Your Roll No. ....

①

Sr. No. of Question Paper : 2585

IC

Unique Paper Code : 32177906

Name of the Paper : Polymer Chemistry

Name of the Course : **B.Sc. (P), DSE-3B**

Semester : VI

Duration : 3 Hours   Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.

2. Attempt **six** questions in all.

3. Question **1** is compulsory.

1. (a) How can you determine molecular weight of a polymer by viscosity method?

   (b) How tacticity of polymer define its physical property?

   (c) Write the structure of repeating units in

   (i) Polyvinyl alcohol

P.T.O.

(ii) Polyethylene oxide
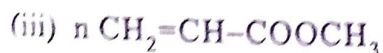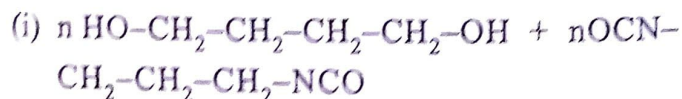
(iii) Polyisoprene

(d) What is butyl rubber?

(e) Give two example of conducting polymer with structure.   (5,3,3,2,2)

2. (a) Show the steps of polymerization of styrene initiated by $BF_3 + H_2O$ and discuss the kinetics of polymerization.

    (b) What is the role of inhibitor in free radical polymerization? Explain.

    (c) Give one example each for the initiators for anionic and radical polymerization.   (8,2,2)

3. (a) Write down the structure of polymer obtained from the reaction of following monomers and also name the preferred mechanism for the reaction :

    (i) n $HO-CH_2-CH_2-CH_2-CH_2-OH$ + nOCN– $CH_2-CH_2-CH_2-NCO$

    (ii) n $ClOC-(CH_2)_5-COCl$ + n $NH_2-(CH_2)_6-NH_2$

    (iii) n $CH_2=CH-COOCH_3$

    (b) Compare bulk and solution polymerization technique by giving examples.

    (c) Write down the structure of alternating and block copolymer obtained from the monomers, acryamide and acrylonitrile.   (6,4,2)

4. (a) The following data were obtained in the determination of average molecular weight of a polymer. Calculate

Molecular Weight	Weight (g)
80,000	1.0
50,000	3.0
30,000	5.0
10,000	6.0

    (i) Number average molecular weight, M_n

    (ii) Weight average molecular weight, M_w.

    (iii) Polydispersity index (PDI) of the polymer?

    (b) Briefly describe Membrane osmometry method for determining number average molecular weight.

OR

Discuss the light scattering method for the determination of molar masses of polymers.   (6,6)

5.   (a) Explain with reaction how do polyethylene produced using Ziegler-natta catalyst differ from polyethylene produced using free radical initiators.

    (b) Write the synthesis of polymer uses as nonstick coating.

    (c) What is meant by a living polymer?   (8,2,2)

6.   (a) Explain with a flow chart, how does polymer industry works?

    (b) Discuss the dissolution process of a polymer in solvents.

    (c) Differentiate between Tg, Tm and Tc of polymers.   (5,4,3)

7.   Explain the following (**any three**)

    (a) Critical solution temperature.

    (b) Flory-Huggins theory

    (c) Bakelite

    (d) Discuss the harmful effect of polymer in day to day life.   (4,4,4)

[This question paper contains 6 printed pages.]

Your Roll No...............

Sr. No. of Question Paper : 2589

Unique Paper Code : 42177926

Name of the Paper : Organometallics, Bioinorganic Chemistry, Polynuclear Hydrocarbon and UV, IR Spectroscopy

Name of the Course : **B.Sc. (Prog.) : DSE-3B**

Semester : VI

Duration : 3 Hours   Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.

2. Attempt any **three** questions from **Section A** and **Section B**.

3. Attempt **Section A** and **Section B** in separate answer sheets.

SECTION A
(Inorganic chemistry)
Attempt any **three** *questions.*

1. (a) Write an essential feature for a compound to be termed as Organometallic Compound. How are

P.T.O.

Organometallic Compounds classified on the basis of bonding? Give one example of each type.

(b) What happens when; (give balanced chemical equation)

    (i) $CoCl_2$ is treated with $NaNO_2$ in presence of acetic acid.

    (ii) $K_4Fe(CN)_6$ reacts with $FeCl_3$.

(c) Define following terms with one example each :

    (i) Essential metal ions

    (ii) Trace metals

    (iii) Non – essential metal ions   (4,4,4.5)

2. (a) Account for the following :

    (i) Manganese does not form a stable mononuclear carbonyl while nickel tetracarbonyl is stable.

