

Biology (2021) Set 'A'
Nightingale International Boarding Secondary School

Kupondole, Lalitpur

Second Term Exam – Grade XII (Science)

Time: 3 hrs.

2082 (2026)

F. M: 75

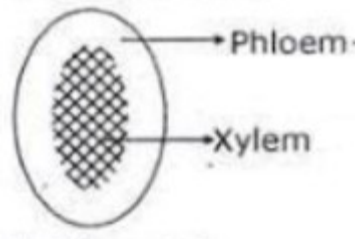
Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate the full marks.

Part I Botany – 37 Marks

Group A

Rewrite the correct option of each questions in your answer sheet. **[5×1=5]**

1. Photosynthesis involves
 - a) Photochemical phase
 - b) Carbon reduction phase
 - c) Carboxylation phase
 - d) All of these
2. The condition occurring when an organism has $2n+1$ chromosome composition is known as
 - a) Monosomy
 - b) Trisomy
 - c) Diploid
 - d) Haploid
3. The diagram shown below represents the type of vascular bundle which is called?



- a) Collateral
 - b) Bicollateral
 - c) Amphicribal
 - d) Amphivasal
4. Which of the following is a type of mutation that involves a rearrangement of genetic material between non-homologous chromosomes?
 - a) Insertion mutation
 - b) Deletion mutation
 - c) Translocation mutation
 - d) Inversion mutation
 5. How many ATP molecules will be produced until the production of acetyl CoA from one molecule of pyruvic acid
 - a) 3ATP
 - b) 6ATP
 - c) 8ATP
 - d) 38ATP

Biology (2021) Set 'A'

Group B

Give short answers to following questions:

[4×4=16]

6. What are Phytohormones? Write the physiological effects of auxin. (1+3)
7. Describe cyclic photophosphorylation.

Or

Explain the process of incomplete linkage with suitable example and its significance in genetics. (3+1)

8. How does gene mutation occur? Explain its types. (1+3)
9. Define vascular bundle. Describe different types of vascular bundles. (1+3)

Group C

Give long answers to following questions

[2×8=16]

10. Why does red green colour blindness occur more in males than in females and which kind of genetic inheritance is involved? Briefly describe it with illustrations and draw conclusions. (1+5+2)

Or

Illustrate the process of allopolyploidy with suitable example. Analyse the benefits and drawbacks of polyploidy on agriculture and plant breeding. (4+2+2)

11. Why is glycolysis also called the common path for anaerobic & aerobic respiration? Describe the process of glycolysis with necessary enzymes involved. (1+7)

Biology (2021) Set 'A'

Part II Zoology – 38 Marks

Group- 'A'

Circle the correct answer from the given alternatives. [6×1=6]

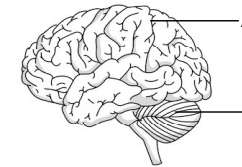
- Which of the following term represents the membrane surrounding the cartilage?
a) Pericardium b) Periosteum
c) Perichondrium d) Endosteum
- A membrane formed after sperm entry into the ovum to prevent further sperm entry is termed as
a) Blastomere b) Vitelline membrane
c) Fertilization membrane d) Endosteum
- Hydrostatic pressure in the glomerular capillaries during urine formation is built because
a) Size of Bowman's capsule is large
b) An afferent arteriole is narrow compared to efferent arteriole
c) Bowman's capsule is cup-shaped
d) An efferent arteriole is narrow compared to afferent arteriole
- Glucagon is a hormone that
a) Accelerates protein synthesis within cells
b) Accelerates conversion of glycogen into glucose
c) Decreases conversion of glycogen into glucose
d) Slows down glucose formation from lactic acid
- Identify the part through which lateral ventricles of the brain opens into the third ventricle?
a) Foramen of Magnite b) Foramen of Luschka
c) Foramen of Monro d) Foramen Magnum
- Human heart is myogenic in nature. It can generate its own cardiac impulse by natural pacemaker called.....
a) SA-node b) AV-node
c) Purkinje fibre d) Bundle of His

Biology (2021) Set 'A'

Group- 'B'

Give short answers to the following questions: [4×4=16]

- Explain the structure and function of striated muscle. Why it is called skeletal muscle fibre? [2+1+1]
- Describe the process of nerve cord formation during embryogenesis. [3+1]
- Study the given diagram and answer the following questions. [1+3]
 - Label A and B.
 - Write any three differences between A and B



- Pituitary gland is also called master gland, justify the statement. Write the roles of hormones produced by neurohypophysis. [2+2]

OR

Differentiate between chyme and chyle? Describe the process of food digestion in the duodenum. [1+3]

Group- 'C'

Give long answers to the following questions: [2×8=16]

- What is ultrafiltration? Describe the detail process of urine formation in human kidney. [1+2+5]

OR

Human heart is myogenic as it can originate its own heart beat. Defining heart beat; discuss origin and conduction of heart beat with well labeled diagram. Suggest a device in case of injury to the SA node. [1+3+2+2]

- What are pathogens? Write the causative agent, modes of infection, Pathogenicity and control measures the bacterial disease in which infected organs are lungs. [1+1.5+1.5+2+2]

Biology (2021) Set 'B'
Nightingale International Boarding Secondary School

Kupondole, Lalitpur
Second Term Exam – Grade XII (Science)

Time: 3 hrs. 2082 (2026) F. M: 75

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Part I Botany – 37 Marks
Group A

Rewrite the correct option of each questions in your answer sheet. **[5×1=5]**

1. In monocot root, we observe
 - a) Polyarch, open, collateral vascular bundles
 - b) Suberised exodermis, casparian stripes, passage cell and cambium
 - c) Suberised exodermis, Polyarch, exarch xylem and large pith
 - d) Diarch to hexarch, exarch xylem and reduced pith
2. Linkage prevents
 - a) Homozygous condition
 - b) Segregation of alleles
 - c) Dominance of genes
 - d) Crossing over
3. What does point mutation involve?
 - a) Change in structure of DNA
 - b) Change in single nucleotide base
 - c) Change in the order of gene
 - d) Change in the number of chromosome
4. If a plant is placed in sealed bell jar with limited oxygen, how will its energy production be affected over time?
 - a) ATP production will increase due to higher glycolysis
 - b) The plant will rely on anaerobic respiration producing less ATP
 - c) The citric acid cycle will become faster to make up for lack of oxygen
 - d) The electron transport chain will continue functioning normally.
5. Which is the most common mechanism of genetic variation in the population of sexually reproducing organisms?
 - a) Recombination
 - b) Translocation
 - c) Chromosomal aberration
 - d) Genetic drift

Biology (2021) Set 'B'

Group B

Give short answers to following questions: **[4×4=16]**

6. What are plant growth hormones? Write the physiological effects of gibberellin. (1+3)
 7. Describe the external factors that affect the phenomenon of photosynthesis.
- Or
- Explain the process of complete linkage with suitable example. Write its significance. (3+1)
8. What is polyploidy? Describe how modern variety of wheat is evolved by this method. (1+3)
 9. In transverse section of stem, vascular bundles remain scattered in ground tissue. Identify the material. Draw a well labelled diagram of that material. (1+3)

Group C

Give long answers to following questions **[2×8=16]**

10. Genes are inherited in new combination due to crossing over in the gametes. Interpret this statement with its mechanism and necessary diagrams. Write the significances also. (7+1)
- Or
- How can chromosomal mutations alter the number and structure of chromosomes? Provide a detailed discussion on the various type of chromosomal mutation. Analyse the significances of chromosomal mutation in an organism. (1+6+1)
11. The source of oxygen in photosynthesis is water but not the carbon dioxide. Explain with reason. Briefly describe Hill reaction. (1+7)

Biology (2021) Set 'B'
Part II Zoology – 38 Marks
Group- 'A'

Circle the correct answer from the given alternatives. [6×1=6]

1. The phagocytic cell present in human blood is.....
a) Acidophil b) Basophil c) Neutrophil d) Lymphocyte
2. The cleavage found in frog is.....
a) meroblastic b) holoblastic c) vertical d) horizontal
3. Enzyme responsible for digestion sugar present in the milk is
a) Casein b) Renin c) Pepsin d) Lactase
4. Aldosterone is secreted by.....
a) Kidney b) Testis c) Pituitary gland d) Adrenal glands
5. If a person excretes glucose in urine, then the person shows the hypersecretion of which one of the following hormone?
a) Glucagon b) Insulin
c) Parathormone d) Thyroxine
6. Even there no air in it, the human trachea does not collapse due to the.....
a) Turgid pressure b) Bony rings
b) Elastic fibres d) Cartilagenous rings

Group- 'B'

Give short answers to the following questions: [4×4=16]

7. Describe the structure, location and functions of adipose tissue in human. [2+1+1]
8. Explain how segmentation occurs during development of frog. [2+2]

OR

How O₂ is transported? Why oxyhaemoglobin is dissociated nearer to the tissue? [2+2]

Biology (2021) Set 'B'

9. Describe the structure and functions of thyroid gland. [2+1+1]
10. Which hormone is responsible for glycogenolysis? Pancreas is also called heterocrine gland, why?

Group- 'C'

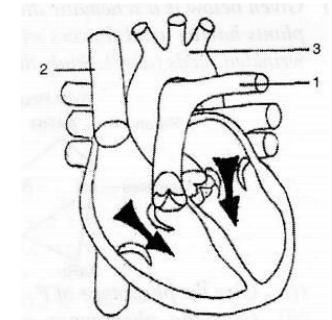
Give long answers to the following questions: [2×8=16]

11. Describe the structure and functions of human brain with well labeled diagram. [5+3]

OR

Carefully observe the given diagram and answer the following questions.

- a) Label 1, 2 and 3 in the given diagram. [1.5]
- b) Why this organ is necessary in our life? [1]
- c) Describe the structure of this organ in detail with complete labeling? [3.5+2]



12. What are vectors? Explain the causative agent, mode of transmission, pathogenicity and control measures of acute diarrheal infection. [1+1+2+2+2]

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Attempt all the questions:

Group A

Multiple Choice Questions

[11×1=11]

- 10ml of 1M H₂SO₄ is mixed with 25ml of 0.4M HCl, the strength of the resulting solution is
a) 0.857N b) 0.571N c) 0.705N d) 1.167N
- What is the pH of a 0.1N H₂SO₄ solution?
a) 1 b) 2 c) 3 d) 4
- A galvanic cell converts
a) Electrical energy to chemical energy
b) Chemical energy to electrical energy
c) Electrical energy to heat
d) Chemical energy to heat
- The equivalent weight of K₂Cr₂O₇ in an acidic medium
a) 49 b) 98 c) 249 d) None
- The particles float in the froth floatation process for the benefit of the ores because
a) They are light
b) They are insoluble
c) Their surface is not easily wetted by water
d) They bear an electrostatic charge
- How many unpaired electrons are present in [Co(Fe)₆]³⁻ complex
a) 4 b) 2 c) 0 d) 3
- CCl₄ is insoluble in water because
a) Water is polar b) CCl₄ is polar
c) Both are polar d) CCl₄ is non-polar
- Benzyl alcohol on reaction with PCl₅ to give
a) Benzene b) Benzyl chloride c) Toluene d) None

- An organic compound (P) undergoes reduction with LiAlH₄ to produce (Q). When (Q) is heated with copper at 300°C to yield P again. The compound (P) is
a) Ethanal b) Acetone c) Ethanol d) Methoxymethane
- Chlorobenzene treated with chloroform in the presence of anhydrous Lewis acid AlCl₃ will give?
a) Toluene b) m-chlorotoluene
c) p-chlorotoluene d) both b and c
- The functional isomer of methoxymethane is
a) Ethanol b) Propanol c) Methoxy ethane d) All

Group B [8×5=40]

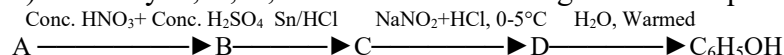
- A metal (M) having electronic configuration [Ar] 4s²3d¹⁰, which is also known as a non-typical transition metal
a) Identify the metal (M), write its chief ore. [1]
b) Prepare the white vitriol from the above metal (M). [1]
c) What happens when white vitriol reacts with [3]
i) BaS ii) NaOH iii) K₄[Fe(CN)₆].
 - You are given a complex [Fe(H₂O)₆]³⁺. Answer the following questions.
a) Define ligand. Give one example of polydentate ligand. [1]
b) Give the geometry of this complex. [1]
c) What is the primary and secondary valency of Fe? [1]
d) Calculate EAN of Fe in above complex. [1]
e) It is paramagnetic? Why? [1]
 - There are many concepts for acid and base, such as the Arrhenius concept, the Bronsted-Lowery concept and the Lewis concept
a) What is the Bronsted-Lowery concept? [1]
b) How is the concept different from the Arrhenius concept [1]
c) Define conjugate acid and base. [1]
d) A decinormal solution of acetic acid is 1.3% ionized. Calculate the ionization constant of acetic acid. [2]
- Or,
- Define the acidity of base.
 - 0.4g of divalent metal was dissolved in 50 cc of 0.64N HCl and the solution was diluted to 100cc. Then 25cc of this solution required 27.3cc of 0.11N NaOH for complete neutralization. Find the atomic mass of the metal. [1+4]

Chemistry (3021) 'A'

