[4317] – 328

Seat No.	

T.Y.B.Sc. (Semester – III) Examination, 2013
BOTANY (Paper – IV)
BO – 334 : Genetics and Plant Breeding
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer the following : **10**

   a) What is gene interaction ?

   b) Define polygenic inheritance.

   c) What is gene map ?

   d) Define linkage.

   e) What are mutagens ?

   f) Define trisomics.

   g) What is back cross ?

   h) Define mutation breeding.

   i) What is heterosis ?

   j) What is plant breeding ?

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

   a) Explain complementary gene interaction (9 :7 ratio) with a suitable example.

   b) Explain multiple allelism in inheritance of human blood groups.

   c) Explain dominance hypothesis of heterosis.

P.T.O.

3. Write notes on (**any two**) : **10**
   a) Self-incompatibility in plants.
   b) Sex linked inheritance in man.
   c) Disadvantages of plant introduction.

4. What is euploidy ? Explain origin and effects of allopolyploidy. **10**

   OR

   What is mass selection ? Explain various steps in the procedure of mass selection.

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[4317] – 330

Seat No.	

T.Y.B.Sc. (Semester – III) Examination, 2013
BOTANY (Paper – VI)
BO – 336 : Cell Biology and Seed Technology
(New Course) (2008 Pattern)

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. Attempt the following : **10**

   a) Who proposed cell theory ?

   b) What is nuclear pore ?

   c) What are labilizers ?

   d) Give any two functions of Endoplasmic reticulum.

   e) What is genome ?

   f) What are plastids ?

   g) What is pinocytosis ?

   h) What is seed certification ?

   i) What is seed processing ?

   j) Define seed marketing.

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

   a) Describe ultra structure of Golgi bodies.

   b) Describe the properties of Cytoplasmic matrix.

   c) Explain the types of seed samples.

P.T.O.

3. Write short notes on **any two** of the following : **10**
   a) Prophase – I of Meiosis
   b) Lampbrush Chromosome
   c) Demand forecasting.

4. Explain the Ultra Structure of Cell wall ? Write its chemical composition and functions. **10**

   OR

   Describe classes of seed and add note on role of seed technology. **10**

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[4317] – 332

Seat No.	

T.Y.B.Sc. (Semester – III) Examination, 2013
ZOOLOGY (Paper – II)
ZY – 332 : Mammalian Histology
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

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

1. Attempt the following : **10**

1) Define Histology.
2) What is Enamel ?
3) State the function of Gastric Gland.
4) State the function of Hepatocyte.
5) What is Malpighian body ?
6) What is function of Sertoli Cells.
7) State the names of any two hormones of Adrenal Cortex.
8) State the function of alveolus of lung.
9) What are Peyer's patches ?
10) Name the layers of arterial wall.

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

i) Describe the histological structure of parotid gland.
ii) Describe the histological structure of Thyroid gland.
iii) Describe the histological structure of uriniferous tubule.

P.T.O.

3. Write notes on **any two** of the following : **10**
   a) Sketch and label C.S. of tongue.
   b) Graffian follicle.
   c) Histology of skin.
   d) Histochemical demonstration of protein.

4. Explain histological structure of Testis. **10**

   OR

   Describe histological structure of duodenum. **10**

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[4317] – 334

Seat No.	

T.Y.B.Sc. (Semester – III) Examination, 2013
ZOOLOGY (Paper – IV)
ZY – 334 : Environmental Biology and Toxicology
(2008 Pattern) (New Course)

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 Ecology.
2) What are Consumers ?
3) Explain the term population explosion.
4) What is Atmosphere ?
5) What is Sewage ?
6) What are biotic components ?
7) What is Pollution ?
8) What is Global Warming ?
9) What is dB ?
10) Define Fertilizer.

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

i) Describe endangered species.
ii) Explain abiotic components.
iii) Explain LC_{50} and LD_{50}.

P.T.O.

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

   a) How does age physiological status and reproductive status affect toxicity ?

   b) Non-renewable resources.

   c) Importance of wild life in India.

   d) Food chain and Food web.

4. What is Air Pollution ? Explain it with relation to acid rain and green house effects. **10**

   OR

   What is Artificial Ecosystem ? Explain the structure and function of cropland ecosystem. **10**

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[4317] – 337

Seat No.	

T.Y.B.Sc. (Semester – III) Examination, 2013
GEOLOGY (Paper – I) (New Course)
GL – 331 : Mineralogy
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

   a) What is relief ?

   b) What is uniaxial mineral ?

   c) Define pleochroism.

   d) What is mica plate ?

   e) What is optic axial angle ?

   f) What is compensation ?

   g) Give silicate structure of amphibole.

   h) What are refractory minerals ?

   i) What is sphalerite ?

   j) Give composition of chromite.

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

   a) Silicate structure and composition of felspar.

   b) Isomorphism.

   c) Physical properties and uses of pyrite.

P.T.O.

3. Write notes on **(any two)** : **10**
   a) Mineralogy and properties of fire clays.
   b) Composition and physical properties of olivine.
   c) Paragenesis and uses of phosphates.

4. Give silicate structure, chemical composition, physical and optical properties, paragenesis and alteration products of pyroxene mineral group or mica mineral group. **10**

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[4317] – 338

Seat No.	

T.Y.B.Sc. (Semester – III) Examination, 2013
GEOLOGY (Paper – II) (New)
GL – 332 : Igneous Petrology
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer the following in **2/3** lines :
   a) Name any two derivative magmas.
   b) What is meant by incongruent melting ?
   c) Define the term 'flow differentiation'.
   d) What are rock kindreds ?
   e) Which minerals are usually found in the rock 'andesite' ?
   f) Which rocks are generated by the process of 'filter pressing' ?
   g) Name the processes which give rise to liquid fractionation within magmas.
   h) Which rocks exhibit 'Orbicular Structure' ?
   i) Which minerals are observed in the rock 'aplite' ?
   j) Name the rocks that usually exhibit a glassy texture.

2. Answer the following (**any two**) :
   a) Complexities in classification of igneous rocks.
   b) Significance of rock kindreds.
   c) Origin, chemical composition and occurrence of andesite.

P.T.O.

3. Write notes on **(any two)** :
   a) Filter press action
   b) Primary granitic magmas
   c) Tectonic setting for generation of magmas.

4. What is meant by ‘magmatic evolution’ ? Explain in detail, the process of crystal fractionation.

   OR

   a) Crystallisation due to immiscibility of magmas.
   b) Ropy and vesicular structures.

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[4317] – 340

Seat No.	

T.Y.B.Sc. (Semester – III) Examination, 2013
GEOLOGY (Paper – IV)
GL – 334 : Structural Geology
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: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) Define compression and tension force.

   b) Draw a neat diagram of strain ellipsoid.

   c) Define flexure folding.

   d) Define twin gliding.

   e) Define foliation.

   f) Define strike-slip fault.

   g) Define the term Ductile and Brittle.

   h) Define Nappe.

   i) Define ultimate strength of a rock.

   j) Distinguish between balanced and unbalanced force.

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

   a) Explain the causes of folding.

   b) Anisotropy and Inhomogeneity.

   c) Intergranular and Intragranular movement.

P.T.O.

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

   a) Explain the mechanics of gravity fault.

   b) Role of confining pressure in controlling the behaviour of rocks under stress.

   c) Explain the concept of strain ellipsoid.

4. Define stress and strain. State the factors controlling behaviour of rocks under stress. Explain the role of temperature. **10**

   OR

   What are lineations ? Explain the formation of primary lineations. **10**

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[4317] – 349

Seat No.	

T.Y.B.Sc. (Semester – III) Examination, 2013
GEOGRAPHY (Paper – I)
Gg – 331 : Principles and Techniques of Watershed Management
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer the following questions in **one** or **two** sentences.
   a) What is bifurcation ratio ?
   b) What is sinuosity index ?
   c) What is channel index ?
   d) What is overland flow ?
   e) What is elongation ratio ?
   f) State the formula for determination of drainage texture.
   g) State the formula for determination of form factor ratio.
   h) What is stream frequency ?
   i) What is drainage density ?
   j) What is a relief ratio of watershed ? **10**

2. Write short answers (**any two**) :
   a) Discuss the effect of land use in watershed.
   b) Describe the importance of ground water flow in watershed.
   c) What are the objectives of Watershed management ? **10**

P.T.O.

3. Write short notes **(any two)** :
   a) Identification of problems in watershed.
   b) Need of land capability classification.
   c) Process of evapotranspiration. **10**

4. Give an account of Universal Soil Loss Equation (USLE).

   OR

   Discuss the need of Watershed management. **10**

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[4317] – 350

Seat No.	

T.Y.B.Sc. (Semester – III) Examination, 2013
GEOGRAPHY (Paper – II)
Gg – 332 : Geography of Travel and Tourism
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

   a) Define tourism.

   b) What is a Winter Resort ?

   c) What is meant by absolute location ?

   d) What is the difference between travel and tourism ?

   e) Who is a domestic tourist ?

   f) Who is a transit visitor ?

   g) What is the lean period in tourism ?

   h) What is a heritage walk ?

   i) What is visitor density ?

   j) Name two wild life sanctuaries in India.

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

   a) The importance of culture as a tourist attraction.

   b) Impact of accessibility on tourism.

   c) Intervening opportunities in tourism.

P.T.O.

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

   a) Tourism as multi faceted phenomena.

   b) International tourism.

   c) The growth of historical places.

4. Explain the impact of climatic factors on tourism. **10**

   OR

   Discuss the different types of tourist activities and the levels of tourist satisfaction.

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[4317] – 352

Seat No.	

T.Y.B.Sc. (Semester – III) Examination, 2013
GEOGRAPHY (Paper – IV)
Gg – 334 : India-A Geographical Study
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

   a) Name two countries with which India shares a land border to the North and East.

   b) Which are the main ranges of the Himalayas ?

   c) Name two areas where the Dharwar rock systems are predominant.

   d) State two predominant characteristics of the peninsular rivers.

   e) Name two tributaries of the river Brahmaputra.

   f) State two areas where Gully Erosion is prominent in India.

   g) Name two drought prone regions of India.

   h) Name two trees important for oil production in India.

   i) Name two areas experiencing medium rainfall in India.

   j) Describe two characteristics of the black cotton soils.

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

   a) The problem of soil degradation in India.

   b) The Deccan Traps.

   c) The coastal lowlands.

P.T.O.

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

   a) Alluvial soils in India.

   b) Flood prone areas in India.

   c) Climatic characteristics of the Tropical semi-arid steppe climate.

4. Discuss the problems of deforestation and the methods of forest conservation in India. **10**

   OR

   Describe the mechanism of the Indian Monsoon.

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[4317] – 323

Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
CHEMISTRY (Paper – V)
CH – 335 : Industrial Chemistry
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

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

1. Answer the following : **10**

i) Define the term 'Conversion'.

ii) What is a producer gas ?

iii) What are Nitrogenous fertilizers?

iv) What is power alcohol ?

v) Define the term molasses.

vi) Explain the term source reduction.

vii) Define the term Quality Assurance.

viii) What are Micro Nutrients ?

ix) What is meant by denatured spirit ?

x) What are Trickling Filters ?

P.T.O.

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

   i) Explain the terms involved in chemical production.

   ii) What is oleum ? How it is converted into concentrated sulphuric acid ?

   iii) What are fertilizers ? What are qualities of a good fertilizer?

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

   i) Explain in brief economic factors associated with chemical process industries.

   ii) Write a note on Atom Economy.

   iii) What is a role of R and D in chemical plant ?

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

   i) Discuss with flow sheet the manufacture of sugar from sugar cane with special reference to crystallisation.

   ii) What is fermentation ? Describe the basic operations involved in fermentation process with flow sheet diagram.

   iii) Describe the various terms involved in waste minimization.

4. A) Discuss the manufacture of Nitric acid from ammonia by Ostwald's process. **6**

   OR

   A) What are phosphatic fertilizers ? Describe the manufacture of triple super phosphate with flow sheet diagram.

   B) Explain two physical methods of testing and estimation of sugar. **4**

   OR

   B) Describe the manufacture of wine from grapes.

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[4317] – 325

Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
BOTANY (Paper – I) (New Course) (2008 Pattern)
BO – 331 : Algae, Fungi and Bryophytes

Time : 2 Hours Max. Marks : 40

Instructions *: 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) Name any two plants from class Rhodophyta.

b) Give any two characters of fungi.

c) What is a Gemmae ?

d) What is a carpogonium ?

e) Enlist the types of spores in Puccinia.

f) Name the reserved food material found in Brown algae.

g) Give any two general characters of Bryophyta.

h) Write any two uses of Saccharomyces.

i) Write any two general characters of class Bryopsida.

j) What is Mycorrhizae ?

P.T.O.

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

   a) General characters of Algae.

   b) Give schematic classification of fungi as per Alexopoulus (1996).

   c) Sketch, label sporophyte of Polytrichum and comment on its salient features.

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

   a) Characters of class Basidiomycetes

   b) Characters of class Hepaticopsida

   c) Asexual reproduction in Cyanophyta.

4. Describe the external and internal structure of thallus of Anthoceros. **10**

   OR

   Describe sexual reproduction in Sargassum using neat labelled diagram. **10**

[4317] – 326

Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
BOTANY (Paper – II) (New Course) (2008 Pattern)
BO – 332 : Molecular Biology

Time : 2 Hours Max. Marks : 40

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

1. Attempt the following : **10**

a) Enlist the model organisms used in molecular biology.

b) What is RNA polymerase ?

c) Define transformation.

d) What is anticodon ?

e) Define Recon.

f) What is proteomics ?

g) Define nucleoside.

h) Enlist pyrimidine nitrogen bases of DNA.

i) What is Repressor ?

j) Define role of t-RNA.

P.T.O.

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

   a) Explain Franklin's and Wilkin's work.

   b) What is DNA replication ? Explain conservative type of DNA replication.

   c) Dark excision repair.

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

   a) Difference between DNA and RNA.

   b) Eukaryotic gene.

   c) Proteomics.

4. Describe the mechanism of translation. **10**

   OR

   Explain gene regulation in eukaryotes (Britten and Davidson model). **10**

[4317] – 327

Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
BOTANY (Paper – III)
BO – 333 : ANGIOSPERMS AND EVOLUTION
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt the following : **10**

a) Give an example of phylogenetic system of classification.

b) Name type of inflorescence in family Asteraceae.

c) Give floral formula of sub- family papilionaceae.

d) Mention any two diagnostic characters of family orchidaceae.

e) Give an example of family cannaceae.

f) Write any two similarities of pteridosperms with angiosperms.

g) Which chemicals are used to disinfect the herbarium specimens ?

h) Define endemism.

i) State any two achievements of BSI.

j) Mention any two phytogeographical regions of India.

P.T.O.

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

   a) Give diagnostic characters of family magnoliaceae with two examples.

   b) Explain importance of Herbaria.

   c) Give merits and limitations of Engler and Prantl's system of classification.

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

   a) Contribution of H. Santapace for floristic studies.

   b) Bennettitalean theory.

   c) Neoendemism.

4. What is Variation ? Discuss any two sources of Variation. **10**

   OR

   Give diagnostic characters, floral formula and floral diagram of family Acanthaceae and Lamiaceae. **10**

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[4317] – 329

Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
BOTANY (Paper – V)
BO – 335 : Biometry and Computer Applications
(2008 Pattern) (New Course)

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 Biometry.

b) What is Data ?

c) Define Median.

d) What is probability ?

e) Give formula to calculate chi-square frequency.

f) What is ALU ?

g) What is GUI ?

h) What is print preview ?

i) What do you mean by LAN ?

j) Define Internet.

P.T.O.

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

   a) What is Sampling ? Explain random sampling.

   b) Write about applications of probability.

   c) Give an account of basic structure of computer.

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

   a) Correlation

   b) Applications of computer networking

   c) Desktop.

4. Calculate the mean, mode and median from the given data.
   9,11,12,10,11,15,11,13,12,14. **10**

   OR

   Give an account of important features of MS-Word. **10**

[4317] – 331

Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
ZOOLOGY (Paper – I)
ZY – 331 : General Zoology (2008 Pattern)
(New Course)

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) State the habitat of calotes.

2) What is Zoea in crustacea ?

3) What is Osphradium ?

4) What is a Nervous Commissure ?

5) State the function of radula in pila.

6) What is the habitat of balanoglossus ?

7) Define pronephros kidney.

8) Give the names of any two dipnoi fishes.

9) Name the organ of aquatic respiration in pila.

10) State the function of teeth in calotes.

P.T.O.

2. Attempt **any two** of the following : **10**
   i) Sketch and label the parts of nervous system of pila.
   ii) Describe the structure of hyoid apparatus in calotes.
   iii) Describe the structure of heart of frog.

3. Write short notes on **any two** of the following : **10**
   a) Neoteny in amphibians
   b) General characters of Rhynchocephalia
   c) Statocyst
   d) Types of scales in calotes.

4. Describe female reproductive system of pila. **10**

   OR

   Describe the anatomical structure of brain of calotes. **10**

[4317] – 333

Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
ZOOLOGY (Paper – III)
ZY – 333 : Biological Chemistry
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

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

1. Attempt the following : **10**

1) Define pH.

2) Mention any two functions of K^f (potassium).

3) What are zwitter-ions ?

4) What is anti egg white injury factor ?

5) What is Mutarotation ?

6) What is covalent bond ?

7) Which amino acid gives yellow colour to nin hydrin ?

8) State the names of any two ketone sugars.

9) What is km value ?

10) State the fat soluble vitamins.

P.T.O.

2. Attempt **any two** of the following : **10**
   i) Explain the effect of substrate concentration on enzyme activity.
   ii) Write about properties of water.
   iii) What is Isomerism ? Write a note on optical isomerism.

3. Write notes on **any two** of the following : **10**
   a) Physical properties of carbohydrates.
   b) Non competitive inhibition.
   c) Vit. C.
   d) Henderson-Hasselbalch equation.

4. What are Proteins ? Explain different types of bonds responsible for stabilisation of protein structure. **10**

   OR

   What are Lipids ? Classify them with suitable examples and add a note on saponification. **10**

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[4317] – 335

Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
ZOOLOGY (Paper – V) (Ele – I)
ZY – 335 (A) : General Pathology (New Course)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt the following : **10**

1) Define Antopsy pathology.

2) What is hyperchlorhydria ?

3) Name the aetiological factor of Tuberculosis.

4) What is Melanosis ?

5) Explain pyknosis.

6) What is Leukemia ?

7) Describe inflammation.

8) What is Vascularization ?

9) Define gas gangrene.

10) Explain the term functiolessa.

P.T.O.

2. Attempt **any two** of the following : **10**
   1) Describe peculiarities of malignant tumour.
   2) Explain repair of abscess.
   3) Distinguish between dry and moist gangrene.

3. Write notes on **any two** of the following : **10**
   a) Vascular changes in inflammation.
   b) Types of necrosis.
   c) Urine examination.
   d) Pathological calcification.

4. What are retrogressive changes ? Explain fatty degeneration as a type of retrogressive changes. **10**

   OR

   What is circulatory disturbance ? Give an account of thrombosis. **10**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
ZOOLOGY (Paper – V) (Ele – I)
ZY – 335 (B) : Basic Entomology (New Course)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

III) ***Neat*** *labelled diagrams must be drawn* ***wherever*** *necessary.*

1. Attempt the following : **10**

1) What are halters ?

2) Define bioluminescence.

3) Define agricultural entomology.

4) Write functions of Ocelli.

5) Define biological weapons.

6) Explain aristae antennae.

7) Define thermal receptors.

8) Name any two genital appendages.

9) Name any two cuticular processes.

10) Define applied entomology.

2. Attempt **any two** of the following : **10**
   I) Describe light producing organ in insect.
   II) Describe releaser and primer pheromones.
   III) Describe biting and chewing type of mouth part.

3. Write notes on **any two** of the following : **10**
   a) Olfactory receptors.
   b) Use of insects in cosmetics.
   c) Mechanism of sound production in cicada.
   d) Distinguishing features of insect.

4. What is Metamorphosis ? Describe paurometabola type of metamorphosis and add a note on its hormonal control. **10**

   OR

   Describe basic structure and type of antennae in insects. **10**

[4317] – 336

Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
ZOOLOGY (Paper–VI)
ZY– 336 : Cell Biology (2008 Pattern) (New Course)

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 Cell Biology.
   2) What is Autophagy ?
   3) What is Necrobiosis ?
   4) Define passive transport.
   5) Define prokaryotic cell.
   6) What are free radicals ?
   7) Give function of cilia.
   8) Define oncogene.
   9) What is centrosome ?
   10) What is basal body ?

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

   i) Give characteristics of cancer cell.
   ii) Describe various membrane receptors.
   iii) Distinguish between microfilaments and microtubules.

