany
(2004 Pattern)

Time: 2 Hours Max. Marks: 40

***Instructions**: i) **All** questions are **compulsory**.*
*ii) **All** questions carry **equal** marks.*
*iii) Neat diagrams must be drawn **wherever** necessary.*

1. Answer the following : **10**

a) Give any two salient features of gymnosperms.

b) Define palaeobotany.

c) Give the habit and habitat of Zamia.

d) Name the genera belonging to group sphenopsida.

e) Which types of leaves are present in Pinus ?

f) Write any two objectives of Palaeobotany.

g) Sketch and label the female cone of Gnetum.

h) Give any two salient features of Lepidodendron.

i) Give any two anatomical pecularities of Gnetum stem.

j) What is Nipaniophyllum ?

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

a) Give the economic importance of Gymnosperm.

b) Describe the internal structure of Gnetum leaf.

c) Explain the concept of form Genera.

P.T.O.

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

   a) Coal ball

   b) Scope of Palaeobotany

   c) Male cone of Zamia.

4. Give the salient features of order calamitales. Describe internal and external morphology of Annularia. **10**

   OR

   Give the characteristic features of order coniferales and explain the internal structure of Pinus needle.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
BOTANY
Paper – III : BO-343 : Plant Physiology and Biochemistry
(2004 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) Give any two examples of C4 plants.

b) What is respiratory quotient ?

c) Define sink.

d) Give any two names of phytohormones which delay senescence.

e) Who proposed Mass Flow hypothesis for organic solute translocation ?

f) Define amino acids.

g) Give any two examples of monosaccharides.

h) Mention any two functions of carbohydrates.

i) Enlist any two examples of hexose sugars.

j) Define secondary metabolites.

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

a) Define glycolysis. Explain mechanism of glycolysis.

b) What are proteins ? Explain tertiary structure of proteins.

c) What are lipids ? Give the classification of lipids.

P.T.O.

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

   a) Process of seed germination.

   b) Types of RNA.

   c) Reductive amination.

4. What is photosynthesis ? Explain C4 cycle. Give significance of photosynthesis. **10**

   OR

   Define co-enzyme. Discuss various factors affecting enzyme activity. **10**

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Third Year B.Sc. (Semester – IV) Examination, 2010
STATISTICS (Principal) (Paper – I)
ST 341 : Distribution Theory – II
(2004 Pattern)

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) Choose the correct alternative in **each** of the following : **(1 each)**

i) If $X \sim L(\mu = 2, \lambda = 1.5)$, then first quartile of X is

A) $2 + \frac{1}{1.5}\log_{e^2}$ B) $2 - \frac{1}{1.5}\log_{e^2}$

C) $1.5 + \frac{1}{2}\log_{e^2}$ D) $1.5 - \frac{1}{2}\log_{e^2}$

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

A) 0 B) $\log \mu$

C) σ^2 D) μ

iii) If (X, Y) ~ BN (3, 1, 16, 25, 0.6) then E (Y | X = 7) equals

A) 4 B) 0.6

C) 3 D) 16

iv) Mean of binomial distribution with parameters n and p, truncated at X = 0 is

A) np B) $\frac{np}{1 - q^n}$

C) $\frac{nq}{1 - q^n}$ D) $\frac{npq}{1 - q^n}$

P.T.O.

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

i) Mode of log normal distribution with parameters 0, μ and σ^2 is $e^{\mu-\sigma^2}$.

ii) If X ~ C(0, 1) then distribution of $\frac{1}{X}$ is also C (0, 1).

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

i) One step transition probability matrix.

ii) Finite Markov Chain.

d) i) State the type of skewness of Laplace distribution. **1**

ii) State the relationship between Uniform and Cauchy distribution. **1**

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

a) Let $X \sim LN(a, \mu, r^2)$. Find distribution function of X and hence obtain first and third quartile of X.

b) Let (X, Y) ~ BN (0, 0, 1, 1, ρ). Show that $\frac{X}{Y}$ has a Cauchy distribution.

c) Let X ~ P(m). If the distribution of X is truncated at X = 0, state the p.m.f. of resulting distribution. Obtain its mean and variance.

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

a) Let $X \sim L(\mu, \lambda)$. Obtain the distribution function of X and hence find its median.

b) Let $(X, Y) \sim BN(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$. Find the marginal distribution of X.

c) i) If $(X, Y) \sim BN\left(1, 2, 4^2, 5^2, \frac{12}{13}\right)$, Find P (X > 2 | Y = 2).

ii) If X and Y are independent and identically distributed C(0, 1) variates, find P(X + Y > 3).

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

a) i) Let $X \sim N(\mu, \sigma^2)$. If the distribution of X is truncated to the right above b, obtain an expression for mean of the resulting truncated distribution. **6**

ii) Find mean deviation about the mean of the Laplace distribution with parameters μ and λ. **4**

b) i) Let $\{X_n, n \geq 0\}$ be a Markov Chain with state space S = {0, 1, 2} and initial probability distribution $P(X_0 = i) = \frac{1}{3}$, i = 0, 1, 2. If one step transition probability matrix of above Markov Chain is

$$P = \begin{bmatrix} \frac{3}{4} & \frac{1}{4} & 0 \\ \frac{1}{4} & \frac{1}{2} & \frac{1}{4} \\ 0 & \frac{3}{4} & \frac{1}{4} \end{bmatrix}$$

Find :

i) $P(X_2 = 2, X_1 = 1, X_0 = 2)$

ii) $P(X_2 = 1 / X_0 = 0)$

iii) $P(X_2 = 2 , X_0 = 0)$ **6**

ii) Let $X \sim LN(0, \mu, \sigma^2)$ and $Y = X^r$, r > 0. Find the distribution of Y. **4**

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[3817] – 450

T.Y. B.Sc. (Semester – IV) Examination, 2010
GEOGRAPHY – VI
Gg. 346 : Fudamentals of Remote Sensing
(2004 Pattern)

Time : 2 Hours Max. Marks : 40

***N.B.**: 1) **All** questions are **compuslory**.*
*2) FIgures to the **right** indicates **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 :

   a) What do you mean by Orbit ?

   b) Mention the types of resolutions.

   c) What is a Sensor ?

   d) What do you mean by Push broom Scanner ?

   e) What do you mean by INSAT ?

   f) What is 'Pixel' ?

   g) Define the term visible spectrum.

   h) Give any two keys of visual image interpretation.

   i) What is GSLV ?

   j) What do you mean by Band ? **10**

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

   a) Which are teh major types of scanning systems used in remote sensing ?

   b) What do you mean by platform ? Give the names of platforms.

   c) Write the importance of annotation strip on an aerial photograph. **10**

P.T.O.

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

   a) Major elements of image intepretation.

   b) INSAT series satellites.

   c) Use of satellite images in resource studies. **10**

4. Give a comparative account of Geostationary and sun synchronous satellites.

   OR

   Write an explanatory note on applications of aerial photographs and satellite images in envuironmental studies. **10**

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[3817] – 456

T.Y. B.Sc. (Sem. – IV) Examination, 2010
MICROBIOLOGY (Paper – VI)(2004 Pattern)
MB-346 : Soil and Agricultural Microbiology

Time : 2 Hours Max. Marks : 40

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

1. Answer the following : **10**

a) Define Rhizosphere.

b) Write chemical composition of pectin.

c) Plasmopara Viticola is a causative agent of _____ plant disease.

d) List electron carriers in nitrogen fixation process.

e) R. leguminosarum found in root nodules of _____ group plants.

i) bean

ii) lupini

iii) soybean

iv) pea.

f) Write composition of biogas.

g) _____ organism is used in iron leaching.

h) Write names of two organophosphorus pesticides.

i) Write composition of alluvial soil.

j) Define humus.

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

a) Describe phosphorus cycle with the help of diagram.

b) Explain biological control of plant diseases.

c) Draw neat labelled diagram of fixed dome type biogas plant.

P.T.O.

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

   a) Soil microbes.

   b) Non-symbiotic nitrogen fixation.

   c) Rots.

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

   a) Describe canker with the help of following points :
      i) Causative agent
      ii) Plants affected
      iii) Disease cycle
      iv) Control.

   b) Describe production of Rhizobium bioinoculant and its application.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
ELECTRONIC SCIENCE (Paper – I) (2004 Pattern)
EL – 341 : Digital Circuits and Systems

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) Define the term fan-out. **1**

b) What is Johnson counter ? **1**

c) What are advantages of ASIC ? **1**

d) Write the general syntax for entity declaration. **1**

e) What are the types of operators used in VHDL code ? **2**

f) 'A counter is essentially a register' comment. **2**

g) Convert binary number 1011 into gray code. Hence draw logic diagram using EX-OR gates. **2**

h) 'ECL family is also known as CML family' comment. **2**

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

a) Explain CMOS NAND and NOR gate. State advantages of CMOS logic family. **4**

b) Design a combinational logic circuit for full adder. **4**

c) Draw the general structure of FPGA and explain it. **4**

P.T.O.

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

   a) Draw the block diagram of PLA. Explain its function. What are its advantages ? **4**

   b) What is data flow modeling in VHDL ? Explain it with suitable example. **4**

   c) Distinguish between combinational and sequential logic circuits. What are the steps involved in designing of sequential logic circuits ? **4**

4) Answer the following :

   a) Compare asynchronous counter with synchronous counter. Using D Flip-Flop design synchronous counter to go through the states 0 -1- 3 - 4 - 6 - 0..... **6**

   b) Draw the block diagram of data transmission system with error detection and explain its function. **6**

OR

4. Answer the following :

   a) Write the VHDL program for a 1 to 4 DMUX using structural modeling. **4**

   b) Design mod-3 counter having three states 00, 01, and 10 using J-K Flip-Flop. **4**

   c) A combinational logic is given by functions

   $A_1 = \bar{x}yz + x\bar{y}z$

   $A_2 = \bar{x}\,\bar{y} + xyz$

   Implement the circuit with PAL. **4**

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[3817] – 461

T.Y. B.Sc. (Semester – IV) Examination, 2010
ELECTRONIC SCIENCE (Paper – V)
EL-345 (A) : Power Electronics – II
(2004 Pattern)

Time : 2 Hours Max. Marks : 40

N.B.: *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Draw labelled diagrams ***wherever*** *necessary.*
4) Use of non-programmable calculator and log table is ***allowed****.*

1. Attempt **all** of the following :
   a) What is the function of an inverter ? **1**
   b) What is the control range of the delay angle for single phase unidirectional controller ? **1**
   c) Define harmonic factor parameter of an inverter. **1**
   d) State any two applications of ON-OFF controller. **1**
   e) 'DC motors play a significant role in modern industrial drives' – Comment. **2**
   f) What are advantages of HVDC system ? **2**
   g) What is AC circuit breaker ? **2**
   h) The output voltage of the push-pull circuit is $V_0 = 24$ V at a resistive load of 4.8Ω. Find input power of the circuit, assume loss less circuit and transformer has ratio $Ns/Np = 0.25$. **2**

2. Attempt **any two** of the following :
   a) Draw the circuit diagram of half-bridge inverter. Explain working of it with necessary waveforms. Obtain an expression for rms output voltage. **4**
   b) Explain Buck regulator with suitable circuit diagram. Draw necessary waveforms. Obtain an expression for peak to peak ripple current. **4**
   c) Draw the circuit diagram of separately excited dc motor. Hence obtain expression of speed of separately excited motor. How speed of motor is controlled ? **4**

P.T.O.

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

   a) Explain single pulse width modulation voltage control technique of inverter with waveforms. Obtain expression for rms output voltage. **4**

   b) What are types of DC motor drives ? Draw block diagram of chopper fed drive and explain function of it. **4**

   c) Construct NOR and NAND gates using thyristor. Explain its working with truth table. **4**

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

   a) What is UPS ? Explain working of ON line and OFF line UPS with block diagram. List the battery sources used in UPS. What are their advantages and drawbacks ? **6**

   b) What is current source inverter ? Explain the working of single phase current source inverter using thyristor. State its advantages. **6**

   c) Write note on :

      i) Battery charging

      ii) Controlled electric heating. **6**

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[3817] – 461

Third Year B.Sc. (Semester – IV) Examination, 2010
ELECTRONIC SCIENCE (Paper – V (B))
EL-345 (B) : Principles and Applications of Sensors – II

Time : 2 Hours Max. Marks : 40

N.B.: *1) Neat diagrams must be drawn **wherever** necessary.*
*2) Black figures to the **right** indicate **full** marks.*
*3) **All** questions are **compulsory**.*
*4) Use of log-table, electronic calculator is **allowed**.*

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

   a) State different types of capacitive sensors used for displacement measurement. **1**

   b) Define gauge factor of strain gauge sensor. **1**

   c) Write four properties of an Intelligent sensor. **1**

   d) What do you mean by MEMS ? **1**

   e) Materials used for wire and jockey in potentiometric transducer are equally important : comment. **2**

   f) Sensors are very useful in environmental monitoring : comment. **2**

   g) PEVCD is advantageous than CVD technique : comment. **2**

   h) State the ecological pollution hazards. **2**

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

   a) What is magnetostriction ? State the different types of magnetostrictive transducers ? Explain any of them in brief. **4**

   b) Explain the loading effect on accuracy of resistive type potentiometric transducer when used for measurement of displacement. **4**

   c) With suitable diagram explain electromagnetic blood flow sensor. **4**

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

   a) Draw the sketch of ultrasonic sensor used for distance sensing and explain its operation in brief. **4**

   b) State different medical diagnostic sensors. Describe radiation sensor used in this field. **4**

   c) Explain with suitable diagram oxygen sensor used in automobile. **4**

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

   a) Explain how charges are developed on two plates placed across a piezoelectric crystal when force is applied on it ? **6**

   b) Define the following terms related with smart sensor :
      i) Excitation
      ii) Converter
      iii) Non-linearity. **6**

   c) State different techniques used for producing thin film sensors. Explain any one of them. **6**

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[3817] – 461

Third Year B.Sc. (Semester – IV) Examination, 2010
ELECTRONIC SCIENCE (Paper – V (C))
EL-345 (C) : Industrial Electronics – II

Time : 2 Hours Max. Marks : 40

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

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

a) State the basic principle of magnetic amplifier. **1**

b) What do you mean by inverter ? **1**

c) List the different types of timers used in industry. **1**

d) What is the working principle of wave soldering ? **1**

e) Draw block diagram of basic process control system. **2**

f) What is CNC machine ? **2**

g) List the characteristics of DC amplifier. **2**

h) List the different ICs which are used in timer circuits. **2**

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

a) Write short note on PWM based inverter. **4**

b) Explain with circuit diagram, the working of difference amplifier. **4**

c) Discuss electromechanical timer in brief. **4**

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

   a) Write short note on Data Acquisition System. **4**

   b) Write short note on Robot Mechanism. **4**

   c) Why indirect heating is preferred in industrial application ? List the various methods of it and explain any one in brief. **4**

