Seat Number

* 0 9 7 5 *

STATISTICS : ST - 354
Sampling Theory
(35174)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.
6. Use of calculator and statistical tables is allowed.

1. Attempt **any eight** of the following. **8**

a) Explain the term: Sampling frame.

b) In SRSWOR define an estimator of the population total based on the sample mean.

c) Complete the following sentence.
Stratified sampling is appropriate when population is.....

d) State the formula for mean square for the population.

e) Complete the following sentence.
The expression $\frac{n}{N}$ is known as.....

f) What do you mean by standard error?

g) Select the correct alternative.
If we have a sample of size n form a population of N units, the finite population correction is.
i) $\frac{N-1}{N}$ ii) $\frac{n-1}{N}$ iii) $\frac{N-n}{N}$ iv) $\frac{N-n}{n}$

h) State one real life situation where systematic sampling is applicable.

i) What do you mean by proportional allocation?

j) Let N denotes the population size and n the sample size. Give number of possible samples in case of SRSWR.

2. Attempt **any four** of the following. **8**

a) What is a sample survey? Explain in brief.

b) State characteristics of good questionnaire.

c) With usual notations, prove that E (p) = P.

d) Define Sampling units with illustration.

e) Explain in brief SRSWOR.

f) State two real life situations where stratified random sampling is appropriate.

3. Attempt **any two** of the following. **8**

a) Write a note on sampling and non-sampling errors.

b) For the following population, consider all possible SRSWOR samples of size 3 and show that $\overline{Y}_n$ is unbiased estimator of $\overline{Y}$

i : 1 2 3 4 5

Yi: 5 8 3 11 9

c) Describe the method of determining the sample size in case of SRSWOR so as to meet the desired margin of error and the confidence coefficient. State your assumptions if any.

4. a) Attempt **any two** of the following. **6**

i) The mean monthly income per household (in rupees) in a township of 7508 families is to be estimated. From a recent study it is known that the standard deviation of household income may be taken to be about Rs 136. Determine how large the sample size should be in SRSWOR in order that the population mean may be estimated with a specified std error, say a standard error of Rs. 5.

ii) Define systematic sampling and explain how it is carried out.

iii) Describe the procedure of stratified random sampling.

b) Discuss the problems of allocation in stratified random sampling. **2**

5. Attempt **any one** of the following. **8**

a) i) Make a critical comparison between. Systematic sampling and SRSWOR.

ii) Suggest an unbiased estimator of the population mean $\overline{Y}$ under stratified random sampling. Obtain the expression for its variance under proportional allocation.

b) With usual notation, in SRSWOR, prove that $E\left(s^2\right)=S^2$.

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Seat Number

* 1 1 3 3 *

GEOINFORMATICS : GEOI - 356/316
Application of Remote Sensing in Geoscience
(34016)

P. Pages : 2

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Draw a neat sketches and diagrams wherever necessary.
6. Figures to the right indicate full marks.

1. Define **any four** of the following. **8**

a) Geomorphology.

b) Landslide.

c) Cuesta.

d) Risk assessment.

e) Water pollution.

f) Caldera.

2. Discuss **any two** of the following. **8**

a) Trellis drainage pattern.

b) Binary model.

c) Soil pollution.

3. a) Explain **any two** of the following. 6

   i) Igneous rock interpretation from aerial photographs.

   ii) Metamorphic rock.

   iii) Future trends of remote sensing.

   b) Define constructive and destructive processes. 2

4. Explain **any two** of the following. 8

   a) Landslide Hazard Zonation (LHZ).

   b) Intrusive igneous landforms.

   c) Horst and Graben.

5. a) Explain the following. 6

   Role of remote sensing in landslide management.

   OR

   Remote sensing applications in Geomorphology.

   b) Name any two tectonic landforms. 2

****

Seat Number

* 1 1 2 8 *

MICROBIOLOGY : MB - 356
Applied Microbiology (35196)

P. Pages : 2

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to right indicate full marks.

1. Attempt **any eight.** **8**

i) Total fat from the milk is removed is called.....
   a) Skimmed milk b) Tonned milk
   c) Standardized milk d) low fat milk

ii) Haematoxylin is used in .....
   a) MBRT test b) Brucella ring test
   c) Resazurin test d) Mastitis test

iii) Efficiency of pasteurization is checked by .....
   a) Phosphatase test b) MBRT test
   c) Resazurin test d) Both A & B

iv) Red milk is caused by .....
   a) P. Synxantha b) P. Syncyanea
   c) Flavobacterium d) S. Marcescence

v) Sweet curdling is achieved by.....
   a) Rennin b) Amylase
   c) Catalase d) None of above

vi) Dough is related to .....
   a) Sauerkraut b) idlii
   c) Bread d) All of the above

vii) ..... storage is at temperature not far above freezing & usually involves cooling by ice.
a) Common b) Chilling
c) Frozen d) None of above

viii) The term in-situ refers to.....
a) In the glasswares b) At a site
c) In animals d) In laboratory

ix) Advantages of bioleaching.
a) Recover metals from low grade
b) Environment friendly.
c) Simple with low cost technology
d) All of the above.

x) Earthy or musty flavour of milk is caused by .....
a) Actinomycetes b) Lactobacilli
c) Clostridium d) Pseudomonas

2. Attempt **any four.** **8**

i) Define Roapiness
ii) What is acidophilus milk
iii) Define ripening.
iv) Methods of pasteurization.
v) Enlist methods of food preservation.
vi) Significance of skimmed milk.

3. Attempt **any two.** **8**

i) Explain Botulism.
ii) Discuss types of milk.
iii) Explain staphylococcus food poisoning.

4. a) Attempt **any two.** **6**

i) Discuss succession of microbes in food.
ii) Explain flavour defects in milk.
iii) Explain Bacillus cereus food poisoning.

b) Comment on Skimmed milk. **2**

5. Explain cheese manufacturing. **8**

OR

Discuss methods of food preservation.

*******.

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carry equal marks.
5. Draw neat well labelled diagrams wherever necessary.
6. Figure to right indicate full marks.

1. Attempt **any eight** of the following. **8**

i) Glucose used as.....source in fermentation.
   a) Carbon b) Hydrogen
   c) Sulphur d) Nitrogen

ii) Depending on composition fermentation media categorized as..... &.....
   a) Complete and simple media.
   b) Composition and compost media.
   c) Simple and complex media.
   d) Complex media.

iii) --------- is good organic nitrogen source
   a) Molases b) Whey
   c) Maltose d) com step liquor

iv) Foam is control in fermentation is by.....
   a) Hexane b) Chloroform
   c) Ethyl acetate d) Oil.

v) .....Process in that it allows enrichment and concentration in one step by reducing the volume of material for further processing.
   a) Fermentation b) Filtration
   c) Glycolysis d) Fumigation.

Seat Number

* 1 1 2 9 *

BIOCHEMISTRY : BC - 356
Biotechnology (35216)

P. Pages : 2

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carry equal marks.
5. Draw neat well labelled diagrams wherever necessary.
6. Figure to right indicate full marks.

1. Attempt **any eight** of the following. **8**

i) Glucose used as.....source in fermentation.
   a) Carbon b) Hydrogen
   c) Sulphur d) Nitrogen

ii) Depending on composition fermentation media categorized as..... &.....
   a) Complete and simple media.
   b) Composition and compost media.
   c) Simple and complex media.
   d) Complex media.

iii) --------- is good organic nitrogen source
   a) Molases b) Whey
   c) Maltose d) com step liquor

iv) Foam is control in fermentation is by.....
   a) Hexane b) Chloroform
   c) Ethyl acetate d) Oil.

v) .....Process in that it allows enrichment and concentration in one step by reducing the volume of material for further processing.
   a) Fermentation b) Filtration
   c) Glycolysis d) Fumigation.

vi) Cross flow filtration is also called as.....
a) Tangential filtration b) Rotary filters
c) Continuous filters d) Stacked filter

vii) Animal cell culture are used widely for the production of.....
a) Insulin b) Somatostatin
c) Mabs d) Thyroxin.

viii) .....refers to the process of using microorganisms to remove the environmental pollutant.
a) Frementation b) Bioremediation
c) Degradation d) Filtration.

ix) Growth medium used for cultivation of microorganism is called as.....
a) Fermentation media b) Nutrient media
c) Growth media d) General media.

x) Which bioremediation approach involves using plants to degrade pollutants ?
a) Biopile b) Phytoremediation
c) Composting d) land farming.

2. Solve **any four** of the following. **8**
i) Turbidostat
ii) Inoculum
iii) Flocculation
iv) Flotation
v) Bioremediation
vi) Characteristic of industrially important strain.

3. Attempt **any two**. **8**
i) Batch fermentation.
ii) Continuous cell line.
iii) Primary and secondary screening for industrial strain.

4. a) Attempt **any two**. **6**
i) Different types of preservation methods for microbes.
ii) Types of cell line
iii) Types of reactions in bioremediation.

b) Applications of animal cell culturing. **2**

5. Solve the following.
Explain the common feature of conventional bioreactor.

OR

Describe different types of cell disruption methods. **8**

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Seat Number

* 1 1 3 0 *

INFORMATION TECHNOLOGY : UG-IT - 356
Programming in PHP (35326)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.

1. Attempt **any eight** of the following. **8**

a) PHP Files have a default file extension of.....
   a) .html b) .xml
   c) .php d) .ph

b) What will be the output of the following PHP code?

```
<?php
$num = 1;
$num1 = 2;
Print $ num. "+". $ num 1;
?>
```

   a) 3 b) 1+2
   c) 1. + .2 d) Error

c) In php eof ( ) is represents.....
   a) end of file b) edit file
   c) Exit file d) None of these

d) The function strpos ( ) is used for.....
   a) Find the last character of the string.
   b) Search for character within a string.
   c) Locate position of a string's first character.
   d) None of these.

e) PHP is a ..... script.
   a) Server side
   b) Client side
   c) Application programming language.
   d) None of these.

f) .....is/are valid data type in PHP.
   a) String
   b) Interer
   c) Boolean
   d) All of these.

g) PHP is widely used..... scripting language that is especially suited for web development.
   a) Open source general purpose.
   b) Proprietary general purpose.
   c) Open source special purpose.
   d) Proprietary special purpose.

h) The.....function reads a file and writes it to the output buffer.
   a) Read file ( )
   b) read ( )
   c) Write ( )
   d) None of these

i) Choose the correct declaration of variable in PHP.
   a) var a=10;
   b) $a=10;
   c) int a;
   d) None of these

j) Which of the following method is suitable when you need to send large form data?
   a) Get
   b) Post
   c) Head
   d) None of these

2. Attempt **any four** of the following. **8**

a) Explain any two string functions in PHP.

b) List any two differences between $_GET and $_POST.

c) What is Recursive function?

d) What is Variable? How it is declared in PHP.

e) What is Comment? Why it is used.

f) What is My SQL?

3. Attempt **any two** of the following. **8**

a) What is constructor? How it is declared in PHP.

b) List and explain Various features of PHP.

c) Explain while loop in PHP with suitable example.

4. a) Attempt **any two** of the following. **6**

a) Explain switch case statement in PHP with suitable example.

b) What is class? How it is declared.

c) How function is declared in PHP? Explain with suitable example.

b) Explain mysqli_connect( ) and mysqli_connect _ errno( ) functions. **2**

5. Attempt **any one** of the following. **8**

a) Write a PHP script to display contents of text file on a web browser.

b) List and explain various PHP functions to handle form data and interact with database table.

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Seat Number

* 1 1 2 7 *

STATISTICS : ST - 356
Statistical Computing Using R-Software (35176)

P. Pages : 3

Time : Two Horus **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.
6. Use of statistical tables and calculator is allowed.
7. Assume suitable additional data, if necessary.

1. Attempt **any eight** of the following. **8**

a) Distinguish between data frame and matrix.

b) Write R-commands to get median of a random sample of size 10 from B(n=7, p=0.5).

c) Write R command to create a vector of numbers 1, 4, 7, 10, 13,.....,37.

d) What is object in R? State the name of any three data objects.

e) Let $x \sim N(\mu = 100, \sigma^2 = 64)$. Write R-command to find K such that $P[x \leq K] = 0.20$.

f) Create a data frame of roll number and sex of 10 students.

g) Write R-commands to simulate an experiment of tossing an unbiased coin 500 times and prepare its frequency distribution.

h) Write R- commands to draw a systematic sample of size 6 from a population of 30 units..

i) Explain round ( ) function.

j) State the meaning of package.

2. Attempt **any four** of the following. **8**

a) State the use of following functions.
i) cbind ii) rbind,

b) Explain with illustration, the use of following functions.
i) rev( ) ii) diff( )

c) Let x~ Poisson ($\lambda = 3.5$). Write R-commands to find
i) $P(x \leq 2)$ ii) $P(4 \leq x \leq 6)$

d) Write R- commands to find the inverse of the following matrix.

$$A = \begin{pmatrix} 2 & 4 & 6 \\ 3 & 5 & 7 \\ 4 & 8 & 12 \end{pmatrix}$$

e) For the following observations
23, 8, 12, 22, 71, 54, 68, 32, 8, 57.
Write R-commands to find geometric mean and harmonic mean.

f) State the precedence rule of arithmetic operators and logical operators.

3. Attempt **any two** of the following. **8**

a) Let $x \sim N(50,36)$. Write R-commands to find
i) $p(x \leq 60)$ ii) $p(40 \leq x \leq 70)$
iii) $p(x \geq 65)$

b) Write R-command to represent the following data by a suitable diagram.

Year	No. of Students			Total
	Arts	Commerce	Science	
2012	300	200	400	900
2013	400	250	450	1100
2014	450	300	600	1350

c) For the frequency distribution, given below.

C. I. :	0-5	5-10	10-15	15-20	20-25
Frequency:	3	7	12	8	5

Write R- commands to compute mean. Variance and coefficient of variation.

4. a) Attempt **any two** of the following. **6**

i) Distinguish between high level functions and low level functions used in graphics with R.

ii) Write R-commands to solve the, following system of linear equations using solve function.

$2x_1 + x_2 = 1$

$x_1 + 3x_2 + x_3 = -3$

$x_2 + 2x_3 = 1$

iii) State the basic utility of following functions.
Length ( ), range( ), unique (), ls ( ), rm ( ), dim( ).

b) Explain the cor ( ) function with illustration. **2**

5. Attempt **any one** of the following. **8**

a) i) Explain the grep ( ) and paste ( ) function with illustration.

ii) What is a CRAN mirror? Distinguish between installing and loading a package. How will you sec the details of a package?

b) Using the following data:

x :	3	6	9	12	15	18
f :	2	13	17	29	10	4

Write R-commands to compute:-
i) First four raw moments.
ii) First four central moments.
iii) Coefficient of skewness based on moments.
iv) Coefficient of kurtosis based on moments.

****

Seat Number

खडू - 103 / 104

* 1 1 2 5 *

COMPUTER SCIENCE : UG-CS - 356
(A) Programming in "C" (35246)
(B) Java Programming - I (35247)

P. Pages : 4

(A) Programming in "C" (35246)

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to right indicate full marks.

1. Attempt **any eight** of following. **8**

a) Which of the following is not a Bitwise operator in C# .net.

a) & b) |
c) << d) +

b) CLR stands for.

a) Common language runtime b) Clear
c) Clear screen d) Common language runner

c) Which of the following in an 8 – byte integer.

a) Char b) Long
c) Short d) Byte

d) What is output of following code

```
int [ , , ] a = new int [4, 4, 4,] ;
console · writeline (a · length).
```

a) 64 b) 16
c) 4 d) 8

e) Which of following statement is correct.

a) C# doesn't support constructor
b) C# doesn't support destructor
c) C# doesn't support constructor overloading
d) C# support polymorphism

f) What is output of following string S_1 = "Nagpur" ;
String S_2 ;
$S_2 = S_1$. Insert (6, "Mumbai") ;
console · writeline (S_2)
a) NagMumbai b) Nagpur Mumbai
c) Nagpur d) NagpurMumbai

g) C# only support methods that return single value.
a) True b) False

h) Keywords are used as variable names in C#.
a) True b) False

i) Which of following is not an integer.
a) Char b) Long
c) Short d) Byte

j) Mostly C# statements are end with ;
a) True b) False

2. Attempt **any four** of following. **8**
a) List various operators in C#.
b) How to declare a method.
c) Write difference between value type and reference type.
d) What is role of precedence in expression evaluation.
e) Write a C# program to calculate factorial.
f) Is it possible to write multiple main funⁿ.

3. Attempt **any two** of following. **8**
a) How to access a class member in C#.
b) Explain any four string methods with example.
c) Write difference between constructor and destructor.

4. a) Attempt **any two** of following. **6**
i) Write characteristics of C#.
ii) Explain any three mathematical funⁿ with example.
iii) Explain Array list class.

b) Explain command line arguments with ex. **2**

5. Attempt **any two** of following. **8**
a) Explain looping statements in C#.
b) Define class. Explain containment inheritance. Explain polymorphism with example.

****

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to right indicate full marks.

1. Attempt **any eight.** **8**

a) Java is ..... language.
   i) Graphics oriented ii) Procedure oriented
   iii) Object oriented iv) Object class

b) What is byte code in Java ?
   i) The type of code generated by Java compiler
   ii) The type of code generated by Java interpreter
   iii) It is a name of java source file
   iv) None of these

c) Which one is not a looping statement ?
   i) While ii) Do-while
   iii) Switch iv) FOR

d) The Java program file extension is .....
   i) .Class ii) .Java
   iii) .Obj iv) None of these

e) Java uses ..... compiler.
   i) Java ii) Javac
   iii) Jdk iv) bin

f) Which class is not further inherited ?
   i) Public ii) Shared
   iii) Final iv) None of these

g) JIT is a part of .....
   i) Class ii) Object
   iii) JVM iv) None of these

h) Which method of string class is used to extract a single character ?
   i) ChatAt( ) ii) Chatat( )
   iii) CharAt( ) iv) CHARAT( )

(B) Java Programming - I
(35247)

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to right indicate full marks.

1. Attempt **any eight.** **8**

a) Java is ..... language.
   i) Graphics oriented ii) Procedure oriented
   iii) Object oriented iv) Object class

b) What is byte code in Java ?
   i) The type of code generated by Java compiler
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   i) While ii) Do-while
   iii) Switch iv) FOR

d) The Java program file extension is .....
   i) .Class ii) .Java
   iii) .Obj iv) None of these

e) Java uses ..... compiler.
   i) Java ii) Javac
   iii) Jdk iv) bin

f) Which class is not further inherited ?
   i) Public ii) Shared
   iii) Final iv) None of these

g) JIT is a part of .....
   i) Class ii) Object
   iii) JVM iv) None of these

h) Which method of string class is used to extract a single character ?
   i) ChatAt( ) ii) Chatat( )
   iii) CharAt( ) iv) CHARAT( )

i) Which is the part of class definition ?
   i) Instance variable ii) Instance methods
   iii) Constructors iv) All of these

j) Two methods cannot have the same name in Java.
   i) True ii) False

2. Attempt **any four.** **8**

a) What is command line argument ?

b) Explain JVM in brief.

c) List features of Java language.

d) What do you mean by a package ?

e) Discuss abstract class.

f) Explain stream buffer in brief.

3. Attempt **any two.** **8**

a) Explain method overloading with an example.

b) Write a short note on inheritance.

c) Discuss constructor with an example.

4. a) Attempt **any two.** **6**

a) Write a java program to find factorial of a given number.

b) Explain string to Kenzier class.

c) Discuss wrapper class in brief.

b) Compulsory question **2**

Explain various string functions in brief.

5. Attempt **any one.** **8**

a) Write a short note on :
   i) Operators in Java
   ii) Multilevel inheritance

b) What is
   i) Exception handling
   ii) Finally exception in detail with example.

****

Seat Number

* 1 1 2 2 *

खडू - 097/098/099/100

ZOOLOGY : ZOO - 356
(A) Biotechnology (35156) / (B) Sericulture (35157) / (C) Animal Behaviour (35158) / (D) Aquaculture and Fisheries (35159)

P. Pages : 8

(A) Biotechnology (35156)

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.
6. Draw neat labelled diagrams wherever necessary.

1. Solve **any eight** of the following multiple choice questions. **8**

i) Mouse 3T3 is an example of.....
   a) Culture cell b) Cell line
   c) Hybrid cell d) None of these

ii) Heterokaryon is a product of .....
   a) Nuclear transfer b) Gene transfer
   c) Somatic cell fusion d) PCR

iii) Hind III is an example of .....
   a) Plasmid b) Fungus
   c) Bacterium d) Restriction enzyme

iv) ..... is used for production of cDNA library.
   a) tRNA b) mRNA
   c) rRNA d) hnRNA

v) Presence of alpha – 1 – antitrypsin in sheep's milk that is used in treatment of cystic fibrosis is a result of.....
   a) Gene farming b) Mutagenesis
   c) Insemination d) None of these

vi) Glucose isomerase is used in food & soft drink industries because of its ability to convert glucose into.....
   a) CO_2 b) Fructose
   c) Galactose d) All of these

vii) Typical fermentation process to produce bioethanol requires.....
a) Bacteria b) Entamoeba
c) Yeast d) Fungi

viii) Embryonic stem cells are.....
a) Totipotent b) Plueripotent
c) Nullipotent d) None of these

ix) Progressive increase in concentration of non degradable synthetic compounds with rise in trophic level in food chain is called.....
a) Chemosynthesis b) Degradation
c) Bio magnification d) Energy pyramid

x) Which one is example of cloning vector .....
a) Plasmid b) Cosmid
c) Bacteriophage d) All of these

2. Define / Explain **any four** of following. **8**
i) Primary culture ii) Somatic cell fusion
iii) Chimeric DNA iv) Clone
v) Biogas vi) Artificial intelligence.

3. Write short notes on **any two** of following. **8**
i) Hybridoma technology. ii) Restriction enzymes.
iii) Gentically modified organisms.

4. a) Explain **any two** of following. **6**
i) Significance of stem cells.
ii) Structure of immunoglobulin IgG.
iii) Advantages tissue culture of animal cells.

b) Biosensor. **2**

5. What is transgenesis ? Describe various methods of gene transfer enlist transgenic animals with their significance. **8**

OR

What are immobilized enzymes ? Explain different methods of immobilization and uses of immobilized enzymes in industries.