P.T.O

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

   a) Describe various types of cell movements.

   b) Describe ultrastructure of mitochondria.

   c) Describe structure of ribosomes.

   d) Describe polymorphism in lysosome.

4. Describe structure of Golgi complex and add a note on its various functions. **10**

   OR

   Describe in detail rough endoplasmic reticulum.

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[4317] – 339

Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
GEOLOGY (Paper – III)
GL – 333 : Sedimentary Petrology
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

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

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

a) Significance of laminations

b) Roundness and sphericity of grains

c) Heavy minerals

d) Stability of minerals

e) Epigenetic sedimentary ores

f) Branches of sedimentology

g) Selective sorting

h) Sedimentary facies

i) Name two sedimentary environments

j) Chemical Weathering.

P.T.O.

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

   a) Describe Dot's scheme of classification of sandstones.

   b) What do you mean by sedimentary environment ? Describe the chemical parameters of a depositional sedimentary environment.

   c) Describe the application of sedimentology in prospecting of hydrocarbons and sedimentary ores.

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

   a) Explain the classification of sedimentary aggregates. Add a note on significance of size classification.

   b) What are sedimentary basins ? Explain the classification of sedimentary basins.

   c) Define sedimentary facies. Describe the types of sedimentary facies and its significance.

4. Name the various primary sedimentary structures. Describe graded bedding and cross bedding with their significance. **10**

   OR

   Describe the concept of dispersal. Explain dispersal based on size, roundness and sphericity of the detrital grains. Add a note on dynamics of transportation of sediments. **10**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
GEOLOGY (Paper – V) (New)
GL – 335 : PRECAMBRIAN STRATIGRAPHY OF INDIA
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

a) What are oceanic trenches ?

b) Define ‘Shield’.

c) Give economic importance of Dharwar Supergroup.

d) Explain the term - ‘Bijli Rhyolite’.

e) Name the craton in which Mayurbhanj granite is found.

f) Give the structural trend of rocks of Iron Ore Group.

g) Name the Proterozoic basin in which Proterozoic rocks were deposited in Bastar Craton.

h) Give subdivisions of Dharwar Supergroup.

i) Name the rock types of chalk hills of Salem.

j) Explain the term ‘OMG’.

P.T.O.

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

   a) Recent classification of Precambrian Formations.

   b) Jammu limestone.

   c) Stratigraphic succession of Vindhyan Supergroup.

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

   a) Peninsular Gneissic Complex.

   b) Stratigraphic succession of Delhi Supergroup.

   c) Igneous rocks in Singhbhum Craton.

4. Give the geographic distribution, classification with stratigraphic succession, lithology and economic importance of Dongargarh Supergroup/ BELT. **10**

   OR

   Cuddapah SuperGroup. **10**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
GEOLOGY (Paper – VI)
GL – 336 : Applied Geology – I
(Field Geology, Remote Sensing)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **two** or **three** lines : **10**

a) Define field correlation.

b) What is chilled contact ?

c) What is oblique aerial photograph ?

d) What is a Stereo-pair ?

e) Give spectral band width of near IR.

f) What is white body ?

g) What is meant by stereo vision ?

h) What is buffer analysis ?

i) What is line feature ?

j) What does LIDAR stand for ?

P.T.O.

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

   a) Explain how you will select area for field survey.

   b) Explain the types of remote sensing satellites with respect to their orbit characteristics.

   c) Explain network analysis.

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

   a) Describe atmospheric absorption.

   b) Describe radial drainage pattern and its significance.

   c) Explain overlay analysis.

4. Describe the applications of remotely sensed data using GIS and GPS. **10**

   OR

   Give a brief history of Remote Sensing Satellites. **10**

[4317] – 351

Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
GEOGRAPHY (Paper – III)
Gg – 333 : Fundamentals of Geoinformatics (Paper – I)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

a) Define Geoinformatics.

b) What is Remote Sensing ?

c) Why GIS is used ?

d) Mention any two functions of GIS.

e) What is entity ?

f) What is spatial data ?

g) Who pioneered the term GIS ?

h) What is DTM ?

i) Write any two characteristics of vector data.

j) What is data model ?

P.T.O.

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

   a) Explain how toposheets are data source in GIS.

   b) Explain management as a GIS task.

   c) Write in brief the history of GIS.

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

   a) Measuring lengths and areas.

   b) Query analysis as a GIS task.

   c) DTM.

4. Discuss the applications of RS and GIS in land forms studies.

   OR

   What is Raster data ? Write the advantages and disadvantages of Raster and Vector data models in GIS. **10**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
GEOGRAPHY (Paper– V)
Gg – 335 : Geography of Soils (Paper – I)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

a) Define Soil.

b) What do you understand by the process of ion exchange ?

c) Define field capacity.

d) What is azonal soil ?

e) What is soil texture ?

f) Define anion.

g) What is primary mineral ?

h) What is bulk density of the soil ?

i) Define Oxidation-reduction.

j) What is redox potential ?

P.T.O.

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

   a) Describe the process of leaching.

   b) Describe the importance of structure of soil.

   c) Distinguish between intrazonal and zonal soils.

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

   a) Tropical soils

   b) Soil porosity

   c) Wilting point.

4. Describe the processes associated with Pedogenesis.

   OR

   Discuss the Jenny's equation of soil formation. **10**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
GEOGRAPHY (Paper– VI)
Gg – 336 : Fundamentals of Geoinformatics (Paper – II)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

a) Define Geoinformatics.

b) Define Wavelength.

c) Mention types of Stereoscopes.

d) Define Electromagnetic Spectrum.

e) What is forward overlap ?

f) What is reflected IR ?

g) What is scattering ?

h) What is a unit of frequency measurement ?

i) Name any two methods of image interpretation.

j) What is Stereogram ?

P.T.O.

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

   1) What is annotation strip on an aerial photograph ?

   2) Distinguish between principle point and conjugate principle point.

   3) “An aerial photograph is a central perspective projection”. Discuss.

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

   a) Types of aerial photographs based on camera axis.

   b) Electromagnetic radiation.

   c) Multispectral image.

4. What is image interpretation ? Explain the elements of image interpretation.

   OR

   Write an explanatory note on applications of aerial photographs. **10**

[4317] – 303

Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
MATHEMATICS (Paper – III)
MT-333 : Problem Course Based on MT-331 and MT-332
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) Answers to the ***two*** *Sections should be written in* ***separate*** *books.*
iv) Tie answer books of ***both*** *Sections together.*

SECTION – I

(Set Theory and Logic)

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

1) For $A=\{a,b,\phi,\{b,c\}\}$ determine (a) $A-\{c,\phi\}$ and (b) $A-\{b,c\}$.

2) If A is uncountable and B is denumerable, then show that A – B is uncountable.

3) Let $n\in\mathbb{Z}$. Prove that if n^2 is even then n is even.

4) Determine whether the argument given here is valid :

'If $\sqrt{2}>\frac{3}{2}$ then $\left(\sqrt{2}\right)^2>\left(\frac{3}{2}\right)^2$'. We know that '$\sqrt{2}>\frac{3}{2}$' leads to the conclusion '$\left(\sqrt{2}\right)^2=2>\left(\frac{3}{2}\right)^2=\frac{9}{4}$'.

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

1) Prove that a function $f:X\to Y$ is one-one if and only if for any $A,B\subseteq X$, $f(A\cap B)=f(A)\cap f(B)$.

2) In $\mathbb{Z}\times\mathbb{Z}$ define (a, b) ~ (c, d) if and only if a + d = b + c. Show that ~ is an equivalence relation.

P.T.O.

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

   1) Using truth tables show that $[(p \to q) \wedge (q \to r)] \to p \to r$ is a tautology.

   2) Let L(x, y) be the statement x loves y, where domain for both x and y consists of all people in the world. Use quantifiers to express each statement : (a) Everybody loves Jerry. (b) Everbody loves somebody. (c) There is somebody whom everbody loves. (d) Nobody loves everybody. (e) There is somebody whom Jin does not love.

   3) Show that the set of all positive rational numbers $\mathbb{Q}^+$ is countable.

SECTION – II

(Real Analysis)

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

   i) Give an example of a sequence $\{S_n\}_{n=1}^{\infty}$ which is not bounded but for which $\lim_{n\to\infty} \frac{S_n}{n} = 0$.

   ii) Does the series $\frac{1}{2} - \frac{2}{3} + \frac{3}{4} - \frac{4}{5} + \ldots$ converge ? Justify.

   iii) Give an example of a function which is bounded on [a, b] but not Riemann integrable on [a, b].

   iv) Find the sum of the series $\sum_{n=0}^{\infty} x(1-x)^n$.

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

   i) Test the convergence of the series $\sum_{n=4}^{\infty} \frac{1}{n \log n}$.

   ii) Show that the sequence $\{f_n\}_{n=1}^{\infty}$ where $f_n(x) = \frac{1}{n} e^{-nx}$ $(0 \le x < \infty)$ converges uniformly on $[0, \infty)$.

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

i) Show that series $\sum_{n=1}^{\infty} \frac{x}{n(1+nx^2)}$ converges uniformly for all $x \in \mathbb{R}$.

ii) Prove that $\int_0^1 \sum_{n=1}^{\infty} \frac{x^n}{n^2} dx = \sum_{n=1}^{\infty} \frac{1}{n^2(n+1)}$.

iii) Prove that $\frac{1}{3\sqrt{2}} \leq \int_0^1 \frac{x^2}{\sqrt{1+x}} dx \leq \frac{1}{3}$.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
MATHEMATICS (Paper – IV)
MT-334 : Group Theory (2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

   i) Show by giving an example that a factor group of a non abelian group may be abelian.

   ii) If G is a group then show that, $(ab)^{-1} = b^{-1}a^{-1}$ for all $a, b \in G$.

   iii) Give an example of a group G and its two subgroups H and K such that $H \cup K$ is not a subgroup of G.

   iv) Prove that S_n is a non-abelian group for all $n \geq 3$.

   v) Let G be any group, g a fixed element in G. Define $\phi : G \to G$ by $\phi(x) = g x g^{-1}$ for all $x \in G$. Find the kernel of the homomorphism ϕ.

   vi) Compute the product (1 2 4 7) (2 3 5 7) in S_7.

   vii) If ϕ is a homomorphism of G into $\overline{G}$, then show that $\phi(e) = e'$, where e is an identity in G and e' is an identity in $\overline{G}$.

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

   i) If H is a nonempty finite subset of a group G and H is closed under multiplication then prove that H is a subgroup of G.

   ii) Prove that the subgroup N of G is a normal subgroup of G if and only if every left coset of N in G is a right coset of N in G.

   iii) If ϕ is a homomorphism of G in to $\overline{G}$ with Kernel K, then show that K is a normal subgroup of G.

P.T.O.

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

   i) Let $\rho = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\ 2 & 3 & 4 & 5 & 1 & 7 & 8 & 9 & 10 & 6 \end{pmatrix}$ be a permutation in the group S_{10}.

   a) Write ρ as a product of disjoint cycles.

   b) Find order of ρ.

   c) Write ρ as a product of transpositions.

   d) State whether ρ is odd or even.

   e) Find an inverse of ρ.

   ii) If G is a finite group and $a \in G$, then show that O (a) | O(G).

   iii) Suppose H is the only subgroup of order O (H) in the finite group G. Prove that H is a normal subgroup of G.

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

   i) State and prove Cauchy's theorem for abelian groups.

   ii) State and prove Cayley's theorem.

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[4317] – 306

Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
MATHEMATICS (Paper – VI)
MT-336 : Problem Course Based on MT-334 and MT-335
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

SECTION – I

1. A) Attempt **any three** of the following : **6**
   i) If G is finite group, show that there is positive integer N such that $a^N = e$ for all $a \in G$.
   ii) State whether true or false with justification. Any two groups of order 5 are isomorphic.
   iii) Find orbits and cycles of the permutation
   $$\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\ 4 & 6 & 5 & 3 & 2 & 1 & 8 & 10 & 9 & 7 \end{pmatrix}.$$
   iv) Let $G = \langle \mathbb{Z}, + \rangle$ and H = 2$\mathbb{Z}$. Find all distinct left cosets of H in G.

   B) Attempt **any one** of the following : **4**
   i) Let G be a group of even order. Show that it has on element $a \neq e$ satisfying $a^2 = e$.
   ii) If H is a subgroup of G and $a \in G$, show that $aHa^{-1} = \{aha^{-1} / h \in H\}$ is also subgroup of G.

2. Attempt **any two** of the following : **10**
   i) Let $\phi : G \to G'$ be a group homomorphism then prove that
      a) ϕ preserves identify in G
      b) ϕ preserves inverse of each element in G.
   ii) Let G be a finite group whose order is not divisible by 3. Suppose $(ab)^3 = a^3b^3$ for all $a, b \in G$. Prove that G must be abelian.
   iii) If N and M are normal subgroup of G, prove that NM is also a normal subgroup of G.

P.T.O.

SECTION – II

(Ordinary Differential Equations)

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

   i) Solve the differential equation $x\frac{dy}{dx} + y = x^4$.

   ii) Show that the solutions $x = e^{4t}$, $y = e^{4t}$ and $x = e^{-2t}$, $y = e^{-2t}$ of the system $\frac{dx}{dt} = x + 3y, \frac{dy}{dt} = 3x + y$ are linearly independent and write the general solution of the system.

   iii) Find the general solution of $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4 = 0$.

   iv) Find the family of orthogonal trajectories to the curves $y = cx^2$.

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

   i) Find a particular solution of $\frac{d^2y}{dx^2} + y = \operatorname{cosec} x$ by variation of parameters method.

   ii) Find the solution of initial value problem $y'' + 6y' + 9y = 0$, with $y(0) = 0$, $y'(0) = 5$.

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

   i) Find the general solution of $\frac{dy}{dx} + xy = x$.

   ii) Solve the system of differential equations $\frac{dx}{dt} = x + y, \frac{dy}{dt} = 4x - 2y$.

   iii) Find the power series solution of the differentia equation $\frac{dy}{dx} = y$.

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[4317] – 310

Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
MATHEMATICS (Paper – VII & VIII)
MT-337(D) : (Elective – I) : Differential Geometry
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

   i) Show the curve r(t) = (e^t cos t, e^t sint t) is a regular curve.

   ii) State Euler's theorem.

   iii) Give an example of smooth surface.

   iv) Let $\bar{r}$ be a unit speed curve and $\bar{a}$ be a unit vector which is perpendicular to plane containing the curve $\bar{r}$.

   Find the first fundamental form of $\sigma(u, v) = \bar{r}(u) + v\bar{a}$.

   v) Find the equation of the tangent plane of $\sigma(r, \theta) = (r\cosh\theta, r\sinh\theta, r^2)$ at (1, 0, 1).

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

   vii) Define geodesics.

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

   i) State and prove Frenet-Serret equations.

   ii) State and prove isoperimetric inequality.

   iii) Determine the area of the part of paraboloid $z = x^2 + y^2$ with $z \leq 1$.

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

   i) Let k_1 and k_2 be principal curvatures at a point P of a surface patch σ. Prove that if $k_1 \neq k_2$, then any two nonzero principal vectors corresponding to k_1 and k_2 respectively are perpendicular.

P.T.O.

ii) Determine the principal curvatures of right circular cylinder given by

$\sigma(u, v) = (\cos v, \sin v, u)$

iii) For the sphere in lattitude longitude co-ordinates

$\sigma(\theta, \phi) = (\cos\theta \cos\phi, \cos\theta \sin\phi, \sin\theta)$

Calculate the first and second fundamental forms.

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

a) i) Let S_1 and S_2 be surfaces and $f : S_1 \to S_2$ be a diffeomorphism. When do you say that f is conformal map ? When do you say that f is an equiareal map ? If f is both equiareal map and conformal map then show that f is an isometry.

ii) With usual notation, show that

$$\| \sigma_u \times \sigma_v \| = (EG - F^2)^{\frac{1}{2}}$$

b) i) The cissoid of diodes is the curve whose equation in terms of polar coordinates (r, θ) is $r = \sin\theta \tan\theta$, $-\pi/2 < \theta \pi/2$. Write down a parametrisation of the cissoid using θ as a parameter and show that $r(t) = \left(t, {}^2\left(\frac{t^3}{\sqrt{1-t^2}} \right) \right)$, $-1 < t < 1$ is reparametrisation of it.

ii) Consider the surface patch $\sigma(u, v) = (u\cos v, v \sin v, u)$ and the curve on this surface patch given by $u = e^{\lambda t}$, $v = t$ where λ is a constant. Find the length of the part of the curve with $0 \le t \le \pi$.

[4317] – 315

Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
PHYSICS (Paper – III)
PH : 333 : Classical Mechanics
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

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

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

   a) What is conservative force ?

   b) Define centre of mass of the system of particles.

   c) Name the parameter that determine the nature of orbit.

   d) What is the effect of impact parameter on scattering angle ?

   e) What is central force ? Give one example.

   f) What do you mean by differential cross-section ?

   g) Determine the number of degrees of freedom for the particle moving on the circumference of a circle.

   h) What do you mean by configuration space ?

   i) What is inertial frame of reference ?

   j) State the principle of Galilean invariance.

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

   a) Discuss the motion of a charged particle under a constant magnetic field. **5**

   b) What is elastic scattering ? Describe two body scattering in Lab and CM systems. **5**

   c) Explain the effect of coriolis force on cyclone formation. **5**

P.T.O.

3. Solve **any two** of the following.

   a) A body is projected so that the horizontal range is three times the maximum height. Determine the angle of projection. **5**

   b) An artificial satellite is revolving around the earth at a distance of 630 km. Calculate the orbital velocity of revolution of satellite.

   [R_e = 6370 km, $G = 6.67 \times 10^{-11}$ N-m^2/kg^2, $M_e = 6 \times 10^{24}$ kg] **5**

   c) A particle of mass 1 gm with velocity 2×10^3 m/s is made incident on a particle of mass 2 gm at rest. The incident particle is scattered along the direction making an angle of 45° with incident direction and the another particle is recoiled with an angle 30°. Find the velocity of incident particle after scattering. **5**

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

   a) i) Show that a two-body problem can be reduced into equivalent one-body problem under the action of central force. **4**

   ii) For identical particle scattering show that $\sigma(\theta) = 4\cos\theta\sigma(\theta')$. **4**

   b) Compare between Lagrangian and Hamiltonian formulations. Obtain Hamiltonian and Hamilton's equations of motion for a simple pendulum. **8**

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

   a) Calculate the total force acting on a freely falling body of mass 10 kg with reference to a frame moving vertically upwards on earth with an acceleration of 3 m/s^2. **2**

   b) Explain the holonomic constraints with suitable example. **2**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
CHEMISTRY (Paper – IV)
CH-334 : Analytical Chemistry
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

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

1. Answer the following : **10**

1) Define the term solubility product.

2) State Beer's law.

3) Define the term λ_{max} .

4) What is meant by chemical interference in AAS ?

5) What is principle of AAS ?

6) Give the expression to calculate the number of excited molecules in FES.

7) What is spectral interference in FES ?

8) Calculate the transmittance of the solution having turbidence 0.480.

9) State Faraday's second law of electrolysis.

10) Define the term electrochemical equivalent.

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

1) Write note on electrolytic separation of copper and nickel.

2) Explain spectrophotometric titrations.

3) What is criterion for deciding whether turbidimetry or nephelometry should be used in analysis of turbid solution ?

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

1) What is digestion ? Give its advantages.

2) How long will it take for a current of 3 ampere to deposit 15 gram of copper from copper sulphate solution ?

(Electrochemical equivalent of copper = 3.290×10^{-4}) .

3) When a monochromatic light was passed through 15 mm cell the absorbance was found to be 0.60 ? Calculate the concentration of solution having molar absorptivity 1200 lit. mol^{-1}. cm^{-1}.

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

1) What are the conditions for good precipitation in gravimetric analysis ?

2) Draw the schematic diagram of single beam atomic absorption spectrophotometer and describe basic components involved in it.

3) Describe any three applications of FES.

