

CENTRAL INSTITUTE OF PETROCHEMICALS ENGINEERING & TECHNOLOGY
HEAD OFFICE : GUINDY, CHENNAI – 600 032.
ACADEMIC CELL
THIRD SEMESTER EXAMINATION – JANUARY - 2023

Duration : 3 Hours
 Course : DPT
 Subject : Polymer Science & Engineering

Max. Marks: 60
 Date : 09.01.2023
 Time : 10.00 a.m. to 01.00 p.m.

(DO NOT CHANGE SEQUENCE OF QUESTION NUMBER IN ANSWER SCRIPT)

PART – A

Answer all questions

30 x 1 = 30

1. Example of semisynthetic polymer
 (a) Polystyrene (b) Cellulose acetate (c) Cellulose (d) None of these
2. The minimum functionality of a monomer that can be converted into polymer is _____.
 (a) 1 (b) 3 (c) 2 (d) 4
3. ABABABABABABABABA type copolymer is a
 (a) Alternating copolymer (b) Graft copolymer (c) Block copolymer (d) Random copolymer
4. Polyester is prepared by which type of polymerization method
 (a) Addition (b) Coordination (c) Condensation (d) None of these
5. Addition polymerization is initiated by
 (a) Free radical initiator (b) Anionic initiator (c) Cationic initiator (d) All the above
6. The suspension polymerization system contains
 (a) Monomer, initiator and water (b) Monomer, initiator and accelerator
 (c) Monomer, initiator and catalyst (d) None of these
7. In bulk polymerization technique viscosity of the system
 (a) Increases (b) Decreases (c) Not affected (d) None of these
8. Degree of crystallinity is generally determined using _____ technique
 (a) DMA (b) NMR (c) X-ray diffraction (d) Both a & b
9. Example for amorphous polymer
 (a) Polystyrene (b) Polypropylene (c) Nylon 6,6 (d) Polyacetal
10. Area under the stress-strain curve is the measure of
 (a) Tensile strength (b) Modulus (c) Toughness (d) Tear strength
11. Colligative property is used to determine which type molecular weight. of polymer
 (a) Weight average (b) Number average (c) z – Average (d) None of these
12. The Mark-Houwink equation is expressed as
 (a) $[\eta]=K/M^a$ (b) $[\eta]=M/K^a$ (c) $[\eta]=KM^a$ (d) $[\eta]=KM^2$
13. Which one of the following is not a macromolecule _____
 (a) Cellulose (b) Rubber (c) Protein (d) Wood
14. Which of the following plastics sink in float test?
 (a) PP (b) PVC (c) HDPE (d) UHMWPE
15. Filler content in glass filled Nylon is determined by
 (a) DSC (b) TGA (c) TMA (d) all the above
16. The PDI is a measure of _____.
17. Which Polymerization technique is known as pearl polymerization _____.
18. When the plasticizer is added to the polymers its T_g _____.
19. When a polymer is stretched to form a neck, this is called _____.
20. The Hildebrand solubility parameter is defined as _____.
21. Caprolactum is used to produce Nylon 6. Say true or false.
22. Polar polymers dissolve in polar solvents. Say true or false.
23. Styrene Acrylonitrile (SAN) is a copolymer. Say true or false.
24. TGA can be used for determining glass transition temperature. Say true or false.
25. Amorphous polymers are transparent. Say true or false.
26. Full form of AIBN is
27. Expand MFI
28. Full form of PDI is
29. Full form of CMC is
30. Expand PTFE

PART – B

Answer **all** questions (Max. 40 words)

4 x 2 = 8

1. Define Critical micelle concentration in emulsion polymerization.
2. Why molecular weight of polymers is expressed as average value?
3. Write the general rules of polymer solubility?
4. What is the difference between initiators and inhibitors in polymerization?

PART – C

Answer any **four** questions (Max. 100 words)

4 x 3 = 12

1. What is the difference between isotactic, syndiotactic and atactic polymers?
2. Draw the structure of monomer and repeating unit of polypropylene and polystyrene.
3. Calculate the weight average molecular weight of polyethylene with degree of polymerization 10000.
4. Why anionic polymerization is known as living polymerization?
5. What is the difference between Newtonian and non-newtonian fluids?