****

(B) Sericulture
(35157)

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

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2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to right indicate full marks.
6. Draw neat labelled diagram wherever necessary.

1. Attempt **any eight** of the following. **8**

i) Pebrine is a ..... disease.
   a) Bacterial b) Protozoan
   c) Fungal d) Viral

ii) Bombyx Mori is belong to ..... family.
   a) Bombycidae b) Saturnidae
   c) Arandae d) None of above

iii) Silk producing machine is an insect called as.....
   a) Silk thread b) Sericulture
   c) Silk industry d) Silkworm

iv) In silkworm rearing for ..... disinfection is used.
   a) Formalin b) Chloroform
   c) Alcohol d) Hydrogen peroxid

v) The raw silk is first reeled on small reels and allow to dry and then ..... on large reel.
   a) Reel b) Brushing
   c) Finishing d) Re-reeling

vi) The unwinding of silk thread from co-coon is called ..... process.
   a) Reeling b) Brushing
   c) Finishing d) Re-reeling

vii) Mouth parts of Bombyx Mori is .....
a) Sucking type b) Mandibulate type
c) Siphoning type d) Pircing type

viii) Muscardin disease is caused by ..... pathogen.
a) Fungal b) Bacterial
c) Protozoan d) Viral

ix) Transfer of newly hatched larvae from egg sheet card to rearing is called.....
a) Brushing b) Crushing
c) Chopping d) Clearing

x) The rearing of silkworm for production of silk is known as.....
a) Sericulture b) Agriculture
c) Ericulture d) Pisciculture

2. Attempt **any four** of the following. **8**
a) Chandrica b) Brushing of rearing
c) Sorting of co-coon d) Quality food for rearing
e) Silkworm f) Metamorphosis

3. Attempt **any two** of the following. **8**
a) Describe male reproductive system of Bombyx Mori.
b) Explain hormonal control of metamorphosis and silk synthesis.
c) Give the systematic position of Bombyx Mori.

4. a) Attempt **any two** of the following. **6**
i) Explain morphology of Endocrine gland.
ii) Give disadvantages of chopped leaves.
iii) Enlist the domesticated species of silkworm.

b) Sketch and label co-coon of Bombyx Mori. **2**

5. Attempt **any one** of the following. **8**
i) Explain in brief the mounting and harvesting of co-coon.
ii) What is soil ? Explain different types of soil in India.

****

(C) Animal Behaviour
(35158)

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.

1. Attempt **any eight** of the followings. **8**

i) Rabbit is ..... animal.
   a) Carnivorous b) Herbivorous
   c) Omnivorous d) None of these

ii) Signal conveys.....
   a) Mechanism b) Learning
   c) Information d) Conclusion

iii) Mechanism of learning is associated with.
   a) Nervous system b) Genes
   c) Environment d) All of these

iv) Migration of birds is .....
   a) Regional b) Seasonal
   c) Periodical d) All of these

v) ..... early trained due to classical conditioning.
   a) Bats b) Dogs
   c) Frogs d) Snake

vi) Lion uses ..... for making territory.
   a) Signal b) Sound
   c) Urine d) Light

vii) Breaking of tail by wall lizard is a sort of ..... behaviour.
   a) Social b) Aggressive
   c) Escape d) Dominance

Instructions to Candidates :

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2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
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1. Attempt **any eight** of the followings. **8**

i) Rabbit is ..... animal.
   a) Carnivorous b) Herbivorous
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   c) Information d) Conclusion

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   a) Bats b) Dogs
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vi) Lion uses ..... for making territory.
   a) Signal b) Sound
   c) Urine d) Light

vii) Breaking of tail by wall lizard is a sort of ..... behaviour.
   a) Social b) Aggressive
   c) Escape d) Dominance

viii) Frightened behaviour due to strange animal is called.
a) Xenophobia b) Chemophobia
c) Hydrophobia d) None of these

ix) Swarming of honey bees is related to :.....
a) Anatomy b) Behavioural ecology
c) Physiology d) Dancing

x) Animal behaviour that involves actual and potential harm to another animal.
a) Crowling b) Aggression
c) Parental care d) None of these

2. Define / Attempt **any four** of the followings. **8**
i) Composite signals. ii) Pain and frustrations.
iii) Xenophobia. iv) Pheromones.
v) Causes of migrations. vi) Endogenous pacemaker.

3. Attempt **any two** of the followings. **8**
a) Explain sex attractant and primer pheromones.
b) Define hormones of gonads and adrenal glands.
c) Explain methods of studying migration in birds.

4. a) Attempt **any two** of the followings. **6**

i) Dominance hierarchies.

ii) Pheromones among humans.

iii) Ant prebel concealment.

b) Explain neural mechanism of learning. **2**

5. Explain the evolution of human reproductive behaviour. **8**

OR

What are the signals. Explain different types of signals.

****

Instructions to Candidates :

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3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicates full marks.
6. Draw neat and labelled diagrams wherever necessary.

1. Attempt **any eight** of the followings. **8**

i) All forms of culture of aquatic animals and plants in fresh, blackish and marine environment.....
   a) Pisciculture b) Agroculture
   c) Ichthyology d) Aquaculture

ii) ..... is necessary for chlorophyll containing plants.
   a) Nitrogen b) Magnesium
   c) Sulphur d) Calcium

iii) Fish diet provides large amount of vitamins .....
   a) A & D b) B & C
   c) K d) E

iv) ..... is prepared from the material left over after extracting oil from the fish.
   a) Fish meal b) Fish vitamins
   c) Fish manure d) Fish guano

v) ..... is prepared from the connective tissue of skin from head & body of fish.
   a) Fish oil b) Fish meal
   c) Fish glue d) Fish manure

vi) Liming is done with the addition of ..... in water.
   a) $CuSO_4$ b) $CaCO_3$
   c) CaO d) $MgSO_4$

(D) Aquaculture and Fisheries
(35159)

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
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3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicates full marks.
6. Draw neat and labelled diagrams wherever necessary.

1. Attempt **any eight** of the followings. **8**

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   a) Pisciculture b) Agroculture
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   a) Fish oil b) Fish meal
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vi) Liming is done with the addition of ..... in water.
   a) $CuSO_4$ b) $CaCO_3$
   c) CaO d) $MgSO_4$

vii) Major carps are economically important fishes because.....
a) They feed on phyto & zooplankton, decaying wood & debris
b) They are purely carnivorous
c) They are purely herbivorous
d) They live in clear water

viii) Spoiled flesh of fish is .....
a) Acidic with pH 6.4 b) Alkaline with pH above 7.6
c) Neutral with pH 7 d) Acidic with pH below 4

ix) Fisheries, training and extension, reservoir fisheries development and group accident insurance for active fisherman are the main features of .....
a) District level fishery schemes
b) State level fishery schemes
c) Centrally sponsored fishery schemes
d) All the above

x) The flesh of fresh fish is.....
a) Stiff and non – flabby b) Hard
c) Soft d) Elastic

2. Define / Explain / Comment on **any four.** **8**
a) Hydronium ion b) Aquarium
c) Isinglass d) Soil
e) Food chain f) Limnetic zone

3. Attempt **any two** of the following. **8**
a) Soil fertility
b) Fish meal
c) Explain some methods of preservation of fish

4. a) Attempt **any two** of the following. **6**
i) Clarius batrachus
ii) Types of lotic water bodies.
iii) Importance of clearing pond bottom.

b) Fecundity. **2**

5. Attempt **any one** of the following. **8**
a) Describe in brief construction and maintenance of fish farm.
b) Explain in detail the skin parasites and the disease caused by them in fish. Add a note on its control.

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Seat Number

* 1 1 2 0 *

CHEMISTRY : CH - 356
(A) Bio-Chemistry (35136) / (B) Environmental Chemistry (35137)

P. Pages : 4

(A) Bio-Chemistry (35136)

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicated full marks.

1. Select the correct option of the following **any eight**. **8**

i) Hydrolysis of sucrose gives.....
   a) Glucose + Glucose b) Glucose + Fructose
   c) Glucose + Galactose d) Fructose + Galactose.

ii) Amino acid behaves as.....
   a) Proton donar b) Proton acceptor.
   c) Ampholyte d) Salt.

iii) In a biochemical reaction, energy of activation is.....
   a) Energy required to convert substrate to transition state.
   b) Energy required to convert substrate to product.
   c) High in presence of enzyme.
   d) Low in absence of enzyme.

iv) In DNA, Guanine of one chain is joined to cytosine of other chain by.....number of H bonds.
   a) 1 b) 2 c) 3 d) 4

v) Wheat, corn and rice are sources of.....nutrient.
   a) Carbohydrates b) Fats.
   c) Vitamins d) Proteins.

vi) During alcoholic fermentation, glucose is converted into.....
a) Two molecules of ethanol
b) Two molecules of lactic acid.
c) Two molecules of ethanol and CO_2
d) Two molecules of lactic acid and CO_2

vii) β-pleated sheet structure is.....structure of proteins.
a) Primary b) Secondary c) Tertiary d) Quaternary

viii) Which one of the following is simple lipid?
a) Phospholipid b) Sphingolipid
c) Triacyl glycerol d) None of these.

ix) Which one of the following is not the type of RNA?
a) p-RNA b) m-RNA c) r-RNA d) t-RNA

x) ATP and ADP are examples of.....energy rich compounds.
a) Acyl phosphates b) Pyrophosphates
c) Enolic phosphates d) Thiol esters.

2. Attempt **any four** of the following. **8**
i) Give the reaction of glucose with Br_2 water.
ii) Write structures of any two amino acids having nonpolar R groups
iii) What are enzymes? Give two examples.
iv) Define monosaccharides.
v) What is decarboxylation?
vi) What are essential nutrients? Name the essential nutrients.

3. Attempt **any two** of the following. **8**
i) Discuss in brief structure of starch.
ii) Write note on β-oxidation process.
iii) Write hydrolytic reactions of a) ATP b) Acyl phosphate.

4. Attempt **any two** of the following. **6**
i) What are disaccharides? Discuss structure of maltose.
ii) Discuss in brief phospholipids.
iii) Write short note on balanced diet.

b) Carry out the following conversion pyruvic acid to Acetyl CoA. **2**

5. Attempt **any one** of the following. **8**
i) Describe the following reactions involved in amino acid metabolism.
a) Transamination b) Deamination (By any two enzymes)
ii) What are nucleic acids? Give types of nucleic acids. Describe Watson and crick model of DNA.

****

(B) Environmental Chemistry (35137)

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
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3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to right indicate full marks.
6. Draw neat diagram wherever necessary.

1. Attempt **any eight** of the following. **8**

i) In the atmosphere ozone layer is situated in -
   a) Troposphere b) Stratosphere
   c) Thermosphere d) ionosphere

ii) .....is having higher affinity towards hemoglobin in human blood.
   a) CO_2 d) CO c) H_2S d) NOX

iii) .....is used to recharge the ground water resources using natural rainfall.
   a) Water harvesting b) Water management
   c) Water budgeting d) Water auditing.

iv) Ferro bacillus is the species of.....decomposing bacteria.
   a) Iron b) Manganese c) Cobalt d) Nickel.

v) Eutrophication processes provides.....to the water body for aquatic life.
   a) Protein b) Fats c) Neutrients d) Vitamins.

vi) The modified and more biodegradable surfactant is-
   a) LAS b) ABS c) PPS d) CBS.

vii) Water logged soil is more.....
   a) Fertile b) Infertile c) Acidic d) Basic.

viii) The C horizon soil is.....
   a) Pod soil b) Weathered rock c) Top soil. d) Sub soil.

ix) Which of the following is not green house gas.
a) CO_2 b) CFC c) CH_3 d) N_2

x) Ocean is the best sink for.....
a) N_2 b) CO c) O_3 d) CO_2

2. Answer **any four** of the following. **8**

i) Describe in brief about sources of CO pollution.
ii) What are the humic substances in water?
iii) What is marine biota?
iv) Explain the D.O. value.
v) What is green house gas?
vi) Ozone layer act as protective layer for life on earth. Explain.

3. Attempt **any two** of the following. **8**

i) Write note on photochemical smog.
ii) Discuss the components of soil.
iii) Explain the harmful effects of CFC's

4. a) Attempt **any two** of following. **6**

i) Explain in brief the acid base chemistry of water.
ii) Explain the thermal pollution.
iii) Define & explain the term Green House Effect.

b) Explain briefly about the control of co emission. **2**

5. Attempt **any one** of the following. **8**

i) Give the effect of Sulphur dioxide (so_2), oxides of nitrogen (No_x) and particulate matter on human health. Explain the effect of particulate matter on material.

ii) Define surfactant and Builders. State and explain the types of surfactants with suitable examples

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Seat Number

खडू - 076

* 1 1 1 1 *

STATISTICS : ST - 355
Financial Mathematics
(35175)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.
6. Use of statistical table and scientific calculator is allowed.
7. Assume constant compound interest unless a question states or implies otherwise.

1. Attempt **any eight.** **8**

a) Define the term simple interest.

b) What is rule of 72 ?

c) Define the term Annuity – due.

d) Is the relation $\overline{s}_{\overline{n}|} = \frac{1-e^{-n\delta}}{\delta}$ is true?

e) Show that $A(n) - A(o) = I_1 + I_2 + I_3 + ... + I_n$.

f) State the Banker's rule.

g) Give the expression for the outstanding loan balance at time t by the retrospective method.

h) State relation between present value and accumulated value of annuity – immediate.

i) Justify : "For compound interest the comparison date in a time diagram is arbitrary".

j) State any two relationships between effective rate of interest and effective rate of discount.

2. Attempt **any four.** **8**

a) Find the accumulated value of 1 at the end of n years if $\delta=(1+t)^{-1}$.

b) A sum of Rs. 1,00,000 is deposited on June 20, 2014 and then withdrawn with interest on September 13, 2014. Find the amount of interest on September 13, 2014 assuming the 30/360 rule at 6% simple interest.

c) Define perpetuity. Derive the expression for present value of perpetuity – immediate.

d) At what rate convertible quarterly Rs. 1000 accumulate to Rs. 1600 in six years ?

e) State the properties of Accumulation function.

f) Find the accumulated value of Rs. 10,000 invested for ten years if the force of interest is 5%.

3. Attempt **any two.** **8**

a) Find the accumulated value of Rs. 10,000 at the end of 5 years and 6 months invested at 9% per annum :
   i) Assuming compound interest throughout
   ii) Assuming simple interest during the final fractional year

b) Complete the following table under simple interest :

Sr. No.	Amount deposited (in Rs)	Period of Investment (in years)	Interest rate (p.a.)	Accumulated value (in Rs)
1		4	0.06	6200
2	4000		0.10	5200
3	8000	5		9600
4	7000	2	0.03	

c) The cash price of a car is Rs. 1,10,000. The buyer is willing to finance the purchase at the rate of interest 18% convertible monthly and make payments of Rs. 3000 at the end of each month for four years. Find the down payment that will be necessary.

4. a) Attempt **any two.** 6

i) Complete the following table.

i	$i^{(12)}$	$i^{(365)}$	δ	$d^{(365)}$	$d^{(12)}$	d
0-10						

ii) Find nominal rate of interest convertible semiannually which is equivalent to a nominal rate of discount of 12% per annum convertible monthly.

iii) Fund A accumulates at a simple interest rate of 5% Fund B accumulates at a simple discount rate 2.5%. Find the point in time at which the forces of interest on the two funds are equal.

b) State Actual / Actual rule. 2

5. Attempt **any one.** 8

a) i) Explain prospective method in finding the amount of outstanding loan balance. Also establish equivalence between prospective and retrospective methods.

ii) At what rate of interest, convertible quarterly, is Rs. 16,000 the present value of Rs. 1000 paid at the end of every quarter for five years ? Use the approximate formula.

b) A borrows Rs. 20,000 from B and agrees to repay it with 20 equal annual installments of principal plus interest on the unpaid balance at 3% effective. After 10 years B sells the right to future payments to C, at a price that yields C 5% effective over the remaining 10 years. Find the price which C should pay to the nearest rupees.

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Seat Number

* 1 1 1 2 *

MICROBIOLOGY : MB - 355
Immunology
(35195)

P. Pages : 2

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carry equal marks.
5. Figures to the right indicate full marks.

1. Attempt following **any eight.** **8**

a) Memory cells are associated with ..... immune response.
   i) Primary ii) Secondary
   iii) Both iv) Tertiary

b) What is inflammation ?

c) What is MHC restriction ?

d) Which Abs are involved in primary immune response ?

e) What is eosinophilia ?

f) Phagocytosis is associated with – cells.
   i) Macrophages ii) B
   iii) T iv) Mast

g) ..... organ is called as grave yard of effect cells.
   i) Bone marrow ii) Spleen
   iii) Lymph node iv) Thymus

h) What is complement ?

Instructions to Candidates :

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5. Figures to the right indicate full marks.

1. Attempt following **any eight.** **8**

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   i) Macrophages ii) B
   iii) T iv) Mast

g) ..... organ is called as grave yard of effect cells.
   i) Bone marrow ii) Spleen
   iii) Lymph node iv) Thymus

h) What is complement ?

i) Anaphylaxis is ..... type of hypersensitivity.
i) I ii) II
iii) III iv) IV

j) What are auto antigens ?

2. Attempt following **any four.** 8

a) Give the subtypes of T cells.

b) Process of phagocytosis by macrophages.

c) Subtypes of lymphocytes.

d) Types of grafts.

e) Enlist methods of specific immunosuppression.

f) MHC restriction.

3. Attempt following **any two.** 8

a) Morphology of spleen.

b) Comparative account of primary & secondary response.

c) Mechanism of CMI.

4. a) Attempt following **any two.** 6

i) Mechanism of autoimmune disease.

ii) Mechanism of action of inf.

iii) Inflammation.

b) What are cytokines ? 2

5. Attempt following **any one.** 8

i) Classical pathway of complement. Add a note on biological functions of complement.

ii) Causes and types of anemia.

****

Seat Number

खडू - 078

1113

BIOCHEMISTRY: BC - 355
Biophysical Chemistry (35215)

P. Pages : 2

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
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4. All questions are compulsory and carry equal marks.
5. Figures to the right indicate full marks.

1. Attempt **any eight.** **8**

i) In ficks law $\frac{da}{dt} = -D.A\left(\frac{dc}{dx}\right)_t$ Where D is .....

a) Diffusion coefficient b) Diffusion constant
c) Diffusion number d) Equation

ii) ..... is the flow of solvent from dilute to a concentrated solution, a cross a semipermeable membrane.

a) Surface tension b) Viscosity
c) Osmosis d) Diffusion

iii) According to Arrhenius, base are compounds which upon ionization in water yields ..... ions.

a) H^+ b) OH^-
c) Cl^- d) Mg^{2++}

iv) When the rotating body is immersed in a liquid it experiences a resistance in its movement, this is due to .....

a) Viscosity effect b) Surface tension
c) Osmosis d) Adsorption

v) As the temperature rises surface tension of liquid.....

a) Increases b) Remain constant
c) Decreases d) Fluctuates

vi) ..... express the amount of energy capable of doing work at constant temperature & pressure.

a) Gibbs free energy b) Standard free energy
c) Constant free energy d) Free energy constant

vii) The failing ball viscometer are design to measure ..... of solution by applying stocks formula.
a) Salinity b) Osmotic pressure
c) Viscosity d) Density

viii) According to second law of thermodynamics the entropy of universe ..... during all chemical & physical processes.
a) Decreases b) Increases
c) Constant d) Fluctuates

ix) Phosphate buffers lacks their buffering capacity in the range of.....
a) 3.5 to 4.5 b) 7.5 to 8
c) 10.5 to 11 d) 12 to 12.5

x) During Isotonic conditions osmotic pressure between cells & its atmosphere remain .....
a) Different b) Same
c) Negligible d) Invisible

2. Attempt **any four.** **8**
Define :
a) Entropy b) Osmotic pressure
c) Viscosity d) Surface tension
e) Colloids f) Buffer.

3. Attempt **any two.** **8**
i) Describe the Bronsted – Lowry theory of acid bases.
ii) With the suitable example explain rotation of cylinder immersed in the solution.
iii) Write a note on Bicarbonate buffer system.

4. a) Attempt **any two.** **6**
i) Write a note on Lyophilic colloids.
ii) Write a note on ionization of water.
iii) Write a note on capillary flow use for viscosity measurement.

b) Define thermodynamics. **2**

5. Describe biological significance of Donnan membrane phenomenon. **8**

OR

Describe significance of viscosity in biological system.

****

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.

1. Attempt **any eight.** **8**

a) Which of the following is a cyber crime ?
   i) Hacking ii) Phishing
   iii) Virus attack iv) All of these

b) The explicit portrayal of sexual subject matter is termed.
   i) Spamming ii) Pornography
   iii) Junking iv) None of these

c) Which one of the following is not an example of using computer as a weapon ?
   i) Cyber Terrorism ii) IPR Violations
   iii) Credit and frauds iv) All of these

d) By hacking web – server taking control on another persons website is called as.....
   i) Spooling ii) Web – jacking
   iii) Spamming. iv) None of these

e) Program that multiply like viruses but spread from computer to computer are called as.....
   i) Worms ii) Virus
   iii) Boot iv) None of these

f) A password is used for .....
   i) Security ii) Lock
   iii) Virus iv) Junking

Seat Number

* 1 1 1 4 *

INFORMATION TECHNOLOGY : IT - 355
Cyber Law and IT Act
(35325)

P. Pages : 2

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
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4. All questions are compulsory.
5. Figures to the right indicate full marks.

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f) A password is used for .....
   i) Security ii) Lock
   iii) Virus iv) Junking

g) E-Governance is used for.....
i) Electronic business ii) Online banking
iii) Online shopping iv) None of these

h) IT – ACT in India was amended in.
i) 2001 ii) 2004
iii) 2008 iv) 2010

i) Computer to Computer exchange of business documents is done through.
i) EDI ii) ERP
iii) CAM iv) CAD

j) B2B stands for.....
i) Bank 2 bank ii) Bank 2 Business
iii) Business 2 Business iv) None of these

2. Attempt **any four.** **8**
a) Define virus ? Give example.
b) What is worm ? Explain.
c) Explain web – jacking.
d) What is software piracy ?
e) What is cyber stalking ?
f) What is fire wall ?