    (ii) IR stretching frequency of C-O bond is different in terminal and bridging carbonyls.

(b) Describe the method of preparation of sodim nitroprusside. What is the oxidation state of iron in it? Give one use of sodium nitroprusside.

(c) Give a diagrammatic representation of sodium potassium pump and explain its working. Why is the pump considered to be a case of active transport?   (4,4,4.5)

3. (a) What do you understand by the term "Hapticity"? Give an example where same ligand shows varying hapticity. Give the structure of ferrocene and methyl lithium.

(b) When an aqueous solution of KOH is added to orange red solution of compound A, a yellow coloured solution is obtained due to the formation of compound B. On acidifying it with H_2SO_4, the yellow colour of the solution changes to orange red again. Identify the compound A and B and give the chemical reactions involved.

(c) What changes occur in the heme group of haemoglobin on going from deoxy to oxy form? How heme-heme interaction favours oxygen carrying capacity of hemoglobin?   (4,4,4.5)

4. (a) Predict the stability of the following according to Effective Atomic No. rule :

P.T.O.

(i) $Cr(C_6H_6)(CO)_3$

(ii) $[Co(CO)_4]^-$

(iii) $Mn(\eta^5\text{-}C_5H_5)(CO)_3$

(iv) Fe_2CO_9
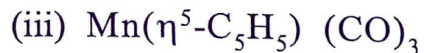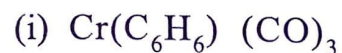
(b) Discuss iron storage and transportation by ferritin and transferrin.

(c) Using molecular orbital diagram of carbon monoxide molecule, how would you explain the following :

    (i) CO molecule acts as electron pair donor through Carbon atom and not through oxygen atom

    (ii) CO is referred as pi-acceptor ligand.
                               (4,4,4.5)

SECTION B

(Organic Chemistry)

Attempt any **three** *questions.*

1. (a) Bond distance between C_1-C_9 (1.365A°) is shorter than C_2-C_3 (1.404 A°) in naphthalene, Why?

(b) Explain difference between bathochromic shift and hypochromic shift.

(c) The electrophilic substitution occurs preferentially at C-2 position in furan. Explain. (4,4,4.5)
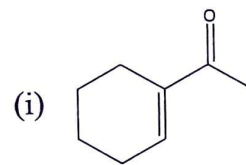
2. Explain the following :

(a) Pyridine is more basic than pyrrole.

(b) Anthracene undergoes electrophilic substitution reactions preferentially at C-9 and C-10 positions.

(c) Nucleophilic substitution takes place more readily in pyridine as compared to benzene? (4,4,4.5)

3. Calculate λ_{max} for the following compounds :

(i)

(ii)

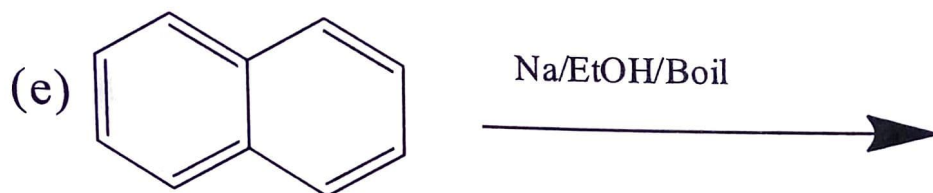Base value for the above compounds is 215 nm.
                                 (8,4.5)

