Seat Number

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BACHELOR OF VOCATION (B.Voc.) : GHT - 111
Greenhouse Plant Protection Management
(11411)

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 **any six** questions from **Section - A**.
5. **Section - B** is compulsory.
6. Each question carries 5 marks.

SECTION – A

1. List out names each group of crops (vegetables, flowers and nursery seedlings) grown in green house with any two diseases occured in each crop. 5

2. Define plant pathology, name various pathogens responsible for plant diseases. 5

3. Give the detail classification of insects. 5

4. Discuss the importance of plant quarantine. 5

5. What are various methods of disease control, describe any one. 5

6. Define integrated pest management and discuss its advantages. 5

7. How insects dispersal occurs, write note on movement of insects. 5

8. Write symptoms of powdery mildew and anthracnose. 5

SECTION – B

9. a) What do you mean plant quarantine.   1

    b) .... disease occur in grape seedlings in green house.   1

    c) ...., ..., ..., are biological pest control measures in   1
       green house.

    d) .... is predator of economic damaging pest aphids.   1

    e) .... are transmitted from plant to plant by vegetative   1
       propagation.

10. a) Write short note on Bordeaux mixture.   2

    b) Write long form of ai, EC, SL, WP, G, ae.   3

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0025

BACHELOR OF VOCATION (B.VOC.)
PT - 111
Printing Technology - I
(11421)

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 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. Fig. to the right indicate full marks.

1.   Attempt **any eight.**   8

   a)   What is use of Zoom tool?

   b)   What is Die-Cutting?

   c)   Define Scoring?

   d)   Which process ink used in offset printing?

   e)   Name file extension in CorelDraw?

   f)   Define perforation.

   g)   What is binding?

   h)   What is meant by ctp?

   i)   Define Colours?

   j)   Types of shapes?

2. Attempt **any four.** 8

   a) What is Digital printing?

   b) Explain primary colours?

   c) Short note on Marketing.

   d) Principles of offset printing?

   e) What is Photoshop.

   f) Draw a Diagram of Communication cycle.

3. Attempt **any two.** 8

   a) Write steps of marketing strategies in detail?

   b) What is CorelDraw?

   c) Write a notes on value added finishing.

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

     i) Write a note on supervisory skill.

     ii) Explain types of communication.

     iii) Explain Pre-press.

   b) Types of Printing Processes. 2

5. Attempt **any one.** 8

   a) Write down a types of text effects in Photoshop.

   b) Explain in detail 'skill of supervision'.

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0027

BOTANY PAPER - I : BOT - 111
Lower Cryptogams
(11145)

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 diagrams wherever necessary.

1.   Solve **any eight.**   8

   a)   Fusion between gametes of same size is known as _____.

      i)   Isogamy   ii)   Anisogamy

      iii) Oogamy   iv)   Somatogamy

   b)   _____ Reserve food is Present in Nostoc.

      i)   Cynophycean Starch   ii)   Chitin

      iii) Mannitol   iv)   Starch

   c)   Plastids are absent in _____.

      i)   Cyanophyta   ii)   Chlorophyta

      iii) Rhodophyta   iv)   Phaeophyta

d) In <u>Sargassum</u> the Part of the Oogonium that forms the psuedostalk is called as _____.

    i) Exochite   ii) Mesochite

    iii) Endochite   iv) Stalk cells

e) Agar-agar is obtained from _____.

    i) <u>Ulothrix</u>   ii) <u>Spirogyra</u>

    iii) <u>Gracillaria</u>   iv) <u>Nostoc</u>

f) Coenocytic Mycelium is found in _____.

    i) Myxomycetes   ii) phycomycetes

    iii) Basidiomycetes   iv) Ascomycetes

g) Reserve food material in fungi is _____.

    i) Cellulose   ii) Starch

    iii) Protein   iv) Glycogen & Oil

h) Ascocarp type of fruiting bodies are found in class _____.

    i) Ascomycetes   ii) Basidiomycetes

    iii) Phycomycetes   iv) Myxomycetes

i) _____ is a fungus Commonly used as food.

    i) <u>Agaricus</u>   ii) <u>Albugo</u>

    iii) <u>Penicillium</u>   iv) <u>Aspergillus</u>

j) <u>Rhizopus</u> is also known as _____.

    i) Black mould   ii) White rust

    iii) Aquatic Saprophytes   iv) Symbiotic fungi

2. Solve **any four.** 8

    i) Give any four general characters of Algae.

    ii) What is anisogamy.

    iii) Give the distinguishing characters of Rhodophyta.

    iv) Explain septate and Aseptate mycelium.

    v) Sketch and label the thallus structure of Rhizopus.

3. Solve **any two.** 8

    i) Explain Sexual reproduction in Algae.

    ii) Role of fungi in industries.

    iii) Sketch label and describe the female conceptacle of Sargassum.

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

    i) Explain internal structure of gills in Agaricus.

    ii) Explain Ultra-structure of Nostoc cell.

    iii) Role of algae in industries.

  b) Secondary mycelium of Agaricus. 2

5. Describe the modes of nutrition in Fungi. 8

OR

Give outline classification of Fungi as per G.M. Smith up to classes giving two example of each class.

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Seat Number

0028

GEOINFORMATICS PAPER - I : GEOI - 101
Fundamentals of Computer : Part - I
(14011)

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 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)   Enlist any four DBMS.

   b)   Give the names of first generation computers.

   c)   Give the sizes of the floppy disk.

   d)   What is output device?

   e)   Define Computer.

   f)   What is the use of word processing software in daily life?

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

   a)   Write note on compact disk.

   b)   Write short note on word processor.

   c)   Explain the concept of simplex, half-duplex and full-duplex connections.

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

    i) Explain the input and output to computer.

    ii) Differentiate between vector and bitmap.

    iii) Write note on RAM.

  b) What is storage device? 2

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

  a) Explain the characteristics of monitor.

  b) Discuss 'speed' characteristics of computer.

  c) Write short note on star and ring topology.

5. a) Attempt **any one** of the following. 6

    i) Explain block diagram of computer.

    ii) Explain keyboard and mouse in detail.

  b) What is EPROM? 2

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Seat Number

MATHEMATICS PAPER - I : MTH - 111
Theory of Matrices
(11115)

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 is not allowed.

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

i) If $A = \begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}$, Find adj A

ii) If A, B are two square matrices of same order such that $A \cdot B = I$ then B = ?

iii) If $A = \begin{bmatrix} 2 & 6 \\ 3 & x \end{bmatrix}$ and $\rho(A) = 1$, then find the value of x.

iv) Write down inverse of an elementary matrix $E_2(7)$ of order three.

v) Define homogeneous system of linear equations.

vi) State Cayley - Hamilton theorem.

vii) Write down the quadratic form of the matrix

$A = \begin{bmatrix} 1 & 2 \\ 2 & 2 \end{bmatrix}$

viii) Show that the matrix $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$
is proper orthogonal matrix.

ix) State the rank of matrix A if A is non - singular matrix of order 8.

x) Define signature of a quadratic form.

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

   i) If A and B are non - singular matrices of the same order then prove that
   adj(A.B) = adjB. adjA

   ii) Find the inverse of the matrix A by using adjoint method
   $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix}$

   iii) Verify that A.adjA = adjA.A =| A | . I where $A = \begin{bmatrix} 2 & 1 \\ 3 & 2 \end{bmatrix}$

   b) Write down the inverse of an elementary matrix $E_{13}(5)$ of order 3.   2

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

   i) Prove that every non - singular matrix can be expressed as a product of
   a finite number of elementary matrices.

   ii) Reduce the matrix A to its normal form and find its rank where

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

   iii) Obtain non - singular matrices P and Q such that PAQ is in the normal
   form, where $A = \begin{bmatrix} 2 & 6 \\ 1 & 3 \\ 3 & 9 \end{bmatrix}$
   Also find the rank of matrix A.

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

   i) Find eigen values and eigen vectors of the matrix $A = \begin{bmatrix} -2 & 7 \\ 2 & 3 \end{bmatrix}$.

   ii) State the condition for consistency of the system of linear equations AX = B.
   Examine the following system of equations for consistency
   $$x + z = 2$$
   $$-2x + y + 3z = 3$$
   $$-3x + 2y + 7z = 4$$

   iii) Find the value of λ for which the system of equations have non - trivial solution.
   $$x + 2y + 3z = 0$$
   $$2x + 3y + 4z = 0$$
   $$3x + 4y + \lambda z = 0$$

   b) Verify Cayley Hamilton theorem for the matrix 2
   $$A = \begin{bmatrix} 1 & -5 \\ 3 & 2 \end{bmatrix}$$

5. a) i) Define orthogonal matrix 4
   prove that the matrix
   $$A = \frac{1}{9}\begin{bmatrix} -8 & 4 & 1 \\ 1 & 4 & -8 \\ 4 & 7 & 4 \end{bmatrix}$$
   is orthogonal.

   ii) Reduce the quadratic form 4
   $$x^2 - y^2 + z^2 - xy - 8yz + 2xz$$
   to its canonical form. Find its rank and index.

   OR

   a) i) For an orthogonal matrix A, show that $A^{-1} = A^T$. 4
   Verify whether the matrix A is orthogonal or not where
   $$A = \frac{1}{3}\begin{bmatrix} 2 & 2 & -1 \\ 2 & -1 & 2 \\ -1 & 2 & 2 \end{bmatrix}$$

   ii) Reduce the quadratic form 4
   $$x^2 + 2y^2 + 2z^2 + 2xy - xz + 2yz$$
   to its canonical form. Find its rank, index and signature.

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Seat Number

MICROBIOLOGY PAPER – I : MB - 111
Elementary Microbiology
(11195)

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 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.   Solve **any eight.**   8

a)   Virology is the study of ....
     a) Bacteria   b)   Protozoa
     c) Algae   d)   Fungi

b)   Archaebacteria used in biogas production is............
     a) Methanogens   b). Thermoacidophiles
     c) Halophiles   d)   All of these

c)   .... was the discoverer of penicillin.
     a) Alexander Fleming   b)   Robert Koch
     c) Louis Pasteur   d)   None of Above

d)   Retroviruses produces .... enzyme.
     a) Protease   b)   Amylase
     c) Reverse transcriptase   d)   None of the above

e)   E. Coli is an example of ....
     a) Cocci   b)   Bacilli
     c) Sprilli   d)   All of the above

f)   The cell division of prokaryotes occur by.
     a) Binary fission   b)   Meiosis
     c) Mitosis   d)   All of the above

g) The controversy of spontaneous generation was solved by.
   a) Louis Pasteur
   b) Robert Koch
   c) Joseph Lister
   d) Leeuwenhoek

h) Fungi are ....
   a) Heterotrophic
   b) Saprophyte
   c) Parasite
   d) All of the above

i) Bacterial cell wall mainly composed of ....
   a) Peptidoglycan
   b) Lipids
   c) Protein
   d) Vitamin.

j) Photosynthetic bacteria contain ....
   a) Chloromosome
   b) Chloroplast
   c) Both a & b
   d) None of these

2. Define **any four**.   8
   a) Putrefaction
   b) Pure culture
   c) Chemotherapy
   d) Mycology
   e) Nanotechnology
   f) Genetic Engineering.

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

   a) Compare between archaebacteria and eubacteria.

   b) Give general characteristic of algae.

   c) Describe Tyndallization experiment.

4. Write short notes on **any two**.   6
   a) i) Food and dairy microbiology.

      ii) 3 domain system of classification.

      iii) Magic Bullet.
   b) Phycology.   2

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

   a) Explain Binomial system of classification.

   b) Give the general characteristic and signification of bacteria.

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Seat Number

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0 0 3 1

ELECTRONICS PAPER - I : ELE - 111
Analog Electronics - I
(11225)

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 Logarithmic Table and non-programmable calculator is allowed.

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

a) Capacitor is used to.............
   i)   block dc current flow   ii) bypass dc current flow
   iii) block ac current flow   iv) dissipate heat.

b) The output voltage of isolation transformer is .... its input voltage.
   i)   greater than   ii) less than
   iii) equal to   iv) none of these

c) .... current flows through each resistance if they are connected in series.
   i)   different   ii) same
   iii) half   iv) double

d) .... gets divided in parallel circuit.
   i)   voltage   ii) voltage and current
   iii) current   iv) none of these

e) According to Ohmis law...........
   i) V= I x R   ii) I = V/R
   iii) V = I/R   iv) I = V x R

f) Norton's theorem reduces complicated network into ....
   circuit.
   i) Simple series   ii) Simple parallel
   iii) tank   iv) none of these

g) The SI unit of frequency is..........
   i) Hz   ii) H
   iii) F   iv) Ω

h) Polarity of sine wave reverses after every........... cycle.
   i) half   ii) full
   iii) two   iv) four

i) Time constant of R-L circuit is given by T =........
   i) R/L   ii) L/R
   iii) RL   iv) R + L

j) In series RC circuit initial rate of rise of voltage is
   i) minimum   ii) maximum
   iii) zero   iv) constant

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

8

   a) Calculate time constant of circuit containing L = 24 μH and
      R = 10 MΩ.

   b) State characteristics of sine wave.

   c) State superposition theorem.

   d) Explain voltage divider circuit.

   e) State and explain Norton's theorem.

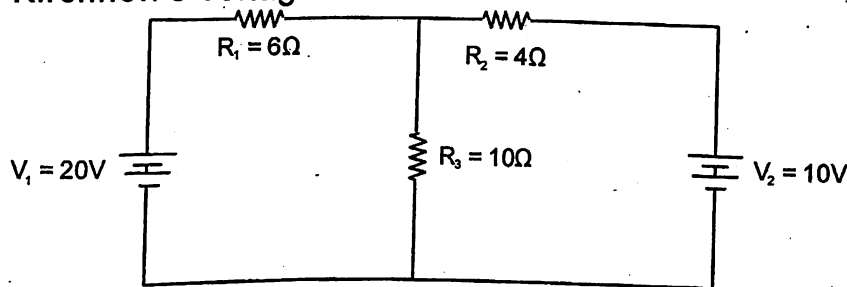   f) State characteristics of parallel circuit.

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

8

   a) Explain the growth of current in R - L circuit and derive
      expression for time constant.

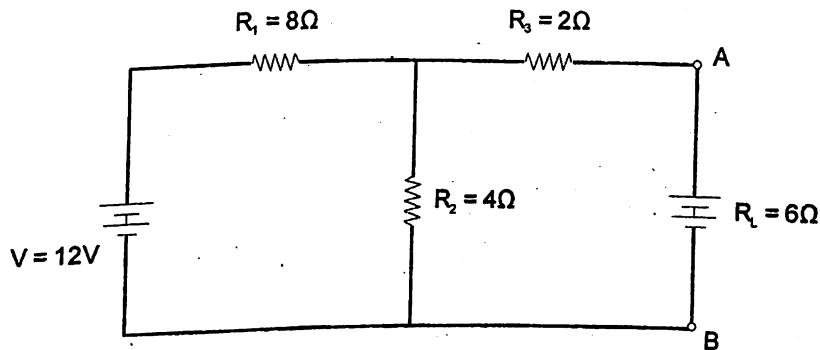b) Find current flowing through R_3 in following circuit using Kirchhoff's voltage law.

$R_1 = 6\Omega$ $R_2 = 4\Omega$

$V_1 = 20V$ $R_3 = 10\Omega$ $V_2 = 10V$

c) Write a note on basic ac generator.

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

    i) Find thevenin's equivalent circuit of given network

$R_1 = 8\Omega$ $R_3 = 2\Omega$ A

$R_2 = 4\Omega$ $R_L = 6\Omega$

$V = 12V$

B

    ii) Find the minimum and maximum value of resentence having colour code sequence brown - red - orange - gold.

    iii) Write a note on electromagnetic relay.

b) State and explain Kirchhoff's voltage law.   2

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

   a) What is transformer? State its types with symbol. Deduce basic relation for voltage, current and turns ratio of it.

   b) State and prove maximum power transfer theorem. Show that efficiency of dc source is 50% under maximum power transfer condition.

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Seat Number

ENVIRONMENTAL SCIENCE PAPER - I
ENVI - 111
Introduction to Environment - I
(11395)

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 following.   8

i) The maximum number of individuals of a species that can be sustained by the Earth is known as _____.

   a) Earth's carrying capacity.

   b) Sustainable development.

   c) Sustainability.

   d) None of the above.

ii) The main source of energy for the biosphere is _____.

   a) Respiration   b) Photosynthesis

   c) Sun light   d) Carbohydrates

iii) The blanket of gaseous and vapors around the earth is known as

   a) Atmosphere   b) Stratosphere

   c) Ionosphere.   d) Troposphere.

iv) Factor responsible for environmental crisis is _____.

a) Deforestation b) Pollution

c) Desertification d) All of the above

v) The source of fresh water needed for humans, animals and plants is _____.

a) Ground water b) Rain water

c) River water d) None of the above

vi) The oxygen content of Atmosphere is about _____.

a) 21.94% b) 18%

c) 79% d) 0.33

vii) Environmental science includes which of the following?

a) Traditional science b) Societal values

c) Political awareness d) All of the above

viii) The physical, abiotic components of our planet can be divided into the _____.

a) Lithosphere, biosphere, and atmosphere.

b) Lithosphere, hydrosphere and atmosphere.

c) Lithosphere, hydrosphere, biosphere and atmosphere.

d) Centrosphere, geosphere, biosphere and biosphere.

ix) Plants conduct photosynthesis, making glucose and other carbohydrates. To do this they need _____.

a) Water from the soil.

b) Water from the humid atmosphere and carbon dioxide from the soil.

c) Water from the soil and carbon dioxide from the soil.

d) Water from the soil and carbon dioxide from the atmosphere.

x) UN conference on sustainable development (2012) was held during 13th to 22nd June at _____.

a) London b) Nairobi

c) Rio de Janeiro d) New Delhi

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

   i) Explain in detail global environmental problems.

   ii) Discuss origin of life on the Earth?

   iii) Explain in brief components of the environment.

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

   i) Discuss the man and environment interaction.

   ii) Discuss the Earth' carrying capacity.

   iii) Explain the various disciplines of environmental science.

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

   i) Explain scope of environmental science.

   ii) Explain evolution of life forms through ages.

   iii) Discuss structure of and type of the environment.

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

   i) Explain in detail evolution of the Universe.

   ii) How man and environment is interrelated? Explain.

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0034

BIOCHEMISTRY PAPER - I : BC - 111
Chemistry of Bio-molecules
(11215)

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 pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory & carry equal marks.
5. Draw correct diagram wherever necessary.
6. Figures to right indicate full marks.

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

   a) Epimers.

   b) Unsaturated fatty acids.

   c) Essential amino acids.

   d) Heteropoly saccharides.

   e) Lipids.

   f) Ketogenic amino acids.

   g) Carbohydrates.

   h) Antioxidants.

   i) Isoelectric pH.

   j) Peptide bond.

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

   a) Name any four bonds responsible for protein structure.

   b) What is saponification number? Give one example.

   c) What do you mean by sugar phosphates & sugar amines?

   d) Explain inversion of sucrose.

   e) Draw structure of phosphatidic acid.

   f) What are coagulated proteins & metaproteins?

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

   a) Define terpene & describe carotenoids.

   b) Describe chondroitin sulfate.

   c) Describe secondary structure or Protein.

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

   i) Give classification of amino acids based on polarity.

   ii) Describe essential fatty acids.

   iii) What is mutarotation? Describe it's mechanism.

  b) Give nomenclature of fatty acids. 2

5. What are Polysaccharides? Describe starch in detail. 8

OR

Describe terpenes in detail.

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0055

COMPUTER SCIENCE PAPER-I : UG-CS-111
Basics of Computer
(11245)

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)   Define operating system.

b)   What is software ?

c)   Enlist input devices of computer.

d)   RAM stands for
     i)   Release Access Memory
     ii) Race At Memory
     iii) Random Access Memory
     iv) Read Access Memory

e)   What is DOS ?
     i)   Data operator student
     ii) Disk operator student
     iii) Disk operating systematic
     iv) Disk operating system

f)   Which command is Linux command ?
     i)   Copy   ii)   Erase
     iii) pwd   iv)   cwd

g) Which of the software is application software ?
   i)   Compiler   ii)   Interpreter
   iii) Ms – word   iv) None of these

h) What is MAN ?
   i) . Meter Area Network
   ii) Mega Area Network
   iii) Metropolitan Area Network
   iv) Mean Array Network

i) Enlist DOS commands.

j) What is GUI in windows O. S. ?

2.   Attempt **any four.**   8

a) What is shell ?

b) What is computer ?

c) What is an Internet ?

d) What are limitations of DOS ?

e) List out the names of Anti – viruses.

f) What is "Honey Pot System" ?

3.   Attempt **any two.**   8

a) Differentiate between DOS and Windows O. S.

b) What is search engine ? Explain any one search engine.

c) List out and Explain any one type of computer.

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

a) Describe in brief the uses of Internet.

b) Write short note on "printer".

c) What is booting ? Explain.

b) Explain following Linux commands 2
   i) ℓs   ii) Cat

5. Attempt **any one**.

   a) i) Write an algorithm to print factorial of a given number. 4

      ii) Draw Block diagram of computer and explain function 4
          of each part of computer.

                    OR

   b) i) What is flow chart ? Explain different types of symbols 4
         used in flowchart.

      ii) Describe in brief the windows explorer. 4

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0058

GEOLOGY PAPER - I : Gl - 111
Geodynamics
(11165)

P. Pages : 2

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

Instructions to Candidates :
1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Draw diagrams wherever necessary.