3. Attempt **any two.** **8**
a) Explain digital signature in detail.
b) What is the need of cyber law ? Explain.
c) Discuss copyright issue on internet.

4. a) Attempt **any two.** **6**
a) Explain categories of cyber crime in brief.
b) What is data encryption ? Explain.
c) Explain Bio-metric and its purpose.

b) Compulsory question. **2**
Discuss smart card in brief.

5. Attempt **any one.** **8**
a) Explain IT Act and its objectives.
b) Discuss intellectual property and requirement of it's copyright.

****

Seat Number

* 1 1 1 6 *

ENVIRONMENTAL SCIENCE : ENVI - 355

Instrumental Techniques in Environmental Analysis – I

(35395)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Draw neat and labelled diagrams wherever necessary.

1. Attempt **any eight** of the followings. **8**

i) The term 'Precision' refers to.
   a) Highly accurate data.
   b) Measurements that are within limit.
   c) Logical accuracy
   d) The repeatability of data.

ii) Following is the CGS unit of energy-
   a) Joule b) Erg
   c) Tesla d) Volt

iii) Majority of conductors in p-type semiconductor are-
   a) Electrons b) Holes
   c) Both d) Neutrons.

iv) What is the flame colour of sodium chloride when it is heated in a Bunsen flame?
   a) Brick-red b) Bluish green
   c) Yellow d) Lilac.

v) An electromagnetic wave consists of-
   a) Both electric and magnetic fields.
   b) Electric field only
   c) Magnetic field only
   d) Non-magnetic field.

vi) The radiation source used in atomic absorption spectroscopy is-
   a) Incandescent lamp b) Hollow cathode lamp
   c) Laser beam d) Nernst Glower.

vii) In a pure state, silicon has the properties of-
   a) Semiconductor b) Insulator
   c) Conductor d) Resistor.

viii) To increase the number of free electrons in silicon, it is doped with following impurity element.
   a) Germanium b) Aluminium
   c) Boron d) Arsenic

ix) A representative sample is used for analysis so that the results of study are-
   a) Generalisable b) Convenient
   c) Limited d) Predictable.

x) Number of moles of substance in 1 litre of the solvent is called-
   a) Normality b) Molarity
   c) Molality d) Mole fraction

2. Attempt **any four** of the followings. 8

i) What is an equivalent weight? What is the normality of solution?

ii) What is meant by a semiconductor? What are its types?

iii) Which are the various instrumental methods of analysis?

iv) What is an electromagnetic spectrum and which are various sub- division of it?

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v) What is meant by detection limit in an instrumental analysis?

vi) Which are the essential components of analytical instruments?

3. Attempt **any two** of the followings. 8

i) Explain the principle of acid- base titration with suitable example.

ii) Discuss the principle and applications of transistors in electronic devices.

iii) What are standard solutions? Explain primary and secondary standard solutions with one example each.

4. a) Attempt **any two** of the followings. 6

i) Describe the principle and applications of polarization of light.

ii) Describe the principle and procedure of gravimetric method of analysis.

iii) What are semiconductor diodes? Explain application of diode as half wave rectifier.

b) Write note on 'Hazards in sampling'. 2

5. Attempt **any one** of the followings. 8

i) Describe various types of errors occurring during analysis and techniques employed for minimisation of errors in an analysis.

ii) Discuss the principle and applications of atomic and molecular absorption of an electromagnetic radiation.

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Seat Number

* 1 1 1 8 *

MATHEMATICS : MTH - 356
(A) Programming in "C" (35117) / (B) Lattice Theory (35118)

P. Pages : 4

(A) Programming in "C" (35117)

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.

1. Attempt **any eight** of the following. **8**

i) How to write the comment statement in C ?

ii) The variable name 'simple interest' is valid or invalid ? if invalid why?

iii) Write the syntax of decrement.

iv) Write the expression $i^2 + j^3 + 4k = 7b$ in 'C'.

v) Explain 'goto' statement.

vi) When to use 'break' statement.

vii) Write any two type of loops in 'C'.

viii) If int a [7] = {3, −6, 8, −9, 1, −5, 4} then a[3] = ..., a[4] = ...

ix) Write one advantage of user defined function.

x) What is 'C' function.

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

i) Write short note on variable in 'C'.

ii) Write a program to calculate area and circumference of the circle, whose radius is given.

iii) Devendra basic salary is input. His pay band is 6000, dearness allowance is 80% of basic salary, house rent allowance is 15% of basic salary, travelling allowance is 8% of basic salary. Write a 'C' program to calculate gross salary. (Gross salary=basic salary + pay band + dearness allowance + house rent + travelling allowance).

b) Write any two difference between 'single character constant' and 'string constant'. 2

3. Attempt **any two** of the following. 8

i) Explain nested 'if' statement.

ii) Write a ' C' Program to check whether a given character is alphabet or not.

iii) Write a program to check whether given year is leap or not.

4. a) Attempt **any two** of the following. 6

i) Explain 'while' statement with suitable example.

ii) Write a C program to find and display all the factors of a given integer.

iii) Write a C program to find LCM of given two positive integers.

b) Write a C program to get output the following multiplication. 2

5 x 1 = 5
5 x 2 = 10
.
.
5 x 10 = 50

5. a) What is an array ? How to declare single dimensional array ? 4

b) Write a C program to get the transpose of the given matrix. 4

OR

a) Write a C program to sort the array elements in ascending order. 4

b) Write a C program to display all prime numbers between the given interval. 4

****

(B) Lattice Theory (35118)

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.

1. Attempt **any eight** of the following. **8**

a) If in a poset $x_1 \leq x_2 \leq ..... \leq x_n \leq x_1$, then show that $x_1 = x_2 = ... = x_n$.

b) Let P be a chain. Then show that nonempty subset S of P is also a chain.

c) Draw the Hasse diagram of a lattice D_{143} of divisors of 143 under divisibility.

d) P is a poset of nontrivial factors of 12 under divisibility. Are least and greatest element of P exist ? Justify.

e) State modular inequality in a lattice.

f) State the necessary and sufficient condition for a subset of lattice to be an ideal of it.

g) Define : Principal ideal of a lattice.

h) Explain the concept of meet homomorphism.

i) Is modular lattice distributive ? State.

j) Show that sublattice of a distributive lattice is distributive.

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

i) if a mapping $f : P \to Q$ is an isomorphism then prove that f is an isotone and has an isotone inverse.

ii) If $< p, \rho >$ and $< p, \sigma)$ are two posets then show that $< p\ \rho \cap \sigma >$ is also a poset.

iii) Let A = {1, 2, 3, 4, 6, 8, 9, 12, 18, 24} be a poset under divisibility. Draw the Hasse diagram of A and hence find least, greatest, minimal and maximal element of A if exits.

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.

1. Attempt **any eight** of the following. **8**

a) If in a poset $x_1 \leq x_2 \leq ..... \leq x_n \leq x_1$, then show that $x_1 = x_2 = ... = x_n$.

b) Let P be a chain. Then show that nonempty subset S of P is also a chain.

c) Draw the Hasse diagram of a lattice D_{143} of divisors of 143 under divisibility.

d) P is a poset of nontrivial factors of 12 under divisibility. Are least and greatest element of P exist ? Justify.

e) State modular inequality in a lattice.

f) State the necessary and sufficient condition for a subset of lattice to be an ideal of it.

g) Define : Principal ideal of a lattice.

h) Explain the concept of meet homomorphism.

i) Is modular lattice distributive ? State.

j) Show that sublattice of a distributive lattice is distributive.

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

i) if a mapping $f : P \to Q$ is an isomorphism then prove that f is an isotone and has an isotone inverse.

ii) If $< p, \rho >$ and $< p, \sigma)$ are two posets then show that $< p\ \rho \cap \sigma >$ is also a poset.

iii) Let A = {1, 2, 3, 4, 6, 8, 9, 12, 18, 24} be a poset under divisibility. Draw the Hasse diagram of A and hence find least, greatest, minimal and maximal element of A if exits.

b) If $\langle Z, \leq \rangle$ be a poset of integers; and $A = Z^{+}$ set of all positive integers, then find supremum and infimum of A, if exist. 2

3. Attempt **any two** of the following. 8

a) Show that a lattice L is a chain if and only if every nonempty subset of it is a sublattice.

b) If L is any lattice then for any a, b, c, $\in$ L, prove that $a \leq b, c \leq d \Rightarrow a \wedge c \leq b \wedge d$ and $a \vee c \leq b \vee d$.

c) Define : sublattice of a lattice. Show by an example that the union of two sublattices may not be sublattice.

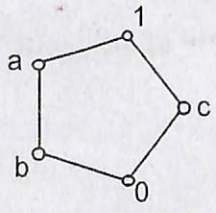
4. a) Attempt **any two** of the following. 6

i) If A and B are ideals of a lattice L then prove that $A \cap B$ is also an ideal of L.

ii) In a lattice L = {1, 2, 5, 10} under divisibility; show that A = {1} is not prime ideal but B={1, 2 } is a prime ideal

iii) Define : Join homomorphism. Show that any meet homomorphism preserves order.

b) Consider the pentagonal lattice given by following figure. Find complements of a, b and c relative to [0,1]. 2



5. a) i) Prove that the homomorphic image of modular lattice is modular. 4

ii) If L is a distributive lattice such that $\forall a,b,c \in L$ $a \wedge c = b \wedge c$ and $a \vee c = b \vee c$ then prove that a = b. 4

OR

i) Let L be a lattice and $\theta : L \to IR$ be a mapping such that $\theta(x)+\theta(y) = \theta(x \wedge y)+\theta(x \vee y)$ and also $x < y \Rightarrow \theta(x) \leq \theta(y)$. Show that L is modular. 4

ii) Define complemented lattice. If x has a complement in a distributive lattice L then prove that such a complement is unique. 4

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Seat Number

* 1 1 0 9 *

COMPUTER SCIENCE : UG-CS - 355
VB .NET
(35245)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.

1. Attempt **any eight** of the following. **8**

a) Transmission control protocol (TCP) is .....protocol.
   i) Transport layer iii) Network layer
   ii) Link layer iv) None of these

b) .Net framework provides runtime environment called as.....
   i) Managed code ii) Common language runtime
   iii) Class library iv) None of these

c) Which of the following method that doesnot return a value.
   i) Function ii) Subroutine
   iii) Method iv) None of these

d) Which of the following operator is Left shift operator.
   i) >> ii) <<
   iii) >>= iv) None of these

e) The occurrence of some condition that changes the normal flow of execution is called as.....
   i) Error ii) Exception
   iii) Polymorphism iv) None of these

f) Which of the following is a method of the console class defined in the system namespace.
i) write ii) writeln
iii) writeline iv) None of these

g) Which of the following is a collection of record that is stored with some purpose.
i) record ii) field
iii) database iv) None of above

h) Which of the following has ability to take more than one form.
i) inheritance ii) data hiding
iii) polymorphism iv) None of these

i) Which of the following method is used to deallocate the resource of an object.
i) constructor ii) Destructor
iii) friend function iv) None of these

j) Which of the following method by which a class can inherit some or all the properties of another class.
i) Polymorphism ii) Inheritance
iii) Data binding iv) None of these

2. Attempt **any four** of the following. 8

a) What is variable and constant? What are rules for valid variable Name?

b) What is class and object?

c) Enlist the component classes that makeup the data provider.

d) What is array? Give any two properties of the array class.

e) What is structured Exception handling? Give the components in code provided by structured exception.

f) What is web form and web services?

3. Attempt **any two** of the following. 8

a) What is Function? Write function to find factorial of a number.

b) Explain while loop with example.

c) Write VB .Net program to demonstrate inheritance.

4. a) Attempt **any two** of the following. 6

a) Write note on ISAPI Filters.

b) Explain If-else statement with example.

c) Write VB .Net program to demonstrate unstructured exception.

b) Compulsory question. 2

What is multithreading?

5. Attempt **any one** of the following. 8

a) What is interface? Write vb.net application to demonstrate the use of interfaces in vb.net.

b) What is datatable? Write an application in vb.net to demonstrate how to create and make use of datatable.

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Seat Number

* 1 1 0 6 *

ZOOLOGY : ZOO - 355
Research Methodology (35155)

P. Pages : 2

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carries equal marks & draw neat labelled diagrams wherever necessary.
5. Figures to the right indicates full marks.

1. Multiple choice questions attempt **any eight**. **8**

1) Pure research is also known as..... research.
   a) Experimental b) Non-experimental.
   c) Applied d) Basic.

2) ..... is a measure of central tendency that is the value that occurs most oftenly.
   a) Mean b) Mode
   c) Median d) Frequency.

3) Talley marking.....
   a) Reduces error b) Increases errors
   c) Do not affect d) None of above.

4) The expression of researchers towards those people who helped him are included in.....
   a) Abstract b) Title.
   c) Acknowledgement d) Refrenes.

5) Replication (repetition) of experiment gives.....
   a) Maximum accuracy b) Minimum accuracy.
   c) Maximum errors d) Minimum errors.

6) The head quarter of google is in.....
   a) California b) Australia
   c) India d) Japan.

7) Head quarter of Microsoft is in.....
   a) London b) Sydney.
   c) Washington d) Mumbai.

8) Research design is important because researcher get.....
   a) Maximum information with minimum efforts.
   b) Maximum information with maximum efforts.
   c) Maximum information in minimum money.
   d) None of above.

9) .....is the main job in the research.
   a) Selection of problem b) Introduction.
   c) Result and discussion d) None of above.

10) Some time the research paper is rejected due to.....
   a) Late submission b) Faulty discussion.
   c) More no. of pages d) None of above.

2. Define/ Explain **any four**. **8**
   a) Research methodology.
   b) Basic principles of experimental design.
   c) Student 't' test.
   d) Mode
   e) Null hypothesis.
   f) Title.

3. Attempt **any two**. **8**
   a) Write a note on significance of research.
   b) Note on frequency distribution.
   c) Write a letter to editor of journal for paper publication.

4. a) Attempt **any two**. **6**
   a) Needs of research design.
   b) Concept of scientific writing.
   c) How to prepare acknowledgment?

   b) Define - Research hypothesis. **2**

5. a) Attempt **any one**. **6**
   i) Explain in brief about Introduction, material & method, result and discussion.
   ii) What is mean by data presentation? Describe various methods of data presentation.

   b) Define / Explain. Meaning of research. **2**

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Seat Number

* 1 1 0 5 *

BOTANY : BOT - 355
Plant Ecology and Phytogeography
(35145)

P. Pages : 2

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions ate compulsory.
5. Figures to the right indicate full marks.
6. Draw neat labelled diagrams wherever necessary.

1. Attempt **any eight.** **8**

a) Study of an organism and its surrounding is called.....
   i) Cytology ii) Physiology
   iii) Ecology iv) Mycology

b) A group of organism having same species in a locality is called .....
   i) Ecology ii) Community
   iii) Population iv) Phycology.

c) Plants growing in the area with scarcity of water or dry habitat are called.....
   i) Hydrophytes ii) Mesophytes
   iii) Xerophytes iv) hallophytes.

d) The features which help the organisms to exit the adverse condition is called.....
   i) Adaptations ii) Stratification
   iii) Succession iv) Conservation.

e) Transfer of food energy from producers to consumers is called.....
   i) Food chain ii) Succession
   iii) Homeostasis iv) All of above.

f) Excessive addition of unwanted substances in environment is called.....
i) Pollution ii) Deletion
iii) Duplication iv) Pollutants.

g) Restriction of a species in a small region is called.....
i) Bioremediation ii) Conservation
iii) Endemism iv) Adaptation.

h) Renewable sources are also called.....energy resources.
i) inexhaustible ii) exhaustible
iii) Fossil fuel iv) none of the above.

i) Solar energy is a ..... source of energy.
i) Conventional ii) Non-conventional
iii) Commercial iv) Non-commercial

j) Green house effect ..... the temperature of earth.
i) Maintains ii) increases
iii) Decreases iv) None of the above.

2. Attempt **any four**. **8**
a) Scope of bioremediation.
b) What is ecological niche?
c) Define frequency.
d) Explain poly climax
e) Define biodiversity.
f) Explain the means of dispersal.

3. Attempt **any two**. **8**
a) Describe carbon cycle.
b) Explain various causes of air pollution.
c) Give vegetational types of Konkan region.

4. a) Solve **any two**. **6**
i) Explain necessity of conservation.
ii) Citing the examples explain conventional sources.
iii) Define ecological indicators. Explain plants as indicators of pollution.

b) Define biogeography. **2**

5. Define succession. Explain the process of succession in hydrosere. **8**
OR
Define ecosystem. Explain the components of ecosystem.

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Seat Number

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* 1 1 0 4 *

CHEMISTRY CH - 355
Industrial Chemistry
(35135)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All question are compulsory.
5. Figure to the right indicate full marks.
6. Neat diagram must be drawn whenever necessary.

1. Select correct alternative from the following and rewrite. **8**

1) Potassic fertilizers contains potassium in the form of.....
   a) KCl b) K_2SO_4
   c) K_2O d) KNO_3

2) Which fertilizer is used as softening agent
   a) Urea b) Triple superphosphate.
   c) Ammonium sulphate d) Sulphate of potash.

3) In manufacture of cement reactions are takes place in.....
   a) Water b) Air
   c) Kiln d) Furnace.

4) Which of the following act as retarder, to prevent a quick stiffening of cement paste.
   a) 2-3% Gypsum b) 5-6% Gypsum
   c) 8-10% Gypsum d) 11-15% Gypsum

5) Which of the following reaction is used in manufacture of dyestuff.
   a) Calcination b) Alkylation
   c) Amination d) Carbonylation.

6) Basic requirement of chemical industries.....
   a) Survey and license
   b) Labour requirement.
   c) Capital requirement and smooth working.
   d) All of these.

7) Molecular formula of cane sugar is
   a) $C_{12}H_{22}O_{11}$ b) $C_{12}H_{24}O_2$
   c) $C_{12}H_{22}O_{12}$ d) $C_6H_{16}O_6$

8) The grades of sugar are Governed by..... every year.
   a) N.C.L b) N.S.I
   c) I.S.I d) None of these

9) Rectified spirit is areotropic mixture of
   a) 94.5% alcohol + 5% water
   b) 96.5% alcohol +3% water
   c) 5% alcohol + 94.5 % water
   d) 3% alcohol + 96.5% water.

10) Beer is obtained from-
   a) Maize b) Grapes Juice
   c) Black strap molasses d) Barley.

2. Answer **any four** of the following. **8**

1) Write a note on Quality control.

2) Explain the term Trade marks.

3) What is absolute alcohol?

4) What is fertilizer?

5) Give average composition of cement.

6) Define cement.

3. Answer **any two** of the following. **8**

1) What is conversion and yield?

2) How is Urea manufactured?

3) What are the basic requirements of success full industrial fermentation process?

4. a) Answer **any two.** **6**

1) Write a note on proof spirit.

2) What are essential requirements to become a fertilizers.

3) Explain theory of fractional distillation.

b) Give reaction in the manufacture of ammonia sulphate. **2**

5. Answer the following. **8**

What is port land cement? Explain the types of port land cement.

OR

Explain :

a) Manufacture of Celotex.

b) Saccharification.

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Seat Number

* 0 9 8 3 *

PHYSICS : PHY - 355
Solid State Physics
(35126)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to right indicate full marks.
6. Draw neat and labelled diagrams wherever necessary.
7. Use of logarithmic table and electronic calculator is allowed.

1. Attempt **any eight** of the following select correct option. **8**

i) In B.C.C. structure, the number of atoms per unit cell is.
   a) 1 b) 2
   c) 3 d) 4

ii) The equilateral triangle possesses ..... fold rotational axis of symmetry.
   a) 1 b) 2
   c) 3 d) 4

iii) In F.C.C. structure, the coordination number is.
   a) 4 b) 8
   c) 12 d) 16

iv) The wavelength for X-rays is of the order of.
   a) 1A° b) 100A°
   c) 500A° d) 5000A°

v) The number of conduction electrons per cubic centimeter of sodium metal is.
   a) 10^{13} b) 10^{33}
   c) 10^{23} d) 10^{34}

vi) In Laue method of x-ray diffraction method ..... is used.
a) Single crystal b) Polycrystal
c) Powder d) None of the above

vii) For metals, Hall coefficient is.
a) Zero b) Positive
c) Negative d) None of the above

viii) The Dulong and Pettit law is.
a) The heat capacity is constant and independent of temperature
b) The heat capacity is not constant and independent of temperature
c) The heat capacity is not constant and dependent of temperature
d) None of the above

ix) Mobility (μ) is defined as.
a) Displacement acquired by charge carriers per unit ele. field
b) Velocity acquired by charge carriers for unit ele field
c) Acceleration acquired by charge carriers per unit ele. field
d) None of the above

x) The Madelung constant (α) for Nacl is.
a) 0.52 b) 0.68
c) 0.74 d) 1.75

2. Attempt **any four** of the following. **8**

a) What is miller indices ?

b) For a S.C. lattice of lattice constant 2.04A°. Calculate the spacing of lattice planes (2,1,2).

c) Explain crystal acts as a diffraction grating for x-rays.

d) State Bragg's diffraction condition.

e) What is cohesive energy ?

f) State any two assumptions of classical theory of SP. heat.

3. Attempt **any two** of the following. 8

a) On the basis of band theory of solids, Distinguish between conductors, semiconductors and insulators.

b) Show that, the modelung constant for 1-D array of ions of alternate signs is 2 ln 2.

c) Explain the concept of reciprocal lattice. Define fundamental reciprocal lattice vectors in terms of direct lattice vectors.