4.   Complete the following reactions :   (2.5 x 5)

(a) + (CH₃CO)₂O $\xrightarrow[\text{O °C}]{\text{BF}_3}$

(b) + $\longrightarrow$

(c) $\xrightarrow{\text{O}_2\text{-V}_2\text{O}_5/\ 450\ °C}$

(d) + CHCl₃ $\xrightarrow{\text{KOH}}$

(e) $\xrightarrow{\text{Na/EtOH/Boil}}$
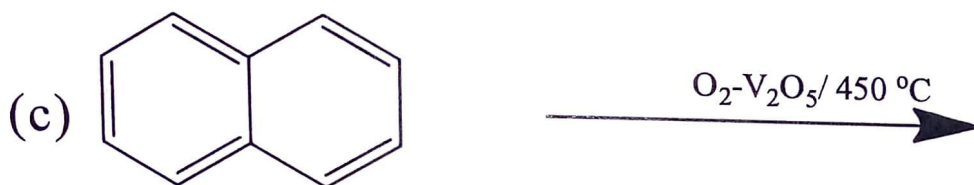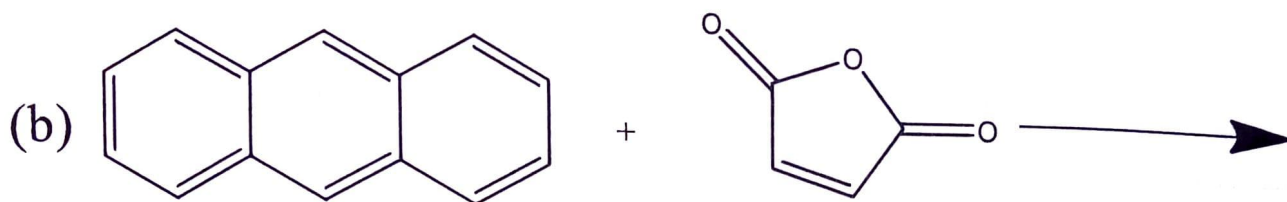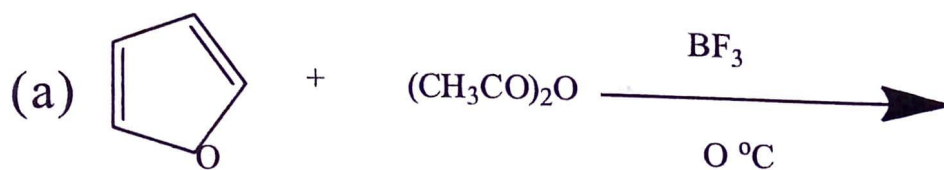
[This question paper contains 4 printed pages.]

③

Your Roll No...............

Sr. No. of Question Paper : 2610

Unique Paper Code   : 42227637

Name of the Paper   : Solid State Physics

Name of the Course   : **B.Sc. (Prog.) : DSE-3B**

Semester   : VI

Duration : 3 Hours   Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.

2. Attempt any **five** questions.

3. Question No. **1** is compulsory.

1. Attempt any **five** of the following :   (5×3=15)

   (a) List three differences between amorphous and crystalline solids with one example of each.

   (b) Show that reciprocal lattice vector $\vec{G}_{hkl}$ is normal to the plane (hkl).

   (c) Calculate Einstein's frequency for copper having Einstein's temperature θ_E = 230K.

P.T.O.

(d) What are phonons? Differentiate between acoustical and optical phonons.

(e) Explain Meissner effect with the help of a diagram.

(f) What do you understand by the term 'Domains'? Why do large number of domains exist in a ferromagnetic material?

(g) Distinguish between Conductors, Semiconductors and Metals on the basis of E-K curve.

(h) What are plasmons?

2. (a) What are Miller Indices? How are they defined for a plane? Name the six faces of a unit cube in terms of Miller Indices.   (3)

(b) Derive Bragg's Law and express it in terms of Reciprocal lattice vector $\vec{G}$.   (7)

(c) Show that Reciprocal Lattice of a bcc is fcc.   (5)

3. (a) Derive the dispersion relation for a linear monoatomic lattice and discuss under what conditions it can act as a 'low pass filter'.   (10)

(b) Why did the classical theory of specific heat fail to explain the behaviour of solids at low temperature? How did Einstein overcome this difficulty?   (5)

4. (a) What are the characteristics of Diamagnetic materials? Derive an expression for diamagnetic susceptibility on the basis of classical theory.   (3,5)

(b) Show that the area enclosed by B-H curve represents the energy loss per cycle.   (5)

(c) A magnetic substance has 10^{28} atoms/m^3. The magnetic moment of each atom is 1.8×10^{-23} Am^2. Calculate the paramagnetic susceptibility at 300 K.   (2)

5. (a) Explain the three types of polarizabilities.   (5)

(b) Derive an expression for electronic polarizability in a time varying field.   (10)

6. (a) Give a detailed account of Kronig-Penny Model. How did it lead to formation of energy bands in solids?   (10)

(b) Discuss three types of E-K zone-schemes and representing them diagrammatically. (5)

7. (a) What is Superconductivity? Give 4 applications of superconductors. (6)

    (b) With the help of diagram discuss Type I and Type II superconductor. (5)

    (c) What is the effect of magnetic field on critical temperature of a superconductor? (4)

Values of constants

h = 6.6 × 10^{-34} J-s

k = 1.38 × 10^{-23} J/K

This question paper contains **4+2** printed pages]

Roll No.