PART – D

Answer any **two** questions (Max. 300 words)

2 x 5 = 10

1. Explain the Solution polymerization technique. Mention its advantages and disadvantages.
2. Write down short note on the following
 - a) Melt flow Index
 - b) Thermogravimetric analysis
3. Define T_g . What are the important factors that affect T_g ?

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HEAD OFFICE : GUINDY, CHENNAI – 600 032.
ACADEMIC CELL
THIRD SEMESTER EXAMINATION – JANUARY - 2023

Duration : 3 Hours
 Course : DPT
 Subject : Plastics Materials-I

Max. Marks: 60
 Date : 10.01.2023
 Time : 10.00 a.m. to 01.00 p.m.

(DO NOT CHANGE SEQUENCE OF QUESTION NUMBER IN ANSWER SCRIPT)

PART – A

Answer **all** questions

30 x 1 = 30

1. Lustrex, Dylene, Fostarene are the trade name of
 a. PP b. PE c. ABS d. PS
2. The B part of ABS is responsible for increase
 a. Clarity b. Impact Strength c. Hardness d. None of these
3. How many reactive sites are present in ethylene monomer?
 a. 1 b. 2 c. 3 d. 4
4. Which one of the following is a natural Polymer?
 (a) Shellac (b) Teflon (c) PPO (d) PP
5. Conventional LDPE is Manufacturing by which of the following process
 a. High Pressure reactor b. Low Pressure reactor c. Autoclave reactor d. None of these
6. Out of the following select the Amorphous Polymer
 a. PP b. PC c. HDPE d. None of these
7. Out of the following materials which form atactic Polymer.
 a. HDPE b. Nylon c. PC d. PP
8. Which of the following material used for making artificial hip joint?
 a. PS b. PP c. UHMWHDPE d. None
9. Polyamide is manufactured by which of the following process
 a. Melt poly condensation b. Condensation c. Addition d. None of these
10. Which one of the following material is used for making Magnetic recording tape?
 a. PET b. PS c. PMMA d. None
11. Novolaks are crosslinked by using
 a. Hexa b. amines c. anhydrides d. Melamine
12. Which of the following exhibit elasticity and exceptional chemical resistance
 a. Epoxies b. MF c. PF d. UF
13. Polyurethane is synthesized by the reaction between
 a. Alcohol and carboxylic acid b. Di-isocynate and diol
 c. Diamine and dibasic acid d. diols and ketones
14. PBT is not available in
 a. Oriented form b. Opaque form c. Semi-Crystalline form d. Reinforced form
15. Bakelite is the trade name of _____ resin.
 a. Epoxy b. Urea c. Melamine d. Phenolic
16. A Polymer which is commonly used as a packing material _____.
17. PBT is prepared from _____.
18. Yellowing and molecular weight degradation of PC during processing is arrested by _____.
19. Origin of Nylon 6 is_____.
20. PBT is prepared from _____.
21. Pre drying is required to before processing of PC materials. Say true or false
22. MF is used to make dinnerware - say true or false.
23. Commercial name of epoxy resin is Teflon. say true or false
24. Unsaturated Polyesters are thermoplastics – say true or false
25. The monomers for epoxy resins are bis-phenol A and epichlorohydrin.- Say true or false
26. The full form of DGEBA is _____.
27. Expand the abbreviation 'PCTFE'-----
28. The full form of PAN is _____.
29. The full form of PBT-----.
30. The full form of EPDM-----.

PART – B

Answer **all** questions (Max. 40 words)

4 x 2 = 8

1. Write the important characteristics of polyethylene.
2. Mention at least two name of polymers which are self extinguishing in nature.
3. Why the numbers 6, 6 and 6 are put in the name of nylon-6, 6 and nylon-6?
4. What is the catalyst used in metallocene process?