15. Zn-Cu galvanic cell also called the Daniel cell.
- Construct a galvanic cell of Zn-Cu, giving very simple diagram.
 - Write the function of the salt bridge in a galvanic cell.
 - Write the oxidation half, reduction half, and net reaction of cell.
 - What is standard hydrogen electrode (SHE). Explain.
 - What is the relation among the emf of the cell, the electrode potential of the cathode and the anode? [1+1+1+1+1]
16. An organic compound (X) that reacts with silver powder to give ethyne [2+1+1+1]
- How would you prepare an organic compound (X) from acetone?
 - What happens when compound (X) reacts with
 - Conc. HNO₃
 - Aq. KOH
 - Acetone
17. An aliphatic compound (A) reacts with aq. NaOH to give (B). B on oxidation with K₂Cr₂O₇/ H⁺ produces (C). The compound (C) responds positively to the iodoform test, identifying (A), (B), and (C). What product would you expect when (A) is heated with H₂/Ni? [1+1+1+2]

Or,

- a) Identify A, B, C, and D in the following reaction sequence



- c) What happens when compound D is subjected to Sandmeyer's reaction? [4+1]
18. a) Write the possible primary, secondary, and tertiary alcohols from C₄H₁₀O.
- b) Which above alcohol give the blood red color at the end of Victor Meyer's test? Write the complete test reaction. [2+3]
19. A carbonyl compound (M) gives iodoform test as well as Tollen's test.
- Identify compound (M) and write its IUPAC name.
 - How does the compound M react with dil. NaOH? Give chemical reaction involved.
 - Write the chemical equation when compound M react with HCN followed by hydrolysis.
 - Convert ethanal into propanone. [1+2+1+1]
- Group C [3×8=24]**
20. a) Define the following terms: [1+1]
- Normality factor
 - Standard solution
- b) Deduce the relation N₁V₁=N₂V₂. [2]

Chemistry (3021) 'A'

- c) 1.40g of a sample of Na₂CO₃ .xH₂O dissolved in water and the volume was made to 200ml. 20ml of this solution is required to neutralize 19.8ml N/10 HCl solution.
- Name the indicator used in the above titration.
 - Calculate the value of x. [1+3]
- Or,
- Detection of basic radicals by wet ways are common in laboratory experiments of class 12 students.
- How would you apply the common ion effect and solubility product principle in this experiment? [4]
 - The solubility product of AgCl is 1.8×10⁻¹⁰. What mass of AgCl will be precipitate if 0.2 mole of HCl solution is added to the saturated solution of AgCl. (Molecular mass of AgCl= 143.5). [4]
21. Write an examples of the following reactions [1+1+1+1+1+1+1+1]
- Aldol condensation reaction
 - Benzoin condensation reaction
 - Rosenmund reduction reaction
 - Wolff-Kishner reduction reaction
 - Tollen's test
 - Wurtz fitting reaction
 - Willianson's reaction
 - Reimer Tiemann's reaction
- Or,
- Define the following terms [1+1]
 - Absolute alcohol
 - Denaturated alcohol - How would you prepare grain alcohol from a fermentation reaction? [2]
 - Convert Propan-1-ol into propan-2-ol and vice versa. [2]
 - Why does propan-2-ol give a positive iodoform test but propan-1-ol does not? Write the reaction. [2]
22. a) Write the structure of the following polymers [2]
- Bakelite
 - Nylon-66
- Write the uses and structure of following drugs [2]
 - Paracetamol
 - Aspirin - Draw the flow sheet diagram for paper production. [2]
 - Write the composition of Portland cement. [2]

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Attempt all the questions:

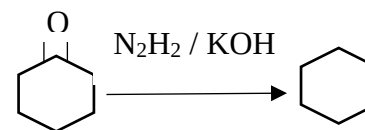
Group A

Multiple Choice Questions

[11×1=11]

- What is the normality of a solution containing 3.65g HCl in 1litre of the solution?
a) 1N b) 0.5N c) 0.1N d) 2N
- What is the pH of solution by dissolving 1g of NaOH in 1litre of its solution?
a) 10.4 b) 11.4 c) 12.4 d) 13
- Without losing its concentration ZnCl₂ solution can not kept in contact with
a) Au b) Al c) Pb d) Ag
- Given that the value of Kw for water is 1×10^{-14} , what is the pH of a 0.001 molar concentration?
a) 10^{-11} b) 10^{-3} c) 3 d) 11
- Which is used as a purgative in medicine?
a) ZnCl₂ b) HgCl₂ c) Hg₂Cl₂ d) ZnSO₄.7H₂O
- The maximum possible oxidation state of the transition metal in 3d series is
a) +3 b) +6 c) +7 d) +8
- Benzene reacts with chlorine to form benzene hexachloride in the presence of which of the following reagent?
a) Ni b) AlCl₃ c) Cl₂ d) Zn
- When benzene diazonium chloride is boiled with water, the resulting organic compound is
a) Benzene b) Phenol c) Benzaldehyde d) Benzoic acid
- When sodiummethoxide treated with chloroethane to give?
a) methoxypropane b) Ethoxyethane
c) Ethoxypropane d) All
- Which of the following compounds gives a positive Tollen's test as well as iodoform test?
a) Propanone b) Ethanol c) Ethanal d) Methanal

11. The reaction is known as



- Clemmensen's reduction
- Birch reduction
- Rosenmund reduction
- Wolff kishner reduction

Group B [8×5=40]

- 'O' is an ore of metal 'M'. 'O' on heating gives black ppt 'B' of metal sulfide, which belongs to group II of basic radical in qualitative analysis. During the metallurgical process, the metal is obtained by the reaction of its oxide and sulfide, and a gas is formed as a byproduct
 - Identify the metal M and write the name of the ore 'O'.
 - Write the reaction involved during the roasting of 'O'.
 - Convert metal 'M' into its vitriol. [2+1+2]
- Steel is an intermediate form of metal containing 0.25% to 2.5% carbon.
 - Define stainless steel. Give its composition. [1]
 - How steel is manufactured by open hearth process? Write its Pros and Cons. [3]
 - What do you mean by spiegeleisen? Why is it used during manufacture of steel? [1]
- Differentiate between primary and secondary standard solutions. [2]
 - What is the importance of calculating the normality factor of solutions during titration? [1]
 - 100ml of decinormal solution of H₂SO₄ mixed with 150ml of normal solution of NaOH to make the resulting solution. Calculate the normality of the mixture. [2]

Or,

 - Deduce the relation, pH + pOH= 14. [2]
 - Is the solution acidic, basic, or neutral, in which the hydrogen ion concentration is 3×10^{-5} mol/L. [2]
 - State Ostwald's dilution law. [1]

Chemistry (3021) 'B'

15. An electrochemical cell is constructed by using Zn electrode and Pb electrode whose standard potential values are -0.76V and -0.13V respectively.

- Indicate the cathode and the anode.
- Write the electrochemical cell notation.
- Write down the redox cell reactions.
- Calculate the emf of the cell. [1+1+1+2]

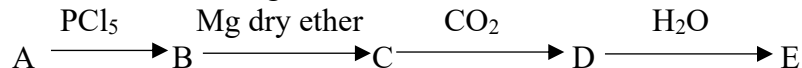
16. An organic compound having a molecular formula C_3H_7Br .

- Write the primary and secondary bromo-alkane using the above molecular formula. [2]
- Convert primary bromoalkane into secondary bromoalkane and vice versa. [2]
- What happens when a secondary bromoalkane is subjected to the Wurtz reaction? [1]

17. The oxidation of different classes of alcohols gives various products

- Name the oxidizing agents used in oxidation of alcohols. [1]
- Write down the oxidation products of primary, secondary and tertiary alcohols. [4]

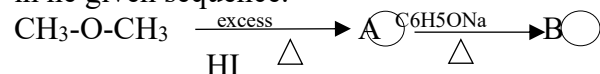
18. Consider a following reaction



The compound A is primary alcohol, which oxidation gives ethanal. Identify A, B, C, D and E. [5]

Or,

- Identify the major products (A) and (B) giving their IUPAC names in the given sequence. [2]



- Convert ethoxyethane into methoxyethane. [2]
- How would you prepare symmetrical ether from Williamson's method. [1]

19. a) What is the major product you would obtain when methanal reacts with ammonia? Write the importance of using the product. [2]

- Convert ethanal into propanone. [2]
- Write the iodoform test of ethanal. [1]

Chemistry (3021) 'B'

Group C [3×8=24]

- Differentiate between end point and equivalence point. [2]
- Distinguish between molarity and normality. [1]
- Give reason, Methyl orange is used as indicator for the titration between H_2SO_4 and Na_2CO_3 . [2]
- 100ml of Na_2CO_3 solution contains 0.53g of Na_2CO_3 . If 10ml of this solution is added to x ml of water to obtain 0.01M Na_2CO_3 solution, calculate the value of x. [3]

OR,

- Write the applications of solubility product and common ion effect in qualitative salt analysis. [4]
 - Calculate the degree of ionization of HCN having Concentration 0.01M (K_a of HCN= 4.8×10^{-10}). Also calculate the H^+ ion concentration and pH of solution. [2]
 - Define buffer solution and write any two acidic and basic buffer. [2]
21. Write an examples of the following reactions. [1+1+1+1+1+1+1+1]
- Clemmensen's reduction reaction
 - perkin's reaction
 - Iodoform test
 - Cannizzaro's reaction
 - Fitting reaction
 - sandmeyer's reaction
 - Markovnikov's rule
 - S_N^1 reaction.

OR,

An alcohol (p) having molecular formula $C_4H_{10}O$ undergoes Victor Meyer's test to give blood red colour at the end of reaction when added KOH solution.

- Draw Structural formula and write IUPAC name of p. [1]
 - Write down complete chemical reaction for the Victor Meyer's test of p. [2]
 - How would you prepare P, starting from CH_3MgBr ? [2]
 - What product would you obtain when p is oxidized? [1]
 - Convert propan-2-ol into propan-1-ol and vice-versa. [2]
22. a) Write the structure of following polymers. [2]
- polystyrene
 - polyethene
- Write the uses and structure of following drugs. [2]
 - penicillin
 - phenacetin
 - Write the difference between OPC and PPC. [2]
 - Draw the flowsheet diagram for manufacturing of Portland Cement. [2]

Computer Science (4281) Set 'A'
Nightingale International Boarding Secondary School
Kopundol, Lalitpur

Second Term Exam – Grade XII (Science)

Time: 2 hrs.

2082 (2026)

F. M.: 50

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks.

Group A

Rewrite the correct options of each questions in our answer sheet. [9×1=9]

1. In Which SQL statement will show the names and heights of all basketball players taller than 6 feet?
A) SELECT name FROM Player WHERE height >6
B) SELECT name FROM Player WHERE height >=6;
C) SELECT name, height FROM Player WHERE height >6;
D) SELECT name, height FROM Player WHERE height <6;
2. Which of the following is not a DDL command?
A) UPDATE B) TRUNCATE C) ALTER D) None of the mentioned
3. Select the perfect order of data communication system or model
A) Source, Sink, Encoder, Decoder, Transmitter, Receiver and Channel
B) Source, Encoder, Channel, Transmitter, Receiver, Decoder and Sink
C) Source, Encoder, Transmitter, Receiver, Channel, Decoder and Sink
D) Source, Encoder, Transmitter, Channel, Receiver, Decoder and Sink.
4. Which of the following is an incorrect IP address?
A) 192.168.0.1 B) 192.168.1.256 C) 172.255.0.0 D) 202.10.79.4
5. What is the correct way to open a file named “data.txt” in C for reading?
A) fopen(“data.txt”, “r”); B) fopen(“data.txt”, “w”);
C) fopen(“data.txt”, “a”); D) fopen(“data.txt”, “rb”);
6. . . .is the process that allows selective hiding of data and functions in a class.
A) class B) inheritance C) encapsulation D) Polymorphism
7. What is the primary purpose of a class in object-oriented programming?
A) To define a blueprint for creating objects B) to store data only
C) to execute functions D) to manage memory
8. . . .is a process of buying and selling or exchanging products services, and information using electronic media.
A) E-commerce B) payment C) shopping D) traditional commerce
9. IoT stands for...
A) Internet of things B) internal of things
C) internet of Technology D) internet of this

Computer Science (4281) Set 'A'
Group "B"

Give short answer to the following questions [5×5=25]

10. Why is normalization needed? Explain 2NF with proper example [2+3]

OR

create a table *pilot(sid, sname, rating, age)* under the database ‘class12’. Also insert any two records inside the table using SQL. [5]

11. Explain class and object with appropriate example. [5]

12. Differentiate between P2P and client server network architecture? [5]

13. Define e-commerce. Explain different types of e-business along with its advantages and disadvantages. [1+4]

14. What are the key challenges of implementing e-governance in developing countries? [5]

OR

Explain different communication flow modes with example. [5]

Group "C"

Give long answer to the following questions. [2×8=16]

15. Define structure with syntax. Write a program to input sid, name, percentage of students and display the record of a student having highest percentage. [2+6]

OR

Write a C program to enter ID, employee_name, post and basic_salary of 6 employees and store them in a data file named "emp.txt". Display each record on the screen in an appropriate format. [8]

16. What do you mean by Network Topology? Explain Bus topology and Ring topology with suitable diagram along with their advantages and disadvantages. [2+6]

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Com. English (0041) Set 'A'
Nightingale International Boarding Secondary School

Kopundol, Lalitpur

Second Term Exam –Grade XII (Scienc)

Time: 3 hrs.

