

B.E. PRINTING ENGINEERING SECOND YEAR SECOND SEMESTER – 2019

PRINTING MATERIAL SCIENCE- II

Time: Three Hours

Full Marks: 100

Answer from all the groups

GROUP – A

Answer any two questions

20 X 2= 40

1. (a) Write the difference between Thermoplastic and Thermosetting polymers. Give an example of this two above mentioned polymers with their applications. 4+4
- (b) Explain the Geometrical Isomerism molecular configuration of polymers. 2
- (c) Compute the percent crystallinity of a branched polyethylene that has a density of 0.925 g/cm^3 . Density for the totally amorphous material is 0.870 g/cm^3 . Density of totally crystalline polyethylene is 0.998 g/cm^3 . 5
- (d) Explain the Spherulite Structure of semicrystalline polymer. 3
- (e) What is Block and Graft Co-polymer? 2

2. (a) Briefly describe Laminar Composites. What is the prime reason fabricating these material? 5
- (b) How fiber orientation and concentration influence the strength properties of fiber-reinforced composites? 5
- (c) What is the distinction between matrix and dispersed phase in a composite material? 2
- (d) List four reasons why glass fibers are most commonly used for reinforcement. 4
- (e) Derive the elastic modulus for fiber-reinforced composites. 4

3. (a) Explain the molecular shape of polymer chain 3
- (b) What are the defects occurs in polymer crystallites? 3
- (c) Explain the deformation of elastomer. 5
- (d) Briefly explain the sandwich panel composite. 5
- (e) Explain the passivity phenomenon. 4

[Turn over]

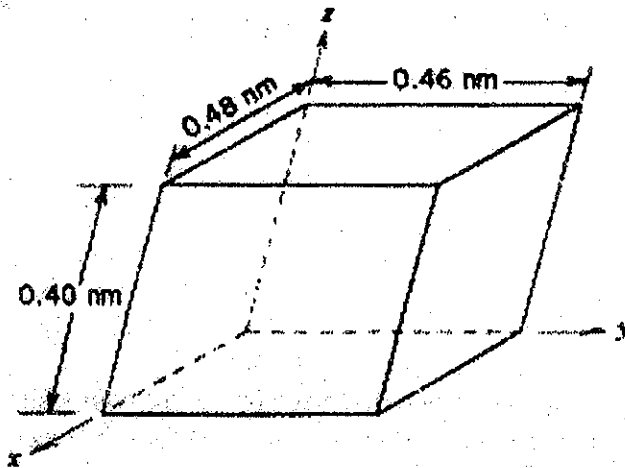
(2)

4. (a) What are the different types of polymer additives used? Explain Briefly. 6
(b) Write the difference between Addition polymerization and Condensation polymerization. 3
(c) Write short notes on Liquid Crystal Polymers. 5
(d) Which factors influence the Glass Transition Temperature? 4
(e) What are the criteria that must be met for a polymer to be elastomeric? 2

GROUP - B

20

5. (a) Calculate the volume of an FCC unit cell in terms of the atomic radius R. Derive the Atomic Packing Factor (APF) for the same. 6
(b) What is meant by Co-ordination Number in crystal structure? 2
(c) Derive Bragg's Law used for crystal structure determination. 4
(d) Copper has an atomic radius of 0.128nm, an FCC crystal structure, and an atomic weight of 63.5g/mol. Compute its theoretical density. 4
(e) What is polymorphism and allotropy? 1
(f) For the unit cell shown in the sketch, locate the point having co-ordinates $\frac{1}{4} 1 \frac{1}{2}$ 3



GROUP - C

20

6. (a) One-half of an electrochemical cell consists of a pure nickel electrode in a solution of Ni^{2+} ions, the other half is Cadmium electrode immersed in a Cd^{2+} solution. If the cell is standard one, write the spontaneous overall reaction and calculate the voltage that is generated. The half-cell potential of cadmium and nickel are respectively, -0.403 and -0.200 V. 4

[Turn over]

(3)

- (b) What is Corrosion Penetration Rate (CPR)? Derive the equation. 2
- (c) Explain the activation polarization. 5
- (d) How galvanic corrosion can be reduced? 4
- (e) Explain the Cathodic Protection corrosion prevention mechanism. 5

GROUP - D

Answer any one question

20 X 1 = 20

7. Write short notes on: (any four)

5 X 4 = 20

- (a) Pultrusion
- (b) Pitting
- (c) Filament winding
- (d) Injection molding
- (e) Extrusion molding
- (f) Spinning

8. (a) Explain the viscoelastic behavior of polymer. How stress-relaxation measurement is used to measure this behavior. 8
- (b) Explain briefly the Drawing process of polymer. 5
- (c) Which factors influence the mechanical properties of semicrystalline polymers? Explain briefly. 5
- (d) What is Vulcanization process? 2