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

   a) State and explain different timer and counter instructions. **6**

   b) Explain any two process control systems with reference to their response. **6**

   c) What is SMD ? What are its advantages ? Explain different steps involved in SMD technique. **6**

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[3817] – 461

Third Year B.Sc. (Semester – IV) Examination, 2010
ELECTRONIC SCIENCE (Paper – V (D))
EL-345 (D/E) : Entrepreneurship Development

Time : 2 Hours Max. Marks : 40

Instructions *: 1)* ***Neat*** *diagrams must be drawn* ***wherever*** *necessary.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Use of log tables, slide rule, electronic calculator is ***allowed****.*
4) ***All*** *questions are* ***compulsory****.*

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

a) What are the responsibility of Entrepreneur in business ? **1**

b) Define term 'Entrepreneur Development'. **1**

c) What are the types of financial assistance the bank provides under the Entrepreneur Scheme ? **1**

d) State any two needs to motivate employee to work. **1**

e) What is SIDO ? What are the functions does it carry out ? **2**

f) State objective of marketing management. **2**

g) What are three distinct stages of project life cycle ? **2**

h) Entrepreneurs are not born they can be develop – Comment. **2**

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

a) What are important qualities of a successful industrial entrepreneur ? **4**

b) What are distinguishing features of a project ? **4**

c) Discuss various parameters related with 'Human Resources Management'. **4**

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

   a) Describe the features of Small Scale Industries. **4**

   b) What are the factors to be considered while starting a new venture ? **4**

   c) What are the objectives of Management Training Programme ? **4**

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

   a) What are advantages of joint stock companies ? **6**

   b) Discuss “causes of sickness of SSI”. **6**

   c) Write short note on role of government in development of SSI. **6**

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T.Y. B.Sc. (Semester – IV) Examination, 2010
COMPUTER MAINTENANCE
Vocational Paper – VI : Network Operating System
(2004 Pattern)

Time : 2 Hours Max. Marks : 40

1. Answer the following in **one**/**two** sentences : **(1×10=10)**

   1) What is a Web Server ?

   2) Comment on : Use of Back Domain in Windows 2003 Network.

   3) Difference between Desktop OS and Network Operating System.

   4) What is replica of computer in a Novell Network ?

   5) Give two different flavours of Linus OS.

   6) Does use of a 'Boot ROM' save hardware resources in Novell Network. How ?

   7) State any two NDS services in Novell Netware.

   8) Give use of a 'SWAP' Partition in Linux.

   9) What is the use of IP address in a Network ?

   10) State the function of 'Boot Loader'.

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

   1) Write a note on Peer-to-Peer Network in Windows.

   2) Differentiate between Workgroup and Domain in Windows.

   3) Give any five utilities of Z.E.N. Works.

P.T.O.

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

   1) Write a note on benefits of Linux Operating System.

   2) List various commands used in Linux. Explain their use.

   3) List five commands used in Novell Netware and explain any four.

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

   A) i) Write a note on Mail Server.

      ii) Explain different types of Graphical user Interface in Linux.

   OR

   B) i) Give steps to configure Network Device in Windows.

      ii) Explain in brief : significance of a File Server.

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T.Y. B.Sc. (Sem. – IV) Examination, 2010
ELECTRONIC EQUIPMENT & MAINTENANCE
Vocational (Paper – VI) (2004 Pattern)
EEM – 346 : Medical Instrumentation

Time : 2 Hours Max. Marks :40

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

1. Answer the following :

a) Answer the following **:** **(4×1=4)**
   i) Define a biopotential.
   ii) State any two sources of noise in biomedical instrument.
   iii) Give the basic principle of electromyogram.
   iv) Show waveform of EEG signal.

b) Answer the following : **(2×2=4)**
   i) State the important parameters of preamplifier used in biomedical instrument.
   ii) State the operating principle of tungsten halogen light source.

c) Answer the following : **(2×2=4)**
   i) State the types of body surface recording electrodes.
   ii) State two basic types of epilepsy.

2. Answer **any two** of the following : **(2×4=8)**
   i) Explain in detail the central nervous system.
   ii) Describe the common tests used in testing of the electric section of medical equipment.
   iii) Write a short note on electrical safety codes and standards.

P.T.O.

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

   i) Explain with neat diagram the anatomy of heart.

   ii) What do you mean by ion analyzer ? Draw a block diagram of a microprocessor based ion analyzer and explain each block in brief.

   iii) Explain with necessary diagram the working of emission type flame photometer.

4. Answer the following : **(2×6=12)**

   a) Explain the function of following subsystems used in automated biochemical analyzer.

      i) Colorimeter ii) Recorder

      iii) Sampling unit iv) Regulated dc power supply.

   b) What do you mean by ion-selective electrode ? Give construction and working of any one type of ion-selective electrode.

OR

4. Answer the following : **(2×6=12)**

   a) Explain with necessary diagram the working of absorption spectrophotometer. Give its applications.

   b) Explain in detail the physiological effects of electricity.

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T.Y. B.Sc. (Sem. – IV) Examination, 2010
MATHEMATICS (Paper – VI)
MT - 346 : Problem Course Based on MT - 344 and MT - 345
(2004 Pattern)

Time : 2 Hours Total Marks : 40

Instructions : *1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Answers to the **two** Sections should be written in **separate** answer sheets.*

SECTION – I
(Ring Theory)

1. Attempt **each** of the following : **5**

i) Give an example of a ring with unity $1 \neq 0$ that has a subring with nonzero unity $1' \neq 1$.

ii) Show that the polynomial $25x^4 - 9x^3 + 3x^2 - 12$ is irreducible over Q.

iii) Find all ideals of the ring $(Z_{23}, +_{23}, \bullet_{23})$.

iv) List all possible ring homomorphisms of Z into Z.

v) Show that an integral domain $Z\left[\sqrt{-5}\right] = \left\{a + ib\sqrt{5} / a, b \in Z\right\}$ is not a UFD.

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

i) Let R be a commutative ring and $a \in R$. Show that $Ia = \{x \in R / ax = 0\}$ is an ideal of R.

ii) Find all irreducible polynomials of degree 2 in $Z_2[x]$.

iii) In a PID, if an irreducible P divides ab, then prove that either P/a or P/b.

3. Attempt **any one** of the following : **5**

i) A ring R is a Boolean ring if $a^2 = a$ for all $a \in R$. Show that every Boolean ring is commutative.

ii) Is $Q[x] / < x^2 - 5x + 6 >$ a field ? Why ? What about $Q[x] / < x^2 - 6x + 6 >$? Justify.

P.T.O.

SECTION – II

(Differential Equations)

1. Attempt **each** of the following : **5**

   i) Solve $\frac{dx}{y-x} = \frac{dy}{z-y} = \frac{dz}{x-z}$.

   ii) Show that the direction ratios of the tangent line to $x^2 + y^2 + z^2 = 1$; $x + y + z = 1$ are proportional to $y - z$; $z - x$; $x - y$.

   iii) Find the complete integral of $pq = 1$.

   iv) Show that $\frac{xy}{z} = C$ is one of the solution of the differential equation

   $$x^2 \frac{\partial z}{\partial x} + y^2 \frac{\partial z}{\partial y} = (x + y)\, z$$

   v) Solve $y\,dx + x\,dy + z\,dz = 0$.

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

   i) Find the integral curve of the equation $\frac{dx}{(x+y)} = \frac{dy}{(x+y)} = \frac{dz}{-(x+y+2z)}$.

   ii) Solve the equation $(p^2 + q^2)\, y = qz$ by Charpits method.

   iii) Solve the equation $P_1^3 + P_2^2 + P_3 = 1$ by Jacobi's method.

3. Attempt **any one** of the following : **5**

   i) Show that the equations $xp - qy - x = 0$; $x^2p + q - xz = 0$ are compatible.

   ii) Find the integral surface of the equation $(2xy - 1)\, p + (z - 2x^2)\, q = 2(x - yz)$; which passes through the line whose parametric equations are $\overset{\uparrow}{x} = 1$; $y = 0$ and $z = t$.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
PHYSICS (Paper – I) (2004 Pattern)
PH-341 : Solid State Physics

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 is* ***allowed****.*

1. Attempt **all** of the following : **10**

   a) What do you mean by the term 'Unit Cell' ?

   b) Explain the term 'Madelung Energy'.

   c) Sketch (110) plane in simple cubic unit cell.

   d) Determine the lattice parameter 'a' if the distance between (020) planes in simple cubic crystal is 2.42 A°.

   e) State any two properties of covalent crystals.

   f) Define the term 'dissociation energy'.

   g) What do you mean by 'domains' in ferromagnetic materials ?

   h) Give any two examples of ferrimagnetic materials.

   i) State any two uses of Hall effect.

   j) Define the term 'magnetization vector $(\overline{M})$. Give its S. I. unit.

2. Attempt **any two** :

   a) What is reciprocal lattice ? Show that the reciprocal vectors of the reciprocal lattice are the direct lattice vectors themselves. **5**

   b) Obtain an expression for energy levels and density of states in one dimension. **5**

   c) Show that Madelung constant for one dimensional array of ions of alternate signs is 2 *l*n 2. **5**

P.T.O.

3. Attempt **any two** :

   a) Calculate the glancing angle on the cubic (100) planes of a rocksalt of lattice constant 2.81 Å , corresponding to second order diffraction maximum of X-rays of warelength 0.710 Å. **5**

   b) A specimen of n-type Ge having thickness 0.8 cm has donor density of $10^{15}/cm^3$. It is arranged in a Hall experiment where magnetic field B_2 = 0.5 Wb/m^2 is applied and a current density j_n = 800 A/m^2 results. What will be the Hall voltage across the specimen ? **5**

   c) Two atoms P and Q are separated by distance 'r'. Their potential energy in the field of each other is given by $U = -A/r^2 + B/r^6$, where A and B are constants (A, B > 0). At what separation they will form stable compound ? **5**

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

   a) Describe powder diffraction method and explain how it is useful for the study of simple cubic crystal structures. **8**

   b) Discuss the characteristic features of diamagnetism, paramagnetism, ferromagnetism and antiferromagnetism. Give an example of each type of material. **8**

   B) Attempt **any one** :

   a) The susceptibility (x) of oxygen is 6×10^{-26}. Calculate the Magnetization of one gram of oxygen gas at N.T.P. in the earth's magnetic field $B_4 = 3.14 \times 10^{-5}$ Tesla. (Given $\mu_0 = 4\pi \times 10^{-7}$ Wb/A.m.) **2**

   b) Find the packing fraction for simple cubic crystal structure. **2**

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T.Y. B.Sc. (Semester – IV) Examination, 2010
PHYSICS (Paper – II)
PH-342 : Quantum Mechanics
(2004 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 (**one** mark **each**) : **10**

   a) Write the relation between group velocity and phase velocity.

   b) State any two requirements of wave function.

   c) Calculate the de-Broglic wavelength associated with a particle moving with momentum 6.625 kg-m/s.

   d) State normalisation condition for wave function.

   e) What are basic operators in quantum mechanics ?

   f) Show that $[x, p_y]\ \psi = 0$.

   g) Give the meaning of 'free particle' in quantum mechanics.

   h) Calculate the ground state energy of a particle of mass 10^{-2} kg which is free to move between two rigid walls separated by 0.1 meter.

   i) What do you mean by a rigid rotator ?

   j) State the quantum number associated with hydrogen atom.

2. Attempt **any two** :

   a) State and explain Hetsenberg's uncertainty principle. Give different forms of uncertainty relations. **5**

   b) Obtain equation of continuity from Schrodinger's time dependent equation. **5**

P.T.O.

c) A particle is moving in 1-D potential well given by **5**

$V = 0 \qquad 0 < x < a$

$= \infty \qquad x \geq a, x \leq 0$

Solve the steady state Schrodinger's equation to obtain energy eigen value of the particle.

3. Attempt **any two** :

a) A wave function of a particle moving in the range $-\infty$ to $+\infty$ is given by

$\psi(x) = e^{-\frac{\alpha x^2}{z}}$ Normalise the wave function and $< x >$. **5**

b) Show that the momentum operator $\left(-i\hbar\frac{\partial}{\partial x}\right)$ is Hermitian operator. **5**

c) The normalized eigen function for ground state of H-atom is given by

$\psi_{100} = \frac{1}{\sqrt{\pi a_0^3}} e^{-r/a_o}$ where a_o = Bohr radius. **5**

Calculate the expectation value of the potential energy.

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

a) What do you mean by expectation values ? Show that $\frac{d}{dt} < x > = \frac{< P_x >}{m}$. **8**

b) Write down the steady state Schrodinger's equation for 1-D harmonic oscillator.
Solve it to show that energy eigen values are given by

$E_n = \left(n + \frac{1}{2}\right)\hbar\omega$. **8**

B) Attempt **any one** :

a) Show that group velocity is equal to particle velocity. **2**

b) Show that : $[L_+ , L_-] = z\hbar\ L_z$. **2**

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T.Y. B.Sc. (Semester – IV) Examination, 2010
PHYSICS (Paper – IV)
PH – 344 : Nuclear Physics (2004 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 logtable and calculator is* ***allowed****.*

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

a) What is isotope ? Give one example.

b) Find the radius of Ag^{107} nucleus.
(Given – $R_0 = 1.2 \times 10^{-15}$ m)

c) Define the activity and give its unit.

d) What are Hadrons ?

e) Give the structure of proton using Quarks.

f) Determine the parity of $_8O^{16}$ nucleus.

g) What is cross-section of nuclear reaction ? Give its units.

h) Define the effective multiplication factor 'K' in nuclear reactor.

i) What is photoelectric effect ?

j) What is nuclear reactor ?

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

a) What is packing fraction ? Explain the stability of nucleus on the basis of packing fraction. **(5)**

b) State the law of radioactive disintegration and obtain an expression.
$N = No\ e^{-\lambda t}$
where symbols have usual meanings. **(5)**

c) What is the threshold energy of nuclear reaction ? Obtain an expression for it. **(5)**

P.T.O.

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

   a) Energy released in one fission of U^{235} atom is 200 MeV. Calculate the amount of energy released during the fission of 100gm of U^{235} in fission reactor. **(5)**

   b) Explain Meson theory of nuclear forces on the basis of Feyman diagrams. **(5)**

   c) A cyclotron with dees of radius 3m has magnetic field of 0.80 wb/m. Calculate the maximum energy to which proton can be accelerated.