1.   Define **any four**   8

1) .... discontinuity exists between Mantle and Core.
   a) Gutenberg   b)   Conrad   c)   Mohorovicic

2) .... is the name of our Galaxy.
   a) Milky Way   b)   Andronema   c)   Constellations

3) Age of the earth is............
   a) 4.5 Ma   b)   4500 Ma   c)   4500 yrs

4) .... is depositional landform of wind.
   a) Leeves   b)   Dunes   c)   Morains

5) Valley is erosional landform of............
   a) Wind   b)   River   c)   Ocean

6) Ritcher's scale is related to.............
   a) Volcano   b)   Mountains   c)   Earthquakes

7) Western Ghats are............. type of mountains.
   a) Tectonic   b)   Erosional   c)   Depositional

8) Earth is.......... planet from Sun.
   a) 4th   b)   3rd   c)   5th

2. Describe **any two**   8

    1) Structure of a volcano.

    2) Pratt's hypothesis of Isostasy.

    3) Sub divisions of Geology.

3. Explain **any two**   8

    1) Big Bang Theory.

    2) Atmosphere and Hydrosphere.

    3) Epirogenesis.

4. Write notes on **any two**.   8

    1) Mantle.

    2) Elastic rebound theory.

    3) Delta.

5. Define and Discuss Plate tectonics.   8

OR

Explain erosional landforms of Oceans.

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* 0 0 5 9 *

BOTANY PAPER – II : BOT - 112
Cell Biology
(11146)

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 diagrams wherever necessary.

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

a) Which of the followings directs and controls all the activities of a cell.
   i) Cell wall   ii) Nucleus
   iii) Flagella   iv) Chloroplasts

b) Rough Endoplasmic Reticulum possess .... on its wall.
   i) Ribosomes   ii) Vesicles
   iii) Pigments   iv) None of these

c) Which of the following organelle functions as packing & forwarding center' of a cell.
   i) Golgi complex   ii) Endoplasmic reticulum
   iii) Nucleus   iv) Cell wall

d) Who proposed the cell theory?
   i) Singer & Nicolson   ii) Schleiden & Schwann
   iii) Nageli & Cramer   iv) R. Brown & R. Hook.

e) 'Suicide bags' are commonly known as..........
   i) Ribosomes   ii) Lysosomes
   iii) Vacuoles   iv) Plastids

f) In prokaryotic cells......... is absent.
   i) Nuclear membrane   ii) Flagella
   iii) plasma membrane   iv) asexual reproduction

g) Golgi apparatus was first time observed by.......
   i) K. R. Porter
   ii) Camillo Golgi
   iii) Robertson
   iv) George Palade

h) Which cell division take place in somatic cells?
   i) Meiosis
   ii) Mitosis
   iii) Binary fusion
   iv) None of these

i) Thyllakoids are saclike bodies found in...........
   i) Chloroplasts
   ii) Leucoplasts
   iii) Chromoplasts
   iv) All of these

j) Telocentric chromosomes generally looks like....... shaped.
   i) J
   ii) V
   iii) i
   iv) L

2. Attempt **any four** of the followings.   8
   i) What is secondary cell wall?
   ii) What is amitosis?
   iii) Give the chemical composition of cell membrane.
   iv) Define Heterochromatin.
   v) Enlist various types of plastids.
   vi) Describe the structure of Rough Endoplasmic Reticulum.

3. Attempt **any two** of the followings.   8
   i) Give few important functions of Golgi Complex.
   ii) What are Lysosomes? Give its types.
   iii) Enlist the stages of meiosis.

4. a) Attempt **any two**.   6
   i) Describe the ultrastructure of Nucleus.
   ii) Give the chemical composition of cell wall.
   iii) Describe the structural organization of chromosome.

   b) Define telomeres.   2

5. Describe the Mitochondria with respect to shape, size, number and   8
   ultrastructure.
   OR
   Describe the functions of Nucleus.

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Seat Number

0060

GEOINFORMATICS PAPER - II : GEOI - 102
Fundamentals of Geoinformatics : Part - I
(14012)

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) Define scale.

   b) What is projection?

   c) Write the quantitative methods.

   d) What is Map?

   e) RF stand for..........

   f) What is bar graph?

2. Attempt **any two** of the following :   8

   a) Write note on Choropleth map.

   b) Classification of maps.

   c) Azimuthal Projection.

3. a) Answer the following **any two**.   6

    i) Write note on Dot map.

    ii) Explain the classification of map projection.

    iii) Explain methods of relief features extraction.

   b) Object oriented models.   2

4.   Attempt **any two** of the following :   8

   a) Distinguish between raster and vector Data.

   b) Explain the statistical diagrams.

   c) What is the difference between small and large scale maps?

5. a) Explain the quantitative methods of relief features extraction with   6
    suitable examples.

OR

Methods of representing Scale.

   b) What is pia diagram?   2

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Seat Number

CHEMISTRY PAPER - I : CH - 111
Physical & Inorganic Chemistry
(11135)

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 a neat diagram wherever necessary.
7. Use of logarithmic table and non programmable calculator is allowed.

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

   i) The logarithm of any number to the same base is always.
       a) 0   b) 1
       c) 2   d) None of these.

   ii) When the slope of any two line is - 1, then these lines are......
       a) Parallel to each other   b) Perpendicular to each other
       c) Parallel having slope -1 d) None of these.

   iii) The unit of equivalent conductance is
       a) ohm cm^2 b) ohm^{-1} cm^2
       c) mho cm^{-2} d) ohm^{-1} cm^{-1}.

   iv) Which of the following electrolyte solution has maximum specific conductance.
       a) 0.1 N   b) 1N
       c) 0.25N   d) 0.75N.

   v) Liquid with high molecular weight have ...... viscosity.
       a) lesser   b) greater
       c) 0 (zero)   d) None of these.

vi) The formula used for the determination of surface tension by capillary rise method is......

   a) $2r = hrdg$ b) $2r = hr^2dg$

   c) $2r = \pi hcos\phi$.   d) $2r = \pi hr^2dg$.

vii) The shape of Xef4 molecule is.......
   a) Linear   b) Pyramidal
   c) Square planner   d) Angular.

viii) The axial overlaps between the two S- orbitals leads to the formation of
   a) Covalent bond.   b) Multiple bond.
   c) Ionic bond.   d) Co-ordinate bond.

ix) In SF4 molecule the s- atom
   a) Sp^3d^2 hybridised.   b) Sp^3d hybridised.
   c) Sp^3 hybridised.   d) Sp^3d^3 hybridised.

x) The strength of a bond depends upon.
   a) Extent of overlapping between the orbitals.
   b) Free rotation about molecular axis.
   c) Whether the overlap is axial or side wise.
   d) Resonance in the molecule.

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

                                                              8

i) Find the equation of a straight line having slope = 3 and passing through the point (2, -3).

ii) The dissociation constant of acetic acid is 1.75×10^{-5}, calculate pKa of acetic acid.

iii) Define equivalent conductance give its units.

iv) Give the C.G.S. and S.I. units of viscosity.

v) Explain S-P overlap with suitable example.

vi) Explain the formation of co-ordinate bond.

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

   i) Differentiate.

     a) $y = x^3(x^2 - 2)$

     b) $y = \dfrac{x^6}{4x^2}$

   ii) Evaluate.

     a) $\int(x^7 + 5x^3 + 5)dx$

     b) $\int_{0}^{5} x^2 \cdot dx.$

   iii) The resistance of 0.1 M acid solution is 2.5×10^3 ohm when measured in a cell whose cell constant is 1.15 cm^{-1} calculate the equivalent conductance of solution.

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

   i) Define covalent bond. Explain formation of NH3 molecule by Lewis concept.

   ii) Discuss Sp^3d^2 hybridisation with suitable example.

   iii) Discuss drop number method to determine surface tension of the liquid.

5. a) Explain how the solubility of sparingly soluble salt is determined by conductance measurements. 6

<div align="center">OR</div>

On the basis of V.S.E.P.R. theory draw & discuss shape of SF_4 molecule.

   b) Explain the effect of pressure on viscosity. 2

<div align="center">***********</div>

0 2 9 8

ELECTRONICS PAPER - II : ELE - 112
Digital Electronics - I
(11226)

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. Figure to right indicates full marks.
6. Use of logarithmic table and non programmable calculator is allowed.

1. Attempt **any eight**. 8

a) _____ number system consist of numericals and alphabates.
   i) Hexadecimal. ii) Octal.
   iii) Binary. iv) Decimal.

b) when both inputs of OR gate are high output is _____.
   i) High. ii) low.
   iii) medium. iv) uncertain.

c) Addition of $(0101)_2$ and $(1001)_2$ is _____.
   i) 1100. ii) 1110.
   iii) 1001. iv) 1111.

d) NOT gate is constructed using _____.
   i) diodes. ii) diodes & resistor.
   iii) transistor. iv) resistors.

e) Binary equivalent of decimal 2.25 is
   i) 10.01. ii) 10.11.
   iii) 0010. iv) 01.001.

f) An Ex-OR gate produces output high only when its two inputs are
   i) high. ii) low.
   iii) different. iv) same.

g) If A=B=1, then $\overline{A+B}$ = _____.
    i)   0   ii)   1
    iii) AB   iv)   A + B

h) The total number of input states for 4 input OR gate is _____.
    i)   20   ii)   16
    iii) 8   iv)- 4

i) In K-map four adjacent ones form _____.
    i)   quad.   ii)   octet.
    iii) pair.   iv)   none of these.

j) Three variable K-map has _____ cells.
    i)   8   ii)   16
    iii) 3   iv)   9

2. Attempt **any four.**   **8**
    a) Find the decimal equivalent of $(10001)_2$.
    b) What is K-map?
    c) Convert decimal number 17 into 8421 code.
    d) Draw the logic circuit diagram for $Y = \overline{A} + BC$.
    e) Draw the symbol of 2-input AND gate & its truth table.
    f) Find 2's complement of 1011011.

3. Attempt **any two.**   **8**
    a) Write a note on Grey Code.
    b) Explain working of OR gate using diodes and resistors.
    c) Using Boolean laws, simplify the equation
       $Y = (A + B)(A + B)(A + C)$.

4. a) Attempt **any two.**   **6**
     a) Convert $Y = AB + A\overline{C} + BC$ into canonical SOP form.
     b) Draw the logic diagram of half adder and explain working of it.
     c) Show that complement of product is equal to sum of complement.

   b) Find the octal equivalent of decimal 88.   **2**

5. Write the truth table for $f(A, B, C, D) = \Sigma m(1,3,4,5,7,9,11,13,15)$.   **8**
    Draw the K- map and simplify it to obtain SOP equation.
<div align="center">**OR**</div>
    Explain with logic diagrams NAND gate as a universal building block.

<div align="center">**************</div>

0 2 9 9

ENVIRONMENTAL SCIENCE PAPER - II : ENVI - 112
Natural Resources - I
(11396)

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. Draw neat and labeled diagrams wherever necessary.

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

i) Biogas is which type of natural resources.
    a) Renewable.   b) Inexhaustible.
    c) Non-conventional.   d) Both (a) and (c)

ii) More than 70% of world's fresh water is contained in
    a) Ponds.   b) Glaciers and polar ice caps.
    c) Green land.   d) Oceans.

iii) Which one of the following is not a functional unit of an ecosystem?
    a) Productivity.   b) Stratification.
    c) Energy flow.   d) Decomposition.

iv) Which one of the following is not a gaseous biogeochemical cycle in ecosystem?
    a) Nitrogen cycle.   b) Carbon cycle.
    c) Phosphorus cycle.   d) Oxygen cycle.

v) Identify the possible link "A" in the following food chain.
Plant→insect→frog→"A"→Eagle.
    a) Cobra.   b) Parrot.
    c) Rabbit.   d) Wolf.

vi) A Carbon dioxide is called green-house gas because it is
   a) Transparent to sunlight but traps heat.
   b) Transparent to heat but traps sunlight.
   c) Used in green-house to increase plant growth.
   d) Transparent to both sunlight and heat.

vii) Which one of the following statements for pyramid of energy is incorrect.
   a) It is upright in shape.
   b) Its base is broad.
   c) Is shows energy content of different trophic level organisms.
   d) It is inverted in shape.

viii) Ozone layer of upper atmosphere is being destroyed by
   a) Chlorofluorocarbon.
   b) Photochemical oxidants.
   c) Sulphur dioxide.
   d) Smog.

ix) The removal of top soil by water or wind is called
   a) Soil wash.   b) Soil erosion.
   c) Soil creep.   d) Silting of soil.

x) The Main cause of extinction of species from tropical areas is
   a) Afforestation.   b) Deforestation.
   c) Pollution.   d) Soil erosion.

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

   i)   What are the sources of carbon dioxide?

   ii) Define soil.

   iii) Give the classification of natural resources.

   iv) Give the causes of forest denudation.

   v)   Define biogeochemical cycle.

   vi) Enlist the types of mineral resources.

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

   i)   Discuss the nitrogen cycle. Draw schematic diagram.

ii) Write a note on problems associated with natural resources.

iii) Explain in brief soil conservation measures.

6

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

i) Discuss the Green house gases.

ii) Write a note on types of food chain.

iii) Explain soil types in India.

2

b) Attempt the following questions.

i) State the First and second law of thermodynamics.

8

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

i) Discuss the productivity in an ecosystem. Add a note on food web.

ii) Describe mineral resources. Add a note on environmental impacts of mining.

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Seat Number

BIOTECHNOLOGY PAPER - II : BT - 112
Methods in Biotechnology
(11336)

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. Figure to the right indicate full marks.

1.   Fill in the blanks.   8

   a)   Bond angle of H-O-H in water is _____.

   i)   104.5°   ii)   104°

   iii) 105.4°   iv)   10.45°

   b)   Buffer has ability to _____.

   i)   change in pH.

   ii)   resist change in pH.

   iii)   not resist to change in pH.

   iv)   none of them.

   c)   The ratio of diameter of lense to focal length is referred as_____.

   i)   Magnification.   ii)   Resolution.

   iii) Numerical aperture.   iv)   none of them.

d) In Gram staining iodine is act as _____.

  i) Counter stain.   ii) Primary stain.

  iii) Mordant.   iv) Secondary stain.

2. Answer the following question. **(any two)**   8

  a) What is monochrome staining? Explain steps involve in it.

  b) Explain the term specific gravity.

  c) write a note on importance of water in Biological system.

  d) Explain Breed method for counting of Microorganism.

3. a) What is microscopy? Explain Transmission Electron   6
     microscope.

                              OR

  a) What is staining? Explain Gram Staining.

  b) What is magnification.   2

4. Attempt the following question **(any 2).**   8

  a) What is aberration? Briefly discuss different type of
     aberration?

  b) Explain Petroff-Haussor counting chamber method for
     organism counting?

  c) Derive Handerson - Haselbalch equation.

  d) What is mordant? Explain different type of mordanting.

5. Write a short note on following **(any four).**   8

  i) Buffer.

  ii) Distillation.

  iii) Steps involve in smear preparation.

  iv) Principle of Negative staining.

  v) Resolving power.

  vi) Indole production test.

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0301

BIOCHEMISTRY PAPER - II: BC - 112
Fundamentals of Microbiology
(11216)

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. All questions carries equal marks.
6. Draw neat labelled correct diagram wherever necessary.
7. Figures to the right indicate marks.

1. Attempt **any eight.** 8

i) Study of viruses is called as _____ .
   a) Mycology.
   b) Phycology.
   c) Virology.
   d) Bacteriology.

ii) Bacterial cell measures in _____ units.
   a) Milimetre.
   b) centimetres.
   c) Micrometres.
   d) None.

iii) _____ is absent in bacteria.
   a) Mitochondria.
   b) ribosomes.
   c) DNA.
   d) proteins.

iv) Mushroom is an example of _____ .
   a) Algae.
   b) Fungi.
   c) Bacteria.
   d) Protozoa.

v) _____ are photosynthetic in nature.
   a) Algae.
   b) viruses.
   c) Bacteria.
   d) fungi.

vi) _____ grow at high temperature conditions.
   a) Psychrophiles.
   b) Acidophiles.
   c) Thermophiles.
   d) Halophiles.

vii) _____ lense produces highest magnifications.
   a) 10X   b) 5X
   c) 100X   d) 40X

viii) Saffranine is used as a counter stain in _____ staining.
   a) Negative staining.   b) Monochrome staining.
   c) Gram staining.   d) Positive staining.

ix) Mycolic acid present in _____ bacteria.
   a) Pseudomonas.   b) Mycobacterium tuberculosis.
   c) B. subtilis.   d) E. coli.

x) Bacteria are observed as _____ in negative staining.
   a) Colourless.   b) Pink.
   c) Blue.   d) Violet.

2.   **Any four.**   8
   a) Give application of bacteria in agriculture.
   b) Describe mode of nutrition of bacteria.
   c) Differentiate Gram positive and Gram negative bacteria.
   d) Draw neat labelled diagram of bacterial cell.
   e) Give applications of staining.
   f) Define: Magnification.

3.   **Any Two.**   8
   a) Describe ultrastructure of plasma membrane.
   b) Give principle and application of negative staining.
   c) Write a note on hallophiles.

4. a) **Any Two.**   6
   i) Describe general characteristics of virus.
   ii) Describe the type of bacteria on the basis of shape and arrangements.
   iii) Give principle of bright field microscope.

   b) Give significance of fungi.   2

5.   Describe ultrastructure of endospore and applications of fungi in   8
   industry.

   OR

   Draw a neat labelled diagram of compound microscope and explain image formation in it.

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Seat Number

0302

COMPUTER SCIENCE PAPER - II : CS - 112
'C' Programming - I
(11246)

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. Figure to the right indicate full marks.

1.   Attempt **any eight.**   8

a) Which are the data types in C?
b) Write the structure of C program.
c) What is array?
d) Explain in brief goto statement.
e) Enlist relational operators.
f) what is the meaning of ++i and i++?
g) The C programming language consist of _____ number of keywords.
     a) 34.   b) 32.
     c) 36.   d) 28.
h) Programming in C introduced by _____.
     a) Bill Gates.   b) Lee.
     c) Dennis Ritchie.   d) Peter.
i) The escape character can be used to begin a new line in C_____.
     a) \n   b) \b
     c) \m   d) \e
j) The operator : is used for _____.
     a) Bitwise AND.   b) Logical AND.
     c) Logical OR.   d) Bitwise OR.

2. Attempt **any four.**   8

   a) Write the format of scanf( ) function.
   b) Explain in short break statement.
   c) Write any four features of C.
   d) Discuss constant.
   e) Explain if statement.
   f) What is identifier?

3. Attempt **any two.**   8

   a) Write a program in C to print Fibonacci series.
   b) Write a program in C to input four digit no. and find its sym.
     e.g. 3435 = 3 + 4 + 3 + 5 = 15.
   c) Explain the precedence and order of evaluation.

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

   a) What are the rules for valid variable names?
   b) Discuss symbolic constant.
   c) Explain bitwise AND operator. Give suitable example.

  b) Attempt compulsory question.   2

   a) Differentiate between do _____ while and while statement.

5. Attempt **any one.**

  a) i) write a program in C to compute the following series.   8
     $x = \frac{1}{2} + \frac{2}{4} + \frac{3}{7} + \frac{4}{11}$ _____ up to n terms.
   ii) Write a program in C to input η elements no. and print it in ascending order.

<div align="center">OR</div>

  b) i) Explain # define and # include with suitable example.
   ii) Explain two dimensional array with suitable example.

<div align="center">*********</div>

Seat Number

GEOLOGY PAPER - II : Gl - 112
Mineralogy
(11166)

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 diagrams wherever necessary.

1.   Define **any four**.   8

   1)   The form of the mineral Beryl is........
         a)   Tabular   b)   Bladed   c)   Columnar

   2)   Axes of symmetry of Orthorhombic system is........
         a)   3   b)   5   c)   13

   3)   Hornblende is a mineral of..... Group.
         a)   Feldspar   b)   Pyroxene   c)   Amphibole

   4)   The color of the powder of the mineral is called as.....
         a)   Hardness   b)   Streak   c)   Lustre

   5)   The Color of the mineral seen under BXN in microscope is called........
         a)   DR colors   b)   extinction colors
         c)   Pleochroic colors.

   6)   The form with two similar faces in crystallography is called as........
         a)   Pinnacoid   b)   Prism   c)   Dome

7) If cleavage is seen as unidirectional in microscope under PPL it is............
   a)   One set   b)   Two set   c)   Fracture

8) Gemology is a branch of mineralogy that studies.
   a)   Mineral   b)   Gem stones   c)   Rocks

2.   Describe **any two.**   8

1)   Lustre and Transparency.

2)   Acicular, fibrous and foliated form of mineral.

3)   Figure of walker steel yard balance.

3.   Explain **any two.**   8

1)   Classification of mineral based on industrial.

2)   Axis of symmetry.

3)   Law of Rational indices.

4.   Write notes on **any two.**   8

1)   Color, form and cleavage under microscope.

2)   Extinction.

3)   ISO and Anisotropism.

5.   Discuss cubic system.   8

OR

Explain orthorhombic system.

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*0 3 0 6 *

STATISTICS PAPER - I : ST - 111
Descriptive Statistics - I
(11175)

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 calculators and statistical tables is allowed.