S. No. of Question Paper : **8884**　　　　　④

Unique Paper Code : **32177904**　　　　　　**HC**

Name of the Paper : Analytical Methods in Chemistry

Name of the Course : **B.Sc. (H) Chemistry/B.Sc. (Prog.)**

　　　　　　　　　　　DSE-3B

Semester　　　　　　　: **VI**

Duration : **3 Hours**　　　　　　　　　Maximum Marks : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Log tables to be provided to the candidates.

Use of scientific calculator is allowed.

Attempt any *six* questions in all including

Q. No. **1** which is compulsory.

1.　Attempt any *five* of the following :　　　5×3=15

　(*a*)　Explain the types of interferences generally produced in atomic absorption spectroscopy (AAS).

　(*b*)　Discuss the various equilibrium processes involved in the solvent extraction of metal ions by solvation.

(c) What is the object of sampling in an analysis ? Explain the procedure of obtaining a representative sample of solids.

(d) State Beer's law. What are the factors responsible for the deviation of this law ?

(e) Discuss redox potentiometric titration with the help of a suitable example.

(f) Explain the basic principle involved in thermogravimetric analysis.

2. (a) Describe analytical applications of Thermogravimetry. Draw a labelled diagram of thermobalance and describe its major components.

(b) Derive the following :

$$M_n = M \left[\frac{V}{DS + V} \right]^n$$

Where V mL of the aqueous solution containing M g of the solute is extracted with S mL of the organic solvent. M_n g solute remains in the aqueous layer after the nth extraction. D is the distribution ratio.

(c) Does a large K_D means a high or low retention of the solute to an ion exchange resin ? Justify your answer.　　　　3×4=12

3. Write short notes on any three of the following :

(a) Significant figures and propagation of error

(b) Column efficiency

(c) Electroanalytical methods

(d) Monochromators.　　　　3×4=12

4. (a) Discuss frontal and elution methods of development of chromatograms.

(b) Explain the various processes involved in flame emission spectroscopy (FES). Discuss choice of flame and burner designs used in AAS and FES.

(c) The absorbance of a 0.0001M solution of a complex is found to be 0.312 at 592 nm. What is the molar absorptivity if the path length is 1.0 cm ?　　3×4=12

5. (a) What are the various oxidants used in AAS ? How does the combination of fuel gases and oxidants affect flame-temperature ?

(b) What are the various ways of expressing accuracy and precision ?

(c) Suggest the effect on plate height (H) if each of the following changes were incorporated into a column chromatographic experiment :

(i) An increase in flow rate

(ii) An increase in the diameter of the column

(iii) An increase in the column length

(iv) An increase in the temperature of the column. 3×4=12

6. Distinguish between the following :

(a) Determinate and indeterminate errors.

(b) Partition chromatography and adsorption chromatography.

(c) Differential thermal analysis (DTA) and differential scanning calorimetry (DSC). 3×4=12

7. (a) What do you mean by a mobile phase and a stationery phase in a chromatographic technique ? Explain with an example.

(b) The accuracy of a new method for analysis of Fe(III) is compared with the standard method. The results of % Fe(III) for each analysis are as follow :

New Method	Standard Method
20.10	18.89
20.50	19.20
18.65	19.00
19.25	19.70
19.99	19.40
19.40	

Is there a significant difference between the two methods ?

(The tabulated value of F and t are 6.26 and 2.262 respectively at 95% of confidence level).

(c) Give a schematic diagram of a glass electrode and explain its function. Why is the glass electrode stored in water ? 3×4=12

8.   (a)   Define the following terms and give the mathematical expression for each of the following :

(i)   Retardation factor

(ii)   Partition coefficient.

(b)   A solution containing 0.804 mg of solute per 100 mL of solvent gives a 40% transmittance in a 1 cm cell.

(i)   What is absorbance of solution ?

(ii)   What would be the absorbance and %T be if the solute was reduced to 0.402 mg of solute per 100 mL of solvent ?

(c)   184 mg of a sample of mixture of $MgCO_3$ and $CaCO_3$ is reduced to 160 mg when subjected to thermogravimetric analysis in the temperature range 480°C-640°C. Calculate the amounts of Mg and Ca in the sample.   4×3=12

Unique Paper Code   : **217683**

Name of Paper   : **EL- 310 (ii) : Polymer Science**

Name of the course : **B.Sc. (Prog.): Applied Physical Sciences**

Semester   : **VI**

Duration   : **3 hours**

Maximum Marks   : **75 Marks**

Instructions for Candidates

Write your roll no. on the top immediately after receipt of this question paper.