   Given : Charge on proton = 1.6×10^{-19}C

   Mass of proton = 1.67×10^{-27}Kg **(5)**

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

   a) Describe the construction and working of G. M. Counter. Explain dead time and resolving time of G. M. counter. **(8)**

   b) Explain the successive disintegration and obtain an expression for the ratio of activity of daughter to parent as

   $$R = \frac{\lambda_2}{\lambda_2 - \lambda_1}\left[1 - e^{-(\lambda_2-\lambda_1)t}\right]$$

   where symbols have usual meanings. **(8)**

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

   a) Explain even and odd parity of nucleus. **(2)**

   b) Explain the formation of $\prod^{+}$ Meson and neutron using the Quark model. **(2)**

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T.Y. B.Sc. (Sem. – IV) Examination, 2010
PHYSICS (Paper – V) (2004 Pattern)
PH – 345 (A) : Electronics

Time : 2 Hours Max. Marks : 40

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

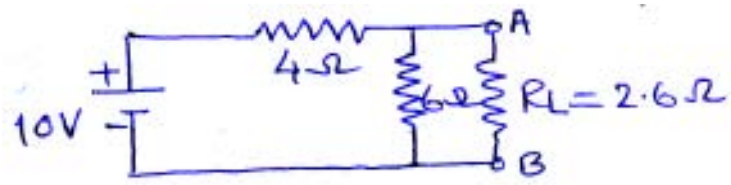
1. Attempt **all** (**1** mark **each**) : **10**
   a) What is Feedback in amplifier ?
   b) What is regulation in power supply ?
   c) Draw the symbol for operational amplifier.
   d) State the formula for voltage gain of an amplifier with feedback.
   e) Define slew rate in operational amplifier.
   f) Calculate reactance of inductor for L = 0.1 H and f = 50 Hz.
   g) State the two applications of FET.
   h) State Thevenin's theorem.
   i) Draw the block diagram for voltage series feedback.
   j) What is differential amplifier ?

2. Attempt **any two** :
   a) Explain action of transistor as a switch. **5**
   b) What is the effect of negative feedback on gain, bandwidth, stability and input and output impedance of an OPAMP. **5**
   c) Explain with suitable diagram positive clipper and clamper circuit. **5**

3. Attempt **any two** :
   a) A feed back amplifier without feedback has a gain 300. When negative feed back is applied, the gain is reduced by 100. Determine the feedback ratio. **5**

P.T.O.

b) Find the Norton equivalent of the following circuit. Hence find current through $R_L = 2.6\Omega$. **5**



c) Explain with circuit diagram and waveform the cross over distortion in class B push pull amplifier. **5**

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

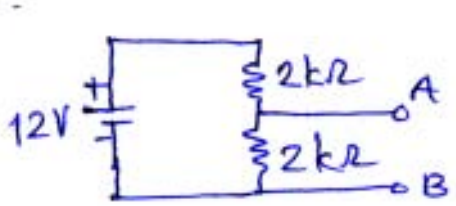
a) Draw the block diagram of IC 723 voltage regulator. List its various features. Determine the output voltage for the IC 723 regulator, if $V_{ref} = 1.6$ V, $R_1 = 8\ k\Omega$, $R_2 = 4\ k\Omega$. **8**

b) Explain construction, working principle of MOSFET. Draw circuit symbol of depletion mode and enhancement mode of MOSFET. **8**

B) Attempt **any one** :

a) Distinguish between the ideal and practical voltage source with diagram. **2**

b) Thevenize the following circuit : **2**



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T.Y. B.Sc. (Sem. – IV) Examination, 2010
PHYSICS (Paper – V) (2004 Pattern)
PH – 345 (B) : Advanced Electronics

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* ***wherever*** *necessary.*
4) ***Use*** *of log tables and calculators is* ***allowed****.*

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

   a) What do you mean by attenuation in optical cable ?

   b) What is scaling circuit ?

   c) Define duty cycle.

   d) What is a demultiplexer ?

   e) What is quantization error ?

   f) List different types of pulse modulation.

   g) State the disadvantage of R-2R ladder D/A converter over weighted resistor D/A converter.

   h) Enlist the basic types of shift register.

   i) A coupler has an excess loss of 1 dB and a splitting ratio 2 : 1. What amount of power of input reaches to the two outputs ?

   j) What is the pulse width of monostable output if R = 500 kΩ and C_T = 125μf ?

2. Attempt **any two** :

   a) With a suitable circuit diagram explain the operation of a astable multivibrator using IC 555. **5**

   b) Explain the operation of 5 × 7 Dot Matrix display. **5**

   c) With a suitable neat diagram explain modulating amplifier circuit. **5**

3. Attempt **any two** :

   a) Write a note on fibre losses. **5**

   b) A 20 MHz sinusoidal carrier wave of amplitude 10 mV is modulated by a 8500 Hz audio signal wave of amplitude 5 mV. Calculate the frequency component of the resultant modulated wave and their amplitude. **5**

   c) Draw the circuit diagram for 4 bit R-2R digital to analog converter. What is the advantage of the R-2R type over the weighted register type ? **5**

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

   a) i) State different characteristic of CMOS integrated circuit. **4**

   ii) State different types of digital logic. With suitable example explain combinational logic. **4**

   b) With suitable diagram explain the construction and working of FLASH (parallel encoded) A/D converter. **8**

   B) Attempt **any one** :

   a) The modulated carrier wave has maximum and minimum amplitudes of 850 mV and 150 mV. Calculate the value of percentage modulation. **2**

   b) An astable multivibrator (IC - 555) has $R_A = 4.57\ k\Omega$, $R_B = 3.49\ k\Omega$ and C = 100 nF. Find the frequency of oscillation of the circuit. **2**

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T.Y. B.Sc. (Semester – IV) Examination, 2010
PHYSICS (Paper – VI (A)) (Elective – II) (2004 Pattern)
PH – 346 : Astronomy and Astrophysics – II

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* ***wherever*** *necessary.*

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

   a) What are Pulsars ?

   b) What is an oscillating universe ?

   c) Which was the 1st Indian Satellite to be launched ?

   d) What are Binary stars ?

   e) What does Hubbles constant signify ?

   f) What are typical features of a "M" star spectra ?

   g) List various types of Galaxies.

   h) What is meant by Cosmology ?

   i) How are Blue Giants different from Red Giants ?

   j) What is meant by the main sequence line on the H-R diagram ?

2. Attempt **any two** :

   a) Discuss the Steady State Theory. **5**

   b) Write a short note on Quasars. **5**

   c) What is a Helium Flash ? **5**

P.T.O.

3. Attempt **any two** :

   a) What was the aim of the Voyager mission ? **5**

   b) Explain the terms Open and Closed Universe. **5**

   c) Explain the Proton-Proton Cycle in Stars. **5**

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

   a) Describe Eclipsing and Spectroscopic binaries. **8**

   b) Explain the spectral classification of OBAFGKM stars. **8**

   B) Attempt **any one** :

   a) Distinguish between Nova and Super Nova. **2**

   b) Distinguish between White Dwarfs and Red Giants. **2**

[3817] – 414

T.Y. B.Sc. (Semester – IV) Examination, 2010
PHYSICS (Paper – VI (B))
PH – 346 : Biophysics – II

Time : 2 Hours Max. Marks : 40

N.B. *: i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) Draw ***neat*** *diagrams* ***wherever*** *necessary.*

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

   a) Draw an EGC curve, and label various waves.

   b) What is chloroplast ?

   c) What are X-rays ?

   d) Define total Lung capacity.

   e) Write the equation explaining photosynthesis.

   f) Calculate the modulation index of an FM carrier having a carrier swing of 80 KHz.

   g) Define half cell potential.

   h) Define the term 'Cell Potential'.

   i) What is radio telephony ?

   j) State the principle of centrifuge machine.

2. Attempt **any two** :

   a) Explain principle and working of calorimeter with the help of neat diagram. **5**

   b) Explain the role of PS I and PS II in the photosynthesis process. **5**

   c) Explain how NMR technique is useful for structural determination. **5**

3. Attempt **any two** :

   a) Explain working of ECG machine with the help of block diagram. **5**

   b) What is 'Respirometer' ? Explain its principle and working. **5**

   c) Glucose is oxidised at 30°C with $\Delta G = -686 \times 10^3 \, cal/_{mole}$ and $\Delta H = -693 \times 10^3 \, cal/_{mole}$. Find energy changes occurring per molecule. **5**

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

   a) State the principle on which spectrophotometer works. Give its construction and explain the working in detail. **8**

   b) Discuss the thermodynamical aspect of photosynthesis and respiration in detail. **8**

   B) Attempt **any one** :

   a) Explain 'Hydrogen bonding'. **2**

   b) The angle of diffraction is 30° for second order diffraction of X-rays. The distance between two planes of biomolecule is 1.5×10^{-9} m. Calculate wavelength of X-rays. **2**

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[3817] – 414

T.Y. B.Sc. (Semester – IV) Examination, 2010
PHYSICS (Paper – VI (C))
PH – 346 : Communication Electronics – II

Time : 2 Hours Max. Marks : 40

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

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

   a) Define noise figure.

   b) What is a padder ?

   c) State the relation between the refractive index and velocities in two media.

   d) Give the principle of heterodying.

   e) What is meant by fidelity ?

   f) What is meant by modulation ?

   g) What is the function of trimmer ?

   h) What is step index fiber ?

   i) Give any one advantage of microwave radio transmission.

   j) Define acceptance angle.

2. Attempt **any two** :

   a) Draw block diagram of FM broadcast radio transmitter and explain various blocks. **5**

   b) Compare microwave communication with satellite communication. **5**

   c) Write a short note on reception using Yagi antenna. **5**

3. Attempt **any two** :

   a) What is fax ? Explain its basic working principle. **5**

   b) Write a note on microwave communication. **5**

   c) What is AGC ? Explain its basic working principle in radio receiver. **5**

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

   a) Draw block diagram of colour T.V. and explain each block. **8**

   b) i) Explain basic principle used in optical fibre communication. State its merits. **4**

      ii) Explain in short radio telephony. **4**

   B) Attempt **any one** :

   a) State the image frequency in a radio frequency program at 1 MHz and using IF of 455 KHz. **2**

   b) Explain the role of local oscillator in tuner circuit. **2**

[3817] – 414

T.Y. B.Sc. (Semester – IV) Examination, 2010
PHYSICS (Paper – VI (D))
PH – 346 : Electro Acoustics and Entertainment Electronics – II

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 (**one** mark **each**) : **10**

   a) Define the term ‘loudness level’.

   b) Give the equation relating phon and sone.

   c) What do you mean by articulation score ?

   d) Give the expression for sensitivity of carbon microphone.

   e) What is folded horn ?

   f) Give typical frequency response of an exponential horn speaker.

   g) What is threshold ?

   h) Explain the term ‘acoustic delay’.

   i) Define characteristic impedance.

   j) What do you mean by ‘room constant’ ?

2. Attempt **any two** :

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

   b) Discuss the strengths of medical ultrasonography. **5**

   c) Distinguish between Dolby B and C type NR systems. **5**

3. Attempt **any two** :

   a) A direct radiator dynamic loudspeaker has a radiation resistance of 2 kg/s. Its voice-coil is 7.5 m in length and suspended in a magnetic field of 1.0 Wb/m^2. Determine the acoustic power output for a current of 2A, if the mechanical impedance is 13.3 kg/s. **5**

   b) An exponential horn having a flare constant of 5.2 is used outdoors at a temperature of 42°C. Determine its cut-off frequency. **5**

   c) Give the equivalent circuit for a direct radiator loudspeaker. State the expression for its electroacoustic efficiency. **5**

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

   a) Give steps involved in the reciprocity calibration of a microphone. **8**

   Hence show that :

$$M_A = \left[\frac{2d\lambda E_A E_A^1}{\rho_0 C E_B I_B} \right]^{1/2}$$

   b) Derive the wave equation for horn loudspeakers. **8**

   B) Attempt **any one** :

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

   b) State any two advantages of folded horns. **2**

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T.Y. B.Sc. (Semester – IV) Examination, 2010
PHYSICS (Paper – VI (E))
PH – 346 : Medical Instrumentation – II

Time : 2 Hours Max. Marks : 40

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

1. Attempt **all** of the following : **10**

   a) Define systolic blood pressure.

   b) What is action potential ?

   c) What are transducers ?

   d) What is need of pacemaker ?

   e) What is electrocardiogram ?

   f) What is X-ray ?

   g) State any two basic requirement of bioamplifier.

   h) What is use of endoscope ?

   i) State elements of volume conductor field.

   j) What do you mean by electrical impedance ?

2. Attempt **any two** :

   a) Explain resting potential, depolarisation, repolarisation of a cell with sketches. **5**

   b) Discuss common problems on ECG recording. **5**

   c) Write a short note on indirect blood pressure measurement. **5**

3. Attempt **any two** :

   a) Explain use of fibre optics in medical instruments. **5**

   b) What do you know about heart sound ? What is its significance ? **5**

   c) Distinguish between wave diathermy and microwave diathermy. **5**

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

   a) Draw block diagram of X-ray unit. Explain each block in detail. Discuss power requirements. **8**

   b) i) Write a short note on functional organisation of peripheral nervous system. **4**

   ii) Discuss working of ultrasonic flow meter. **4**

   B) Attempt **any one** :

   i) Find cardiac output if heart rate is 60 bpm and stroke volume is 80 mL/beat. **2**

   ii) Calculate R. R. distance between consecutive peak of a normal person having heart rate 75 BPM. Assume that chart speed is 50 cm/s. **2**

[3817] – 414

T.Y. B.Sc. (Semester – IV) Examination, 2010
PHYSICS (Paper – VI (F))
PH – 346 : Motion Picture Physics – II

Time : 2 Hours Max. Marks : 40

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

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

   a) What do you mean by tripack ?

   b) What do you mean by fade ?

   c) What is zoom lens ?

   d) Draw split beam reflex view finder.

   e) What is mired unit ?

   f) What is gamma factor ?

   g) What do you meant by wide screen ?

   h) What is sprocket ?

   i) Draw a neat labelled diagram of variable shutter.

   j) What is colour temperature ?

2. Attempt **any two** :

   a) Explain laboratory special effects. **5**

   b) Explain D-log E curve and its use in photography. **5**

   c) Explain magazine and draw neat labelled diagram. **5**

3. Attempt **any two** :

   a) Explain image formation in colour – ve film with necessary diagram. **5**

   b) Explain drive mechanism and spool boxes of projection. **5**

   c) Explain glass shots and mirror shots. **5**

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

   a) Explain camera movements in detail. **8**

   b) Explain additive and subtractive method of colour mixing. **8**

   B) Attempt **any one** :

   a) Write E-6 process. **2**

   b) Define miniature. **2**

[3817] – 414

T.Y. B.Sc. (Semester – IV) Examination, 2010
PHYSICS (Paper – VI (G))
PH – 346 : Renewable Energy Sources – II

Time : 2 Hours Max. Marks : 40

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

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

   a) What is thermochemical pyrolysis ?

   b) Name different materials used in solar cell fabrication.

   c) State different types of solar cells.

   d) What is biomass ?

   e) What are advantages of photovoltaic system ?

   f) Define fill factor of solar cell.

   g) State principle of wind turbine.

   h) What is tidal energy ?

   i) State any two factors affecting efficiency of solar cell.

   j) Write disadvantages of wind energy.