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

a)   A statistical population is either _____ or _____.

b)   Sturges formula for determining the number of classes is _____.

c)   If each observation of a set is divided by 2, then the mean of new values is _____ of the original values.

d)   Say true or false: $Q_2 = D_5 = P_{50}$.

e)   _____ is the best relative measure of dispersion.

f)   If S. D. is 15 and mean is 30, the coefficient of variation is _____ percent.

g)   Define raw moment for n observations.

h)   Mean squared deviation about _____ is the least.

i) If the data are for speed or rates _____ .mean is better than the other means.

j) Give any one definition of statistics.

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

a) State scope of statistics in the field of Economics.

b) Define – Variables and attributes.

c) For a moderately skewed distribution mean is 30 and mode is 36. Find the median of the distribution.

d) The observations are 7,7,7,7,7,7,7 then the coefficient of variation is _____ %

e) Find median of the following data-
48, 35, 36, 40, 42, 54, 58, 60.

f) Team A has mean score 7 and variance 25, team B has mean score 6 and variance 9. Which team is more consistent?

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

a) Write a note on ogive curves.

b) Define a Statistical table. Explain different parts of a statistical table.

c) The mean age of a combined group of men and women is 30 years. If the mean age of the group of men is 32 and that of women is 27 find out the percentage of the men and women in the group.

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

i) State the requirements of a good measure of central tendency.

ii) Explain: population and sample.

iii) Derive the relation between raw and central moments hence derive the expression for first two central moments.

b) Explain: Exclusive classes and Inclusive classes.

                                                        2

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

    a) i) For two observations prove that   4

        $$A \cdot M \geq G \cdot M \geq H \cdot M$$

        ii) A distribution has mean 30, coefficient of variation 20% and coefficient   4
             of skewness is 0.30. Find mode.

    b) With usual notations prove that variance of two groups combined is given by   8

        $$\sigma^2 = \frac{n_1\sigma_1^2 + n_2\sigma_2^2 + n_1 d_1^2 + n_2 d_2^2}{n_1 + n_2}$$

****

0307

ZOOLOGY PAPER - I : ZOO - 111
Non-Chordates - I
(11155)

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.
6. Draw neat labelled diagrams wherever necessary.

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

    i) The spicules having only one axis called as _____.
        a) asters   b) sigmas
        c) monoaxons   d) spheres

    ii) In pila shell usually consist of _____.
        a) 3.5 whorls   b) 5.5 whorls
        c) 6 whorls   d) 6.5 whorls

    iii) The floor of buccal cavity in pila is raised to form tongue mass which is _____.
        a) radula   b) ctenidium
        c) odontophore   d) vestibule

    iv) The mode of respiration in Pila is _____.
        a) Aquatic   b) aerial
        c) Parasitic   d) Both a and b

    v) In pila _____ pair of tentacles are present.
        a) 2   b) 4
        c) 6   d) 8

vi) Pila is _____ animal.
   a) Unisexual
   b) Bisexual
   c) Hermaphrodite
   d) undifferentiated

vii) Pila chiefly excrete _____.
   a) ammonia
   b) uric acid
   c) ammonia compound
   d) both a & b

viii) Pedicellariae are characteristics of _____.
   a) Platyhelminthes
   b) Mollusca
   c) Echinodermata
   d) Arthropoda

ix) Pearl is produced by _____.
   a) arthropods
   b) echinoderms
   c) Molluscs
   d) annelids -

x) The foot in Pila is _____.
   a) elongated
   b) flat leaf shaped
   c) well muscularised
   d) not found

2. Define / Explain / comment **any four.**   8
   i) Tentacles   ii) Pulmonary chamber
   iii) Ctenidium   iv) Blood of Pila
   v) Ommatophore   vi) Amphidisc spicules.

3. Attempt **any two** of the following.   8
   i) Gemmule formation.
   ii) Sketch and label – female reproductive system of pila.
   iii) Describe Pericardium and heart of Pila.

4. a) Attempt **any two** of the following.   6
   i) Describe the Copulation and fertilization of pila.
   ii) Give an account on biting and chewing type of mouth parts.
   iii) Describe Osphradium in Pila.

   b) Explain – Pulmonary sac.   2

5. Attempt **any one** of the following.   8
   i) Describe excretory system and physiology of excretion in pila.
   ii) Describe the nervous system of Pila.

****

030.8

PHYSICS PAPER - II : PHY - 112
Electricity and Magnetism
(11126)

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 and carry equal marks.
5. Figures to the right indicates full marks.
6. Draw a neat labelled diagram wherever necessary.
7. Use of logarithmic table or standard electronic calculator is allowed.
8. Symbols have their usual meanings.

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

   i)   The S. I. unit of Resistivity (ρ) is..............
        a) Ω/m b) Ω/cm c) $\Omega \cdot m$ d) $\Omega \cdot cm$

   ii) The time constant of capacitive circuit is..............
        a) R. t   b) c.t   c) R/C   d) R·C

   iii) For soft magnetic materials, the Hysteresis loop is..............
        a) Very narrow   b) Small
        c) Large   d) None of these

   iv) An example of ferromagnetic material is ....
        a) Cerium   b) Oxygen
        c) Nickel   d) Tungsten

   v)   The relation between current density vector and volume charge density is known as.................
        a) Equation of continuity   b) equation of resistivity
        c) equation of relativity   d) None of these

vi) The S. I. unit of voltage is...............
   a) Nanovolt
   b) volt
   c) Ampere
   d) None of these

vii) The group of atomic magnets formed due to interactions are called as............
   a) Inductances
   b) domains
   c) resistances
   d) None of these

viii) S. I. unit of self Inductance is...............
   a) amp/sec
   b) volt/sec
   c) Henry
   d) None of these

ix) Michael Faraday discovered that steady magnetic field cannot produce an............
   a) Electric current
   b) Electric voltage
   c) Electric density
   d) None of these

x) For Isolation Transformer..............
   a) NS = NP
   b) NS > NP
   c) NP > NS
   d) None of these

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

a) Define time constant for growth of charge in RC circuit.

b) On what factors resistivity of a conductor depends?

c) What are step up and step down transformer?

d) Draw the curves representing growth and decay of current in RC circuit.

e) Define the terms
   i) Short circuit Current
   ii) Open circuit Voltage

f) Draw the symbol of the transformer.

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

a) Obtain an expression for decay of current in LR circuit.

b) What is solenoid? Explain self induction of a solenoid obtain an expression for inductance of it.

c) What is Hysteresis? Explain residual Magnetization and coercive force.

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

   i) A step down transformer connected to the main supply of 240 volts is used to operate at 12V, 36W lamp. Neglecting Power losses, find the turn ratio and the current in primary.

   ii) Derive the equation of continuity $\vec{\nabla} \cdot \vec{J} + \dfrac{dp}{dt} = 0$.

   iii) Draw and explain circuit diagram for charging of condenser through resistance.

   b) State any four applications of transformer.   2

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

   a) State and explain Norton's theorem using suitable example. Give the different steps to Nortonise the circuit.

   b) Discuss Paramagnetism and Ferromagnetism with their characteristic properties.

****

Seat Number

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ZOOLOGY PAPER - II : ZOO - 112
Parasitology
(11156)

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 indicates full marks.

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

   i) Sacculina and crab association is called as ....
      a) Symbiosis   b) Mutualism
      c) Commensalism   d) Parasitism

   ii) Following is the example of ectoparasite ....
      a) T. Solium   b) P. Vivax
      c) bed bug   d) Trypanosoma

   iii) Infection caused by .... is called pediculosis.
      a) bed bug   b) Tick
      c) Louse   d) Mosquito

   iv) A parasite .... which cause the disease liver rot to it's hosts.
      a) Ascaries   b) Louse
      c) Tapeworm   d) Liver fluke

   v) Dengue is transmitted by .... mosquito.
      a) Culex   b) Aedes
      c) Anopheles   d) None of above

   vi) In hyperplasia increase metabolism increase the ....
      a) rate of cell division   b) rate of cell death
      c) rate of cell elongation d) none

vii) Malarial fever is caused by ....
   a) E. histalytica   b) P. Vivax
   c) E. Coli   d) E. gingivalis

viii) .... is ectoparasite of man, which make tunnel on the skin.
   a) Tick   b) Mite
   c) Louse   d) Bedbug

ix) The parasite that found inside the body of the host cell.............
   a) Obligatory   b) Temporary
   c) Ectoparasite   d) Endoparasite

x) The organism that transfer the pathogen from one host to another host is called.
   a) Vector   b) host
   c) parasite   d) all

2. Define / Explain / Comment on **any four.**   **8**
   a) Commensalism   b) Parasite

   c) Definitive host   d) Adaptation

   e) Calcification   f) Pathogen

3. Attempt **any two** of the following.   **8**
   a) Morphology of head louse.

   b) Explain vector with suitable example.

   c) What are endoparasite ? Explain with suitable example.

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

   ii) Give prevention and control of Malaria.

   iii) Explain the nutritional effect of parasite on host.

   b) Protozoa.   **2**

5. Attempt **any one** of the following.   **8**
   a) Sexual life cycle of P. Vivax in mosquito.

   b) Describe brief account on life cycle of Fasciola hepatica.

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031 1

GEOGRAPHY PAPER - I : Gg - 111
Physical Geography (Lithosphere) Paper - I
(11185)

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. Figures to the right indicate full marks.
5. Draw neat labelled diagrams & sketches wherever necessary.
6. All questions are compulsory.

1. Choose the Appropriate alternative from those given below and rewrite the correct sentence **any eight**   8

i) $23\frac{1}{2}°$ south circle is known............
   a) Axis   b) Tropic of cancer
   c) Tropic of Capricorn   d) Arctic circle

ii) .... Is the largest ocean in the world?
   a) Antarctica   b) Atlantic
   c) Pacific   d) Indian

iii) Mohorovicic discontinuity separates..............
   a) Crust & mahtle   b) Core & Mantle
   c) Inner core & outer core d) Sial & Nife

iv) Metamorphic rocks originate from..............
   a) Igneous rocks
   b) Sedimentary rocks
   c) Both Igneous rocks & sedimentary rocks.
   d) All of the above

v) Coal occurs in..............
a) Sedimentary rocks   b) Metamorphic rocks
c) Igneous rocks   d) None of these

vi) When the strata is bent upward into simple upfold called.......
a) Syncline   b) Anticline
c) Monocline   d) Folding

vii) Earthquake waves are recorded by............
a) Thermograph   b) Barograph
c) Seismograph   d) Pantograph

viii) The place of origin of the earthquake is called...............
a) Epicentre   b) Focus
c) Seismic zone   d) None of these

ix) The lines running North to south and Intersects equator at right angle is known................
a) Equator   b) Parallels of latitudes
c) Tropic of cancer   d) Meridian of longitudes.

x) Distribution of continents and oceans on the earth is.............
a) even   b) uneven
c) parallel   d) all of the above

2. Write short answer **any four.**   8

i) Define parallels of Latitudes?

ii) Explain Mohorovicic discontinuity?

iii) Give the types of rocks?

iv) Draw the sketch of Rift valley?

v) Draw the sketch of symmetrical fold?

vi) Draw the sketch of Interior of the earth?

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

i) Explain Arctic and Antarctic circle?

ii) Describe the core?

iii) Give the economic importance of rocks?

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

    i)   Explain Asymmetrical folds with diagram?

    ii) Give the objections against Wegner's theory?

    iii) Describe formation of metamorphic rock?

  b) Explain fold? 2

5. Answer the following **any one.** 8

    i)   Describe outer crust of the earth interior?

    ii) Explain causes of the earthquake?

****

Seat Number

CHEMISTRY PAPER - II : CH - 112
Organic & Inorganic Chemistry (11136)

P. Pages : 3

Time : Two Hours

Max. Marks : 40

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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. Use of logarithmic table and non programmable calculator is allowed.

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

   i)   Which statement is not correct about organic Chemistry?
        a) It is chemistry of carbon compounds.
        b) All organic compounds contain carbon, Hydrogen, Oxygen and Nitrogen.
        c) Carbon is essential element in organic compounds.
        d) It is study of Hydrocarbon and Its derivatives.

   ii) An isomer of ethanol is.....
        a) Methanol   b) Dimethyl ether.
        c) Diethyl ether   d) Ethylene glycol.

   iii) The IUPAC name of $CH_3 - O - C_2H_5$ is.....
        a) Ethyl methyl ether   b) Methoxy ethane
        c) Ethoxy methane   d) Methyl ethyl ether.

   iv) The reactions of alkanes with oxygen to form CO_2, H_2O and heat is called as......
        a) Hydrocracking   b) Pyrolysis.
        c) Combusion   d) Catalytic cracking.

   v)   Alkenes are converted to alkanes by reaction....
        a) Dehydrogenation   b) Hydration
        c) Hydrogenation   d) Dehydration.

vi) Saturated hydrocarbons mainly undergo.......
    a) Addition reaction   b) Substitution reaction
    c) Elimination reaction   d) Polymerisation.

vii) BF_3 molecule is.......
    a) Bronsted acid   b) Lewis Acid
    c) Bronsted base   d) Lewis Base.

viii) According to Arrhenius theory, Base is the substance which.......
    a) Donate H^+ ions in Solution   b) Accepts H^+ ions in solution.
    c) Gives OH^- ions in solution.   d) Donate pair of electrons.

ix) Which of the following is not an inorganic solvent?
    a) H_2O b) NH_3
    c) CCl_4 d) SO_2

x) Solvent with longest range of liquid state is..........
    a) Ammonia   b) HF
    c) Water   d) SO_2

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

                                        8

i) Explain the concept of tetravalency of carbon.

ii) Define Inductive effect with suitable example.

iii) Draw the structural formula for the following compounds (any two).
    a) cyclohexane   b) Ethanol
    c) 1-chloropropane.

iv) Give the IUPAC names for the following compounds (any two).

    a)   b)

$$CH_3-CH-CH_2-CH_3$$
$$\qquad\quad |$$
$$\qquad\quad Br$$

COOH

c)

O
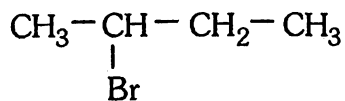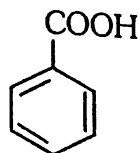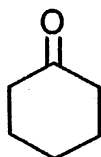
v) Discuss Bronsted - Lowry theory of acids and bases.

vi) Calculate the pH value of 0.01M H_2SO_4 Solution, assuming the complete dissociation.

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

   i) Explain SP hybridization with the formation of acetylene molecule

   ii) What are alkanes? Explain one method of formation of alkanes.

   iii) What is the action of following reagents on propylene?
       a) $O_3/Zn-H_2O$ b) H_2/Pt

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

   i) Derive the Henderson - Hassel Balch equation for pH of basic buffer solution.

   ii) Define and explain Ionic product of water.

   iii) What is dehalogenation? How will you prepare propene by this method?

5. a) Define the term resonance. State the conditions necessary for   6
      resonance and mention rules for writting resonance structures.

<div align="center">OR</div>

   Define solvents. Discuss classification of solvents with suitable   6
   examples.

   b) Give any four rules for IUPAC nomenclature of alkynes.   2

<div align="center">**********</div>

||||| *0 3 1 3 *

PHYSICS PAPER - I : PHY - 111
Mechanics & Properties of Matter
(11125)

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 and carry equal marks
5. Figures to the right indicate full marks.
6. Draw neat and labelled diagram wherever necessary.
7. Use of logarithmic table or standard electronic calculator is allowed.
8. Symbols have their usual meanings.

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

   i)   A compound pendulum, Keter's pendulum, torsional pendulum and bifiter pendulum are some of the examples of......
       a) Linear SHM   b) Angular SHM
       c) Linear motion.   d) Projectile motion.

   ii) The periodic time of compound pendulum is minimum when the length of compound pendulum is ...... its radius of gyration about a horizontal axis passing through its C.G.
       a) Equal to   b) Less than
       c) Greater then   d) Nearly zero to.

   iii) Using Keter's pendulum 'g' can be calculated by...........
       a) $\dfrac{2\pi L^2}{T^2}$ b) $\dfrac{4\pi^2 L^2}{T^2}$

       c) $\dfrac{2\pi^2 L}{T^2}$ d) $\dfrac{4\pi^2 L}{T^2}$

iv) During bending of the beam, the layer which remains unaltered is called......
   a) Principle axis
   b) Y- axis
   c) Neutral axis
   d) X- axis.

v) The bodies which regains their original shape and size after removal of the deforming forces are called...........
   a) Elastic bodies
   b) Plastic bodies
   c) Elastic & plastic bodies
   d) Organic bodies.

vi) The angle of contact is.......... for a liquid which does not wet the solid.
   a) Acute
   b) Obtuse
   c) 90°
   d) 0°

vii) The ....is the value of surface tension, greater is the tendency to form drops.
   a) Larger
   b) Smaller
   c) Equal
   d) Zero.

viii) S.I unit of surface tension is......
   a) N/m^2
   b) Cm/s^2
   c) N/m
   d) $dyne/m^2$

ix) In streamline flow the path of the particles during motion is..........
   a) Zig-zag
   b) in a particular layer
   c) Circular
   d) elliptical

x) Liquid in motion does not possesses.......
   a) K.E.
   b) P.E.
   c) Pressure energy
   d) Flow energy.

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

i) What is compound pendulum?

ii) Define point of suspension & point of oscillation.

iii) What is Keter's pendulum?

iv) Define bending moment of beam.

v) Define surface tension in terms of surface energy.

vi) Explain turbulent flow of liquid.

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

   i) A heavy uniform rod of length 90 cm swings in a vertical plane about a horizontal axis passing through its one end. Calculate the position at which a concentrated mass may be placed so that swing remains unaltered.

   ii) Explain Poiseuille's experimental method for determination of co-efficient of viscosity of a liquid.

   iii) Obtain an expression for excess pressure inside a soap bubble.

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

   i) An uniform bar of length 96 cm oscillates like a compound pendulum about horizontal axis passing through its end. Calculate the period of oscillations.

   ii) State basic assumptions for theory of bending.

   iii) Explain the factors affecting surface tension.

   b) Draw a meat labeled diagram of conical pendulum. 2

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

   i) A thin uniform bar of rectangular cross-section is supported at its ends on two knief edges and loaded in the middle. Derive an expression for the depression of the mid point of the beam for a load W. Negtect mass of the beam.

   ii) State and prove Bernoulli's theorem.

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0009

Environmental Studies
(पर्यावरण अभ्यास)

(55555)

P. Pages : 7

Time : Three Hours   **Max. Marks : 80**

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 diagrams wherever necessary.

1. Choose the proper alternatives.   **10**

   i) Environment protection act was passed in..............
      a) 1989   b) 1986
      c) 1974   d) 1981

   ii) The ultra – violet radiation from sun is absorbed by ....
      a) SO_2 b) Oxygen
      c) Ozone layer   d) Nitrogen

   iii) .... is a biotic factor.
      a) Soil   b) Water
      c) Micro – organism   d) Solar energy

   iv) Which gas caused Bhopal gas tragedy.
      a) Methyl alcohol   b) Methyl acetate
      c) Methyl isocyanate   d) Methyl carbamate

   v) Sahara is an example of .... ecosystem.
      a) Marine   b) Desert
      c) Grassland   d) Forest

vi) The greatest source of energy on the earth is.............
    a) Water   b) Coal
    c) Wind   d) Sun

vii) Producer in the ecosystem prepare food in the process of ....
    a) Respiration   b) Vaporization
    c) Photosynthesis   d) Digestion

viii) How many hot spots of biodiversity are in the world.
    a) 40   b) 35
    c) 25   d) 85

ix) Creation of unwanted sound is ....
    a) Noise pollution   b) Thermal pollution
    c) Air pollution   d) None of the above

x) What is the correct food chain.
    a) Green plants → Insect → Snake → Frog
    b) Green plants → Insect → Frog → Snake
    c) Green plants → Frog → Insect → Snake
    d) Green plants → Frog → Snake → Insect

2.   Define or explain **any five.**

                                                      10

    i)   Population explosion

    ii)   Environment

    iii) Pollution

    iv) Solid waste

    v)   Earthquake

    vi) Rain water harvesting

    vii) Food web

    viii) Soil erosion

    ix) Drought

    x)   Resources

3. Answer in one sentence **any five**.

i) Give the name of air pollutant.

ii) Give the types of ecological pyramids.

iii) What is meant by desertification ?

iv) What is flood ?

v) Define earthquake.

vi) Define soil pollution.

vii) Which are the main components of the environment.

viii) Give any two name of non renewable energy sources.

ix) Give the names of any two National park.

x) What is value education ?

30

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

i) What is green house effect ? Explain the role of green house gases in global warming.

ii) India as a mega biodiversity nation explain.

iii) What is AIDS ? Discuss, symptoms spreading and preventive measures.

iv) What is water pollution ? How it can be controlled discuss.

v) What is acid rain ? Discuss the effects of acid rain.

20

5. Write short notes **any four**.

i) Importance of environmental studies.

ii) Human right.

iii) Ozone layer depletion.

iv) Family welfare programme.

v) Threats to biodiversity.

vi) Marine pollution.

vii) Water conservation.