*Attempt **six** questions in all*

Question no. 1 is compulsory

Question 1:

(A) Differentiate between the following types of polymers: 2 X 3

(i)   Thermoplastic and thermosetting

(ii)   Addition polymers and condensation polymers

(B) Give the chemical representation and important uses of the following polymers: 3 X 2

(i) Nylon-6, 6

(ii) Bakelite

(iii) PVC

(C) What do you understand by functionality for polymer formation?   3

Question 2:

(A) How will you prepare Low Density Polyethylene and High Density Polyethylene? Give their properties as well their uses?   4, 2. 2

(B) What are Ziegler-Natta catalysis? Write their advantages.   2, 2

Question 3:

(A) Show that benzoyl peroxide initiation of styrene for polystyrene formation follows the below given kinetic scheme:

$$R_p = K_p (K_d/K_t)^{1/2} (f [I])^{1/2} [M]$$
                                                                                                8

(A) The polymerization between equimolar amount of diol and diacid proceeds with the 0.892 extent of reaction (p). What will be the degree of polymerization if the reaction is carried out in a closed system without the removal of the byproduct water?   4

Question 4:

(A) Define Glass Transition Temperature (Tg) of polymer.   2

(B) Describe the Free Volume Theory for the determination of Tg of polymer.   5

(C) Discuss the factor affecting Tg.   5

Question 5:

(A) Discuss the weight average molecular weight (Mw) in case of polymers.   2

(B) Briefly describe the determination of molecular weight by viscometric method.   6

(A) Differentiate between Novalack resin and Bakelite.   4

Question 6:

(A) What is crystalline melting point? What are the factors affecting it?   6

(B) Give important uses of Teflon   4

(A) Explain the conditions for the polymer to be soluble in a particular solvent.   2

Question 7:

(A) Describe Flory-Huggins theory and its relevance in case of polymers.   6

(B) Give preparation of polyacetylene and its use.   3, 3

Question 8: Write short note on any *three* of the following: 3 X 4

(A) Silicone polymers

(B) Polydispersity Index

(C) Upper critical solution temperature

(2)

(D) Application of polystyrene

Unique paper code : 217663 (ICPT-606)
Name of the paper : Instrumental Methods of Analysis
Name of the Course : B.Sc. Applied Physical Sciences Ind. Chem.
Semester : VI   I
Duration : 3 hours
Maximum marks : 75 Marks ⑥

Instructions: Attempt any five questions. Each question carries 15 marks.

Q.1 Explain the following: (any five)   (3x5=15)
 i. Vacuum distillation
 ii. Gas liquid chromatography (GLC)
 iii. Rheology
 iv. Solvent extraction process
 v. UV-spectroscopy
 vi. Conductometric titration

Q2 Write a short note on the following: (any five)   (3x5=15)
 i. Gas chromatography
 ii. Induced couple plasma (ICP) spectroscopy
 iii. ASTM standard
 iv. Coulometric titration
 v. Reduced and intrinsic viscosity
 vi. Nuclear magnetic resonance (NMR) spectroscopy

Q3 Differentiate the following: (5x3=15)
 i. Atomic absorption spectroscopy (AAS) and atomic fluorescence spectroscopy (AFS)
 ii. Thermal gravimetric analysis (TGA) and thermal mechanical analysis (TMA)
 iii. Amperometry and voltammetry

Q4 Answer the following: (5x3=15)
 i. How is differential scanning calorimetry (DSC) helpful in the characterization of polymers?
 ii. Why is high performance liquid chromatography (HPLC) preferred over column chromatography?
 iii. Explain the shearing forces of deformation.

Q5 Answer the following: (8.0, 5.0, 2.0) (8,5,2)
 i. Explain the instrumentation of electron spin resonance (ESR) spectroscopy.
 ii. Discuss the acid-base titration using potentiometer.
 iii. What do you mean by ISO standard?

Q6 Answer the following: (5.0, 3.0, 4.0, 3.0) (5,3,4,3)
 i. Explain the instrumentation of Infra-red spectrophotometer.
 ii. Describe BTS and ISI standards.
 iii. Explain the working of flame photometer.
 iv. Differential Thermal Analysis (DTA)

Roll No.

2019

Sr. No. of Question Paper : 3517

⑦

Unique Paper Code : 222663

Name of the Paper : **Solid State and Nuclear Physics (PHPT 606)**

Name of the Course : B.Sc. (Physical Sciences)- Old Semester System

Semester : **VI**

Duration: **3 Hours**

Maximum Marks: 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt any *five* questions.