2. Attempt **any two** :

   a) Describe principle and working of a solar cell. **5**

   b) Explain PV system for street light. **5**

   c) Compute the system of output and current of a PV array for a 100 Watt load needed for 24 hrs. at 24 V at New Delhi (ϕ = 28° 35'), mean horizontal isolation from standard map H_0 = 5.4 KWh/m^2. **5**

3. Attempt **any two** :

   a) Explain in detail vertical axis type wind mills. **5**

   b) Write a short note on photovoltaic pannels. **5**

   c) Explain the photosynthesis process in brief and give its necessary conditions. **5**

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

   a) Explain I-V characteristic of solar cell and hence define fill factor (F.F.) and maximum conversion efficiency. **8**

   b) Discuss temperature gradient in sea and explain its use for power generation. Draw the curve for typical variation of temperature with ocean depth. **8**

   B) Attempt **any one** :

   a) State the various form of energy wastage. **2**

   b) Explain the effect of green house on environment. **2**

[3817] – 414

T.Y. B.Sc. (Semester – IV) Examination, 2010
PHYSICS (Paper – VI (H))
PH – 346 : Basic Microprocessor and Programming – II

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* ***wherever*** *necessary.*
4) ***Use*** *of log table and calculator is* ***allowed****.*

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

   a) Define T state.

   b) What is stack ?

   c) Explain RIM instruction of μp 8085.

   d) What is the control word in 8255 if all the ports are working as output port in mode O ?

   e) What do you mean by program ?

   f) How many memory locations can be addressed by a microprocessor with 16 bit address lines ?

   g) What is the difference between CALL and JMP ?

   h) What is a flag ?

   i) What is the difference between assembler and compiler ?

   j) What is the need to demultiplex $AD_0 – AD_7$ bus of μp 8085 ?

2. Attempt **any two** :

   a) Write a note on interrupt system of μp 8085. **5**

   b) Draw a schematic diagram to explain control word register format for PPI 8255. **5**

   c) Explain the difference between CALL-RET and PUSH-POP. **5**

3. Attempt **any two** :
   a) Explain various addressing modes in 8085 with examples. **5**
   b) Explain RAL and RAR instruction with example. **5**
   c) Write an assembly level program to add series of 10 numbers. **5**

4. A) Attempt **any one** :
      a) Draw a flow chart and write assembly level program to convert a 4 bit binary number to corresponding ASCII code. **8**
      b) A block of ten 8 bit numbers is stored from 7000H to 7009H. Draw a flow chart and assembly level program to MOVE this block to 8000H – 8009H. **8**

   B) Attempt **any one** :
      a) Give the difference between L X IH 6000H and LHLD 6000H. **2**
      b) What is the difference between HLT and RET ? **2**

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T.Y. B.Sc. (Semester – IV) Examination, 2010
PHYSICS (Paper – VI (I))
PH – 346 : Auxiliary Electronics

Time : 2 Hours Max. Marks : 40

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

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

   a) What is the use of function switch in Simpson-260 multimeter ?

   b) State two applications of capacitor.

   c) Draw the electrical symbol for transformer.

   d) What is a transducer ?

   e) Draw the symbol for termistor.

   f) State two types of resistor.

   g) What is full form of LVDT ?

   h) Why shielding and earthing is necessary ?

   i) What is photoresist ?

   j) What is electrical wattage of a resistor ?

2. Attempt **any two** :

   a) What is thermocouple ? What are its applications ? State Thomson effect in thermoelectricity. **5**

   b) Draw the circuit symbol for transformer. State different types of transformer. What is its use in electrical or electronic circuit ? **5**

   c) What is thermistor ? What are two basic types of thermistor ? What is the temperature coefficient of the thermistor ? State its unit. **5**

3. Attempt **any two** :

   a) A wire strain with a gauge factor 2 is connected to a steel chamber which is subjected to a strain of 10^{-6}. If original resistance of gauge is $100\,\Omega$, calculate the change in gauge resistance. **5**

   b) What is an inductor ? What are the different types of inductor ? Calculate reactance offered by inductor of value 0.01 H at frequency 50 Hz. **5**

   c) Explain the working of function generator using IC 8038. **5**

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

   a) Explain working and application of analog multimeter with circuit diagram. What is sensitivity of multimeter ? **8**

   b) With the help of neat block diagram, explain construction and working of CRO. **8**

   B) Attempt **any one** :

   a) What is Hysteresis loss in transformer ? **2**

   b) What is tolerance in resistor value ? **2**

[3817] – 414

T.Y. B.Sc. (Semester – IV) Examination, 2010
PHYSICS (Paper – VI (J))
PH – 346 : Elements of Material Science

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 (**1** mark **each**) : **10**

   a) What do you mean by toughness of the material ?

   b) Define electrical conductivity of the material.

   c) What is alloy ?

   d) State the types of imperfections in crystals.

   e) Give any one advantage of hot working.

   f) The degree of polymerization of polyethelene is 1200. Calculate the molecular mass.

   g) Give any two uses of polymers.

   h) State the types of glasses.

   i) State the co-ordinates of phase diagram.

   j) What are the objectives of phase diagram ?

2. Attempt **any two** :

   a) What is deformation ? Compare between elastic and plastic deformations. **5**

   b) Define polymerization. Distinguish between addition and condensation polymerization. **5**

   c) Discuss the electromagnetic behaviour of ceramics. **5**

3. Solve **any two** :

   a) At certain temperature there can be 1.7 w/o carbon in solid solution with FCC iron. How many carbon atoms will be for 100 unit cells ? **5**
   Given : At. Wt. of Fe = 55.85 a.m.u.
   At. Wt. of C = 12.01 a.m.u.

   b) One out of 10^{10} atoms has the energy required to jump out of its lattice sites into an interstitial position at 500°C. This fraction increases to 10^{-9} at temperature of 600°C. Calculate the energy required for this jump. ($K = 13.8 \times 10^{-24}$ J/atom. °K). **5**

   c) Calculate the density of CsBr which has the same structure as CsCl. The centres of the two unlike atoms are separated by 0.37 mm.
   Given : At Wt. of Cs = 132.9 a.m.u.
   At. Wt. of Br = 79.9 a.m.u. **5**

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

   a) Explain the process of cold working of metals with reference to **8**
      i) advantages
      ii) disadvantages
      iii) working processes.

   b) Give the importance of phase diagram. Draw and explain the phase diagram for solubility of sugar in water. **8**

   B) Attempt **any one** :

   a) Differentiate between recovery and recrystallization. **2**

   b) Comment on the relationship between the structure, properties and processing. **2**

[3817] – 414

T.Y. B.Sc. (Semester – IV) Examination, 2010
PHYSICS (Paper – VI (K))
PH – 346 : Vacuum Technology

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 (**one** mark **each**) : **10**

   a) Define pump down time.

   b) What is degassing ?

   c) What is viscous diffusional flow ?

   d) What is ultimate pressure ?

   e) What is adsorption ?

   f) What is absolute vacuum ?

   g) Define mean free path.

   h) Define true leak.

   i) Give any two units of vacuum measurements.

   j) Define pumping speed.

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

   a) Explain various types of gaskets. **5**

   b) Describe construction and working of pirani gauge with neat diagram. **5**

   c) Describe the construction and working of sorption pump with neat diagram. **5**

3. Attempt **any two** of the following :
   a) Calculate the effective pump speed for the pump of speed 90 lit/sec with conductance of 60.0 lit/sec. **5**
   b) Discuss mercury U-tube manometer with neat diagram. **5**
   c) Explain the requirements of seals used at low and high temperatures. **5**

4. A) Attempt **any one** of the following :
      a) Discuss the construction and working of oil sealed rotary pump. **8**
      b) Explain the construction and working of Byard Alpert gauge with diagram. **8**
   B) Attempt **any one** of the following :
      a) Explain the moisture trap. **2**
      b) Give two applications of vacuum systems. **2**

[3817] – 414

T.Y. B.Sc. (Semester – IV) Examination, 2010
PHYSICS (Paper – VI (L))
PH – 346 : Lasers

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

   a) Give examples of Gas Lasers.

   b) Which is the active material used in Ruby Laser ?

   c) At which wavelength does He-Ne Laser emit ?

   d) What is the need for population inversion ?

   e) Explain the term Spontaneous Emission.

   f) What is meant by Laser Fusion ?

   g) What is Doppler Broadening ?

   h) What is meant by Polarization ?

   i) What do you understand by Pumping action ?

   j) What is a metastable state ?

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

   a) Describe the use of Lasers in Industry. **5**

   b) Describe the characteristics of Laser Light. **5**

   c) Draw a neat labelled diagram of a Ruby Laser. **5**

3. Attempt **any two** of the following :
   a) What is an Optical Resonator ? What is its need ? **5**
   b) How can a Laser be used in Range Finding ? **5**
   c) A laser emits at 671 nm at 5 mW. How many photons per sec. does it emit ? **5**

4. A) Attempt **any one** of the following :
      a) Describe in detail the working of the He-Ne Laser. **8**
      b) What is meant by line shape broadening ? Derive an expression for Lorentz line shape broadening using classical treatment. **8**

   B) Attempt **any one** of the following :
      a) What is meant by spatial coherence ? **2**
      b) Calculate the frequency of laser light of wavelength 6943Å. **2**

[3817] – 422

T.Y. B.Sc. (Sem. – IV) Examination, 2010
BOTANY – II
BO - 342 : Biology of Seed Plants – III
(Anatomy and Embryology)
(2004 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer the following : **10**

a) Which tissue is responsible for secondary growth ?

b) Define stomata.

c) What is maceration ?

d) Enlist any two tissue systems in plants.

e) Give any one adaptive significance of Anomalous secondary growth.

f) Define embryology.

g) How many sporangia are found in tetrasporangiate author ?

h) What is cytokinenesis ?

i) Define chalazogamy.

j) What is megasporogenesis ?

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

a) Comment on principle of incompressibility.

b) What is endosperm ? Describe nuclear type of endosperm.

c) Discuss the technique of sectioning and staining in Anatomy.

P.T.O.

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

   a) Structure of 8 nucleated embryo sac.

   b) Tyloses

   c) Types of microspore tetrad.

4. What is anomalous secondary growth ? Explain the unusual behaviour of cambium in Bignonia stem. **10**

   OR

4. What is double fertilization ? Explain Syngamy and triple fusion. Give its significance in Angiosperms.

[3817] – 425

T.Y. B.Sc. (Semester – IV) Examination, 2010
BOTANY (Paper – V)
BO-345 : Molecular Biology and Biotechnology (2004 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 followings : **(10)**

a) What is rhizogenesis ?

b) Give Chargaff's Law.

c) Define molecular biology.

d) Define gene.

e) Who proposed the clover-leaf model of t-RNA ?

f) Write the use of southern blotting.

g) Name any two enzymes used in protoplast fusion technology.

h) Define cellular differentiation.

i) Give the function of RNA polymerase.

j) Give any two achievements in crop biotechnology.

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

a) Explain the types of embryos.

b) Write the mechanism of Dark-excision repair.

c) Give Meselson and Stahl experiment of semi-conservative replication.

P.T.O.

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

   a) Gene-libraries

   b) Triplet genetic code

   c) Electroporation.

4. What is gene regulation ? Explain the mechanism of Lac Operon in E-Coli. **(10)**

   OR

4. Enlist various types of vectors used in plant genetic engineering and give details of Ti and YAC plasmids.

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[3817] – 430

T.Y. B.Sc. (Sem. – IV) Examination, 2010
ZOOLOGY (Paper – IV)
ZO - 344 (a) : Economic Entomology (2004 Pattern)

Time : 2 Hours Total 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) What are miners ?
   2) What is cotton stainer ?
   3) What do you mean by veterinary entomology ?
   4) Name any two insects as a source of medicine.
   5) What is IPM ?
   6) What is cochineal ?
   7) Mention any two examples of predacious insects.
   8) What is gall ?
   9) What is honey dew ?
   10) What is shellac ?

2. Attempt **any two** of the following : **10**
   i) Explain the damage caused by defoliators.
   ii) Describe the role of insects as biological control.
   iii) Describe cultural methods of pest control.

3. Write notes on **any two** of the following : **10**
   a) Potato tuber moth.
   b) Sugarcane stem borer.
   c) Calliphora
   d) Forest Pests.

4. What is pest ? Describe various types of insect pests. **10**

   OR

   Describe with the help of suitable examples, how insects are enemies of plants. **10**

P.T.O.

[3817] – 430

ZO - 344 (b) : Public Health and Hygiene
(2004 Pattern)

Time : 2 Hours | Total 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) Define Health.
   2) What are condiments ?
   3) State composition of air.
   4) Define sanitary well.
   5) Which viral disease is spread by dog ?
   6) What are occupational diseases ?
   7) State importance of vital statistics.
   8) Name any two diseases spread by housefly.
   9) State hazards caused by radiation.
   10) State damage caused by silverfish.

2. Attempt **any two** of the following : **10**
   i) Explain the natural ventilation system.
   ii) Explain different diseases spread by soil.
   iii) Explain role of rat as a pest.

3. Write notes on **any two** of the following : **10**
   a) Drug addiction.
   b) Standards for urban housing.
   c) Sewage disposal method.
   d) Water pollutants.

4. Describe various methods of food preservation. **10**

OR

Explain the signs, Symptoms, mode of transmission and control measures of leprosy.

[3817] – 430

ZO - 344 (c) : Aquaculture
(2004 Pattern)

Time : 2 Hours | Total 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) Define integrated fish farming.

2) Name any two organic manures used in pond fertilization.

3) What is pond cage culture ?

4) State any two equipments used in maintenance of aquarium.

5) Name any two endoparasites of fishes.

6) What is gene banking ?

7) Mention any two chemical factors related to aquaculture.

8) Write any two devices used in prawn harvesting.

9) Name any two moluscs used in aquaculture.

10) Define phytoplankton.

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

i) Explain the role of physical factors in fish pond.

ii) State the role of earvicidal fishes as a substitute of insecticides.

iii) Explain the methods of harvesting ornamental fishes and fishes related to biological control.