2082 (2026)

F. M: 75

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt all the questions.

1. Read the following text carefully and do the tasks that follow: [15]

Arteries of the heart blocked by plaque can reduce the flow of blood to the heart possibly resulting in heart attack or death. Plaque is actually fat and cholesterol that **accumulates** on the inside of the arteries. The arteries of the heart are small and can be blocked by such accumulations. There is a medical procedure that creates more space in the blocked artery by inserting and inflating a tiny balloon into the blood vessel. It is called coronary balloon angioplasty. Angioplasty means "blood vessel repair". When the balloon is **inflated**, it compresses the plaque against the wall of the artery, creating more space and improving the flow of blood. Many doctors choose this technique, because it is less invasive than bypass surgery. Yes, both involve entering the body cavity, but in bypass surgery, the chest must be opened, the ribs must be cut, and the section of diseased artery must be removed and replaced. To replace it, the patient's body opened, once again, to acquire a healthy section of artery. Usually, this blood vessel is removed from an artery **located** in the calf of the leg. This means the patient now has two painless incisions that must heal at the same time. There is far more risk in such bypass surgery than in an angioplasty, which involves threading a thin tube, called a catheter, into the circulatory system and working it to the damaged artery. Angioplasty may take between 30 minutes to 3 hours to complete. It begins with a distinctive dye that is injected into the bloodstream. A thin catheter is then inserted into the femoral artery of the leg, near the groin. The doctor monitors the path of the dye using X-rays. He moves the tube through the heart and into the plaque filled artery. He inflates the balloon, **creating** more space, deflates the balloon, and removes the tube. It is important to note that the plaque has not been removed; It has just been compressed against

Com. English (0041) Set 'A'

the sides of the artery. Sometimes, a stent may be implanted, a tiny tube of stainless steel that is expandable when necessary. Its function is to keep the artery open. There are both good and bad news. The good news is that the statistics compiled are superb. Ninety Percent of all **angioplasty** procedures are successful. The risk of dying during an operation of this type is less than 2%. The risk of heart attack is also small: 3-5%. Yet heart surgeons do not take any risk lightly; therefore, a team of surgeons get ready to perform bypass surgery if needed. The length of hospitalization is only three days. The bad news is twofold. First, this procedure treats the condition but does not eradicate the cause. in 20% of the cases, there is a recurrence of plaque. Second, angioplasty is not **recommended** for all patients. The surgeons must consider the patient's age, physical history, how severe the blockage is, and, finally, the degree of **damage** to the artery before they make their determination.

A. Match the words in Group 'A' with their meanings in Group 'B'. [1×5=5]

Group 'A'

- a. Inflated
- b. Vessel
- c. Distinctive
- d. Eradicate
- e. Determination

'Group 'B'

- i. to destroy something completely
- ii. the process of establishing something
- iii. filled with gas or air
- iv. a hollow container
- v. characteristics of one person or thing
- vi. locate something properly

B. Complete the following sentences using the appropriate word highlighted in the text. [5×1=5]

- a. When the balloon is..... it compresses the plaque against the wall of the artery.
- b. Plaque is actually fat and cholesterol that on the inside of the arteries.
- c. Ninety Percent of all procedures are successful is a good news.
- d. The surgeons most consider the degree of..... to the artery before they make their determination.
- e. In bypass surgery, blood vessel is removed from an artery..... in the calf of the leg.

C. Briefly answer the following questions. [5×1=5]

- What Is called a coronary balloon angioplasty?
- Why is an angioplasty a better choice of many doctors?
- How long does it take to complete an angioplasty surgery?
- Which of the surgery is less invasive; and why?
- When does a heart get at a risk?

2. Answer the following questions. (Short answer) [5×2=10]

- How did Rakesh serve his parents? (A Devoted Son)
- Why does the speaker choose her new path against her tradition? (I Was My Own Route)
- How can you say that M. Durand loves his daughters more than he does himself? (Facing Death)
- Do you think that 'Famous Actress' is really good at acting? If yes, how? (A Matter of Husbands)
- Why did the essayist dislike his school? (On Libraries)

3. Answer the following questions. (Long answer) [2×5=10]

- Summarize the poem 'A Day'.
- Nepal is a multicultural and multilingual country but there is no conflict among different communities. Support this statement on the basis of the story 'Neighbours'.

4. Write a paragraph about your plan after class 12. [7]**5. Write a letter to the editor to be published in the national daily newspaper suggesting the ways to 'Solving Garbage Problems.' [8]****6. Write a press release regarding the cancellation of the flight to the mountain region due to the bad weather condition. [10]****7. Do as indicated in the brackets: [10×1=10]**

- Listen carefully,.....? (Supply the question tag)
- When she was 40, she (can, will, must, could) speak ten different languages. (Choose the correct word from the bracket.)

- Sita is (a, an, the) M.A in English. (Choose the correct article from the bracket.)
- Neither Ramesh nor Mahesh (is, are, be) responsible for this mistake. (Choose the correct verb.)
- She said who are you (Punctuate this sentence.)
- The weather was extremely bad. The pilot landed the plane safely. (Join these sentences using 'In spite of'.)
- I lost my Smartphone. I have (not buy) a new one yet. (Put the verb in the correct form.)
- The principal said, "You can phone from my office, Rita". (Change into Indirect speech.)
- Columbus discovered America. (Change into Passive voice.)
- Necessity/ mother/ invention/of/ the / is. (Rearrange the words to make a sensible sentence.)

8. Do as indicated: [5×1=5]

- The word 'no' has the same vowel sound as in
i) so ii) to iii) vow iv) too
- Make any two words using the prefix 'inter-'.
i) ii)
- Maya dances beautifully. (Identify the word class of the underlined word in the above sentence.)
- I look forward to (see) you at the Pokhara Airport. (Write the verb in the bracket in the correct form.)
- In the word 'Examination', the stress falls on the.....syllable.
i) First ii) Second iii) Third iv) Fourth

Com. English (0041) Set 'B'
Nightingale International Boarding Secondary School

Kopundol, Lalitpur

Second Term Exam –Grade XII (Scienc)

Time: 3 hrs.

2082 (2026)

F. M: 75

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt all the questions.

1. Read the following text carefully and do the tasks that follow: [15]

The branch of medicine that deals with the care of children and adolescents is pediatrics. This term has roots in the Greek word pedo pais (a child) and iatras (healer). Pediatrics covers the age group less than 18 years of **age**. The goal of the specialty is to enable a child to survive, remain healthy, and attain the highest possible potential of growth, development and intellectual achievement. Child health encompasses approaches, interventions and strategies that preserve, protect, promote and restore health of children at individual and population level. A physician who **specializes** in the healthcare of children and adolescents is a pediatrician. Children under 15 years of age comprise about 30% of India's population. Childhood is the state when the human being is growing and developing. It is the age to **acquire** good habits, values and lifestyles that would make children fit, responsible and productive adults and citizens. The family, society and nation are duty-bound to make children feel secure, cared for, and protected from exploitation, violence and societal ills. Female children face gender bias in access to healthcare and nutrition. A **civilized** society nurtures all its children, girls and boys alike, with love, **generosity** and benevolence. Child is not a miniature adult. The principles of adult medicine cannot be directly adapted to children. Pediatric biology is unique and risk factors of disease are distinct. Clinical manifestations of childhood diseases may be different from adults. Indeed, many disorders are unique to children-these do not occur in adults. Drug dosages in children are specific and not a mathematical derivation of adult dosages. Wholesome nutrition is even more important for children not only to sustain life, but also to ensure their growth and development PEDIATRICS AS A SPECIALITY Pediatrics is a fascinating specialty. It encompasses care of premature neonates on the one hand, and adolescents, on the other.

Com. English (0041) Set 'B'

The discipline of pediatrics has branched into well-developed (such as neonatology, nephrology, pulmonology, infectious disease, critical care, neurology, hemato-oncology, endocrinology and cardiology). Pediatrics encompasses intensive care of neonates and children using the most sophisticated technology, on the one hand, and, providing home care to newborns and children, on the other. Child health is thus a state-of-the-art clinical science as well as a rich public health **discipline**. Medical students should possess competencies for the care of healthy and sick children. The agenda of high child mortality due to pneumonia, neonatal infections, preterm birth complications, diarrhea, birth asphyxia and vaccine preventable diseases is still unfinished. The benefits of **advancing** pediatric specialty care must reach to all children. Besides, an increasing body of knowledge on pediatric origins of non-communicable diseases of the adult is set to change the paradigm of child health. Primary prevention and early detection of adult disorders is an important goal of pediatrics. Adolescence offers second chance in life to shape good lifestyles and prepare for adulthood. (Source: Ghai's Essential Pediatrics (Ninth Edition))

A. Match the word in Column 'A' with their meanings in Column 'B'. [5×1=5]

Group 'A'

'Group 'B'

- | | |
|------------------|--|
| a. Paradigm | i. an event or action that clearly shows something |
| b. Premature | ii. surround and hold within |
| c. Manifestation | iii. a typical example or pattern of something |
| d. Encompass | iv. continue to exist especially in hardship |
| e. Survive | v. occurring before the usual time |
| | vi. to live long |

B. Complete the following sentences finding the appropriate word highlighted in the text. [5×1=5]

- Childhood is the age to..... good habits, values and lifestyles.
- The benefits of..... pediatric specialty care must reach to all children.
- Child health is a state-of-the-art clinical science as well as a rich public health.....
- A physician who..... in the healthcare of children and adolescents is a pediatrician.

Com. English (0041) Set 'B'

- e.society nurtures all its children, girls and boys alike, with love, generosity and benevolence.

C. Answer these questions in brief. [5×1=5]

- What is meant by a pediatrics?
- Who should possess competencies for the care of sick children?
- Where has the word 'pediatrics' been derived From?
- Whom does pediatrics cover?
- Why can't the principles of adult medicine be directly adapted to children?

2. Answer the following questions (Short answer): [5×2=10]

- How did the neighbours help the Australian couple in the kitchen garden? (Neighbours)
- How can you say that Mrs. Baroda is a respectable woman? (A Respectable Woman)
- Who are the poor creatures? Why does the speaker call them poor creatures? (Every Morning I Wake)
- According to the author, what is marriage? (Marriage is a Social Institution)
- How did Oliver Sacks pass his childhood? (On Libraries)

3. Answer the following questions (Long answer): [2×5=10]

- "One actress is more dangerous than a hundred women." Explain this statement with reference to the text A Matter of Husbands.
- Summarize the poem 'A Day' in your own words.

4. Write a couple of paragraphs about the "Digital Payment System in Nepal" or "The Growing Use of Computers in Daily Life" in about 150 words. [7]

5. Write a letter to your friend stating the importance of library for the students in about 180 words. [8]

6. Write an essay on "Marriage Practices in My Culture" in about 300 words. [10]

7. Do as indicated in the brackets and rewrite the sentences. [10×1=10]

- We go to the movie theatre. (Put the adverb "occasionally" in the appropriate place and rewrite.)
- He was accused (of/off) stealing her ring. (Choose the correct preposition.)

Com. English (0041) Set 'B'

- Neither Rita nor I (be) happy with this result today. (Put the correct form of the verb.)
- I'm very helpful to the needy people,. ...? (Add the appropriate question tag)
- He realized he (forget) to lock his main gate when he reached his office. (Complete the sentence using the correct form of the verb)
- The man we met on the way, is my cousin. (Fill in the blank choosing the right relative pronoun. (who, whom, whose)
- Nepali people have limited income. They are happy. Join the pair of sentences using appropriate connective.
- They discussed about their new business plan for 3 hours. (Change into "How long" question)
- The police killed two youths near Balkumari yesterday. (Change into passive.)
- Please, show me your answer sheet. (Change this into indirect speech, beginning with She requested...)

8. Choose and copy the correct answer. [5×1=5]

- Which of the following words has a different **vowel** sound?
i. put ii. Pool iii. Pull iv push
- I'm interested to **grapple with** the difficult verses of poetry In this sentence, the meaning of the underlined word is.
i. never find a solution ii. to try hard to create problem
iii. to try hard to find a solution iv extremely good, wonderful
- Make two words, using the prefixes **ultra-** and **hyper-**.
- Make a sensible sentence of your own using the word extraordinary.
- Nepal hasin the field of road construction after democracy.
i. marched backward ii. marched forward
iii. marched over iv marched outside

Mathematics (0081) Set 'A'
Nightingale International Boarding Secondary School

Kopundol, Lalitpur

Second Term Exam –Grade XII (Science)

Time: 3 hrs.

2082 (2026)

F. M: 75

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks.

Group 'A' [1×11 = 11]

Rewrite the correct option in you answer sheet.