All questions carry equal marks.

1. (a) What is reciprocal lattice? Find the reciprocal lattice vectors for

$$a = 5i, b = 5j, c = i + j + k \qquad [5]$$

(b) Define electric susceptibility. Derive the Clausius-Mossotti relation expressing the relationship between dielectric constant and atomic polarizability. [10]

2. (a) Explain Bragg's law for X-ray diffraction. Calculate the glancing angle of the (110) plane of a simple cubic crystal (a = 2.814 A°) corresponding to the second-order diffraction maximum for the X-rays of wavelength 0.710 A°. [7]

(b) Distinguish between the diamagnetic, paramagnetic, ferrimagnetic and ferromagnetic materials. Comment on the temperature variation of susceptibility for all these materials. [8]

3. (a) State Bloch theorem. Discuss qualitatively the motion of electrons in a periodic lattice and explain how it leads to the origin of the energy bands and the forbidden bands in solids. [10]

(b) Explain the difference between type I and type II superconductors using the Meissner effect. [5]

4. (a) What do you understand by the effective mass of an electron? Explain its significance. [5]

(b) Describe the Langevin's theory of paramagnetism and obtain an expression for paramagnetic susceptibility. [10]

①

5. (a) What is binding energy? Calculate the binding energy per nucleon for $^{20}_{10}Ne$. (Given: Mass of $^{20}_{10}Ne$ = 19.992 u, mass of neutron = 1.008665 u and mass of proton = 1.007825 u) [5]

(b) Establish the relationship between the half-life time and the decay constant. The half-life of a radioactive nucleus is 2.5 days. What percent of the original substance will have disintegrated in 7.5 days? [10]

6. (a) What are the features of α, β and γ decay? Explain with examples. [9]

(b) Differentiate between nuclear fission and fusion process with examples. [6]

7. (a) Derive the semiemperical binding energy mass formula for the liquid drop model. [10]

(b) Complete the following reactions: [5]

(i) $^{238}_{92}U \rightarrow ^{234}_{90}Th +$? ?

(ii) $^{234}_{90}Th \rightarrow ^{234}_{91}Pa +$? ? + ? ?

(iii) $^{22}_{11}Na \rightarrow ^{22}_{10}Ne +$? ? + ? ?

8. (a) Classify the elementary particles in reference to their spin, lepton numbers and baryon numbers. [10]

(b) What are quarks? Write down the quark structures for proton, neutron and π^+ meson. [5]

2

Unique Paper Code: 235666   ⑧

Name of the Paper: Mechanics and Discrete Mathematics (MAPT 606)

Name of the course: B.Sc. Physical Sciences (Prog)/ B-Sc. Math. Science

Semester: VI

Duration: 3 hrs.

Maximum marks: 75 marks

(Write your roll no on the top immediately on receipt of this question paper.)

Attempt any two parts from each question. All questions are compulsory. Marks are indicated.

Q1(a): A light ladder is supported on a rough floor and leans against a smooth wall. How far up the ladder can a man climb without slipping taking place?   **(8)**

Q1 (b)(i): Particles of weights 1 lb, 2 lb, 3 lb, 4 lb are placed at the angular points of square, whose each side is of 'a' ft. in length. Find the mass centre of the system of particles.   **(4)**

(ii) Equal forces P act at a point parallel to the sides of a triangle ABC taken in order the same way round. Prove that the resultant R is given by

$$R^2 = P^2(3 - 2\cos A - 2\cos B - 2\cos C).$$ **(4)**

Q1(c) Two weights, w_1 and w_2, rest on a rough plane inclined at an angle α to the horizon, being connected by a string which lies along the line of greatest slope. If μ_1, μ_2 are their cofficients of friction with the plane, and $\mu_1 > \tan \alpha > \mu_2$, if they are both on the point of slipping, prove that

$$\tan \alpha = \frac{\mu_1 w_1 + \mu_2 w_2}{w_1 + w_2}.$$ **(8)**

Q2(a): A gun is mounted on a hill of height h above a level plain. Show that, if the resistance of air is neglected, the greatest horizontal range for given muzzle velocity V is obtained by firing at an angle of elevation θ such that

$$\cot^2 \theta = 1 + \frac{2gh}{V^2}$$ **(8)**

Q2(b): Show that motion of simple pendulum is simple harmonic motion. Also find its time period.   **(8)**