PART – C

Answer any **four** questions (Max. 100 words)

4 x 3 = 12

1. Write down the optical applications of poly carbonate?
2. Mention any four applications of Epoxy Resins.
3. Write name of monomers of the following polymers and classify them as addition or Condensation polymers-Teflon, Bakelite, Natural rubber
4. What is the natural rubber? Describe the vulcanization process of natural rubber.
5. What are styrenics? Describe the different copolymer of styrenes?

PART – D

Answer any **two** questions (Max. 300 words)

2 x 5 = 10

1. Explain the preparation, properties and application of epoxy resins. Compare the advantages over unsaturated polyester resins?
2. Explain the method of manufacture of polycarbonate by phosegenation process. Describe the chemical reaction involve in it. Also discuss the properties and application of PC.
3. Describe the manufacturing process of PVC by emulsion polymerization process and illustrate the various properties of the resin

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THIRD SEMESTER EXAMINATION – JANUARY - 2023

Duration : 3 Hours
 Course : DPT
 Subject : Plastics Processing Technology-I

Max. Marks: 60
 Date : 11.01.2023
 Time : 10.00 a.m. to 01.00 p.m.

(DO NOT CHANGE SEQUENCE OF QUESTION NUMBER IN ANSWER SCRIPT)

PART – A

Answer **all** questions

30 x 1 = 30

1. The recommended pre-drying temperature for Nylon 6 and Nylon 66 is ----
 (a) 80 °C (b) 90 °C (c) 110 °C (d) None of the above
2. Thermoset Plastics can also be processed by
 (a) Injection moulding (b) Extrusion (c) Blow molding (d) None of the given
3. What is compression ratio?
 (a) Volume of first channel in feed section/volume of last channel in meeting section
 (b) volume of last channel in meeting section / Volume of first channel in feed section
 (c) Both (a) & (b)
 (d) None
4. Haul-off unit is related with-----
 (a) Extrusion blow molding process (b) Pipe extrusion process
 (c) Film extrusion process (d) None of these
5. Spring shut-off nozzle is suited for
 (a) PVC (b) HDPE (c) Nylon (d) All of the given
6. Fish eyes defect in an injection molding part is primarily due to
 (a) Entrapped air in the mold (b) blow melt temperature (c) High screw rotation speed (d) None of these
7. Knock out pins, Stripper rings, hard stripping is associated with _____
 (a) Injection systems (b) Ejecting System (c) Cooling system (d) All of the these
8. Which of the following is a part of cycle time
 (a) Fill & Pack time (b) Mould closing time (c) Cooling time (d) All of the given
9. Band heaters are _____
 (a) Mica insulated (b) Ceramic Insulated (c) Both a & b (d) Either a or b
10. Distance between centre of two adjacent flights is called
 (a) Land (b) Channel width (c) Bore dia (d) Pitch
11. Which of the following causes short fill
 (a) High mould temperature (b) lower shot volume
 (c) Presence of moisture in material (d) low cooling time
12. Machining of plastics to desired shape is
 (a) Primary processing (b) Secondary processing (c) Both a & b (d) Neither a nor b
13. Cross head die is used for which of the following
 (a) Extrusion blow moulding (b) Sheet Extrusion (c) Pipe Extrusion (d) wire & cable coating
14. _____ type of extrusion is used for higher clarity PP film
 (a) Vertically upward (b) Vertically downward
 (c) Horizontal (d) Both Vertically downward and upward
15. Three plate mould have -----opening
16. Co-extrusion blow moulding is used to produce-----
17. Venting is necessary for -----
18. -----machine is used for multi Color injection moulding
19. In parison programming -----part of the die is moved up and down _____
20. ----- bearing used in extruder for supporting screw molding
21. Extrusion blow molding principally uses an unsupported parison -SAY TRUE OR FALSE
22. Reduction in cycle time causes a decrease in the melt temperature - SAY TRUE OR FALSE
23. Plastics are Newtonian fluids - SAY TRUE OR FALSE.
24. Bi-axial orientation is occurred in blown film - SAY TRUE OR FALSE
25. Twin screw extruder is a continuous mixing device - SAY TRUE OR FALSE
26. NRV in injection molding stands for-----
27. Tg is -----
28. What is full form of IBM
29. What is full form of GPPC
30. MFI stands for

PART – B

Answer **all** questions (Max. 40 words)

4 x 2 = 8

1. What is relation between viscosity and shear rate?.
2. Enlist the different types of Injection molding machine
3. What is melt fracture?
4. What is the difference between Newtonian & Non-Newtonian fluids?