1. The number of numbers between 100 and 1000 such that every digit is either 2 or 9 is
 a) 2 b) 3 c) 6 d) 8
2. The number of terms in the expansion of $(a+x)^n$ where n is a positive integer is,
 a) n-1 b) n c) n+1 d) n+2
3. The value of amplitude of $2+2\sqrt{3}i$
 a) 30^0 b) 60^0 c) 90^0 d) 120^0
4. If the line $3x + 4y + k = 0$ is tangent to the circle $x^2 + y^2 = 36$ then the value of k is
 a) ± 5 b) ± 10 c) ± 20 d) ± 30
5. If \vec{a} and \vec{b} are unit vectors and θ is the angle between then **Fehler!** is
 a) $|\vec{a} - \vec{b}|$ b) $\frac{1}{2}|\vec{a} - \vec{b}|$ c) $|\vec{a} + \vec{b}|$ d) $\frac{1}{2}|\vec{a} + \vec{b}|$
6. The value of correlation coefficient 'r' lies
 a) $r < 1$ b) $r > 1$ c) $-1 \leq r \leq 1$ d) $-1 < r < 1$
7. The derivative of $\text{Sech}^{-1}x$ is
 a) **Fehler!** b) **Fehler!**
 c) **Fehler!** d) **Fehler!**
8. The value of **Fehler!** is
 a) **- Fehler!** b) **Fehler!** c) 1 d) 0
9. The equation of tangent to the circe $x^2 + y^2 = 5$ at (1, 2) is
 a) $x + 2y - 5 = 0$ b) $x + 2y - 3 = 0$
 c) $x + 2y + 3 = 0$ d) $x - y = 0$

Mathematics (0081) Set 'A'

10. If a stone thrown into a pond, then it produces a circular ripple that increases at the rate of 2.5 m/sec. How fast is the area growing when the radius is 4m.?
 a) $8\pi \text{ m}^2/\text{sec}$ b) $5\pi \text{ m}^2/\text{sec}$ c) $16\pi \text{ m}^2/\text{sec}$ d) $20\pi \text{ m}^2/\text{sec}$
11. For two events A and B, $P(A) = 0.42$, $P(B) = 0.56$ and $P(A \cap B) = 0.35$, Calculate $P(B/A) =$
 a) $5/6$ b) $5/8$ c) 0.56 d) 0.42

Group 'B' [5 × 8 = 40]

12. The binomial expression for two algebraic terms b and y is given as $(b+y)^n$.
 a) Write the binomial theorem for any positive integer 'n' in expansion form. (1)
 b) Write the general term in the expansion. (1)
 c) Write the middle term in the expansion when n is even. (1)
 d) Write the coefficient of y^5 when n is 12. (2)
13. a) Prove that the sum to infinity of the series $:\frac{1^2}{1!} + \frac{2^2}{2!} + \frac{3^2}{3!} + \dots$ Is $2e$ (3)
 b) Simplify by using De-Moivre's Theorem $(-1 - i)^{14}$. (2)
14. a) In any triangle ABC, prove that:
 $c^2 \cos^2 B + b^2 \cos^2 C + bc \cos(B-C) = \text{Fehler!}$. (3)
 b) In any triangle ABC, prove that the sides are in A.P. if a $\cos^2(C/2) + c \cos^2(A/2) = 3b/2$ (2)
15. a) Show that the locus of the middle points of the chords of a parabola passing through the vertex is a parabola. (3)
 b) Prove vectorically that $\text{Cos}(A + B) = \text{Cos} A \text{Cos} B - \text{Sin} A \text{Sin} B$ (2)

Mathematics (0081) Set 'A'

16. a) Compute correlation and interpret about the ages of husband and wife given below: (3)

Age of husband:	24	20	22	25	23	26	27	28	31	20
Age of wife:	20	18	23	20	21	21	22	24	31	23

- b) Find the correlation coefficients between two variables if $b_{xy} = 1.8$ and $b_{yx} = 0.35$ (1)
- c) Find two regression coefficients from the given data
 $\sigma_x = 6, \sigma_y = 12$ and $r = 0.8$ (1)
17. a) A function $f(x)$ which is derivable at a point $x = x_0$, it is continuous at that point but the converse may not true. Illustrate this with suitable example. (2)
- b) If $y = \tanh^{-1}(\sin x)$, then show that **Fehler!** (1)
- c) Find the derivatives of $(\sinh x)^{\tanh x}$ (2)
18. a) Evaluate : $\int \frac{dx}{x^2+49}$ (1)
- b) Solve: $\int \frac{(2x+3)dx}{x^2+4x+5}$. (2)
- c) Evaluate: $\int \frac{dx}{4+3\cos x}$. (2)
19. a) A box contain 4 red and 6 white balls . Two balls are drawn one after another. If first ball is not replaced before the second ball is drawn, find the probability that
- both are white
 - First red and second white
 - One red and one white (3)
- b) Determine the regression equation of X and Y and also determine the value of X for Y = 22. (2)

X	75	77	85	86	87	88
Y	14	15	16	17	20	26

Mathematics (0081) Set 'A'
Group 'C' [3 × 8 = 24]

20. a) There are 3 prizes to be distributed among 5 students. In how many ways can it done if:
- no students get more than one prize? (1)
 - a student may get any number of prizes. (1)
 - no students get all the prizes? (1)
- b) Prove that: **Fehler!** $\infty = 2 - 2\ln 2$. (3)
- c) Solve and find the 6 roots of z in $z^6 + 1 = 0$ (2)
21. a) Find the equation of the circle whose centre at $(-4, 2)$ and tangent is to the line $x - y = 3$. (2)
- b) Find the latus rectum, the eccentricity, the coordinates of the foci of the ellipse $9x^2 + 5y^2 - 20y = 0$. (3)
- c) Find the equation of ellipse in standard form with a vertex at $(9, 0)$ and eccentricity $2/3$. (3)
22. a) Two buses start from a certain places at the same instant. One goes east at 40km per hour and the other goes north at 30 km/hr. How fast is the distance between them increasing? (2)
- b) Find the equation of tangent and normal to the curve $y = x^2 + 2x + 4$ at point $(1, 1)$. (2)
- c) Evaluate: $\int \frac{dx}{(2-x)(x^2+3)}$. (3)
- d) What is the relationship between derivatives and Integration. (1)

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Mathematics (0081) Set 'B'
Nightingale International Boarding Secondary School

Kopundol, Lalitpur

Second Term Exam –Grade XII (Science)

Time: 3 hrs.

2082 (2026)

F. M: 75

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks.

Group 'A' [1×11 = 11]

Rewrite the correct option in you answer sheet.

1. The number of arrangement of n different object taken r at a time is
 a) n! b) **Fehler!** c) **Fehler!** d) **Fehler!**
2. The sum of all the binomial coefficients in $(1+x)^n$ is
 a) 2^{n-1} b) 2^n c) $n2^n$ d) none of these
3. In any triangles the value of $\sin A + \sin B + \sin C =$
 a) s b) s/R c) R d) R/s
4. If the line $lx + my + n = 0$ is a normal to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$, then
 a) $n + lg + mf = 0$ b) $n = lg + mf$
 c) $n - lg + mf = 0$ d) $n + lg - mf = 0$
5. If $\vec{a} = \vec{i} + 3\vec{j} + 2\vec{k}$ and $\vec{b} = 2\vec{i} + 3\vec{j} - \vec{k}$. The projection of \vec{a} on \vec{b} is
 a) **Fehler!** b) **Fehler!** c) **Fehler!**
 d) **Fehler!**
6. If $r = 0.8$, $\sigma_x = 3$, $\sigma_y = 6$, then the regression coefficient of y on x is
 a) 2 b) 0.5 c) 1.6 d) 0.4
7. The derivative of $\coth^{-1}x$ is
 a) **Fehler!** b) **Fehler!**
 c) **Fehler!** d) **Fehler!**
8. The value of **Fehler!** is
 a) 0 b) -1 c) 1 d) 2
9. The angle made by the tangent to the curve **Fehler!** at $x = -1$ is
 a) 0° b) **Fehler!** c) **Fehler!** d) **Fehler!**

Mathematics (0081) Set 'B'

10. The radius of the spherical ball is increasing at the rate of 1.cm/sec. At what rate is the surface area of the ball increasing when the radius is 2cm?
 a) $24\pi \text{ m}^2/\text{sec}$ b) $16\pi \text{ m}^2/\text{sec}$
 c) $9\pi \text{ m}^2/\text{sec}$ d) none of them
11. What is the probability of a sure event ?
 a) 1 b) 0 c) -1 d) Can't predict

Group 'B' [5 × 8 = 40]

12. In the expansion of $(x+a)^n$, n is positive integer.
 a) Write the general term when x is replaced by $-x$. (1)
 b) Write the single term for $c(n, m) + c(n, m-1)$. (1)
 c) Write the coefficient of last term. (1)
 d) Write the expand form when $a = -1$ and $n = -n$. (1)
 e) Write the expand form when $a = 1$ and $x = -x$ and $n = -n$. (1)
13. a) Prove that the sum to infinity of the series $: 1 + \frac{3}{1!} + \frac{5}{2!} + \frac{7}{3!} + \dots$ is $3e$ (3)
 b) Use De- Moivre's theorem to find cube root of -i. (2)
14. a) If $\frac{\sin(A-B)}{\sin(A+B)} = \frac{a^2-b^2}{a^2+b^2}$, Prove that the triangle ABC is either isosceles or right angled. (3)
 b) In triangle ABC if $a = 3, b = 4$ and $c = 5$ find R and $\cos(A/2)$ (2)
15. a) Find the equation of the parabola whose focus is at the point (1, -2) and the directrix is $x + y - 2 = 0$ (3)
 b) Prove that: $\vec{a} \cdot \vec{b} = \frac{1}{4} [|\vec{a} + \vec{b}|^2 - |\vec{a} - \vec{b}|^2]$. (2)
16. Equations of two regression lines are $4X + 3Y + 7 = 0$ and $3X + 4Y + 8 = 0$ find
 a) Mean of X and Mean of Y. (2)

Mathematics (0081) Set 'B'

- b) Regression coefficient b_{yx} and b_{xy} . (3)
17. a) What is first principle of differentiation? (1)
- b) Write any one condition where we can use the derivatives to find the limit of a function. (1)
- c) What does dy/dx represent geometrically at particular point of a curve? (1)
- d) Find the derivatives of $(\ln x)^{\sinh x}$ (2)
18. a) Evaluate : $\int \frac{dx}{x^2+25}$ (1)
- b) Evaluate: $\int \frac{1}{(2x+1)(\sqrt{4x+3})} dx$. (2)
- c) Evaluate: $\int \frac{1}{3\sin x - 4\cos x} dx$. (2)
19. a) A box contain 5 blue and 6 white balls . Two balls are drawn one after another. If first ball is not replaced before the second ball is drawn, find the probability that
- i) both are white
- ii) First blue and second white
- iii) One blue and one white (3)
- b) Find the karl pearson's coefficient of correlation of the marks of the following distribution. (2)

x	20	30	40	50	60
y	50	46	30	24	8

Mathematics (0081) Set 'B'

20. a) In how many ways the letters of the word "INTERMEDIATE" be arranged so that
- i) The vowels always occupy even places? (1)
- ii) The realative order of vowels and consonant do not change. (1)
- iii) The order of vowels do not change? (1)
- b) If $y = \text{Fehler!}^\infty$, where $|x| < 1$, show that **Fehler!**. (2)
- c) Find the fourth roots of $\frac{-1}{2} + i\frac{\sqrt{3}}{2}$ (3)
21. a) Find the condition that the line $lx + my + n = 0$ may be a tangent to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$. (3)
- b) Find the latus rectum, the eccentricity, the coordinates if the foci of the ellipse $25x^2 + 4y^2 = 100$. (3)
- c) Find the equation of ellipse in standard form with a focus at (0, 3) and length of minor axis is 8. (2)
22. a) Find the points on the circle $x^2 + y^2 = 16$ at which the tangents are parallel to the x axis (2)
- b) Man 1.5 m tall walks at a uniform speed of 5 km/hr away from a lamp-post 6m high. Find the rate at which two length of his shadow increase? (2)
- c) Evaluate: $\int \frac{dx}{(x-2)^2(x-3)^3}$. (3)
- d) Write down any difference between Antiderivative and Derivative? (1)

-0-

Group 'C' [3 × 8 = 24]

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k"Off{^sM &%

ljBfyL{x^zn] ;s];Dd cf^g} zAbdf pQ/ lbg'kg]{ 5 . bfofF lsgf/dfd lbOPsf] cín] k"Off{^s hgfpFb5 .

!= lbOPsf] cg'R5]bdf /]vf^s]g ul/Psf zAbx^sf] clf/ ;+/rgf b]vfO{ clf/ ;^Vof n]Vg'xf];\ M -#_

df]g;sf cfcf^gf ?lr / rfxgf x'G5g\ . s;]nfO{ lxdfn cf/f]xOf ug{ dg nfU5 eg] s;]nfO{ Oltxf; / ;+:s[tsf] cWoog ug{ dg nfU5 . s]zidlOf cfkM"nfO{ xjfo{hxfh p8fpg clt dgkg]{ atfpF5 .

@= lbOPsf] cg'R5]bnfO{ z'4 u/L k'gn]{vg ug'xf];\ M

-#_

pmHofnf] x'Fb} hfFbf af6fdf bdoGtLn] a}lbs dGq h'gu'gfpFb} uPsf s]xL a|fXdg / lflqo kbofqlnfO{ e]6] sf]xL s;]-;Fu af]n]gg\ . ;a} cf^gf] af6f] nfu] .

