20-221

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

Duration : 3 Hours
Course : PGD-PPT
Subject : Plastics Materials & its Applications - II

Max. Marks: 60
Date : 03.07.2023
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. Source for PCL is
   a) Polycaprolactone b) caprolactum c) ethylene glycol d) None of the above
2. Advantage of using metallocene catalyst is to get
   a) Broader molecular weight distribution b) narrow molecular weight distribution
   c) High molecular weight polymer d) low molecular weight polymer
3. Which one of the following is a water soluble polymer?
   a) Polyamide b) Polyamide-imide c) Polyacrylamide d) None of these
4. Characteristics of PSU are
   a) High strength and hardness b) very high dimensional stability
   c) Stability at high temperatures d) all of the above
5. 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
6. HDT Value for PSU is
   a) 180°C b) 207°C c) 290°C d) 260°C
7. PPS Melting temperature is _____
   a) 185°C b) 280°C c) 285°C d) 300°C
8. What is C stage phenolic resin?
   a) Fusible rein b) soluble resin c) fusible and soluble resin d) insoluble and infusible resin
9. Polysulphones are unable to crystallise due to
   a) Stiff chain b) Higher Tm c) Mismatch in bond angle d) All the above
10. Which one of the following is notch sensitive.
    a) Polysulfone b) Polyolefin c) ABS d) Nylons
11. The applications of Biodegradable polymer include _____
    a) Dental b) Pharmaceutical c) Tissue Scaffolds d) All of the above
12. Which one of the following aliphatic polyester is biodegradable?
    a) PLA b) PBAT c) PHBV d) PBS
13. Trimellitic anhydride is used to synthesize
    a) Polyimide b) Polyamide-imide c) Polyether imide d) All the above
14. Polyarylene sulfones are synthesised by
    a) Hydrolysis process b) polysulfonylation c) polyester synthesis d) none of the above
15. Which one of the following aliphatic polyester is biodegradable?
    a) PLA b) PBAT c) PHBV d) none of the above
16. _____ fiber reinforced composites have higher strength than short fiber reinforced composites.
17. _____ is used to modify the surface modification.
18. _____ and _____monomer are used for manufacturing general purpose epoxy resin
19. The first man-made fiber is _____.
20. Most widely used form of FRP is _____ Structure.
21. Polyimide on aluminum gives glossy, heat-resistant coatings which are resistant to solvents and prevent stain formation. (SayTrue or False)
22. Additional chemical resistance includes the organic solvents, aqueous reagent, and long term performance in superheated water at 180°C (say True or False)
23. Polysulfone is manufactured from bisphenol A and 4, 4-dichlorosulfonyl sulfone by a multi-step condensation reaction.(say True or False)
24. PVF is not available as film form. (say True or False)
25. Lyotropic liquid crystal transition occurs by Temperature. (Say True or False)
26. Expand DGEBA.
27. Expand UF & MF.
28. Expand PAI.
29. Expand PTFE.
30. Expand PLA.

PART – B

Answer **all** questions (Max. 40 words) 4 x 2 = 8

1. What are the different types of Specialty polymers?
2. What is epoxide equivalent?
3. What are specialty Plastics?
4. What are the disadvantage of PEI?

PART – C

Answer any **four** questions (Max. 100 words) 4 x 3 = 12

1. What are Nano material, Nano structure and applications of Nano Technology?
2. State the structure of UF & MF.
3. Briefly describe Epoxy Resin.
4. Difference between the LCP & PI?
5. Explain the manufacturing process of PES.

PART – D

Answer any **two** questions (Max. 300 words) 2 x 5 = 10

1 .Write a short note on structure and properties of PAI.
2. Write down the special characteristics of silicones? Mention their applications
3. Explain the role of polymeric chain in stabilization of nanomaterial in polymer composites.

