

Use separate answer
scripts for each group

B.Sc. (Honours) Examination, 2019

Semester-VI

Chemistry (Honours)

Course: BCHE-61

Time: Three Hours

Full Marks: 40

Questions are of value as indicated in the margin.

Answer *any two* Groups.

Group-A

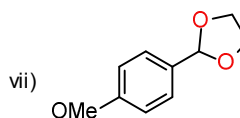
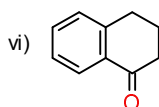
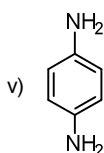
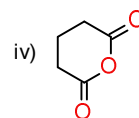
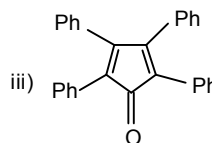
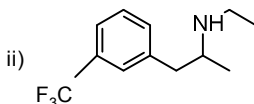
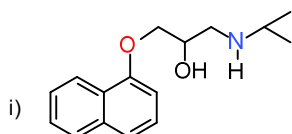
Answer *any two* questions.

1. Answer *any four* questions: 4x2.5
 - a) How are corannulene and pyracilene units of C_{60} different from their molecular form?
 - b) What is carbon nanotube? Mention different types of carbon nanotubes? Which one of (9,0) and (10,0) nanotubes is semiconducting and why?
 - c) What do you mean by organic-inorganic hybrid materials? Compare class-I and class-II hybrids.
 - d) Briefly discuss the effect of particle size on band gap of the semiconductor nanoparticles.
 - e) The electrical conductivity of mesoporous indium tin oxide is 10^3 order less than the bulk counterpart: why?
2. Answer *any four* questions: 4x2.5
 - a) Mention different factors which affect surface plasmon resonance band.
 - b) What are exciton and exciton Bohr radius?
 - c) What is Kubo gap? Nanoscopic amount of a metal may behave as a semiconductor or an insulator: Justify the statement.
 - d) What is Kasha's rule? What do you mean by band edge fluorescent emission?
 - e) Compare the defect luminescence and the band edge luminescence.
3. Answer *any four* questions: 4x2.5
 - a) What is Ballistic electrical conductivity?
 - b) Briefly describe template based synthesis of a microporous material.
 - c) What is superparamagnet? How does it differ from a paramagnet?
 - d) Define different terms involved in the expression $\tau = \tau_0 \cdot \exp(K.V/k_B T)$ and mention their physical significance.
 - e) Compare scanning and tunnelling electron microscopy.

Group-B

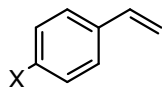
Answer *any two* questions.

1. Write down the possible retrosynthetic pathway of the following molecules to reach a suitable starting materials and outline their forward synthesis (*any four*): 4x2.5



P.T.O.

2. a) Write the boiling point range and chemical composition of petrol and diesel. 4x0.5
 b) Define the term co-polymer. Mention the types of co-polymers when the one monomer is A and the other is B. 0.5+1.5
 c) Arrange the substituted styrenes in order of their decreasing rate of cationic chain polymerisation. 2



X=CH₃, H, OCH₃, Cl

- d) What is fire retarding polymer? Give one example. 1+1
 e) Outline the synthesis of Nylon-66 with necessary chemical equations. 2
3. a) What is the differences between soap and detergents? 2
 b) What is flash point of liquid fuel? What is its significance? 1+1
 c) What is the basic structural difference between HDPE and LDPE? 1
 d) Outline the synthesize of the following molecules with proper retrosynthetic pathway (*any two*): 2x2.5