****

मराठी रुपांतर

Time : Three Hours   **Max. Marks : 80**

_____

सूचना :-

1. प्रश्नपत्रिकेवर बैठक क्रमांकाशिवाय काहीही लिहू नये.
2. ग्राफ किंवा आकृती काढण्यासाठी पेपर सोडवितांना काळ्या शाईचा पेन अथवा काळी एच्. बी. पेन्सीलच वापरावी.
3. पुरवणी मिळणार नाही याची विद्यार्थ्यांनी नोंद घ्यावी.
4. इंग्रजी व मराठी भाषांतरामध्ये काही संदिग्धता असल्यास त्यावेळी मूळ प्रश्नपत्रिका इंग्रजी भाषेतील ग्राह्य धरण्यात यावी.
5. सर्व प्रश्न आवश्यक आहे.
6. उजवीकडील अंक पुर्ण गुण दर्शवितात.
7. आवश्यक तेथे सुबक व नामो निर्देशीत आकृत्या काढा.

1. योग्य पर्याय निवडा.   **10**

1) पर्यावरण संरक्षण कायदा .... साली लागू झाला.
   अ) 1989   ब) 1986
   क) 1974   ड) 1981

2) .... स्तर सुर्यापासून येणारी हानीकारक अतीनिल किरणे शोषून घेते.
   अ) सल्फरडायआक्साईड   ब) प्राणवायू
   क) ओझोन   ड) नायट्रोजन

3) .... हा एक जैविक घटक आहे.
   अ) मृदा   ब) जल
   क) सुक्ष्मजीव   ड) सौरउर्जा

4) भोपाळ वायू दुर्घटना .... या वायूमुळे झाली.
   अ) मिथाइल अल्कोहोल   ब) मिथाइल ऑसीटेड
   क) मिथाइल आयसोसायनेट ड) मिथाईल कारबामेट

5) सहारा हे .... परिसंस्थेचे उदाहरण आहे.
   अ) सागरी   ब) वाळवंटीय
   क) गवताळ   ड) जंगल

6) पृथ्वीवरील सर्वात मोठा उर्जास्त्रोत .... हा आहे.
   अ) पाणी   ब) कोळसा
   क) वारा   ड) सुर्य

7) परिसंस्थेतील उत्पादके .... या क्रियेने अन्न तयार करतात.
   अ) श्वसन   ब) बाष्पीभवन
   क) प्रकाशसंश्लेषण   ड) पचन

8) जगात एकुण किती जैवविविधतेची संवेदनशील क्षेत्र आहे.
   अ) 40   ब) 35
   क) 25   ड) 85

9) नकोसा असलेल्या आवाजाला .... म्हणतात.
   अ) ध्वनीप्रदुषण   ब) औष्णीक प्रदुषण
   क) वायूप्रदुषण   ड) वरीलपैकी नाही

10) योग्य अन्नसाखळी कोणती.
   अ) हरीत वनस्पती → किटक → साप → बेडुक
   ब) हरीत वनस्पती → किटक → बेडुक → साप
   क) हरीत वनस्पती → बेडुक → किटक → साप
   ड) हरीत वनस्पती → बेडुक → साप → किटक

2. व्याख्या लिहा किंवा स्पष्टीकरण करा **कोणतेही पाच.**

10

1) लोकसंख्या विस्फोट

2) पर्यावरण.

3) प्रदुषण.

4) घनकचरा.

5) भुकंप.

6) वर्षाजल संचयन.

7) अन्नजाळी.

8) मृदा धुप.

9) अवर्षण.

10) संसाधने.

3. एका वाक्यात उत्तरे लिहा **कोणतेही पाच.** 10

   1) कुठल्याही दोन हवा प्रदुषकांची नावे लिहा.

   2) परिस्थितीकीय मनोरे प्रकार लिहा.

   3) वाळवंटीकरण म्हणजे काय ?

   4) पूर म्हणजे काय ?

   5) भुकंपाची व्याख्या लिहा.

   6) मृदा प्रदुषण म्हणजे काय ?

   7) पर्यावरणाचे प्रमुख घटक कोणते.

   8) अपुननीकिरणीय उर्जा स्रोतांची कोणतीही दोन नावे लिहा.

   9) कोणत्याही दोन राष्ट्रीय उद्यानांची नावे लिहा.

   10) मुल्यशिक्षण म्हणजे काय.

4. खालीलपैकी **कोणतेही दोन प्रश्न सोडवा.** 30

   1) हरीतगृह म्हणजे काय ? जागतिक तापमानातील वाढ यामधील हरीतगृह वायूच्या भुमिकेचें वर्णन करा.

   2) भारत महा जैवविविधता देश आहे वर्णन करा.

   3) एडस् म्हणजे काय ? एडस् बाबत लक्षणे प्रसार व प्रतीबंधक उपाय यावर चर्चा करा.

   4) जल प्रदुषण म्हणजे काय ? ते कसे थांबवता येईल चर्चा करा.

   5) आम्ल पर्जन्य म्हणजे काय ? त्याचे परिणामाची चर्चा करा.

5. टिपा लिहा **कोणत्याही चार.** 20

   1) पर्यावरण अभ्यासाचे महत्व

   2) मानवी हक्क.

   3) ओझोनथर क्षय.

   4) कुटूंब कल्याण कार्यक्रम.

   5) जैवविविधतेला घातक ठरणारे घटक.

   6) सागरी प्रदुषण.

   7) जलसंवर्धन.

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Seat Number

0314

MATHEMATICS PAPER – III : MTH – 113
(A) Co-ordinate Geometry (11117) OR /
(B) Graph Theory (11118)

P. Pages : 7

(A) Co-ordinate Geometry
(11117)

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 calculator is not allowed.

1. Attempt **any eight.** 8

i) Where is the origin shifted when the new coordinates of (5, -1) are (3, 2) ?

ii) State the formula for θ, through which the axes should be rotated so as to remove the term in xy from the expression $ax^2 + 2hxy + by^2 + 2gx + 2fy + c$.

iii) State the conditions that the equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents ellipse.

iv) Find the radius of the sphere $x^2 + y^2 + z^2 - 3x - 4y + 5z + 1 = 0$.

v) Define 'Right circular cone'.

vi) State the equation of the cone passing through three axes.

vii) Define a normal section of the right circular cylinder.

viii) State the conditions that two spheres are externally touching.

ix) Find the equation of the sphere whose diameter has the endpoints (1, 0, 2) and (-1, 3, 0).

x) Define guiding curve of the cylinder.

6

2. a) Attempt **any two**.

i) Prove that every general equation $Ax^2+Ay^2+2Gx+2Fy+C=0$ represents a circle. Find its centre and radius.

ii) If the origin is shifted at (3, k), the transformed equation of locus given by $2y^2+4x-6y+7=0$ does not contain the first degree term in y then find the value of k.

iii) Find the new equation of the locus given by $x^2+4yx+y^2=0$ when the axes are rotated through 45°. Identify the nature of the locus.

2

b) Find the new equation of the locus given by $x^2+4x-2y+6=0$ when the origin is shifted at (-2, -1).

8

3. Attempt **any two**.

i) Find the condition that the plane $lx+my+nz = p$ touches the sphere $x^2+y^2+z^2=a^2$. Also find the point of contact.

ii) Find the equation of the sphere centred at (3,2,1) and touching the plane $2x-2y+z+7=0$.

iii) Show that the spheres $x^2+y^2+z^2+6y+2z+8=0$ and $x^2+y^2+z^2+6x+8y+4z+20=0$ are orthogonal.

6

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

i) Show that the equation of the cone with vertex at origin is homogenous.

ii) Find the equation of the right circular cone with vertex at (2,-1,4) ; semi vertical angle $Cos^{-1}(4/\sqrt{6})$ and having axis with direction ratios 1, 2, -1.

iii) Find the equation of the cone with vertex at the origin and having the guiding curve.
$x^2+y^2+z^2+4x+3y+7=0$; $3x-y+4z = 2$.

2

b) State the condition that the general equation
$f(x,y,z) \equiv ax^2+by^2+cz^2+2fyz+2gzx+2hxy+2ux+2vy+2wz+d=0$
represents a cone.
and also state the equations whose solution is the vertex.

4

5. a) i) Find the equation of the cylinder whose generators have direction cosine ℓ, m, n and which passes through $x^2+z^2 = 1$ in zox plane.

4

ii) Find the equation of cylinder whose generators pass through $x+y+z=1$; $x^2+y^2+z^2=4$ and parallel to $\frac{x}{2}=\frac{y}{-1}=\frac{z}{2}$.

OR

4

a) i) Find the equation of the right circular cylinder whose axis is $\frac{x}{2}=\frac{y}{3}=\frac{z}{6}$ with radius 4.

4

ii) Find the equation of cylinder whose generators intersect the plane curve $2x^2+3y^2=1$, z = 0 and parallel to x=2y=3z.

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(B) Graph Theory
(11118)

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 is not allowed.

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

i)   Define 'degree of a vertex'.

ii) How many total number of edges in K_n are ?

iii) Give an example of a connected graph which is neither an eulerian nor a Hamiltonian.

iv) Define weighted graph.

v)   A complete graph $K_{m,n}$ is Hamiltonian iff.
   a) $m > n$
   b) $m \neq n$
   c) $m = n$
   d) $m < n$

vi) State Euler's formula for planar graph.

vii) Determine chromatic number of the following graph.
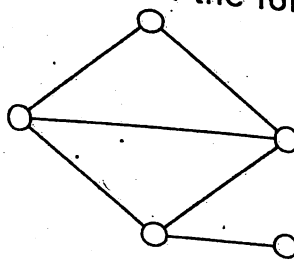
viii) Find a tree on 6 vertices having exactly three leaves.

ix) Define 'fundamental cut set'.

x)   Define 'spanning tree'.

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

    i) If G is self complementary graph on n vertices then show that n is of the type 4k or 4k+1 for some integer K.

    ii) Show that two graphs G_1 and G_2 given below are not isomorphic.

G_1 G_2
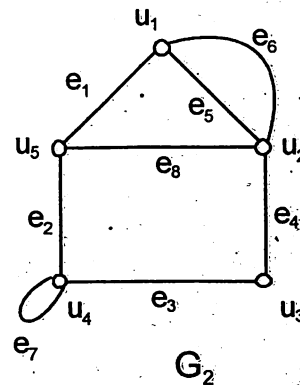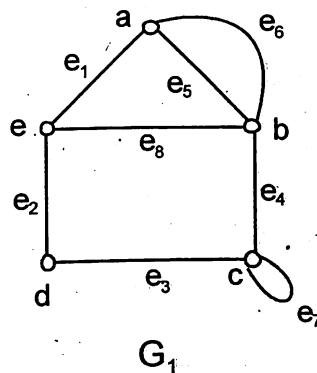
    iii) Does there exist a regular graph of degree 5 on 7 vertices ? Justify.

  b) Find complement of the following graph. 2
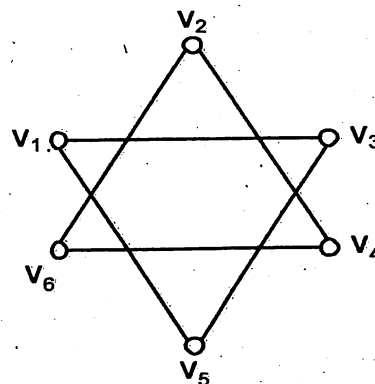
3. Attempt **any two** of the following. 8

    i) Let G = (V, E) be a simple graph with k-component and $|v| = n$, $|E| = m$ then prove that $m \geq n-k$.

ii) For the following graph G
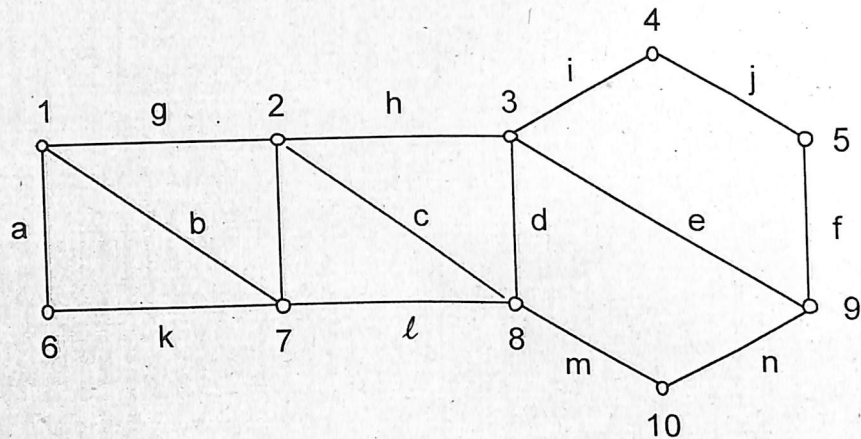
Find :
a) A closed walk of length 8.
b) Distance between 6 and 9.
c) Three cut sets

iii) Construct the graph in which $K(G) < \lambda(G) < \delta(G)$.

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

i) Let G be a 2 – connected planer graph without a triangle and if G has p – vertices, q – edges then prove that $q \leq 2p-4$.

ii) Find the indegree and out degree of each vertex in following digraph and verify that $\sum_{i=1}^{n} d^{+}(v_i) = \sum_{i=1}^{n} d^{-}(v_i)$
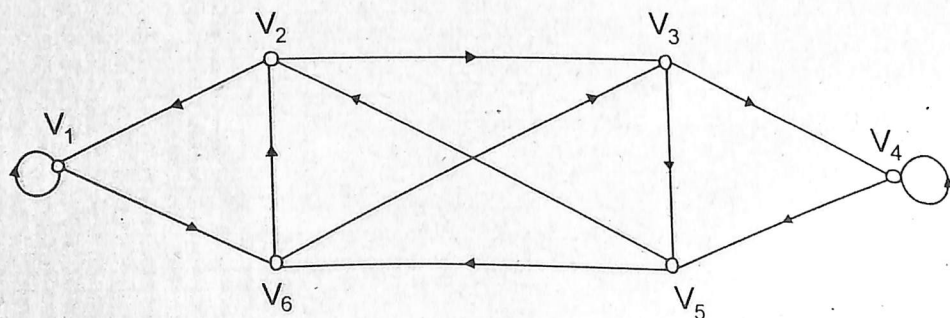
iii) Find number of edges in a simple planar graph with 16 vertices and 20 faces.

b) What is the dual of the following graph ? 2
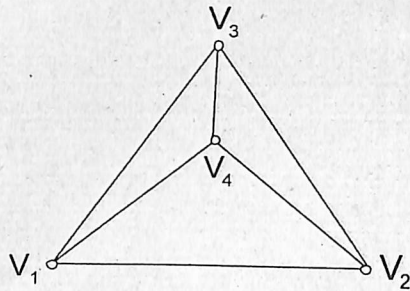
5. a) i) Prove that a tree with n vertices must have (n-1) edges. 4

ii) Draw all possible non – isomorphic trees on 9 – vertices. 4

OR

a) i) Prove that every tree is a bipartite graph. Which trees are complete bipartite graphs ? 4

ii) Find the fundamental cutset of a graph G with respect to given spanning tree T. 4

G.

T.

****
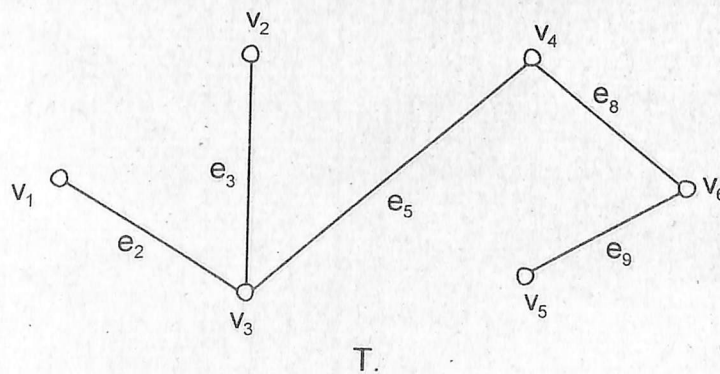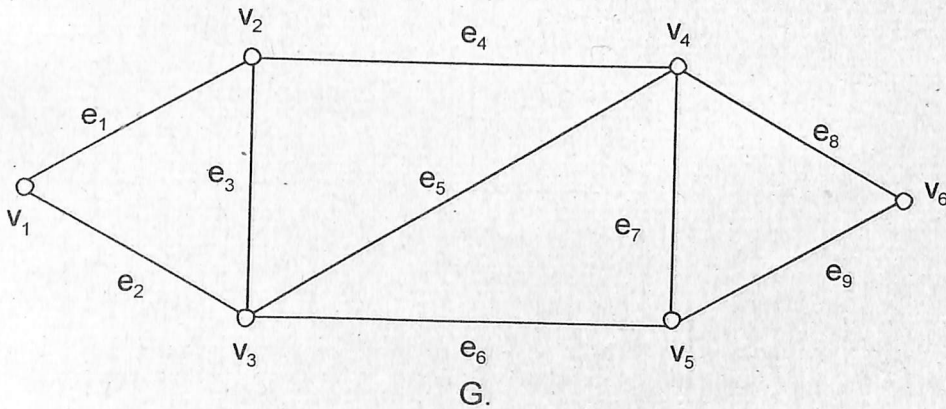
Seat Number

GEOGRAPHY PAPER - II : Gg - 112
Physical Geography (Atmosphere) Paper - III
(11186)

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 labelled diagrams and sketches wherever necessary.
7. Use of map stencils is allowed.

1. Choose the appropriate alternative from those given below and rewrite the correct sentence **any eight.**   8

   i)   Atmosphere contains highest proportion of..........gas.
        a) Oxygen   b) carbon dioxide
        c) Nitrogen   d) Helium

   ii) Calorie is a unit of measurement of...........
        a) Rainfall   b) Humidity
        c) Air pressure   d) Heat

   iii) The radient energy that reaches the surface of the earth from the sun is called..........
        a) Insulation   b) Insolation
        c) Isolation   d) Convection

   iv) The upper limit of the troposphere is called...........
        a) Stratopause   b) Tropopause
        c) Stratosphere   d) Ozonosphere

   v)   Monsoons are...............
        a) Permanent winds   b) Temporary winds
        c) Seasonal winds   d) Westerly winds

vi) At the equator there is a belt of low pressure is called............
   a) Doldrums   b)   Horse Latitude
   c) Sub-tropical high   d)   Anticyclones

vii) The relative humidity of the saturated air is.................
   a) 50%   b)   60%
   c) 80%   d)   100%

viii) The pressure belts are found more or less in regular pattern in the.............
   a) Northern hemisphere   b)   Southern hemisphere
   c) Eastern hemisphere   d)   Western hemisphere

ix) The Rainfall related to mountain is called ....
   a) orographic rainfall   b)   cyclonic rainfall
   c) convectional rainfall   d)   frontal rainfall

x) ....are responsible for the maximum reflection of light in the atmosphere.
   a) Oxygen molecules   b)   Water vapour
   c) Dust particles   d)   Ozone

2. Write short answer **any four**.   8

   i)   What is condensation?

   ii) Draw the diagram of mountain winds.

   iii) Define climate.

   iv) Draw the figure of planetary winds.

   v)   Define Albedo of the earth.

   vi) Draw the figure of Anticyclone in Northern Hemisphere.

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

   i)   Explain the composition of the atmosphere.

   ii) Explain the mountain & valley winds.

   iii) What do you mean by heat budget? How does the earth maintain a heat balance.

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

   i)   Explain any two factors that affects the distribution of
        Insolation.

   ii) Explain the forms of precipitation.

   iii) Explain the shifting of pressure belts and their effects.

5.   Answer the following **any one.**   8

   i)   Explain with suitable diagram, the structure of earth's
        atmosphere.

   ii) Explain the orographic and cyclonic rainfall.

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MATHEMATICS PAPER - II : MTH - 112
Calculus
(11116)

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 is not allowed.

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

   i) Evaluate $\lim\limits_{x \to 2} \dfrac{x^2 - x - 2}{x^2 - 5x + 6}$

   ii) Evaluate $\lim\limits_{x \to 0} \dfrac{\sin 3x}{x}$

   iii) For which value of $C \in \left(-\dfrac{\Pi}{2}, \dfrac{\Pi}{2}\right)$ the Rolle's theorem is applicable for the function $F(x) = \cos x$ in $\left[-\dfrac{\Pi}{2}, \dfrac{\Pi}{2}\right]$.

   iv) State Langrange's Mean Value theorem.

   v) Evaluate $\lim\limits_{x \to 1} \dfrac{\log x}{x - 1}$

   vi) Write n^{th} derivative of $\cos(ax + b)$.

vii) Write the expansion of e^x

viii) Evaluate $\int_0^{\pi/2} \sin^8 x \, dx$

ix) Define uniform continuity of function on an interval.

x) State Maclaurin's theorem.