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

   a) Fish protozoan diseases and their control.

   b) Role of extension agencies in aquaculture.

   c) Process of fish marketing related to food value.

   d) Pond fertilization.

4. Give an account of culture methods of cat fishes and air breathing fishes. Add a note on their significance. **10**

   OR

   What is gene manipulation ? Describe its technique and a note on its significance. **10**

[3817] – 431

T.Y. B.Sc. (Semester – IV) Examination, 2010
ZOOLOGY (Paper – V) (2004 Pattern)
ZO–345 : Molecular Biology

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) What is C-DNA ?

2) What is genetic engineering ?

3) State any two features of Z-DNA.

4) State the function of amino-acyl-tRNA synthatase.

5) What is a bacteriophage ?

6) Define Euchromatin.

7) State two applications of ELISA.

8) What are Okazaki fragments ?

9) Define exon.

10) What charge is present on DNA ?

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

i) Explain the initiation of transcription.

ii) Explain the double helical structure of DNA.

iii) What is genetic code ? Explain its properties.

P.T.O.

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

   a) Cloning vectors

   b) PCR

   c) tRNA as an adaptor

   d) Nucleosome.

4. Explain Griffith's experiment and add a note on mechanism of transformation. **10**

   OR

4. Explain in detail Lac operon. **10**

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T.Y. B.Sc. (Semester – IV) Examination, 2010
ZOOLOGY
ZO-346 : Developmental Biology (Paper – VI)
(2004 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) Define Chemotaxis.
   2) What is differentiation ?
   3) What is chalaza ?
   4) Define polyspermy.
   5) What is emboly ?
   6) Define cloning.
   7) Mention any two types of eggs.
   8) What are morphogenetic movements ?
   9) Enlist extra embryonic membranes.
   10) Explain role of MPF (Maturation Promotion Factor).

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

   i) Describe different types of cleavage patterns.
   ii) Sketch and label the structure of human sperm.
   iii) Describe the process of vitellogenesis.

P.T.O.

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

   a) Fertilizin and antifertilizin reaction

   b) Organisers

   c) Allantois

   d) General structure of an ovum.

4. What is blastulation ? Describe types of blastulae and add a note on its significance. **10**

OR

4. Trace development of nervous system in chick upto 72 hours of incubation. **10**

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[3817] – 433

T.Y. B.Sc. (Semester – IV) Examination, 2010
GEOLOGY (Paper – I)
GL. 341 : Indian Stratigraphy – II
(2004 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) Name the fauna of tertiary of Assam.

b) Mention structural features of Deccan Traps.

c) What is the age of Siwaliks ?

d) Give the geographical distribution of Karewas.

e) Name the important fossils of Mesozoic Era.

f) Name the fossils found in cretaceous rocks of Narmada Valley.

g) Name the divisions of Umia group with their fauna.

h) Name the important mega-fossils of Siwaliks.

i) Name the type area of Permian.

j) Which type of climate existed during Talchir time ?

P.T.O.

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

   a) K-T boundary.

   b) Classification of Jurassics.

   c) Depositional environment of Siwaliks.

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

   a) Geological and geographic distribution of Deccan Traps.

   b) Lithological succession and fossil content of Spiti area.

   c) Cretaceous of Tiruchirapalli.

4. Discuss the type area, broad lithology, fossil content and classification of carboniferous system. **10**

   OR

   Devonian system.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
GEOLOGY (Paper – II)
GL – 342 : Petrology – II
(2004 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) Name any two compounds that melt incongruently in a binary system.

b) Name the earliest member (mineral) to appear in the continuous reaction series.

c) What is a anorthite ?

d) Enumerate any two modes of transport of sediments.

e) Name any two stable heavy minerals.

f) Define weathering potential index.

g) What is meant by maturity of sediments ?

h) What are biomicritos ?

i) What is a Petrographic, Province ?

j) What is meant by a 'QAP' diagram ?

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

a) Mineral composition, origin and tectonic setting of granites.

b) CIPW classification of igneous rocks.

c) Leucite - Silica Binary System of crystallisation of Magma.

P.T.O.

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

   a) Okada's classification of sandstones

   b) Definition and types of sedimentary facies.

   c) Provenance of sediments based on light mineral suites.

4. Define and explain the selective sorting and progressive dilution during dispersal of sediments ? **10**

OR

4. What are the factors that control the textures of the sediment rock ? Describe the grade scale of Wentworth.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
GEOLOGY
GL-343 : Geotectonics Geology
(Paper – III) (2004 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 Hot spots ?

b) What are Primary Seismic Waves ?

c) Who proposed the theory of Plate tectonics ?

d) Define the term TRM.

e) Name any one Triple junction.

f) Give one example of continent-continent collision.

g) What is meant by the term orogenesis ?

h) Enumerate the depth at which the mantle-core boundary is located.

i) What is a low velocity zone ?

j) What is meant by magnetic reversal ?

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

a) Distinction between divergent and convergent plate boundaries.

b) Sea floor spreading.

c) Transform faults.

P.T.O.

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

   a) Characteristics of the mantle.

   b) Palaeomagnetic evidences of continental drift.

   c) Deep sea trenches.

4. Describe the convection current theory and thermal cycle hypothesis. **10**

   OR

   Enumerate and describe the major discontinuities within the earth, with the help of a neat diagram.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
GEOLOGY (Paper – IV)
GL 344 : Economic Geology (II)
(2004 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.
   a) Name the chief ore minerals of Lead.
   b) Name the clay used for manufacture of Crockery.
   c) Give the important localities of Bauxites deposits in Maharashtra.
   d) Which are the semi-precious varieties of Quartz family.
   e) Name the double sulphide of Silver and Arsenic.
   f) In which part of India Corals are found ?
   g) Name the transparent and clearable variety of Gypsum.
   h) Name the important gold-fields of Karnataka State.
   i) Enumerate important contents of a Mining Report.
   j) What is period for which a mining lease may be granted ? **10**

2. Write notes on (**any two**) :
   a) Geopressurized zones and their use as the source of energy
   b) Geological distribution of Mica deposits in India.
   c) Objectives of NMP. **10**

P.T.O.

3. Answer the following (**any two**) :
   a) Describe the Mineralogy of Nickel and Chromium Ore deposits and give their geographical distribution in India.
   b) Distinguish between Wet and Dry steam.
   c) Give the geological distribution and uses of Precious stones. **10**

4. What are the restrictions on the grant of "Prospecting Licence" or a "Mining Lease" ? Explain the clause pertaining to the preferential right regarding mining lease.

OR

4. Give the mineralogy, geological and geographical distribution of Iron deposits in India. Add a note on it's uses. **10**

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T.Y. B.Sc. (Semester – IV)Examination, 2010
GEOLOGY (Paper – V) (2004 Pattern)
GL 345 : Natural Resource Management

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 **two/three** lines : **10**

   a) Give two uses of wind energy.

   b) What is fly ash ?

   c) Define pearched aquifer.

   d) What are 'alternate resources of energy'.

   e) Give composition of coal.

   f) Define an 'environment'.

   g) What is land capability index ?

   h) Give three stages of coalification.

   i) Give geological constraints in conservation of natural resources.

   j) What is lignite ?

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

   a) Porosity and permeability.

   b) Structural traps of oil.

   c) Uses of solar energy for betterment of mankind.

P.T.O.

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

   a) Objectives of watershed management.

   b) Classification of soils.

   c) Surface indications of petroleum occurrence.

4. Describe geological and geographical distribution and stratigraphy of Raniganj coal field. **10**

OR

4. Describe the vertical distribution of ground water. Add a note on conservation of ground water.

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[3817] – 440

Third Year B.Sc. (Semester – IV) Examination, 2010
STATISTICS (Paper – II) (Principal)
ST-342 : Testing of Hypotheses
(2004 Pattern)

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* ***allowed****.*
4) ***Symbols*** *and* ***abbreviations*** *have their usual meaning.*

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

i) Let $\overline{X}$ be the mean of a random sample of size 'n' from $N(\mu, \sigma_0^2)$. Then 95% confidence interval for μ is

A) $\overline{X} \mp \frac{1.96\,\sigma_0}{\sqrt{n}}$ B) $\overline{X} \mp \left(\frac{2.56\,\sigma_0}{\sqrt{n}}\right)$

C) $\overline{X} \mp \frac{1.64\,\sigma_0}{\sqrt{n}}$ D) $\overline{X} \mp \left(\frac{1.96\,\sigma_0^2}{n}\right)$

ii) Type I error is

A) Reject H_0, when H_0 is true B) Accept H_0, when H_1 is true
C) Reject H_0, when H_1 is true D) Accept H_1, when H_0 is true

iii) In S.P.R.T. for testing the mean of an exponential distribution, $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1 (< \theta_0)$ Reject H_0 if

A) $\sum_1^m X_i^2 \le a_0 + bm$ B) $\sum_1^m X_i^2 \ge a_0 + bm$

C) $\sum_1^m X_i \le a_0 + bm$ D) $\sum_1^m X_i \ge a_0 + bm$

P.T.O.

iv) For testing the randomness of a sample, we use

A) Sign test B) Run test

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

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

i) There does not exist an uniformly most powerful test for testing $H_0 : \mu = \mu_0$ against $H_1 : \mu \neq \mu_0$ for a $N\left(\mu, \sigma^2\right)$ distribution.

ii) Length of 95% confidence interval for a certain parameter is always more than that of 90% confidence interval for the same parameter.

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

i) Composite hypothesis

ii) Critical region.

d) i) What is meant by a 'pivotal quantity'. **1**

ii) What is meant by 'distribution free statistic' ? **1**

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

a) Obtain a confidence interval for σ^2 in a $N\left(\mu, \sigma^2\right)$ population when μ is unknown, given a random sample of size n from that population [Use confidence coefficient $(1-\alpha)$].

b) A continuous r.v.x has p.d.f.

$$f(x, \theta) = \begin{cases} (\theta+1)x^{\theta}, & 0 \leq x \leq 1 \\ 0, & \text{otherwise} \end{cases}$$

To test the hypothesis $H_0 : \theta = 1$ against $H_1 : \theta = 4$, a single observation is taken, find the best critical region of size α for this test. Also find probabilities of two kinds of errors.

c) Explain Kolmogorov – Smirnov test.

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

   a) Construct SPRT of strength (α, β) for testing $H_0 : \lambda = \lambda_0$ against $H_1 : \lambda = \lambda_1$ $(\lambda_1 > \lambda_0)$ for a Poisson variate X with mean λ.

   b) Construct uniformly most powerful test of size α for testing $H_0 : \mu = \mu_0$ against $H_1 : \mu > \mu_0$, where μ is the mean of $N(\mu, \sigma^2)$, based on a random sample taken from this distribution.

   c) The win loss record of a certain basket ball team for their last consecutive 25 games was as follows : WWLLWLWLLLWWLLWWW LLWLWWLW. Test whether the sequence of wins and losses is random at 5% level of significance.

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

   a) i) Explain Wald's sequential Probability Ratio Test procedure. In what respect does it differ from fixed sample size tests ?

   ii) Let X be a random variable with its p.m.f. under H_0 and under H_1 are as given below :

x	1	2	3	4
$P[X = x / H_0]$	0.1	0.2	0.3	0.4
$P[X = x / H_1]$	0.4	0.3	0.2	0.1

   Write all critical regions with $\alpha \leq 0.3$. Also find powers of all these critical regions. **(6+4)**

   b) i) Describe sign test for one-sample and two sample problems.

   ii) Let 41.8, 53.2, 48.5, 40.6, 50.8, 54.9, 72.1, 76.2, 60.4 be the random sample from a continuous distribution with unknown median M. Find $P[X_{(2)} < M < X_{(8)}]$, hence find 95% confidence interval for M, approximately.

   iii) Write one advantage and disadvantage of non-parametric tests. **(4+4+2)**

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[3817] – 441

T.Y. B.Sc. (Semester – IV) Examination, 2010
STATISTICS (Principal) (Paper – III)
ST-343 : Statistical Process Control (Offline Methods)
(2004 Pattern)

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 abbriviations have their usual meaning.*

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

i) Consumer's risk is

A) Probability of rejecting a lot of quality LTFD

B) Probability of accepting a lot of quality LTFD

C) Probability of accepting a lot of quality AQL

D) Probability of rejecting a lot of quality AQL

ii) From the OC curve of single sampling plan following can not be determined

A) Producer's risk

B) Consumer's risk

C) Point of indifference

D) AOQL

iii) For single sampling plan, ATI is given by

A) N B) $nP_a + N(1 - P_a)$

C) NP_a C) nP_a

iv) If a series system consists of three components with individual reliabilities 0.95, 0.8 and 0.9 respectively then reliability of the system is

A) 0.80 B) 0.95

C) 0.684 D) 1

P.T.O.

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

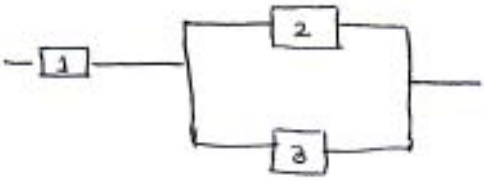
i) For single sampling plan ASN always equal to N.

ii) OC curve of a single sampling plan is a curve of probability of acceptance of a lot and incoming quality p of a lot.

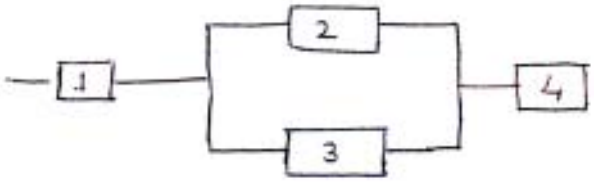
c) i) Define : minimal path vector. **1**

ii) State one advantage of double sampling plan over single sampling plan. **1**

d) i) For a system with following reliability block diagram, draw fault tree diagram. **1**



ii) Obtain structure function of the system with following reliability block diagram. **1**



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

a) Obtain expression for AOQ for single sampling plan.

b) Define reliability of a coherent system. Obtain reliability of parallel system with three components if all the components have same reliability.

c) Write a note on ISO 9001 : 2000

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

   a) Describe working of a double sampling plan.

   b) For a series system with three components, find all possible path vectors, minimal path vector, all possible cut vectors, minimal cut vector, minimal cut sets.

   c) Define IFR. Prove that exponential distribution belongs to IFR class.