4. a) Explain with suitable illustrations precipitation from homogeneous solution. What are its advantages ? **6**

OR

a) i) Explain mole ratio method for determination of molar composition of complex. **3**

ii) Describe turbidimetric titrations with suitable examples. **3**

b) A 3.4×10^{-4} M solution of aniline in water has absorbance 0.544 at 280 nm when measured in 1 cm cell? Find the transmittance of 1.23×10^{-4} M aniline solution in water when measured at same wavelength but in 1.5 cm cell. **4**

OR

b) What is solubility of $MgCl_2$ (molecular weight = 95) in gram per litre if the solubility product is 7.1×10^{-9}? **4**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
CHEMISTRY (Paper – VI) (Ele – I)
CH – 336 (A) : Nuclear Chemistry
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

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

1. Answer the following : **10**

a) Which of the following nuclide is more stable ?

i) $^{40}_{20}Ca$ ii) $^{119}_{50}Sn$ iii) $^{30}_{13}Al$ iv) $^{55}_{25}Mn$

b) Define binding energy and mean binding energy.

c) State the merits of shell model.

d) State Geiger – Nuttal's law.

e) Give the general nuclear reaction for α -decay with one example.

f) State the magic number of protons and neutrons in case of

A) $^{210}_{84}Po$ B) $^{208}_{82}Pb$

g) Complete the following nuclear reaction $^{14}_{7}N + ^{1}_{0}n \rightarrow ---+ ^{1}_{1}H$

h) State Bethe's notations.

i) In the shell model, nucleons in a nucleus _____

A) interacts strongly with each other
B) had no interaction with other shells
C) both A and B
D) revolves combinely

j) State two salient features of shell model.

P.T.O.

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

   a) Write short notes on α -energy spectrum.

   b) What are the photonuclear reactions ? State its different types.

   c) Give the classification of nuclides, according to their mass number (A) and atomic number (Z).

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

   a) Calculate the binding energy of $^{209}_{83}B_i$

   Given : Mass of proton = 1.007825 amu

   Mass of neutron = 1.008665 amu

   Mass of ^{209}Bi = 208.980 amu

   b) Explain conservation of protons and neutrons in nuclear reaction.

   c) State general characteristics of radioactive decay process.

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

   a) What is half life and average life ? Show that radioactive decay follow first order kinetics.

   b) What is compound nucleus ? Discuss important features of compound nucleus.

   c) State and explain semi-empirical mass equation. What are its applications ?

4. A) Describe liquid-drop model in detail giving postulates. **6**

   OR

   A) Explain Fermi theory of β -decay. **6**

   B) Describe Auger effect. **4**

   OR

   B) The disintegration of 1 gram of ^{222}Ac was studied, 0.563 gram of actinium remained after 5 hours. Find half life of ^{222}Ac. **4**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
CHEMISTRY (Paper – VI) (Ele – I)
CH – 336 (B) : Polymer Chemistry
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

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

1. Answer the following : **10**

i) Define the term – homopolymer.

ii) Glass is an inorganic polymer. State whether the statement is true or false and rewrite.

iii) Write IUPAC name of $Br.ClSiMe_2$.

iv) Give the names of two important fillers.

v) Draw the structure of poly (1-chloro) ethylene.

vi) The P-F resin was invented by _____

vii) Calculate the molecular weight of polyvinylalcohol whose Dp. is 600.

viii) Explain the term – “Thermosetting polymers”.

ix) Write two important applications of PVC.

x) Draw the structures of the following monomers –

a) Vinyl acetate

b) Isoprene.

2. A) Explain the following **(any three)** : **6**

   i) Poly carbonate polymer is used for making bullet-proof jackets.

   ii) Liquid resins are used in plywood industries.

   iii) In day to days life, polymeric articles are gift to human being.

   iv) Nylon-66 is used for making fisherman's net.

   B) How will you differentiate between the following **(any two)** : **4**

   i) Linear and cross-linked polymers.

   ii) Synthetic and natural polymers.

   iii) Plasticizers and antioxidants.

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

   i) Give a full account of ionic polymerisation with suitable examples.

   ii) Discuss in brief suspension polymerisation and melt polymerization techniques.

   iii) Write the practical significance of polymer molecular weight.

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

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

   Set A : 20 mangoes with weight of each mango 200 g

   Set B : 25 mangoes with weight of each mango 160 g

   Set C : 30 mangoes with weight of each mango 140 g

   Set D : 35 mangoes with weight of each mango 100 g

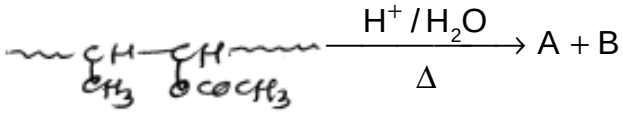
   Calculate the weight-average $(\overline{M}w)$ molecular weight for the mangoes.

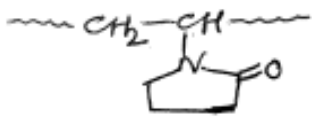
   ii) Write a brief account of viscosity of polymeric materials.

   iii) Write a short note on – Vulcanization.

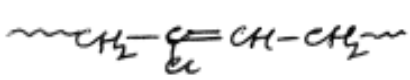
B) Complete the following polymer reactions **(any four)**: **4**

i) $n\,HOOC(CH_2)_4COOH + n\,HOCH_2CH_2OH \xrightarrow{\Delta} A$

ii)  $\xrightarrow[\Delta]{H^+ / H_2O} A + B$

iii)  $\xrightarrow[\Delta]{H^+ / H_2O} A$

iv)  $\xrightarrow{\Delta} A$

v)  $\xrightarrow{mCPBA} A$

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
CHEMISTRY (Paper – VI) (Ele – I)
CH – 336 (C) : Introduction to Biochemistry and Molecular Biology (Biochemistry) (New) (2008 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* ***wherever*** *necessary.*

I. Answer the following : **10**

1) Name two hormones of adrenal cortex.
2) Give the structure of one aromatic amino acid.
3) What are epimers ? Give examples.
4) Define Saponification number.
5) List out two functions of cell membrane.
6) What is the coenzyme form of Thiamin ?
7) Give two significance of SDS-PAGE.
8) List out 2 enzymes of Hydrolase class.
9) What are sugar acids ? Give example.
10) Name two conjugated proteins.

II. A) Attempt **any two** : **6**

1) Write note on mutarotation of sugars.
2) Give the significance of phospholipids.
3) Differentiate between standard and non-standard amino acids.

B) Write the structures of **any two** of the following : **4**

1) α-D Glucopyranose and β-D Glucopyranose

2) Lecithin

3) Val-phe-ser

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

1) Classify enzymes with suitable examples.

2) Describe the organisation of an animal cell membrane and give its features.

3) Explain the principle, procedure and applications of Affinity chromatography.

IV. Answer the following : **6**

1) Explain the reactions of Amino acid with Sanger's reagent, Dansyl chloride and Edmann's reagent with their significance.

OR

1) Discuss the effect of any four factors that affect enzyme activity.

2) Write note on dialysis. **4**

OR

2) Write note on titration curve of glycine.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
CHEMISTRY (Paper – VI) (Ele – I)
CH – 336 (D) : Environmental Chemistry
((2008 Pattern) (New)

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* ***whenever*** *necessary.*

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

   a) Define the term 'Pollutant'.

   b) Define the term Dissolved Oxygen (D.O.).

   c) What is 'lapse rate' ?

   d) What is 'Air Pollution' ?

   e) Name the any two sources of carbon monoxide.

   f) What are the 'Humic Substances' ?

   g) What do you mean by Acid Mine drainage ?

   h) Define the term 'Sediments'.

   i) Define 'Disease'.

   j) Name any two major components of Atmosphere.

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

      i) Explain pathway of pollutant with example.

      ii) What is effect of pesticides on human health ?

      iii) Describe about Total Hardness of water.

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

      i) Stratosphere

      ii) Acid rain

      iii) Eutrophication

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

   i) Explain in detail mechanism of earth's radiation balance in atmosphere.

   ii) Explain Minamata Disease.

   iii) Describe in brief Geological Hazards in environment.

4. a) Give source and sink of carbon monoxide (CO) pollutant and give its effect and control of CO pollution. **6**

   OR

   a) What is Total Organic Carbon (T.O.C.) ? Describe the method of its determination.

   b) Write short note on **(any one) :** **4**

      i) London smog

      ii) Stratification of water bodies.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
CHEMISTRY (Paper – VI) (Ele. – I)
CH – 336 (E) : Agricultural Chemistry
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

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

1. Answer the following : **10**

a) What do you mean by ESP ? How is it calculated ?

b) What is herbicides ?

c) What is lime requirement ?

d) Give importance of buffer action in Agriculture.

e) What is Bordeaux mixture ?

f) What are objectives of agriculture chemistry ?

g) Define the term 'Biofertilizers'.

h) What do you mean by saturation zone ?

i) Classify phosphatic fertilizers.

j) What is symbosis ?

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

1) What is soil testing ? Give its importance.

2) Explain the insecticidal activity of a) BHC b) Carbaryl c) Baygon.

3) Which are different factors controlling the availability of phosphorous in the soil ?

B) Attempt **any two** : **4**

1) Why are gypsum and calcium chloride can not be used for improvement of acid soils ?

2) Why does plant need nutrients ? Which is the criteria of essentiality of plant nutrients ?

3) Differentiate between attractants and repellants.

3. Attempt **any two** : **10**

1) State the factors controlling soil reactions.

2) Classify nitrogenous fertilizers. Explain the action of urea and ammonium sulphate on soil.

3) What are pesticides ? Give their classification and mode of action of insecticides.

4. A) Attempt **any two** : **6**

1) Discuss in detail the major impurities found in raw water.

2) Give advantages and disadvantages of green manuring.

3) Define soil. What are the components of soil ?

B) Answer **any two** : **4**

1) Give general functions of micronutrients.

2) What is humus ? Explain its functions.

3) Describe briefly the functions of dissolved minor constituents present in irrigation water.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
MICROBIOLOGY (Paper – IV)
MB-334 : Immunology – I
(New) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Do as directed :

A) Match the following : **5**

I	II
1) T and B cells	a) Anti tetanus serum
2) Secretory antibody	b) RBCs
3) Passive immunization	c) Hybridoma
4) Insoluble antigen	d) Antibody production
5) Tumour cells	e) IgA

B) Fill in the blanks : **5**

1) An example of hapten is _____
2) Toxoid gives _____ immunity.
3) An example of biological response modifier is _____
4) The affinity of an antibody is _____ .
5) Antigen processing and presentation is done by _____ cells.

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

A) Three lines of defense.
B) Classical pathway of competent system.
C) Molecular basis of antibody diversity.

P.T.O.

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

   A) Diagrammatically illustrate structure of IgG.

   B) Comment on ‘thymus dependent and thymus independent antigens’.

   C) Briefly describe ‘Western blot technique’.

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

   A) Describe the structure and function of spleen and lymph node.

   B) Describe the structure and function of phagocyte and dendritic cell.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
MICROBIOLOGY (Paper – VI)
MB-336 : Food and Dairy Microbiology
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

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

1. Attempt the following :

A) Match the following : **5**

A	B
a) Serratia marscencens	i) Resazurin
b) Streptococcus agalactiae	ii) Red milk
c) Phosphatase test	iii) Ropiness
d) Alcaligenes viscolactis	iv) Mastitis
e) Dye reduction test	v) CQC

B) Fill in the blanks : **2**

i) The full form of NDDB is _____

ii) Water activity is _____ factor of food affecting microbial growth.

C) Write any two advantages of Tetrapak. **1**

D) What is the time and temperature relationship used in HTST method of pasteurisation ? **1**

E) Define : Skimmed milk. **1**

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

i) Spoilage of bread.

ii) Sweet curdling of milk.

iii) Food poisoning by Clostridium botulinum.

P.T.O.

3. Attempt **any two** of the following : **10**
   i) Give significance of fermented foods.
   ii) Describe briefly food poisoning by A. flavus with respect to sources and prevention.
   iii) Describe MBRT test.

4. Attempt **any one** of the following : **10**
   a) Explain use of any five chemical preservatives in food preservation.
   b) Describe succession of microorganisms in milk leading to spoilage.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
ELECTRONIC SCIENCE (Paper – III)
EL-333 : Analog Circuits Design and Applications of Linear IC's
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

   a) What is the purpose of common grounding in a circuit ? **1**

   b) Why ideal OPAMP can drive an infinite number of devices ? **1**

   c) State one application of peak detector. **1**

   d) Write any two features of regulator IC LM 317. **1**

   e) "Precision full wave rectifier is also called absolute value circuit". Comment. **2**

   f) List four advantages of active filter over passive filter. **2**

   g) What is clipper ? Give its two advantages. **2**

   h) Inverting amplifier using OPAMP IC 741 has 3 dB frequency 400 KHz and input resistance $50\,k\Omega$. Calculate its gain. (f_T = 10 MHz) **2**

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

   a) Draw the circuit diagram of practical S/H circuit and explain its working. State its applications. **4**

   b) Explain the concept of switched capacitor filter. State the limitations of switched capacitor filter. **4**

   c) Describe the working of log amplifier using PN junction diode as log element. Derive the expression for output voltage. **4**

P.T.O.

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

   a) Draw the circuit diagram of practical integrator. Write the designing steps for it. **4**

   b) Explain with circuit diagram of low voltage regulator using IC 723. Write the expression for output voltage. **4**

   c) Draw the circuit diagram of monostable multivibrator using IC 555 and explain it. **4**

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

   a) Draw the circuit diagram of function generator using IC 8038. Give the expression for its output frequency. State two features of IC 8038. **6**

   b) Write in detail the various factors on which the selection of OPAMP depends in circuit design. **6**

   c) Explain the working of V/F converter using OPAMPS. Write the expression for its output frequency. Give its any two applications. **6**

OR

4. Answer the following :

   a) For VCO IC 566, +V = 12 V, V_C = 9.5 V, $C_1 = 0.001\mu F$, $R_1 = 10\,k\Omega$. Determine the output frequency. **4**

   b) Design Astable multivibrator using OPAMP for frequency of oscillation f_0 = 1 KHz. **4**

   c) Design second order low pass Butterworth filter with high cut-off frequency 10 KHz and pass band gain 1.586. **4**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
ELECTRONIC SCIENCE (Paper – V)
EL-335 : 'C' Programming
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer **all** of the following :
   a) Name the basic types of constants in 'C'. **1**
   b) How a single character can be entered into the computer using 'C' library function ? **1**
   c) State format for pointer declaration. **1**
   d) What is size of a structure ? **1**
   e) How do string constant differ from character constant ? Give examples. **2**
   f) How 'while' control structure differs from 'do while' ? **2**
   g) "The return statement can not be used to return an array" Comment. **2**
   h) "Pointer provides alternative method to access array elements" comment. **2**

2. Answer **any two** of the following :
   a) What is branching in C program ? Distinguish between 'break' and 'continue statements. **4**
   b) What are formal and actual arguments in function ? Give example. **4**
   c) Define multidimensional array. How the elements are acessed from multidimensional array ? **4**

P.T.O.

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

   a) Expalin the ‘getc’ and ‘putc’ functions with suitable examples. **4**

   b) What is text mode and graphic mode ? Write ‘C’ statement to detect graphic driver and intialise graphics. **4**

   c) What is an operator ? List various types of operators in ‘C’ . Explain any one of them. **4**

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

   a) Explain ‘fscanf’ and fprintf’ functions in ‘C’ with suitable examples. **6**

   b) Give the general format of ‘For’ loop statement and explain how it is executed ? How for loop differs from other loop statements ? **6**

   c) How array elements are processed by using pointer ? Elaborate with suitable examples. State applications of pointers. **6**

OR

4. Answer **all** of the following :

   a) Write a ‘C’ program to find factorial of an integer using recursion. **4**

   b) Write a ‘C’ program to input the elements of two 3×3 matrices and find their multiplication. **4**

   c) Write a ‘C ‘ program to draw a triangle and a ellipse. **4**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
ELECTRONIC SCIENCE (Paper – VI) (Optional) (Ele. – I)
EL – 336 (A) : Fiber Optics and Fiber Optics Communications
(New) (2008 Pattern)

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 BW ? **1**

b) What is quantum efficiency ? **1**

c) State types of optical coupler. **1**

d) What do you mean by longhall communication ? **1**

e) State any four applications of fiber optic communication system. **2**

f) Compute the NA and acceptance angle of fiber having μ_1(core refracting index) = 1.50 and refractive index of cladding = 1.45. **2**

g) State commonly used optical sources and detectors. **2**

h) "Fiber optic link has different types of losses". Comment. **2**

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

a) Discuss applications of fiber optic communication system in data transfer and telephony. **4**

b) Explain structure and working of optic fiber cable with suitable diagram. **4**

c) With neat diagram explain CATV network. **4**

P.T.O.

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

   a) Write a note on types of optical fibers. **4**

   b) What are the specification of good LED material. **4**

   c) Draw schematic for **4**

      i) Spherical ended fiber coupling

      ii) Edge emitting LED lens ended coupling.

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

   a) Explain terms :

      i) NA

      ii) Acceptance angle

      iii) Dispersion in optic fiber. **6**

   b) Explain any two losses in splices and connectors. **6**

   c) Discuss optical power budgeting for design of optical fiber link. **6**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
ELECTRONIC SCIENCE (Paper – VI) (Optional) (Ele. – I)
EL – 336 (B) : Sensors and Actuators
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to ***right*** *indicate* ***full*** *marks.*
iii) ***Draw*** *neat diagrams* ***wherever*** *necessary.*

1. **All** sub-questions are **compulsory**.

a) Define transfer function. **1**

b) State any two specifications of relay. **1**

c) Name two amplifiers used for signal conditioning. **1**

d) State any two sensors used in industrial applications. **1**

e) “Chemical sensors are helpful in atmospheric pollution control”. Comment. **2**

f) “Active filters are more advantageous over passive filter”. Comment. **2**

g) What is solenoid ? State two applications of it. **2**

h) State different technologies used for fabrication of sensor. **2**

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

a) Explain primary and secondary transducer with the help of examples. **4**

b) Describe with neat diagram LVDT as displacement sensor. **4**

c) Write note on “oxygen sensor used in automobile”. **4**

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

   a) Write note on thermistor as temperature sensor. **4**

   b) What are different performance testing parameters of sensors ? Explain any two of them. **4**

   c) Explain the working of stepper motor as an actuator in computer and printer. **4**

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

   a) What are different types of photo sensors ? Explain the construction and spectral response of selenium cell with necessary diagrams. **6**

   b) What is actuator ? Explain the working of solenoide as an actuator. What are important specifications of solenoide ? **6**

   c) With neat diagram explain the working of instrumentation amplifier. State advantages of it. **6**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
DEFENCE AND STRATEGIC STUDIES) (Paper – IV)
DS-334 : Research Methodology
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** to **4** sentences **each** : **16**
   1) Define research.
   2) What is meant by observation method ?
   3) Define primary data.
   4) Write the importance of scientific methods is research.
   5) How Physical Sciences differ from Social Sciences in objectivity ?
   6) What do you understand by Historical Research ?
   7) What is applied research ?
   8) What is conceptualization ?

2. Answer in **8** to **10** sentences **each** (**any two**) : **8**
   1) Write the role of research in important areas.
   2) Write about the significance of research.
   3) What are the sources of stating a problem ?

3. Write short notes on (**any two**) : **8**
   1) Hypothesis
   2) Research Design
   3) Need of research in disaster management.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Discuss the style and structure of a research report.
   2) Explain about the qualities of interviewer.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – IX) (Ele – IV)
DS-339 (A) : Defence Management in India (Optional)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** to **4** sentences **each** : **16**
   1) Write any two features of Defence Management.
   2) Define Defence Management.
   3) What do you mean by Military Strategy ?
   4) State the concept of Military Organization.
   5) Define Leadership.
   6) Define Economic Culture.
   7) Write the meaning of National Defence.
   8) What do you mean by Political Economy ?

2. Answer in **8** to **10** sentences **each** (**any two**) : **8**
   1) Explain scope of Defence Management.
   2) Discuss application of war principles in Corporate Management.
   3) Explain human resource management in Defence Services.

3. Write short notes on (**any two**) : **8**
   1) Team building in Armed Forces.
   2) Principles of Management.
   3) Organizational aspects of Decision Making.

4. Answer in **18** to **20** sentences (**any one**) : **8**
   1) Evaluate application of management practices in Indian Armed Forces.
   2) Write a note on the challenges to Defence Management.

P.T.O.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – IX) (Ele – IV)
DS-339 (B) : Internal Security of India (I) (Optional)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** or **4** sentences **each** : **16**
   1) Define “Internal Security”.
   2) State the meaning of S.E.Z.
   3) What do you mean by Agitation ?
   4) Define “State”.
   5) What do you understand by Seven Sister of India ?
   6) What do you mean by Human Security ?
   7) What do you understand by Naxalbari ?
   8) State any two internal security problem of India.

2. Answer in **8** to **10** sentences (**any two**) : **8**
   1) Write few lines on “Origin of Naxalism”.
   2) Explain in brief Indian state affected by S.E.Z.
   3) Write in brief socio-ethnic dimension of India’s internal security problem.