Q2(c) If R is the horizontal range of a projectile, and h is its greatest height, prove that its initial speed is

$$\left[2g\left(h + \frac{R^2}{16h}\right)\right]^{1/2}$$

(8)

Q3. (a) Define complete graph. Using principle of mathematical induction prove that the number of edges in K_n is $\frac{n(n-1)}{2}$. Also draw the graph K_4 . (7)

Q3(b)(i):How many edges are there in a graph with 10 vertices each of degree 4. (3)

(ii): Prove that an undirected graph has an even number of vertices of odd degree. (4)

Q3(c) Find the number of subgraphs of C_3 with at least one vertex. (7)

Q4(a) Find out the number of paths of length 4 , from a to d in the following simple graph G, using adjacency matrix of it ? Identify all the paths too.
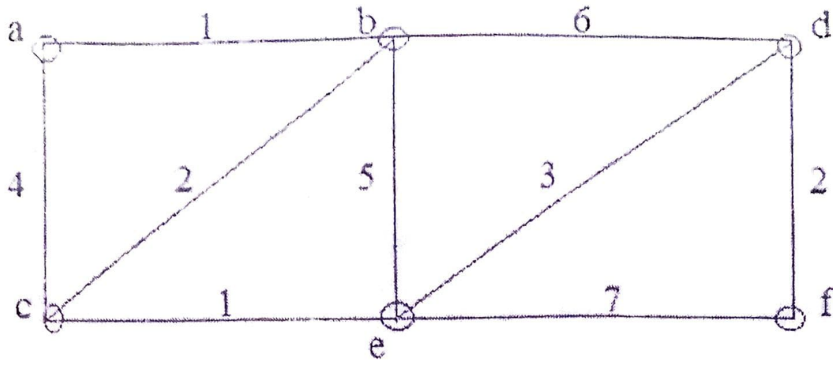

G
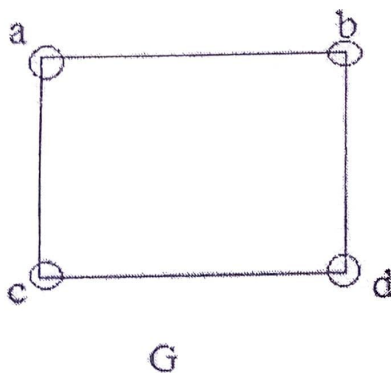
(7)

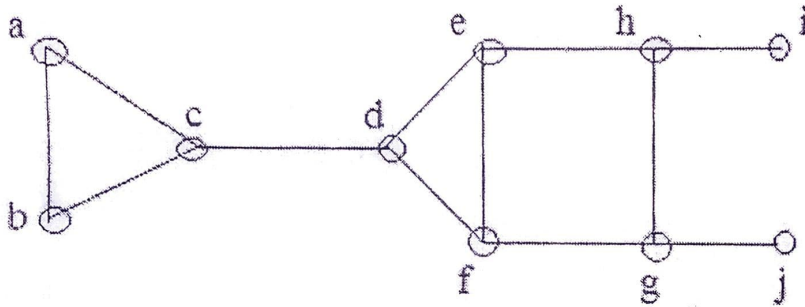4(b) Define Euler cycle. For what values of n, the following graphs have an Euler cycle.

(i) Complete graph K_n (ii) Cycle graph C_n (iii) Wheel graph W_n (7)

4(c) Find the length of shortest path between the vertices a and f in the following graph , using Dijkstra's algorithm:

(7)

Q5(a) Find out spanning tree rooted at d for the graph shown in following figure, using Breadth-first search.
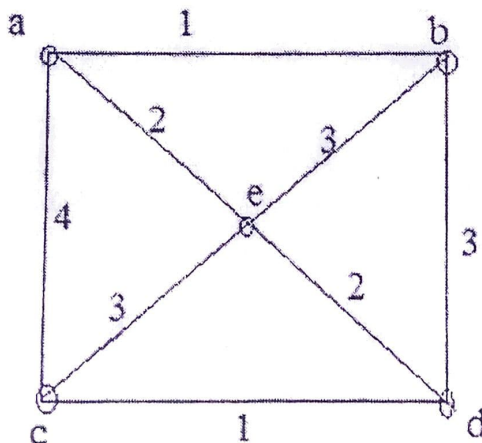

(7.5)

5(b) Prove that a graph T is a tree if and only if it has a unique path between every pair of its distinct vertices. (7.5)

5(c) Find out minimum spanning tree for the graph G, shown in following figure, using Kruskal's algorithm. Also find the total weight of the minimum spanning tree.