#= s'g} Ps k|Zgsf] pQ/ lbg'xf];\ M -@_

s_ lbOPsf c+zaf6 Pp6f kfl/eflifs zAb / Pp6f cg's/OffTds zAb klxrfg u/L jfSodf k|of]u ug'xf];\ M

sDKo'6/df efO/; ;^qmd0faf6 dd{t x'g g;s]sf kfOnnfO{ PlG6efO/; uf]v]{n] k|fljlw1nfO{ v'?v'? l8ln6 ug{ ;'emfj lbof] . cf^gf] sfd ;s]/ d';d';' xF:b} pm n'?n'? af6f] nfUof] .

v_ lbOPsf] cg'R5]baf6 Pp6f pvfg / Pp6f 6'Ssf klxrfg u/L ltgnfO{ jfSodf k|of]u ug'xf];\ M

gkTofpg] vf]nfn] aufpF5 eg]em}F ;fwf/Of n]vk9 ePsf âfl/sfn] k'ik Joj;foaf6 /fd|f] cfDbfgL u5{g\ . k/Dk/fut v]tL ug]{x^nfO{ r'nf] km'Sg wf} wf} 5 . lxhf] âfl/sfsf] s'/f sf6\g]x^ cfh n]Hht 5g\ . cflv/ vfg] d'vnfO{ h'ufFn] 5]Sb]g To; ;sxfF elgPsf] xf] / Û

\$= lbOPsf] cg'R5]bdf /]vf^s]g ul/Psf zAbx^sf] kbju{ klxrfg u/L n]Vg'xf];\ M

-#_

xfd|f] ;dfhdf hftLo / n]lËs lje]bdf sdL cfpFb} 5 . lognfO{ k"Of{ ?kdf x6fpg cem} r]tgfsf] vfFrF] 5 .

%= lbOPsf] cg'R5]baf6 b'O{cf]6f tT;d / b'O{cf]6f tb\ej zAb klxrfg u/L n]Vg'xf];\

M -@_

clgjfo{ -)}@!_ ;]6 ...sÚ

cToGt udL{ ePsf]n] 5fq5fqfx^ 5ftf cf]9]/ ljbfnO hfFb} 5g\ . pgLx^sf xftdf kfFrkfFr cf]6f k':ts;d]t 5g\ .

^= s'g} Ps k|Zgsf] pQ/ lbg'xf];\ M

-#_

s_ tnsf] cg'R5]baf6 tLgcf]6f pk;u{ Jo'TkGg zAb / tLgcf]6f k|Too Jo'TkGg zAb klxrfg u/L ltgsf] lgdf{Of k|l]mof b]vfp'g'xf];\ M

g]kfnf] k|fs[Its ;f]Gbo{ cnf]lss 5 . ;+;f/e/sf cEofutsf] lrQfsif{Of ug{ ;Sg] lxdfnL ;'Gb/tf oxFF b]Vg kfOG5 . sltko b'u{d uGtJodf ljfs;sf 9f]sf vf]n]/ ;'ud agfpg ;s] ljb]zL ko{6sx^sf] ;^Vof cem} a9fpg ;lsG5 .

v_ tnsf] cg'R5]baf6 tLgcf]6f ;d:t zAb / tLgcf]6f lâTj zAb klxrfg u/L ;d:t zAbsf] lju|x / lâTj zAbsf] bf]xf]l/Psf] c+z b]vfp'g'xf];\ M

kLtfDa/ / gLns07n] cf–cf^gf] af/Ldf ;okqL km"nsf] Joj;fo u]/ / 3/vr{ rnfPsf 5g\ . pgLx^zn] afa'cdf;Fu klg o; sfdsf nflu cfk;L ;/;Nnfx u]/sf lyP . 7"nf7"nf ;kgf k"/f ug{sf nflu em}+emu8f gul/s; ;^ul7t k|oTg / cfk;L d]nldnfksf] vfFrF] kb{5 eGg] s'/fdf pgLx^ ;r]t 5g\ .

&= s'g} Ps k|Zgsf] pQ/ lbg'xf];\ M

-\$_

s_ n], nfO{ af6, b]lv, df, sf], gf], âf/f ljelQmx^sf] k|of]u u/L tkfO{F{ ;xefuL ePsf] s'g} Ps d]nf jf dx]T;jsf af/]df rf/ jfSodf jOf]g ug'xf];\ M

v_ k|yd k'?ifsf jfSodf kl/jt{g u/L k'gn]{vg ug'xf];\ M

pm lgs] ldlxg]t uYof]{ . p;n] ;fyLnfO{ klgl ldlxg]t ug{ nufpFYof] . pgLx^ cfk;df ldn]/ gofF sfd u/] . pgLx^ ;kmn eP .

*= s'g} Ps k|Zgsf] pQ/ lbg'xf];\ M

-\$_

s_ cf1fy{s lqmofkbsf] k|of]u u/L rf/ jfSodf cf^gf] efOnfO{ g/fd|f] afgL kl/Tofu ug{ ;Nnfx lbg'xf];\ .

v_ tnsf] cg'R5]bsf jfSox^nfO{ s/Of eP cs/Of / cs/Of eP s/Ofdf kl/jt{g u/L n]Vg'xf];\ M

d]/f ;fyL ahf/ uP5g\ . pgLx^zn] /fd|f /fd|f Hof]6 lsg]5g\ . dnfO{ cfdfn] k];f lbg' ePg . d]n] rflxF Hof]6 lsGg kfOGF .

(= s'g} Ps k|Zgsf] pQ/ lbg'xf];\ M

-\$_

clgjfo{ g]kfnL -)}@!_ ;]6 ...sÚ

s_ tnsf rf/cf]6f hl6n jfSonfO{ cf7cf]6f ;/n jfSodf ljZn]if0f ug{'xf];\ M

uf]kfnk|;fb l/dfnn] Úcfdfsf] ;kgfÚ sljtf n]v] lsgeg] g]kfnndf kl/jt{g cfjZos lyof] . g]kfnndf w]/)k6s cfGbf]ng eP tfklg ;dfhdf cem] ;dfgtf cfPsf] 5]g . ha;Dd ;a]n] GofO / ;dfgtf k|fKt ub}{gg\ ta;Dd kl/jt{g ePsf] dflgFb}g . ;dfhdf ;a] OHhtk"j{s a:g kfp'g'k5{ tfklg g]]kfnL ;dfhdf ;dfgtf sfg'gdf dfq ;Lldt ag]sf] 5 .

v_ tn lbOPsf k|Toif sygsf jfSoxčnfO{ ck|Toif sygdf abNg'xf];\ M

lzlfns] eGg'eof], æxNnf ug]{ ;a} ljBfyL{xč aflx/ hfcf] .Æ æljBfyL{xčn] lzlfns ;fd' xft hf]8\b} eg], æs[kof cfhnfO{ dfkmL lb'g'xf];\ .Æ lzlfns] eGg'eof], æca cFOGbf o:tf] eof] eg] /fd|f] x'g] 5]g .Æ æxj; \ ;/ .Æ ljBfyL{xčn] eg] .

!]= lbOPsf] cg'R5]b k9L cGTodf ;f]lwPsf k|Zgsf] pQ/ lb'g'xf];\ M

-%×!Ö%_

;fFRrL g] ljbjzdf g]kfnLnfO{ k/]sf] ;d:of ;'gfp] :yfg / ;dfwfgsf nflu ;Nnfx lng ;Sg] Pp6] dfq ynf] b"tfjf; g] x'G5 . dfgf]F pgLxč ;fgfltgb]lv 7'nf / uDeL/ ;d:ofxč b"tfjf;df ;'gfpkI5 ;xh čkdf ;'INemG5 eGg] dgf]lj1fg lnP/ cfpF5g\ . b"tfjf; g] cf^gf] cfdfsf] bf];|f] čk h:t} 7fG5g\ . ljbjzdf k'u]sf]n] h;/L x/b'Mvdf cdfdf eg]/ k'sf]/G5 / ;Demg] ul/G5 . x'g t of] d]/f] cleJolSt xf] . To;]n] d h:t} cčn] ;lDemG5g\ ls ;lDemg]gg\ b'Mvdf cf^gL cdfdfnfO{ t/ d eg] cfkt\ljkt\ / b'Mvdf hlxn] kl]g ;lDemG5' cf^gL cdfdfnfO{ . To:t} k|sf/n] ljbjzdf ePsf g]kfnLsf] cfdfsf] čkdf /x]sf] x'G5 g]kfnL b"tfjf; . b"tfjf;sf] pkl:ylt gePsf b]zdf cf^gf ;d:of, lk/dsf{ / dgsf] ax kf]Vg] :yfg sXLfst} x'Fb}g . sDtLdf cf^g} b]zsf bh'efOnfO{ cf^g} efiiffdf cf^gf ;d:of ;'gfpFbf dfq kl]g xn'sf cg'ej x'G5 . log] dfg]Lo sf]0faf6 ;f]r]/ r'krfk ;d:of ;'Gg] / ;s];Dd dndk6\6L nufpg] vfnsf s'/f u]/ ;Demfpg] / a'emfpg] sfd ug]{tkm{ nfUg'kčof] stf/df . o;/L slxNo} gef]luPsf, slxNo} g;'lgPsf / slxNo} g;f]lrPsf ljlrq lsl;dsf sfdaf/] ;Nnfx tyf ;'emfj lb]g afWo x'g'kčof] stf/df .

k|ZgxčM

- s_ b"tfjf;n] s] sfd u5{ <
- v_ lsg b"tfjf;nfO{ cdfdf;Fu t'ngf ul/Psf] xf] <
- u_ b"tfjf;sf] pkl:ylt gePsf b]zdf s:tf ;d:of x'G5g\ <
- 3_ b"tfjf;nfO{ lsg bf];|f] cfdfsf] ?kdf k'sf]/G5 <
- a_ n]vs]n] stf/df s;/L sfd ug'kčof] <

!!= lbOPsf] cg'R5]b k9L d'Vo d'Vo rf/cf]6f a'Fbf l6kf]6 u/L ;f/f+z n]Vg'xf];\ M -

@±#Ö%_

clgjfo{ -)}@!_ ;]6 ...sÚ

s'n ufx{:y pTkfbgdf cf]Bf]lus lf]qs] of]ubfg a9fpgsf nflu ;jb]zL tyf ljbjzL k'FhLsf] kl/rfng ug'k5{ . Psn laGb' ;]jf s]Gb]sf dfWodaf6 j]b]lzs nufgL k|jw{g ug{ cfjZos 5 . pknAw ;|f]t;fwg / >dsf] pkof]u u/] / cf]Bf]lus pTkfbg / pTkfbsTjdf clej]l4 ug{ ;lsG5 . n3', 3/]n' tyf ;fgf pBf]usf] ;+/lf0f / k|jw{g u/L /f]huf/L l;h{gf ug{ ;lsG5 . ul/aL Go"gLs/Of, g]kfnL j:t' tyf ;]jfsf nflu nufgLd]qL jftfj/Of l;h{gf, cfoft k|lt:yfkg / lgof{t k|jw{gsf dfWodaf6 cy{tGqnfO{ ;'b[9 ug{ cfjZos 5 . t'ngfTds nfe tyf k|lt:kwL{ lfddf ePsf g]kfnL j:t' tyf ;]jfsf] pTkfbg j]l4 ug'k5{ . lgof{t k|jw{g tyf cfoft Joj:yfkg u/L cfGtl/s dfu k'lt{ ug{ ;lsG5 . lăklfLo, lf]qLo / ax'klfLo Jofkf/ k|OffnLaf6 clwstd nfe lng] u/L j]b]lzs Jofkf;/DaGwL of]hgf tyf sfo{]j]md ;~rfng ug{ cfjZos 5 . vfBfGg, cf]ifwL tyf k]6«f]lnod kbfy{ h:tf cTofjZos j:t'sf] ;/n / plrt d"Nodf ;xh pknAw x'g] Joj:yf cfjZos 5 . o;sf nflu cfk'lt{ Joj:yfkgdf ;'wf/ NofO{ d"no l:y/tf sfod ug'k5{ . u'Of:t/Lo j:t' tyf ;]jfdf ;xh kxF'r k'čofO{ pkef]Stfsf] xsixt ;+/lf0f ug'k5{ . vfBfGg tyf cGo j:t'df x'g] ld;jf6, 7uL, sfnf]ahf/L, lgoGqOf ug{ ahf/ cg'udgnfO{ tLj] agfpg cfjZos 5 . o;sf nflu ljBdfg P]g lgods]f k|efj]s/L sfof{Gjog ug}{ u/L sfo{]j]md sfof{Gjog ug'k5{ .

!@= s'g} Ps k|Zgsf] pQ/ n]Vg'xf];\ M

-\$_

s_ cf^gf] sn]hdf ug{ nfluPsf] a[xt /Qmbfg sfo{qmdf k|flj]lws ;xof]u ul/lbg cg'/f]w ub}{ /]8qm; ;f];fO6L lhNnf zfvfnfO{ n]lv]g] lgj]bgsf] gd'gf tof/ kfg{'xf];\ .

v_ cf^gf] 6f]ndf a[xt\ ;/;kmfO sfo{qmd ug{sf nflu 6f]n ljsf ;+:yfsf] sfo{ ;ldltsf] a}7ssf] lgOf{o tof/ kfg{'xf];\ M

!#= s'g} Ps k|Zgsf] pQ/ n]Vg'xf];\ M

-%_

s_ tkfOF{n] e|dOf u/]sf] s'g} wfld{s tyf P]ltxf]l;s :yfgsf af/]df !%) zAb ;Ddsf] Pp6f k|ltj]bg tof/ kfg{'xf];\ M

v_ ;fdflhs ;~hfnsf] b'?kof]uÚ zLif{sdf !%) zAb;Ddsf] l6KkOfL n]Vg'xf];\ .