3. Write short notes on (**any two**) : **8**
   1) Economic dimension of India’s internal security problem.
   2) External abetment of India’s internal security problem.
   3) Nature of Kashmir problem.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Explain the security challenges to North-East region of India.
   2) Write a note on “Elements of The State”.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – IX) (Ele – IV)
DS-339 (C) : India's Maritime Security (I) (Optional)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** to **4** sentences **each** : **16**
   1) State the meaning of Maritime Security.
   2) Define Maritime State.
   3) Define Territorial Waters.
   4) State the meaning of Continental Shelf.
   5) Define War Potential.
   6) Write the meaning of Law of the Sea.
   7) Define Sea Power.
   8) Write any two elements of Sea Power.

2. Answer in **8** to **10** sentences **each** (**any two**) : **8**
   1) Explain brief history of Ocean.
   2) Discuss concept of Maritime Boundaries.
   3) Explain Exclusive Economic Zone (EEZ).

3. Write short notes on (**any two**) : **8**
   1) India's Maritime Strategy.
   2) Fixed Assets of Indian Navy.
   3) Role of Coast Guard.

4. Answer in **18** to **20** sentences (**any one**) : **8**
   1) Explain new challenges to Maritime Security.
   2) Discuss maritime resources and their importance to National Economy.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
ENVIRONMENTAL SCIENCES (Paper – I)
ENV-331 : Terrestrial Ecosystems and Management
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

   a) What are biogeographic zones ?

   b) Enlist the parameters for study of terrestrial environment.

   c) What are biotic components of terrestrial ecosystem ?

   d) Define 'Tundra Biome'.

   e) Enlist any two applications of remote sensing in ecosystem management.

   f) Define 'Bio-geocycles'.

   g) Mention any two reasons of forest fire.

   h) Give any two methods of vegetation sampling.

   i) What is Habitat Restoration ?

   j) Define 'Eco-tourism'.

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

   a) The vegetation subsystem.

   b) The point Frame method.

   c) Aesthetic and cultural benefits of terrestrial ecosystem management.

P.T.O.

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

   a) Describe the community based forest management practices.

   b) Explain the role of Local Government and People in conservation.

   c) Describe in brief - Biodiversity hotspots in India.

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

   a) Explain the methods of vegetation data analysis.

   b) Describe the distribution of major terrestrial communities, their structure and classification.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
ENVIRONMENTAL SCIENCE (Paper – III)
ENV 333 : Water Quality
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

2) Neat and labeled diagrams must be drawn ***wherever necessary****.*

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

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

a) What is meant by water inventory ?

b) Define : Weathering.

c) Enumerate any two biological characteristics of water.

d) Give any two sources of pathogen in water.

e) Give the full form of GIS.

f) State the difference between Natural and Accelerated eutrophication.

g) Define Ballast water and mention its use.

h) Name the causative agent for typhoid and cholera.

i) Give examples of any two insecticides.

j) Mention the difference between point and non-point source of water pollution.

P.T.O.

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

   a) History of water resources development.

   b) Trickling filter with labelled diagram.

   c) River water pollution with respect to sources, effects and a case study.

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

   a) What are the issues related to water crisis ?

   b) Explain the sources and effects of Thermal pollution.

   c) Define : Marine pollution and explain in detail its effect on marine life.

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

   a) Discuss in detail role of science and policy in solving water problems.

   b) Give any five detrimental effects of detergents. Add a note on ecofriendly detergents.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
ENVIRONMENTAL SCIENCES (Paper – VI)
ENV-336 : Environmental Biotechnology – I
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

*2) **Neat** and labeled diagrams must be drawn **wherever** necessary.*

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

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

   a) Define traditional biotechnology.

   b) Define cell fusion.

   c) What is sustainable agriculture ?

   d) Write any two benefits of patent system.

   e) What is bioleaching ?

   f) What is full form of GMM ?

   g) Define hog fuel.

   h) What is bioaguementation ?

   i) Define activated sludge.

   j) Write any two names of petro crops.

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

   a) Mycoproteins.

   b) Life cycle of earthworm.

   c) Methanogenesis.

P.T.O.

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

   a) What is SCP ? Explain its nutritional values.

   b) Describe the advantages of biopesticides.

   c) What are the methods used for gene transfer in transgenic plants ?

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

   a) What is cartogena protocol ? Explain its significance.

   b) Explain enrichment, isolation and counting of microbes.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
INDUSTRIAL CHEMISTRY (Paper – V)
Industrial Methods of Chemical Analysis
(Vocational Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) 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) What is the voltage-ramp used in square wave polarography ?
   b) Define the term 'decomposition potential' used in polarography.
   c) State the principle of differential pulse polarography.
   d) What is the energy of X-rays ?
   e) What is Bremsstrahlung ?
   f) State the two forms of lead found in petrol.
   g) What is the temperature of acetylene-air flame ?
   h) Define soft method of ionization as used in mass spectrometry.
   i) Why are membrane electrodes called ion-selective electrodes ?
   j) Define a thermal neutron.

2. A) Answer **any two** of the following : **6**
   a) Explain the role of gelatin in polarography.
   b) Draw a neat labelled diagram of an X-ray fluorescence apparatus.
   c) Write a note on fluoride ion electrode.

P.T.O.

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

a) Give the values of neutron flux obtained from nuclear reactor, radioisotope and accelerator.

b) State any four applications of mass spectrometry.

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

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

a) Write the differences between AAS and FES.

b) Explain with a neat labelled diagram the premix burner as used in AAS.

c) Calculate the mass absorptive coefficient at 0.436 nm of an alloy consisting of 85.0 percent Fe, 5.0 percent Ni, 9.0 percent Cu and 1.0 percent Zn. The mass absorptive coefficients for the pure elements at 0.436 nm are 610, 715, 760 and 910 cm^2/g respectively for Fe, Ni, Cu and Zn.

4. A) Give the principle, apparatus and working of a flame photometer. **6**

OR

A) Describe with a neat labelled diagram, the single crystal method of X-ray diffraction. **6**

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

a) A time of flight mass spectrometer has a flight path of 50.0 cm and accelerating potential of 1250 V. What is the time required for ionic fragments with $\frac{m}{z} = 50$ to strike the detector ?

b) Enlist the applications of an X-ray absorption method.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
(Vocational)
INDUSTRIAL MICROBIOLOGY (Paper – V)
VOC-IND-MIC-335 : Pollution Control Technology
(2008 Pattern)

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 electronic pocket calculator is* ***allowed****.*
5) Assume suitable data, ***if necessary****.*
6) ***All*** *questions care* ***compulsory****.*

1. Answer as directed : **10**

For (a) to (d) state whether the statement given is **True** or **False** :

a) Activated sludge process is a single unit process.

b) Settled bacteria in the settling tank of an activated sludge process contribute to approximately 23% of the degradation of the organic matter.

c) Type II settling involves hindered settling.

d) “Sludge bulking” is associated with the activated sludge process.

For (e) to (j) choose the best option/answer among those given :

e) Volatile Suspended Solids (VSS) represent the :
   a) Active Biomass
   b) Total biomass
   c) All the volatile fractions in the wastewater
   d) Small particles that float on the wastewater

f) Grit chambers would be considered –
   a) A part of Primary Treatment
   b) A part of Secondary Treatment
   c) Only used when floatable solids are to be removed
   d) Only in industrial wastewater

g) Which of the following trickling filter problems could be reduced by increasing the recirculation ratio ?
   a) Filter flies
   b) Filter ponding
   c) pH stabilization
   d) Both a and b

h) Poor settling tank performance is indicated by
   a) Floating clumps of sludge on water surface
   b) Low pH of wastewater and odour
   c) Loss of solids over effluent weirs
   d) All of the above

i) The relationship of BOD and COD for almost all wastewaters is
   a) BOD is more than or equal to COD
   b) COD is not always less than BOD
   c) COD is more than or equal to BOD
   d) None of the above are true

j) Excessive solids in the activated sludge process, must be wasted to maintain the
   a) BOD : COD ratio
   b) The endogenous decay rate
   c) Influent BOD/MLVSS ratio
   d) MLVSS/Influent BOD ratio

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

a) Explain the principle of Type I sedimentation based on the Stoke's Law. State the conditions under which this type of sedimentation occurs in wastewater treatment systems, with examples.

b) Draw a labeled diagram of any one type of anaerobic digester used in wastewater treatment, and explain its functioning.

c) Explain the role of the equalization tank in a wastewater treatment process.

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

   a) Describe any unit process used for removal of phosphorus from wastewaters.

   b) List and explain the objectives of industrial wastewater treatment. Give suitable examples wherever necessary.

   c) Justify that Rotating Biological Contractors are “combined unit processes” used in treatment of wastewaters.

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

   a) Explain how MCRT differs from HRT. Using suitable data, explain the calculation of MCRT and HRT in an activated sludge process assuming the following values :

Influent TSS	0 mg/L
Recycle line total suspended solids	6000 mg/L
Mixed liquor suspended solids	3000 mg/L
Effluent total suspended solids	15 mg/L
Influent flow	7500 m^3/d
Waste activated sludge flow	0.06 m^3/d
Primary clarifier volume	1.0 million litres
Aeration basin volume	6.0 million litres
Secondary clarifier volume	1.0 million litres

   b) Draw a flow sheet of a typical two-stage trickling filter system. Explain the operating parameters that need to be controlled if the system is malfunctioning. State the malfunction and how the operating parameter is controlled.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
Vocational
INDUSTRIAL MICROBIOLOGY (Paper – VI)
VOC-IND-MIC-336 : Plant and Animal Tissue Culture
(2008 Pattern)

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 electronic pocket calculator is **allowed**.*
*5) Assume suitable data, **if necessary**.*
*6) **All** questions are **compulsory**.*

1. Answer as directed. **10**

a) Define / Explain in one line : Primary cell line.

b) Define / Explain in one line - Fibronectin.

c) Mark **True** / **False** : RPMI 1640 medium is used for growth of hybridoma.

d) Mark **True** / **False** : Presence of serum in cell culture has major advantage in product purification and may even help in the pharmaceutical acceptance of the product.

e) Mark the correct choice : For successful monolayer culture, following should not occur in cell lines, EXCEPT :

i) transformation

ii) organogenesis

iii) contact-inhibition

iv) differentiation.

f) Enlist the enzymes used for making protoplast of plant cells.

P.T.O.

g) Draw the structure of indole acetic acid.

h) Explain in 1-2 lines : Totipotency

i) What are Transgenic plants ?

j) T-DNA represents following tumor genes :

1) _____, 2) _____, 3) _____

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

a) Explain in brief “Slide / Coverslip cultures”.

b) Describe the steps in mechanical disaggregation of cells from the explant.

c) Explain use of animal cell lines in cytokine and growth factor assays.

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

a) Write the detailed protocol of ‘Callus culture’ and write importance of it.

b) Describe in detail the methods used for developing herbicide resistance in plants.

c) What are the nutritional requirements of plants ? Describe any one culture medium and the role of ingredients for plant tissue culture.

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

a) Discuss the factors affecting growth of animal cells in culture.

b) Describe in detail *Agrobacterium tumafaciens* mediated gene transfer with suitable example.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
SEED TECHNOLOGY (Vocational)
Seed Farm Management, Processing and Storage (Paper – VI)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **one** sentence **each** : **(1×10=10)**

   a) Give any one objective of farm management.

   b) Draw basic flow pattern in seed processing plant.

   c) Define capital limitation.

   d) Define seed marketing.

   e) What is seed processing ?

   f) Enlist methods of seed treatment.

   g) What is seed cleaning ?

   h) Give the name of any one seed treating equipment.

   i) What is seed conditioning ?

   j) Define seed grading.

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

   a) Describe in detail factors affecting storability of seeds.

   b) What is seed drying ? Explain in detail any one method of seed drying.

   c) Write an account on comparison of Farm management and Agricultural economics.

P.T.O.

3. Write notes on **any two** of the following : **(5×2=10)**
   a) Major components of seed marketing.
   b) Basic requirements of seed storage.
   c) Fundamentals of farm management.

4. Explain in detail maintenance and management of seep processing plant. **10**

OR

4. What is seed treatment ? Write in detail methods of seed treatment.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
MATHEMATICS (Paper – II)
MT – 332 : Real Analysis
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

   i) Define limit superior and limit inferior of a sequence.

   ii) Does the series $1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}+\frac{1}{5}-\frac{1}{6}+\cdots$ converge ? Justify.

   iii) Discuss the convergence of the series $\sum_{n=2}^{\infty}\frac{1}{(\log n)^n}$.

   iv) Show that the series $\sum_{n=1}^{\infty}\frac{n!}{n^n}$ is convergent.

   v) If f is defined on [0, 1] such that

   $$f(x)=1;\quad x\neq\frac{1}{2}$$
   $$=0;\quad x=\frac{1}{2}$$

   then show that $f\in R[0,1]$

   vi) Find the limit function of the sequence $\{f_n\}_{n=1}^{\infty}$, where $f_n(x)=x^n$ $(0\le x\le 1)$.

   vii) Prove that the series $\sum_{n=1}^{\infty}\frac{1}{n^p}\cos nx$ for $p>1$ converges uniformly on $(-\infty,\infty)$.

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

   i) If $\sum_{n=1}^{\infty}a_n$ is a series of non-zero real numbers and if $A=\lim_{n\to\infty}\sup\left|\frac{a_{n+1}}{a_n}\right|$, then prove that $\sum_{n=1}^{\infty}|a_n|<\infty$ provided $A<1$.

P.T.O.

ii) If $\sum_{n=1}^{\infty} a_n$ converges absolutely, then prove that $\sum_{n=1}^{\infty} a_n$ converges. Give an example of a series which is convergent but not absolutely convergent.

iii) Test the convergence of $\sum_{n=1}^{\infty} \frac{3}{4+2^n}$.

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

i) If f is a continuous function on the closed interval [a, b], and

if $\phi'(x) = f(x)\ (a \le x \le b)$, then prove that $\int_a^b f(x)dx = \phi(b) - \phi(a)$.

ii) If $f \in R[a,b]$ and a < c < b, then prove that $f \in R[a,c]$ and $f \in R[c,b]$.

Also prove that $\int_a^b f = \int_a^c f + \int_c^b f$.

iii) If $f(x) = x^2$ and for each $n \in I$, if $\sigma_n = \left\{0, \frac{1}{n}, \frac{2}{n}, ..., \frac{n}{n}\right\}$ is a sub-division of [0, 1], then compute $\lim_{n\to\infty} \cup [f : \sigma_n]$.

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

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

b) Show that series $\sum_{n=1}^{\infty} \frac{x}{n^p + n^q x^2}$ for an $x \in R$ is uniformly convergent if $p + q > 2$.

ii) a) Show that the sequence $\{f_n\}_{n=1}^{\infty}$, where $f_n(x) = \frac{x^n}{1+x^n}$ $(0 \le x \le 1)$, does not converge uniformly on [0, 1].

b) Show that the series $\sum_{n=1}^{\infty} x^n e^{-nx}$ is uniformly convergent on [0, 10]

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
MATHEMATICS (Paper – V)
MT – 335 : Ordinary Differential Equations
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

i) Find the family of orthogonal trajectories to the curves $x^2 + y^2 = c$.

ii) Solve the differential equation $\frac{dy}{dx} - xy = 0$.

iii) Find the general solution of the differential equation $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = 0$.

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

$$\frac{dx}{dt} = x + 2y$$

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

v) Find the singular point of differential equation $(1+ x^2)\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = 0$. Verify that 0 is an ordinary point.

vi) Show that the series $y = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + ...$ satisfies the differential equation

$$\frac{d^2y}{dx^2} = -y .$$

vii) Is the differential equation $(y – x^3) dx + (x + y^3) dy = 0$ exact ? If yes find its solution.

P.T.O.

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

   i) Prove that the necessary and sufficient condition for the differential equation Mdx + Ndy = 0 to be exact is that $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$.

   ii) Solve the linear differential equation $x^2 \frac{dy}{dx} + xy = x^3$.

   iii) Solve the homogeneous differential equation $\frac{dy}{dx} = \frac{y^2}{xy - x^2}$.

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

   i) Explain the method of variation of parameters to solve the differential equation

   $$\frac{d^2y}{dx^2} + p(x)\frac{dy}{dx} + q(x)\,y = r(x).$$

   ii) Solve the differential equation $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} - 10y = 6e^{4x}$ by method of undetermined coefficients.

   iii) Verify that $y_1 = e^x$ is one solution of the equation $x\frac{d^2y}{dx^2} - (2x+1)\frac{dy}{dx} + (x+1)y = 0$. Find y_2 and the general solution by using a known solution y_1.

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

   i) a) If W(t) is the Wronskian of the two solutions of the homogeneous system of differential equations, then prove that W(t) is either identically zero or nowhere zero on [a, b].

   b) Find the general solution of the system $\frac{dx}{dt} = -3x + 4y$, $\frac{dy}{dt} = -2x + 3y$.

   ii) Find the power series solution of differential equation

   $$\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = 0.$$

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
MATHEMATICS (Paper – VII & VIII)
MT – 337 (A) : Operations Research (Ele. – I)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

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

i) Define slack and surplus variables.

ii) What is degeneracy in a Transportation problem ? How is it resolved ?

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

iv) Identify the direction of increase in Z of the function max $Z = 3x_1 - 6x_2$.

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

Max : $Z = x_1 - 2x_2 + 3x_3$

Subject to $-2x_1 + x_2 + 3x_3 = 2$

$2x_1 + 3x_2 + 4x_3 = 1$

$x_1, x_2, x_3 \geq 0$

vi) What are redundent constraints in following problem ?

Max $Z = 3x_1 + 9x_2$

Subject to $x_1 + 4x_2 \leq 8$

$x_1 + 2x_2 \leq 4$

$x_1, x_2 \geq 0$

P.T.O.

vii) Express the following LPP in equation form and determine one basic feasible solution.

Maximize $Z = 2x_1 + 3x_2$

Subject to $x_1 + 3x_2 \leq 6$

$x_1, x_2 \geq 0$

2. Attempt **any two** of the followings : **[10]**

i) Reddy Mikks produces both interior and exterior paints from two raw materials, M1 and M2. The following table provides the basic data of the problem :

Raw Material	**Tons of raw material per ton of**		**Maximum daily availability (tons)**
	Exterior paint	**Interior paint**	
M1	6	4	24
M2	1	2	6
Profit per ton ($1000)	5	4	

A market survey indicates that the daily demand for interior paint cannot exceed that for exterior paint by more than 1 ton. Also the maximum daily demand for interior paint is 2 tons. Formulate the above problem as LPP.

ii) Solve the following LPP graphically.

Maximize $Z = 2x_1 + 4x_2$

Subject to $x_1 + 2x_2 \leq 5$

$x_1 + x_2 \leq 4$

$x_1, x_2 \geq 0$

iii) Consider the following LP :

Maximize $Z = 2x_1 + 3x_2 + 5x_3$

Subject to $-6x_1 + 7x_2 - 9x_3 \geq 4$

$x_1 + x_2 + 4x_3 = 10$

$x_1, x_3 \geq 0$, x_2 – unrestricted

Conversion to the equation form involves using the substitution $x_2 = x_2^- - x_2^+$. show that a basic solution cannot include both x_2^- and x_2^+ simultaneously.

3. Attempt **any two** of the followings : **[10]**

i) Solve the following assignment problem.

		Operator				
		I	**II**	**III**	**IV**	**V**
Machines	**A**	10	5	13	15	16
	B	3	9	18	3	6
	C	10	7	2	2	2
	D	5	11	9	7	12
	E	7	9	10	4	12

ii) Find IBFS of the following transportation problem by VAM. The entries in the matrix indicate the cost in rupees of transporting a unit from a particular source to a particular destination.

Source	**Destination**				**Supply**
	D_1	**D_2**	**D_3**	**D_4**	
S_1	15	18	22	16	30
S_2	15	19	20	14	40
S_3	13	16	23	17	30
Demand	20	20	25	35	

iii) Determine optimal assignment for four sales representatives to different sales territories where the estimated monthly sales (in lakh rupees) to be made by each of them in different territories are as given below. What will be the total maximum sales ?

Sales Representatives	Sales Territories			
	W	X	Y	Z
A	20	25	22	18
B	25	24	19	21
C	18	20	22	20
D	25	20	17	22

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

i) Solve the following LP by Big-M method.

Minimize $Z = 4x_1 + x_2$

Subject to $3x_1 + x_2 = 3$

$4x_1 + 3x_2 \geq 6$

$x_1 + 2x_2 \leq 4$

$x_1, x_2 \geq 0$

ii) Solve the dual of the following problem. Then find optimal solution of the primal from the solution of the dual.