4. a) Attempt **any two** of the following. 6

i) Write a note on molecular bonds.

ii) State salient features of Einstein's model for SP. heat of solids.

iii) What do you mean by symmetry ? Explain any one symmetry operation.

b) What is hall affect ? 2

5. Attempt **any one** of the following. 8

a) Show that for a 3-D free electron gas the Fermi energy is given by.

$$\Sigma_f = \frac{\hbar^2}{2m}\left(\frac{3\pi^2 N}{V}\right)^{2/3}$$

b) Obtain Bragg's diffraction condition in reciprocal Lattice.

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Seat Number

* 0 9 8 2 *

MATHEMATICS : MTH - 355
(A) Industrial Mathematics (35115) / (B) Number Theory (35116)

P. Pages : 7

(A) Industrial Mathematics
(35115)

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to right indicates full marks.
6. Use of scientific calculator is allowed.

1. Attempt **any eight** of the following. **8**

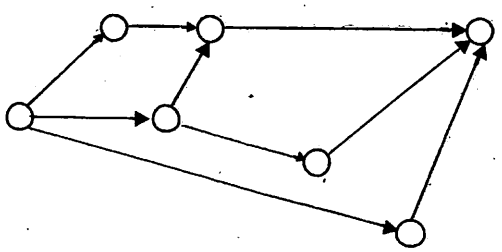
a) Let $f(x) = 3x^2 \quad 0 \le x \le 1$
$= 0 \quad$ elsewhere

Show that f is p.d.f.

b) State 3σ control limits for d-chart.

c) Explain in brief the characteristic, arrival distribution in queuing model.

d) Using Fulkerson's rule number the events of the following network.



e) If X~B (n,p) then mean is given by.....

f) How do you interprete d-chart ?

g) In single channel queuing model, average time a customer spends in the system is given by.....

h) Define event with reference to the Network.

i) Define successor activity in network.

j) Find k, if f(x) is p.d.f. where

$f(x) = k(x-1)^2 \quad 1 \le x \le 3$

$= 0 \quad$ Otherwise

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

i) For binomial distribution, determine first two moment about origin, μ_1', and μ_2'.

ii) Let x be a continuous random variable with probability density function (p.d.f)

$f(x) = ax \quad ; 0 \le x \le 1$

$= a \quad ; 1 \le x \le 2$

$= -ax+3a \quad ; 2 \le x \le 3$

$= 0 \quad$; elsewhere

Determine the constant a.

iii) In a book of 520 pages, 390 typographical errors occure. Assuming Poisson law for the number of errors per page, find the probability that a random sample of 5 pages will contain no error.

b) If F(x) is the distribution function of the random variable X then prove that. 2

$F(x) \le F(y)$ if $X<Y$

3. Attempt **any two** of the following. 8

i) For the following data of 12 samples each of size 4 obtain control limits for $\bar{x}$ chart and R chart and comment on the status of the process.

Sample No.	1	2	3	4	5	6	7	8	9	10	11	12
$\bar{x}$	140.50	142	140.75	139.25	145.75	146.75	146.25	145.5	139.5	139.5	139.75	140
R	7	6	3	6	1	5	3	3	3	1	5	6

For a sample size n=4, A_2=0.73 D_3=0 D_4=2.28

ii) The following data referes to visual defects found during inspection of the first ten samples of size 100 each.

Sample No.	1	2	3	4	5	6	7	8	9	10
Number of defects	4	8	11	3	11	7	7	16	12	6

Plot the control limits and the observations on np-chart and state whether the process is under control or not ?

iii) Distinguish between process control & product control How are they achieved.

4. a) Attempt **any two** of the following. 6

i) Write a note on multi channel queuing theory.

ii) A self service store employ one cashier at it's counter. Nine customers arrive on an average every 5 minutes, while the cashier can serve 10 customers in 5 minutes. Assuming Poisson distribution for arrival rate and exponential distribution for service rate find.
Average number of customers in the system
Average number of customers in queue
Average time a customer spends in the system.

iii) In a railway marshalling yard goods train arrive at a rate of 30 trains per day. Assuming that the interarrival time follows an exponential distribution and service time (the time taken to hump the train) distribution is also exponential with an average of 36 minutes calculate.
Expected queue size (length of a queue)
Probability that the queue size exceed 10.

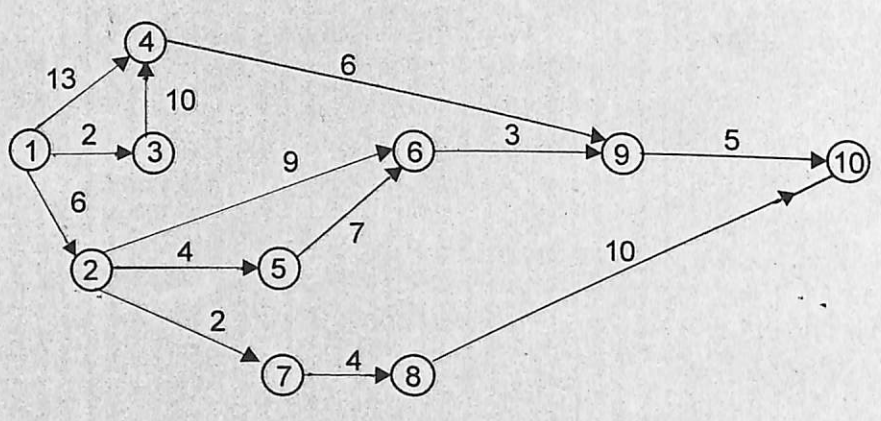
b) Define waiting line and customer with reference to the queuing model. 2

5. i) Seven jobs go first over machine 1 and then over machine 2 processing times in hours are given as. 4

Jobs	A	B	C	D	E	F	G
Machine 1	6	24	30	12	20	22	18
Machine 2	16	20	20	12	24	2	6

Find the optimal sequence in which jobs should be processed Also find total elapsed time and idle time for each machine.

ii) For the following network diagram determine the earliest start time and the latest finish time for each event and determine the critical path. 4



Numbers on the activity denote activity duration in days.

OR

5. i) We have six jobs each of which must go through machines A, B and C in the order ABC. Processing time in hours are given in the following table. 4

Job	1	2	3	4	5	6
Machine A	8	3	7	2	5	1
Machine B	3	4	5	2	1	6
Machine C	8	7	6	9	10	9

Determine the optimal sequence of jobs, total elapsed time & idle time for each machine.

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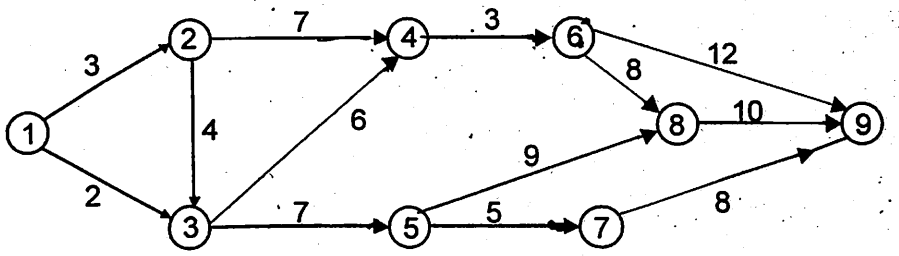
ii) For the following network diagram compute earliest event time and latest event time and find critical path. 4



Numbers on the activity denote activity duration.

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(B) Number Theory
(35116)

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.

1. Attempt **any eight** of the following. **8**

i) State well ordering principle for a non – empty set.

ii) If a|b and c|d then prove that ac|bd, where a,b,c,d are integers.

iii) Define gcd (a,b), where a and b are non zero integers.

iv) State Goldbach conjecture.

v) Write two examples of twin primes.

vi) If $a \equiv b \pmod{n}$ and m|n then prove that $a \equiv b \pmod{m}$

vii) Test whether the number 5233779 is divisible by 9 ?

viii) State Wilson's theorem.

ix) Define Fibonacci sequence.

x) Represent the prime 233 as a sum of two square.

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

i) Prove that gcd (a,b) as linear combination of a and b.

ii) Use the Euclidean algorithm to obtain integers x and y satisfying gcd (56,72) = 56x+72y.

iii) Determine all solutions in the integers of the Diophantine equation 24x + 138y = 18.

b) If a|b and a|c, then prove that a|(bx+cy) for arbitrary integers x and y. **2**

खडू - 066/067

Instructions to Candidates :

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3. Students should note, no supplement will be provided.
4. All questions are compulsory.
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b) If a|b and a|c, then prove that a|(bx+cy) for arbitrary integers x and y. **2**

3. Attempt **any two** of the following. 8

i) State and prove fundamental theorem of Arithmetic.

ii) Find all primes between 2 to 100.

iii) Show that the sum of twin primes p and p+2 is divisible by 12 when p>3. Also if 1 is added to a product of twin primes, prove that a perfect square is always obtain.

4. a) Attempt **any two** of the following. 6

i) State and prove Fermat's little theorem.

ii) If gcd (a, 133) = gcd (b,133) = 1 then show that $133|a^{18}-b^{18}$.

iii) Use Wilson's theorem to show that 16! + 86 is divisible by 323.

b) If $a \equiv b \pmod n$ and $b \equiv c \pmod n$ then prove that $a \equiv c \pmod n$. 2

5. a) If for some integer k>1, 2^k-1 is a prime then prove that $2^{k-1}(2^k-1)$ is a perfect number. 4

b) Define Mersenne's number. Show that M_{23} is a composite number. 4

OR

a) Define Fermat number. Prove that any two Fermat numbers are relatively prime. 4

b) Define perfect number. Prove that every even perfect number has the last digit either 6 or 8. 4

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Seat Number

* 0 9 7 9 *

BIOTECHNOLOGY : BT - 354
Industrial Biotechnology
(35334)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.

1. Fill in the blanks **any eight** **8**

i) The amount of money required for establishing building / plant is called.....
   a) Fixed capital cost b) Indirect capital cost
   c) Operating cost d) None of them

ii) ..... testing induces the measurement of rise in body temperature.
   a) Carcinogen b) Toxicity
   c) Pyrogen d) All of the above

iii) In ion exchange chromatography the cation cataion exchange resin contain an active group as.....
   a) Sulfuric acid b) Carboxylic acid
   c) Phospharic acid d) All these three

iv) Yeast cell can be collected on drum by.....
   a) String discharge
   b) Scraper discharge
   c) Scraper with pre-coated drum
   d) None of them

v) In liquid liquid extraction choice of solvent depends on.....
   a) Partition coefficient b) Size of partical
   c) nature of salute d) All of these

vi) In Quality central Aim's test concern with.....
a) Pyrogen b) Carcinogenicity
c) Toxicity d) None of them

vii) Extraction & purification of desire product from fermentation broth is called.....
a) Up stream process b) Down stream process
c) Analysis d) None of them

viii) Tubular bowl centrifuge is use to separate.....
a) Solid from liquid
b) Separation of mycellia
c) light phase & Heavy phase
d) None of them

ix) .....an Exoenzyme act on starch on to produce maltose and limit dextrin.
a) α– amylase b) protease
c) Invertase d) β - amylase

x) ..... is the best carbon source for citric acid production at laboratory scale.
a) Lactose b) Whey
c) maltose d) Sucrose

2. Answer the following questions **any four.** 8

i) Define upstream and down stream process.

ii) How will you detect Mercury and Potassium from fermented broth?

iii) Write a note on cell aggregation and flocculation.

iv) How will you isolate revertant that do not recognised in presence of inhibitor.

v) Explain production of Inoculum for citric acid production.

vi) Explain liquid shear method for call disruption.

3. Attempt **any two** of the following. 8

i) Write a note on sterility testing.

ii) Explain multichamber centrifuge.

iii) Write a note on production of citric acid by surface fermention.

4. a) Attempt **any two** 6

i) Explain cross flow filtration method.

ii) How will you recover citric acid from fermentation broth?

iii) Write a note on capital cast estimate.

b) Explain string discharge method to recover biomass. 2

5. a) Explain the process and recovery of Cynocabalamine. 8

OR

Explain in details production of penicilline.

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Seat Number

* 0 9 7 6 *

MICROBIOLOGY : MB - 354
Medical Microbiology
(35194)

P. Pages : 2

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.
6. Draw neat labelled diagram wherever necessary.

1. Attempt the following **any eight.** **8**

i) .....breakdowns fibrin.
   a) Streptokinase b) Kinase
   c) Coagulate d) Amylase

ii) .....are subjectives changes and are notapparant.
   a) Signs b) Symptoms
   c) Syndrome d) Lesions.

iii) ..... is the largest organ of Human body.
   a) Heart b) Liver
   c) Skin d) Large intestine

iv) Tuberculosis is a..... disease.
   a) acute b) chronic c) sub acute d) Latent

v) Zidovudine is used to treat.....
   a) SARS b) Influenza c) Polio d) AIDS

vi) Portal of energy of HBV is.....
   a) Blood b) Skin c) Mouth d) None of these

vii) Serological tests detects.....
   a) antibiotics b) antiserums
   c) antibodies d) All of these

viii) Amantadine is effective against..... disease.
a) AIDS b) Polio
c) Hepatitis d) Influenza

ix) ..... is the science which deals with study of disease transmission.
a) Pedology b) Epidemiology
c) Oncology d) Sociology

x) .....vitamin is synthesized by intestinal flora.
a) A b) B_{12} c) C d) all of these

2. Attempt **any four** of the following. 8
i) Disadvantages of normal Flora of human body- explain.
ii) What is difference between mutualism and commensalism?
iii) What are nosocomial infections?
iv) Enlist parts of nervures system of man.
v) What is immunoprophylaxis?
vi) Explain mode of action of polyenes on Fungi.

3. Attempt **any two** of the following. 8
i) Enlist criteria for evaluation of chemotherapeutic agent.
ii) Comment on- Bacterial vaccines.
iii) What is role of CDC in control of community infections?

4. a) Attempt **any two** of the following. 6
i) Describe different factors determining normal Flora of human body.
ii) What is natural drug resistance?
iii) Explain role of enzymes in spread of infection.

b) Comment on "Antitoxin". 2

5. Attempt **any one** of the following. 8
i) Explain the structure and function of Digestive system with neat labelled diagram.
ii) Explain the mode of action of Tetracycline on microorganisms.

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Seat Number

0978

INFORMATION TECHNOLOGY : UG – IT - 354
Java Programming - I
(35324)

P. Pages : 4

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.

1. Attempt **any eight.** **8**

a) What is the range of data type short in Java ?
   i) -128 to 127
   ii) -32768 to 32767
   iii) -2147483648 to 2147483647
   iv) None of the mentioned

b) Which of the following statements about the Java language is true ?
   i) Java supports only procedural approach towards programming
   ii) Both procedural and object oriented programming are supported in Java
   iii) Java supports only object oriented programming approach
   iv) None of the above

c) JVM stands for.
   i) Java verified machine
   ii) Java virtual machine
   iii) Java very large machine
   iv) Java very small machine

d) What is the output of the following program class modulus operators 1

```
{ public static void main (string [ ] args)
    { Float f = 7.5 f
      System.out.println ("7.5 % 2 =" + f % 2) ;
} }
```

i) 1
ii) Compilation error : modulus operator can not be applied on Floating point number
iii) 1.5
iv) None of the above

e) A compiler converts the Java program into an intermediate language representation called.....

i) Bytecode
ii) Byteclass
iii) Byte
iv) Bytejav

f) The class at the top of the exception classes hierarchy is called.....

i) Common
ii) Throwable
iii) Null
iv) Catch

g) What is the output of the following program ?

```
public class For loop
{ public static void main (string [ ] args)
  {  for (int i = 0 ; i < 6 ; itt)
    {system.out.println ("i=" + i) ;
     itt ;
     }
    }
  }
```

i) i=0 i=1 i=2 i=3 i=4 i=5
ii) i=0 i=2 i=4 i=6
iii) i=0 i=2 i=4
iv) Compilation Error

h) Which of the following is not a wrapper class ?

i) String
ii) Integer
iii) Boolean
iv) Character

i) What is the output of the following program ?

```
public class question {
public static void main (string args [ ]) {
string S1 = "abc" ;
string S2 = "def" ;
string S3 = S1. concat (S2- to UpperCase ()) ;
system.out.println(S1+S2+S3) ;
} }
```

i) abcdefabcdef
ii) abcabcDEFDEF
iii) abcdefabcDEF
iv) None of the above

j) Which of the following can you perform using the file class.
i) Change the current directory
ii) Return the name of the parent directory
iii) Modify a file
iv) Find if a file contains text or binary information

2. Attempt **any four.** **8**

a) What is interface ?

b) Write advantages of Java ?

c) What is overriding ?

d) Write use of this keyword.

e) What is package ?

f) Define Reflection.

3. Attempt **any two.** **8**

a) Write a program in Java to count the maximum occurrence of vowel in a given string.

b) Explain multiple catch statement with example.

c) Write note on Random – Access file stream.

4. a) Attempt **any two.** **6**

i) What do you understand by scope and life time of a variable.

ii) What is Inner classes ? Explain with example.

iii) Explain charAt( ), getChars( ), getBytes( ) with example

b) What is the use of finally block in exception handling ? **2**

P.T.O

5. Attempt **any one.** **8**

Write a program to print name, telephone number and email – id into a file and retrieve those records and print them on the screen.

OR

a) What is inheritance ? Explain multilevel inheritance with example. **4**

b) Write a program to create a class student having variables roll_no and name. Define two methods one will take input and other will display output. Create one object of class take input and display output. **4**

****

Seat Number

0972

GEOLOGY : GL - 354
Igneous Petrology
(35164)

P. Pages : 2

Time : Two Hours

Max. Marks : 40

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.

1. Answer **any eight.** **8**

1) The rocks formed at intermediate depth are called as
   a) Plutonic b) Volcanic c) Hypabyssal

2) The first member of the Discontinuous Reaction Series is
   a) Pyroxene b) Olivine c) Ca Plagioclase.

3) The Crust is made up of SIAL and SIMA.
   a) True b) False.

4) .....rocks do not contain Quartz.
   a) Basic b) Acidic c) Ultra-basic.

5) The rock Anorthosite dominantly consists of ..... feldspar.
   a) Oligoclase b) Orthoclase c) Labradorite.

6) Plutonic rocks are formed under.
   a) Deep seated and moderate T-P Condition.
   b) Deep seated, high temp and high pressure
   c) Near the earth's surface at high temp.

7) .....rock contains lowest percentage of Silica.
   a) Basalt b) Andesine c) Rhyolite.

8) Forsterite and quartz react to form.
   a) Olivine b) Enstatite c) Diopside.

9) The olivine free Basalts are termed as
a) Dunite b) Tholeiites c) Syenite.

10) Magma is formed mostly by.
a) Partial melting of curst and upper mantle.
b) Melting of inner core.
c) Magma chamber.

2. Define the following **any four**. **8**

1) SIAL
2) CIPW
3) Acidic Igneous rocks
4) Granite
5) Liquid Immiscibility
6) Contamination.

3. Describe the following **any two**. **8**

1) Mixing of dissimilar magma.
2) Bowens Reaction Series.
3) Fo-Fa series.

4. Explain the following **any two**. **8**

1) Discontinuous Reaction Series.
2) Fa- Silica series.
3) Significance of Contamination.

5. Describe in detail the IUGS Classification of Igneous rocks. **8**

OR

Describe in detail the crystallization of Ternary system.

****

Seat Number

0973

COMPUTER SCIENCE : UG-CS - 354
Computer Aided Graphics
(35244)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.

1. Attempt **any eight.** **8**

a) Sutherland Hodgeman algorithm works for
   i) line clipping ii) polygon clipping
   iii) line drawing iv) None

b) DDA stands for
   i) Digit difference application.
   ii) Digital Differential Analyzer.
   iii) Digit Different Application.
   iv) Digital Data Analyzer

c) Viewport is generally..... than window.
   i) larger ii) smaller
   iii) equal iv) higher

d) The maximum number of points that can be displayed without overlap on a CRT is.....
   i) Resolution ii) Aspect Ratio
   iii) Pixel iv) Brightness

e) The.....simply reads each successive byte of data from the frame buffer.
   i) Data controller ii) Digital controller
   iii) Display controller iv) All of the above

f) Random scan systems are designed for
   i) Pixel drawing application
   ii) Line drawing application
   iii) Colour drawing application
   iv) None of these

g) The transformation in which an object is moved from one position to another is called.
   i) Rotation ii) Translation
   iii) Scaling iv) Replacement

h) Coordinates of windows are known as
   i) screen coordinates ii) world coordinates
   iii) Cartesian coordinates iv) device coordinates

i) The region code of a point within the window is
   i) 1111 ii) 0000 iii) 1000 iv) 0001

j) The process which divides each element of picture into visible and invisible portions, allowing invisible portion to be discarded is called.....
   i) Transformation ii) Clipping
   iii) Mapping iv) Projection

2. Attempt **any four.** **8**

a) Define Coherence.

b) Differentiate Raster and Random scan displays.

c) What do you mean by active and passive graphics?

d) Explain 2D - Transformation principles.

e) List various clipping Algorithms.

f) What are limitation of depth buffer algorithm?

3. Attempt **any two.** **8**

a) Explain Bresenham's Line Drawing Algorithm.

b) Explain windowing transformation.

c) Discuss 3-D perspective transformation.

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4. a) Attempt **any two.** **6**

a) Explain.
   i) Object space algorithm
   ii) Image space algorithm

b) Write 2 - D transformation formula for.
   i) Translation
   ii) Scaling
   iii) Rotation

c) Explain Yx algorithm.

b) Compulsory question. **2**

Define Pixel and Aspect Ratio.

5. Attempt **any one.** **8**

a) Explain Cohen Sutherland line clipping algorithm.

b) Write a short note on Warnock's algorithm.

****

Seat Number

खडू - 052

* 0 9 6 8 *

CHEMISTRY : CH - 354
Analytical Chemistry
(35134)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicates full marks.
6. Draw neat diagram wherever necessary.

1. Attempt **any eight** choose the correct answer. **8**

1) Very fine precipitate like $BaSO_4$ is filtered from
   a) Normal filter paper
   b) Whatmann filter paper 40
   c) Whatmann filter paper 41
   d) Whatmann filter paper 42

2) Peptization can be prevented by.
   a) Coagulation b) Stirring of solution
   c) Cooling of solution d) None of the above.

3) Solvent extraction is a technique of
   a) Purification b) Separation
   c) Estimation d) None of these.