(7.5)

③

Unique paper code :222665

Name o. the Course :B.Sc.Physical Science/Old Semester System (prog)

I

Name Of The Paper :Communication Electronics

Semester :VI

Duration :3 Hours   Maximum Marks: 75

Instruction for the candidates

1-Write your Roll no. on the top of the paper

2-Attempt any five questions

3-All question carries equal marks

Q1(a) Define amplitude modulation and modulation index. Derive the expression for the total power contained in amplitude modulated wave.   (8)

(b) Find the DC component and first eight harmonics for the given square wave of amplitude 2 A and time period 2ms represented by fourier series.

$$i(t) = \frac{4I}{\pi} \left(sin\omega t + \frac{1}{3} sin3\omega t + \frac{1}{5} sin5\omega t + \cdots \right)$$ (7)

Q2 (a) Describe the collector modulator circuit for generation of amplitude modulated wave.   (12)

(b) The total power content of DSBSC- AM signal is 600W at modulation index 40%. Determine the power contained in the sidebands if modulation index is increased to 60%?(3)

Q3 (a) What is frequency modulation? Establish the equivalence between Frequency and phase modulated wave.   (6)

(b) Explain the generation of Frequency modulated wave using varactor diode ckt. circuit   (9)

Q4. Describe the working of Foster Seeley Discriminator.   (4)

Q5 (a) State and prove sampling theorem. What is Nyquist criteria?.   (8)
What is quantization in Explain coding in PCM System
(b) What is quantization & Explain coding in PCM system.   (7)

Q6. (a). What do you understand by satellite communication? Calculate the height of geostationary satellite from the earth's ground level.   (8)

(b) Draw the satellite system block diagram for downlink and explain its various stages. (7)

Q7 (a) What is the principle of light propagation in optical fiber? Derive the expression for acceptance angle. (8)

(7)

(b). Define FSK. Give the block diagram of FSK transmitter.

(7.5.7.5)

Q8. Write short note any two

With the help of suitable diagrams explain the working

(a) Superhetrodyne receiver

(b) Explain the Frequency re use in cellular network .

(c) Generation of SSB AM using third method

(d) FDM

(10)

Unique Paper Code	:	234663
Name of the Paper	:	Multimedia Systems & Applications
Name of the Course	:	B.Sc Physical Science (CSPT-602)
Semester	:	Semester-VI
Duration of Examination	:	Three Hours
Max. Marks	:	75

Instructions for the candidates:

1) The paper has **two** sections. All questions in 'Section A' are compulsory.
2) Attempt **any five** questions from 'Section B'.
3) Parts of a question must be answered together.

SECTION A

Q1. a) HTML and DHTML web pages or sites are generally viewed using _____. [1]

b) A _____ is a simple matrix of the tiny dots that form an image. [1]

c) MIDI stands for _____. [1]

d) Audio recorded at 44.1 kHz, 16-bit stereo is considered _____ quality. [1]

e) What do you mean by PNG ? [1]

f) How authoring software differs from editing software? [2]

g) Briefly explain : [2X5=10]

   i.   Morphing

   ii. HSB color Model

   iii. Color Palette

   iv. 2D animation technique

   v. Virtual Reality

h) Explain the functioning of a Scanner. [2]

i) Differentiate between: [3x2=6]

   i.   GIF and JPEG

   ii. LCD and CRT monitors

SECTION B

Q2) a) Define Multimedia. What is the difference between a multimedia application and a conventional approach? [5]

b) What is authoring? Explain different types of authoring tools. [5]

Q3) a) What is Digital Audio? How is it created and how does it differ from MIDI ? [6]

b) Explain any two CD standards. [4]

②

Q4) a) What is Compression? What benefits are offered by compression schemes in designing multimedia system. [5]

b) Explain Dithering. Why is it required? [5]

Q5) a) Briefly describe various MPEG standards and the reason of their evolution. [6]

b) Compare RGB and CMYK color models. [4]

Q6) Briefly explain : [10]

a) Various audio file formats.

b) Different storage devices for a multimedia application.

Q7) a) Differentiate between : [6]
   i. HTML and DHTML
   ii. Hypertext and Hypermedia

b) Explain any four methods for searching words in hypermedia systems. [4]

Q8) a) List any four features of a 3-D modelling tool. [4]

b) Describe the stages of a multimedia project. [6]