Min $Z = x_1 + x_2$

Subject to $x_1 + 2x_2 \geq 2$

$x_1 + 7x_2 \geq 7$

$x_1, x_2 \geq 0$

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
MATHEMATICS (Paper – VII & VIII)
MT-337 B : (Elective – I) : Lattice Theory
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

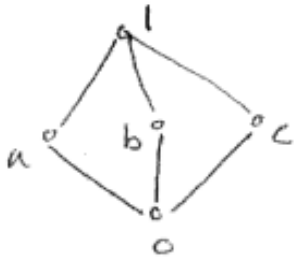
1. Attempt **any five** of the following. **10**

   i) Prove that every distributive lattice is modular.

   ii) Draw Hasse diagram of lattice D(20) where D(20) = set of all positive divisors of 20. The partial order relation on it, defined by $a \leq b$ iff a/b.

   iii) Show that intersection of two ideals in lattice is ideal.

   iv) Show that following lattice is not distributive.



   v) In a lattice, prove that join homomorphism preserves the order.

   vi) In Boolean algebra B_1, show that $(a')' = a$ for all $a \in B_1$.

   vii) Define complete lattice.

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

   i) Let L be lattice satisfying Descending Chain Condition (DCC). Suppose a, $b \in L$ with $a \nleq b$. Show that there exists a join irreducible element x such that $x \leq a$ and $x \nleq b$.

P.T.O.

ii) Show that in a lattice L, for all a, b, $c \in L$

$(a \wedge b) \vee (b \wedge c) \vee (c \wedge a) \leq (a \vee b) \wedge (b \vee c) \wedge (c \vee a)$.

iii) Show that every chain is distributive lattice. Also show by an example, that the converse is not true.

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

i) Write the DNF of the following function $f(x, y, z) = \left[(x \wedge y')' \vee z' \right] \wedge (x' \vee z)'$.

ii) Simplify the circuit represented by

$f = (a \wedge c' \wedge d') \vee (a \wedge b' \wedge d) \vee (a \wedge c \wedge d')$.

iii) In a Boolean algebra, prove that

$(a')' = a, \ (a \wedge b)' = a' \vee b'$.

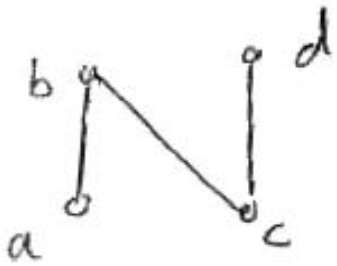
4. Attempt **any one** of the following. **10**

i) a) Prove that a lattice of length two is modular.

b) In a bounded distributive lattice, prove that the complement of an element is unique, if it exists.

ii) a) State and prove Knaster-Tarki Fixpoint theorem.

b) Write family of all down-sets of the poset.



Also draw the diagram of this family.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
MT – 337 (C) (Elective – I) MATHEMATICS
(New Course)
C – Programming – I (Paper – VII & VIII)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

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

   i) Find the value of following expression

   10/2 * 5 + 5% 2 * 3 –7.

   ii) Define a one dimensional, four element character array called “letter”. Assign the characters ‘N’, ‘S’, ‘E’ and ‘W’ to the array element.

   iii) Explain the meaning of following function declaration.

   float f (int, char [ ]);

   iv) What is the decimal equivalent of 0x10 and 010 ?

   v) What is the difference between

   getchar ( ), getch ( ), and getche ( )

   vi) Write note on ternary operator in ‘C’.

   vii) What is the alternative to nested if else construct ? Write its syntax.

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

   i) Differentiate, while vs. do while loop.

   ii) Explain use of scanf function.

   iii) Write a program to find reverse of the number.

P.T.O.

3. Attempt **any two** of the following : **10**
   i) Write a program to print ASCII value of each character in a string.
   ii) Write a note on logical operators in ‘C’.
   iii) Explain ‘break’ and ‘continue’.

4. Attempt **any one** of the following : **10**
   i) a) Draw a flow chart to find minimum of two numbers.
      b) Define a function to find maximum of two numbers.

   ii) a) Write note on multidimensional array.

      b) Describe the output generated by the following C-program.

```
# include < stdio.h >

int main ( ) }

        int a = 10, b = 20;

        swap (a, b);

        print f (“ % d, %d”, a, b);

      }

void swap (int x, int y)

} int t;

   t = x, x = y, y = t;

  }
```

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
MATHEMATICS (Paper – VII & VIII) (Ele. – I)
MT – 337 (E) : Combinatorics
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

   a) How many ways are there to pick a man and a woman who are not husband and wife from a group of 10 married couples ?

   b) How many ways are there to distribute 10 identical sticks of red licorice and 12 identical sticks of black licorice among five children ?

   c) Determine the number of onto functions from {1,2,....,n} to {1,2}, where $n \geq 2$.

   d) How many nonnegative integer solutions are there to $x_1 + x_2 + x_3 + x_4 = 20$?

   e) In how many ways can 13 persons be seated at a round table ?

   f) Among 600 families, 100 families have no children, 200 have only boys and 200 only girls. How many families have boys and girls ?

   g) How many ternary words of length n are there ?

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

   a) Find the coefficient of x^5 in the expression of $(1+3x + 2x^2)^4$.

   b) How many even numbers in the range 100 – 999 have no repeated digits ?

   c) If there are n objects, with r_1 of type 1, r_2 of type 2,..., and r_m of type m, where $r_1 + r_2 + ... + r_m = n$, then prove that the number of arrangements of these n objects, is $\frac{n!}{r_1! r_2! ... r_m!}$.

P.T.O.

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

   a) Solve the recurrence relation $a_n = 3a_{n-1} + 4a_{n-2}$ for $n \geq 2$ and $a_0 = a_1 = 0$.

   b) Prove that the number of selections with repetitions of r objects chosen from n types of objects is $\binom{r+n-1}{r}$.

   c) What is the probability that an arrangement of the letters in the word INSTRUCTOR has

      i) 3 consecutive vowels ?

      ii) 2 consecutive vowels ?

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

   a) i) Among the integers 1, 2, ..., 200, if any 101 integers are chosen, then show that there are two among the chosen integers, such that one is divisible by other.

      ii) How many arrangements of the digits 0, 1, 2 ...., 9 are there in which the first digit is greater than 1 and last digit is less than 8 ?

   b) i) A man has a staircase of n stairs to climb. Each step he takes can cover either 1 or 2 stairs. Find a recurrence relation for a_n, the number of different ways for the man to ascend the n-stair staircase.

      ii) There are 9 persons. In how many ways they can be seated at a round table with the condition that 2 of them, a and b, must not sit in adjacent seats ?

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
MATHEMATICS (Paper – VII and VIII)
MT – 337 (F) Elective – I : Number Theory
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

   i) If gcd (a, b) = 2 then find gcd (a, b + 3a).

   ii) If x and y are odd integers, prove that $x^2 + y^2$ is even but not divisible by 4.

   iii) Prove that [x + m] = [x] + m if m is an integer.

   iv) Find value of $\left(\frac{20}{17}\right)$.

   v) Find the smallest integer x for which d (x) = 6.

   vi) True or false : Justify.

   $4x \equiv 4y \pmod 6$ implies $x \equiv y \pmod 3$.

   vii) What is the last digit of 3^{400} ? Justify.

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

   i) Solve the system of congruences

   $x \equiv 3 \pmod{11}$, $x \equiv 5 \pmod{19}$, $x \equiv 10 \pmod{29}$.

   ii) If gcd (a, m) = 1 then prove that $a^{\varphi(m)} \equiv 1 (\text{mod } m)$.

   iii) Prove that there are infinitely many primes of the form 4K + 1.

P.T.O.

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

   i) Let f(n) is multiplicative function and let $F(n) = \sum_{d|n} f(d)$, then prove that F(n) is multiplicative.

   ii) If x, y, z is a primitive Pythagorean triple then prove that one of the integers x and y is even while the other is odd.

   iii) Let p is odd prime and (a, p) = 1. Then prove that $\left(\frac{a}{p}\right) \equiv a^{\frac{p-1}{2}} \pmod{p}$.

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

   i) a) Find all solutions of 10x – 7y = 17.

   b) Apply Wilson's theorem to show that

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

   and

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

   ii) a) Let P be a prime. Then prove that the largest exponent e such that $P^e \mid n!$ is $e = \sum_{i=1}^{\infty} \left[\frac{n}{P^i}\right]$.

   b) Find the number of positive solutions of 3x + 5y = 1.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
PHYSICS (Paper – I)
PH : 331 – Mathematical Methods in Physics
(New (2008) Pattern)

Time : 2 Hours Max. Marks : 40

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

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

a) What is co-ordinate system ?

b) Write generating function for Legendre polynomials.

c) State degree and order of the differential equation

$$\left(\frac{d^2y}{dx^2}\right)^3 + \left(\frac{dy}{dx}\right)^4 + xy = 0$$

d) Define singular point of a differential equation of the form

$$\frac{d^2y}{dx^2} + P(x)\frac{dy}{dx} + Q(x)y = 0$$

e) Write gradient operator in orthogonal curvilinear system.

f) What do you understand by frame of reference ?

g) Define homogeneity of differential equation.

h) Define proper length.

i) Prove that $J_0'(x) = -J_1(x)$.

j) Define the term metric coefficients.

P.T.O.

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

   a) Show that the point $x = \infty$ is a regular singular point of the Legendre's differential equation

   $$(1-x^2)y'' - 2xy' + l(l+1)y = 0 .$$

   b) Prove that $H_n'(x) = 2_n H_{n-1}(x)$.

   c) At what speed will the mass of a proton become double of its rest mass ?

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

   a) Show that the volume element in curvilinear co-ordinate system is

   $$dv = h_1 h_2 h_3 \, du_1 du_2 du_3.$$

   b) Using the method of separation of variables, solve Laplace's equation in cylindrical co-ordinate system.

   c) Obtain Einstein's mass-energy relation.

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

   a) Obtain the series solution for K = 1, $a_1 = 0$ of one dimensional harmonic oscillator differential equation $y'' + w^2 y = 0$.

   b) Derive the Lorentz transformation equation, which connect the co-ordinates between two inertial frame of reference.

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

   a) An electron has kinetic energy six times greater than its rest energy. Find its total energy.

   b) Prove that $H_n(0) = 0$, when n is odd.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
PHYSICS (Paper – II)
PH-332 : (Classical Electrodynamics)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

a) Define 'surface charge density'.

b) What do you mean by 'Non polar molecules' ?

c) State Gauss's law. Write the expression for integral form of Gauss's law.

d) State Biot-Savart's law.

e) Define Magnetisation. Give its SI unit.

f) Define the term remanence and coercivity of the substance.

g) Write Faraday's law in integral form.

h) What do you mean by 'plane polarized wave' ?

i) Find the electric potential at a distance of 25 cm from a charge of 0.2 μc.

(Given : $\in_0 = 8.85\times10^{-12}\ C^2/Nm^2$).

j) Find the magnitudes of $\vec{D}$ for a dielectric material in which E = 0.10 MV/m and K = 3.

(Given : $\in_0 = 8.85\times10^{-12}\ C^2/Nm^2$)

P.T.O.

2. Attempt **any two** :

   a) Explain $\vec{D}, \vec{E}$ and $\vec{P}$ vectors and obtain relation between them. **5**

   b) State Ampere's force law. Show that the forces between two current loops due to their magnetic interactions are equal in magnitude and opposite in direction. **5**

   c) Write Maxwell's equations in integral form. Give physical significance of these equations. **5**

3. Attempt **any two** :

   a) The current density in the wire of circular cross section having radius 'a' is proportional to the distance from the axis. Show that the total current (I) through the wire is proportional to a^3. **5**

   b) Two long parallel conducting wires separated by distance 4.5 cm in air carry current of 25 A each. Find force acting on one meter length of the wire.

   (Given : $\mu_0 = 4\pi \times 10^{-7}$ Wb/Am). **5**

   c) A material having $\sigma = 10^{-2} / \Omega m$ and $\in = 3 \in_0$ is exposed to sinusoidally varying electric field of angular velocity 'ω'. The ratio of conduction current density (J_c) to displacement current density (J_d) is given by $J_c / J_d = \sigma / \omega \in$. At what frequency (f) the two current densities will be equal ?

   (Given : $\in_0 = 8.85 \times 10^{-12}$ C^2/Nm^2). **5**

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

   a) What is meant by an electrical image ? A point charge '+q' is placed at a perpendicular distance 'd' from the grounded conducting plane of infinite extent. Obtain an expression for electric potential, electric intensity and surface charge density at any point on the conducting plane. **8**

   b) State and prove Poynting's theorem. **8**

B) Attempt **any one** :

a) Find the magnitude of $\vec{P}$ for a dielectric material in which E = 0.20×10^{6} V/m and x_e = 4.

(Given : $\in_0 = 8.85\times10^{-12}\ C^2/Nm^2$). **2**

b) Find the loss of energy per hour at a frequency of 25 cycles per second. If the energy dissipated in iron per cycle is 3×10^{6} ergs. **2**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
PHYSICS (Paper – IV)
PH-334 : Atomic and Molecular Physics
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt **all** of the following (**one** mark **each**) : **10**
   a) What is the meaning of electron spin ?
   b) Define reduced mass of a molecule.
   c) What is the quantum state of an electron ?
   d) What is Rayleigh line ?
   e) State four quantum numbers.
   f) What is Raman shift ?
   g) Define spin-orbit interaction energy.
   h) What is normal Zeeman effect ?
   i) What are X -rays ?
   j) Write the electronic configuration of sodium atom (Z = 11).

2. Attempt **any two** of the following :
   a) Show that for rigid diatomic molecule.

   $E_J = \frac{J(J+1)\hbar^2}{2I}$ where symbols have their usual meanings. **5**

   b) Explain LS coupling scheme for two valence electron system using neat vector diagram. **5**
   c) State and explain Moseley's law. Discuss application of Moseley's law. **5**

P.T.O.

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

   a) The force constant of CO band is 187 N/m. Find the frequency of vibration of CO molecule and spacing between vibrational levels.

   [Mass of ^{12}C atom = 1.99×10^{-26} Kg and ^{16}O = 2.66×10^{-26} Kg
   h = 6.63×10^{-27} erg – sec, 1ev = 1.6×10^{-12} erg c= 3×10^{8} m/s]. **5**

   b) Electrons are accelerated in a television tube through potential difference of 20 KV. Find the highest frequency and minimum wavelength of the electromagnetic waves emitted, when these strike the screen of the tube. In which region of the spectrum will these waves lie ? **5**

   c) The Zeeman components of a 500 nm spectral lines are 0.0116 nm apart when the magnetic field is one Tesla. Find the e/m for electron. **5**

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

   a) i) Describe the main features of the doublet character of Na - spectrum. **4**

   ii) What is electronic spectra of molecule ?

   Hence discuss fluorescence and phosphorescence in detail. **4**

   b) What are selection rules ? Describe selection rules in connection with different quantum numbers and mention uses of selection rules. **8**

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

   a) What are the 'L' and 'S' quantum numbers corresponding to $^{2}D_{3/2}$? **2**

   b) Compare X - ray spectra with optical spectra. **2**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
Paper – V PHYSICS
PH 335 : 'C' Programming and Computational Physics
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

a) What are keywords in 'C' ? Enlist at least four of them.

b) Compare round-off error and truncation error.

c) Give the size of short integer in terms of bits. What is range for signed and unsigned short integers ?

d) Enlist four storage classes of variables.

e) In printf ( ) statement explain "% W.pf" in control string.

f) Give the syntax of an arc graphic command in 'C'.

g) What is a pixel ? Give the resolution of medium resolution screen.

h) Why function getch ( ) is often used at the end of 'C' program ?

i) On the graphic screen show the pixels represented by (0,0) and (X_{max}, Y_{max}).

j) For what purpose call and return statements (Key-words) are used in 'C' programmes ?

P.T.O.

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

   a) With the help of flow-chart and suitable examples compare top-tested and bottom-tested loops. **5**

   b) With the help of flow-chart explain the nested if ... else statement. Use it to find the largest of the three numbers. **5**

   c) Draw the flow-chart and write the C program to find the largest number in an array of ten numbers. **5**

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

   a) What are different operators in C ? Give two examples of each. **5**

   b) Write C programs for finding factorial of given integer by i) top-down and ii) recursion methods. **5**

   c) Give the syntax of following graphic functions. **5**

      i) Line
      ii) Circle
      iii) Rectangle
      iv) Ellipse
      v) Bar

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

   a) Draw flow-chart and write 'C' program to find the root of $f(x) = x^3 - 5x+3 = 0$ using Newton-Raphson method. **8**

   b) Draw flow-chart and write 'C' program to integrate $\int_0^1 \frac{1}{\sqrt{1-x^2}}\,dx$ using Trapezoidal rule in ten iterations. **8**

   B) Attempt **any one**.

   a) Draw a flowchart for finding the sum of digits of a decimal number. **2**

   b) State the rules which must be obeyed while selecting the identifier (variable or function name). **2**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
PHYSICS (Paper – VI) (New) (Elective – I)
PH – 336 (A) : Astronomy and Astrophysics – I
(2008 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 **wherever** necessary.*

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

   a) Explain the steady state theory.

   b) What is meant by main sequence star ?

   c) What are binaries ?

   d) How is Wein's Law used in Astronomy ?

   e) Calculate the distance of 'Uranun' in A.U. using Bode's law.

   f) What is an Asteroid ?

   g) Explain the 'Doppler effect' in light.

   h) What are promineances ?

   i) What are Sayfert galaxies ?

   j) What are pulsars ?

2. Attempt **any two** :

   a) Explain photospheric phenomenon on the sun. **5**

   b) Explain the cassegrain reflector telescope. **5**

   c) What is Hubble's constant ? State significance of Hubble's constant in Astronomy. **5**

P.T.O.

3. Attempt **any two** :

   a) How is rotational period of a star obtained from its spectra ? **5**

   b) What is meant by solar maxima and solar minima ? **5**

   c) What is a spectroscope ? Describe their types. **5**

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

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

      b) Write a short note on Quazar shift. **8**

   B) Attempt **any one** :

      a) Calculate the distance of Mars in A.U. from the sun. **2**

      b) What is 'Helium Flash' ? **2**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
PHYSICS (Paper – VI) (Elective – I)
PH – 336 (B) : Elements of Material Science
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

N.B. : *I)* ***All*** *questions are* ***compulsory****.*
II) Figures to the ***right*** *indicate* ***full*** *marks.*
III) ***Use*** *of scientific calculator is* ***allowed****.*

1. Attempt **all**.

   a) Define ductility.

   b) What are various defects in crystals ?

   c) State Fick's law of diffusion.

   d) Enlist different types of ceramics.

   e) Define thermal conductivity. Give its unit.

   f) Define degree of polymerization.

   g) Which additives are added to the polymers ?

   h) Define CRSS : Critical Resolved Shear Stress.

   i) In phase diagram define system and components.

   j) State Gibb's phase rule.

2. Attempt **any two** :

   a) What is an AX structure in ceramics ? Draw AX structure for NaCl. **5**

   b) Compare thermosetting plastics with thermoplastics. Give one example of each. **5**

   c) Compare elastic deformation with plastic deformation. **5**

3. Attempt **any two** :

   a) What is a solid solution ? State rules of solid solubility. **5**

   b) What are Whitewares and structural ceramics ? **5**

   c) Which various polymers are used in industry and for domestic purposes ? Give their monomer structure. **5**

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

      a) Draw the phase diagram of Pb-Sn. Explain it in detail. **8**

      b) What is atomic diffusion ? On what factors it depends ? What is effect of temperature on it ? **8**

   B) Attempt **any one** :

      a) Copper has resistivity $17x10^{-9}$ ohm-m. What is the resistance of copper wire of length 2 cm and cross-sectional area 5 mm x 1 mm ? **2**

      b) What is elastic strain in metal rod if stress of 70 MPa is applied to it ? (Modulus of elasticity = 1.1×10^5 MPa). **2**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
PHYSICS (Paper – VI) (Elective – I)
PH – 336 (C) : Motion Picture Physics – I
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

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

1. Attempt **all** questions (**1** mark **each**) : **10**
   a) State types of aberration in lenses.
   b) What is point source ? Give examples.
   c) Give the essential chemicals in B/W processing.
   d) State basic principle of image intensifier.
   e) What do you mean by filters ?
   f) Define shutter speed.
   g) Give applications of slow and fast motion.
   h) State basic principle of photography.
   i) Give applications of movie camera.
   j) Explain the term equivalent exposer.