4) The factor that donot affect solvent extraction is.....
   a) Masking agent b) Modifier
   c) pH value d) Pressure.

5) In ion exchange chromatography, the exchange of ion obeys the law of.
   a) Dilute solutions b) Absorption
   c) Adsorption d) Mass action.

6) In ion exchange chromatography there is a exchange of ions of
   a) opposite charge
   b) Similar charge
   c) Different ions of similar charge
   d) Similar ions of different charge.

7) Mobile phase in gas chromatography is also called as.....
   a) inert gas phase b) fuel gas
   c) dry ice d) carrier gas

8) In the Van-Deempter equation, the constant A is called.
   a) eddy diffusion b) longitudinal diffusion
   c) vertical diffusion d) none of these.

9) GSC and GLC carrier gas is the.....in both techniques.
   a) phase b) mobile phase
   c) stationary phase d) critical phase.

10) In HPLC eluting power of the mobile phase is determine by it's.....
   a) polarity b) normality
   c) impurity d) purity.

2. Attempt **any four**. **8**

1) Explain the term digestion.

2) Define distribution coefficient & give its limitations.

3) What is degree of cross- linkage of resin?

4) Give the steps involved in ion exchange mechanism.

5) Define total ion exchange capacity of resin.

6) Give the principle of electron capture detector used in gas chromatography.

3. Attempt **any two**. **8**

1) Explain cation exchange resin. Give the types of cation exchange resin. How they are produced.

2) Describe principle construction and working of thermal conductivity detector used in gas chromatography.

3) Give the advantages of HPLC.

4. a) Attempt **any two.** **6**

1) What is hydrophilic & hydrophobic colloids? Give one example of each.

2) Explain the term percent extracted.

3) Describe mobile phases used in gas chromatography.

b) Give the advantages of Gas chromatography. **2**

5. Attempt **any one.** **8**

1) Describe in brief various steps of gravimetric analysis.

2) What is selective extraction of metal? Explain the factors which govern the selectivity of extraction of metal.

****

Seat Number

0967

खडू - 050 / 051

PHYSICS : PHY - 354
(A) Electronics - II (35124) / (B) Instrumentation - II (35125)

P. Pages : 7

(A) Electronics - II (35124)

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicates full marks.
6. Draw neat labelled diagrams wherever necessary.
7. Use of log table and electronic calculator is allowed.

1. Attempt **any eight** of the following. **8**

a) The electrodes of FET are.....

i) Emitter, base, collector ii) Source, drain, gate

iii) Anode, cathode gate iv) Emitter, base-I, base-II.

b) The output of IC 7805 is.....

i) +7 ii) +8

iii) -5 iv) +5

c) The differential amplifier has ..... maximum configurations

i) 3 ii) 4

iii) 5 iv) 6

d) OPAMP as an inverter when.....

i) $V_o = -Av\ V_i$ ii) $V_o = -V_1$, $Av = 1$

iii) $V_o = -V_1$, $Av > 1$ iv) None of these.

e) Variations in input voltage causes variations in output voltage. Such a p/s is called.....

i) Regulated p/s ii) unregulated p/s

iii) Series regulated p/s iv) None of these.

f) A register that counts the number of clock pulses at its clock input is called as.....

i) Counter ii) Flip-Flop

iii) De-multiplexer. iv) Multiplexer.

g) Functional block diagram of IC 555 consists of.....

i) One R-S-Flip-Flop ii) one J. K. F. F.

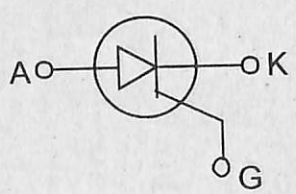
iii) Two R. S. F. F. iv) 2-J. K. F. F.

h) ..... is logic circuit that accept a data of single I/P line and distributes it over one of several O/P lines.

i) Multiplexer ii) Demultiplexer

iii) Flip-Flop iv) Counter.

i)



This is schematic symbol of.....

i) FET ii) VJT

iii) SCR iv) MOSFET

खडू - 050 / 051

j) OPAMP as an adder when.....

i) $V_o = -V_1$ ii) $V_o = A_v V_1$

iii) $V_o = -(V_1+V_2+....+V_n)$ iv) None of these.

2. Attempt **any four** of the following. 8

a) Draw the pin diagram of IC 741.

b) Draw the construction of FET.

c) Define Commen mode Rejection Ratio (CMRR).

d) What is decoder?

e) What do you meant by astable multivibrator?

f) Give any two demerits of unregulated power supply.

3. Attempt **any two** of the following. 8

a) Explain the working of 3-BIT up down counter.

b) Explain application of UJT as a relaxation oscillator.

c) Write a note on precision voltage regulater using IC- 723.

4. a) Attempt **any two** of the following. 6

a) Explain construction of MOSFET with suitable diagram.

b) Explain the need of constant current source in differential amplifier.

c) Explain OPAMP as an integrator.

b) Define line regulation of regulated power supply. 2

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

a) For an OPAMP explain the following terms.

i) I/P and O/P impedance.

ii) I/P and O/P offset voltages.

iii) Open loop voltage gain.

iv) I/P bias current.

v) Slew rate.

b) Explain the working of 4-BIT synchronous counter with neat diagram.

****

B) Instrumentation - II (35125)

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicates full marks.
6. Draw neat diagrams wherever necessary.
7. Use of logarithmic table and electronic calculator is allowed.

1. Attempt **any eight** of the following, select the correct option. **8**

i) The largest change of measurand to which the instrument does not respond is known as.....

a) Drift b) Hysteresis

c) Dead-band d) Back lash.

ii) .....is contacting type of instrument.

a) Clinical thermometer b) Bourdan gage

c) Differential transformer d) Variable reluctance tachometer.

iii) ..... is self generating type of transducer

a) Thermocouple

b) Platinum resistance thermometer.

c) L.V.D.T.

d) Thermistor.

iv) The balance equation for Campbell's bridge is.....

a) $\frac{L_1}{L_2}=\frac{R_2}{R_1}=\frac{R_3}{R_4}$ b) $\frac{L_2}{L_1}=\frac{R_1}{R_2}=\frac{R_4}{R_3}$

c) $\frac{L_1}{L_2}=\frac{R_1}{R_2}=\frac{R_3}{R_4}$ d) None of the above.

v) ..... method in which self inductance is measured in terms of standard capacitor.

a) Maxwell bridge b) Anderson's bridge.

vi) ..... recorder has number of moving coils

a) ultra violet b) x-y

c) strip chart d) magnetic

vii) Strip chart recorder records input quantity with respect to.

a) Length b) distance

c) Flux d) time.

viii) A buffer amplifier has gain of.....

a) infinity

b) Zero

c) Unity

d) Depend upon the circuit Parameters.

ix) An 8 bit converter is used for a d.c. range 0-10 V find the weight of LSB.

a) 39 mv b) 78 mv.

c) 39.2 mv d) none of the above.

x) Potentiometric as

a) Active transducer

b) Passive transducer

c) Both active and passive transducer

d) Out put transducer.

2. Attempt **any four** of the following. **8**

a) Define resolution.

b) Explain LCD.

खडू - 050 / 051

c) Give classification of transducer.

d) Define digital to analog converter.

e) Define gage factor.

f) Explain Drift.

3. Attempt **any two** of the following. 8

a) Explain X-Y recorder with diagram.

b) Write a note on piezo-electric transducer.

c) Explain single channel data acquisition system.

4. a) Attempt **any two** of the following. 6

i) Explain formation of system equation with suitable example.

ii) Draw a neat diagram of single slope analog to digital converter.

iii) Describe general form of an AC bridge with a diagram.

b) Explain LED. 2

5. Attempt any one of the following. 8

a) Explain basic functional elements and auxiliary elements of measurement system with block diagram and enlist the classification of instruments.

b) Describe the measurement of mutual inductance by Carey-Foster bridge and obtain its relation.

****

Seat Number

* 0 7 9 2 *

GEOINFORMATICS : GEOI - 353/313
Digital Image Processing - I
(34013)

P. Pages : 2

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Draw a neat sketches and diagrams wherever necessary.
6. Figure to the right indicates full marks.

1. Attempt **any four** of the following. **8**

a) What is the Fourier analysis?

b) Define resolution.

c) Which GIS software will be used for image rectification?

d) Write in short about Image Restoration.

e) What do you mean by Kernel in Digital Image processing?

f) ETM stand for _____.

2. Attempt **any two** of the following. **8**

a) Discuss in details about contrast stretching.

b) What is Gray-level thresholding?

c) Explain principal components & canonical components.

3. a) Attempt **any two** of the following. 6

i) Describe the Intensity-hue-saturation (IHS) colour space transformation.

ii) Explain in detail radiometric correction.

iii) What is convolution?

b) Compulsory question 2

Level slicing in DIP.

4. a) Attempt **any two** of the following. 8

i) Explain edge enhancement.

ii) Write down the short note on vegetation components.

iii) Explain in brief geometric corrections.

5. a) Attempt **any one** of the following. 6

i) Explain the Spatial feature manipulation.

ii) Write a note on multi image manipulation.

b) Compulsory question 2

What is Multi - spectral band ratio?

****

Seat Number

* 0 7 8 8 *

BIOCHEMISTRY : BC - 353
Clinical Biochemistry
(35213)

P. Pages : 2

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carry equal marks.
5. Figures to the right indicate full marks.

1. Attempt **any eight.** **8**

i) .....is the anaemia caused by Defect in stem cells.
   a) Megablastic b) Aplastic
   c) Microcytic d) None of these

ii) Lactose intolerance is due to deficiency of enzyme.....
   a) Lactose b) Lactmutase
   c) Lactase d) Lacnase.

iii) Liver removes benzoic acid by conjugating it with.....to form hippuric acid.
   a) Leucine b) Isoleucine
   c) Glycine d) Valine

iv) Deficiency of..... leads to Niemann pick disease.
   a) Sphingomyelinase b) Myelinase
   c) Sphingoligase d) Sphingosine

v) Vita B-12 deficiency leads to..... anaemia.
   a) Megablastic b) Microcytic
   c) Sickle cell d) None

vi) Elevation in SEPT concentration in serum indicates.....damage.
   a) Cardiovascular b) Hepatocellular
   c) Renal d) Nervous

vii) Functional capacity of kidney can be measured by the.....test.
a) location b) Urine exit
c) urine clearance d) Nephron

viii) Myocardial infraction can be detected by the elevation of serum.....
a) SGPT b) SGOT
c) Triacylglycerol d) Urea

ix) Van Gierke's disease is due to the deficiency of.....:
a) Glucose-6-phosphatase b) Glucokinase
c) Hexokinase d) Isomerase

x) ..... is due to deficiency of Tyrosinase enzyme.
a) Albinism b) Sickle cell anaemia
c) Gout d) Alkaptonuria.

2. Attempt **any four** define following. 8
a) Gout b) Anaemia
c) Gallstone d) Lactose intolerance
e) Hypoxia f) Thalasemias

3. Attempt **any two.** 8
i) Write a short note on phenylketonuria.
ii) Write a short note on Liver cirrhosis.
iii) Write a short note on Haemorrhage.

4. a) Attempt **any two.** 6
i) What is kidney stone? How it forms?
ii) Describe Lesch-Nyhan syndrome.
iii) Write about anaemia due to stem cell defect.

b) What is Hepatitis? 2

5. Attempt **any one.** 8

Describe the etiology & symptoms of Jaundice.

OR

Write about congestive heart failure.

****

Seat Number

* 0 7 8 9 *

INFORMATION TECHNOLOGY : UG-IT - 353
Data Communication
(35323)

P. Pages : 2

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Figures to the right indicate marks.
5. All questions are compulsory.

1. Solve **any eight** **8**

a) A..... is a data communication system spanning states, countries or the whole world.
   a) MAN b) WAN
   c) LAN d) None of the above

b) Which topology requires a multipoint connection?
   a) Bus b) Star c) Hub d) Ring

c) In a..... connection two & only two devices are connected by a dedicated link.
   a) multipoint b) point to point
   c) A & B d) None of the above

d) The information to be communicated in a data communication system is the.....
   a) medium b) protocol
   c) message d) transmission

e) A television broadcast is an example of.....transmission.
   a) half - duplex b) Simplex
   c) full duplex d) Automatic

f) Devices may be arranged in a.....topology.
   a) mesh b) ring
   c) bus d) all of above

g) Frames from one LAN can be transmitted to another LAN via the device.
   a) Router b) Bridge
   c) Repeater d) Modem

h) An error - detecting code inserted as a field in a block of data to be transmitted is known as.
   a) Frame check sequence b) Error detecting code
   c) Checksum d) Flow control

i) The cheapest modems can transmit.....
   a) 300 bits per second b) 1,200 bit per second
   c) 2,400 bits per second d) 4,800 bits per second

j) .....cable carry a light signals.
   a) Twisted wire pair b) Co-axial cable
   c) Optic fiber d) All of the above

2. Solve **any four** **8**
a) Give the advantages of Ring topology.
b) What is the use of computer network?
c) Define computer network.
d) Define the term message.
e) What do you mean by topology?
f) Enlist types of network.

3. Solve **any two.** **8**
a) Explain circuit switching in detail.
b) Write a short note on twisted pair cable.
c) Describe modulation technique in short.

4. a) Solve **any two.** **6**
a) What is Data compression? Explain in detail.
b) Give application of Bluetooth.
c) Explain satellite communication in detail.

b) What is frame? **2**

5. Solve **any one** **8**
a) Explain cyclic Redundancy code & compute check summed frame for a frame 1101011011 using generator $G(x) = x^4 + x + 1$.
b) Explain optical fibers & co-axial cable.

****

Seat Number

* 0 7 8 6 *

STATISTICS : ST - 353
Design of Experiments - I
(35173)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
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4. All questions are compulsory.
5. Figures to the right indicate full marks.
6. Use of statistical table and calculator is allowed.

1. Attempt **any eight.** **8**

a) In the random effect model for two way classified data with one observation per cell.
$y_{ij} = \mu + a_i + b_j + c_{ij} + e_{ij}$; c_{ij} stands for.....

b) State the hypotheses to be tested in Analysis of variance of two way classification with m (>1) observations per cell.

c) Name the basic principle of design of experiments not used in CRD.

d) If fertility gradient is present in one direction, which design is recommended?

e) What is the objective of conducting uniformity trial?

f) State Smith's variance law.

g) In the experiment of comparing effectiveness of different teaching methods, what are the experimental units?

h) State the estimator of the parameter μ in the analysis of LSD.

i) Various objects of comparison in a comparative experiment are termed as.....

j) Group of homogeneous experimental units is called as.....

2. Attempt **any four.** **8**

a) Distinguish between fixed effect model and random effect model.

b) Write down the ANOVA table for CRD.

c) Give a particular layout of RBD with 4 treatments and 3 blocks.

d) Define experimental error.

e) State two demerits of LSD.

3. Attempt **any two.** **8**

a) Explain replication as a basic principle of design of experiments.

b) State the model of LSD and estimate the parameters involved in the model.

c) Derive an expression for the efficiency of RBD relative to CRD.

4. a) Attempt **any two.** **6**

i) Partition total sum of squares into various components in case of two way classification with m (>1) observations per cell.

ii) Complete the following ANOVA table for LSD and find efficiency of LSD relative to RBD with rows as blocks.

Source	df	ss	m.s.s.
Rows	-	72	-
columns	-	-	36
treatments	-	-	-
Error	6	-	12

iii) Obtain expectation of treatment sum of squares in case of two way classification with random effect model.

b) Define efficiency of a design. **2**

5. Attempt **any one.** 8

a) Obtain expectation of error mean sum of squares in case of LSD.

b) i) In a RBD, there are only two blocks. Let k be the number of treatments and $\overline{X}_1$ and $\overline{X}_2$ be the average yield of two blocks. Show that the block sum of squares can be expressed as $\frac{k}{2}(\overline{x}_1 - \overline{x}_2)^2$

ii) Explain randomisation as a basic principle of design of experiments.

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Seat Number

* 0 7 8 6 *

STATISTICS : ST - 353
Design of Experiments - I
(35173)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

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4. All questions are compulsory.
5. Figures to the right indicate full marks.
6. Use of statistical table and calculator is allowed.

1. Attempt **any eight.** **8**

a) In the random effect model for two way classified data with one observation per cell.
$y_{ij} = \mu + a_i + b_j + c_{ij} + e_{ij}$; c_{ij} stands for.....

b) State the hypotheses to be tested in Analysis of variance of two way classification with m (>1) observations per cell.

c) Name the basic principle of design of experiments not used in CRD.

d) If fertility gradient is present in one direction, which design is recommended?

e) What is the objective of conducting uniformity trial?

f) State Smith's variance law.

g) In the experiment of comparing effectiveness of different teaching methods, what are the experimental units?

h) State the estimator of the parameter μ in the analysis of LSD.

i) Various objects of comparison in a comparative experiment are termed as.....

j) Group of homogeneous experimental units is called as.....

2. Attempt **any four.** 8

a) Distinguish between fixed effect model and random effect model.

b) Write down the ANOVA table for CRD.

c) Give a particular layout of RBD with 4 treatments and 3 blocks.

d) Define experimental error.

e) State two demerits of LSD.

3. Attempt **any two.** 8

a) Explain replication as a basic principle of design of experiments.

b) State the model of LSD and estimate the parameters involved in the model.

c) Derive an expression for the efficiency of RBD relative to CRD.

4. a) Attempt **any two.** 6

i) Partition total sum of squares into various components in case of two way classification with m (>1) observations per cell.

ii) Complete the following ANOVA table for LSD and find efficiency of LSD relative to RBD with rows as blocks.

Source	df	ss	m.s.s.
Rows	-	72	-
columns	-	-	36
treatments	-	-	-
Error	6	-	12

iii) Obtain expectation of treatment sum of squares in case of two way classification with random effect model.

b) Define efficiency of a design. 2

5. Attempt **any one.** 8

a) Obtain expectation of error mean sum of squares in case of LSD.

b) i) In a RBD, there are only two blocks. Let k be the number of treatments and $\bar{X}_1$ and $\bar{X}_2$ be the average yield of two blocks. Show that the block sum of squares can be expressed as $\frac{k}{2}(\bar{x}_1 - \bar{x}_2)^2$

ii) Explain randomisation as a basic principle of design of experiments.

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Seat Number

* 0 7 8 4 *

COMPUTER SCIENCE : UG-CS - 353
Software Engineering
(35243)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.

1. Attempt **any eight.** **8**

a) ..... is the process of various modifications in running software product.

a) maintenance b) SGA
c) Quality d) SCM

b) ..... consist of auditing and reporting functions to management.

a) SGA b) RAD model
c) Quality control d) Analysis

c) Software does not.....

a) Developed b) Manufactured
c) Check d) none of these

d) Waterfall model is also known.....

a) Classic life cycle b) Linear model
c) Web - Application d) None of these

e) Spiral model is the combination of.....

a) Waterfall, Prototype, Increment
b) RAD and Increment
c) RAD & waterfall
d) None of these

f) Coupling is.....
   a) Measure of degree Independence
   b) Join both module
   c) Extract from module
   d) Randomise

g) ..... is the best cohesion.
   a) Communicational b) Sequential
   c) Functional d) Logical

h) Centex level in DFD is ..... level.
   a) zero b) first c) second d) Third

i) SGA is.....
   a) Software Quality Assurance.
   b) Software Quality Analysis.
   c) Software Quality Asset
   d) None

j) Black box is.....
   a) Internal structure of Process
   b) External structure of Process
   c) Black code
   d) None of these

2. Attempt **any four.** **8**

a) Discuss path testing.

b) What is SDLC?

c) List the techniques for system Analysis.

d) Draw a figure for hybrid design strategy.

e) Write a steps of maintenance.

f) Discuss in brief education and training in implementation phase of SDLC.

3. Attempt **any two.** **8**

a) Discuss various types of maintenance.

b) What is the relationship between cohesion and coupling? Explain

c) Explain waterfall model.

4. a) Attempt **any two.** 6

a) Draw a DFD for your College admission system.

b) Write a note on programming style.

c) Discuss software process activities.

b) Attempt compulsory question. 2

a) Explain in brief technical feasibility.

5. Attempt **any one.** 8

a) i) Explain top down and bottom up design strategy.

ii) Discuss black box testing. Give suitable example.

b) i) Explain prototyping model.

ii) What are the software quality assurance activities? Discuss.

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Seat Number

* 0 9 1 4 *

COMPUTER SCIENCE : UG - CS - 353/313
Software Engineering
(32413)

P. Pages : 2

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Draw diagram wherever necessary.

1. Attempt **any four.** **8**

a) Define term software Engineering.

b) Explain structured flow chart.

c) State steps of SDLC.

d) Define term system with suitable example.

e) State characteristics of good software.

f) State different types of software maintenance.

2. Attempt **any two.** **8**

a) Write a short note on waterfall model.

b) What are the principles of code design?

c) State and explain types of coupling.

3. a) Attempt **any two.** **6**

a) Write a short notes on decision tree.

b) Explain benefits of structured English.

c) Explain software Review.

b) Write short note on object oriented testing. 2

4. Attempt **any two**. 8

a) Write short note on Role of software maintenance in development method.

b) Explain CBSD with examples.

c) Differentiate between prototype and RAD model.

5. a) Attempt **any one**. 6

a) Write a short note on fact gathering Techniques

b) Write short note on significant code.

b) What is structured chart? 2

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Seat Number

* 0 7 8 3 *

GEOLOGY : GL - 353
Mineralogy and Optics
(35163)

P. Pages : 2

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.

1. Answer **any eight.** **8**

1) _____ two minerals show green colour pleochroism.
   a) Hornblende and Actinolite.
   b) Tremolite and Actinolite.
   c) Diopside and Enstatite.

2) Name any one clinopyroxene.
   a) Hypersthene. b) Diopside.
   c) Enstatite.

3) _____ is the composition of Nepheline?
   a) $CaSiO_3$. b) $NaAl\ Si_3O_8$
   c) $Na_3(Na,K)Al_4Si_4O_{16}$.

4) _____ is uniaxial positive mineral.
   a) Calcite. b) Augite.
   c) Quartz.