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

   a) i) For a double sampling plan with N =2000, $n_1 = 60$, $c_1 = 1$, $n_2 = 100$, $c_2 = 3$. Find ATI if lots of quality p = 0.04 are submitted for inspection. **7**

   ii) Draw the reliability block diagram for the system with structure function **3**

   $$\phi(\underline{X}) = x_1 x_2 [1-(1-x_3)(1-x_4)]$$

   b) i) Define hazard rate r(t). Show that $r(t) = \frac{f(t)}{\overline{F}(t)}$. **5**

   ii) Prove that hazard rate of a series system of components having independent life times is summation of component hazard rates. **5**

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T.Y. B. Sc. (Semester – IV) Examination, 2010
STATISTICS (Principal) (Paper – V)
ST-345 : Operations Research
(2004 Pattern)

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) Choose the correct alternative in **each** of the following : **(1 each)**

i) One disadvantage of using North-West corner rule to find initial solution to the transportation problem (TP) is that

A) it is complicated to use

B) it does not take into account cost of transportation

C) it always leads to a degenerate initial solution

D) it gives infeasible solution.

ii) A feasible solution to an LP problem is a solution which

A) must satisfy all constraints simultaneously and non-negativity restrictions

B) must be a corner point of the feasible region

C) need not satisfy all of the constraints, only some of them

D) must optimize the value of the objective function.

iii) In the optimal simplex table, $Z_j - C_j = 0$ value indicates existence of

A) unbounded solution

B) no solution

C) alternative solution

D) infeasible solution

iv) For a maximization problem, the objective function coefficient for an artificial variable is

A) + M B) – M C) Zero D) 1

P.T.O.

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

i) Every sequencing problem must have unique optimal solution.

ii) If the solution space is unbounded, the value of objective function is always unbounded.

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

i) basic feasible solution to an LPP.

ii) an optimal solution to an LPP.

d) Define **each** of the following : (**1 each**)

i) total elapsed time in sequencing problem.

ii) standard form of an LPP.

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

a) i) Explain the use of slack variable and artificial variable in solving an LPP by simplex method with an illustration. **3**

ii) State criteria used in simplex method for deciding whether an LPP has unbounded solution and infeasible solution. **2**

b) Use graphical method to solve the following LPP **5**

Minimize $Z = 5X_1 + 4X_2$

Subject to the constraints

$X_1 - 2X_2 \leq 1$

$X_1 + 2X_2 \geq 3$

$X_1, X_2 \geq 0$

c) Five jobs are to be processed on machines M_1 and M_2, first on M_1 and then on M_2. The processing times, in hours, on each machine are given in the table given below : **5**

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

In what sequence the jobs are to be processed to minimize the total elapsed time ? What are the idle time of the machines and the total elapsed time ?

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

a) i) Explain the least cost method to obtain IBFS of a balanced TP. **3**

ii) What is an unbalanced assignment problem ? Explain in brief how to solve it. **2**

b) The assignment costs of four operators to four machines are given in the following table : **5**

Machines	Operators			
	I	**II**	**III**	**IV**
A	18	26	17	11
B	13	28	14	26
C	38	19	18	15
D	19	26	24	10

Write the assignments of machines to various operators so as to minimize the total cost.

c) Write the dual of the following LPP : **5**

Minimize $Z = 2X_1 + 5X_2 + X_3$

Subject to the constants

$9X_1 - 3X_2 + 5X_3 \geq 7$

$6X_1 - 4X_2 - 3X_3 \leq 2$

$X_1, X_2 \geq 0$; X_3 unrestricted.

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

a) Solve the following LPP by Simplex method :

Maximize $Z = 3X_1 - X_2$

Subject to the constraints

$2X_1 + X_2 \geq 2$

$X_1 + 3X_2 \leq 3$

$X_2 \leq 4$

$X_1, X_2 \geq 0.$

b) Goods have to be transported from sources S_1, S_2 and S_3 to the destinations D_1, D_2, D_3 and D_4. The transportation cost per unit, capacities of the sources and requirements of the destinations are given in the following table :

Source	**Destination**				**Capacity**
	D_1	**D_2**	**D_3**	**D_4**	
S_1	19	30	50	10	7
S_2	70	30	40	60	9
S_3	40	8	70	20	18
Requirement	5	8	7	14	34

Find the optimal solution to the above TP by obtaining initial solution using VAM.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
GEOGRAPHY
Gg-342 : Geography of Tourism (Paper – II)
(2004 Pattern)

Time : 2 Hours

Max. Marks : 40

***Instructions**: 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Draw neat diagrams and sketches **wherever** necessary.*
*4) **Use** of map stencils is **allowed**.*

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

   1) What is 'economic multiplier' ?
   2) Provide any two examples of boosting trade due to tourism.
   3) What is meant by 'tourist literature' ?
   4) State any two impacts of tourism on religion.
   5) What is human resource planning in tourism ?
   6) State any two print media commonly used in tourism promotion.
   7) Mention any two impacts of tourism on waterbodies.
   8) State any two obstacles in tourism planning.
   9) Mention any two tourist attractions from Ganapati Pule.
   10) Which hill station is called 'the Queen of Satpoda' ?

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

   a) Tourism and foreign exchange
   b) Impact of tourism on wildlife
   c) Neocolonialism

P.T.O.

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

   a) Levels of tourism planning

   b) Tourism and financial planning

   c) Bhakra dam.

4. Discuss with suitable examples tourism planning in India. **10**

   OR

   Describe the importance of Melghat and Kaziranga as National Parks. **10**

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[3817] – 447

T.Y. B.Sc. (Semester – IV) Examination, 2010
GEOGRAPHY – III
Gg-343 : Fundamentals of Geographical Information System
(2004 Pattern)

Time : 2 Hours Max. Marks : 40

***Instructions** : 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**

1) List commonly used Boolean operations.

2) What is spatial filtering ?

3) What is SQL ?

4) What is sixth line dropout ?

5) List the main types of vector overlays.

6) Define gravity model.

7) What do you mean by DN ?

8) What is density slicing ?

9) What do you mean by DBMS ?

10) What is DEM ?

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

1) What are Atmospheric corrections ?

2) What do you mean by edge enhancement ?

3) State the various interpolation methods.

P.T.O.

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

   1) Non spatial analysis

   2) Overlay analysis

   3) Query in GIS.

4. Comment on the various methods of image processing. **10**

   OR

   Give an account of topographic analysis in GIS.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
MICROBIOLOGY (Paper – I)
MB–341 : Medical Microbiology (2004 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions carry* ***equal*** *marks.*

2) ***All*** *questions are* ***compulsory****.*

3) Draw neat, labelled diagrams ***wherever*** *necessary.*

1. A) Match the following : **5**

1) Influenza	a) Retrovirus
2) Dengue fever	b) Hepatitis B virus
3) AIDS	c) Hepatitis A virus
4) Polio	d) Arbovirus
5) Serum Hepatitis	e) Picornavirus
	f) Orthomyxovirus

B) State **true** or **false** : **5**

1) Oral thrush is caused by Candida species.
2) Man is the definitive host of malarial parasite.
3) The feeding stage of E. histolytica is known as trophozoite.
4) Nalidixic acid inhibits nucleic acid synthesis.
5) Polymyxin B is antiviral drug.

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

a) Draw the structure of HIV

b) Describe cryptococcosis

c) Explain in short any one mechanism of drug resistance in bacteria.

P.T.O.

3. Attempt **any two** : **10**

a) Comment on treatment of malaria

b) Explain mode of action of Actinomycin D

c) Write note on MIC.

4. Attempt **any one** : **10**

a) Discuss morphology and antigenic variation of Influenza virus.

b) Explain antifungal drugs.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
MICROBIOLOGY (Paper – II)
MB : 342 : Genetics and Molecular Biology
(2004 Pattern)

Time : 2 Hours

Max. Marks : 40

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

1. A) Answer the following as directed : **5**

i) State true or false : Structural gene lac y codes for the enzyme β galactosidase.

ii) What is the correct sequence of stages in eukaryotic cell cycle ?
   i) $S - G_1 - M - G_2$
   ii) $G_1 - S - G_2 - M$
   iii) $G_1 - M - G_2 - S$
   iv) $M - S - G_1 - G_2$.

iii) Define – cryptic plasmids.

iv) Complete the sentence
In lysogenic cycle, the Viral DNA is in _____ state.

v) Terminal nucleotidyl transferase is used in _____
   i) Preparation of linkers
   ii) Homopolymer tailing
   iii) Preparation of adaptors
   iv) Activity of ligase

B) Match the following : **5**

A	**B**
i) Amber mutant	a) PCR technique
ii) Pribnow box	b) Conditional lethal
iii) Tag polymerase	c) ECORI target site
iv) GAATTC	d) Aneuploidy
v) 2n –1	e) Melting of DNA

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

   a) Justify – plasmid P^{BR322} is a good cloning vector.

   b) Explain host range mutants of bacteriophage.

   c) Enlist and explain properties encoded by plasmid.

3. Draw diagrams of **any two** of the following : **10**

   a) Graphical representation of one step growth curve of a lytic phage.

   b) Mitotic cell division.

   c) Southern blotting technique.

4. Explain the various stages of transcription of a bacterial gene. Highlight role of various forms of RNA polymerase at each stage. **10**

   OR

   What is parasexual cycle ? Explain heterokaryon formation and describe mitotic crossing over in the parasexual cycle.

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T. Y. B.Sc. (Semester – IV) Examination, 2010
MICROBIOLOGY (Paper – III)
MB-343 : Enzymology and Biochemistry
(2004 Pattern)

Time: 2 Hours Max. Marks: 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) ***All*** *questions carry* ***equal*** *marks.*
3) Draw neat, labelled diagrams/structures ***wherever*** *necessary.*

1. Attempt the following : **10**

   a) Write two examples of photosynthetic bacteria with species name.

   b) Write components of photosynthetic apparatus in bacteria.

   c) Give names of any two cross liking agents used for immobilization of enzyme.

   d) Give name of multienzyme involved in fatty acid biosynthesis.

   e) Define free energy.

   f) State the second law of thermodynamics.

   g) Give two names of carriers used in immobilization of enzyme by adsorption.

   h) Write any two elongation factors involved in protein synthesis.

   i) Define calorie.

   j) What is the value of $\Delta G°$ at PH7.0 ? When ATP is hydrolyzed to AMP ?

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

   a) Explain chemiosmotic coupling hypothesis for formation of ATP.

   b) Describe different ways of passive transport mechanism.

   c) What is photophosphorylation ? Explain noncyclic photophosphorylation.

P.T.O.

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

   a) Explain the process of glycogen degradation.

   b) Enlist 5 applications of immobilized enzymes.

   c) Explain the Kreb's Hansleit cycle of protein degradation.

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

   a) What is meant by high energy compound ? Draw the structure of ATP and explain how it is high energy compound.

   b) What are fatty acids ? Explain fatty acid biosynthesis with palmitic acid as an example.

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T.Y. B.Sc. (Sem. – IV) Examination, 2010
MICROBIOLOGY (Paper – VI)(2004 Pattern)
MB-346 : Soil and Agricultural Microbiology

Time : 2 Hours Max. Marks : 40

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

1. Answer the following : **10**

a) Define Rhizosphere.

b) Write chemical composition of pectin.

c) Plasmopara Viticola is a causative agent of _____ plant disease.

d) List electron carriers in nitrogen fixation process.

e) R. leguminosarum found in root nodules of _____ group plants.

i) bean

ii) lupini

iii) soybean

iv) pea.

f) Write composition of biogas.

g) _____ organism is used in iron leaching.

h) Write names of two organophosphorus pesticides.

i) Write composition of alluvial soil.

j) Define humus.

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

a) Describe phosphorus cycle with the help of diagram.

b) Explain biological control of plant diseases.

c) Draw neat labelled diagram of fixed dome type biogas plant.

P.T.O.

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

   a) Soil microbes.

   b) Non-symbiotic nitrogen fixation.

   c) Rots.

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

   a) Describe canker with the help of following points :
      i) Causative agent
      ii) Plants affected
      iii) Disease cycle
      iv) Control.

   b) Describe production of Rhizobium bioinoculant and its application.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
ELECTRONIC SCIENCE (Paper – VI) (2004 Pattern)
EL-346 (A) : Computer Networking – II

Time : 2 Hours Max. Marks : 40

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

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

   a) What is ethernet ? **1**

   b) Define NOS. **1**

   c) What is the purpose of documentation in network ? **1**

   d) What is SNMP protocol ? **1**

   e) Write difference between LAN and WAN. **2**

   f) What is the role of print server in network ? **2**

   g) "Network scale is important factor to be consider while designing network". Comment. **2**

   h) List various hardware tools used for network troubleshooting. **2**

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

   a) Define networking. Discuss its advantages. **4**

   b) Write note on network protocols. **4**

   c) Explain the hardware and software requirement for installation of network. **4**

P.T.O.

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

   a) Explain peer-to-peer network. Give its advantage. **4**

   b) Write a short note on user account. **4**

   c) Discuss possible faults in cables used in computer network. **4**

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

   a) Explain different methods used in data back up. **6**

   b) What are the different types of network operating systems ? Discuss features of Window NT/ Window 2000. **6**

   c) Write short note on hardware and software prevention tools used for smooth functioning of network. **6**

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T.Y. B.Sc. (Semester – IV) Examination, 2010
ELECTRONIC SCIENCE (Paper – VI) (2004 Pattern)
EL-346 (B) : Network Operating Systems

Time : 2 Hours Max. Marks : 40

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

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

   a) What does DHCP stands for ? **1**

   b) State any two server level security mechanisms. **1**

   c) Define the concept of user account. **1**

   d) State any two system services in LINUX. **1**

   e) "Computer operating system can be used as network operating system". Comment. **2**

   f) What is WIN ? How it works ? **2**

   g) List any four features of LINUX operating system. **2**

   h) List any four resources shared by Novell Netware. **2**

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

   a) What are general features of Network operating system ? **4**

   b) Describe the features of Novell Netware. **4**

   c) Explain basic commands in administrative utility in LINUX. **4**

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

   a) What is resource ? Explain resource management in WINDOWS Operating System. **4**

   b) Explain file and print services in Novell Network. **4**

   c) Compare Windows and LINUX network operating systems. **4**

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

   a) Explain DNS in Windows 2000 operating system. **6**

   b) Write steps involved in setting up Novell netware based client server system. **6**

   c) Write step involved in configuring simple file server in LINUX. **6**

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T.Y. B.Sc. (Semester – IV) Examination, 2010
ELECTRONIC SCIENCE (Paper – VI)
EL-346 (C) : Biomedical Instrumentation – II

Time : 2 Hours | Max. Marks : 40

N.B. : *i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) Draw neat diagrams ***wherever*** *necessary.*

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

   a) List any two respiratory volume flow meter. **1**

   b) Define chemical biosensor. **1**

   c) What is chromatography ? **1**

   d) State at least two applications of MRI. **1**

   e) What is noise image ? **2**

   f) Pacemaker is very useful in medical field. Comment. **2**

   g) Define acoustic impedance. **2**

   h) Protection against electrical stocks is essential in medical equipments. Comment. **2**