2. Attempt **any two** of the following :
   a) Explain the role of laboratory special effects. What is matter printing ? **5**
   b) Describe in brief optical and sound recording on films. **5**
   c) Explain classification of printing papers. **5**

3. Attempt **any two** of the following :
   a) Explain different stages involving in the processing of colour and B/W printing. **5**
   b) Explain the terms zoom, filters. Give applications. **5**
   c) Distinguish between freeze action and reverse action. **5**

4. A) Attempt **any one** of the following :
      a) Explain basic principle, construction and working of TLR camera. Give applications. **8**
      b) Describe the projector and its essential parts. Explain intermittent and drive mechanism. **8**

   B) Attempt **any one** of the following :
      a) Explain the role of telephoto lenses in photography. **2**
      b) Define depth of field. **2**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
PHYSICS (Paper – VI) (Elective – I)
PH – 336 (D) : Biophysics
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

Instructions : *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 (**1** mark **each**) : **10**

   a) What is Redox-couple ?

   b) Define bond length.

   c) What is DNA ?

   d) Draw PQRST curve for ECG.

   e) Write the Nernst equation.

   f) Give the full form of ECG and ERG.

   g) State principle of centrifuge machine.

   h) What is colorimetry ?

   i) Define Radioactivity.

   j) What is the function of NMR ?

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

   a) Discuss the functional aspects of mitochondria and chloroplast. **5**

   b) Explain the term Resting Potential and Action Potential. **5**

   c) With the help of neat diagram explain principle and working of calorimeter. **5**

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

   a) Explain working of ECG machine with the help of block diagram. **5**

   b) Draw a block diagram of Basic X-ray machine. Explain each term of diagram. **5**

   c) Discuss the construction and working of a centrifuge. **5**

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

      a) What is cell ? Explain function of each constituents of a cell in detail. **8**

      b) Discuss origin of different compound action potentials of the human body (in brief). **8**

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

      a) Calculate the heart rate from the following data :

         R-R interval – 40 mm

         Chart speed – 52 mm/sec. **2**

      b) What do you mean by ‘Genetic code’ ? **2**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
PHYSICS (Paper – VI) (Elective – I)
PH – 336 (E) : Medical Electronics
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

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

1. Attempt **all** of the following (**1** mark **each**) : **10**
   a) State the principle of resistive transducer.
   b) What is polarization ?
   c) Draw the circuit diagram of OPAMP as an integrator.
   d) What do you mean by murmur ?
   e) Define the term 'Diastole'.
   f) What is low pass filter ?
   g) State the normal B.P. values of male and female.
   h) What do you mean by ECG ?
   i) Define 'slew rate'.
   j) Give any two physiological effects of electricity.

2. Attempt **any two** :
   a) Write a note on microelectrodes. **5**
   b) Explain the principle, construction and working of inductive sensor. **5**
   c) Write a short note on chromatography. **5**

3. Attempt **any two** :
   a) List the main types of blood tests. Explain any two in brief. **5**
   b) Draw the circuit diagram of low pass and high pass active filters and explain it in detail. **5**
   c) Explain the OPAMP as differentiator with the help of a suitable diagram. **5**

4. A) Attempt **any one** :
      a) What do you mean by Heart Sound ? What is its significance ? **8**
      b) Explain standard and unipolar limb lead system used for recording the electrocardiogram. **8**

   B) Attempt **any one** :
      a) Give the difference between direct and indirect measurement of blood pressure. **2**
      b) What is function of pacemaker ? When it is used ? **2**

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Seat No.	

T.Y.B.Sc. (Semester – III) Examination, 2013
CHEMISTRY (Paper – I)
CH – 331 : Physical Chemistry
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

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

1. Attempt the following : **10**

   a) Give any two examples of second order reaction.

   b) Calculate the reduced mass of HCl molecule.

   c) Sketch the structure of primitive hexagonal crystal structure.

   d) Give any one example of adsorption of gases on solid surface.

   e) State the equation for the velocity constant of the third order reaction for equal initial concentration of the reactants.

   f) Why homonuclear diatomic molecules are Raman active ?

   g) What do you mean by adsorption isotherm ?

   h) Define the term optical exaltation.

   i) Calculate rate constant of first order reaction, if half life period of reaction is 13.3 minutes.

   j) Define centre of symmetry of crystals.

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

   i) Explain the various factors which affect the rate of reaction.

   ii) Define the term dipole moment. Describe any one method for its determination.

   iii) Define the term van der Walls' adsorption. Derive the expression for Freundlich adsorption isotherm.

P.T.O.

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

i) The microwave spectrum of HI molecule consists of a series of equidistant lines with a spacing's of 12.8 cm^{-1}. Calculate the moment of inertia and inter nuclear distance of HI molecule. [Given : At. Wts. H = 1, I = 127, h = 6.626×10^{-27} erg. sec. and c = 3×10^{10} cm sec^{-1}]

ii) The diffraction of a crystal of sample with X-rays (λ = 1.54 A°) gives the first order reflection at 26.5°. Calculate the distance between the different planes.

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

i) Derive an integrated rate expression for the second order reaction with unequal initial concentrations.

ii) What is rotational spectra ? Derive an expression for energy of transition from J $\rightarrow$ J+1 level in rotational spectrum of a simple diatomic molecule.

iii) Discuss the Laue's method for determination of crystal structure.

4. A) Discuss and obtain the expression for the kinetics of reacting gas molecules slightly adsorbed on the adsorbate. **6**

OR

A) Attempt the following : **6**

i) Give the characteristics of chemisorptions.

ii) Distinguish between Raman Spectra and Infrared Spectra..

B) Solve the following (**any one**) : **4**

i) For a certain first order reaction the time required for 50% completion is 30 minutes at 27°C and 10 minutes at 47°C. Calculate the activation energy of the reaction. [R = 8.314 Joules mol^{-1} K^{-1}]

ii) Dielectric constant of CH_4(g) at 0°C and at one atmosphere is 1.00094. Assuming that methane is an ideal gas, calculate :

a) the induced molar polarization and

b) the polarizability of this substance. [N = 6.023×10^{23}].

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
CHEMISTRY (Paper – II)
CH – 332 : Inorganic Chemistry
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to **right** indicate **full** marks.*
3) Actual calculations must be shown while solving the problems.
*4) Marks are reserved for **neat** and labelled diagrams.*
*5) **Use** of log table and calculator is **allowed**.*
6) Atomic Numbers : H = 1, C = 6, N = 7, CI = 17, Ti = 22, Fe = 26, Co = 27, Ni = 28, Ag = 47, Pt = 78.

1. Answer the following : **10**

I) Give M.O. electronic configuration of C_2 molecule.

II) Draw the diagram of π bonding molecular orbital formed by combination of two p atomic orbitals.

III) Define, 'innert complexes'.

IV) Mention different types of valencies according to Werner's theory.

V) Draw facial isomer of $[Co(NH_3)_3 CI_3]$.

VI) How many electron pairs are donated by ligand EDTA in $[M(EDTA)]^{2+}$?

VII) What is the geometry of $[Pt(CI)_4]^{2-}$ complex ion ?

VIII) Which d configuration is most favourable for square planar complexes ?

IX) Give CFSE for d^4 weak field octahedral complex.

X) How many unpaired electrons are present in $[Ti(H_2O)_6]^{3+}$ ion ?

P.T.O.

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

   I) Discuss geometrical isomerism in $[M\,abcd]$ type complexes, where a, b, c and d are different monodentate ligands.

   II) Discuss the formation of N_2 molecule with the help of MOT.

   III) Explain the formation of $[Ni\,(CN)_4]^{2-}$ ion on the basis of VBT.

   B) Distinguish between **any two** of the following : **4**

   I) Double salt and complex salt.

   II) BMOs and ABMOs.

   III) Inner orbital complexes and outer orbital complexes.

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

   I) Discuss the formation of HCI molecule with the help of MOT. Comment on its polarity.

   II) Discuss d-orbital splitting in tetrahedral and octahedral complexes with suitable examples with the help of CFT.

   III) Give the comparison of V.B.T., C.F.T. and M.O.T.

4. A) Answer the following : **6**

   I) Discuss the factors affecting the magnitude of 10 Dq or Δ_0.

   II) Calculate EAN of following complexes

   a) $[Ag\,(NH_3)_4]^{+}$ b) $[Pt\,(NH_3)_4]^{4+}$ c) $[Fe\,(CO)_5]$

   OR

   A) Discuss the formation of CO and CO^+ on the basis of MOT. **6**

   B) Discuss Werner's theory of coordination complexes with suitable example. **4**

   OR

   B) Answer the following : **4**

   I) Give IUPAC names of following complexes :

   a) Li [AI H_4] b) Na_3 [Ag $(S_2O_3)_2$]

   II) Name the type of hybridization and give magnetic property of $[Co\,(CN)_6]^{3-}$ ion.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
CHEMISTRY (Paper – III)
CH-333 : Organic Chemistry
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) Draw the structures and ***neat*** *diagrams if* ***necessary****.*

1. Answer the following : **10**

i) Write the name and acronyms of

$$\begin{array}{l} N - COOC_2H_5 \\ \| \\ N - COOC_2H_5 \end{array}$$

ii) Pthalimide is almost as acidic as phenols.

iii) Arrange the increasing stability order of 1, 4 – dimethyl cyclohexane.

trans 1, 4(e, e), trans 1, 4 (a, a), cis 1, 4 (a, e) and (e, a).

iv) Why $\overset{\ominus}{N}H_2$ is good nucleophile than $\overset{\ominus}{O}H$?

v) Write the product when alkene react with alkaline $KMnO_4$.

vi) Write the reaction when Thioketal treated with Raney Nickel.

vii) What is reduction ? Name any two reducing agents.

viii) What is kinetic isotopic effect ?

ix) 1-iodopropane undergoes faster E_2 elimination than 1-chloropropane. Why ?

x) How will you get Cis-2-betene from 2-butyne ?

P.T.O.

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

   i) What is ozonolysis ? Discuss the mechanism of addition of O_3 molecule to 2-butene.

   ii) Explain steric effect. Why N-N-dimethyl aniline is very much weaker base than 2, 6-dimethyl N-N-dimethyl aniline ?

   iii) Write the mechanism of addition of 2, 4-diphenyl hydrazine and semicarbazide with 2-propanone.

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

   i) Write any two applications of $LiAlH_4$.

   ii) Write comparison of SN^1 and SN^2 reactions.

   iii) Write the reaction of oxidative cleavage of α -D-glucopyranoside.

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

   a) Draw the chair conformations of cis 1, 2-dimethyl cyclohexane. Comment on their stability and optical activity.

   b) What is mesomeric effect ? Give the rules for writing mesomeric structures. Draw the resonating structure for phenol.

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

4. A) What is β -elimination reaction ? Discuss the mechanism of E_2 reaction with suitable examples. Give one evidence supporting E_2 reaction. **6**

   OR

   A) i) Discuss the mechanism of cross Cannizzaro's reaction. **3**

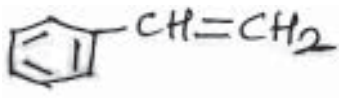
   ii) Write oxymercuration-demercuration reaction of 1-methyl cyclopentene. **3**

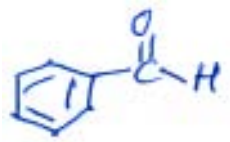
   B) i) What is Hofmann elimination reaction ? Explain with suitable example. **2**

   ii) Explain peroxide effect with suitable example. **2**

   OR

   B) Predict the product and justify your answer : **4**

   i)  $\xrightarrow{(BH_3)_2/THF}$? $\xrightarrow{H_2O_2/NaOH}$?

   ii)  $\xrightarrow{ph\text{–}NH\text{–}NH_2}$? $\xrightarrow{LiAlH_4}$?

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
STATISTICS (Principal) (Paper – IV)
ST-334 : Design of Experiments
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

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

i) In CRD with four treatments each replicated five times, degrees of freedom for the error sum of squares are _____

a) 3 b) 4 c) 16 d) 19

ii) The total number of parameters to be estimated in RBD with 3 treatments and 3 blocks are _____

a) 5 b) 6 c) 7 d) 8

iii) In a factorial experiment 3^p means _____

a) 3 factors each at p level b) p factors each at 3 levels
c) 3 parameters d) power of 3 is p

iv) Kruskal-Wallis test is an alternative to

a) Non-Parametric test b) t test
c) LJung-Box test d) F test

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

i) Replication is one of the principal of local control.

ii) Confounding is a size reduction technique.

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

i) Local Control.

ii) Treatments.

d) i) Give two advantages of CRD. **1**

ii) Define the term 'Contrast'. **1**

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

i) Discuss the Yates method of computing factorial effect totals.

ii) Derive the efficiency of RBD over CRD.

iii) Discuss the procedure of testing factorial effects A, B and AB in 2^2 experiment.

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

i) Write note on square root transformation. Give an illustration.

ii) For the ANOCOVA in RBD, develop a test for testing the significance of the regression coefficient β . Prepare corresponding ANOCOVA table.

iii) Give the statistical analysis of split-plot design.

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

i) a) For the given information, test the hypothesis that the treatment effects are zero, showing all the steps in general test procedure. **5**

Given : S.S due to blocks = 26.8, Total S.S = 85.3, Mean S.S. due to error = 2.5, No. of Blocks = 05, No. of treatments = 04.

b) Estimate the parameters in RBD model. **5**

ii) a) Explain the procedure of testing equality of all the possible pairs of treatments in CRD. **4**

b) In testing the value of three fertilizers N,P and K each at two levels, eight pairs of blocks of 4 plots are used. The treatment N,P,K and NPK are put in one block. What should be the composition of the other block for the completely confounding the second order interaction ?

Give the ANOVA table for this confounded factorial design. **6**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
STATISTICS (Principal) (Paper – V)
ST-335 : C Programming (Turbo C)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

Instructions : *i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) ***Use*** *of scientific calculators and statistical tables is* ***allowed.***
iv) Symbols and abbreviations have their usual meaning.

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

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

i) If y = 8% 49 then value assigned to y is

A) 8 B) 49 C) 41 D) 0

ii) The operators used for comparison are _____ operators.

A) assignment B) arithmetic C) logical D) relational

iii) The formal % 7.2f will print _____ digits after the decimal point of 23.7654.

A) 2 B) 3 C) 1 D) 4

iv) The value of the expression a = c && b > a for a = – 5, b = 3, c = 1 is

A) 1 B) – 1 C) 0 D) 4

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

i) A variable can also be accessed by its pointer.

ii) The statement x = (int) 7.5 will assign value 8 to variable x.

c) i) Write the syntax of do .... while statement used in C. Illustrate with suitable example. **1**

ii) Write an expression in C for the following mathematical expression $3X^3 + (X – Y)^2$. **1**

iii) State the syntax and use of getchar() function used in C. **1**

iv) Explain how a pointer variable is declared and initialized ? **1**

P.T.O.

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

   a) Explain each of the following giving syntax and one suitable illustration.

      i) if .... else

      ii) strlen( )

   b) Draw a flow chart which will print sum of first n natural numbers.

   c) What is a user defined function in C ? Write a function to obtain factorial value of a positive integer.

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

   a) Write a C program to compute and print arithmetic mean and variance of 15 numbers entered through keyboard.

   b) Write a C program to arrange 10 numbers in ascending order and print the median of the observations.

   c) What is recursion ? Write a C program to obtain GCD of two numbers using recursive function.

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

   a) What is an array ? How is a two-dimensional array declared and initialized ? **3**

      Write a C program that will read two 3 × 3 matrices and print their product. **7**

   b) What is a structure ? How structures are declared ? Give on suitable example. **4**

      Write a C program to compute and print correlation coefficient between 10 pairs of values of variables X and Y. **6**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
STATISTICS (Principal) (Paper – VI)
ST – 336 (A) : Operations Management
(Ele. – I) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

i) In ABC analysis C type items are those which have

A) low usage value B) high consumption

C) low consumption D) low unit price

ii) A critical path in a network is

A) the shortest path

B) the longest path

C) the path with minimum number of activities

D) the path with maximum number of activities

iii) In PERT analysis variance of the project is

A) based on critical activities B) based on all activities

C) based on non critical activities D) based on all dummy activities

iv) Which of the following is not a decision making criterion ?

A) Hurvitz B) Minimin C) Maximax D) Minimax

P.T.O.

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

i) Critical activities are the activities of least duration.

ii) Hurvitz criterion is based on coefficient of optimism.

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

i) Free float

ii) EOQ.

d) i) What is a critical activity ? **1**

ii) State the maximax criterion of decision making. **1**

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

a) The following table indicates activities involved in a project with their time estimates.

Activity	t_0	t_m	t_p
1 – 2	6	9	12
1 – 6	4	7	8
2 – 3	14	17	20
2 – 4	7	10	13
3 – 5	3	5	9
4 – 5	13	18	25
6 – 7	10	14	16
5 – 8	9	11	12
7 – 8	1	4	7

Draw the project network.

Compute the variance of the project.

b) Derive an expression for economic lot size with uniform rate of demand, finite replenishment with no shortages.

c) The purchase price of an instrument is Rs. 50,000/- Its per year running cost (Rs.) and resale value (Rs.) are as given below :

Year	1	2	3	4	5	6	7
Running Cost	5,000	6,000	70,000	9,000	12,500	16,000	18,000
Resale value	30,000	15,000	7,500	3,750	2,000	2,000	2,000

Determine the optimal replacement time.

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

a) For a project consisting of the following activities calculate earliest and latest time at each node. Hence identify the critical path. Also find the project duration.

Activity	1 – 2	1 – 3	2 – 4	3 – 5	3 – 6	4 – 5	5 – 6
Duration (Days)	5	4	6	5	8	4	6

b) The demand pattern of flowers (Kg) at a florist during a week is as follows :

Days	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.
Probability	0.05	0.05	0.1	0.25	0.2	0.15	0.2

If the florist buys the flowers at Rs. 50/- per kg and sells them at Rs. 80/- per kg, what quantity of flowers he should buy to maximize his profit ?

c) Write a short note on ABC analysis.

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

a) i) The demand for an item is 600 unit per year. The cost of the item is Rs. 50 per unit while the cost of placing an order is Rs. 5. The per unit inventory carrying cost is 20 % of the cost of total investment and the per unit shortage cost is Re. 1 per unit per month. Find the optimal ordering quantity when replenishment is instantaneous and stockouts are permitted. **5**

ii) Explain **each** of the following terms : **5**

i) Total Float ii) Free Float iii) Independent Float

b) The following table indicates normal time and cost, crash time and cost of activities of a project. **10**

Activity	Normal time (weeks)	Normal cost (Rs.)	Crash time (weeks)	Crash cost (Rs.)
1 – 2	8	7,000	6	9,000
1 – 3	4	8,000	3	10,000
2 – 4	2	6,000	1	7,000
2 – 5	10	8,000	5	15,000
3 – 4	5	8,000	3	10,000
4 – 5	3	5,000	1	10,000

Determine the critical path and obtain the normal project duration. Crash the relevant activities upto 2 stages systematically and determine the project duration if the indirect cost is Rs. 1,000/- per weak.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
STATISTICS (Principal) (Paper – VI)
ST-336 (B) : Actuarial Statistics (Ele. – I)
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

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

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

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

i) The force of mortality μ_x, is defined as the derivative w. r. t. x of

A) log S(x) B) – log S(x) C) log F(x) D) – log F(x)

ii) The present value of annuity certain immediate at the rate of 1 unit per annum for n years is given by

A) $(1 - v^n)/d$ B) $(1 - v^n)/i$ C) $(1 - v^n)/\delta$ D) $(1 + v^n)/d$

iii) The pdf g(t) of T(x) is given by

A) ${}_tp_x\mu_x$ B) ${}_tq_x\mu_{x+t}$ C) ${}_tp_x\mu_{x+t}$ D) ${}_tq_x\mu_x$

iv) For feasibility of insurance business the utility function of both the insured and the insurer must be

A) increasing convex B) increasing concave
C) decreasing convex D) decreasing concave

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

i) The actuarial present value of a unit benefit payable at the moment of death for the n-year term insurance, is always less than or equal to 1.

ii) The present value of annuity certain immediate at the rate of 1 unit per annum for n years is greater than that for annuity certain due.

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

i) Equivalence principle to determine the premium

ii) Discount factor

d) Explain meaning of the following symbols : **(1 each)**

i) ${}_tq_x$ ii) A_x

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

   a) State in terms of survival function, the assumption of uniformity of deaths for fractional ages. Under this assumption find the expression for 1_{x+t} where x is an integer and $0 < t < 1$.

   b) It is given that $q^{28} = 0.0013$, $q^{29} = 0.0014$, $q^{30} = 0.0015$. Find the actuarial present value of the benefit of 1000 in a 3-year endowment insurance.

   c) A loan of Rs. 50,000/- is taken on January 1, 2000. It has to be repaid in 5 equal installments payable yearly at the beginning of the year. Based on 6% annual rate of interest, determine the amount of installment.

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

   a) suppose the life length random variable is modeled by a distribution with force of mortality as specified below.

$$\mu_s = \begin{cases} 0.01, & \text{if } 0 < s < 15 \\ 0.02, & \text{if } 15 \le s < 25 \\ 0.03, & \text{if } s \ge 25 \end{cases}$$

   Find corresponding S(x), f(x) and probability density function g(t) of T(20).

   b) If $\mu_x = 0.02$ for $40 \le x \le 47$, evaluate ${}_2p_{43}$ and ${}_{3/4}q_{40}$.

   c) It is given that $\mu_{x+t} = 0.03x + 0.001t$, where x is an integer and t is a fraction. Calculate q_{50}.