5) _____ is the chemical composition of Apatite.
   a) Al_2O_3. b) $Ca_3(PO_4)_2$.
   c) $CaCO_3$.

6) _____ mineral shows sieve structure under microscope.
   a) Staurolite. b) Calcite.
   c) Diopside.

7) _____ is the crystal system of olivine.
   a) Cubic. b) tetragonal.
   c) Orthorhombic.

8) _____ mineral shows symmetrical extinction.
   a) Augite. b) Calcite.
   c) Fluorite.

9) The _____feldspar mineral has K and Na ions in its composition.
   a) Orthoclase. b) Anorthoclase.
   c) Quartz

10) Becke line determines _____ property of the mineral.
   a) RI. b) Extinction.
   c) Sp Gr.

2. Define **any four.** **8**
1) Uniaxial indicatrix.
2) Extinction angle of hornblende.
3) Cation distribution in pyroxenes.
4) Alteration products of pyroxenes.
5) Occurrence of feldspathoids.
6) Silicate structure of Zeolites.

3. Describe **any two.** **8**
1) Biaxial interference figure.
2) Optical properties of Ab-An series.
3) Distinguishing properties of Orthopyroxenes.

4. Explain **Any two.** **8**
1) Optic sign of uniaxial minerals.
2) Structure and Chemistry of zeolite.
3) Perthites.

5. Explain Biaxial interference figure perpendicular to Acute bisectrix and its sign. **8**

OR

Describe the physical, optical properties and alteration products of amphiboles.

****

Seat Number

* 0 7 8 0 *

BOTANY : BOT - 353
Genetics and Molecular Biology
(35143)

P. Pages : 2

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.
6. Draw neat labelled diagrams wherever necessary.

1. Attempt **any eight.** **8**

i) Mendel's F_2 dihybrid phenotypic ratio is.....
a) 13:3 b) 12:3:1 c) 9:3:3:1 d) 9:6:1

ii) All multiple alleles occupy.....
a) Same locus & influence same character
b) Different loci & influence different character
c) Same locus but influence different character.
d) Different loci & influence same character.

iii) Double crossing over occurs between.....
a) Two chromatids b) Three chromatids
c) Four chromatids d) 2, 3 or 4 chromatids

iv) The frequency of a gene in a large population is affected by.....
a) mutation b) migration
c) Selection d) Selection, mutation & migration

v) Substitution point mutations change.....
a) all codons b) only one codon
c) one gene d) all genes

vi) DNA replication occurs in.....
a) G1 phase b) G-2 phase
c) S - phase d) mitotic phase

vii) The two strands of DNA are.....
a) anti-parallel b) parallel
c) perpendicular d) coiled.

viii) The flow of genetic information is directed from.....
a) Protein → DNA → RNA b) RNA → DNA → Protein
c) Protein → RNA → DNA d) DNA → RNA → Protein

ix) The smallest unit of DNA capable of recombining is known as.....
a) Muton b) Criston
c) Recon d) replicon

x) Tryptophan operon is an.....
a) non regulated operon b) inducible operon
c) repressible operon d) Complex operon

2. Attempt **any four.** **8**
i) Define cell cycle.
ii) Why crossing over between alleles of a gene is not possible?
iii) Define law of purity of gamets.
iv) Define gene mutation.
v) Define pseudogenes.
vi) Why 3′ – 5′ DNA strand is called leading strand?

3. Answer **any two** **8**
i) Explain 9:6:1 ratio with suitable example.
ii) Explain the structural gene of Lac-operon.
iii) Explain Griffith and Avery's experiment.

4. a) Attempt **any two.** **6**
i) Comment on conservative and dispersive DNA replication.
ii) Give an account of reciprocal and complimentary chiasma.
iii) Describe multiple alleles and human blood groups.

b) Give role of t RNA in protein synthesis. **2**

5. Explain mechanism of DNA replication. **8**

OR

Comment on process of crossing over.

****

Seat Number

* 0 7 7 9 *

CHEMISTRY : CH - 353
Organic Chemistry
(35133)

P. Pages : 4

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.
6. Draw the diagrams wherever necessary.

1. Attempt **any eight** of the following. **8**

i) Resonance effect operates through _____.

a) Sigma bond. b) Pi bond.

c) Co-ordinate bond. d) None of these.

ii) The intermediate in SN^1 reaction is _____.

a) Carbonium ion. b) Carbanion.

c) Carbon free radical. d) Carbene.

iii) In 1, 2 elimination Proton is removed from _____.

a) α b) β

c) γ d) δ

iv) The reagent used for trans hydroxylation of an alkene is _____.

a) Alkaline $KmNO_4$

b) OSO_4

c) CH_3COOOH

d) alcoholic KoH

v) Oxime is obtained from Ketone by reaction with _____.

a) $ph - NH - NH_2$ b) HCN

c) NH_3 d) $NH_2 - OH$

vi) Diazonium cation can be obtained from _____.

a) primary aromatic amine.

b) secondary aromatic amine.

c) Tertiary aromatic amine.

d) None of these.

vii) Which of the following is strongest acid _____.

a) $Cl - CH_2 - COOH$

b) CH_3COOH

c) $Br - CH_2 - COOH$

d) $F - CH_2 - COOH$

viii) _____ is the ambident nucleophile.

a) $Cl^{\ominus}$ b) $CN^{\ominus}$

c) $OH^{\ominus}$ d) $OR^{\ominus}$

ix) The correct order of increasing rate of nucleophilic addition reaction is _____.

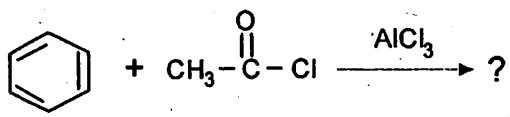
a) $HCHO < CH_3CHO < CH_3COCH_3$.

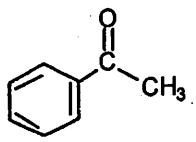
b) $CH_3CHO < HCHO < CH_3COCH_3$.

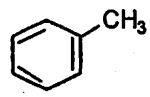
c) $HCHO < CH_3COCH_3 < CH_3CHO$.

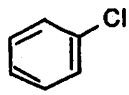
d) $HCHO > CH_3CHO > CH_3COCH_3$.

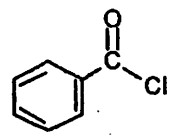
x) Predict the product in following reaction.



a) 

b) 

c) 

d) 

2. Attempt **any four** of the following. **8**

i) What is inductive effect?

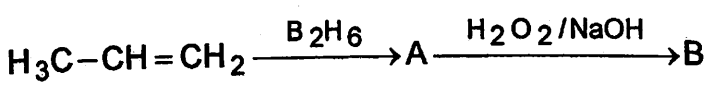
ii) What is SNi reaction? Give an example.

iii) Define Saytzeff rule.

iv) What is Carbanion? How it is formed?

v) Why attack of nucleophile on aromatic ring is difficult?

vi) Predict the product A & B in the following reaction.



3. Attempt **any two** of the following. **8**

i) Discuss the mechanism of addition of bromine to an alkene.

ii) Write note on hyperconjugation effect.

iii) Explain Aldol condensation reaction with mechanism.

4. a) Attempt **any two** of the following. **6**

i) What is electrophilic aromatic substitution reaction? Give its general mechanism.

ii) Why aqueous medium can not be used for reduction by $LiAlH_4$?

iii) What is hydration of an alkene? Give its mechanism.

b) Give two limitations of Friedel Crafts alkylation reaction. **2**

5. a) What is SN^1 reaction? Discuss its mechanism. What is effect of solvent on rate of SN^1 reaction? **8**

OR

Explain E_2 mechanism with suitable example.
Comment on stereochemistry of E_2 reaction.

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Seat Number

* 0 7 7 7 *

MATHEMATICS : MTH - 353
Modern Algebra
(35113)

P. Pages : 2

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.

1. Attempt **any eight** of the following. **8**

a) State: Cayley's theorem.
b) Define: automorphism.
c) If $\sigma = (2,3,5,7)$ is a permutation in S_7 then state whether it is even or odd.
d) Define : commutator of a subgroup of a group.
e) Give only an example of an abelian quotient group G/H where G is not abelian.
f) State the necessary and sufficient condition that a nonempty subset H of ring $<R,+,\cdot>$ to be a subring of R.
g) Show that the set of all rationals is not an ideal of the ring of real numbers.
h) Let R/S be a quotient ring and ring R has a unity element 1. What is the unity element of R/S?
i) State division algorithm theorem for polynomials.
j) Explain irreducible polynomials over a field.

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

i) Show that a subgroup of index two in a group G is a normal subgroup of G.
ii) Prove that every homomorphic image of a group is isomorphic to some quotient group of it.

iii) Let C and C_0. denote the set of complex numbers and the set of nonzero complex numbers respectively. Show that the mapping $f_a : <C,+> \to <C,+>$ defined by $f(z) = az \quad \forall Z \in C$; is an automorphism of $C, a \in C_0$ being fixed.

b) If G' is a commutator subgroup of a group G such that G'= {e} then prove that G is abelian. 2

3. Attempt **any two** of the following. 8

a) Prove that out of the n! Permutations of S_n; $\frac{n!}{2}$ are even permutations and $\frac{n!}{2}$ are odd permutations.

b) Show that there is no permutation $\alpha \in S_n$ such that $\alpha(1,2)\alpha^{-1} = (3\ 4) \circ (2, 7)$

c) If $\alpha = (1\ 2\ 3)$ and $\beta = (2\ 3\ 4\ 5)$ then calculate $\alpha^{-1}\beta\alpha$; and express $\alpha^{-1}\beta\alpha$ as a product of transpositions.

4. a) Attempt **any two** of the following. 6

i) Prove that the intersection of two subrings is again a subring.

ii) Prove that every quotient ring of ring R is homeomorphic image of R.

iii) Define: prime ideal and maximal ideal of a ring. give an example of a prime ideal which is not maximal

b) If R is a ring such that $x^2 = x \quad \forall x \in R$ then prove that the characteristic of R is 2. 2

5. a) i) If R is a commutative ring with unity then prove that a polynomial ring R[x] is also commutative ring with unity. 4

ii) Find the deg $[f(x)+g(x)]$ and deg $[f(x)\cdot g(x)]$ 4

if $f(x) = 5 + 4x + 3x^2 + 2x^3$ and $g(x) = 1 + 4x + 5x^2 + x^3$ are polynomials over the field $<Z_6, +_6, \times_6>$.

OR

i) Show that the polynomial x^2+x+4 is irreducible over the filed F of integers modulo 11. 4

ii) State Eisenstein's criterion for irreducibility. Prove that $a \in F$ is Zero of $f(x) \in F(x)$ if and only if (x-a) is a factor of f (x). 4

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Seat Number

* 0 7 7 4 *

BIOTECHNOLOGY : BT - 352
Agricultural Biotechnology
(35332)

P. Pages : 2

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.

1. Attempt **any eight** of the following. **8**

i) Rhizobia do not possess following character.
a) Soil bacteria b) diazotrophy
c) non-sporulating rod d) independent N_2 fixation.

ii) ..... does not show N_2 fixation.
a) Rhizobia b) Frankie
c) E-coli d) Cyanobacteria

iii) Azotobacter is widely used as.....
a) Biofertilizer b) Biopesticide
c) SCP d) All of these

iv) ..... is one of the phytohormone.
a) Acetic Acid b) Citric acid
c) Abscisic acid d) Sulphuric acid

v) Cotton blight is..... disease.
a) Fungal b) Bacterial
c) Viral d) Protozoal

vi) Bacterial blight primary affect leaves, steam and.....
a) bolls b) roots
c) Seeds d) All of these

vii) Sugarcane smut is caused due to.....spp.
a) Xanthomonas b) Sporisorium
c) Azotobactor d) Rhizobium

viii) Spirulina is widely used as.....
a) SCP b) Biopesticide
c) Vector e) None of these

ix) ..... is an example of fungal biopesticide.
a) Sporisorium b) Pseudomonas
c) Saccharomyces d) Trichoderma

x) Mushroom belong to the.....family.
a) bacteria b) fungi
c) Algae d) Protozoa

2. Attempt **any four** of the following. **8**
i) Define: Diazotrophy.
ii) Define: phytohormone.
iii) Give physiological effects of auxins.
iv) Give concept of plant pathology.
v) Microbial pesticides.
vi) Give symptoms of sugar cane smut.

3. Attempt **any two** of the following. **8**
i) Explain Sulphur and Phosphorus assimilation by plants.
ii) Discuss Azotobacter as bioinoculant.
iii) Give various applications of biofertilizers.

4. a) Attempt **any two** of the following. **6**
i) Discuss spirulina as a SCP.
ii) Explain pathogenesis, transmission and control of bacterial blight of cotton.
iii) Explain advantages of biopesticides over chemical pesticides.

b) Comment on - dinitrogenase complex. **2**

5. Discuss various agricultural biotech products in the market. **8**

OR

Give classification and physiological effects of-
a) Cytokinins. b) Gibberellins.

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Seat Number

* 0 7 7 3 *

INFORMATION TECHNOLOGY : IT - 352
System Programming
(35322)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.
6. Draw neat diagram wherever necessary.

1. Attempt **any Eight.** **8**

a) Which table is not created during lexical analysis.
   i) Literal ii) symbol
   iii) identifier iv) value

b) Type-1 grammar corresponds to
   i) Regular grammar ii) context free
   iii) context sensitive iv) phrase structure.

c) Software always found in main memory.
   i) Assembler ii) compiler
   iii) Linker iv) Loader

d) DC is _____.
   i) Imperative statement ii) Declarative
   iii) Assembly directive iv) None of the above

e) Top-Down parsing uses _____.
   i) Reduction ii) Derivation
   iii) syntax tree iv) None

f) Front end in language processing performs _____.
   i) code generation
   ii) memory allocation
   iii) Lexical, syntax and semantic analysis.
   iv) None of above.

g) Compile time address is generated by _____.
   i) Loader ii) compiler
   iii) Linker iv) Assembler

h) Display the values of variables this task is performed by
   i) Profile monitor ii) variable
   iii) keyword iv) debug monitor

i) Macro – expansion is performed by
   i) macro pre-processor ii) macro
   iii) microprocessor iv) None of the above

j) Vi is which type of editor.
   i) stream ii) Line
   iii) screen iv) structure

2. Attempt **any four** (Each carry 2 marks). **8**

a) Define system program and list system softwares.

b) What is shared library?

c) Explain Programming environment.

d) Functions of Loader.

e) Define phase library.

f) List functions of analysis phase of assembler.

3. Attempt **any two** (Each carry four marks). **8**

a) Describe in brief Relocatable and self Relocatable program.

b) Explain bottom up parsing.

c) Define language processor? Explain different types of Language processor.

खडू - 029

4. a) Attempt **any two** (Each carry 3 marks). 6

a) Write short note on shift Reduce parse.

b) Explain different statements used in assembly language.

c) Describe in brief Link, Load & 90 scheme.

b) Compulsory question. 2
Define user centric view of system software.

5. Attempt **any one.**

a) i) Describe in brief Pass-I of assembler. 4

ii) Explain Language processor Development Tools (LPDT). 4

b) i) Describe 'Program Relocatibility'. 4

ii) Explain Goals of system software. 4

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Seat Number

0772

BIOCHEMISTRY : BC - 352
Plant Biochemistry
(35212)

P. Pages : 2 **Max. Marks : 40**

Time : Two Hours

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All Questions are compulsory and carry equal marks.
5. Draw neat and well labelled diagrams wherever necessary.
6. Figures to right indicate full marks.

1. Attempt **any eight** of the following. **8**

i) Chlorophyll contains a.....metal.
   a) copper b) lead
   c) Iron d) Magnesium

ii) The light energy of photosynthesis changes into.....form.
   a) Chemical energy b) Mechanical energy
   c) electrical energy d) Electromechanical energy

iii) Chlorophyll 'a' is distributed in all photosynthesizing plants except.....
   a) Red algae b) Brown algae
   c) Blue green algae d) Bacteria

iv) Carotenoids are.....
   a) Green pigments b) Yellow or orange pigments
   c) Red pigments d) Blue pigments

v) In the very first step of calvin cycle the CO_2 is accepted by.....
   a) 3-phosphoglyceric acid b) Ribulose phosphate.
   c) Ribose - 5 phosphate d) Ribulose 1, 5 - diphosphate

vi) Explain the non plant secondary metabolite is.....
   a) alkaloid b) Flavonoid
   c) Steroids d) Penicillin

vii) Auxins, cytokinins and Gibberellins are called.....
a) pheromones b) phytohormones
c) phycollins d) gases

viii) Photorespiration is also known as.....cycle.
a) C_3 b) C_4 C) C_2 d) Kalvin

ix) Kinetin is a type of.....
a) Auxin b) Cytokinin
c) Abscisic acid d) a and b

x) Lignin is most commonly derived from.....
a) Stem b) leaf
c) root d) wood

2. Solve **any four** of the following. **8**
i) Give the significance of photosynthesis.
ii) Define phytohormones and give it's type.
iii) Carotenoids.
iv) Gibberellins.
v) Define-seed germination.
vi) Terpenoids.

3. Attempt **any two.** **8**
i) Define photophosphorylation and explain non-cyclic photophosphorylation.
ii) Discuss the significance of seed dormancy.
iii) Significance of photorespiration.

4. a) Attempt **any two.** **6**
i) Comparison between C_3 and C_4 pathway.
ii) Difference between dark respiration and photorespiration.
iii) Light and dark reaction.

b) Alkaloids as drug explain. **2**

5. Attempt the following. **8**

Definition and types of phytohormones, Give physiological effect and application of Auxins.

OR

Explain photosystem I and II.

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Seat Number

* 0 7 7 0 *

MICROBIOLOGY : MB - 352
Fermentation Technology
(35192)

P. Pages : 2

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Draw a neat labelled diagram wherever necessary.
5. All questions are compulsory.
6. Figure to the right indicate full marks.

1. Attempt **any eight** of the following. **8**

a) Baffles were use to avoid.... Formation.
   i) Growth ii) Contamination
   iii) Inhibitor iv) Vortex.

b) Agent which cause mutation is.....
   i) Pyrogen ii) Mutagen
   iii) Contaminant iv) Sterilent

c) Sparger is used to provide sterile.....in fermenter.
   i) Air ii) Media
   iii) Sample iv) product

d) Potential yield increases using strain improvement by.....
   i) Sterilization ii) Isomerism
   iii) r DNA technology iv) disinfection

e) In.....end product of biochemical pathway inhibits the activity of enzyme catalyzing first reaction of pathway.
   i) Feedback repression ii) Feedback repression
   iii) Deactivation iv) activation.

f) Fermentation is a process carried out by microorganism in ..... condition
   i) Microaerophilic ii) aerobic
   iii) anaerobic iv) aerobic & anaerobic

g) Conical base of cylindro conical fermenter has angle of.....
   i) 45° ii) 90°
   iii) 180° iv) 70°

h) ..... is used to provide sterile condition in fermenter
   i) Baffles ii) Sealing gasket
   iii) Sparger iv) Impeller.

i) Scale up means..... the scale of fermentation.
   i) Increase ii) Improve
   iii) Maintain iv) Decrease.

j) Antifoam agent is used to avoid ..... formation
   i) Floating cells ii) foam
   iii) Mutant iv) contamination.

2. Write short notes on **any four** of the following. **8**
1) Mechanism for control of foam
2) Aseptic sealing and gasket
3) Impeller. 4) O_2 probe
5) Mutation 6) Sparger.

3. Attempt **any two** of the following. **8**
1) Give brief account on production of beer on large scale.
2) Write a note on different criteria for scale up.
3) Describe sterilization of media in batch fermentation.

4. a) Attempt **any two** of the following. **6**
1) Describe in brief sterilization of air by filtration
2) Explain strain improvement by rDNA technology.
3) Draw a neat labelled diagram of Air- lift fermenter.

b) What is modification of permeability? **2**

5. Attempt **any one** of the following. **8**
1) Explain in detail large scale production of vinegar.
2) What is strain improvement ? Explain strain improvement based on mutation.

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Seat Number

0769

STATISTICS : ST - 352
Statistical Inference - I
(35172)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.
6. Use of statistical table and calculator is allowed.

1. Attempt **any eight.** **8**

a) State whether the following statement is true or false.
'Unbiased estimator is always unique.'

b) Define consistent estimator.

c) Give one example of unbiased estimator.

d) Prove or disprove: sample mean is not unbiased estimator of the population mean.

e) Is $\bar{x}$ is a sufficient statistic for λ when r. s is from poisson distribution with parameter λ ?

f) Define relative efficiency of T_1 with respect to T_2.

g) Give any two properties of maximum likely hood estimator.

h) Explain statistic and parameter.

i) What is point estimation?

j) $x_1, x_2 \ldots x_n$ is a r. s. form $N(\mu,\sigma^2)$, If $T_1 = \sum_{i=1}^{n} x_i$ & $T_2 \sum_{i=1}^{n} x_i^2$ then which of the following statement is correct for μ and σ^2 :-

i) T_1 is sufficient statistic for μ ii) T_2 is sufficient for σ^2

iii) T_2-T_1 is sufficient for (μ,σ^2) iv) (T_1, T_2) is sufficient for (μ,σ^2).