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

   a) Write a short note on radiography. **4**

   b) Write a short note on computed tomography. **4**

   c) Explain electrodes used in cardiac defibrillator. **4**

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

   a) Describe with diagram any one type of audiometers. **4**

   b) List various susceptibility parameters and explain them in brief. **4**

   c) What is microshocks and macroshocks ? State various causes of them. **4**

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

   a) Explain TLV, RV, FRC, IC and ERV with respect to Lung volume. **6**

   b) Write a note on optical blood glucose sensor. **6**

   c) Draw a block diagram of spectrophotometer and explain its working. **6**

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T.Y. B.Sc. (Semester – IV) Examination, 2010
ELECTRONIC SCIENCE (Paper – VI)
EL-346 (D) : Medical Instrumentation – II

Time : 2 Hours Max. Marks : 40

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

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

3) Draw labelled diagram ***wherever*** *necessary.*

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

a) What is biopotential ? **1**

b) State the use of calorimeter in medical lab. **1**

c) List different parts of the biomedical instrument. **1**

d) State the causes of microshocks. **1**

e) "Electrodes are essential in medical diagnosis" – Comment. **2**

f) State the use of electrode jellies and creams with recording electrodes. **2**

g) "Noise is unwanted signal in medical equipments" – Comment. **2**

h) "Electrical safety analyzer is important in medical equipment" – Comment. **2**

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

a) Write a short note on microelectrodes. **4**

b) Write a short note on polarizable and nonpolarizable electrodes. **4**

c) Describe Electrode-skin interface in brief. **4**

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

   a) Explain the operating principle of EMG. **4**

   b) Discuss the general considerations for Bio-electronic recorder amplifier. **4**

   c) State general considerations for signal conditioning circuit. Explain in brief. **4**

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

   a) Explain the working of clinical flame photometer with suitable diagram. **6**

   b) What is spectrophotometer ? Explain with suitable diagram. **6**

   c) Describe in detail physiological effects of electricity. **6**

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T.Y. B.Sc. (Semester – IV) Examination, 2010
ELECTRONIC SCIENCE
(Optional) (Paper – VI)
EL-346 (E) : Agricultural Electronics – II

Time : 2 Hours Max. Marks : 40

N.B. : *1) Neat diagrams must be drawn **wherever** necessary.*
*2) Black figures to the **right** indicate **full** marks.*
*3) **Use** of logarithmic tables, electronic pocket calculator is **allowed**.*
*4) **All** questions are **compulsory**.*

1. Answer **all** of the following :
   a) "Cooling grain by aeration aids insect control". Comment **1**
   b) What is a data logger ? **1**
   c) State the factors related to grain moisture content. **1**
   d) How remote sensing techniques are useful in agriculture ? **1**
   e) What do you mean by preventive maintenance and corrective maintenance ? **2**
   f) What are simulators ? How they are used in agriculture ? **2**
   g) Explain why standard procedures for troubleshooting and maintenance are not possible for agriculture instrument. **2**
   h) List any two optoelectronic devices used in agrielectronics. **2**

2. Answer **any two** of the following :
   a) List laboratory methods to determine moisture content in grains. Explain any one in brief. **4**
   b) Explain with block diagram multichannel data acquisition system using single ADC. **4**
   c) What is AWS ? With the help of block diagram explain its working in detail. **4**

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

   a) Explain with neat diagram bathtub graph for an instrument. Explain its usefulness in maintenance. **4**

   b) What is an internet ? Explain its importance and usefulness for agriculture with proper examples. **4**

   c) Write short note on wear house for food grain storage. **4**

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

   a) What is an irrigation system ? How it can be automated ? State advantages of autoirrigation system. **6**

   b) Explain in brief specific ion analyser. State its application in agriculture. **6**

   c) List important agrimeterological parameters. Explain general requirements of instruments to measure these parameters. **6**

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T.Y. B.Sc. (Semester – IV) Examination, 2010
ELECTRONIC SCIENCE (Paper – VI)
EL-346 (F) : Fiber Optics and Fiber Optic Communication – II

Time : 2 Hours Max. Marks : 40

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

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

   a) State the most often used light sources in optical transmitter. **1**

   b) What do you mean by intrinsic fiber optic sensor ? **1**

   c) State the two different types of optical amplifier. **1**

   d) State the main cause of intramodel dispersion in optical fiber. **1**

   e) What is meant by mechanical splice ? **2**

   f) State the materials used in multielement glasses of fiber fabrication. **2**

   g) State the application areas of optical amplifier. **2**

   h) The output voltage of a photo receiver connected at the other end of 2 km fiber is 2.1 V at a wavelength of 0.85 μm, when the fiber is cut back to leave a 2 meter length the output voltage increases to 10.7 V. Determine the attenuation per kilometer for the fiber at a wavelength of 0.85 μm. **2**

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

   a) State the important requirement of optical fibers to be used as replacement of electrical transmission line. **4**

   b) Explain any one method of fiber attenuation measurement. **4**

   c) Describe the principle and operation of fiber optic current sensor. **4**

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

   a) Describe a method to measure refractive index profile of an optical amplifier. **4**

   b) Compare the LASER and LED as a light source in optical fiber transmitter. **4**

   c) Explain fiber optic liquid level sensor. **4**

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

   a) Explain internal chemical vapour deposition technique of fiber fabrication. **6**

   b) With suitable schematic explain semiconductor optical amplifier. State its limitations **6**

   c) Describe LED drive circuits used for analog and digital fiber optic transmission with suitable circuit diagram. **6**

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T.Y. B.Sc. (Semester – IV) Examination, 2010
DEFENCE AND STRATEGIC STUDIES
DS – 341 : Role of Science and Technology in National Security
(Paper – I) (2004 Pattern)

Time: 2 Hours Max. Marks: 40

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

1. Answer in **2** or **4** sentences **each** : **16**
   1) Differentiate between discovery and invention.
   2) Define 'Radiation'.
   3) What do you mean by generations of computer ?
   4) Introduce 'Space'.
   5) What is meant by indigenous technology ?
   6) What is 'Electronics Engineering' ?
   7) What is meant by ferrous and non-ferrous metals ?
   8) Introduce 'Armoured Fighting Vehicle'.

2. Answer in **8** to **10** sentences each (**any two**) : **8**
   1) Explain the working principle of submarine.
   2) Explain the theory of flight.
   3) Explain about India's achievement in space.

3. Write short notes on (**any two**) : **8**
   1) Theory of Relativity.
   2) DRDO's contribution in India's Military Aviation.
   3) Naval science and related technology.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Explain about the military application of computer.
   2) Discuss the discovery of Electron and its role in development of related military technology.

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B/II/10/80

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T.Y. B.Sc. (Semester – IV) Examination, 2010
DEFENCE AND STRATEGIC STUDIES (Paper – III)
DS – 343 : Defence Economics (2004 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** to **4** sentences **each** : **16**
   1) What do you mean by budgetary perspective ?
   2) Explain meaning of defence planning.
   3) What is meant by self-reliance ?
   4) Define Real Cost of war.
   5) State the meaning of 'Economic Warfare'.
   6) Define war potential.
   7) What do you mean by 'War Finance' ?
   8) Define Budget.

2. Answer in **8** to **10** sentences (any **two**) : **8**
   1) Discuss relationship between strategic minerals and war potential.
   2) Discuss post war problems.
   3) Write a note on real cost of war.

3. Write short note on (**any two)** : **8**
   1) Contributory elements.
   2) War Finance.
   3) Effects of war on industry.

4. Write in **16** to **20** sentences (any **two**) : **8**
   1) Analyse India's defence spending from 1962.
   2) Write a note on Defence Vs Development.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
DEFENCE AND STRATEGIC STUDIES (Paper – IV) (2004 Pattern)
DS – 344 : Indian Military History

Time: 2 Hours Max. Marks: 40

***Instructions**: 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 duration of Rajput period.
   2) Which was the chief weapon of Rajput ?
   3) Write any two names of outstanding Rajput rules.
   4) State the duration of Sultanate period.
   5) Who introduced the Artillery to the Indians ?
   6) What do you mean by Mansabdar ?
   7) State any two names of Indias southern empire.
   8) What was the aim of Akbar for battle of Haldighat ?

2. Answer in **8** to **10** sentences (**any two**) : **8**
   1) Explain in brief a concept of Rajput.
   2) Write in brief a significance of battle of Somnath.
   3) Write in short Sultanate Military System.

3. Write short notes on (**any two**) : **8**
   1) Rajput Art of war.
   2) Causes of Battle of Tarrian.
   3) Military Reforms by Ghiasuddin Balban.

4. Answer in **18** to **20** sentences (**any one**) : **8**
   1) Explain in detail Mughal Military System.
   2) Write a note on Battle of Haldighat.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
DEFENCE AND STRATEGIC STUDIES (Paper – V)
DS – 345 : Computer Application in Defence (2004 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** to **4** sentences **each**. **16**
   1) Define computer Network.
   2) What do you mean by central processing unit ?
   3) Explain the meaning of Data Processing.
   4) Define Flowchart.
   5) State the meaning of assembly language.
   6) Define star war.
   7) What do you mean by Surveillance ?
   8) Define war framing.

2. Answer in **8** to **10** sentences **each** (**any two**) : **8**
   1) Write in short role of information in high-tech war.
   2) Explain application of computer in night vision.
   3) Discuss role of computer in Surveillance.

3. Write short notes on (**any two**) : **8**
   1) Characteristics of computers.
   2) Limitations of computers.
   3) Generation of computers.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Discuss application of computer in Weapon System.
   2) Write a short note on S.D.I. (star war)

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T.Y. B.Sc. (Semester – IV) Examination, 2010
DEFENCE AND STRATEGIC STUDIES (Paper – VI)
DS – 346 (A) : Strategic Thinkers (2004 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) According to Lenin, state the aim of war.
   2) "Political power flows from the barrel of Gun" who said this ?
   3) What do you mean by "Mobile Warfare" ?
   4) As per A.T. Mahan, define "Sea Power".
   5) Define "Air Power".
   6) What do you know about "Stalin" ?
   7) State the interwar period.
   8) What do you mean by strategy ?

2. Answer in **8** to **10** sentences (any **two**) : **8**
   1) Write in brief Fullers views on "Professional Army".
   2) Explain the concept of "Civil - Military Relations" as per Churchill.
   3) Write in brief military thoughts of Lenin.

3. Write short notes on (any **two**) : **8**
   1) Thoughts of Mao-Tse-Tung on "Discipline".
   2) Tranch Warfare.
   3) Germans concept of "Total War".

4. Answer in **18** to **20** sentences (any **one**) : **8**
   1) Explain the strategic thoughts of A.T. Mahan with special reference to "Sea Power".
   2) Highlight on Douhet's theory of "Air Power".

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P.T.O.

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DEFENCE AND STRATEGIC STUDIES
DS – 346 (B) : International Law

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 do you mean by International Law ?
   2) How many permanent members are in security council ?
   3) State any two objectives of U.N.
   4) Write the name of principal organs of U.N.
   5) Why General Assembly is described as the "town meeting of the world" ?
   6) Write any two responsibilities of the security council.
   7) State the meaning of veto.
   8) What are the main objectives of trusteeship system.

2. Answer in **8** to **10** sentences **each** (any **two**) : **8**
   1) Explain pacific means of settlement of international disputes.
   2) Discuss effects of the outbreak of war.
   3) Explain concept of total war.

3. Write short notes on (any **two**) : **8**
   1) Functions of general assembly.
   2) Role of ICJ in the development of international law.
   3) U.N. sanction and international law.

4. Answer in **16** to **20** sentences **each** (any **one**) : **8**
   1) "International law does not exist. There is only international morality". Discuss.
   2) Examine the security council's efforts in maintaining the world peace.

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DEFENCE AND STRATEGIC STUDIES
DS – 346 (C) : Refugees Studies

Time: 2 Hours Max. Marks: 40

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

1. Answer in **2** or **4** sentences **each**. **16**
   1) Define 'International law'.
   2) Introduce United Nation.
   3) Who is categories as refugee ?
   4) Define NGO.
   5) Who is Foreigners ?
   6) Who is known as 'Migrants' ?
   7) Introduce UNHCR.
   8) What is meant by 'Right' ?

2. Answer in **8** to **10** sentences (any **two**) : **8**
   1) Explain the status of refugee in India.
   2) Explain the status of refugee in Srilanka.
   3) Explain the status of refugee in Pakistan.

3. Write short notes on (any **two**) : **8**
   1) Rights of Refugees
   2) Duties of Refugees
   3) Future of Refugees

4. Answer in **16** to **20** sentences (any **one**) : **8**
   1) Explain war of liberation.
   2) Explain the concept of regional integration on refugees.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
DEFENCE AND STRATEGIC STUDIES (Paper – VIII)
DS – 348 (A) : Armed Forces and Society
(2004 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***marks****.*

1. Answer in **2** or **4** sentences **each** : **16**
   1) Define 'Religion'.
   2) What is 'Group Dynamics' ?
   3) Define the term 'Defence'.
   4) What is 'War' ?
   5) Define 'Motivation'.
   6) What is 'Nation Building' ?
   7) What is 'Human Rights' ?
   8) Define 'Society'.

2. Answer in **8** to **10** sentences (**any two**) : **8**
   1) Discuss the obligation of society and armed forces on each other.
   2) Write the contribution of Defence in Nation Building.
   3) Establish relationship between morality and motivation.

3. Write short notes on (**any two**) : **8**
   1) Soldier and Religion
   2) Ethics and Society
   3) Civil - Military Relations.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Justify why human rights are required to be adhered by the armed forces ?
   2) How military group is a sociological phenomenon ? Explain.

P.T.O.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
DEFENCE AND STRATEGIC STUDIES
DS – 348 (B) : Geopolitics
(2004 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** or **4** sentences **each** : **16**
   1) Write the long form of LOC.
   2) State the limits of Territorial sea.
   3) What do you mean by Boundaries ?
   4) State any two factors of geography affecting on 'War'.
   5) Write any two types of Boundary.
   6) What do you understand by Frontiers ?
   7) Define Land Locked State.
   8) Write any two functions of Boundary.

2. Answer in **8** to **10** sentences (**any two**) : **8**
   1) Explain in brief role of E.E.Z. in the process of National Development.
   2) Write in brief role of "Location" in defence prepared of the country.
   3) Explain the concept of Border.

3. Write short notes on (**any two**) : **8**
   1) Demarcation of the Boundaries.
   2) Concept of Territorial sea.
   3) Impact of 'Size' on conduct of war.