PART – C

Answer any **four** questions (Max. 100 words)

4 x 3 = 12

1. Discuss in detail the effect of flowing properties on process techniques Physical form
(a) Moisture (b) Physical form
2. Draw the neat sketch of an injection – molding machine and name its parts
3. State any three defects in Blow moulding and suggest remedies
4. What is the difference between the Toggle & Hydraulic Clamping System
5. Write a short note on;
(a) Working principal of blow molding process (b) any two types of gate in injection molding

PART – D

Answer any **two** questions (Max. 300 words)

2 x 5 = 10

1. Explain in detail the Twin screw extruder with a neat sketch and its advantages
2. Explain in detail the parameters that help one to select the right options for processing
3. Write a short notes on
(a) Automatic material handling
(b) Non return valve used in injection molding machine
(c) Causes and remedies of melt fracture

26. Draw the Symbol of First angle and Third Angle Projection.
27. Name the different drawing instruments?
28. What do you mean by Convention/ Code?
29. Name The Principal Planes of Projection.
30. What is sectional View Drawing?

PART – B

Answer **all** questions (Max. 40 words)

4 x 2 = 8

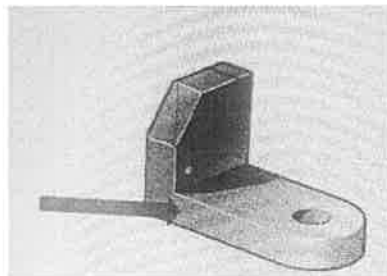
1. What is Projection and types of it?
2. What are the two systems of placing dimensions on a drawing?
3. A point A is 20 mm above HP and 30 mm in front of VP. Draw its projection.
4. Explain clearly the difference between the first-angle projection method and the third-angle projection method.

PART – C

Answer any **four** questions (Max. 100 words)

4 x 3 = 12

1. Draw the six principals view of given object.



2. Explain the types of Sectional View with neat sketch?
3. What is the Principal of Oblique Projection. Explain the difference b/w Oblique and Isometric Projection?
4. Show by means of neat, dimensioned sketches the shapes of the following rivets: Cup head; pan head; conical head; countersunk head.
5. Draw the isometric view of a square-headed bolt 24 mm diameter and 70 mm long, with a square neck 18 mm thick and a head, 40 mm square and 18 mm thick.

PART – D

Answer any **two** questions (Max. 300 words)

2 x 5 = 10

1. Draw the projections of the following points on the same ground line, keeping the projectors 25 mm apart.
 - A, in the H.P. and 20 mm behind the V.P.
 - B, 40 mm above the H.P. and 25 mm in front of the V.P.
 - C, in the V.P. and 40 mm above the H.P.
 - D, 25 mm below the H.P. and 25 mm behind the V.P.
 - E, 15 mm above the H.P. and 50 mm behind the V.P.
 - F, 40 mm below the H.P. and 25 mm in front of the V.P.
 - G, in both the H.P. and the V.P.
2. Explain the types of lines with neat sketch.
3. What is projections of solids. Explain the types of solids with neat diagrams.

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THIRD SEMESTER EXAMINATION – JANUARY - 2023

Duration : 3 Hours
Course : DPT
Subject : Mould Manufacturing

Max. Marks: 60
Date : 13.01.2023
Time : 10.00 a.m. to 01.00 p.m.