2. Attempt **any four**. **8**

a) Let x_1, x_2, x_3 be a r. s. from $p(\lambda)$ distribntion. If $T_1 = \frac{x_1 + 2x_2 + 3x_3}{6}$ and $T_2 = \frac{x_1 + x_2 + x_3}{3}$. Find relative efficiency of T_1 with respect to T_2.

b) If T_1 and T_2 are two mutually independent unbiased estimators of parameter θ, obtain unbiased estimator for $\theta(1-\theta)$.

c) Find fisher information function $I(\mu)$ for $N(\mu,\sigma^2)$ distribution. σ^2 known.

d) Find maximum likely hood estimator (mle) for θ when r. s. is from:
$f(x,\theta) = \theta e^{-x\theta}$ $x > 0, \theta > 0.$

e) Prove or disprove: If T is a sufficient statistics of θ, then it is also a sufficient statistics of any function of θ.

f) Obtain unbiased estimator for parameter θ^{-1} when single observation x is taken from the p.m. f $p(x) = \theta(1-\theta)^{x-1}$ $x = 1,2,3,\ldots.. 0 < \theta < 1.$

3. a) Attempt **any two**. **6**

i) Show that sample standard deviation is not an unbiased estimator of population standard deviation.

ii) Describe method of maximum likely hood estimator.

iii) Estimate θ by the method of moments when r. s. of six n is from following probability distribution. $f(x,\theta) = \theta x^{\theta-1}$ $0 < x < 1, \theta > 0.$

b) Prove or disprove: Sample mean is never an unbiased estimator of population median. **2**

4. Attempt **any two**. 8

a) State and prove uniqueness theorem of MYBUE.

b) Let T_1 and T_2 be two unbiased estimators of parameter θ, having ρ is the correlation coefficient between them. Find the unbiased estimator of θ which is the linear combination of T_1 and T_2 and having smallest variance.

c) Obtain the sufficient statistic for σ^2 when r. s. is from $N(0, \sigma^2)$ distribution.

5. Attempt **any one**. 8

a) i) State the Neumann factorization theorem.

ii) State and prove Cramer-Rao inequality.

b) For the distribution.

$f(x,\alpha) = k e^{-(x-\alpha)}.(x-\alpha)^p$ $\quad x \geq \alpha, \alpha \in \mathbb{R}$

p known

i) Find E(x) and hence find unbiased estimator for α based on r. s. of size n.

ii) Estimate parameter α by the method of moments.

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Seat Number

* 0 7 6 7 *

COMPUTER SCIENCE : UG - CS - 352
Advanced DBMS
(35242)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All Questions are compulsory.
5. Figures to the right indicate full marks.

1. Attempt **any Eight.** **8**

i) A transaction may obtain locks but may not release any lock is known as _____.
   a) shrinking phase b) Growing phase
   c) strict two phase d) None

ii) Which property of transaction is known as "alt or none"
   a) Isolation b) Durability
   c) Automicity d) ACID

iii) _____ is a world wide used to represent semi structured data
   a) XST b) XML
   c) HTML d) PL/SQL

iv) There are two functional dependencies with the same set of attributes of the left hand side of the arrow $A \rightarrow BC$ and $A \rightarrow B$ This can be combined as
   a) $A \rightarrow BC$ b) $A \rightarrow B$
   c) $B \rightarrow C$ d) none

v) A Table has fields F1,F2,F3,F4,F5 with the following functional dependencies $F1 \rightarrow F2$, $F2 \rightarrow F4$, $(F1, F2) \rightarrow F5$ in term of normalization this table is in
   a) 1NF b) 2NF
   c) 3NF d) None of above

vi) Storing a fragment of database at multiple location is
a) Horizontal fragmentation b) Data replication
c) Vertical fragmentation d) none of above

vii) An unnormalised relation contains values
a) Atomic b) non-atomic
c) Repetative d) none of above

viii) Shadow paging is used for
a) writing same item at some location.
b) writing same item at different location.
c) writing shadows.
d) none of above.

ix) Video database is represented as _____.
a) video b) Audio
c) frames d) none of above

x) Two or more users accessing database simultaneously is _____.
a) conflict serial b) concurrency control
c) serially d) none of above

2. Attempt **any four.** **8**

a) What is serializability?

b) State two deadlock prevention algorithms.

c) What is Backup? State a need of it.

d) Draw Transaction state diagram.

e) What is JPEG in multemedia database?

f) State Advantages of Web Database.

3. Attempt **any two.** **8**

a) Compute F^+ for following functional dependencies R(A,B,C,D) $F = (A \rightarrow B, A \rightarrow C, BC \rightarrow D)$.

b) What is Distributed Data storage? Explain Data fragmentation.

c) Explain serializability with non-serial schedule transaction example.

4. a) Attempt **any two.** 6

a) State and Explain any three codd rules.

b) What is Mobile Database? State Applications of it.

c) Describe Deffered update and Immediate update modification Recovery techniques.

b) What is Deadlock? 2

5. Attempt **any one.** 8

a) What is Normalisation? Normalise following Relation is in 3NF?
Library (Acc. No, Tittle, Author1, Author2, Publication, Edition, Cost, Pages, mem-no, m-name, Dtofreg, issue-Date, Ret-date,No-of-days, fine-Amt)
Explain Insert, Update, and Delete anomalies for above relation.

b) What is Two-phase commit (2PC) protocol? Explain steps of each phase. What is drawback of 2PC.

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Seat Number

* 0 7 6 2 *

CHEMISTRY : CH - 352
Inorganic Chemistry
(35132)

P. Pages : 3

Time : Two hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.
6. Neat diagram must drawn whenever necessary.

1. Attempt **any eight** of the following. **8**

i) The outer electronic configuration of copper group element is .....

a) nd^{10}, ns^1 b) $(n-1)d^{10}, ns^1$

c) $(n-1)d^9, ns^2$ d) $(n-2)d^{10}, ns^1$

ii) Copper group elements also called as.....

a) Alkali metals b) Alkaline earth metals

c) Coinage metals d) non metals.

iii) Amphoteric solvents are the solvents which acts as.....

a) Acids b) Bases

c) Acids as well as bases d) Neutral

iv) According to which theory formation of co-ordination bond is acid- base reaction.

a) Arrhenius theory b) Lowery -Bronsted theory.

c) Lewis theory d) Electron theory.

v) In the complex $[CoCl_3 (H_2O)_3]$ the charge on Co is.....
   a) +3 b) -3
   c) -6 d) +6

vi) According to IUPAC the name of the complex $K_4[Fe(CN)_6]$ is.....
   a) Tetrapotassium Hexacyano ferrate (II)
   b) Potassium Hexacyano Ferrate (II)
   c) Potassium ferrocyanide
   d) Potassium Ferricyanide.

vii) $[Co(NH_3)_5 Br]SO_4$ & $[Co(NH_3)_5 SO_4]Br$ is example of.....
   a) Co-ordinate isomerism b) Hydrate isomerism
   c) Ionisation isomerism
   d) Co-ordinate position isomerism.

viii) The compound having same empirical formula but different molecular weight is.....
   a) Ionisation isomerism b) linkage isomerism
   c) Co-ordinate isomerism d) Polymerization isomerism.

ix) Which of the following metal does not corrode when exposed to air or when immersed in water of reactive liquids or solutions
   a) Ca b) Fe c) Zn d) Au

x) Alloying of metal with chromium
   a) Decreases corrosion b) Increases corrosion
   c) Form electrochemical cell d) Form Anode.

2. Answer **any four** of the following. **8**

i) What are protic and aprotic solvents?

ii) Define chelating ligand with example.

iii) Define the term double salt with example.

iv) What is linkage isomerism? Explain with example.

v) What is corrosion inhibitor? Give an example.

vi) Name the types of passivity.

3. Answer **any two** of the following. 8

i) Explain the extraction of Gold using amalgamation process.

ii) How ligands classified as unidentate, bidentate and polydentate? Explain with suitable examples.

iii) Discuss the microbial corrosion.

4. a) Answer **any two** of the following. 6

i) Give important uses of copper.

ii) Define hard and soft acids and bases.

iii) Write IUPAC names of the following complexes.
$K_4[Fe(CN)_6]$, $Na_3[Ag(S_2O_3)_2]$, $[Cr(H_2O)_2Cl_4]^-$

b) Explain Differential Aeration theory of corrosion. 2

5. Answer **any one** of the following. 8

i) Describe physical properties of solvent.

ii) Discuss the structure of $CoCl_3\,6NH_3$ on the basis of Werner's theory.

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Oct TYBSC April 2015

Seat Number

खडू - 001

* 0 5 4 7 *

MATHEMATICS : MTH - 351
Metric Spaces (35111)

P. Pages : 2
Time : Two Hours

Max. Marks ; 40

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Figures to the right indicate full marks.
5. All questions are compulsory.

1. Attempt **any eight** of the following. **8**

a) State the relationship between the convergent sequence and Cauchy sequence in a discrete metric space R_d.

b) Is the function $f : \mathbb{R} \to [0, \infty)$; defined by $f(x) = |x| \forall x \in \mathbb{R}$; a one one? Justify.

c) Find an open sphere $S(1/2, 1/4)$ in a usual metric space $M = (0, 1)$.

d) Find the limit point of the sequence $\left\{1 - \frac{1}{n}\right\}_{n=1}^{\infty}$.

e) Define: Complete metric space.

f) Give only an example of a disconnected subset of a connected set in a metric space.

g) When the metric space is said to have a finite intersection property?

h) State whether $A \times B$ is compact subset of $\mathbb{R}^2$ or not if A and B are compact subsets of metric space $\mathbb{R}$.

i) When a subset A of R_d is totally bounded?

j) Is A a closed subset of a metric space $\langle M, \rho \rangle$? Here $\langle A\ \rho \rangle$ is compact.

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

i) If B is countable subset of the uncountable set A then prove that $A - B$ is countable.

ii) If $\{x_n\}_{n=1}^{\infty}$ is a convergent sequence in R_d then show that there exists a positive integer N such that $x_N = x_{N+1} = x_{N+2} = \_\_\_\_\_$.

iii) Let $M = (-\infty, \infty)$. Prove that $\rho(x, y) = \sqrt{|x - y|}$ for every $x, y \in M$; is metric on M.

b) Sketch the subset $A=\{P\in\mathbb{R}^2/\sigma(0,P)<1\}$ of $\mathbb{R}^2$ if $(\mathbb{R}^2,\sigma)$ is a metric space where σ is defined by $\sigma(P,Q)=|x_1-x_2|+|y_1-y_2|\forall P\equiv(x_1,y_1)$, $Q\equiv(x_2y_2)\in\mathbb{R}^2$ and $O=(0,0)\in\mathbb{R}^2$. 2

3. Attempt **any two** of the following. 8
   a) If G_1 and G_2 are open subsets of the metric space M then prove that $G_1\cap G_2$ is also open in M.
   b) If A and B are closed subsets of IR then prove A×B is closed subset of $\mathbb{R}^2$.
   c) Prove that the metric spaces $[-\pi/2,\pi/2]$ and [-1, 1] are homeomorphic to each other.

4. a) Attempt **any two** of the following. 6
   i) Prove that the union of two connected subsets of a metric space M is connected if their intersection is non empty.
   ii) If A is a closed subset of a complete metric space $\langle M,\rho\rangle$ then prove that $\langle A,\rho\rangle$ is complete.
   iii) If $f:[0\ 1]\to[0\ 1]$ and if there is a real number α with $0<\alpha\leq 1$ such that $|f'(x)|\leq\alpha$ in [0,1] where F' is derivative of f then show that F is contraction on [0 1].

   b) If A is a subset of ℓ^2; consisting of the points $e_1=(1,0,0\_\_\_\_)$, $e_2=(0,1,0\_\_\_\_)$ $e_3=(0,0,1\_\_\_\_)\_\_\_\_\_$ then prove that A is bounded. 2

5. a) i) If f is one one continuous function from the compact metric space $\langle M_1,\rho_1\rangle$ onto the metric space $\langle M_2,\rho_2\rangle$ then prove that $\bar{f}'$ is continuous on M_2 and hence homeomorphism. 4
   ii) If $f(x)=\frac{1}{1+x^2}\forall x\in(-\infty,\infty)$ then show that f(x) attains maximum value but does not attain minimum value. 4

OR

   i) If the metric space $\langle M,\rho\rangle$ is compact then prove that every sequence $\{x_n\}_{n=1}^{\infty}$ of points in M has subsequence $\{x_{n_k}\}_{k=1}^{\infty}$; converging to a point in M. 4

   ii) If $F:\mathbb{R}\to\mathbb{R}$ be defined by $f(x)\equiv\sin x\forall x\in\mathbb{R}$ then show that f(x) is uniformly continuous on IR. 4

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Seat Number

* 0 7 4 5 *

PHYSICS : PHY - 351
Mathematical Physics
(35121)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Draw neat diagram wherever necessary.
6. Figures to the right indicates full marks.
7. Use of Log table or standard calculator is allowed.

1. Attempt **Any Eight** of the following. **8**

a) Which is the correct sentence of the following.
   i) The velocity of light is variable.
   ii) The velocity of light is different in different medium.
   iii) The velocity of light is constant.
   iv) The velocity of light does not depends on velocity of source.

b) The volume element in cylindrical co-ordinate system is _____
   i) $\rho^4 d\rho d\phi dz$ ii) $\rho d\rho d\phi dz$
   iii) $\rho^2 d\rho d\phi dz$ iv) $\rho^3 d\rho d\phi dz$

c) The degree and order of $\frac{d^2y}{dx^2} + \sqrt{\frac{dy}{dx}} + y = 0$ is _____.
   i) 1,1 ii) 2,2
   iii) 2,1 iv) 1,2

d) The Legendre polynomial $P_n(x) = p_n(1)$ is _____.

i) 0 ii) 1
iii) -1 iv) 2

e) Green's theorem in plane is _____.

i) $\oint_c (Mdx + Ndy) = \iint_s \left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}\right) dx\, dy$.

ii) $\oint_c (Mdx + Ndy) = \iint_s \left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right) dx\, dy$.

iii) $\oint_c (Ndx + Mdy) = \iint_s \left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}\right) dx\, dy$.

iv) None of these.

f) For the differential equation $y'' - 2x'y + 2\lambda y = 0$ where 'λ' is constant, the point x=0 is _____.

i) Regular singular point. ii) Ordinary point.
iii) Singular point. iv) Irregular singular point.

g) The generating function of first kind $J_n(x)$ is _____.

i) $x/2\left(t - 1/t\right)$ ii) $1/2\left(x - 1/t\right)$
iii) $e^{x/2}\left(t - 1/t\right)$ iv) None of these

h) The length of object moving with the velocity of light is equal to

i) Double of its original length.
ii) half of its original length.
iii) one fourth of its original length.
iv) zero.

i) The scale factors for cylindrical co-ordinate system are _____.

i) $h_1 = 1, h_2 = 1, h_3 = 1$ ii) $h_1 = 1, h_2 = 1, h_3 = \rho$
iii) $h_1 = 1, h_2 = \rho, h_3 = 1$ iv) $h_1 = \rho, h_2 = \rho^2, h_3 = 1$

j) Statement of Stoke's theorem is _____.

i) $\oint \vec{v} \cdot d\vec{\ell} = \int_s \vec{v}.d\vec{s}$ ii) $\oint_s (\nabla \times \vec{v}) \cdot d\vec{s} = \oint_c \vec{v} \cdot d\vec{s}$
iii) $\oint_c \vec{v} \cdot d\vec{\ell} = \int_s (\nabla \times \vec{v}) \cdot d\vec{s}$ iv) None of these

2. Attempt **any four** of the following. 8

a) Define Fuchs's theorem.

b) State mathematically Legendre differential equation.

c) Obtain area element in spherical-polar co-ordinate system.

d) Write down equation of $\vec{\nabla}$ operator in general curvilinear co-ordinate system.

e) Write down the generating function for Hermite polynomial $H_n(x)$.

f) State the results of Michelson and Morley experiment.

3. Attempt **any two** of the following. 8

a) Write a note on 'Length Contraction'.

b) Prove that $(n+1)P_{n+1}(x) = (2n+1)xP_n(x) - nP_{n-1}(x)$.

c) Show that the point x=0 is an ordinary point of Legendre differential equation.

4. a) Attempt **any two** of the following. 6

a) State and prove Green's identities.

b) Mean proper life time of particle is $2\mu s$. The particle moves through the laboratory at $2.4\times10^8 m/s$. What is it's life time as measured by an observer in the laboratory.

c) Find expression for gradient in cylindrical co-ordinates.

b) State inverse Lorentz transformation equations. 2

5. Attempt **any one** of the following. 8

a) Derive an expression for Curl. of vector field in general curvilinear co-ordinate system.

b) Separate the variables in Laplace equation in spherical polar co-ordinates.

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Seat Number

* 0 7 4 6 *

CHEMISTRY : CH - 351
Physical Chemistry
(35131)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to right indicate full marks.
6. Use of logarithmic table and calculator is allowed.

1. Attempt **any Eight** of the following. **8**

i) One Einstien energy is _____.

a) $E = \frac{2.859}{\lambda} \times 10^{8} cal \cdot mole^{-1}$ b) $E = \frac{2.859}{\lambda} \times 10^{5} k cal\ mole^{-1}$

c) $E = \frac{2.859}{\lambda} \times 10^{5} J mole^{-1}$ d) $E = \frac{2.859}{\lambda} \times 10^{5} k J mole^{-1}$

ii) The emission of alight as a result of chemical action is _____.

a) Cold light b) hot light

c) Bright light d) None of these

iii) For a reaction that obeys Einstiens law _____.

a) $\phi = 1$ b) $\phi > 1$

c) $\phi < 1$ d) $\phi = 0$

iv) An increasing temperature by 10°C generally increases the rate of reaction by_____.

a) 2 times b) 10 time

c) 9 time d) 100 time

v) The unit of rate constant of first order reaction is expressed in _____.

a) Mole Lit Sec^{-1} b) $mole^{-1}$ Lit^{-1} sec^{-1}

c) mole Lit^{-1} sec^{-1} d) Sec^{-1}

vi) Liquid junction potential can be eliminated by using _____.
a) Porous partion b) salt bridge
c) semipermeable membrane d) none of these

vii) When hydrogen gas electrode is combined with saturated calomel electrode, then ph of a solution is determined by using _____.
a) $pH = Ecell - 0.242$ b) $pH = \frac{E\,Cell + 0.242}{0.0591}$
c) $pH = \frac{E\,Cell - 0.242}{0.0591}$ d) None of these.

viii) The most commonly used semiconductor is _____.
a) Germanium b) Silicon
c) Carbon d) Sulphur

ix) The structure of NaCl is _____.
a) BCC b) FCC
c) SCC d) None of these

x) Liquid crystal are also called as _____.
a) Mesomorphic b) Mesomorphase
c) Mesophilic d) Mesophoric.

2. Answer **any four** of the following. 8

i) What is Photochemical and Thermal reaction?

ii) What is Phosphorescence? Give one example.

iii) Define energy of activation. Give it's unit.

iv) What is polymorphism? Give one example.

v) Give advantages of potentiometric titrations.

vi) Define order of a reaction. Mention the methods of determination of order of reaction.

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

i) A system absorb 2×10^{16} quanta per second, when it is irradiated for 20 minute, 3×10^{-5} moles of a reactant reacted, What is quantum yield of a reaction?

ii) 5 ml methyl acetate was mixed with 100 ml N|50 HCl, 10 ml of the mixture was removed at different time interval and titrated with standard NaOH solution following reading were obtain.

Time (min)	0	75	120	180	∞
Ml of NaOH	19.24	24.20	26.60	29.32	42.03

Show that reaction is of first order.

iii) Explain the term quantum yield. Give reasons for high and low quantum yield.

4. a) Answer **any two** of following. **6**

i) What is liquid crystal? Give their types.

ii) What is concentration cell? Give it's classification.

iii) Give the principle Bragg's method. Write Braggs equation and name the term involved in it.

b) What is chemical cell? How chemical cell without transference is constructed. **2**

5. Answer **Any one** of following. **8**

i) Define second order reaction. Give it example. Obtain the expression for velocity constant of a second order reaction. When reactant have different initial concentration.

ii) How electrolyte concentration cell with transference reversible to cation is constructed? Obtain the cell reaction and emf equation for it.

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Seat Number

* 0 7 4 8 *

ZOOLOGY : ZOO - 351
Non-Chordates - III
(35151)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicates full mark.

1. Multiple choice attempt **any eight.** **8**

i) The eggs of grasshopper are also called .....
   a) sperm b) ova
   c) ovipositer d) otvecu

ii) Radial symmetry is found in .....
   a) Ascasis b) Sponge
   c) Sea star d) Pila

iii) The mouth parts of grasshopper are of ..... type.
   a) Mandibulate b) Siphoning
   c) Piercing and sucking d) Sponging.

iv) The abdomen of grasshopper is ..... segmented.
   a) Nine b) Ten
   c) Elevan d) Twelve

v) Stone canal in sea – star connects the .....
   a) Ring canal and polian vesicle
   b) Ring canal & radial canal
   c) Mudreposite and king canal
   d) Mudreposite and polian vesicle

vi) The respiratory organs of sea-star are .....
a) Pedicellariae b) Tube feet
c) Body wall d) Madreporite

vii) Grasshopper feeds on .....
a) Solid food b) liquid food
c) Vegetable food d) Blood

viii) Larval stage in life history of sea – star is .....
a) Bipinnaria larva b) Bruchiolaria
c) Both d) none

ix) A peculier characteristics of sponge is presences of ..... on the body.
a) Pores b) Hairs
c) Cilia d) Flagella

x) ..... ganglia are present in the abdomen of grasshopper.
a) Three b) Four
c) Five d) Six

2. Define / Explain / Comments on **any four.** 8

a) Malpighian tubules.

b) Haemal system in sea – star.

c) Haemocoel

d) Fertilization in sea – star.

e) Trachea

f) Gonads in Sea – Star.

3. Attempt **any two** of the following. 8

a) Describe sycon type canal system in sponges.

b) Describe foot in class – scaphopoda.

c) Sketch and label Metanauplius larva of crustacean.

खडू - 005

4. a) Attempt **any two** of the following. 6

   i) Describe brain of grasshopper.

   ii) Sketch and label crossed type pedicellariae.

   iii) Sketch and label maxilla of grasshopper.

   b) Explain – Oviposition. 2

5. Attempt **any one** of the following. 8

   i) Describe female reproductive system of grasshopper.

   ii) Describe the water vascular system of sea – star.

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Seat Number

0751

COMPUTER SCIENCE : UG - CS - 351
System Programming
(35241)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.
6. Draw neat diagram whenever necessary.