!\$= s'g} Ps p4/Ofsf] JofVof ug'k5{xf];\ M

-\$_

s_ dg}{ k5{ eg] kl]g k/ k'uL d/f]F gem'Sg] of] lxdfndf lsg em'sL d/f]F .

v_ cflv/ hLjg g} gf6s xf] . ;+;f/ g} /Ěd~r xf]] .

clgjfo{ g|kfnL -)})@!_ ;]6 ...sÚ

!%=s'g} Ps cg'R5]bsf] b'O{ k|Zgsf] pQ/ n]Vg'xf];\ M

-\$_

s_ lbOPsf] hLjgL c+z k9L ;f]lwPsf k|Zgsf] pQ/ n]Vg'xf];\ M

xlsªn] k[YjLdf cfOk]g{ ;Defljt ljkLQaf6 aRg dfgj ;d'bfofnfO{ af/Djf/ ;r]t u/fpg] uy]{ . pgn] k/dfOf'o'4, ljZjJofkL tfkqmd j[l4, k|s[ltlj?4sf dfgjLo ultljwsf sf/Of k[YjLdf dfgj hLjg vt/fdf /x]sf] atfPsf 5g\ . o;}n] o;tkm{ ;dod} ;r]t x'g cfu|x u/]sf 5g\ . o:t} pgn] dflg;nfO{ s[lqd a'l4dQfk"Of{ /f]af]6sf] lgdf{Ofdf ;r]t x'g'kg]{ atfPsf 5g\ . s[lqd a'l4dQfk"Of{ /f]af]6 dflg;sf] lbdfusf pkh x'g\ t/ logLxçsf] :d/Of / ljZn]ifOfTTds ;fdYo{ dflg;sf] eGbf w]/} x'Fb} uO/x]sf] 5 . dflg;n] ug{ ;Sg] ;a} sfd oL oGqxç ;lhn] ug{ ;S5g\ . o;}n] pgl s[lqd a'l4dQfn] dflg;nfO{ geO{ dflg;n] s[lqd a'l4dQfnfO{ lgoGqOf ug{'kg]{ dfGotf af/Djf/ bf]xf]—ofO{ /xGy] .

k|ZgxçM

-c_ k[YjLdf dfgj hLjg vt/fdf kg{'sf sf/Of s]s] x'g\ <
-cf_ xlsªPn] dflg;nfO{ lsg s[lqd a'l4dQfk"Of{ /f]af]6sf] lgdf{Ofdf ;r]t x'g cfu|x u/]sf x'g\ <

v_ lbOPsf] syf+z k9L ;f]lwPsf k|Zgsf] pQ/ lbg'xf];\ M

clftf x]/] em}F klqsfsf kmfOn x]b}{ xf8{l8:sdf /fVb} ug{ yfNof] PIG6efO/; uf]v]{ . cfwfhlt k'¥ofPkl5 /flf; h:t]f] l3g nfUbf] b]lv]g] efO/; e]6\of] . emf]nfaf6 v/fgL lgsfNof] . dGq k'ms]/ /]vf xfNof] . To; efO/;nfO{ p7fP/ v/fgLsf] 3]/fleg y]rf¥of] . km]l/ :Sofg ug{ yfNof] . :Soflgª ug{ yfn]kl5 s]xL efO/; efu]/ s'gf s'gdf k:bf /x]5g\ . sl/a Ps nfv kmfOn :Sofg u/]kl5 kfFr y/Lsf efO/; e]6\of] . tL efO/;n] nueu rf/ ;o kmfOndf ;ª]j|mdOf u/]sf lyP . y'k|} kmfOn dd{t eP, dd{t x'g g;s]sfnfO{ PIG6efO/; uf]v]{n] l8ln6 ug{ ;'emfj lbof] . k]znn] ...cf]s]Ú n]v]sf 7fpFdf dfp;sf] r'Rrf] nu]/ lyRof] . efO/;n] lauf/]sf / dd{t x'g g;s]sf kmfOn hlt :jfQ} p8fof] .

k|ZgxçM

-c_ ...efO/;nfO{ p7fP/ v/fgLsf] 3]/fleg y]rf¥of]Ú eGg'sf] tfTko{ s] xf] <
-cf_ uf]v]{n] sDKo'6/nfO{ efO/;d'St agfpgsf nflu u/]sf lj|mofsnfk s] s] x'g\ <

clgjfo{ -)})@!_ ;]6 ...sÚ

!^= s'g} Ps k|Zgsf] pQ/ lbg'xf];\ M

-\$_

s_ ...dft[TjÚ syfsf] kfq ;'af]wsf] 7fpFdf olb tkfOF{ x'g' ePsf] eP ddtf / pgsf ;Gtfgk|lt s:t]f] Jojxf/ ug{' x'GYof], cfkgf] ljr/ k|:t't ug{'xf];\ M

v_ sDKo'6/nfO{ ;'/lIft /fVg jf efO/; d'Qm agfpg To;df PIG6efO/; OG:6n ug{'k/]emF} dflg;nfO{ efO/;sf] ;ª\qmdOf x'g glbg / ;ª\qmltd eO;s]sf] cj:yfdf To;af6 d'Qm agfpg s] ug{' knf{, ts{ lbg'xf];\ M

!&=s'g} Ps k|Zgsf] ;dLlffTds pQ/ lbg'xf];\ M

-*_

s_ ...Ps lrxfgÚ pkGof;df g|kfnL ;dfhsf] s:t]f] cj:yfsf] lrqOf ul/Psf] 5, lj]rgf ug{'xf];\ .

v_ ...b[9OR5f zlQm, 1fgzlQm / lqmofzlQmsf ;fd' zf/LI/s /f]u zlQmxLg x'G5 .Ú o; egfOnfO{ ...l:6kmg ljlnod xlsªÚ hLjgLsf cfwf/df k'li6 ug{'xf];\ M

!*= s'g} Ps zLif{sdf sDtLdf @%) zAb;Ddsf] lgaGw n]Vg'xf];\ M

-*_

s_ e|i6frf/ d'Qm b]z v_ lzlffM ;dfh kl/jt]gsf] cfwf/

u_ ;d[4 /fi6«lgdf{Ofdf o'jfju{sf] e"l dsf

—)

ljifo M clgifo{ g]kfnL -)}@!_ ;]6 ...vU
gfOl6a\u]n OG6/g]Zgn af]l8{a\u ;]s]G8/L :s'n

sf]k'08f]n, nlnTk'/

bf];|f] q]dfl;s k/Llff – slff !@ -lj1fg ;+sfo_

;do M # 306f @)*@ -@)^_ k"Off{a\sM &%

ljBfyL{x;n] ;s;Dd cf^g} zAbdf pQ/ lbg'kg]{ 5 . bfofF lsgf/fdf lbOPsf] cín] k"Off{a\s hgfpFb5 .

!= tnsf] cg'R5]bdf /]vf^s\g ul/Psf zAbsf] clf/ ;+/rgf / clf/ ;a\Vof b]vfp'g'xf];\ M - #_

ul/aL Go"gLs/Of g]kfnL j:t' tyf ;]jfsf nflu nufgld}qL iftfi/Of l;h{gf / lgof{t k|j4{gsf dfWodaf6 cy{tGqnfO{ ;'b[9 ug{ cfjZos 5 . t'ngfTds nfe tyf k|lt:kwL{ lfdtf ePsf g]kfnL j:t' tyf ;]jfsf] pTkfbg j[l4 ug{'k5{ .

@= z'4 u/L k'gn]{vg ug{'xf];\ M -#_

hLagdf slt psfnf sf6Lof] xfnf / slt cf]/fnf eml/of] t/ yf]/] JPIQmn] dfq 3g3:ofsf] psfnf] r9]sf xfnfng\ of] o:tf] psfnf] xfnf hf] s7f]/tf df cl4lto 5 .

#= s'g} Ps k|Zgsf] pQ/ lbg'xf];\ M -@_

s_ lbOPsf c+zaf6 Pp6f kfl/eflifs zAb / Pp6f cg's/OffTds zAb klxrfg u/L jfSodf k|of]u ug{'xf];\ M
snsn ub}{ aUg] gbL / 5a5a ub}{ emg]{ 5x/fn] ;lhPsf] hn;|f]tn] ;DkGg e"kl/]li7t / ljsf;f]Gd'v b]z g]kfnnfO{ ljB'tLs/Of u/] / ;d[4 /fi6« agfpg pmhf{sf] vktdf ;d]t Wofg lbg' cfjZos 5 .

v_ lbOPsf] cg'R5]baf6 Pp6f pvfg / Pp6f 6'Ssf klxrfg u/L ltgnfO{ jfSodf k|of]u ug{'xf];\ M

xfd|f] ;dfh cfn' vfP/ k]8fsf] wfs nufpg] / s'\Vf sf6\g] k|j]lQ lgs} a9]sf] b]lvG5 . o:tf] k|j]lQ a9\b} uPdf ;dfhn] sfFr'nL km]g]{ s'/f t cfsfzsf] kmn cfFvf t/L d/ eg]emF} kf] x'G5 .

\$= tnsf] cg'R5]bdf /]vf^s\g ul/Psf zAbsf] zAbju{ klxrfg ug{'xf];\ M -#_

;f]j]/df b'3{6gf ePsf] s]xL lbgkL5 bdoGtL / tL gf/L ;Fu;Fu] r]bL hgkbsf] 5]pdf k'u] . ToxfFaf6 eg] pgLxç 5'!\$P/ cf–cfkm\gf] uGtJotkm{ nfu} .

%= lbOPsf] cg'R5]baf6 b'O{cf]6f tT;d / b'O{cf]6f tb\ej zAb vf]hL n]Vg'xf];\ M -@_

lzlffaf6 ;a)n] 1fg xfl;n ug{'k5{ g ls cx^s\sf / . tkfO{Fn] lzlffsf] anaf6 k|fkt ug{'ePsf] dfg / k|lti7fdf 3dG8 ug{'eof} . ca tkfO{Fsf] t]:tf] cfFvf v'Ng hç/L 5 .

^= s'g} Ps k|Zgsf] pQ/ lbg'xf];\ M -#_

s_ tnsf] cg'R5]baf6 tLgcf]6f pk;u{ Jo'TkGg zAb / tLgcf]6f k|Too Jo'TkGg zAb klxrfg u/L ltgsf] lgdf{Of k|lj] mof b]vfp'g'xf];\ M

ljifo M clgifo{ g]kfnL -)}@!_ ;]6 ...vU

efiff dflg;sf] cgdfl]n ;DklQ xf] . efiffdf dflgPsf ;f]rfO, cg'ej, ljr/ tyf ;f+:s[its klxrfg ;'/lft x'G5g\ . ;+o'Qm /fi6« ;a\3n] klg efiffnfO{ dfgjtsf] cd"t{ ;Dkbf dfg]sf] 5 . dflg;eGbf cGo k|f0fLsf cfjfhnfO{ eg] efiffsf] dfGotf lbOPsf] 5}g .

v_ tnsf] cg'R5]baf6 tLgcf]6f ;d:t zAb / tLgcf]6f lâTj zAb klxrfg u/L ;d:t zAbsf] lju|x / lâTj zAbsf] lgdf{Of k|lj] mof b]vfp'g'xf];\ M

xfdLn] cf^gf] hGde'ldnfO{ k|fyldstf lbP/ cf–cf^gf] k];fdf ;dlk{t eO{ ?lr / lfdtfcg';f/sf] sfdsfh ug{'k5{ . cfnT'–kmfNt' s'/fdf Wofg lbg'sf] ;\$f cdf a'afn] eg]sf sfd ;/tL{ ug{ ;s]df cgdfl]n hLjg ;fy{s x'G5 . ufPF ufPF g8'nL, b'OIha]] dflg;sf s'/f;'/f g;'gL 3/kl/jf/nfO{ d'6'df ;hfpFbf efUof]bosf 9f]sf v'N5g\ .

&= s'g} Ps k|Zgsf] pQ/ lbg'xf];\ M -\$_

s_ n], nfO, { âf/f, b]lv, af6, sf], /f], df ljelQm nfu]sf leGg leGg sf/ssf] k|of]u u/L cfkm"n] u/]sf] z]llfs e|d0fsf af]/df rf/ jfSodf jOf]g ug{'xf];\ M

v_ lbOPsf jfSonfO{ t[tlO k'?ifdf kl/jt{g u/L k'gn]{vg ug{'xf];\ M
d kxf8df hlgdPsf] lyPF . clxn] hgsk'/df a:5' . kl/jf/df xfdL hDdf rf/ hgf 5f]F . xfdL ;dfh;]jf ug{ rfxG5f]F .

*= s'g} Ps k|Zgsf] pQ/ lbg'xf];\ M -\$_

s_ ck"Of{ jt{dfg sfnsf km/s km/s lqmofkb k|of]u u/L k/Llff :yndf eO/x]sf] sfo{sf af]/df rf/jfSodf jOf]g ug{'xf];\ .

v_ tn lbOPsf jfSof] jfRo kl/jt{g ug{'xf];\ .
s[ifsxç /ftlbg kl/>d u5{g\ . pgLxç dfgf] /f]k]/ d'/L kmnfpF 5g\ . pgLxç ;'vb'Mvdf /dfpF5g\ . pgLxçn] ;+;f/nfO{ u'g nufPsf 5g\ .