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

   i) Prove that every continuous function on closed and bounded interval is bounded.

   ii) Examine the continuity of the function.

   $$F(x) = \begin{cases} \dfrac{x^2 - 9}{x - 3} & \text{for } 0 \le x < 3 \\[2mm] 6 & \text{for } x = 3 \\[2mm] 8 - \dfrac{18}{x^2} & \text{for } x > 3 \end{cases}$$

   at x = 3.

   iii) Evaluate $\displaystyle \lim_{x \to 0} (\cos ecx)^{\frac{1}{\log x}}$

   b) Evaluate $\displaystyle \lim_{x \to 0} \left[\frac{1}{x} - \frac{1}{e^x - 1} \right]$ 2

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

   i) State and Prove Cauchy's Mean Value theorem.

   ii) Verify Langranges Mean Value theorem for the function $F(X) = x(x-1)(x-2)$ in $\left[0, \dfrac{1}{2} \right]$

iii) Show that

$$\frac{b-a}{1+b^2} < \tan^{-1} b - \tan^{-1} a < \frac{b-a}{1+a^2} \text{ if } 0 < a < b$$

and hence deduce that

$$\frac{\Pi}{4} + \frac{3}{25} < \tan^{-1}\left(\frac{4}{3}\right) < \frac{\Pi}{4} + \frac{1}{6}$$

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

   i) State and Prove Leibnitz's theorem for the nth derivative of product of two functions.

   ii) Find the nth derivative of $\dfrac{x^2 + 1}{(x-1)(x-2)(x-3)}$

   iii) If $y = \sin^{-1} x$ show that $(1-x^2) \cdot y_{n+2} - (2n+1) x y_{n+1} - n^2 y_n = 0$

   b) Find the nth derivative of $x \log x$.   2

5. i) Obtain the reduction formula for $\displaystyle\int \frac{\sin n x}{\sin x} dx$, $(n > 1)$ where n is a positive integer.   4

   ii) Obtain by Maclaurin's theorem the first three terms in the expansion of $\log (1 + \sin x)$.   4

<div align="center">OR</div>

   i) State and Prove Taylor's theorem with Langrange's form of remainder after n terms.   4

   ii) Evaluate $\displaystyle\int_{0}^{\infty} \frac{x^4}{(1+x^2)^5} dx$ 4

<div align="center">**********</div>

MICROBIOLOGY PAPER - II : MB - 112
Microscopy and Basic Biochemistry
(11196)

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. Coloured diagrams are allowed.
7. Neat labelled diagrams must be drawn wherever necessary.

1.   **Solve any eight.**   **8**

a) R. I. of oil used in microscope is.............
  a) 1.5   b) 2.5
  c) 3.5   d) 0.5

b) .... staining is an differential staining procedure.
  a) Monochrome   b) Negative
  c) Gram   d) All

c) .... is formed when two or more elements are joined together by chemical bond.
  a) Compound   b) Molecule
  c) atom   d) Bond

d) A made is defined as .... weight in grams.
  a) Molecular   b) Equivalent
  c) Atomic   d) All

e) .... group in the stain imparts coloring property.
  a) Chromophore   b) Auxochrome
  c) Metachrome   d) None of all

f) .... is synthesis reaction.
   a) Anabolism b) Catabolism
   c) exchange   d) reversible

g) .... is added to the medium to maintain osmatic pressure.
   a) Nacl b) NaoH
   c) Kcl   d) KoH

h) Liquid media is called as...............
   a) Butt   b) Broth
   c) Slant d) Stab

i) Water activity is denoted by ....
   a) aw b) wa
   c) Aw d) WA

j) pH at which proteins do not have any charge is known as........
   a) Isoelectric paint   b) Dielectric point
   c) monoelectric point d) all of above

2. Define **any four** of the following with example.   8

a) molecule

b) Acidophiles

c) Mordants

d) Media

e) Hydrogen bond

f) Mole

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

a) Selective media.

b) Mechanism of Gram staining.

c) Formation of ionic bonds.

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

   i) Magnification

   ii) Principle of Monochrome staining.

   iii) Temperature requirement for growth of bacteria.

   b) Define – Resolution. 2

5. Solve **any one** of following. 8

   a) Explain nutritional classification of bacteria.

   b) Explain Principle working and significance of compound Microscope.

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0005

COMPUTER SCIENCE PAPER - I : UG-CS - 121
Basics of DBMS
(12245)

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.**   8

a) What is database?

b) Define Metadata.

c) What do you mean by data?

d) What are entities?

e) Enlist the types of attributes.

f) What is domain?

g) What do you mean by data integrity?

h) Define Candidate Key.

i) List binary operators in relational algebra.

j) What is sub query?

2. Attempt **any four.**   8

   a) Define:

      1) Data Dictionary   2) Query.

   b) What is data definition Language?

   c) What are strong and weak entities?

   d) What do you mean by referential integrity?

   e) List unary operators in relational algebra.

   f) Explain how to modify the structure of table.

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

   a) Explain nested queries with example.

   b) Explain set difference operation in relational algebra.

   c) What are advantages & disadvantages of relational model?

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

      i) Explain DML Commands with example.

      ii) Write short note on Trigger.

      iii) What are Conventions for representing entities & attributes in E-R diagram?

   b) Explain how to modify the structure of table.   2

5. Attempt **any one.**   8

   a) Construct E-R diagram for a Car Insurance Company that has set of customers, each one has one or more Cars. Each Car has associated with it zero or any number of recorded accidents.

   b) Describe different types of Integrity Constraints.

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Seat Number

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0011

INFORMATION TECHNOLOGY PAPER – I : UG – IT - 121
Web Design - II
(12325)

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 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 diagram, wherever necessary.

1.   Attempt **any Eight**.   8

a) Which is character entity reference for © in html ?

b) Which tag is used to create list, that display items with bullets ?

c) What is Java Script ?

d) Define the term variable.

e) What is object ?

f) What is string.

g) What is validation ?

h) Explain break statement in Java Script.

i) Explain the syntax of <Anchor> tag.

j) What is Data Type ?

2.   Attempt **any four.**   8
   a) What is function ?

   b) Explain Navigation object in Java Script with its properties
       and methods.

   c) Explain for loop with suitable example.

   d) Explain <Script> tag in HTML with attributes.

   e) What is event ? Explain any two events.

   f) Explain syntax of do while loop in Java Script.

3.   Attempt **any two.**   8
   a) Write a Java Script for detecting mouse click event.

   b) What is object ? How object is created in Java Script.

   c) Explain string object in Java Script.

4. A) Attempt **any two.**   6
   a) Write a Java Script to find factorial of given number.

   b) Explain <img> tag with attributes.

   c) Explain Array object in brief.

   B) Explain logical operators in Java Script.   2

5.   Attempt **any one.**   8
   a) Write a Java Script for validation of pin / zip code.

   b) Write HTML code for following table.

Sr. No.	Particular	Rate	
		Rs.	Ps.
1	A4 Note Book	25	50
2	Marker Pen	12	50

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0012

GEOLOGY PAPER – I : Gl - 121
Paleontology
(12165)

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 pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.

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

i)   Aperture is present in ....
      (Bivalves / Cephalopods / Gastropods)

ii)   Permian is division of .... era.
      (Paleozoic / Mesozoic / Cenozoic)

iii) Jurassic is division of .... era.
      (Paleozoic / Mesozoic / Cenozoic)

iv)   Tertiary is division of .... era.
      (Paleozoic / Mesozoic / Cenozoic)

v)   Pliocene is ....
      (Era / Period / Epoch)

vi)   Hinge line is present in ....
      (Bivalves / Cephalopods / Gastropods)

vii) Longest eon of geological time scale is.........
      (Cryptozoic / Phanerozoic / Palaeozoic)

viii) Unequal valves are present in ....
(Brachiopods / Cephalopods / Echinoderms)

ix) Corona is present in ....
(Brachiopods / Cephalopods / Echinoderms)

x) Thorax is present in ....
(Brachiopods / Trilobites / Echinoderms)

2. Describe **any two**. 8

i) Branches of Paleontology.

ii) Uses of fossils.

iii) Impression.

3. Explain **any two**. 8

i) Illustration techniques in fossils.

ii) Cast and Mould.

iii) Mega and Microfossils.

4. Write notes on **any two**. 8

i) Convolute and conical forms in Gastropods.

ii) Heterodont and Schizodont hinge line in Bivalves.

iii) Apical disc in Echinodermata.

5. Describe Geological Time Scale. 8

OR

Describe Hard part morphology of Brachiopod.

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CHEMISTRY PAPER – II : CH - 122
Organic & Inorganic Chemistry
(12136)

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 logarithmic table and non – programmable calculator is allowed.

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

i) During a titration equivalence point is reached when.
   a) Volume of titrant is equal to volume of analyte
   b) Normality of analyte is equal to normality of titrant
   c) N_1V_1 of titrant is equal to N_2V_2 of analyte
   d) Indicator shows colour change

ii) The reaction

$$R-X + CN^{\ominus} \rightarrow R-CN + X^{\ominus}$$
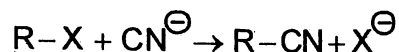
   a) Addition reaction   b) Elimination reaction
   c) Substitution reaction   d) Rearrangement reaction

iii) 1M NaCl contains.
   a) 58.5 gm NaCl in 100 ml H_2O
   b) 5.85 gm of NaCl in 1000 ml H_2O
   c) 58.5 gm NaCl in 1000 ml H_2O
   d) 5.85 gm NaCl in 1L H_2O.

iv) The formula of ethyl ethanoate is,
   a) $CH_3COOC_2H_5$ b) $C_2H_5COOC_2H_5$
   c) $C_2H_5COOCH_3$ d) $C_2H_5OC_2H_5$

v) Sum of atomic weights of atoms that make a molecule is
   a) Molecular weight   b) Formula weight
   c) Atomic weight   d) Equivalent weight

vi) Nitration of benzene can be carried out using.
    a) Conc. HNO_3 b) Conc. H_2SO_4
    c) dil. HNO_3 d) Nitrating mixture

vii) Alkaline hydrolysis of ester is called.
     a) Neutralization   b) Esterification
     c) Polymerization   d) Saponification

viii) Ethyl alcohol reacts with thionyl chloride to give
      a) $CH_3-CH_2-Cl+HCl$
      b) $CH_3-CH_2-Cl+H_2O+SO_2$
      c) $CH_3-CH_2-Cl+HCl+SO_2$
      d) $CH_3-CH_2-Cl+Cl_2+SO_2$.

ix) Molarity X volumes in milliliters is known as,
    a) Moles   b) Millimoles
    c) Equivalents   d) Milliequivalents

x) Williamson's synthesis is used for preparation of
   a) Alkyl halides   b) Alcohols
   c) Ethers   d) Aldehydes

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

8

i) Give chemical reaction when ethyl alcohol is heated with 95% H_2SO_4.

ii) Define the term standard solution.

iii) Give synthetic uses of $NaBH_4$.

iv) Define the term molecular weight with example.

v) Name the following **any two**.

a)

CH₃ ... OH (benzene ring structure)

b)

COOH ... NH₂ (benzene ring structure)
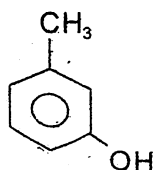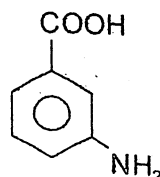
c)
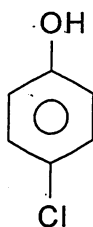
d)
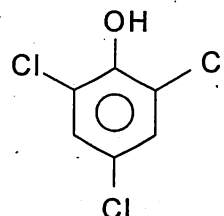
vi) What are ethers ? Give one example of symmetrical and unsymmetrical ethers.

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

i) How many grams of $K_2Cr_2O_7$ are present in 500 ml 0.5 N solution (Given Equivalent Weight of $K_2Cr_2O_7 = 49.032$).

ii) Give any two methods of preparation of ethyl alcohol.

iii) What is nitration ? Discuss nitration of benzene.

4. a) Discuss calibration of pipette and volumetric flask.

OR

a) What are alkyl halides ? How are they classified ? Give one method for synthesis of alkyl halides. 6

b) What is the effect of $NaHCO_3$ on CH_3COOH. 2

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

i) Identify A and B

$$CH_3 - \overset{\overset{O}{\|}}{C} - Cl \xrightarrow[BaSO_4]{pd} A \xrightarrow{C_6H_5\,NH\,NH_2} B$$
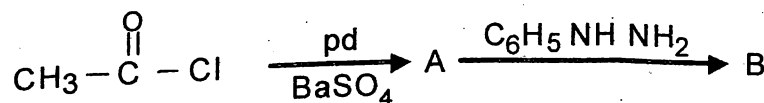
ii) Give requirements of primary standard substances.

iii) Describe the method for formation of carboxylic acid from nitriles.

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0022

PHYSICS PAPER - I : PHY - 121
Heat and Thermodynamics
(12125)

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 and carry equal marks.
5. Figures to the right indicate full marks.
6. Draw neat diagram whenever necessary.
7. Use of logarithmic table or standard electronic calculator is allowed.
8. Symbols have their usual meanings.

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

   i) When there is no unbalanced force acting on any part of the system or the system as a whole it is said to be in a state of........
      a) Mechanical Equilibrium b) Chemical Equilibrium
      c) Thermal Equilibrium d) Electrical Equilibrium

   ii) Van der Waal's equation of state is ....
      a) $PV = RT$
      b) $P = \dfrac{a}{v^2} + \dfrac{b}{RT}$
      c) $\left(P + \dfrac{a}{v^2}\right)(v - b) = RT$
      d) $PdV = RdT$

   iii) A system in which exchange of both mass and energy is possible between system and its surroundings is called as ....
      a) Closed system
      b) Open system
      c) Isolated system
      d) Equilibrium system

iv) Andrews carried out a systematic study of the behaviour of
.... under different conditions of pressure and
temperature.
  a) N_2 b) O_2 c) Co_2 d) He_2

v) S. I. unit of entropy is ....
  a) J/°K   b) N/m
  c) eV   d) J/°C

vi) In Otto engine working substance is ....
  a) Air   b) Oxygen
  c) Carbondioxide   d) None of the above

vii) Diesel cycle is perfectly ....
  a) Reversible   b) Irreversible
  c) Isothermal   d) both b & c

viii) Practical efficiency of diesel engine is about..........
  a) 44%   b) 55%
  c) 98%   d) 100%

ix) A unit used in the field of refrigeration is ....
  a) Kilogram of refrigeration   b) Ton of refrigeration
  c) Ton per degree Kelvin   d) Per degree centigrade

x) The effectiveness of refrigerator is expressed by a term ....
  a) C. O. P.   b) Enthalpy
  c) Entropy   d) Temperature

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

a) Define Boyle temperature.

b) Explain the form adiabatic change.

c) Give the Clausius statement of second law of thermodynamics.

d) Calculate the efficiency of Carnot's engine operating between 300°C and 100°C.

e) Draw block diagram of simple vapour compression refrigeration system.

f) A quantity of gas at atmospheric pressure is compressed adiabatically to one-fourth of its original volume. Calculate the resulting pressure (γ for gas = 1.4)

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

   a) For an adiabatic change of gas show that.

$$W = \frac{R(T_1-T_2)}{\gamma-1}$$ where symbols have their usual meanings.

   b) Draw a flow diagram and explain working of vapour compression refrigeration system.

   c) Calculate the change in entropy when 50gm of water at 15°C is mixed with 80gm of water at 40°C. Sp-heat of water may be assumed to be 1.

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

     i) Show that $T_B = \left(\frac{27}{8}\right)T_C$, Where the symbols have their usual meanings.

     ii) Derive an expression for work done in an isothermal change of gas.

     iii) Give the names of different strokes in Otto engine.

   b) State different methods of refrigeration. 2

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

   a) Explain Otto cycle in detail.

   b) i) Using Van der Waal's equation find the critical constants in terms of Vander Waal's constants and hence show that critical coefficient for any gas is 2.67.

     ii) Calculate the critical pressure and temperature for nitrogen. Van der Waal's constants for nitrogen are $a = 2.72 \times 10^{-3}$, $b = 1.73 \times 10^{-3}$, where pressure is expressed in atmosphere and volume expressed in terms of the volume at NTP.

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Seat Number

STATISTICS PAPER - I : ST - 121
Descriptive Statistics - II
(12175)

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 & calculator is allowed.

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

a) If angle between two regression lines is zero then lines will be .... or the lines will be..........

b) Scarcity and price of a commodity are .... correlated.

c) In skewness if $(Q_3 - Q_2) > (Q_2 - Q_1)$ then the distribution is .... skew.

d) State whether the following statement is true or false.
    " The measures of skewness are invariant to change of origin and scale".

e) Define coefficient of determination.

f) If $\beta_2 > 3$, the distribution is ....
    i)   Symmetric   ii)   Leptokurtic
    iii) Mesokuritic   iv)   Platy – Kuritic

g) The standard error of regression estimate of y is given by

i) $S_x = r^2 \sqrt{1 - \sigma_y^2}$

ii) $S_y = \sigma_y \sqrt{1 - r^2}$

iii) $S_x = \sigma_x \sqrt{1 - r^2}$

iv) $S_y = \sigma_x \sqrt{1 - r^2}$

h) If coefficient of correlation between X and Y is $r_{xy} = 0.80$ then coefficient of correlation between $(5x - 4)$ and $(3 - y)$ will be............

i) Define 'rank' of an observation in the data.

j) Define complete association between two attributes A and B.

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

a) Given A·M = 160, mode = 157, σ = 50 find coefficient of skewness.

b) What is regression?

c) Interpret the following cases of associations
i) Q = +1   ii) Q = -1   iii) Q = 0

d) Give the demerits of coefficient of correlation.

e) Explain the terms:
i) ultimate class frequencies and

ii) zero order class frequency in theory of attributes.

f) If for a frequency distribution. $\mu_1' = 2$, $\mu_2' = 20$ find μ_1 and μ_2.

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

a) With usual notations prove that

i) $byx \cdot bxy = r^2$ and

ii) byx and bxy cannot exceed unity simultaneously.

b) Write a note on Lorenz curve.

c) Find the coefficient of association between cleanliness of mothers and their children from the following data.

	Mother	
Child	Clean	Not clean
Clean	70	30
Not clean	20	60

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

    i) If X and Y are uncorrelated variables then prove that.
$$Var (X + Y) = Var (X) + Var (Y).$$

    ii) Describe the method of obtaining second degree curve Y on X.

    iii) Explain Gini's coefficient.

b) The equation of line of regression X on Y is 3Y - 5X + 15 = 0. If the ratio of standard deviations of X and Y is 3:4 then find coefficient of correlation between X and Y.   2

5. a) Attempt **any one** of the following.   6

    i) Show that coefficient of association Q_{AB} between two attributes A and B lies between -1 and +1.

    ii) Define coefficient of correlation. Show that it lies between - 1 and +1.

b) i) If A and B are two independent attributes then show that A' and B' are also independent.   2

    ii) Write a note on kurtosis.

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0065

ZOOLOGY PAPER – I : ZOO - 121
Chordates - I
(12155)

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.
  6. Draw neat labelled diagrams wherever necessary.

1.   Multiple choice question.   8

  i)   In frog, Kidney as .... organ.
        a) Haemopoietic   b) Homeostatic
        c) Both a and b   d) None

  ii)   In male frog testis are located............
        a) Inside abdomen   b) Outside abdomen
        c) In scrotum   d) All

  iii) Frog is..........
        a) Herbivorous   b) Omnivorous
        c) Sanguivorous   d) Carnivorous

  iv)   Thyroxine contains........... which accelerates the metamorphosis
        a) Iodine   b) Chloride
        c) Calcium   d) Phosphorus

  v)   Which of the following organism is called living fossil
        a) Hemidactylus   b) Testudo
        c) Sphenodon   d) All.

vi) In frog, the R.B. Cs. are............
    a) Binucleated   b) Without nucleus
    c) Nucleated   d) none of these.

vii) Frog has .... vision.
    a) monocular   b) Binocular
    c) Multicular   d) none of these

viii) Vocal sacs are present in..............
    a) Male frog   b) female frog
    c) Both male & female frog   d) none of these.

2. Define/ Explain/ comment **any four.**   **8**

i) Respiration   ii) Cloaca

iii) Liver   iv) Meninges

v) Trachea   vi) Nephron

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

i) Describe the mechanism of pulmonary respiration in frog.

ii) Sketch & label male Urinogenital system of frog.

iii) Give the functions of different parts of brain.

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

i) Explain the pancreas of frog.

ii) Describe the membranous labyrinth of frog.

iii) Explain the altitudinal migration of birds with suitable example.

b) Explain - Receptors.   **2**

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

i) Describe the digestive system of frog.

ii) Give the avian and reptilian feature of Archaeopteryx.

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0066

MATHEMATICS PAPER - II : MTH - 122
Algebra
(12116)

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

i)   State Division algorithm.

ii)   Define relatively prime integer.

iii) Define Equivalence Classes.

iv)   Let $A = \{1, 2, 3, 4, 5\}$, the relation R on A defined as aRb iff a < b. Find range of R.

v)   If α, β are roots of the equation $ax^2 + bx + c = 0$ then $\alpha + \beta = \ldots\ldots$ and $\alpha\beta = \ldots\ldots$.

vi)   If α, β, γ are the roots of the cubic equation $2x^3 - 6x^2 + 3x + 1 = 0$ find the value of $\Sigma\alpha\beta\gamma$.

vii) Change the signs of the roots of the $3x^8 + 5x^5 - 2x^2 + 4 = 0$

viii) Find the equation whose roots are the reciprocal of the roots of
$$x^3 + 5x^2 - 7x + 8 = 0$$

ix) Define Greatest common divisor.

x) To remove the second term from the equation
$$x^3 - 12x^2 + 48x - 72 = 0,$$ the roots are diminished by ....

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

   i) Use the principle of finite induction show that
   $$2^n < n!, \text{ for all } n \geq 4.$$

   ii) If $d = (a, b)$, $a = dx$, $b = dy$, $x, y \in \mathbb{Z}$ then show that $(x, y) = 1$

   iii) Find the g. c. d. of 252 and 595 and express it in the form $252m + 595n$.

   b) If a/b and b/c then prove that a/c. **2**

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

   i) State and prove Fermat's theorem.

   ii) Prepare the composition table for addition and multiplication of residue classes modulo 7.

   iii) Define a relation R on $\mathbb{Z}$ by aRb if $x - y$ is an even integer. Prove that R is equivalence relation.