4. Answer in **18** to **20** sentences (**any one**) : **8**
   1) Highlight on the problems and prospects of Buffer state.
   2) Explain the concept of LOC with examples.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
ENVIRONMENTAL SCIENCE – II (2004 Pattern)
EN – 342 : Natural Resource Management

Time : 2 Hours Max. Marks : 40

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

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

   a) Define biodiversity.

   b) What are protected areas ?

   c) Enlist any two tiger reserves in Maharashtra.

   d) What are the levels of biodiversity ?

   e) Define 'Ecosystem Diversity'.

   f) Enlist two Ramser sites in India.

   g) What is water conservation ?

   h) Mention the modern methods of water management.

   i) Enlist threatened animals of Maharashtra.

   j) State any two reasons for Biodiversity loss.

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

   a) Wetlands distribution in India.

   b) Purpose of National parks and sanctuaries.

   c) Magnitude of biodiversity.

P.T.O.

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

   a) What conservation measures should be taken for Wetland conservation ?

   b) Describe the uses of biodiversity.

   c) Explain the importance of Biodiversity hotspots.

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

   a) Explain the IUCN protected area management categories.

   b) What are the types of Wetlands ? Describe the ecological status of Wetlands in India with suitable example of fresh water area.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
ENVIRONMENTAL SCIENCE – IV (2004 Pattern)
EN – 344 : Environmental Management

Time: 2 Hours Max. Marks: 40

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

1. Attempt the following in **1 - 2** lines each. **10**
   a) Mention any 2 hydrological parameters considered for watershed.
   b) Enlist 2 methods of water conservation.
   c) What are NGO's ?
   d) Write the significance of technology transfer.
   e) State any 2 processes in organic farming.
   f) Define global partnership in environmental management.
   g) What is multipurpose plantation ?
   h) Write the significance of mulching.
   i) What is agroforestry ?
   j) Define land cover.

2. Write note on **any 2** of the following : **10**
   a) Land use mapping.
   b) Organic farming.
   c) Earth Summit.

3. Attempt **any two** from the following : **10**
   a) Explain various measures adopted for soil conservation.
   b) Elaborate on the selection criteria for plantation in watershed development project.
   c) Discuss the role of women in Agenda 21.

4. How organic farming and agroforestry can be correlated with the concept of organic farming ? **10**

   OR

   Explain significant concepts from Agenda 21 with suitable case studies.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
ENVIRONMENTAL SCIENCE (Paper – VI) (2004 Pattern)
EN-346 : Applied Biology

Time : 2 Hours Max. Marks : 40

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

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

   a) Define waste.

   b) Give fullform of GIS.

   c) Define sericulture.

   d) Give two applications of Bioinformatics.

   e) Define informal garden.

   f) Give any two methods used in social forestry.

   g) Define ecotourism.

   h) Define incineration.

   i) Give two legislative methods used for hazardous waste management.

   j) What is applied biology ?

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

   a) Vermi composting.

   b) Rainwater harvesting.

   c) Image and photographic systems.

P.T.O.

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

   a) Describe the process and applications of remote sensing.

   b) Describe the process and importance of pyrolysis.

   c) Give principles and practices of apiculture.

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

   a) What is GIS ? Which software are used for GIS ? What are the applications of GIS ?

   b) What is industrial waste ? Describe different treatments for segregation of hazardous waste from paper industry.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
BIOTECHNOLOGY (Vocational)
BT- 345 : Animal Cell Biotechnology (Paper – V)
(2004 Pattern)

Time: 2 Hours Max. Marks: 40

Instructions : *1)* ***Neat*** *diagrams must be drawn* ***wherever*** *necessary.*
2) ***All*** *questions carry* ***equal*** *marks.*
3) ***All*** *questions are* ***compulsory****.*

1. Answer the following questions in short : **10**

   a) Define vaccination.

   b) What are differentiated cells ?

   c) Name any two commonly used cell lines.

   d) What is GCSF ?

   e) Write the use of tPA.

   f) Give the meaning of 'infinite cell lines'.

   g) What is somatic cell hybridization ?

   h) Give two characteristics of embryonic stem cells.

   i) What is factor VIII ?

   j) Explain the term 'autotransplantation'.

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

   a) Describe the design and working of a bioreactor for suspension cultures.

   b) How are vaccines classified ?

   c) Give any two applications of monoclonal antibodies in diagnostics.

P.T.O.

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

   a) Insulin production.

   b) Transformed cell lines.

   c) Applications of animal cell biotechnology.

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

   a) What are monoclonal antibodies ? How are they produced by hybridoma technology ?

   b) What are growth factors ? Explain with the help of any four growth factors how they are useful in animal cell cultures.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
STILL PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION
(Vocational)
Paper – V (Old Course) (2004 Pattern)
Fundamentals of Video

Time : 2 Hours Max. Marks : 40

***Instructions**: 1) Attempt **all** questions.*
*2) Draw **neat** and labeled diagrams **wherever** necessary.*
*3) Figures to the **right** indicate **full** marks.*

1. Answer the following : **10**

   a) State the horizontal and vertical scanning frequencies in India.

   b) Name the primary colours used in TV.

   c) State the function of AGC in TV receiver.

   d) What is the application area of magnetic video disc ?

   e) What is helical scanning ?

   f) State two points of comparison between motion picture film and video tape.

   g) Which colour TV standard is used in India ?

   h) State the working principle of image orthicon camera tube.

   i) What type of pick up stylus is used in mechanical video disc ?

   j) How is an optical video disc replayed ?

2. Answer **any two** : **10**

   a) Explain the working of vidicon camera tube. Explain how it responds to different colours and intensities of light.

   b) What is the need for scanning ? Explain one complete frame of interlaced scanning pattern.

   c) Explain why rotating head mechanism is used in a VCR. Give track survey for VHS tape.

P.T.O.

3. Answer **any two** : **10**

   a) What is a colour vector ? Explain the need for colour burst. Explain the terms hue and saturation of colour.

   b) Explain the working of magnetic video disc machine. What is its application area ?

   c) Explain how an optical video disc is recorded and replayed. Give diagram and explain construction of optical video disc player.

4. Answer **any one** : **10**

   a) Give a block diagram of monochrome TV receiver. Explain how synchronisation section works.

   b) Explain the working of record / replay electronics in a VCR. How is drop out compensation achieved ?

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T.Y. B.Sc. (Semester – IV) Examination, 2010
COMPUTER MAINTENANCE & EQUIPMENT
Vocational Paper – V : Entrepreneurship Development
(2004 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 **one** sentence : **(1×10=10)**

1) What is risk bearing function of an Entrepreneur ?

2) Define term cost.

3) Explain any two needs that motivate an employee of entrepreneurship.

4) How one can define small business entrepreneur ?

5) Distinguish between born and made entrepreneur.

6) What is Public Ltd. Company ?

7) What are external resources of recruitment ?

8) What is entrepreneurial opportunity ?

9) Who is a sleeping partner ?

10) List any two Government Funding Agencies supporting for entrepreneur.

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

1) What are various types of Entrepreneurs ? Explain in brief function of each.

2) Differentiate between Co. Ltd. by Shares and Co. Ltd. by Guarantee.

3) Explain collective entrepreneurship i.e. Co-operative Society.

P.T.O.

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

   1) Give entrepreneur's role towards economic growth and development.

   2) What are the financial statements prepared by an entrepreneur ?

   3) Explain the characteristics of Entrepreneur.

4. Answer the following : **(1×10=10)**

   1) What are the advantages of Joint Stock Companies ?

   OR

   2) What do you mean by Partnership Firm ? Explain its features.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
SEED TECHNOLOGY (Vocational)
Seed Entomology (Paper – V)
(2004 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer the following : **(1×10=10)**
   a) What is a Drone ?
   b) What are Insecticides ?
   c) What is Royal jelly ?
   d) What is a scape ?
   e) Define-Arista.
   f) What is a Hexapoda ?
   g) Give the functions of Nozzle.
   h) What are borers ?
   i) Define-Hemielytra.
   j) What is a Empodium ?

2. Attempt **any two** of the following : **(2×5=10)**
   a) What are fumigants ? Describe applications of fumigants.
   b) Describe any three leg modifications in Insects.
   c) Describe with examples, Insects as pollinators.

3. Write short notes on **any two** : **(2×5=10)**
   a) Pests of vegetables.
   b) Types of Antennae in Insects.
   c) Biological Pest Control.

P.T.O.

4. Classify **any two** of the following insects to their respective orders and give the characteristics features of the order.

   a) Plant bug

   b) Moth

   c) House fly

   d) Grasshopper. **10**

   OR

   What are Insecticidal appliances ? Describe any two of them. **10**

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T.Y. B.Sc. (Sem. – IV) Examination, 2010
INDUSTRIAL CHEMISTRY (Paper – VI)
VOC-IND-CH 346 : Industrial Methods of Chemical Analysis – II
(Vocational Course) (2004 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.*
*4) **Use** of calculator/logarithmic table is **allowed**.*
*5) **Assume** suitable additional data **if necessary**.*

1. Answer precisely the following : **10**

a) Write the general reaction occurring in polarography.

b) Define the term 'decomposition potential' as used in polarography.

c) Name different electrodes used in polarography.

d) State the energy range in joules of an X-ray radiation.

e) State the condition for emission of an X-ray fluorescence.

f) Write the Boltzmann equation for the fraction of atoms excited by flame in flame photometry.

g) What is the major limitation of AAS ?

h) Define ion-selective electrode.

i) Write the reaction to produce neutrons from Beryllium.

j) Define hard method of ionization as used in mass spectrometry.

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

a) Explain the role of supporting electrolyte in polarography.

b) Draw and explain the typical X-ray absorption spectrum.

c) Give the properties of ion-selective membranes.

P.T.O.

B) Answer briefly the following (**any two**) : **4**

a) Explain with a diagram, the voltage ramp used in normal pulse polarography.

b) Define thermal neutrons and thermalization.

c) State and explain the principle of mass spectrometry.

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

a) What are the advantages and disadvantages of AAS ?

b) Explain with a neat labelled diagram, laminar burner used in FES.

c) The polarogram of 1.25×10^{-3} M solution of Zn^{+2} showed a diffusion current of 7.12×10^{-6} A. The capillary characteristics were, t = 3.475 s, m = 1.42 mg s^{-1}. Calculate the diffusion coefficient of Zn^{+2} ions.

4. A) Describe with a neat labelled diagram the gas ionization detector used in an X-ray absorption technique. **6**

OR

A) Draw a neat labelled diagram of a mass spectrometer and explain the function of its various components. **6**

B) Answer the following (**any one**) : **4**

a) What accelerating potential is required to focus an ion with $\frac{m}{z}$ 250 on the entrance slit of a detector if the magnetic analyzer has a radius of curvature at the location of the detector of 20.0 cm and if the applied magnetic flux density is 0.8 T.

b) A powder diffraction pattern of lead was obtained with Cu – K_α radiation (λ = 1.539 Å). Calculate the interplaner distance in nanometer which gives rise to a first order line at $\sin\theta$ = 0.9210.

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T.Y. B.Sc. (Semester – IV) Examination, 2010
BIOTECHNOLOGY (Vocational) (2004 Pattern)
BT – 346 : Microbial Biotechnology (Paper – VI)

Time : 2 Hours Max. Marks : 40

Instructions : *1)* ***Neat*** *diagrams must be drawn.*
2) ***All*** *questions carry equal marks.*
3) ***All*** *questions are* ***compulsory****.*

1. Give short answers for the following questions : **10**
   a) What is Z-value ?
   b) Enlist the steps involved in the process of canning.
   c) What are toxins ? Give one example.
   d) Give full form of IPR and GATT.
   e) Name an animal toxin with its antidote.
   f) Define pasteurization.
   g) Give the function of an agitation.
   h) Define Gene therapy.
   i) Define purified antigen vaccine.
   j) What is fermentation ?

2. Attempt **any two** of the following : **10**
   a) Discuss the production of any one antibiotic.
   b) Describe the characteristic of an Ideal vaccine.
   c) Give the characteristic and mode of action of Diphtheria toxin.

3. Write short notes on **any two** : **10**
   a) Ergotism
   b) Zearalenonons
   c) Risk assessment

4. Attempt **any one** of the following : **10**
   a) Describe Immunoenhancing technology.
   b) Describe in brief the patent process. Comment on Biosafety guidline to avoid the escape of microbes in environment.

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T.Y.B.Sc. (Sem. IV) Examination, 2010
(Vocational) (2004 Pattern)
INDUSTRIAL MICROBIOLOGY (Paper – VI)
VOC-IND-MIC : 346 : Industrial Management, Law and Taxation

Time : 2 Hours Max. Marks : 40

***Instructions** :1) **Neat** diagrams must be drawn **wherever** necessary.*
*2) Black figures to the **right** indicate **full** marks.*
*3) **All** questions carry **equal** marks.*
*4) **Use** of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is **allowed**.*
*5) **Assume** suitable data, **if necessary**.*
*6) **All** questions are **compulsory**.*

1. Attempt as per the instructions. **10**

A) Choose the correct answer :

i) A company can obtain new products through new-product development _____ are the new products.
   a) original products b) product improvements
   c) product modification d) all of the above

ii) Segmentation on the basis of factors like age, education, income, gender, occupations and cultures is called _____
   a) Psychographic segmentation b) Behavioural segmentation
   c) Demographic segmentation d) Use-related segmentation

iii) _____ can be defined as systematic gathering, recording, and analyzing data about problems relating to the marketing of goods and services.
   a) Marketing Research b) Market Research
   c) Product Research d) Marketing Intelligence

iv) During _____stage of the new-product development process are preliminary figures for costs, sales, and profits estimated.
   a) Idea screening b) Development
   c) Business analysis d) Test marketing

P.T.O.

v) _____ can be termed as the process of identifying groups or set of potential customers at either the national level or subnational level who are likely to exhibit similar buying behaviour.

a) Targeting b) Segmentation

c) Positioning d) Branding

vi) Price is commonly known as the _____ value of a product or service expressed in terms of _____

a) trading b) exchange

c) barter d) money

B) State **true** or **false** :

i) The concept of market segmentation is based on the assumption that the markets are homogeneous.

ii) The buying behaviour demonstrated by the rural Indian differs tremendously when compared to the typical urban Indian.

iii) New products should be new to the market.

iv) The minimum number of persons required to form a public company is 15.

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

I) Distinguish between equity shares and preference shares.

II) Differentiate between Excised Duty and Sales Tax.

III) Discuss the significance of marketing in the context of Indian economy.

3. Attempt **any two** : **10**

I) Explain how other functions in an organization have interface with production.

II) Explain in details the merits of consumer market segmentation.

III) Define price. Explain importance of price in business.

4. Attempt **any one** : **10**

"Marketing should aim at meeting a given customer need rather than selling a given product". Comment.

OR

What is a new product ? Discuss in details stages for developing a new product.