(= s'g} Ps k|Zgsf] pQ/ lbg'xf];\ M -\$_

s_ tnsf rf/cf]6f hl6n jfSonfO{ cf7cf]6f ;/n jfSodf kl/jt{g ug{'xf];\ M
/fhgllts lvrftfgL a9]sf] x'Fbf nf]stGqk|lt hgtfsf] ljt[i0ff hfUb} 5 . ha;Dd kf6L{sf g]tfxç ;jfyL{ / ;a\sL0f{ /xG5g\ ta;Dd b]zn] cu|ult lng ;Sb}g . d'n'ssf] pGgl / k|ult geO{ hgtfsf] enf] klg x'g ;Sb}g . b]z ul/a x'G5 clg lab]l;g] hgtfsf] ;a\Vof a9\5 .

v_ tnsf jfSonfO{ k|Toif sygdf kl/jt{g ug{'xf];\ M

;zLnfn] cfdfnfO{ vfgf vfg cfpgsf nflu cfu|x u/L . cfdfn] ;'zLnfnfO{ vfgf k:sg eGg'eof} . ;'zLnfn] cfkm" l56f] ljBfno hfg' kg]{ s'/f atfO{ . cfdfn] ;'zLnfnfO{ Wofg lbP/ k9\g lgb]{z ug{'eof} .

!)= lbOPsf] cg'R5]b k9L cGTodf ;f]lwPsf k|Zgsf] pQ/ n]Vg'xf];\ M -%×!Ö%_

cfo'j]{b k"jL{o k|frlg lrlsT;f k4lt xf]cfo'j]}{bU zAbsf] cy{ ...cfo'sf] 1fgU eGg] x'G5 . o;nfO{ cfo'lj{1fg klg elgG5 . cfo'sf] 1fg eGgfn] hLjgdf k"Of{ cfo' lhp] ljifo / snfsf] 1fg xf] . k"Of{ cfo' lhp] :jf:Yo klxnf] cfjZostf xf] . :j:y JoISt g] k"Off{o'sf] hLjg lhpF5 eGg] cfo'j]{bsf] dfGotf xf] . o;}n] cfo'j]{bdf hLjg :j:y /fVg]

ljifo M clgjfo{ g}kfnL -))@!_ ;]6 ...vU

pkfosf af/]df lj:t{t ÷kdf rrf{ ul/Psf] 5 . hLjg :j:y /fVg' eg]sf] ;se/ z/L/df /f]usf] k|j]z x'g glbg' xf] / sbflrt\ /f]usf] k|j]z eOxfn] klg pkrf/sf dfWodaf6 z/L/af6 To;sf] lgisf;g ug'{ xf] . cfo'j]{bdf /f]usf] pkrf/sf nflu sfolrlsT;f, zNo tGq, zfnfSo tGq, e"tljBf, sf]df/e[To, cub tGq, /;fog tGq / afhLs/Of tGq u/L cf7 cª\ u /x]sf 5g\ . oLdWo] sfolrlsT;fdf zf/Ll/s /f]u, zNo tGqdf lr/kmf/ ug'{kg}{ /f]u, zfnfSo tGqdf gfs, sfg, 3ff6L jf cGo s'g} sf/Of ePsf] 6fpsfsf] /f]u, e"tljBfdf e"t, u|x jf dfgl;s sdhf]/Lsf sf/Of nflu]sf] dfgl;s /f]usf] pkrf/sf] k4lt k|:t't ul/Psf] 5 . o:t} sf]df/e[To]df ue]jtL :qLnfo{ nfu]g /f]u / afn/f]u, cub tGqdf z/L/df ljifn' kbfiy{sf] k|j]zsf sf/Of pTkGg ePsf] /f]u, /;fog tGqdf j[4fj:yfdf x'g] /f]u, afhLs/Of tGqdf z/L/df wft'sf] sdLsf sf/Of x'g] /f]usf] pkrf/sf] k4lt ;dflii6 5 . cfo'j]{bsf cg';f/ d'Vo ÷kdf z/L/df jft, lkQ / skm oL lqbf]jfsf] c;Gt'ngsf sf/Of /f]usf] k|j]z x'G5 . oL tLg bf]jifaf6 aRg] d'Vo pkfo eg]sf] plrt cxf/ / pko'St hLjgz}nL g} xf] . pko'St cxf/ / hLjgz}nLaf6 z/L/df /f]u;Fu n8]g] cf]h jf hLjgL zLst ;zSt ÷kdf lj|mfzLn aG5 . hLjgL zLstsf] ;zStf x'Fbf z/L/df /f]un] k|j]z g} ug{ kfpFb}g, sbflrt\ k|j]z ul/xfn] klg To]f k|efjxLg x'G5 . k|efjxLg To; /f]unfo{ klg :yfgLo h8La'6L / vlghsf] pkof]u u/L z/L/af6 ;xh] lgisf;g ug{ ;lsG5 . o;}n] plrt cxf/, pko'St hLjgz}nL / pknAw :yfgLo h8La'6Lsf] ;jgaf6 :j:y /x/ k'Off{o'sf] hLjg lhpg ;lsG5 eGg] s'/fsf] dfu{lgb}{zg ug}{ lrlsT;f k4lt g} cfo'j]{b xf] .

k|Zgxç M

-s_ cfo'j]{bsf cf7 cª\ u s] s] x'g\ <
-v_ cfo'j]{bsf] dfGotf s] xf] <o;df s] sf] rrf{ ul/Psf] 5 <
-u_ sfolrlsT;f / zNo tGqdf s'g s'g /f]usf] pkrf/ k4lt k|:t't ul/Psf] 5 <
-3_ z/L/df /f]usf] k|j]z x'g'sf] sf/Of s] xf] <
-ª_ cfo'j]{bn] hLjgdf k'Off{o' lhpg s] ug'{kg}{ ;'emfj lbPsf] 5 <

!!= lbOPsf] cg'R5]b k9L d'Vo d'Vo rf/cf]6f a'Fbf l6kf]6 u/L Ps t[tLof+zdf ;f/f+z n]Vg'xf];\ M

hLjgdf c;kmn x'g sf]xL klg rfxGgg\ t/ ;kmn x'gdf c;kmntfnfo{ klg :jLsf/ ug{ ;Sg'k5{ . vf]nf t/ eGg ;lhnf] 5 t/ vf]nf t/]/ b]vfp]g] sfd >d / zLst;fWo 5 . c;kmn x'Gg eGg ;lhnf] 5 t/ ;kmn x'g klg lg/Gt/sf] ;fwgf / ;'ema'em rfxG5 . o;}n] ;kmn x'g rfxg] hf];s'n] c;kmntf;Fu 8/fpg' rfxF x'Fb]g . s] ubf{ sfd aG5 s] ubf{ lau|G5 eGg] ;'ema'emsf] ljsf; klg c;kmntfk15 g} x'G5 . c7f/ k6s ljzjs} ;jf]{Ts[i6 n]vs ag]sf ;]7 uf]l8gn] ;jf]{Ts[i6 lsf]a lgsfNg' cl3 bz jif{ k':ts k|sfzg u[xdf Ps sd{rf/Lsf ÷kdf sfd u/]sf lyP . o;k15 pgnfo{ lsf]a lgsfNg] w'g r9\of] . x/]s dlxgf Pp6f lsf]a lgsfn] . Pp6f sfd ul//x]sf] dfG5]n] csf]{ sfddf xft xfnbf c;kmn x'g} ;Defjgf k|an x'G5 . o;}n] xf]nf, pgn] k|sfzg u/]sf !@) lsf]adWo] w/})n] pTs[i6 x'g' t k/} hfcf];\ /fd|f] ahf;/d]t kfp]g ;s]gg\ . Jofkf/ gePsf sf/Of pgL;t s/ ltg]{ k};f;d]t ePg .

ljifo M clgjfo{ g}kfnL -))@!_ ;]6 ...vU

o:tf] cj:yfdf klg pgn] lxDdt eg] xf/]gg\ . k|To]s c;kmntfn] pgnfo{ kf7sdfem s:tf] lsf]a nfg] eGg] af/] l;sfpg w/}) dbt u}of] . To;k15 lgsfn]sf x/]s k':ts ;jf]{Ts[i6 x'Fb] uP . ;jf]{Ts[i6 n]vssf] :yfg lbPsf pgsf !* cf]6} k':tssf] clxn] #% eGb] a9L efiffdf cg'jfb eO;]sf] 5g\ . o:t} dxfg\ j]1f]gs yf]d; PNe]f P18;g klg ljB'tLo lrdsf] cflijisf/sf j]mddf xhf/f]F k6s c;kmn ePsf lyPxhf/f]F k6s c;kmn x'Fbf klg tkfo{Fn] lsg xf/ dfGg'ePg U

!@= s'g} Ps k|Zgsf] pQ/ n]Vg'xf];\ M

s_ cf`gf] sn]hdf cfof]hgf x'g] sljtf dxft]T;jsf nflu lgsflng] ;"rgfsf] gd'gf tof/ ug'xf];\ -dfgf]+ tkfo{sf] gfd ;'af]w xf] / ljBfnosf] gfd lqe'jg df= lj= xf] .
v_ s'g} Ps ljQLo ;+:yfdf ahf/ k|ltlglw kbsf nflu v'n]sf] lj1fkg adf]lhd cfj]bg lbg cfjZos kg}{ cf`gf] JolQmut lj]Of tof/ kfg'xf];\ .

!#= s'g} Ps k|Zgsf] pQ/ n]Vg'xf];\ M

s_ cf`gf] sn]hn] cfof]hgf u/]sf] z]l]fs e|dOf sfo{qmdsf ;Dk'Of] lj]Of ;d]6L !%} zAbdf g36fo{ k|ltj]bg tof/ kfg'xf];\ .
v_ æj]b]lzs /f]huf/Lk|ltsf] cfsif{OfÆ zLif{sdf !%} zAb;Ddsf] l6KkOfL n]Vg'xf];\ .

!\$= s'g} Ps p4/Ofsf] JofVof ug'xf];\ M

s_ 6fs/fdf s'lx/fsf] bf]8fbf]8L xf]nf n]sb]lv OG>]gLn] agj]+;L 5f]nf e]8f rnf{g\ lgufnfsf] 6'Kkf lxnfp/ rd|L rnf{g\ rd/sf] em'kf em'nfP/ .
v_ d]/f 5f]/f5f]/L d]/f nflu rG> / ;"o{x'g\ .

!%= s'g} Ps cg'R5]bsf] b'O{ k|Zgsf] pQ/ n]Vg'xf];\ M

s_ lbOPsf] hLjgL c+z k9L ;f]lwPsf k|Zgsf] pQ/ lbg'xf];\ M
xlsª afNosfn]lv g} lgs] lh1f;' / l;hgzLn :jefjsf lyP . s'g} klg oflGqs j:t'nfO{ ulxl/P/ x]g]{, To;sf] leqL] ;+rgfnfo{ a'eg] / ltgaf6 aGg ;Sg] gofF a:t'sf] af/]df kl/sNkgf ug]{ pgsf] afgL lyof] . ;fyLxçsf] ;xof]u lnO{ pgn] k'/fgf] 38L tyf /]l8of]sf kf6k'hf[af6 sDKo'6/ agfPsf lyP / o;af6 pgL cjwf/OffTds ul0ftLo ;dLs/Ofsf] ;dfwfg ug]{ uy]{ . pgn] cfm"n] v]Ng] u]d / xjfOhxfh, 8ª\uf cflbsf] gd'gf klg cfm]F agfPsf lyP . o:tf] l;hgzLn sfo{af6 k|efljt ePsf pgsf ;fyLxç xlsª cf`gf] ;+;f/sf] /rgf u/]/ To;nfO{ rfxg] lgod cfm]F agfpg ;S5g\ eg]/ pgnfo{ yk xf];nf lbGy] . pgsf o:tf sfdaf6 k|efljt ePsf lz]fs pgnfo{ hGdhft k|lter ePsf] JolQm dfGy] . ;fyLxç rfxF pgnfo{ cfOG:6fOg eg]/ af]nfpFy] . 3/df a:bf klg pgL k|foM zf]wvf]hdf g} tNnLg eO/xGy] . pgL cf`gf ;fyLnfo{ lnP/ ;fFemsf] ;dodf 3/sf] k5f18 hfGy] / cfsfzsf tf/fnfO{ x]l//xGy] . a|Xdf08k|ltsf] lh1f;fn] pgnfo{ afNosfn]lv]lv g} 3R3RofO/x]sf] lyof] .