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

   i) If α, β, γ are the roots of the equation $x^3 - px^2 + qx - r = 0$ find the value of $\dfrac{1}{\beta^2\gamma^2} + \dfrac{1}{\gamma^2\alpha^2} + \dfrac{1}{\alpha^2\beta^2}$.

   ii) Solve the equation $x^3 - 5x^2 - 2x + 24 = 0$, if the product of the roots is 12.

   iii) Find the condition that the root of the equation
   $$x^3 - px^2 + qx - r = 0 \text{ are in A.P.}$$

b) If α and β are the roots of $ax^2+bx+c=0$ find the value of $\alpha^3+\beta^3$. 2

5. a) i) Remove the fractional coefficient from the equation 4
$x^3-\frac{5}{2}x^2-\frac{7}{18}x+\frac{1}{108}=0$.

ii) Find the equation whose roots are the roots of 4
$x^4-x^3-10x^2+4x+24=0$ increased by 2.

OR

a) i) Remove the second term from the equation 4
$x^4+x^3+x-5=0$

ii) Explain Carden's method of solving the cubic equation. 4

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0068

BOTANY PAPER - II : BOT - 122
Economic Botany
(12146)

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. Figures to the right indicate full marks.
5. All questions are compulsory.
6. Draw neat diagrams wherever necessary.

1.   Solve **any Eight**.   8

   i) Common name of _curcuma longa_ is.............

       a) Kalimirch   b) Lavang

       c) Haldi   d) Hirda

   ii) Wheat grains are chief sources of.......

       a) vitamins   b) starch

       c) oils   d) fuel

   iii) In cotton plant Fibers chemically contain.........

       a) Proteins   b) cellulose

       c) sugars   d) Fats

   iv) On hydrolysis sucrose is converted into......

       a) Fructose & mannose   b) Fructose & Glucose

       c) Glucose & sucrose   d) Glucose & Mannose.

v) 'Ghritkumari' is a common name for.........

    a) Neem   b) *Aloe vera*

    c) Emblica officinalis   d) Baheda

vi) Commercial coffee is obtained from......

    a) Stem   b) Fruits

    c) Roasted seeds   d) Leaves

vii) 'Piperin' an alkaloid commonly found in......... of *piper nigrum*.

    a) Leaves   b) Fruits

    c) Seeds   d) Stem

viii) *Trifolium alexandrinum* is commonly known as........

    a) Lasun ghass   b) Egyptian clover

    c) Gajar gavat   d) alfalfa.

ix) *Jatropha* oil can be used as a source of..........

    a) Biogas   b) Fodder

    c) Biodiesel   d) Edible oil.

x) Latex of rubber is obtained by.......

    a) Extraction   b) Tapping

    c) Distillation   d) Vulcanization.

2.   Solve **any four**.

                                                           8

    i) Give the byproducts of sugar industry.

    ii) What are essential oils?

    iii) Give active principles of Neem.

    iv) Define Latex.

    v) Give the uses of coir.

    vi) Explain various sources of Bioenergy.

3. Attempt **any two**. 8

    i) Give characteristics and uses of cotton.

    ii) Give active principles and uses of *piper nigrum*.

    iii) Describe the process of solvent extraction of groundnut oil.

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

    i) Give the characteristics & uses of cane sugar.

    ii) Describe the importance of turmeric.

    iii) Give active principles & uses of *Aloe vera*.

  b) What is the scope of economic botany. 2

5. Describe the steps in process of extraction of *Jatropha* oil and elaborate the conversion of it into biodiesel. 8

OR

Mention botanical source, chemical contents & uses of Chick pea.

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Seat Number

0069

GEOINFORMATICS PAPER - II : GEOI - 202
Fundamentals of Geoinformatics : Part - II
(14022)

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) Define GIS.

   b) In survey of India (SoI) maps settlement and drainage are shown in which colour.

   c) Write down types of remote sensing.

   d) Which is Indian example of a virtual globe?

   e) What do you mean by toposheet?

   f) What do you mean by remote sensing?

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

   a) Concept of black body radiation.

   b) National scenario of Indian remote sensing.

   c) Physiographic and socio-economic information from toposheet.

3. a) Answer the following **any two**.   6

    i)   What is marginal information and colour scheme?

    ii) Describe the historical development of remote sensing?

    iii) What is spectral signature? Give in detail with a suitable
         diagram the following.
         i)   vegetation   ii) Water
         iii) soil   iv) snow

    b) Write down name of Law of radiation.   2

4. Write note on **any two**.   8

    a) History of GIS.

    b) Numbering and reference grid of toposheets.

    c) Elements of remote sensing system with suitable diagram.

5. a) Explain in detail about electromagnetic radiation with suitable   6
       diagram.

                              OR

    Discuss the following in detail about GIS.

    1) Component   2) Evolution

    3) Objectives

    b) How virtual globes are important?   2

                          ****

0293

COMPUTER SCIENCE PAPER - II : UG-CS - 122
C Programming - II
(12246)

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) File manipulation functions in C are available in which header file ?
   i)   streams.h   ii)   stdio.h
   iii) stdlib.h   iv)   files.h

 b) Pointers are of
   i)   integer data type   ii)   char data type
   iii) unsigned integer data type
   iv) None of these

 c) By default a function returns a value of type
   i)   int   ii)   char
   iii) void   iv)   none of these

 d) Which is valid string function ?
   i)   strpbrk   ii)   strlen
   iii) strxfrm   iv)   strcut

 e) Which function reallocates memory ?
   i)   realloc   ii)   alloc
   iii) malloc   iv)   None of these

 f) Give the syntax of defining putpixel( ) ?

g) What is the use of fseek( ) ?

h) What do you mean by call by reference ?

i) What will be the size of following union declaration ?
Union Test {
    int x;
    char y;
    float z; }
i) 7 bytes   ii) 4 bytes
iii) 1 byte   iv) 5 bytes

j) Define the term file ?

2. Attempt **any four.**   8

a) Explain (i) strlen( ) (ii) strcat
with suitable examples ?

b) What is structure ? Give one example ?

c) Explain any two graphics function ?

d) What is command line argument ?

e) Explain dynamic memory allocation ?

f) Define the terms
i) Record   ii) Field

3. Attempt **any two.**   8

a) What is recursion explain with suitable example ?

b) What is pointer ? Explain with suitable example ?

c) Explain (i) fprintf( )   (ii) fscant( )
with example.

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

a) Explain automatic storage class specifier ?

b) Distinguish between structure & union ?

c) Explain getc( ) and putc( ) in brief ?

B) List any three file mode in C ?   2

5. A) Attempt **any one.**   8

    a) Write a 'C' language program to draw '+' sign at the center of screen.

    b) Distinguish between call by value and call by reference ?

<center>**OR**</center>

B) a) Write a 'C' language program to swap two numbers using pointers and function ?

    b) Explain the concept of pointer to pointer with suitable example ?

<center>**************</center>

0294

INFORMATION TECHNOLOGY PAPER - II : UG-IT - 122
Object Oriented Programming using C++
(12326)

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.**   8

a) Define object.

b) Enlist inheritance types.

c) A constructor is a function having same name as that of.........

d) Define inline function.

e) What does private keyword means.

f) What is use of scope resolution operator.

g) What is purpose of <u>COOT</u> statement in C++.

h) What is use of new operator ?

i) What is mean by overloading ?

j) What is purpose of abstract class ?

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

a) What is use of static variable ?

b) Why friend functions are used ?

c) What is mean by method ? How it can be called ?

d) What is use of template ?

e) What is mean by destructor ?

f) What is a reference variable.

3. Attempt **any two**. 8

   a) Explain the difference between structure and class.

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

   c) What is operator overloading ? Explain unary operator overloading.

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

   a) Explain single inheritance.

   b) Write a constructor function for a class matrix which initialise the elements to zero.

   c) Write a C++ program to find factorial of a number.

  b) Explain any two string functions in C++. 2

5. Attempt **any one**. 8

   a) Write a C++ program to overload + operator for string class.

   b) Write note on Access specifiers in C++.

****

0295

GEOLOGY PAPER - II : GI - 122
Petrology
(12166)

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.   Fill in the blanks **any eight** from ten   8

   1)   Science of rocks is called as.........
        (petrology/geology/mineralogy)

   2)   Laccoliths is .... form of igneous rock. (discordant /
        extrusive/ concordant)

   3)   Volcanic neck is .... form of igneous rock (discordant/
        extrusive/ concordant)

   4)   Grains are of unequal size are found in .... texture.
        (equigranular /inequigranular / glassy)

   5)   Mechanical disintegration of rocks is ...... weathering.
        (Mechanical/ chemical/ biological)

   6)   Clastic texture is found in........ rocks.
        (igneous/ sedimentary/ metamorphic)

   7)   Dynamothermal metamorphism is of .... type.
        (local/ regional / thermal)

   8)   Gneissose structure is of...... rocks. (igneous / sedimentary /
        metamorphic)

9) Fissure type eruption is............... form. (extrusive / intrusive / discordant)

10) Lamination is found in rock. (Igneous / sedimentary / metamorphic)

2. Describe **any two**. 8

1) Agents of metamorphism.

2) Types of metamorphism.

3) Granulose structure.

3. Explain **any two**. 8

1) Crystallization of unicomponent magma.

2) Central types of eruption.

3) Equigranular texture.

4. Write notes on **any two**. 8

1) Rock cycle   2) Ripple marks

3) Wentworth classification of sediments.

5. Describe tabular classification of Igneous rocks. 8

OR

Describe sedimentary rock classification based on products of weathering.

****

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STATISTICS PAPER - II : ST - 122
Probability & Probability Distributions - II
(12176)

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 & statistical tables is allowed.

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

a) Give a real life situation of Hypergeometric distribution.

b) Define expectation of a discrete random variable.

c) If $X \to B\left(n, \frac{1}{4}\right)$, then probability distribution of $Y = n - X$ is ------

   i) $B\left(n, \frac{1}{4}\right)$ ii) $B(4n, 1)$

   iii) $B\left(n, \frac{3}{4}\right)$ iv) $B\left(2n, \frac{1}{4}\right)$

d) Define r^{th} factorial moment of a univariate discrete probability distribution.

e) State whether true or false :
    "Sum of two discrete uniform random variables is discrete uniform".

f) Let $X \to B(n, p)$. The binomial distribution is positively skew if
    i) p=q   ii) q>p
    iii) p>q   iv) p=q=1

g) Define coefficient of correlation $\rho(X, Y)$.

h) Define conditional variance of X given Y.

i) If discrete random variable X follows uniform distribution on 1, 2, ---, n and the mean of the distribution is 6. Then the value of 'n' is
   i) 6
   iii) 11
   ii) 18
   iv) 12

j) Let $X \rightarrow H(N, M, n)$.
   then A.M. of the distribution is ---------.

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

a) If X and Y are any two discrete random variables with $Cov(X, Y) = 50$ then $Cov(5X - 2, 10Y + 2)$.

b) For (X, Y) a bivariate discrete random variable $\sigma_X^2 = 9, \sigma_Y^2 = 4$ and $Cov(X, Y) = 4$ then find $Var(2X - 3Y)$.

c) Give two real life situations of Bernoulli random variable.

d) Let X be a discrete random variable with mean 2 and variance 5. Find the mean and standard deviation of $Y = \dfrac{X - 2}{5}$.

e) Let $X \rightarrow B(n, p)$.
   If $E(X) = 6, Var(X) = 4.2$ find n and p.

f) With usual notations prove that
   $E(X - K)^2 = Var(X) + [E(X) - K]^2$
   where K is a constant.

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

a) Obtain mode of B(n, p) distribution. Is it always unique ?

b) Following are marginal p.m.fs of X and Y.

X	1	2	3
p(x)	0.3	0.3	0.4

and

Y	1	2	3
p(y)	0.1	0.6	0.3

Assuming independence of X and Y, obtain the joint probability distribution of X and Y.

2

c) For the following joint probability distribution.

X \ Y	1	2	3
0	0.1	0.2	0.3
1	0.1	0.1	0.2

Obtain conditional mean and variance of X given Y=3.

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

　　i)　Let discrete random variable $X \to H(N, M, n)$ find the mean of X.

　　ii)　State and prove additive property of Binomial distribution.

　　iii)　For (X, Y), a bi-variate discrete random variable,
　　　　$\sigma_X^2 = 9$, $\sigma_Y^2 = 4$, $Cov(X, Y) = 4$ find $\rho\left(\dfrac{3X+5}{2}, \dfrac{5-3Y}{2}\right)$.

　b)　Let X be the roll number of a student selected at random from 20　　2
　　　students bearing roll numbers 1 to 20. Write the p.m.f. of X. Obtain
　　　mean of X.

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

　a)　i)　Let $X \to B(n_1, p)$; $Y \to B(n_2, p)$. X and Y are independent.
　　　　Then obtain the conditional distribution of X given X+Y=n.

　　ii)　Define the joint distribution function of a two dimensional
　　　　discrete random variable.

　b)　i)　Let $X \to B(n, p)$. Let μ_r denote the rth central moment of X.
　　　　Then show that $\mu_{r+1} = pq\left[\dfrac{d}{dp}\mu_r + n_r \mu_{r-1}\right]$, $r = 1, 2, ---$.

　　ii)　Let the probability distribution of X be

X	0	1	2	3
p(x)	$\dfrac{1}{16}$	$\dfrac{5}{16}$	$\dfrac{7}{16}$	$\dfrac{3}{16}$

obtain the p.g.f. of r.v.X.

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0344

ZOOLOGY PAPER - II : ZOO - 122
Ecology
(12156)

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 indicates full marks.
6. Draw neat labelled diagram wherever necessary.

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

i) Ecology is the study of the relationship of plants and ------- to their physical and biological environment.
   a) microbes   b) animals
   c) decomposers   d) producers

ii) In food chain, the herbivores are commonly known as --------
   a) Top consumers   b) Tertiary consumers
   c) Primary consumers   d) Secondary consumers

iii) The process of soil formation is known as ----------
   a) Paedogenesis   b) Glycogenesis
   c) Fermantation   d) None

iv) -------- is the by-product of photosynthesis.
   a) CO_2 b) Co
   c) NO_2 d) O_2

v) ------- energy is the unpolluted and unlimited source of energy.
   a) Wind   b) Solar
   c) Ocean   d) Biomass

vi) The animals which are living in --------- are called aquatic animals.
   a) Soil   b) Water
   c) Desert   d) Air

vii) -------- is one of the greenhouse gas.
   a) Co
   b) Co2
   c) H2SO4
   d) H2S

viii) The Kaziranga wild life sanctuary is famous for conservation of
   ----
   a) Lion
   b) Wild buffalo
   c) Rhinoceros
   d) Tiger

ix) Ostrich shows the --------- type of adaptation.
   a) Fossorial
   b) Aquatic
   c) Cursorial
   d) arborial

x) The energy harnessed from the hot rock present inside the earth is called ----------
   a) Geothermal
   b) Solar
   c) Tidal
   d) Thermal

2. Define / Explain / Comments any four.   8
   a) Global warming   b) Adaptation
   c) Humidity   d) Biogas
   e) Photosynthesis   f) Ecosystem.

3. Attempt any two of the following.   8
   a) Explain aquatic adaption with suitable example.
   b) Sketch and label pond ecosystem.
   c) Describe Nitrogen cycle with suitable diagram.

4. a) Attempt any two of the following.   6
   i) Describe prey-predator food chain in grassland ecosystem.
   ii) Explain non-conventional energy sources.
   iii) Write short note on solar cooker.

   b) What is decomposer's.   2

5. Attempt any one of the following.   8
   a) Define biomass energy. Explain brief account on types of biomass energy.
   b) With the help of diagrammatic representation show the food web in forest ecosystem.
   ****

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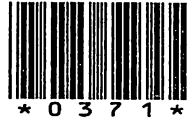
MATHEMATICS PAPER - I : MTH - 121
Differential Equations
(12115)

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

   i)   Define an integrating factor.

   ii)   State differential equation $\frac{dy}{dx} + 2y \tan x = \sin x$ is liner or not.

   iii)   Define Bernoulli's differential equation.

   iv)   Define general differential equation of first order and higher degree.

   v)   Is differential equation $p^2 - 6p + 5 = 0$ solvable for p?

   vi)   Define Clairaut's equation.

   vii)   Define homogeneous differential equation.

   viii)   P. I. of LDE with constant coefficients of type $(D - a)^t \, y = e^{ax}$ is ....

   ix)   If $f(-a^2) \neq 0$ then $\frac{1}{f(D^2)} \sin(ax + b) =$ ....

x) To reduce the equation

$$(3x+2)^2 \frac{d^2y}{dx^2} + (3x+2) \frac{dy}{dx} - 36y = 3x^2$$

into homogeneous differential equation form put.......

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

   i) If the differential equation Mdx+Ndy = 0 is exact then show that $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$.

   ii) Solve $x^2y\,dx - \left(x^3 + y^3\right)dy = 0$.

   iii) Solve $\frac{dy}{dx} + x^2y = x^5$.

b) Find an I. F. of $y(xy + 1)dx + \left(x^2y^2 + xy + 1\right)x\,dy = 0$.   2

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

   i) Explain the method of solving the differential equation F (x,y,p) = 0, where $P + \frac{dy}{dx}$, solvable for x.

   ii) Solve $p^2 - 8p + 12 = 0$.

   iii) Solve $y - 2px = f\left(xp^2\right)$.

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

   i) If $f(D)y = e^{ax}$ be a LDE with constant coefficient with $f(a) \neq 0$ then show that

$$P.\,I. = \frac{1}{f(D)}e^{ax} = \frac{e^{ax}}{f(a)}.$$

   ii) Solve $(D^2 + 2D + 3)y = x - 2x^2$

   iii) Solve $\left(D^2 + 4\right)y = \sin 3x$

b) Find the general solution of $(D-1)^2 (D^2 - 1) y = 0$.   **2**

5. a) i) Solve $(1+x)^2 \dfrac{d^2y}{dx^2} + (1+x) \dfrac{dy}{dx} + y = 4 \cos [\log(1+x)]$ **4**

ii) Solve $x^2 \dfrac{d^2y}{dx^2} - 3x\dfrac{dy}{dx} + 4y = 2x^2$ **4**

OR

i) Solve $(x+2)^2 \dfrac{d^2y}{dx^2} - (x+2) \dfrac{dy}{dx} + y = 3x + 4$ **4**

ii) Explain the method of solving the homogeneous linear differential equation.   **4**

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Seat Number

[ ][ ][ ][ ][ ][ ]

0372

MICROBIOLOGY PAPER - I : MB - 121
Cell Biology of Microorganisms
(12195)

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. Neat labelled diagrams must be drawn wherever necessary.

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

a) An endospore returns to vegetative state is called............
   a) Sporulation   b) Germination
   c) Reproduction   d) All of above

b) R>D in.......... phase of growth.
   a) lag   b) log
   c) stationary   d) death

c) Petroff - Hausser counting chamber is used for counting of.........
   a) prokaryotic   b) eukaryotic
   c) both a & b   d) none of above

d) Gap between cell wall & cell membrane is...............
   a) Periplasmic space   b) cytoplasm
   c) cytosol   d) all of above

e) Nonhistone proteins are present in the nucleus of...........
   a) eukaryotes   b) prokaryotes
   c) protoplast   d) None of above

f) Define log phase.

g) Define generation time.

h) Define phycology.

i) Define volutin granules.

j) Define budding.

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

a) Enlist two functions of cell wall.

b) Define microtubules.

c) Enlist two example of acid fast bacteria.

d) Explain stationary phase.

e) Define flagella.

f) Define slime layers.

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

a) Explain different stages of sporulation.

b) Compare between Gram Positive and Gram Negative bacterial characters.

c) Explain ultrastructure of protozoal cell.

4. a) Explain **any two** of the followings.　　6
　　i) Explain Coulter Counter.
　　ii) Turbidimetric Method.
　　iii) Explain functions of plasma membrane.

b) Define lysosomes.　　2

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

a) Define growth and explain Mathematical expression of growth.

b) Explain the structure and function of eukaryotic nucleus.

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Seat Number

0373

GEOGRAPHY PAPER - II : Gg - 122
Physical Geography - IV (Hydrosphere)
(12186)

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. Figures to the right indicates full marks.
5. Draw neat labelled diagrams and sketches wherever necessary.
6. All questions are compulsory.

1. Choose the appropriate alternative from those given below and   **8**
    rewrite the correct sentence, **Any eight.**

    i) Distribution of salinity of ocean is shown on the map with the
        help of _____.
        a) Isobar   b) Isohytes
        c) Isoholines   d) Isotherm

    ii) The deepest part of the sub-marine relief is called _____.
        a) Continental Shelf   b) Continental Slope
        c) Trench   d) Island

    iii) The current pass through Madagaskar and Mozambique
         channel of Africa known as _____ current.
        a) Bengula   b) Mozambique
        c) Agulhas   d) Cannary

    iv) The Mountain ranges on ocean floor beneath the ocean water
        are known as _____.
        a) Submarine ridge.   b) Oceanic island.
        c) Oceanic plateau.   d) Ocean deeps.

v) The part of the Atlantic Rise that lies to the south of the equator is known as _____.
   a) Dolphine Rise.   b) Challenger rise.
   c) Walvis Ridge.   d) Rio-grand ridge.

vi) _____ is the warm ocean currents.
   a) Kuo-shio.   b) Labrador.
   c) Benguela.   d) Gulf Stream.

vii) The red colour of red mud is due to _____.
   a) Glauconite.   b) Silica.
   c) Iron oxide.   d) none of these.

viii) _____ is the saltiest sea in the world.
   a) Red sea.   b) Dead Sea.
   c) Mediterranean Sea.   d) Arabian Sea.

ix) _____ are under water structures made from calcium carbonate secreted by corals.
   a) coral reefs.   b) ooze.
   c) Red clay.   d) none of these.

x) Ocean water contains maximum proportion of _____ salts.
   a) magnesium.   b) sodium chloride.
   c) magnesium sulphate.   d) calcium carbonate.