(DO NOT CHANGE SEQUENCE OF QUESTION NUMBER IN ANSWER SCRIPT)

PART – A

Answer **all** questions

30 x 1 = 30

- The cutting tools are made from
(a) Nickel chrome steel (b) Silicon steel (c) Chrome steel (d) High speed steel
- The process which improves the machinability of steels, but lowers the hardness and tensile strength is
(a) Normalizing (b) Full Annealing (c) Partial Annealing (d) Spheroidizing
- Lathe bed is made up of
(a) high carbon steel (b) high alloy steel (c) cast iron (d) mild steel
- Jigs are used
(a) For holding and guiding the tool in drilling, reaming or tapping operations
(b) For holding the work in milling, grinding, planning or turning operations
(c) To check the accuracy of workpiece
(d) None of the above
- Pantograph Engraving mechanism is
(a) 2 bar mechanism (b) 3 bar mechanism (c) 6 bar mechanism (d) 4 bar mechanism
- How are core manufactured in casting?
(a) Cores are manufactured from a pattern in the same way as of mould
(b) Cores are manufactured by machining process
(c) Cores are manufactured by traditional methods
(d) Cores are not manufactured, they are found naturally
- EDM stands for
(a) Electronics Defect Machine (b) Electrical Discharge Machine
(c) Electroplating Delay Mechanic (d) Electron Dissemble Moving Machine
- In EDM process, work piece is generally connected to
(a) positive (b) negative (c) neutral (d) earth terminal
- What is a Mould.
(a) It is a custom build tool in which we convert plastic raw material into finished product.
(b) It is a custom build tool in which we convert sheet metal strips into final product.
(c) It can be used for both plastic and sheet metal components
(d) It is a cutting tool operation
- The female portion of the mould which gives the moulding its external shape is called.
(a) cavity (b) core (c) ejector (d) All of these
- Which of the following is not a type of protective coating?
(a) Metallic (b) Non-metallic (c) Organic (d) Inorganic
- A mixture of oil and pigment in water is known as
(a) Enamel (b) Emulsion (c) Shellac (d) Lacquer
- What are the main elements of mould?
(a) Core and cavity (b) Drill (c) Fixture (d) all of them
- In mechanical machining, material is removed by
(a) Erosion (b) Corrosion (c) Abrasion (d) Vaporization
- The process of modifying a metal's properties is called _____
(a) Electrolysis (b) Electro deposition (c) Electro less plating (d) Electroplating
- The _____ is the foundation of lathe.
- CNC stands for _____
- Cutting Tool is hold in _____
- The heel is the portion of the _____
- _____ is the main body of tool bit
- Preventive maintenance is the remedial maintenance that occurs when equipment fails and must be repaired on an emergency or priority basis. say True or False
- Frequency modulation is used in the case of visible light EDM. say True or False
- The barrel is used for the opening and closing of the mold. say True or False

- 24. There is a varied pressure provided in the solidification unit of injection moulding process. say True or False
- 25. Cutting speed depend on the nature of material. say True or False
- 26. RP stand for _____
- 27. RPM stand for _____
- 28. ECM stand for _____
- 29. MRO stand for _____
- 30. SPCT stands for _____

PART – B

Answer **all** questions (Max. 40 words)

4 x 2 = 8

- 1. Explain ferrous, nonferrous and alloy metal with examples?
- 2. Explain conventional and non-conventional technique with examples?
- 3. What is polishing?
- 4. Draw and explain the symbol of surface roughness?

PART – C

Answer any **four** questions (Max. 100 words)

4 x 3 = 12

- 1. What is dielectric fluid explain its types, application and uses?
- 2. Explain Electroforming process in detail?
- 3. What is spark gap and explain technical Parameters of EDM?
- 4. Discuss in details the construction and working of ultrasonic polishing?
- 5. Define various mould elements and draw a neat diagram showing assembly of all elements?

PART – D

Answer any **two** questions (Max. 300 words)

2 x 5 = 10

- 1. Explain in details the construction and working of Electrical Discharge Machining (EDM) process. Also discuss the advantages over the conventional machining process?
- 2. Discuss in detail the constructional features of lathe. Explain its basic principle of operation and advantages over application.
- 3. Justify the mold maintenance and its importance? Discuss the mold neglect causes and benefits of a properly maintained mold.