k|Zgxç M

-c_xlsª s:tf] :jefjsf lyP <
-cf_...xlsªnfO{Ú pgsf ;fyLx¿n] cfOG:6fOg eGg'sf] sf/Of s] xf] <

v_ lbOPsf] syf+z k9L ;f]lwPsf k|Zgsf] pQ/ n]Vg'xf];\ M

PIG6efO/; uf]v]{ h'?Ss p7\of] . ænf, r'; ca /ut ÚÆ To;sf] d'vdf v'6\6f] /fv]/
lyRg vf]Hb} lyof] v'6\6} rkfOlbof] efO/;n] . b'vfOn] OGt' g lrGt' eof]
PIG6efO/; uf]v]{ . bfx|f ls6/ s'lxgfn] efO/;sf] 6fps} 6fpsdf lxsf{P/ df¥of] .
To;kl5 cf^gf] /StfDd] v'6\6f] ;dfP/ cfTyf === cfTyf ug{ yfNof] . Tof] b]v]/
k]znn] æd s'g} ;xof]u ug{ ;S5' < s'lxgfn] efO/;sf] 6fps} 6fpsdf lxsf{P/
df¥of] . To;kl5 cf^gf] /StfDd] v'6\6f] ;dfP/ cfTyf === cfTyf ug{ yfNof] . Tof]
b]v]/ k]znn] æd s'g} ;xof]u ug{ ;S5' < 6fOk xfGof] . æwGojfb, tkfO{F lrGtf
gug';\ .Æ ;fGTjgf :j¿k PIG6efO/; uf]v]{n] xfF:g] sf]l;; u¥of] . pm b'vfOn]
/GylgPs] lyof] . cf^gf] kl8fnfO{ la;}{/ p;n] t];|f] efO/; lgsfNof] . t];|f] efO/;
8/fPsf] x'g'k5{, p;nfO{ s]xL ;f]Wg} k/]g . km6fkm6 eGg yfNof], æd]/f] gfd
cGo efO/; xf] . 6]Dkf]//L kmf]N8/df uP/ a:5' . Toxf ePsf kmfOnn]
v'ln/x]sf] k|f]u|fd rNgdf dbt k'¥ofO/x]sf x'G5g\ . d klg ToxL kmf]N8/df
a;]/ kmfOnnfO{ ¥ofd, ;L=kL=o'=, xf8{I8:sdf bf}8fO/xG5' . o;n] ubf{
rln/x]sf] kmfOn crfgs aGb eOlbg], k]h tndfly x'g] / sDKo'6/ cgfjZos ¿kdf
Jo:t eO/fVg] x'G5 .Æ

k|Zgx¿ M

-c_ PIG6efO/; uf]v]{ / efO/;n] Pscsf{dfly ljho k|fKt ug{ s] s] u/]sf 5g\ <
-cf_ cGo efO/; gdfs] t];|f] efO/;n] ug]{ ultljw / sDKo'6/nfO{ k'¥ofpg] c;/
s] s] x'g\ <

!^= s'g} Ps k|Zgsf] pQ/ lbg'xf];\ M -\$_

s_ 5f]/f5f]/Lsf] dfof, nf]Ug]sf] dfof, c¿sf] dfof 5'\$f5'\$} x'g\ . dfofsf] cf^g}
ljz]iftf 5 . o; egfOnfO{ dft[T] syfsf] cfwf/df k'li6 ug{'xf];\ M

v_ ...uf]v]{Ú syfsf] kfq k]znsf] 7fpFdf olb tkfO{F x'g' ePsf] eP k|ljlwsf] lf]qdf s]
s:tf] gofF sfdf ug{' x'GYof], cf^gf] ljr/ n]Vg'xf];\ M

!&= s'g} Ps k|Zgsf] ;dLlffTds pQ/ lbg'xf];\ M -*_

s_ cdfsf] ;kgf ;fsf/ kfg{ qmflGt k'?ifsf] e"ldsf s:tf] x'g' k5{, ...cdfsf] ;kgfÚ
sljtfsf cfwf/df rrf{ ug{'xf];\ M

v_ ...Ps lrxfgÚ pkGof;df g]kfnL ;dfhsf] s] s:tf] jf:tljstfnfO{ k|:t't ul/Psf] 5,
;dLlff ug{'xf];\ M

!*= s'g} Ps zLif{sdf sDtLdf @%) zAb;Ddsf] lgaGw n]Vg'xf];\ M -*_

s_ ;fdflhs ;~hfnsf] ;b'kof]u v_ d / d]/f] b]z

u_ lj1fg / k|ljlwsf] dxTj

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt all the questions.

Group A (11×1=11)

Multiple choice questions:

- Which quantity in rotational motion is analogous to force in linear motion?
 - Torque
 - Moment of inertial
 - Angular velocity
 - Angular momentum
- The earth is made smaller by squeezing its mass, then the duration of day will be
 - Remain same
 - increases
 - Decreases
 - Becomes zero
- For a simple pendulum, when the bob is at mean position which of the following statement is true?
 - KE is maximum and PE is minimum
 - Velocity is maximum
 - KE is minimum and PE is maximum
 - Both a) and b)
- Internal energy of an ideal gas depends on
 - Temperature
 - Pressure
 - Volume
 - All
- Which of the following condition is true for adiabatic process?
 - $dQ = 0$
 - $dW = 0$
 - $dV = 0$
 - $dP = 0$
- Velocity of sound is double the velocity at 0°C , at temperature
 - 270°C
 - 800°C
 - 819°C
 - 950°C

- For constructive interference the path difference should be
 - Fehler!
 - Fehler!
 - λ
 - Fehler!
- The production of emf by maintaining a difference of temperature between the two junction of different metal is called
 - Thompson's effect
 - Peltier's effect
 - Joule's effect
 - Seebeck's effect
- Kirchhoff's voltage rule is analogous to
 - Conservation of charge
 - Conservation of energy
 - Conservation of current
 - Conservation of voltage
- In a PN junction with barrier potential 1V, -1.5V is connected to P side. What will be its new potential barrier?
 - 0.5V
 - 0.5V
 - 2.5V
 - 2.5V
- The half-life of radioactive substance is 2 months then the amount of substance left after 1 year is
 - $\frac{1}{64}$ part
 - $\frac{1}{32}$ part
 - $\frac{1}{16}$ part
 - $\frac{1}{128}$ part

Group B (8×5=40)

- Define radius of gyration. [1]
 - Derive formula for moment of inertia of thin rod about axis passing through its center. [2]
 - A disc of radius 1m and mass 5kg is rolling along a horizontal plane. Its moment of inertia about center is 2.5 kgm^2 . If velocity along the plane is 2m/s then find its total energy. [2]
- What is simple harmonic motion? [1]
 - Derive an expression for frequency in mass-spring system. [2]
 - A particle of mass 0.25kg oscillates with a period 2sec. If its greatest displacement is 0.4m then find maximum kinetic energy. [2]

Physics (2011) Set 'A'

14. a) State first law of thermodynamics. [1]
 b) Why value of c_p always greater than c_v ? [2]
 c) Derive expression for work done in adiabatic process. [2]
15. a) What is progressive wave? Derive its expression in terms of wave vector and displacement. [3]
 b) At what temperature the velocity of sound increased by 50% to that at 27°C ? [2]
16. a) What is thermocouple? [1]
 b) Differentiate between Seebeck's effect and Peltier's effect in two points. [2]
 c) A cold junction of thermocouple is maintained at 283K . No emf is developed when the hot junction is maintained at 530°C . Find neutral temperature. [2]
17. a) State Kirchhoff's current law. [1]
 b) Derive formula for balanced condition of Wheatstone bridge circuit. [3]
 c) Why potentiometer is considered to have infinite resistance? [1]
18. a) Draw and write about rectification of AC into DC using center tapped rectifier. [3]
 b) What is NAND gate? Draw its symbol and make truth table of it. [2]
19. a) Write any two application of radioactivity. [1]
 b) Derive the formula: $N = N_0 e^{-\lambda t}$. [2]
 c) Half-life of carbon -14 is 5700years. Find activity of 5gm of carbon 14? [2]

Group C (3×8=24)**Physics (2011) Set 'A'**

20. a) State Huygens ' Principle. [1]
 b) Write condition for resonance in open organ pipe and discuss different modes of vibration. [2]
 c) Define coherent sources. Write the conditions for it. [1+2=3]
 d) Write the conditions for constructive and destructive interference. [2]
21. a) Write down formula for force on moving charge in magnetic field, also write how to find direction of force. [1]
 b) How can we increase voltage sensitivity of galvanometer? Write two ways. [2]
 c) Find magnetic field due to straight current carrying conductor using Biot-Savart law. [3]
 d) A proton is moving northwards with velocity of $5 \times 10^6 \text{ m/s}$ in magnetic field of 0.1T directed eastward. Find the magnitude and direction of force on proton. [2]
22. a) What is cross-field? [1]
 b) Draw and write about JJ Thompson's experiment to find specific charge. [3]
 c) Photoelectric current depends on intensity of light but does not take place below certain frequency, why? [2]
 d) A nickel surface has work function 5.1eV is exposed to light of wavelength 235nm . What is the maximum speed of the photoelectron emitted from its surface? [2]

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt all the questions.

Group A (11×1=11)

Multiple choice questions.

- Linear velocity of a body is constant then its angular velocity will upon increasing radius.
 - Increases
 - Decreases
 - Remain same
 - Becomes negative
- Two discs A and B are on inclined plane. A is rolling without slipping while B slips down. What relation defines their kinetic energy?
 - $KE_A > KE_B$
 - $KE_A < KE_B$
 - $KE_A = KE_B$
 - $KE_A = KE_B = 0$
- The period of oscillation of mass M suspended from spring is 2sec. What will be the period of mass that is equal to 4M?
 - 1sec
 - 2sec
 - 4sec
 - 8sec
- Which variable quantity must be known in order to find work done in adiabatic process?
 - Temperature
 - Pressure
 - Volume
 - Both b) and c)
- Which of the following condition is true for isothermal process?
 - $dQ = 0$
 - $dW = 0$
 - $dT = 0$
 - $dV = 0$
- A gas compressed in cylinder, velocity of sound in that compressed gas will
 - Decrease
 - increase
 - Equal
 - Sound can't be heard

- Two coherent source will emit light with
 - Same velocity
 - Same intensity
 - Same wavelength
 - Same frequency with constant phase
- The neutral temperature of thermocouple is 160°C , its emf change sign at 500K , then the cold junction will be
 - 93°C
 - 73°C
 - 67°C
 - 27°C
- A magnetic needle is kept in a non-uniform magnetic field, it experiences
 - A force and torque
 - No force but only torque
 - No torque but only force
 - Neither force nor torque
- In a P type semiconductor, the impurity will
 - Donate an electron
 - Donate a hole
 - Take electron from valence band
 - Take hole from valence band
- The time taken to reduce substance ($\frac{1}{8}$) th of its original value is 6 days. The half-life is
 - 2 days
 - 12 Days
 - $\frac{2}{3}$ days
 - 4 days

Group B (8×5=40)

- Define angular momentum. Write down its formula. [1]
 - Derive equation for moment of inertia of thin rod about its end. [2]
 - A ballet dancer spins about a vertical axis at 1rev/s with her arm stretched. With her arms folded, her moment of inertia decreases by 40%, calculate new rate of rotation. [2]
- Derive expression for total mechanical energy of a particle executing SHM to be $E = \frac{1}{2}m\omega^2A^2$. [3]
 - A body is vibrating with simple harmonic motion of amplitude 15cm and frequency 4Hz. Calculate maximum value of acceleration and velocity. [2]

Physics (2011) Set 'B'

14. a) What is isothermal expansion? [1]
 b) Establish relation between c_p and c_v . [2]
 c) A type burst out in hot summer day. Explain about the change and thermodynamic process taking place for air inside type. [2]
15. a) What is stationary wave? [1]
 b) Why frequency is considered as fundamental property of wave? [2]
 c) Calculate wavelength of sound wave in air at 25°C if the frequency of sound is 256Hz and velocity is 330m/s at 0°C . [2]
16. a) What is Joule's law of heating? Write its formula. [1]
 b) What s cause of Seebeck's effect? [2]
 c) In a thermocouple, the temperature of cold junction is 25°C and the neutral temperature is 543K. What is value of temperature of inversion? [2]
17. a) State Kirchhoff's voltage law. [1]
 b) Draw and explain about determination of internal resistance of cell using potentiometer. [3]
 c) How can galvanometer be used as ammeter? [1]
18. a) Define barrier potential. [1]
 b) Draw and write about rectification of AC into DC using bridge rectifier. [3]
 c) Write down symbol and truth table for NOT gate. [1]
19. a) What is decay constant? [1]
 b) Establish relation between decay constant and half-life. [2]
 c) A radioactive substance contain 10^{12} atoms. The half-life of material is 40days. Calculate rate of disintegration. [2]

Physics (2011) Set 'B'**Group C (3×8=24)**

20. a) Prove law of refraction using Huygens ' Principle? [3]
 b) Derive the conditions for constructive and destructive interference. [3]
 c) Two independent sources never coherent why? [2]
21. a) Write down formula for force on current carrying conductor in magnetic field and write how to find direction of force. [1]
 b) What is Hall effect? Write down its application. [2]
 c) Find magnetic field inside a solenoid using Ampere's law. [3]
 d) A wire carrying current 10A and 2m in length is placed in a magnetic field of flux density 0.34T. What is the force on the wire if it is placed at 60° to the direction of field? [2]
22. a) What is formula to find time period of an electron moving perpendicular to the magnetic field? [1]
 b) Show that motion of electron in electric field is parabolic. [3]
 c) Derive Einstein's equation for photoelectric emission. [2]
 d) In a Thompson's experiment, voltage across the plate is 50V and the distance between them is 3cm. The magnetic field applied to make beam undeflected is 10^{-4}T . What is velocity of electron passing through the plate? [2]