2. Write short answer (Any four).   **8**

i) Define Tsunami?

ii) Why the salinity of Dead Sea is highest?

iii) Define coral reefs?

iv) Draw the sketch map of mid – Indian ridge?

v) Define oceanic trench?

vi) Draw the ocean currents in the north Atlantic ocean?

3. Answer the following – **Any two.**   **8**

i) Explain the horizontal distribution of ocean temperature?

ii)   What is Terrigeneous material?

iii) Explain the continental shelf & slope?

4.   Answer the following – **Any two.**   8

i)   Explain the formation of corals?

ii)   Explain with the help of diagram the ocean current circulation in south Atlantic ocean?

iii) Explain ocean Trench and deep?

5.   Answer the following – **Any one.**   8

i)   Describe the circulation of ocean currents in the Indian ocean?

ii)   Explain the salinity of the open ocean and partially enclosed sea?

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खजिना - 022

0374

PHYSICS PAPER - II : PHY - 122
Theoretical Physics
(12126)

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 and carry equal marks.
   5. Figures to the right indicates full marks.
   6. Draw neat diagrams whenever necessary.
   7. Use of logarithmic tables or simple electronic calculator is allowed.
   8. Symbols have their usual meanings.

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

   i)   What is the addition of the complex numbers $6-5i$ and $3-i$
        a) $9-6i$ b) $9+6i$
        c) $3+6i$ d) $9-9i$

   ii) The differential equation $dF = M(x, y)dx + N(x, y)dy$ is exact differential equation, if it is satisfies the condition......

   a) $\dfrac{\partial^2 x}{\partial y^2} = M(x, y) + N(x, y)$ b) $\dfrac{\partial M}{\partial y} = \dfrac{\partial N}{\partial x}$

   c) $\dfrac{\partial f}{\partial y} = \dfrac{\partial^2 f}{\partial x^2}$ d) none of the above

   iii) $\overline{A} \cdot (\overline{B} \times \overline{C}) = $..........

   a) $\overline{A} \cdot \overline{B} + \overline{A} \cdot \overline{C}$ b) $\overline{B} \cdot \overline{C} + \overline{A} \cdot \overline{C}$
   c) $\overline{A} \times \overline{B} + \overline{C}$ d) none of the above

iv) Vector product of two parallel vectors is ....
   a) zero   b)   1
   c) ∞ d)   none of the above

v) If $\phi(x, y, z)$ be a differential scalar field, then gradient of ϕ is .....
   a) $\nabla\phi$ b) $\nabla^2\phi$
   c) $\nabla\times\phi$ d)   none of the above

vi) If $\overline{\nabla}\times\overline{V} \neq 0$, then vector field $\overline{V}$ is ....
   a) irrotational   b)   rotational
   c) Non solenoidal   d)   none of the above

vii) The divergence of curl of $\overline{A}$ is ....
   a) 1   b)   0
   c) ∞ d)   100

viii) Area of parallelogram whose sides are $\overline{A}$ & $\overline{B}$ is given by ....
   a) $\overline{A}\times\overline{B}$ b) $\overline{A}\cdot\overline{B}$
   c) $\overline{A}\cdot(\overline{A}\times\overline{B})$ d)   none of the above

ix) $\hat{i}\times\hat{i}$ = ...
   a) 1   b) $\hat{j}$

   c) $\hat{k}$ d)   0

x) If F = f(x, y), then the total differential dF = ...
   a) $F_x dx + F_y dy$ b) $F_y dx + F_x dy$
   c) $x^2 dx + y^2 dx$ d)   none of the above

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

                                                   8

   a) Give the statement of De-Moiver's theorem.

   b) Define vector triple product of three vectors.

   c) Define field ? State its two types.

   d) State Euler's Formula.

   e) If $F(x, y) = x^3y^2 - e^{xy}$, then find F_x.

   f) State Geometrical interpretation of scalar triple product.

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

i) If $\overline{A} = 2\hat{i} + 2\hat{j} - \hat{k}$ and $\overline{B} = 6\hat{i} - 3\hat{j} + 2\hat{k}$, then calculate.
a) $\overline{A} \cdot \overline{B}$
b) $\overline{A} \times \overline{B}$
c) Area of parallelogram whose sides are $\overline{A}$ & $\overline{B}$

ii) Using idea of total differential, find the approximate value of
$\sqrt{(4.98)^2 + (12.02)^2}$

iii) Prove that $\overline{\nabla} \cdot (\phi\overline{A}) = \phi\overline{\nabla} \cdot \overline{A} + \overline{A} \cdot \nabla\phi$

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

i) Find constants 'a', 'b' & 'c', so that
$\overline{A} = (2x + y + az)\hat{i} + (bx - y - 3z)\hat{j} + (2x + cy + z)\hat{k}$ is irrotational.

ii) Express $\left(\dfrac{9 - 7i}{2 - 3i}\right)$ in the form of $x + iy$.

iii) If $u = e^x \cdot \cos y$ then show that $\dfrac{\partial^2 u}{\partial x \partial y} = \dfrac{\partial^2 u}{\partial y \partial x}$

b) Determine constant 'a' so that vectors 2
$\overline{A} = 3\hat{i} + 2\hat{j} - a\hat{k}$ and $\overline{B} = 2\hat{i} + \hat{j} - 2\hat{k}$ are parallel.

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

i) Define curl of vector field, explain its physical significance and hence state the condition for rotational and irrotational vector field.

ii) What is Argand diagram ? Explain addition, substraction, multiplication and division of two complex numbers by using Argand diagram.

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खजिना - 023

CHEMISTRY PAPER - I : CH - 121
Physical & Inorganic Chemistry
(12135)

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. Figures to right indicates full marks.
6. Use of logarithmic table and non programmable calculator is allowed.

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

i)   The value of gas constant (R) in SI Unit.

a) 8.314×10^7 erg degree $^{-1}$ mol^{-1}.

b) 8.314 Joule degree $^{-1}$ mol^{-1}.

c) 1.987 cal degree $^{-1}$ mol^{-1}.

d) 0.08205 Litre atm degree $^{-1}$ mol^{-1}.

ii)   The rate of diffusion of different gases at constant temperatures and pressure are inversely proportional to the square root of their.

a) density   b)   Molecular weights

c) Viscosities   d)   Both a and b.

iii) The temperature at which real gas obeys ideal gas law over appreciable range of pressure is called......

    a) Compressibility factor.   b) Absolute Zero temperature.

    c) Boyle's temperature   d) Vander Waal's temperature.

iv) The Unit of Vander Waal's constant 'a' is

    a) $atm\ L^2\ mol^{-2}$.   b) $atm\ L^2\ mol^{-1}$.

    c) $atm\ L^2$ d) atm

v) Structure of Nacl crystal is

    a) Tetragonal   b) Cubic

    c) Orthorhombic   d) Monoclinic.

vi) The existence of a substance in more than one solid modification is known as.

    a) Isomorphism   b) Polymorphism

    c) Amorphous   d) Allotropy.

vii) The value of ionisation potentials increases in order.

    a) First < Third < Second   b) First > Second > Third

    c) First > Second = Third   d) First < Second < Third

viii) The modern periodic table is given by....

    a) Mendeleev   b) Einstein

    c) Bohr   d) Mosley.

ix) In a charcoal test, the mixture is prepared with

    a) NaCl   b) $NaHCO_3$

    c) Na_2CO_3 d) MnO_2

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

i) Define Root mean square velocity. Give its unit.

ii) What is compressibility factor?

iii) Define Heat of crystallization.

iv) Explain Isotropic substance with example.

v) Why zero group elements are chemically inert?

vi) What are acidic and basic radicals?

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

i) State the assumptions of kinetic theory of gases.

ii) What is etch figure. Give the uses of etch figure.

iii) The compressibility factor Z is 0.783 for methane gas. Calculate the volume of 5 moles of methane at $0^\circ c$ and at 10 atmosphere.

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

i) Explain, cation is smaller and anion is larger than parent atom.

ii) Write a short note on common ion effect.

iii) Write kinetic gas equation and deduced Avogadro's principle from it.

5. a) Answer **any one** of the following. 6

i) Describe the Andrew's isotherm of carbon dioxide.

ii) Explain the following properties of an element.

a) Electronegativity.

b) Electron affinity.

b) Explain plane of symmetry. 2

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0405

ELECTRONICS PAPER – I ELE - 121
Analog Electronics - II
(12225)

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. Figure to the right indicate full marks.
6. Use of logarithmic table and non programmable calculator is allowed.

1. Attempt **any eight.**   8

a) FET is .... device.
   i)   Unipolar   ii) Bipolar
   iii) Passive   iv) None of these

b) The efficiency of bridge rectifier circuit is ....%
   i)   121   ii) 48.2
   iii) 81.2   iv) 40.6

c) .... region of transistor is heavily doped.
   i)   Base   ii) Emitter
   iii) Collector   iv) All

d) Addition of .... impurity in pure semiconductor gives
   p – type semiconductor
   i)   Pentavalent   ii) Trivalent
   iii) Tetravalent   iv) Hexavalent

e) FET stands for.........
   i) Filled effect transistor   ii) Field effect transistor
   iii) Filled effect transformer iv) Filled effect transducer

f) UJT has .... junction.
   i) One   ii) Two
   iii) Zero   iv) Three

g) Ripple factor of full wave rectifier is ....%
   i) 81.2   ii) 40.6
   iii) 48.2   iv) 121

h) LED emitts light when it is...........
   i) Reverse biased   ii) Forward biased
   iii) Self biased   iv) None of these

i) The frequency of oscillation of UJT relaxation oscillator depends on..........
   i) Externally connected resistor and capacitor
   ii) Externally connected power supply
   iii) Temperature and capacitor
   iv) Resistor only.

j) In which of following material valence band and conduction band are overlapped.
   i) Insulator   ii) Silicon
   iii) Conductor   iv) Semiconductor

2. Attempt any four.   8

   a) Draw symbol of n – channel and p – channel MOSFET.

   b) Define ripple factor and efficiency of rectifier.

   c) Draw the symbol of LED and photodiode.

   d) Find α, if transistor has β = 100.

   e) Define peak inverse voltage of diode.

   f) Draw the equivalent circuit of UJT.

2

3.   Attempt **any two.**   8

     a)   Explain FET as a VVR.

     b)   Explain with neat diagram forward biasing of diode.

     c)   Draw I – V characteristic of UJT and explain negative resistance region in it.

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

     a)   Explain with neat diagram diode as a clipper.

     b)   Explain need of biasing of transistor. Name types of biasing.

     c)   Explain formation of p – type semiconductor.

   b)   Calculate the value of η of UJT if R_{BB} = 10 kΩ and R_{BI} = 6 kΩ.   2

5.   Distinguish between common emitter, common collector and common base configurations of transistor.   8

OR

Calculate the efficiency of full wave rectifier.

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0406

BIOTECHNOLOGY PAPER - I : BT - 121
Biomolecules
(12335)

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. Explain the terms **any four**.   8

   i)   Derived lipids.

   ii) β sheet.

   iii) Capping.

   iv) Sucrose

   v) Glycogen.

   vi) Linoleic acid.

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

   i) Explain the structure & properties of glycerol.

   ii) What is protein? Give applications of protein.

   iii) Distinguish between purines & pyrimidines.

   iv) Explain tRNA & its significance.

   v) Write a note on mutarotation.

   vi) Explain saturated & unsaturated lipid.

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

   i)   Differentiate between essential & non essential amino acid.

   ii) What is RNA? Explain types of RNA.

   iii) Explain α Helix with suitable diagram.

   b) Explain Chargaff rule.   **2**

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

   i)   What is DNA & explain β form of DNA.

   ii) Write a note on titration of amino acids.

   iii) Explain the tertiary structure of protein.

   iv) Describe the structure & function of phospholipids.

   v)   Write a note on D & L isomers.

   vi) Explain the biological significance of lipids.

5.   Answer the following

   i)   Write an account of structure, function & nomenclatum of   **6**
        nucleotides.

   ii) Explain isoelectric pH.   **2**

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Seat Number

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0407

BIOCHEMISTRY PAPER - I : BC - 121
Basic Biochemistry (12215)

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 & carry equal marks.
5. Draw neat wel-labelled diagram wherever necessary.
6. Figures to right indicate full marks.

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

i) Enzyme commission number has...............digits.
    a) 5   b) 3   c) 4   d) 2

ii) DNA contains...........sugar.
    a) Ribose   b) Ribulose
    c) Deoxyribose   d) Deoxyribulose

iii) .... is not fat soluble vitamin.
    a) Vit. A   b) Vit. D   c) Vit. B   d) Vit K

iv) .... is a protein part of Holoenzyme.
    a) Coenzyme   b) Cofactor
    c) Apoenzyme   d) Prosthetic group

v) Nitrogen base, pentose sugar & phosphate group combine to form.............
    a) Nucleoside   b) Nucleotide
    c) Nucleic acid   d) DNA

vi) Severe deficiency of vit. A leads to...........
    a) Night blindness   b) Dermatitis
    c) Xerophtnalmia   d) Nyctalopia

vii) Define turnover number.

viii) The diameter of DNA double helix is............
   a) 30 A°   b) 10 A°   c) 20 A°   d) 40 A°

ix) Vitamin C is also known as...........
   a) Pyruvic acid   b) Lactic acid
   c) Ascorbic acid   d) Thiamine

x) Lock & Key model is proposed by...........
   a) Emil Fischer   b) Koshland
   c) Summer   d) Robert Koch

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

   i)   Write in brief about fat soluble vitamins.

   ii) Give any four Chargaff's rule.

   iii) Write any four biological roles of enzymes.

   iv) Draw schematic representation of DNA.

   v)   Write any four functions of vitamin E.

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

   a) Define enzyme inhibition & describe in brief competitive inhibition.

   b) Describe in brief mRNA.

   c) Write down chemistry & biochemical functions of Niacin.

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

   i)   Compare between DNA & RNA.

   ii) Describe effect of temperature on enzyme activity.

   iii) Describe structure & functions of Choline.

   b) Enlist the components of DNA & RNA.   2

5. Describe in detail Watson & Crick model of DNA.   8

OR

Describe I. U. B. Classification of enzymes.

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Seat Number

0408

ENVIRONMENTAL SCIENCE PAPER - I : ENVI - 121
Introduction to Environment – II (12395)

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 neat and labelled diagrams wherever necessary.

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

   i)   When ozone levels decrease below 200 DU, the conditions is called...........
   - a) Smog
   - b) Ozone hole
   - c) Ozone umbrella
   - d) Ozone enrichment

   ii)   Which of the following power resources is considered as cleanest fuel?
   - a) Wood
   - b) Coal
   - c) Oil
   - d) LPG

   iii)   Noise is measured in................
   - a) dB
   - b) mg/L
   - c) ppm
   - d) m/S

   iv)   The amount of molecular CO_2 by volume in atmosphere is.......
   - a) 76%
   - b) 0.003%
   - c) 0.3%
   - d) 0.03%

   v)   The following green house gas is generated in biogas plant.....
   - a) Methane
   - b) Carbon dioxide
   - c) Nitrous oxide
   - d) Nitrogen dioxide

   vi)   Depletion of protecting layer Ozone will cause...........
   - a) Increase in ice burger
   - b) Increase in skin cancer
   - c) Global warming
   - d) Acid rain

   vii)   Atmosphere of large cities gets polluted mainly by.............
   - a) Sewage
   - b) Garbage
   - c) Automobile exhaust
   - d) Industrial waste

viii) The name of the gas leaked in Bhopal gas industrial accident
is...............
   a) Sodium isothiocynate   b) Methyl isocynate
   c) Ethyl isocynate   d) Methyl isothiocynate

ix) Ozone layer is found in............
   a) Stratosphere   b) Mesosphere
   c) Atmosphere   d) Ionosphere

x) Soil erosion is the process of...............
   a) Soil formation   b) Filtering of pollutants
   c) Sediment formation   d) Removal of soil by wind & water

2. Attempt **any four** of the followings.   **8**
   i) What is soil? Mention the constituents of soil.
   ii) Define: air pollutants and its sources.
   iii) Define: Solid waste management.
   iv) Explain: Pollutants on the basis of their degradation.
   v) Explain: Point sources of water pollution.
   vi) Define:- Plate tectonic.
   vii) Define:- Ozone layer depletion.

3. Attempt **any two** of the followings.   **8**
   i) Explain the Domestic sources of solid waste pollution.
   ii) Write a note on objectives of environment education.
   iii) Write a note on - Evolution of mountain.

4. a) Attempt **any two** of the followings.
   i) Explain: Constructive plate boundaries with neat labelled   **6**
     diagram.

   ii) Explain Sources of Surface and Ground water pollution.

   iii) Explain in brief:- Mechanism of green house gas phenomenon.

  b) Explain pollutants on the basis of state.   **2**

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

   i) Explain the interior structure of the earth with neat labelled
     diagram.

   ii) Explain in brief - Environmental education in India.

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0409

MATHEMATICS PAPER - III : MTH - 123
(A) Laplace Transforms (12117) OR /
(B) Computational Mathematics (12118)

P. Pages : 4

(A) Laplace Transforms (12117)

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
   i) Find $L(t^n \cdot F(t))$
   ii) Find $\beta(1, 1)$.
   iii) Find $L(\cosh 4t + 1)$.
   iv) Find $L^{-1}\left(\dfrac{1}{s^7}\right)$.
   v) Cost and sint are periodic function with period...............
   vi) Find $L^{-1}\left(\dfrac{1}{s^2 - 4}\right)$
   vii) Find $L^{-1}\left(\dfrac{1}{2s + 5}\right)$
   viii) If $\int_0^t F(u) \cdot G(t - u)\, du = F * G$ then $G * F$ is...................
   ix) Define Heaviside's unit step function $U(t - q)$.
   x) Find $\overline{6}$.

2. a) Attempt **any two** of the following.   6
   i) Prove that $L(F(t)) = f(s)$ then prove that
      $L\left(e^{at} \cdot f(t)\right) = f(s - a)$
   ii) Find $L\left(4e^{5t} + 6t^3 - 3\sin 4t + 2\cos 2t\right)$.
   iii) Find $L(t \cdot \cosh 3t)$

   b) Using $L(F'(t)) = Sf(s) - F(0)$ show that $L(t) = \dfrac{1}{s}$.   2

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

    i)   If $L^{-1}(f(s))=F(t)$ then $L^{-1}(f(ks))=\frac{1}{K}F\left(\frac{t}{K}\right)$

    ii)   Find $L^{-1}\left(\frac{12}{4-3s}\right)$.

    iii)   Find $L^{-1}\left(\frac{6s-4}{s^2-4s+20}\right)$.

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

    i)   Find F(t) from the graph given below with period $T=2\pi$.
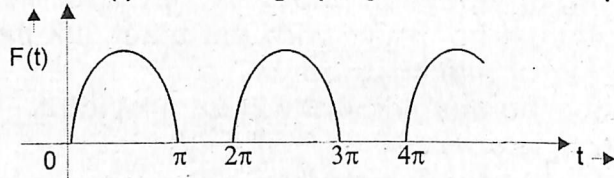
    ii)   Find $L^{-1}\left(\frac{3s+7}{(s-3)(s+1)}\right)$.

    iii)   Find $L^{-1}\left(\frac{1}{(s^2+1)(s+1)}\right)$. use convolution theorem.

   b) Show that $|*|*|*-----*|$ (n times) $=\frac{t^{n-1}}{(n-1)!}$ n = 1, 2, 3.......... 2

5.   i)   Prove that $L(U(t-a))=\frac{e^{-as}}{s}$ 4

           Where U (t - a) is Heaviside's unit step function.

    ii)   Find $L(\sin 2t\,\delta(t-3))$

<div align="center">OR</div>

                                                  4

    i)   Using Laplace transform, solve $y''+y=\cos t$ where $y(0)=0=y'(0)$. 4

    ii)   Using Laplace transform solve

           $\frac{d^2y}{dt^2}+9y=0$ subject to the condition $y(0)=1$, $y'(0)=0$. 4

<div align="center">**************</div>

(B) Computational Mathematics (12118)

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 is allowed.

1. Attempt **any eight** of the following.   **8**
   i) Define Discrete Numeric function.
   ii) Define $S^{-i}a$ for the numeric function a.
   iii) If numeric function $a_r = 7 \ \forall \ r \geq 0$ then A(z)=..........
   iv) If f (x) is divisible by x - a then a is the root of f (x) =...............
       a) - 1   b) 1
       c) 0   d) None of these
   v) The root of the equation $x^3 - x - 4 = 0$ lies between...........
       a) 1 and 2   b) -1 and -2
       c) 0 and 1   d) None of these
   vi) Define optimal strategy.
   vii) What is mean by unfair game?
   viii) Define 'Value of the game'.
   ix) What is processing time?
   x) Define 'Ideal Time'.