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

   a) i) Show that the actuarial present value (a. p. v.) of n-year endowment insurance with benefit payable at the end of year of death is the addition of a. p. v. of n-year term insurance and a. p. v. of n-year pure endowment insurance. **5**

   ii) For the mortality model specified in Que. 3 a) calculate a. p.v. of 5-year term insurance with benefit payable at the moment of death issued to (20). **5**

   b) Explain the following annuities :

   i) n-year temporary life annuity due **3**

   ii) Whole life annuity immediate **3**

   iii) The actuarial present value at age 27 of a unit benefit to be paid at the moment of death in a 5-year endowment insurance with force of interest $\delta = 6\%$, is 0.7395. Find premium payable as a continuous 5-year temporary life annuity. State the results that you may use. **4**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
STATISTICS (Principal) (Paper – VI)
ST – 336 (C) : Time Series Analysis
(2008 Pattern) (New Course) (Ele. – I)

Time : 2 Hours Max. Marks : 40

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

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

i) Let X_t be an AR {1} series given by

$X_t = \phi X_{t-1} + e_t \sim$ i.i.d.N $(0, \sigma^2)$

Then E (X_t) is equal to :

A) 0 B) σ^2 C) infinity D) e^2

ii) Differencing of a time series once can lead to the following

A) Trend will be removed always

B) Seasonality will be removed always

C) Both trend and seasonality will be removed always

D) A linear trend will be removed

iii) The Box-Cox transformation will help the series to

A) bring to nonnormality B) reduce the variance

C) remove the mean D) remove the outliers

iv) Durbin-Watson test is used to

A) test the mean of a time series

B) test the variance of a time series

C) test the serial correlation of a time series

D) test the coefficient of variation of a time series

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

i) A quadratic trend can be eliminated by differencing the series twice.

ii) Time series is same as regression analysis with the regressor x replaced by time t.

c) i) Give one example of a time series and mention its general characteristics. **1**

ii) State AR (1) model and one of its important property. **1**

d) i) State multiplicative model of time series. **1**

ii) Define autocorrelation function and mention its two properties. **1**

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

a) Describe two different methods of removing the trend from a time series and compare their merits and demerits.

b) Show that a 2-point central moving average yields the same results as a three point weighted moving average with different weights.

c) What is seasonal differencing ? Explain with the help of an example.

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

a) Explain any one of the methods for deseasonalizing a time series under multiplicative model.

b) Write a short note on Box-Jenkins time series modeling.

c) Discuss how nonparametric tests are useful in time series modeling.

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

a) i) Given a seasonal series of monthly observations $\{X_t\}$, assume that the seasonal factors $\{S_t\}$ are constants so that $S_t = S_{t-12}$ for all t. Assume that $\{\in_t\}$ is a stationary series of random deviations. Suppose we have a global linear trend and multiplicative seasonality, that is, $X_t = (a + bt)\, S_t + \in_t$. Does the difference operator $\nabla_{12} X_t = X_t - X_{t-12}$ reduce to stationarity ? If not find the difference operator which does. **6**

ii) Suppose the first six observations of a time series are 4, 7, 6, 6, 7 and 8. Forecast the next four observations using the single exponential smoothing with parameter $\alpha = 0.8$. **4**

b) i) Consider an AR (1) model $X_t = \phi X_{t-1} + \in_t$. Suppose we know that the values of $X_1, X_2, \ldots, X_{100}$. What is the best prediction of X_{105}, if the parameter ϕ is known ? **4**

ii) Describe the double exponential smoothing procedure of a time series. Is this better than single exponential smoothing ? If yes, in what why ? **6**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
MICROBIOLOGY (Paper – I)
MB-331 : Medical Microbiology – I
(New) (2008 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. Attempt the following :

A) Match the following : **5**

A	B
a) Lowenstein Jensen medium	i) Staphylococcus aureus
b) Wilson and Blair medium	ii) Mycobacterium tuberculosis
c) Muller Hinton agar	iii) Vibrio cholerae
d) Mannitol salt agar	iv) Salmonella
e) TCBS agar	v) Neisseria

B) Fill in the blanks : **3**

i) The strains of str. pyrogenes that produce erythrogenic toxin are responsible for _____ fever.

ii) The microbial enzyme that digests tissue cementing substance and encourages passage through the tissues is called _____

iii) Widal test is used for diagnosis of _____

C) State whether the following statements are **true** or **false** : **2**

i) Gas gangrene is caused by Clostridium botulinum.

ii) Pathogenic Treponemes do not grow in artificial culture media.

P.T.O.

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

   a) Discuss any two diseases of the genital system with their causative agents and symptoms.

   b) Discuss role of carriers in transmission of diseases.

   c) Comment on – E.Coli is an opportunistic pathogen.

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

   a) Draw and label – formation of a tubercle.

   b) Write a short note on : pathogenesis and control of campylobacter infection.

   c) Discuss Pathogenesis of Shigella.

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

   a) Discuss – Pathogenesis, laboratory diagnosis and treatment of cholera.

   b) Discuss – Disease prevention and control measures.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
MICROBIOLOGY (Paper – II) (2008 Pattern) (New Course)
MB – 332 : Genetics and Molecular Biology – I

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) Match the following : **5**

1) G_1, S and G_2 phases of Eucaryotic cell cycle	a) Exact multiple of a chromosome set
2) Euploid	b) Pribnow box
3) Rho protein	c) Interphase
4) TATAAT	d) Termination of DNA replication
5) Ter sequences	e) Transcription termination

B) Fill in the blanks : **5**

1) The base sequence in the RNA transcript is identical to the sequence in the _____ strand.
2) The core enzyme of RNA polymerase becomes a holoenzyme after binding with sigma factor.
3) The origin of DNA replication in E.coli is called _____
4) _____ increases positive supercoiling of DNA.
5) DNA pol II has _____ exonuclease activity.

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

a) Excision repair of damaged DNA.

b) Host range mutants of bacteriophages.

c) Initiation of protein synthesis.

P.T.O.

3. Diagrammatically represent **any two** of the following : **10**

   a) Replication fork of DNA.

   b) Lytic and lysogenic switch over of bacteriophages.

   c) Doerman's experiment -Graphical representation.

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

   a) Describe the structure and working of Lac operon.

   b) Describe different stages of parasexual cycle and their use in mapping of Aspergillus nidulans chromosome.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
MICROBIOLOGY (Paper – III)
MB – 333 : Enzymology
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt the following. **10**

A) Match the following.

A	**B**
i) X-rays	a) Luciferase
ii) Riboflavin	b) Covalent modification
iii) Luminescence	c) 3-D structure of protein
iv) Phosphorylase	d) Polyacrylamide
v) Cross linking	e) FMN

B) State whether the following statements are **True** or **False**.

i) Allosteric enzymes show sigmoidal behaviour.

ii) In competitive inhibition Km increases.

C) Fill in the blanks.

i) In ion exchange chromatography _____ is used as a cation exchanger.

ii) The pH at which proteins carry zero charge is called as _____

D) Define - Coenzyme.

P.T.O.

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

   a) Explain the use of substrate analogue for mapping of active site.

   b) Explain the role of nicotinic acid as a coenzyme.

   c) Explain the use of radioisotope assay for determination of enzyme activity.

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

   a) Explain sequential feed back inhibition with example.

   b) How SDS-PAGE can be used to determine purity of an enzyme ?

   c) What are immobilized enzyme ? Explain immobilization of an enzyme by entrapment.

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

   a) Derive Michaelis-Menten equation by Briggs-Haldane approach.

   b) Explain any two methods of enzyme purification based on solubility.

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Seat No.	

T.Y.B.Sc. (Semester – III) Examination, 2013
MICROBIOLOGY (Paper – V) (New Course)
MB – 335 : Fermentation Technology – I
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Do as directed : **5**

A) Match the following :

I	II
i) Paper chromatography	a) Thioglycolate broth
ii) Antifoam agent	b) Counter current
iii) Sterility testing	c) $AgCl_2$ electrode
iv) Liquid liquid extraction	d) Partition chromatography
v) pH control	e) Lard oil

B) What are permeability mutants ? **1**

C) Name any two non-recurring expenses. **1**

D) Name any two types of centrifuges used in product recovery. **1**

E) Fill in the blanks : **2**

i) The term used for protecting patents is _____

ii) The area within the axes of contour plots is termed as _____

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

a) Describe the enzymatic methods for quantification of fermentation products.

b) Explain analogue resistant mutants.

c) Explain Ames test in quality assurance.

P.T.O.

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

   a) Describe the monitoring and control of temperature in fermentation technology.

   b) Describe different levels of scale-up in fermentation.

   c) Explain market potential as an important parameter in process economics.

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

   a) Explain different methods of cell disruption used in down stream processing.

   b) Describe the different methods used for isolation of high yielding auxotrophic strain.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
ELECTRONIC SCIENCE (Paper – I)
EL-331 : Advanced Digital Systems Design
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *i)* ***All*** *questions are* ***compulsory****.*
ii) Neat diagrams must be drawn ***wherever*** *necessary.*
iii) Figures to ***right*** *indicate* ***full*** *marks.*
iv) Use of calculator is ***allowed****.*

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

   a) State any one technique for making critical race free state assignment for asynchronous sequential machine. **1**

   b) Define stable total state. **1**

   c) List various internal blocks of FPGA. **1**

   d) Write any one disadvantage of VHDL. **1**

   e) "A single state that is not compatible with any other state, is a maximal compatible" Comment. **2**

   f) Give any two diadvantages of ASIC. **2**

   g) "Non critical race is not harmful" Comment. **2**

   h) Draw the logic circuits, described by following VHDL statements : **2**

   x < = NOT ((a AND b) OR (c AND d) OR (e AND f) or g) ;

   y < = (c OR (NOT d)) AND (g OR (NOT b)) ;

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

   a) Explain Equivalence classes. State reduction technique using suitable state table. **4**

   b) What is digital system ? Write various steps for designing of a modern digital system. **4**

   c) With the help of block diagram, explain fundamental mode asynchronous sequential machine. **4**

P.T.O.

3. Answer **any two** of the following :
   a) Explain working of Data synchronizer with block diagram and timing diagram. **4**
   b) Describe how PROM works as PLD, with the help of Block diagram. **4**
   c) Write various symbols used in ASM diagram and explain each. **4**

4. Answer **any two** of the following :
   a) Draw and explain block diagram of stepper motor sequence generator. **6**
   b) What is purpose of mixed operating mode ? Draw logic diagram of mixed operating mode flip flop and explain it. **6**
   c) i) Draw the general structure of PLA and explain it. **6**
      ii) Compare synchronous and asynchronous sequential machines.

OR

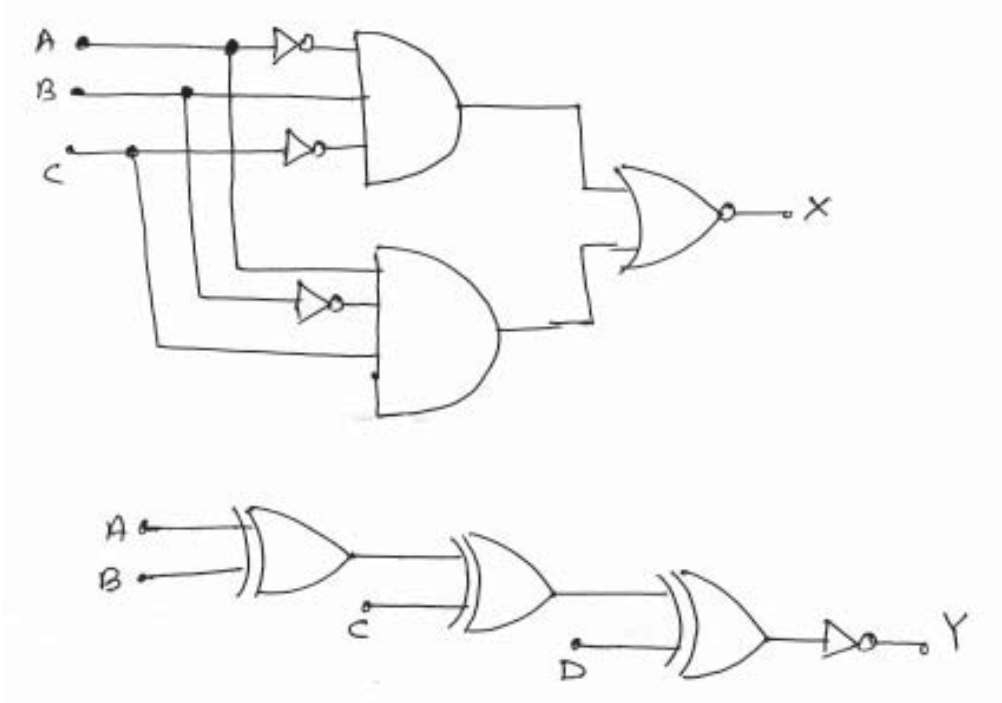
4. Answer the following :

   a) For the given logic functions, specify the size of PAL and also draw the diagram of PAL. **4**

   $Z_1 = A\overline{B} + C\overline{D}$

   $Z_2 = ABCD + \overline{B}\,\overline{C}D$

   b) Write VHDL program for following logic circuits. **4**



c) Reduce the following state table using implication chart. **4**

Present State	Next state x = 0	Next state x = 1	Output x = 0	Output x = 1
S0	S4	S2	0	0
S1	S2	S0	0	0
S2	S1	S6	0	0
S3	S6	S0	0	0
S4	S5	S1	1	0
S5	S4	S3	0	0
S6	S3	S6	0	0

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
ELECTRONIC SCIENCE (Paper – II)
EL – 332 : Microcontrollers (New) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

***Instructions** : 1) **All** questions are **compulsory**.*
*2) **Neat** diagram must be drawn **whenever** necessary.*
*3) Figures to **right** indicate **full** mark.*
*4) **Use** of calculator is **allowed**.*

1. Answer **all** the following :

a) Which bits of the PSW are responsible for selection of register banks ? **1**

b) What is role of Linker ? **1**

c) If A = 59H, what will be the content of A after execution of instruction SWAP A. **1**

d) What is difference between SETB P0.7 and CLR P0.7 ? **1**

e) Explain the function of instruction DIV AB. **2**

f) List the instructions related with stack. **2**

g) Why current drivers are required in interfacing stepper motors to microcontroller 8051 ? **2**

h) "Microcontroller 8051 is 8 bit processor". Comment. **2**

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

a) List the various addressing modes and explain it with proper example. **4**

b) Draw and explain internal block diagram of μc 8051. **4**

c) Explain PSW register of μc 8051. **4**

P.T.O.

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

   a) Write a program to add five numbers stored in internal RAM from location 30H, store the result in Ro (Result of addition is not exceeding $(255)_{10}$). **4**

   b) Write a brief note on interfacing of stepper motor to 8051 µc . **4**

   c) Explain TMOD register with its format and find the value of TMOD to operate timer 1 in mode 1 operation. **4**

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

   a) Explain instruction PUSH and POP with suitable example. **6**

   b) Draw a flow chart and write a program to find largest number out of 50 given numbers in array. **6**

   c) Interface 8 bit DAC to µc 8051 and write a program to generate square wave. **6**

OR

4. Answer **all** of the following :

   a) Write a program to clear 10 RAM locations starting at RAM address 20H. **4**

   b) Assume A = 25H, find the contents of A after execution of each of the following instructions. **4**

   ORL A, # 75H

   XRL A, # 0F2H

   ANL A, # 23H

   c) Write a program to add two 16 bit numbers ABCDH and BCDEH. Store the result of addition in R_1 and R_0. **4**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
ELECTRONIC SCIENCE
EL-334 : Foundation of Nano Electronics (Paper – IV)
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

N.B. : *1)* ***All*** *questions are* ***compulsory****.*
2) ***Neat*** *diagrams must be drawn* ***wherever*** *necessary.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*
4) Log table/calculator is ***allowed****.*
Given : mass of electron m = 9.11×10^{-31}Kg.
Planck's constant h = 6.625×10^{-34}J.S.

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

a) Define critical angle. **1**

b) List fabrication techniques used for nano-technology. **1**

c) Define orbital. **1**

d) What is photo electrical effect ? **1**

e) What is NEMS ? **2**

f) State importance of nano technology. **2**

g) State basic characteristics of flash memory. **2**

h) What is the Hamiltonian function ? **2**

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

a) Obtain Schrondinger time dependent equation for free particle. **4**

b) Explain Fermi-Dirac probability distribution function. **4**

c) What is skin depth ? Obtain an expression for skin depth. **4**

P.T.O.

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

   a) What is quantum well ? Explain electron transport in it. **4**

   b) State and explain Pauli exclusion principle. **4**

   c) Obtain an expression for motion of charged particle in an EM field. **4**

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

   a) The EM wave is incident normally at the interface of two conducting media.

   Show that $R_n = \left(\frac{n_1 - n_2}{n_1 + n_2}\right)^2$ and $T_n = \frac{4n_1 n_2}{(n_1 + n_2)^2}$. **6**

   b) Explain electron transport in quantum dot. **6**

   c) Describe the construction of resonant tunneling diode with proper diagram. **6**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – I)
DS-331 : Science, Technology and National Security
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

   1) Define Military Science.

   2) Define Information Technology.

   3) Define National Security.

   4) What is Strategic Defence Initiative (SDI) ?

   5) What is Composite Material ?

   6) Define Stealth Technology.

   7) What is meant by Aeronautics ?

   8) What is meant by Transfer of Military Technology ?

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

   1) Write about the Revolution in Military Affairs.

   2) Write the concept of Information Warfare.

   3) Write the role of Science and Technology in National Security.

P.T.O.

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

   1) Space Warfare

   2) Development Trends in Defence Material

   3) Civil and Military application of Nuclear Science.

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

   1) Explain about the strides in military revolution.

   2) Explain about the promising and new military technologies.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – II)
DS : 332 : Defence Economics
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

1. Answer in **2** to **4** sentences **each**. **16**
   1) What do you mean by Defence Economics ?
   2) Define Perspective planning.
   3) Write any two functions of Leadership.
   4) State the concept of Public Good.
   5) What do you mean by War Potential ?
   6) State the meaning of Deficit Budget.
   7) What do you mean by Economic mobilization ?
   8) What do you mean by Threat Perception ?

2. Answer in **8** to **10** Sentences each (**any two**). **8**
   1) Explain role of Ideology in Defence expenditure.
   2) Explain relationship between planning and budget.
   3) Discuss Industrial capability as an element of war potential.

3. Write short notes on (**any two**). **8**
   1) Meaning and concept of war finance.
   2) Scope of economic warfare.
   3) Importance of price control during war.

4. Answer in **18** to **20** sentences (**Any one**). **8**
   1) Write a note on salient features of Indian Economic System.
   2) Explain meaning and concept of Parliamentary Control over Defence Budget.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – III)
DS – 333 : Study of Disaster
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** to **4** sentences **each** : **16**
   1) What do you mean by Disaster Management ?
   2) What are the types of Disaster ?
   3) Define earthquake.
   4) State the meaning of Manmade Disaster.
   5) What do you mean by Global warming ?
   6) Define Nuclear war.
   7) What do you mean by Medical Alteration ?
   8) State the meaning of Tsunami.
2. Answer in **8** to **10** sentences each (**any two**) : **8**
   1) Explain the effects of Global warming.
   2) Explain types of Manmade Disaster.
   3) Discuss effects of population burden.
3. Write short notes on (**any two**) : **8**
   1) Biological War and Disaster.
   2) Nuclear War and Disaster.
   3) Structure of Disaster Management in India.
4. Answer in **18** to **20** sentences (**any one**) : **8**
   1) Explain relationships between the study of national security and disaster.
   2) Write a note on war and disaster.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – V)
DS-335 : Computer Applications in Defence Management
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** to **4** sentences **each** : **16**
   1) What do you mean by Information Technology ?
   2) Write the difference between CRT and LCD monitor.
   3) What do you mean by Computer Aided Design ?
   4) State the meaning of Simulation.
   5) What do you mean by the storage devices of computer ?
   6) Define operational research.
   7) Write any two features of assembly language.
   8) What do you mean by Web camera ?

2. Answer in **8** to **10** sentences **each (any two)** : **8**
   1) Explain historical evolution of computer.
   2) Discuss application of computer in war gaming.
   3) Discuss scientific approach to Weather Forecasting.

3. Write short notes on **(any two)** : **8**
   1) Role of Computer in battlefield command and control.
   2) Surveillance and target acquisition system.
   3) Scientific approach to Medical Aspects.