1. Attempt **any eight.** **8**

a) LTORG is ,.....
   i) Imperative statement
   ii) Declarative statement
   iii) Assembly directive statement
   iv) Non origin statement.

b) MACRO name followed by .....
   i) Actual parameter
   ii) Formal parameter
   iii) Formal and keyword parameter
   iv) None of these

c) TECO is which type of editor.
   i) Line editor ii) Stream editor
   iii) Screen editor iv) Structure editor

d) The specification gap between two programming languages bridges by .....
   i) Translator ii) Assembler
   iii) Migrator iv) De-translator

e) A → Y is which type of grammer.
   a) Type – 0 b) Type – 1
   c) Type – 2 d) Type – 3

f) Load time address is generated by .....
   i) Loader ii) Linker
   iii) Compiler iv) De-translator.

g) Object file containing library routines and data are –
   i) Dynamic library ii) Static library
   iii) Shared library iv) none of these

h) Bottom up parsing uses –
   i) Reduction ii) Derivation
   iii) Parse tree iv) Syntax tree

i) Which table is created in pass-2 of assembler –
   i) Literal table ii) Base table
   iii) Symbol table iv) OP code table

j) Back end performs function –
   i) Scanning
   ii) Memory allocation & code generation
   iii) Lexical & syntax analysis
   iv) None of these

2. Attempt **any four.** **8**

a) What is phase library ?

b) Define user centric view of system software.

c) What is de-translator.

d) Define finite Automata.

e) List the functions of, synthesis phase of assembler.

f) List and explain tables used in design of macro-assembler.

3. Attempt **any two.** **8**

a) Write short note on –
   i) Link and go scheme

   ii) Link, Load & go scheme.

b) Explain Goals of system software.

c) Describe in brief Top-Down parsing.

4. a) Attempt **any two.** 6

i) Explain tools for program designing and coding.

ii) What is macro ? Explain with example – Actual parameter, formal parameter, keyword parameter.

iii) Write short note on – Lexical Analyzer.

b) Compulsory question. 2
What do you mean by relocation.

5. Attempt **any one.**

a) i) Draw a flow chart of Pass – I of Assembler. 4

ii) Write a short note on 'Language Processor Development Tools". 4

b) i) Explain data structure used in Design of Assembler. 4

ii) Write short note on : 4

a) Relocatable program.

b) Self Relocatable program.

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Seat Number

खडू - 010

* 0 7 5 3 *

STATISTICS : ST - 351
Distribution Theory - I
(35171)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.
6. Use of statistical tables and calculator is allowed.

1. Attempt **any eight.** **8**

a) Let $(x_1, x_2, x_3) \sim MD\left(n = 3, p_1 = \frac{1}{2}, p_2 = \frac{1}{4}, p_3 = \frac{1}{4}\right)$. Write variance covariance matrix. (x_1, x_2, x_3).

b) Let $x_{(1)}, x_{(2)}, x_{(3)}, x_{(4)}$ be order statistics of random sample of size 4 from U (0, 1) distribution. State p.d.f. of x (4).

c) State weak law of large numbers (WLLN) for i.i.d.r.v.s with finite mean and finite variance.

d) State Chebychev's Theorem.

e) Let $X \sim U(-4,4)$. Find K such that $P[x < k] = \frac{1}{4}$.

f) Define convergence in probability of sequence of random variables.

g) let $x \sim U(a,b)$. State E (x).

h) Let $x_{(1)}, x_{(2)}, \ldots x_{(n)}$ be the order statistics corresponding to the random sample of size n from continuous distribution. If n is odd, state the distribution of sample median.

i) Let $(x_1, x_2, \ldots x_k) \sim MD\ (n, p_1, p_2, \ldots p_k)$ State the variance covariance matrix of $(x_1, x_2, \ldots x_k)$.

j) If $Mx\ (t) = (0.4 + 0.6e^t)^7$. What is mean and standard deviation of x.

2. Attempt **any four.** **8**

a) A random variable X has mean value 5 and variance 3, what is the least value of the $P[|X-5|<3]$.

b) State Bay's Theorem.

c) Let $X \sim B\left(400, \frac{1}{5}\right)$. Use central limit theorem (CLT) to find $P\left[0.25 < \frac{x}{n}\right]$.

d) Obtain mean and variance of degenerate random variable X.

e) State the m.g.f of geometric distribution with parameter p.

f) State the reproductive property of binomial distribution.

3. Attempt **any two.** **8**

a) Obtain the p.d.f of highest order statistic corresponding to a random sample of size n from a continuous distribution with distribution function F(x) and p.d.f. f (x).

b) State and prove the Chebyshev's inequality for continuous random variable x.

c) Suppose that (x,y) is a bivariate continuous random variables having p.d.f.
$f(x,y)=k \quad 0 < x < y < a, k > 0$
Find constant K. Also find p [x<y].

4. a) Attempt **any two.**
i) Suppose $\bar{x}$ is the mean of random sample of size 100 from Chi square distribution with 50 degree of freedom. Using central limit theorem (CLT) find an approximate value of **6**
$P\ [48.04 < \bar{x} < 51.96]$

ii) Let $x_{(1)} < x_{(2)} < ..... < x_{(10)}$ be the order statistics drawn from population with p.d.f.

$f(x) = e^{-x} \quad x > 0$

$= 0 \quad$ otherwise

Find $P[x_{(1)} > 0.2]$.

iii) Define uniform distribution find r^{th} moment about origin of uniform distribution and hence find variance.

b) Define trial and sample space. 2

5. Attempt **any one.** 8

a) Let $x_1, x_2, ... x_k$ have multinomial distribution with parameter $n, p_1, p_2, ... pk$ and $\sum_{i=1}^{k} pi = 1$. Find m.g.f of the distribution and hence find marginal distribution of x_1. Identity the distribution of x_1.

b) Let x and y be independent random variables with uniform distribution over (0,1) find the distribution of $U = \frac{x}{y}$ and $V = x.y$.

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Seat Number

खडू - 011

* 0 7 5 4 *

MICROBIOLOGY : MB - 351
Microbial Genetics (35191)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Neat labelled diagrams must be drawn wherever necessary.
6. Figures to the right indicate full marks.

1. Solve **any eight** of the following. **8**

i) The process in which ribosomes read information on mRNA and use it for protein synthesis is called.
   a) Transcription
   b) Translation
   c) Replication
   d) None of these

ii) RNA polymerase core enzyme has five subunits as follows.
   a) $2\alpha, 1\beta, 1\beta' \& 1\omega$
   b) $1\alpha, 1\beta, 1\beta' \& 1\omega$
   c) $2\alpha, 2\beta, 2\beta' \& 2\omega$
   d) $2\alpha, 1\beta, 1\beta' \& 2\omega$

iii) The central dogma of molecular biology deals with the fact that.
   a) DNA make RNA and RNA makes protein
   b) RNA makes DNA
   c) RNA makes protein
   d) RNA makes DNA and DNA makes protein.

iv) The shape of T_4 phage is.
   a) Polyhedral
   b) Polygonal
   c) Icosahedral
   d) Hexagonal

v) CI, CII, CIII are
   a) Terminator proteins
   b) Anti terminator proteins
   c) Protein inhibitors
   d) Repressor proteins

vi) The steps involved in the breakdown of bacterial chromosome are.
a) Unfolding
b) Disruption
c) Degradation
d) All of these

vii) Gram positive bacteria regulate competence by secreting external factors called.
a) Mesosomes
b) Hormones
c) Pheromones
d) Lysosomes

viii) Plasmids that are both conjugative and mobilizable are.
a) Self – transmissible
c) Plasmid mobilizable
c) Chromosome mobilizable
d) None of these

ix) The phenomenon of creating unstable transductants with unintegrated fragments is.
a) Abortive transduction
b) Specialized transduction
c) Generalized transduction
d) Phage conversion

x) Mechanism of transposition was proposed by.
a) Jim Shapiro
b) Lederberg
c) Jacod Monod
d) E. L. Tatum.

2. Solve **any four** of the following. **8**

i) What are PSTC proteins ?

ii) Write two examples in which phage conversion is observed.

iii) What is the role of the two promoters pRE & pRM ?

iv) Write the characteristic features of amber mutants.

v) What is rapid lysis inhibition ?

vi) What is a primary transcript.

3. Solve **any two** of the following. **8**

i) With a neat diagram describe the experiment used to demonstrate that DNA was the genetic material using radioactive isotopes.

ii) Explain how transcription terminates in bacteria.

iii) Explain the general mechanism of conjugation.

4. a) Solve **any two** of the following. 6

i) What is conservative and replicative transposition ?

ii) What is promoter clearance ?

iii) With a neat diagram demonstrate the steps involved in lytic cycle

b) Define transduction. 2

5. Solve **any one** of the following. 8

i) Explain the mechanism of translation in bacteria.

ii) Write the striking features of Mu phage.

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Seat Number

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INFORMATION TECHNOLOGY : UG - IT - 351
Database Management System
(35321)

P. Pages : 3

Time : Two Hours

Max. Marks : 40

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Draw figures wherever necessary.

1. Attempt **any eight.** **8**

i) Relational calculas is a.
   a) Procedural language
   b) Non procedural language
   c) DDL
   d) HLL

ii) Cartesian product in relational algebra is.
   a) Unary operator
   b) Binary operator
   c) A ternary operator
   d) Not defined

iii) DML is provided for.
   a) Description of logical structure of database
   b) Addition of new structure of DBMS
   c) Manipulation and processing of database
   d) None of these

iv) Architecture of the database can be viewed as.
   a) Two levels
   b) Four levels
   c) Three levels
   d) One level

v) In an E-R diagram attributes are represented by.
   a) Rectangle
   b) Square
   c) Ellipse
   d) Triangle

vi) Count function in SQL return the number of.
a) Valluer b) District values
c) Groups d) Columns

vii) Copy of one database is stored on two or more sites is.....
a) Fragmentation b) Replication
c) Authorisation d) None

viii) If a relation is in BCNF, then it is also in.
a) 1NF b) 2NF
c) 3NF d) 4NF

ix) A process of simultaneous updation of same database is.
a) Concurrency b) Non concurrency
c) Serial d) None of above

x) '6' operator is used for.
a) Selecting columns b) Defining predicate
c) Displaying columns d) None of above.

2. Attempt **any four.** **8**

a) Differentiate DBMS and RDBMS.

b) What is primary key ?

c) State transaction states with suitable diagram.

d) What is Relationship between strong and weak entity sel.

e) Define Data independence.

f) State any two importance of Backup.

3. Attempt **any two.** **8**

a) State and explain advantages of distributed database.

b) Explain any four Codds rules.

c) Write down syntax of GROUP BY clause of SQL with example.

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

a) Compute the clousure of following set F of functional dependences for relation schema.
$R=(A,B,C,D,E)$ $F=(A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A)$

b) What is Normalisation ? Explain 2NF.

c) Explain shadow paging.

B) Define OLAP. 2

5. Attempt **any one.** 8

a) Write down SQL for the following relation
Dept (dept – no, dname, location)
emp (emp – no, ename, designation, dept no)
Project (project – no, emp – no, project – name, status)

i) List all employees of 'computer' department of 'Jalgaon' location.

ii) List the names of employees who are working on 'Banking' project.

iii) Give the name of managers from 'marketing' dept.

iv) List afl the employees working under 'Incomplete' project.

b) Explain ACID properties with proper example.

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Seat Number

* 0 7 5 7 *

BIOTECHNOLOGY : BT - 351
Genetics
(35331)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to right indicate full marks.

1. Attempt **any eight** of the following. **8**

a) The character which expresses itself in F_1 generation is called as ..... character.
   i) Dominant ii) Recessive
   iii) Lethal iv) Codominant

b) The cross of a progeny individual with its any one of the two parents is known as.....
   i) Crossing over ii) Back cross
   iii) Test cross iv) Cloning

c) A gene which suppress the action of a gene at another locus is termed as..... gene.
   i) Hypostatic ii) Holandric
   iii) Epistatic iv) Supplementary

d) The occurrence of two or more genes in the same chromosome is known as .....
   i) Co – occurrence ii) Codominance
   iii) Multiple alleles iv) Linkage

e) In..... Chiasma, both the chromatids taking part in the second chiasma are different from those chromatids involved in the first chiasma.
i) Complimentary ii) Reciprocal
iii) Single iv) Gametic

f) The genes which occur on Y – chromosome are called.....
i) Lethal ii) Holandric
iii) Supplementary iv) Complimentary

g) Alkaptonuria is also called as.....
i) Phenylketonuria ii) Anemia
iii) Black urine disease iv) Albinism

h) The genetic makeup of an individual is known as .....
i) Phenotype ii) Homozygous
iii) Heterozygous iv) Genotype

i) When characters go directly from female to female is known as.....
i) Hologenic ii) Holandric
iii) Diagenic iv) Diandric

j) ..... is the total sum of alleles in the members of a population.
i) Gene frequency ii) Gene pool
iii) Genetic drift iv) Selection

2. Attempt **any four** of the following. **8**

a) Add a note on Lethal genes.

b) Discuss about incomplete dominance.

c) What is gene pool ?

d) Comment on simple crossing over.

e) Explain the concept of linkage.

f) Write about selection.

3. Attempt **any two** of the following. 8

a) Explain the law of independent assortment in detail.

b) Explain Hardy – Weinberg law briefly.

c) Describe the theories of linkage in detail.

4. a) Attempt **any two** of the following 6

i) What are the characteristics of crossing over ?

ii) Comment on quantitative inheritance.

iii) Describe diagnosis and treatment of phenylketonuria.

b) Give the characteristics of multiple genes. 2

5. Attempt **any one** of the following. 8

a) Describe the mechanism of crossing over.

b) Explain the law of segregation along with its phenomenon and example.

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Seat Number

* 0 7 5 5 *

BIOCHEMISTRY : BC - 351
Genetics (35211)

P. Pages : 2

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **all** questions.
5. Figure to right indicate full marks.

1. Attempt **any eight.** **8**

i) Down syndrome is due to.....
   a) Trisomy 21 b) Trisomy 18
   c) Trisomy 15 d) Trisomy 5

ii) Monosomics can be represented by.....
   a) 2h – 1 b) 2h – 2
   c) 2h -1 -1 d) 2 h +2.

iii) TATA box is located about ..... up stream from the transcription initiation site.
   a) 40 bp b) 50 bp
   c) 30 bp d) 20 bp

iv) The character which remain unexpressed in F1 – generation is called as..... character.
   a) Dominant b) Incomplete
   c) Recessive d) Lethal

v) In splicing clearage – ligation reaction occure by .....
   a) Transesterification b) Elongation
   c) Mutation d) Aldol condensation

vi) DNA polymerase I shows ..... activity.
   a) 3' → 5' Exonuclease b) 3' → 5' Endonuclease
   c) 5' → 3' Polymerization d) None of these

vii) The cross of individual with its recessive parents is known as .....
a) Back cross b) Test cross
c) Mega cross d) Incomplete cross

viii) Multiple cullels pressent in ..... speciese.
a) Same b) Different
c) Both d) All

ix) m RNA is transcribed from ..... direction.
a) 3' → 5' b) 5' → 3'
c) 4' → 3' d) 3' → 4'

x) The of blood group person have ..... antigen.
a) A & O b) Only O
c) B & O d) Only B.

2. Attempt **any four.** 8
Define following.
i) Back cross ii) Recon
iii) Uneuploidy iv) Ideogram
v) Mutagen vi) Recessive character.

3 Attempt **any two.** 8
i) What is incomplete dominance ? Explain
ii) Describe nonsense mutation.
iii) Describe Meselson & Stahl experiment.

4. a) Attempt **any two.** 6
i) What is karyotype ? Give its significance.
ii) Rho dependent termination of RNA synthesis.
iii) Describe 5' caping as a posttranscriptional modification.

b) What is splicing ? 2

5. Describe Law of segregation with suitable example. 8

OR

Describe Lac operon in details.

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Seat Number

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* 0 7 6 0 *

MATHEMATICS : MTH - 352
Real Analysis - I
(35112)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicates full marks.

1. Attempt **any eight** of the following. **8**

a) Define Riemann upper integral.

b) Define Riemann lower sum.

c) State the point at which $\int_0^1 \frac{dx}{\sqrt{1-x^2}}$ is improper.

d) State comparision test in limit form for improper integral $\int_a^b f(x)dx$

e) State first mean value theorem.

f) State Weierstrass's second mean value theorem.

g) State the Necessary and sufficient condition for R-integrability of a bounded function f on [a , b].

h) State the infinite point of discontinuity for $\int_0^1 \frac{1}{1-x}dx$.

i) Define Legendre polynomial.

j) Show that $P_n(1) = 1$.

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

i) If $f(x) = \sqrt{1-x^2}$ when x is rational
$= 1 - x$ when x is irrational.
show that f is not R-integrable on [0 , 1].

ii) Prove that every continuous function is R-integrable.

iii) Show that x^2 is R-integrable on any subinterval [0 , K].

b) Evaluate **2**

$$\lim_{n\to\infty} \frac{1}{n}\left[e^{1/n} + e^{2/n} + \_\_\_\_ + e^{1} \right]$$

3. Attempt **any two** of the following. **8**

i) State and prove weierstrass's mean value theorem.

ii) Show that $\frac{1}{2} \le \int_0^1 \frac{dx}{\sqrt{4-x^2+x^3}} \le \frac{\pi}{6}$

iii) Verify first mean value theorem for
$f(x) = e^x$ and $g(x) = x$ in $[-1,1]$.

4. a) Attempt **any two** of the following. **6**

i) Prove that every absolutely convergent integral is convergent.

ii) Examine the convergence of $\int_0^1 \frac{dx}{x^{1/2}\cdot(1-x)^{1/3}}$.

iii) Examine the convergence of $\int_1^\infty \frac{\log x}{x^2} dx$.

b) State Dirichlet's test for convergence of $\int_a^{\infty} f(x)\phi(x)dx$ at ∞. 2

5. a) Express $x^4+2x^3+2x^2-x-3$ in terms of Legendre polynomial. 4

b) Show that $P_n'(1)=\frac{1}{2}\eta(n+1)$ 4

OR

a) Show that $P_n(1)=1$. 4

b) Show that $P_n(-x)=(-1)^n P_n(x)$ and Deduce to $P_n(-1)=(-1)^n$. 4

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Seat Number

* 0 7 6 1 *

PHYSICS : PHY - 352
Classical Mechanics
(35122)

P. Pages : 3
Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to the right indicate full marks.
6. Draw neat and labelled diagram wherever necessary.

1. Attempt **any Eight** of the following. **8**

i) Lorentz force is given by_____.

a) $\vec{F} = Q\left(\vec{E} + \vec{V} \times \vec{B}\right)$ b) $\vec{F} = Q + \left(\vec{E} \times \vec{V} + B\right)$

c) $\vec{F} = Q\left(\vec{E} \times \vec{B} + V\right)$ d) $\vec{F} = Q \times \left(E \times \vec{V} \times \vec{B}\right)$

ii) Law of gravitation is _____.

a) $\vec{F} = G\dfrac{m_1 m_2 \vec{r}_{12}}{r_{12}^3}$ b) $\vec{F} = G + \dfrac{m_1 m_2}{r}$

c) $\vec{F} = G\dfrac{m_1}{r_{12}} + \dfrac{m_2}{r_{12}}$ d) $\vec{F} = G \cdot \dfrac{m_1^2 m_2^2}{r_{12}}$

iii) Kepler's III[rd] law of planetary motion is _____.

a) $T \alpha a$ b) $T^2 \alpha a^2$

c) $T^2 \alpha a^3$ d) $T \alpha a^3$

iv) If E=0 & E=1 the nature of orbit will be _____.

a) Hyperbola b) Parabola

c) Ellipse d) Circle

v) A holonomic Constraint is one that may be expressed in the form of equation relating _____ of system & time.

a) Co-ordinate b) Momentum

c) Energy d) Velocity

vi) The Lagrangian L as given by L =

a) T + V b) T V

c) T / V d) T – V

vii) Hamiltonian Canonical equations of motion are _____.

a) $\dot{q}_j = \frac{\partial H}{\partial P_j}; \dot{p}_j = \frac{-\partial H}{\partial q_j}$ b) $\dot{q}_j = \frac{\partial H}{\partial t}; \dot{p}_j = \frac{\partial H}{\partial q}$

c) $\dot{p}_j = \frac{-\partial H}{\partial t}; \dot{q}_j = \frac{\partial H}{\partial P}$ d) $\dot{q}_j = \frac{\partial H}{\partial \dot{P}_j}; \dot{p}_j = \frac{-\partial H}{\partial \dot{q}_j}$

viii) Equation between L & H is _____.

a) L + H = 0 b) $\frac{-\partial L}{\partial L} = \frac{\partial H}{\partial t}$

c) $\frac{\partial L}{\partial t} = \frac{\partial H}{\partial t}$ d) $\frac{\partial L}{\partial x} = \frac{\partial H}{\partial x}$

ix) The earth Constitutes a rotating system with angular velocity _____.

a) 70×10^{-2} rad/sec b) 7×10^{-3} rad/sec

c) 0.7×10^{-4} rad/sec d) Zero

x) The operator equation is _____.

a) $\frac{d}{dt} = \frac{dI}{dt} + \vec{\omega} \lambda$ b) $\frac{\partial}{\partial t} = \frac{\partial}{\partial x} + \vec{r}$

c) $\frac{d}{dx} = \frac{dI}{dx} + \vec{r} \lambda$ d) $\frac{d}{dx} = \frac{dI}{dt}$

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2. Attempt **any four** of the following. 8

a) Mention any two types of forces.

b) What is non holonomic Constraint.

c) Write the lagrangian for charged particle moving in an electromagnetic field.

d) Define Conservation of linear momentum.

e) Define parabola show with figure.

f) State second Newtons Law of motion.

3. Attempt **any two** of the following. 8

a) Derive an equation for one dimensional motion of particle with velocity $\dot{r}$ & position r.

b) Apply Lagrange's equation of motion to simple Pendulum.

c) Obtain mathematical statement of D' Alembert's principle.

4. a) Attempt **any two** of the following. 6

i) Explain physical significance of H.

ii) Explain Idea of Phase space.

iii) State and prove Kaper's IIIrd Law of planetary motion.

b) Write the equation of Coriolis force. 2

5. Attempt **any one** of the following. 8

a) Derive equation of motion of a particle Subjected to Central force.

b) Derive an expression for effective force f_{eff} with the help of rotating co-ordinate system.

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