2. a) Attempt **any two** of the following.   **6**
   i) If A (z) and B (z) are generating functions of numeric functions a and b respectively then show that.
       A(z) + B(z) = C(z) for c = a + b and
       A(z) · B(z) = D(z) for d = a·b.

   ii) let $a_r = \begin{cases} 1 & \text{if } 0 \leq r \leq 2 \\ 3r & \text{if } r \geq 3 \end{cases}$ and $b_r = \begin{cases} 2^r + 1 & \text{if } 0 \leq r \leq 1 \\ r - 5 & \text{if } r \geq 2 \end{cases}$

   Find $a_r + b_r$ and $a_r \cdot b_r$

   iii) Determine the generating function of numeric $a_r = 3^r + 4^{r+1}$

   b) Find the generating function of 2, 4, 8, 16, 32,........   **2**

3. Attempt **any two** of the following.   **8**
   i) Explain Newton-Raphson method to find the root of f (x) = 0.

3

P.T.O

ii) Find the root of $x^3 - 2x - 5 = 0$ by Regula - Falsi method up to three iterations.

iii) Find the real root of $x^3 - x - 1 = 0$ by Bisection method. Perform three iterations.

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

   i) Explain solving 2×2 game by mixed strategy method.

   ii) Solve the following game by saddle point method.

$$\begin{array}{c} & & \text{Player B} \\ & & \begin{array}{cccc} B_1 & B_2 & B_3 & B_4 \end{array} \\ \text{Player A} \begin{array}{c} A_1 \\ A_2 \\ A_3 \end{array} & \left[\begin{array}{cccc} 6 & 3 & 1 & 20 \\ 5 & 5 & 4 & 6 \\ 4 & -2 & 0 & -5 \end{array}\right] \end{array}$$

   iii) Solve the following game by using the rule of Dominance.

$$\begin{array}{c} & & \text{Plyear B} \\ & & \begin{array}{ccc} B_1 & B_2 & B_3 \end{array} \\ \text{Player A} \begin{array}{c} A_1 \\ A_2 \\ A_3 \end{array} & \left[\begin{array}{ccc} 6 & -3 & 7 \\ -3 & 5 & 4 \\ 1 & 1 & 7 \end{array}\right] \end{array}$$

  b) Define Pay - off Matrix.   2

5. a) i) Explain the procedure to find optimal sequence of n jobs on two machines.   4

   ii) Find an optimal sequence for the following problem for machines M_1, M_2 and M_3.   4

Job	J_1	J_2	J_3	J_4	J_5	J_6
M_1	15	10	14	9	12	9
M_2	10	11	12	9	8	13
M_3	15	14	13	16	17	16

OR

i) Explain the assumptions which are generally made in sequencing problem.   4

ii) Six jobs are to be performed on machine & then on machine B. The processing time for each job is given below.   4

Time (in minutes)

Job	I	J	K	L	M	N
A	8	12	7	10	11	9
B	10	7	11	6	12	8

Find optimal sequence of jobs.

****

Seat Number

GEOGRAPHY PAPER - I : Gg - 121
Physical Geography - II (Lithosphere)
(12185)

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. Figures to the right indicate full marks.
5. Draw neat labelled diagrams and sketches wherever necessary.
6. Use of map stencils is allowed.
7. All questions are compulsory.

1. Choose the appropriate alternative from those given below and rewrite the correct sentence **any eight.**   8

i) Ox-bow lakes are formed by..........
   a) Erosional work of wind
   b) Erosional work of Glaciers
   c) Rivers during their middle and lower course.
   d) All of the above

ii) Mushroom rock is formed by
   a) Depositional work of wind
   b) Erosional work of wind
   c) Transportational work of wind
   d) None of these

iii) The process of mechanical disintegration and chemical decomposition of rocks in situ is called.........
   a) deposition   b) folding
   c) weathering   d) earthquake

iv) The chemical weathering is most dominant in the areas of........
   a) Basaltic topography   b) limestone topography
   c) Desert topography   d) Snow covered topography

v) The formation of yardang and zeogen are associated with the work of..........
   a) Wind erosion   b) river erosion
   c) Sea waves deposition   d) sea waves erosion

vi) A lagoon is formed by.............
   a) sea waves deposition   b) wind erosion
   c) sea waves erosion   d) wind deposition

vii) Deltas are formed in the..........course of river
   a) Middle   b) Lower
   c) Upper   d) Upper and middle

viii) Beach is formed by...........
   a) sea waves deposition   b) wind deposition
   c) river deposition   d) wind erosion

ix) Barkhan is formed by...........
   a) Erosional work of river
   b) Depositional work of wind
   c) Erosional work of sea waves
   d) Depositional work of river

x) Irregular branching of tributary streams in many directions known as...........
   a) Dendritic Pattern   b) Radial Pattern
   c) Parallel Pattern   d) Rectangular Pattern

2. Write short answer **any four**.

8

i) Define mechanical weathering.

ii) Name any two features which are associated with depositional work of sea waves.

iii) Write in brief about drainage density.

iv) Draw the figure of water fall.

v) What are different types of sand dunes?

vi) Draw the labelled diagram of barkhan.

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

   i) Write in brief Biological weathering.

   ii) Which factors are necessary for the delta formation.

   iii) Describe the formation of mushroom rock with diagram.

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

   i) Explain the sea cliff and wave – cut platform.

   ii) State the importance of weathering.

   iii) State the formation of rapid with diagram.

5. Answer the following **any one**.　　　　　8

   i) Describe any two landforms with diagrams which are caused by depositional work of wind.

   ii) Explain in detail the chemical weathering.

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ELECTRONICS PAPER - II : ELE - 122
Digital Electronics – II (12226)

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 Logarithmic Table and non-programmable calculator is allowed.

1. Attempt **any eight.** 8

   a) Multiplexer is a circuit with .... input and .... outputs.

      i) One, many   ii) One, one

      iii) Many, one   iv) Many, many

   b) IN JK FF, when J = 0, K =1, it is possible to........the Flip-Flop.

      i) No change   ii) Toggle

      iii) Reset (0)   iv) Set (1)

   c) In serial-In-serial-out and serial-in-parallel-out shift Register, the data bits are entered in to the Register...........

      i) Similarly   ii) Differently

      iii) Reversely   iv) None of these

   d) Instead of counting with binary numbers, ... uses words that have a single high bit.

      i) Synchronous   ii) Ring

      iii) Up   iv) Down

e) A decoder is similar to a Demultiplexer, with one exception that................

   i) there is no data input   ii) there is only data input

   iii) there is two data inputs   iv) there is many data inputs

f) .... are the basic building blocks of a sequential logic circuit.

   i) Counters   ii) Flip-Flops

   iii) Address   iv) Subtractors

g) Serial Loading means storing the data in a shift Register by entering............ per clock pulse.

   i) a word   ii) 1-bit

   iii) a nibble   iv) a byte

h) The last count shown by the mod - 20 counter is............

   i) 10011   ii) 11011

   iii) 10100   iv) 10101

i) .... is known as a 1-bit Register.

   i) Flip-Flop   ii) Counter

   iii) Decoder   iv) Encoder

j) The number of FFs required to construct a shift Register capable of storing 6-bit number is ....

   i) 3   ii) 6

   iii) 9   iv) 12

2. Answer **any four**.

                                                               8

a) What is Decoder?

b) State the important applications of Flip-Flop?

c) What is the advantage of Master Slave Flip-Flop?

d) What are the basic types of Shift Registers in terms of data movement?

e) Draw the circuit diagram of a Left Shift Register using D - Flip - Flops.

f) Define a Counter?

3. Attempt **any two**.   8

a) Draw the Logic Diagram of 2:1 Line Multiplexer using gates and explain its Truth - Table.

b) With Logic Diagram, explain RS FF using NAND gates.

c) Explain the working of 4-bit serial - In - parallel - out shift Register with neat diagram.

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

i) Explain T - Flip - Flop with Block diagram. Draw its Logic symbol.

ii) Explain the function of Preset and clear inputs in FFs.

iii) Draw the logic diagram of Mod-5 counter and give its Truth Table.

b) What is the Difference between "D" Type and "T" Type Flip-Flop?   2

5. Attempt **any one**.   8

a) With Logic diagram and block diagram, explain 8:1 Line Multiplexer. Give its Truth Table.

b) With Logic diagram and waveforms, explain Decode counter (Mod - 10) in detail.

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0412

BIOTECHNOLOGY PAPER - II : BT - 122
Microbial Techniques
(12336)

P. Pages : 2

Time : Two Hours   Max. Marks : 40

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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 with suitable option **any four**.   8

   a) Culture containing more than one kind of microorganism is called.............
       i)   Pure culture   ii)   Auxenic culture
       iii) Mix culture   iv)   None of the above

   b) ....is referred as non ionizing radiation.
       i)   Uv rays   ii)   X-ray
       iii) Gamma ray   iv)   Cathod ray

   c) Molecular taxonomy determined by DNA base composition based on...........
       i)   % of G + C   ii)   % of A + T
       iii) % of A + G + T + C   iv)   all of the above

   d) Separation of small molecule can be done by...............
       i)   Spectrophotometer   ii)   Centrifugation
       iii) Viscometer   iv)   flow cyclometer

   e) In molecular taxonomy, ribotyping based on............
       i)   5s rRNA   ii)   16s rRNA
       iii) 23s rRNA   iv)   none of the above

f) In Laminar air flow.............type of filter is located.
   i) membrane filter ii) Seitz filter
   iii) HEPA iv) all of the above

2. Attempt the following questions **any two**. 8

a) Write a note on Binomial nomenclature.

b) Explain slide culture technique for fungal cultivation.

c) Explain the mode of action of disinfectant –
   i) Alcohol ii) Halogens .

d) What is sterilization? Explain sterilization by moist heat?

e) Explain construction and working of pH meter.

3. a) What is continuous culture? Explain construction working of chemostat. 6

OR

Define isolation? Explain isolation of microorganism by pour plate technique?

b) Define aseptic technique. 2

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

a) Write a note on DNA – DNA Hybridization.

b) Write a note on characteristics of ideal disinfectant.

c) Explain streak plate technique for isolation of aerobes?

d) Comment on biological indicator for sterilization.

5. Define the following **any four**. 8
   i) Pure culture & Mix culture.
   ii) D – value.
   iii) Binomial nomenclature.
   iv) Viscosity.
   v) Antiseptic & Sanitizer.
   vi) Batch culture.

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Seat Number

BIOCHEMISTRY PAPER - II : BC - 122
Microbial Growth & Nutrition
(12216)

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. All questions carry equal marks.
6. Draw neat labelled diagram wherever necessary.
7. Figure to the right indicate full marks.

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

   i) After inoculation of bacterial culture into a fresh nutrient medium, the microbial population remains constant for initial period, it is known as...........phase.
   a) Log
   b) Lag
   c) Stationary
   d) Death

   ii) Direct microscopic count can be done by...............
   a) TVC
   b) Cell nitrogen measurement
   c) Turbidometry
   d) Breed count method

   iii) Organisms which are growing below 15°C are called as.........
   a) Mesophiles
   b) Thermophiles
   c) Psychrophiles
   d) Barophiles

   iv) E· Coli can grow optimally at temperature.............
   a) 37°C
   b) 52°C
   c) 8°C
   d) 75°C

v) Microbes use CO_2 as sole carbon source, are called as.........
   a) chemotrophs
   b) Heterotrophs
   c) Autotrophs
   d) Saprophytes

vi) ....is the useful method for bacterial cultivation to study, bacterial count.
   a) Slide culture
   b) Streak plate
   c) Pour plate
   d) All

vii) ......is not a culture characteristic for bacteria on solid medium.
   a) Margin
   b) Opacity
   c) Colour
   d) % G + C

viii) Heavy metals do not have............activity.
   a) Bactericidal
   b) Fungicidal
   c) Virucidal
   d) Sporicidal

ix) Household bleach is a chemical sterilizer contains............
   a) Heavy metals
   b) Sodium hypochlorite
   c) Alcohol
   d) All

x) Milk contaminating pathogens can be killed generally by the process.
   a) Pasteurization
   b) Heavy metals
   c) uv – radiations
   d) Autoclaving

2. **Any four** short note.   8

   a) Tydallization.

   b) Coulter method.

   c) Generation Time.

   d) Specialized medium.

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

  a) Explain chemical factors affecting growth.

  b) Explain pour plate technique with application.

  c) Give principle and application for uv – sterilization.

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

  a) Comment on. Counting chamber method.

  b) Comment on sanitizer.

  c) HEPA filters.

  b) Enlist the culture characteristics on solid medium.   2

5. Solve **any one**.   8

  a) Explain principle and applications of radiation method for sterilization.

  b) Explain Growth curve and comment on generation time.

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*0 4 1 4 *

ENVIRONMENTAL SCIENCE PAPER - II : ENVI - 122
Natural Resources - II
(12396)

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 process of desert formation is called............
        a) Desertification   b) Afforestation
        c) Land degradation   d) Organic Farming

   ii) Which of the following is non-renewable resource?
        a) Wind   b) Tides
        c) Coal   d) Solar radiation

   iii) Flood is a...........phenomenon.
        a) Meteorological   b) Hydrological
        c) Geological   d) Climatological

   iv) A major in-stream use of water is for..............
        a) Producing hydroelectric power
        b) Industrial processing
        c) Domestic use
        d) Agriculture irrigation

   v)   The major constituent in biogas is.........
        a) Hydrogen Sulphide   b) Methane
        c) Carbon Dioxide   d) Hydrogen

vi) The loss of top soil cover is called as...........
    a) Soil erosion   b) Wind erosion
    c) Soil Conservation   d) Soil Pollution

vii) Chipko Movement was launched for protection of.........
    a) Forests   b) Wetlands
    c) Grasslands   d) Livestock

viii) Oceans and Seas contain about..............of the total earth's water.
    a) 97.20%   b) 95%
    c) 90%   d) 92.5%

ix) Both power and manure are provided by.............
    a) Thermal plants   b) Nuclear plants.
    c) Biogas plants   d) Hydroelectric plants.

x) Forest helps in increasing the...........
    a) Precipitation   b) Humidity
    c) Temperature   d) Wind speed

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

                                                                  8

i) Define Mining.

ii) Enlist the uses of water.

iii) What is soil erosion?

iv) Give the causes of deforestation.

v) Define hydropower.

vi) What are renewable natural resource?

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

i) What are floods? Explain in brief the causes and effects of floods.   8

ii) Define land degradation. Explain in detail the reasons of land degradation.

iii) Explain in brief how solar energy can be used as alternate energy resource.

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

    i) Discuss the use and overutilization of surface and ground water.

    ii) Explain the causes and effects of desertification.

    iii) Write a note on equitable use natural resources.

  b) Define droughts. 2

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

    i) Explain in brief the role of an individual in conservation of natural resources.

    ii) Discuss the use and overexploitation of forest resources giving appropriate case studies.

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0415

BOTANY PAPER - I : BOT - 121
Higher Cryptogams
(12145)

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. Draw neat labelled diagram wherever necessary.
5. All questions are compulsory.

1.   Attempt **any eight**.   8

   i)   Riccia is an example of ......
         a) Thallophyta   b) Bryophyta
         c) Pteridophyta   d) Gymnosperm

   ii)   in division psilophyta sporophyte consist of underground..........
         a) Stem system   b) Root system
         c) Rhizome & rhizoids   d) Bulbil

   iii) .... are commonly called as mosses.
         a) Musci   b) Hepaticae
         c) Anthocerotae   d) Ferns

   iv)   Operculum is present in the sporophyte of...........
         a) Riccia   b) Funaria
         c) Marchantia   d) Axthoceros

   v)   Dominant phage of pteridophyte is ....
         a) Sporophyte   b) Gametophyte
         c) Rhizoids   d) Leaves

vi) Female sex organs of <u>selaginella</u> are called ....
   a) Archegonia   b) Oogonia
   c) Antheridia   d) Perigonia

vii) Legules are present beneath the leaf of ....
   a) <u>Funaria</u>   b) <u>Riccia</u>
   c) <u>Selaginella</u>   d) <u>Equisetum</u>

viii) Spares of <u>Funaria</u> germinate to produce........
   a) Buds   b) Protonema
   c) Calyx   d) Rhizome

ix) Bryophytes flourish luxuriantly on ....
   a) Moist soil   b) Dry soil
   c) Loamy soil   d) Sandy soil

x) Carinal canal is present in the stem of ....
   a) <u>Selaginella</u>   b) <u>Equisetum</u>
   c) <u>Funaria</u>   d) <u>Riccia</u>

2.   Attempt **any four**.   8

   i)   Give distinguishing characters of Musci.

   ii) Rhizophore of <u>selaginella</u>.

   iii) Give systematic position of <u>equisetum</u>.

   iv) Describe sporophyte of <u>Riccia</u>.

   v)   What is Heterospory.

   vi) Draw and label external morphology of gametophyte of <u>funaria</u>.

3.   Attempt **any two**.   8

   i)   Give general characters of pteridophytes.

   ii) Describe antheridial head and structure of antheridia in <u>Funaria</u>.

   iii) Describe strobilus and structure of sporangiophore in <u>equisetum</u>.

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

    i)   Describe the process of fertilization in <u>Riccia</u>.

    ii) Give economic importance of bryophytes.

    iii) Sketch and label L – S of strobilus of <u>equisetum</u>.

    b) Sketch and label structure of megasporangium of <u>selaginella</u>.   2

5. Give an outline of classification of bryophytes according to G. M   8
    Smith giving atleast two examples of each class.

<div align="center">**OR**</div>

What is alternation of generation ? Explain alternation of
generation in <u>selaginella</u>.

<div align="center">*********</div>

Seat Number

0416

GEOINFORMATICS PAPER - I : GEOI - 201
Fundamentals of Computer : Part - II
(14021)

P. Pages : 2

Time : Two Hours

Max. Marks : 40

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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 diagram wherever necessary.
6. Figures to the right indicates full marks.

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

   a)   TCP/IP stands for.............

   b)   VBA stands for..............

   c)   Enlist any four applications areas of multimedia.

   d)   'C++' language is the
       i)   low level programming language
       ii) Middle Level programming language
       iii) High Level programming language
       iv) None of the above

   e)   Write down any four desktop publishing software packages.

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

   a)   Explain file compression utility.

   b)   Explain the working of client / server applications on the network?

   c)   Write short note on desktop publishing.

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

   i)   What is VB? Which are the basic features of VB?

   ii) Write short note on illustration programs.

   iii) Who are the users of AutoCAD software?

   b) Discuss one example of intranet.   2

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

   a) Explain disk cleanup and disk defragmenter utilities.

   b) Write short note on coral draw software.

   c) Explain the concept of internet.

5. a) Attempt **any one** of the following   6

   i)   What are the advantages and disadvantages of high level
        programming languages over low level?

   ii) Explain advantages and disadvantages of intranet.

   b) Why AutoCAD software runs on only MS-Windows environment?   2

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Seat Number

BACHELOR OF VOCATION (B.VOC.) : GHT - 121
Greenhouse Agro Techniques and Crop Cultivation
(12411)

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 carry equal marks.
5. Solve **any six** questions from Section A.
6. **Section B** is compulsory.

SECTION - A

1. Define green house. Explain in detail scope of green house. ? 5

2. Define Olericulture. Write in brief types of vegetable gardens? 5

3. Write in detail cultivation of tomato on following points. 5

   i) Seed rate & spacing ii) Nursery management. 5

   iii) Transplanting iv) Manures & fertilizers.

   v) Varieties.

4. Write in detail cultivation practices at chill on following points? 5

   i) Soil & climate

   ii) Irrigation

   iii) Interculture and weed control.

   iv) Pest & diseases

   v) Varieties.

5. Write in detail cultivation of reddish? **5**

6. Explain in detail cultivation of Gerbera? **5**

7. State the components of Drip irrigation system with their uses. **5**

8. Write short notes on **any two**. **5**

   1) Growing media.

   2) Earthing up

   3) Staking.

SECTION - B

9. Fill in the Blanks. **5**

   1) ....Queen of flowers.

   2) ....is used for sterilization of bed.

   3) Blanching is an important intercultural operation in..........

   4) Carnation are used as.........as well as for the extraction of perfume.

   5) Appearance of premature seed stalks bulb onion crop is known as........

10. Match the pair. **5**

A	B
1) Gerbera	a) 30-60% water saving
2) Onion	b) Rock wool
3) Water melon	c) Dusty
4) Drip irrigation.	d) Sugar baby
5) Growing media.	e) Phule Sated.

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Seat Number

BACHELOR OF VOCATION (B.VOC.) : PT - 121
Printing Technology - II (12421)

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. Figure to the right indicate full marks.

1. Attempt **any eight**.   8

   a) What is meant by 'RGB'?

   b) Define web fed offset press?

   c) Write name of short key used to save file?

   d) Who is inventor of printing?

   e) What is typography?

   f) Types of alignment?

   g) Define Texture?

   h) Write down principles of Design?

   i) Write down names of primary colors.

   j) Write name of units of sheet fed press?

2. Attempt **any four**. 8

   a) Short note on colour.

   b) Short note on inks.

   c) Define desktop publishing.

   d) Types of Communication.

   e) List principles of design.

   f) What is screen printing?

3. Attempt **any two**. 8

   a) Write any 5 short keys with its application in Corel draw.

   b) Write a application letter for the post of Graphic designer.

   c) Explain types of Printing.

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

   i) Short note on web fed offset press.

   ii) List raw material used in printing.

   iii) Explain text tool.

   b) Explain use of fill tool. 2

5. Attempt **any one**. 8

   a) Explain in detail RGB & CMYK colour modes.

   b) Write in detail screen printing process.

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