4. Answer in **18** to **20** sentences **(any one)** : **8**
   1) Explain the role of computer in Defence Management.
   2) Discuss future application of computer in Battle Management System.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – VI)
DS 336 (A) : Indian Military System (2008 Pattern) – I (Optional) (Ele. – I)

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) Why the study of Indian Military history is necessary ?
   2) State the meaning of Military history.
   3) What do you know about Sudas ?
   4) Who was Vasista ?
   5) What was the basic reason for battle of ten King ?
   6) Write the title of literature wrote by Kautilya.
   7) State the basic reason for battle of Jhelum.
   8) Between whom the battle of Tarrain was fought ?
2. Answer in **8** or **10** sentences **(any two) :** **8**
   1) Write few lines on Military system during Vedic period.
   2) Explain in brief “Porus as a Patriotic King”.
   3) Write in brief “Art of warfare” during Rajput period.
3. Write short notes on **(any two) :** **8**
   1) Difference between Military history and general history.
   2) Functions of Guru during Ramayana and Mahabharata period.
   3) Merits of Rajputs.
4. Answer in **16** to **20** sentences **(any one) :** **8**
   1) Describe the laws of war during Ramayana and Mahabharata period.
   2) Analyse the causes of defeat of Porus at battle of Jhelum (Hydaspus).

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P.T.O.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – VI)
DS 336 (B) : Maratha Military System (2008 Pattern) – I (Optional) (Ele. – I)

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 : **16**
   1) Write the name of Shivaji's mother and teacher.
   2) What was the aim of Shivaji for battle of Jawali ?
   3) Which challenge was accepted by Afzulkhan at Adil Shahi darbar ?
   4) State the name of Chief of Maratha Navy during Shivaji's period.
   5) Why treaty of Purandar it was signed by Shivaji ?
   6) State the two names of saint during Shivaji's era.
   7) What do you mean by Panch-Hazari ?
   8) What was the grand strategy of Shivaji ?
2. Answer in **8** or **10** sentences **(any two) :** **8**
   1) Write a few lines on Mirza Raje Jaisingh.
   2) Explain the economic condition of Maharashtra before Shivaji.
   3) Highlight on implications of Shivaji's raid on Shahistekhan.
3. Write short notes on **(any two) :** **8**
   1) Chandra Rao More
   2) Murar Baji
   3) Strategic importance of Jawali
4. Answer in **16** to **20** sentences **(any one) :** **8**
   1) Explain in detail "Shivaji as a Military leader".
   2) Describe the Maratha Military system during Shivaji's era.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – VI)
DS 336 (C) : Indian Wars Since Independence (2008 Pattern) – I (Optional) (Ele. – I)

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 : **16**
   1) Which country played the role of mediator during Indo-Pak war of 1965 ?
   2) On which date the first Indo-Pak war of 1947 was started ?
   3) State the basic cause of Indo-Pak wars.
   4) In which sectors India-China war was fought during 1962 ?
   5) Why UNO sent observer to Kashmir in 1948 ?
   6) State the starting and end of Indo-Pak war of 1965.
   7) Which area was granted by China during 1962 war ?
   8) What do you understand by Tashkant Agreement ?
2. Answer in **8** to **10** sentences **(any two) :** **8**
   1) Write in brief the end of Indo-Pak war of 1947-48.
   2) Explain the causes of India-China war of 1962.
   3) Why the Chinese declared the unilateral ceasefire during 1962 war ?
3. Write short notes on **(any two) :** **8**
   1) Aksai-Chin and India China war of 1962.
   2) Chhamb sector of Indo-Pak war of 1965.
   3) End of 1962 war.
4. Answer in **16** to **20** sentences **(any one) :** **8**
   1) Explain the implications of Chinese aggression of 1962 on Domestric and Regional scenario.
   2) Describe the Indo-Pak war of 1965 in detail.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – VII)
DS-337 A : Military Sociology (Optional) (Ele – II)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** to **4** sentences **each** : **16**
   1) Define Military.
   2) Define Sociology.
   3) What is the concept of Martial Race ?
   4) What is JUST WAR (*Dharma Yudha*) ?
   5) What is Group Dynamics ?
   6) Write about Chetwodian Motto.
   7) Define Warrior.
   8) What is meant by Cantonment ?
2. Answer in **8** to **10** sentences **each** (**any two**) : **8**
   1) Explain about the anthropological concept of military.
   2) What is Military Career ?
   3) Write about the Social Causes of War.
3. Write short notes on (**any two**) : **8**
   1) Strategic Culture in India.
   2) Social importance of Republic Day Parade.
   3) One Class Army.
4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Explain about tradition of gallantry in India.
   2) How war and soldiering has religiously been justified by *Geeta* ?

P.T.O.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – VII)
DS-337 B : Defence Journalism (Optional) (Ele – II)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** to **4** sentences **each** : **16**
   1) Write the functions of Army.
   2) Write the role of Air Force.
   3) How a submarine works ?
   4) What do you understand by an aircraft carrier ?
   5) What do you understand by supersonic and hypersonic aircrafts ?
   6) What are the functions of Maintenance Command of IAF ?
   7) Elaborate C^4 ISR.
   8) What do you mean by the term “total war” ?
2. Answer in **8** to **10** sentences each (**any two**) : **8**
   1) Explain the characteristics of journalism.
   2) What military matters should not and should be reported ?
   3) Write the scope of Defence Journalism.
3. Write short notes on (**any two**) : **8**
   1) LCA Project.
   2) Role of Security Forces in Counter Insurgency.
   3) Media and National Security.
4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Write a report on Republic Day Parade.
   2) What are the hurdles in Defence Journalism ?

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – VII)
DS-337 C : Defence Preparedness of India (I) (Optional) (Ele – II)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** to **4** sentences **each** : **16**
   1) Comment on India's air superiority.
   2) Comment on India's ship building capacity.
   3) What is meant by 'Unity in Diversity' ?
   4) Why defence preparedness is necessary ?
   5) What is strategic culture ?
   6) Define Economic Potential.
   7) Introduce EEZ.
   8) Obsolescence factor in Weapon Systems.
2. Answer in **8** to **10** sentences each (**any two**) : **8**
   1) Explain about India's land border.
   2) Discuss the issues between India and Bangladesh.
   3) Explain about the role of political factor in defence preparedness.
3. Write short notes on (**any two**) : **8**
   1) Ups and Down in Indo-Pak relations.
   2) India's Maritime Boundaries.
   3) Status of Indian Navy.
4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Discuss the contrast and relationship between defence and development.
   2) Justify, why war now-a-days is more influenced by the science of economics than the art of strategy ?

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – VIII)
DS.-338 (A) : Armed Conflict & Human Rights (Optional) (Ele. – III)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

   1) What do you mean by “Human Rights” ?

   2) Write the long form of P.O.W.

   3) How you would like to define democracy ?

   4) What do you understand by combatant ?

   5) What is “Humanitarian” ?

   6) Define International Relations.

   7) What do you know about Defenseless Victims ?

   8) Define armed conflict.

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

   1) Explain the significance of Human Rights.

   2) Write in brief “Humanitarian Studies”.

   3) Explain your ideas on “Protection of civilians”.

P.T.O.

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

   1) Concept of Human Rights

   2) Scope of International Relations

   3) Concept of democracy.

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

   1) Explain in detail present status of international relations with special reference to Preservation of Human Rights.

   2) Write a note on “International Humanitarian Studies”.

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T.Y. B.Sc. (Semester – III) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – VIII)
DS.-338 (B) : International Organisation and National Security (Optional) (Ele. – III)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** or **4** sentences **each** : **16**
   1) Define International Organisation.
   2) State any two objectives of League of Nations.
   3) Write the long form of U.N. E.P. K.F.
   4) What do you mean by UN-Charter ?
   5) What do you mean by National Security ?
   6) State the date and year of formation of League of Nations.
   7) State the long form of UNO.
   8) What was the aim of Treaty of Versailles ?

2. Answer in **8** or **10** sentences **(any two)** : **8**
   1) Explain the linkages between Atlantic Ocean and UN Charter.
   2) Write in brief the history of international organisation.
   3) Explain in brief the structure of League of Nations.

3. Write short notes on **(any two)** : **8**
   1) Permanent Court of International Justice
   2) Secretary General of UN – Power and functions
   3) Security Council – Structure and functions.

4. Answer in **16** to **20** sentences **(any one)** : **8**
   1) Explain the role of UN for preserving the International Peace and Security with examples.
   2) Describe the structure and functions of main bodies of League of Nations.

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T.Y. B.Sc. (Semester – III) Examination, 2013
DEFENCE AND STRATEGIC STUDIES (Paper – VIII)
DS.-338 (C) : International Law (Optional) (Ele. – III)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** or **4** sentences **each** : **16**
   1) What do you mean by Human Rights ?
   2) Define “Treaty”.
   3) State the meaning of conventions.
   4) Write the meaning of protocol.
   5) What do you mean by subject of International Law ?
   6) What do you understand by UN Charter ?
   7) Why the use of Biological weapons is strictly prohibited during war ?
   8) What do you mean by sources of International Law ?

2. Answer in **8** or **10** sentences **(any two)** : **8**
   1) Highlight on the linkages between Morality and laws of war.
   2) What do you know about U.N. Charter ? Explain in brief.
   3) Write few lines on Universal Declaration of I.H.R.

3. Write short notes on **(any two)** : **8**
   1) Nature of International Law
   2) Geneva Convention of 1949
   3) Concept of Human Rights.

4. Answer in **16** to **20** sentences **(any one)** : **8**
   1) Explain the diplomatic procedure for controlling of international conflict with example.
   2) Highlight on various sources of International Law.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
Environmental Science
(2008 Pattern) (New Course) (Paper – II)
ENV 332 : WILDLIFE BIOLOGY

Time : 2 Hours Max. Marks : 40

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

1. Attempt the following in **1-2** lines **each**. **10**
   a) Define Wildlife.
   b) State any 2 characteristic difference between Angiosperm and Gymnosperm.
   c) Give an example each of a tropical and temperate grasslands.
   d) Define Urbanisation.
   e) What are Bryophytes ?
   f) Give any 2 examples of brackish water ecosystem.
   g) What are pug marks ?
   h) State any 2 characteristics of Arachnids.
   i) Enumerate any 2 wetlands of international importance.
   j) Name any 2 aquatic mammalian species.

2. Write a short note on **(any two)** : **10**
   a) Net Sweep method.
   b) Point centre method for diversity assessment of plants.
   c) Mangrove ecosystem.

3. Answer **any two** from the following : **10**
   a) Give the main characteristics and an example each of the 5 major groups of Arthropods.
   b) Discuss agricultural landscape as a wildlife habitat.
   c) Discuss the use of GIS and remote sensing in wildlife management.

4. Attempt **any one** of the following : **10**
   a) Explain in detail, any 5 threats to wildlife.
   b) Discuss any 2 diversity indices.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
ENVIRONMENTAL SCIENCES (Paper – IV)
ENV – 334 : Issues in Environmental Science (New Course)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

   a) What is the meaning of an impact ?

   b) Give the full form of LCA.

   c) Define nano-technology.

   d) What is rehabilitation ?

   e) Enlist any two ozone depleting substances.

   f) Mention any two causes of water crisis.

   g) Define energy crisis.

   h) What do you mean by biodiversity ?

   i) Enlist any two renewable energy resources.

   j) Give the full form of CDM.

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

   a) World trade organisation and environmental issues.

   b) Eco-terrorism.

   c) Green Revolution.

P.T.O.

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

   a) What are the controversies associated with GM plants ?

   b) Explain the process of E-waste management.

   c) What are the benefits of public participation in solving environmental issues ?

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

   a) Define sustainable development. What is importance of sustainable development ?

   b) Define global warming. Explain reasons and consequences of global warming.

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Seat No.	

T.Y. B.Sc. (Semester – III) Paper – V New Course Examination, 2013
(Environmental Sciences)
ENV – 335 : ENVIRONMENTAL GOVERNANCE AND EQUITY : LAW AND ETHICS
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt the following in **1-2** lines **each** : **10**
   a) Name any two fundamental rights.
   b) What is the aim of The Biodiversity Act, 2002 ?
   c) Write any forest related act in India.
   d) Define the term 'Occupier'.
   e) Mention the place and year of 'Earth Summit'.
   f) What do you mean by liability ?
   g) Write the examples of 'Articles' mentioned in Wildlife Protection Act.
   h) Write the full form of PIL.
   i) Enlist any 2 objectives of the National Environmental Tribunal Act, 1905.
   j) What is the policy level outcome of Rio Declaration ?
2. Write a short note on (**Any two**) : **10**
   a) National Forest Policy.
   b) Ecomarks and Environmental labelling.
   c) Environmental Policy Resolution.

P.T.O.

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

   a) Elaborate the need of environmental governance.

   b) Describe the major limiting factors for successful implementation of environmental legislation.

   c) Discuss the impact of population on environmental ethics.

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

   a) Describe the effective functioning of pollution control with respect to legislation and public policy strategy.

   b) Discuss the provisions of the Water (Prevention and Control) Act, 1975. Add a note on its merit and demerit.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
Biotechnology (Vocational) (Paper – V)
PLANT BIOTECHNOLOGY (2008 Pattern)
(Voc. Biotech – 335)

Time : 2 Hours Max. Marks : 40

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

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

   a) Define callus.

   b) Give two advantages of somaclonal variation.

   c) What is meant by somatic embryogenesis ?

   d) What are secondary metabolites ?

   e) Define haploids.

   f) Give two gene transfer methods.

   g) Define cryopreservation.

   h) What is micropropagation ?

   i) Give full form of GM foods.

   j) Give examples of two auxins.

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

   a) Explain the causes of somaclonal variation.

   b) How are secondary metabolites produced ?

   c) Describe micropropagation of endangered species.

P.T.O.

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

   a) Embryogenesis.

   b) GMP (Genetically Modified Plants).

   c) Cryopreservation.

4. What is anther culture ? Explain uses of haploids in plant breeding. **10**

   OR

   Explain gene transfer in plants using Agrobacterium. **10**

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
ELECTRONIC EQUIPMENT AND MAINTENANCE
(Vocational) (Paper – V)
Electronic Equipment Troubleshooting and Repairs
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer the following: **(3×4=12)**

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

      i) State the advantages of SMPS over linear regulator.

      ii) State various types of losses in transformer.

      iii) Define - Equipment failure.

      iv) List any two faults in Zener diode.

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

      i) Explain the testing of RAM.

      ii) AF signal generator works normally on all ranges except one. What could be the fault ?

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

      i) Reading drawings and circuit diagrams are important in troubleshooting of electronic equipment - Comment.

      ii) In repair work, users complaint and report is important - Comment.

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

   a) Draw blockdiagram of DMM and explain any two faults.

   b) Explain faults in dc power supply and their remedies.

   c) Explain common faults in digital circuits.

P.T.O.

3. Answer **any two** of the following : **(2×4=8)**
   a) Explain the common faults in transistor and their remedies.
   b) Explain the common faults in OP-AMP and their remedies.
   c) Describe the various faults in Rectifier circuits.

4. Answer the following : **(2×6=12)**
   a) Explain the steps in troubleshooting of CRO.
   b) Explain typical faults and their causes in various types of resistors.

OR

4. Answer the following : **(3×4=12)**
   a) Explain the procedure of troubleshooting of 'Data Acquisition System'.
   b) Explain the steps in troubleshooting of Analog Multimeter.
   c) Explain the working of following digital test instruments.
      i) Logic probe
      ii) Logic comparator.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
SEED TECHNOLOGY (Voc.) (Paper – V)
Seed Pathology and Entomology
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Sketch neat and labeled diagrams ***wherever*** *required.*

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

   a) Give one example of seed borne fungal disease.

   b) Mention any one disease caused by seed borne viruses.

   c) What is seed infection ?

   d) What is a pest ?

   e) Give one example of seed borne bacteria.

   f) Give the scientific names of any two important pests of seeds.

   g) What is seed storage ?

   h) Give any one distinguishing character of order Heteroptera.

   i) Enlist the stages in life cycle of a pest.

   j) Mention any two methods used for seed health testing.

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

   a) Describe the damage caused by rice weevil and its control.

   b) Write any five general characters of order Lepidoptera.

   c) Write an account on storage fungi.

   d) Comment on seed infection.

P.T.O.

3. Write short notes on **any two** of the following : **(5×2=10)**

   a) History of seed pathology

   b) Seed treatment

   c) Pests on pulses

   d) Mechanism of seed transmission.

4. Draw and describe the life cycle of red cotton bug. Add a note on damage caused by it. **10**

   OR

   Explain the impact of seed borne bacteria and viruses on crops.

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Seat No.	

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

Time : 2 Hours Max. Marks : 40

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

1. Answer the following questions : **10**
   i) Define the term fermentation.
   ii) What is fungicide ?
   iii) What is composition of Torper ?
   iv) What is Oleum ?
   v) What is mollasses ?
   vi) Explain, “Urea is most popular fertilizer”.
   vii) What is emulsion paint ?
   viii) Define Wash.
   ix) Define the term, “Process control”.
   x) Define Brix Unit of measurement.

2. A) Attempt **any two** of the following : **6**
      i) Write a note on purification in contact process.
      ii) Explain crystallisation of sugar.
      iii) Discuss the manufacturing of triple phosphate.

   B) Attempt **any two** of the following : **4**
      i) Explain, “SO_3 is not directly absorbed in water”.
      ii) What is herbicide ? Explain its application with one example.
      iii) What is gun powder ? What is its composition ?

P.T.O.

3. Attempt **any two** of the following : **10**
   i) Describe the manufacturing of raw sugar from sugarcane with flow sheet.
   ii) Describe manufacturing of urea with flow sheet.
   iii) Write a note on, enamel paint and its applications.

4. A) Describe the manufacturing of nitric acid by Ostwald's process. **6**

   OR

   A) Describe classification of paints with suitable example.

   B) Attempt **any one** of the following : **4**
   i) Describe the manufacturing of NH_3 by Haber-Bosch process.
   ii) What is pyroelectronic product ? Explain its composition with application.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
BIOTECHNOLOGY (Paper – VI) (Vocational)
Biotech-336 : Environmental Biotechnology
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

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

   a) Define bioaugmentation.

   b) Enlist the bioreactors used for waste water treatment.

   c) What are biofertilizers ?

   d) Define environmental biotechnology.

   e) Define in-situ bioremediation.

   f) What is composting ?

   g) What is biosorption ?

   h) Give examples of biofuels.

   i) Give examples of xenobiotics.

   j) Give the advantages of biogas as a fuel.

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

   a) Explain the role of microorganisms in waste water treatment.

   b) Explain the applications of biotechnology to food industry.

   c) What is bioremediation ? Give its applications.

P.T.O.

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

   a) Biopesticides

   b) Ethanol production

   c) Biogas production

4. What are hazardous wastes ? Discuss the role of biotechnology in hazardous waste management. **10**

   OR

   Give detail account of role of biotechnology in environment protection.

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Seat No.	

T.Y. B.Sc. (Semester – III) Examination, 2013
ELECTRONIC EQUIPMENT AND MAINTENANCE (Voc.) (Paper – VI)
Electronic Instrumentation
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. a) Answer the following : **(4×1=4)**
   i) What is precision characteristic of instrument ?
   ii) What is impedance ?
   iii) What is meant by calibration of an instrument ?
   iv) What is dynamometer ?

   b) Answer the following : **(2×2=4)**
   i) Explain null type instrument with one example.
   ii) For true value of 10 V, measured value on a dc voltmeter is 10.2 V. Find % accuracy of the meter.

   c) Answer the following : **(2×2=4)**
   i) Define the term “static sensitivity”.
   ii) “Instrument with 2% accuracy is better than that with 5% accuracy”. Comment.

P.T.O.

2. Answer **any 2** : **(2×4=8)**

   i) What do you mean by DSP ? State 2 advantages of it.

   ii) Write a note on basic operating principle of digital LCR meter.

   iii) What is DVM ? State any 4 advantages it.

3. Answer **any 2** : **(2×4=8)**

   i) Explain the term spectrum analyzer.

   ii) What is a logic analyzer ? Discuss its 2 types.

   iii) Explain process control application of instrumentation system.

4. Answer **any 2** : **(2×6=12)**

   i) Write a note on distortion analyzer.

   ii) With a block diagram discuss functional elements of instrumentation system.

   iii) Discuss the time domain and frequency domain analysis in analyzers.

OR

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

   i) In a Seismic instrument, m = 100 gm, spring stiffness is 0.001 N/m, damping ratio is 0.4. If motion to be measured is 0.003 sin 200 t (meters), find the recorded amplitude of motion.

   ii) What are proximity devices ? Explain any 1.

   iii) Write a short note on hydraulic load cell.

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