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HEAD OFFICE : GUINDY, CHENNAI – 600 032.
ACADEMIC CELL
SECOND SEMESTER EXAMINATION – JULY 2023

Duration : 3 Hours
Course : PGD-PPT
Subject : Plastics Processing Technology-II

Max. Marks: 60
Date : 04.07.2023
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. Calendering performance can be improved by employing processing aid like acrylic to
   a) Roll release b) Glass & surface uniformity c) Both (a) & (b) d) None
2. Calendaring of heavy gauge rigid PVC sheet is done by _____ Process
   a) 'Z'type b) ' L'ype ' c) Luvitherm d) Inverted 'L' type
3. Which one of the following has excellent merchantability
   a) PVC b) PC c) PTFE d) LDPE
4. The best way to join PTFE sheets is by _____
   a) Solvent cementing b) Adhesive bonding c)Welding d)Mechanical fasteners.
5. Generally Refrigerator door lines are produced by
   a)Continuous forming b) Drape forming c) Plug –assisted forming d)Scrapless Thermoforming
6. Jerry can with handle is produced by
   a) Injection blow moulding b) Extrusion blow moulding
   c) Injection stretch blow moulding d) Extrusion stretch blow moulding
7. The main root cause for 'pitted surface' defect in blow molding is
   a)Excessive melt temperature b) Inadequate air venting c) High blow ratio d) None of the above
8. Which of the following materials not usually thermoformed?.
   a) HIPS & ABS b) PMMA c) PVC d) POM & Nylon
9. Canopies for racing vehicles is produced by _____
   a) free forming or free blowing b) drape forming c) Pressure forming d) Mechanical forming
10. Which of the following is not a thermoforming process ?
    a)Vacuum forming b) Pressure forming c) free blowing d) None of the above
11. The life of thrust bearing depends upon _____
    a) RPM of screw b) Back pressure c) Temperature d) Both (a) & (b)
12. In extrusion process the function of screen pack is
    a) To filter contamination b)Arrest unmelted particles c) Developing backpressure d) All the above
13. In extrusion process sudden compression screw is preferred for processing of
    a) PVC b) PC c) nylon d) PP
14. PET bottles are produced by
    a)Injection blow moulding b)Extrusion blow moulding
    c)Injection stretch blow moulding d)Extrusion stretch blow moulding
15. Which of the following is a type of Calendaring roll?
    a) 'L' type b) 'K' type c) 'M' type d) 'N' type
16. Roll temperature for PVC in calendaring are in the range of ____ C°
17. Fish eye defect related to _____ process
18. The strength of blown film is _____ than cast film
19. Nylon & Polyester fibers are made by _____ Process.
20. The major problem in plasticized PVC processing during calendering is_____
21. CN film is produced by casting process- True/False
22. Polypropylene material has excellent Electroplatability - True/False
23. Longitudinal film variation during calendaring may be eliminated by pre- loading the bowls to prevent journals floating in their bearings.- True/False
24. In Thermoforming plastic sheet is heated to the sag point- True/False
25. Melt index is one of the key parameter in thermoforming process. -True/False
26. Abbreviate TRM and SSE
27. Abbreviate ISBM
28. Abbreviate FRP
29. Abbreviate SBF
30. Abbreviate PAF

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PART – B

Answer **all** questions (Max. 40 words) 4 x 2 = 8

1 State the importance of screw cooling.
2. What is Pinch off?
3. Match the Following

a. Parison	1. Calendaring
b. 'Z' Type	2. Blow Moulding
c. Die	3. Thermoforming
d. Sag point	4. Extrusion

4. State the various mould materials used in Thermoforming.

PART – C

Answer any **four** questions (Max. 100 words) 4 x 3 = 12

1. State the two different principles used in joining of plastics. Give example..
2. Explain Twin screw extruder with a neat sketch
3. State the difference between pressure thermoforming and Drape Thermoforming.
4. What is plate out in case of calendaring? Mention types of calendars.
5. What is free forming? State the merits of die-matched thermoforming.

PART – D

Answer any **two** questions (Max. 300 words) 2 x 5 = 10

1. What is calendaring ? Explain in detail Calendaring process for PVC.
2. What do you mean by parison programming? Explain in brief with neat sketch.
3. Short note
   a. Powder Coating b. High speed Mixer

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

Duration : 3 Hours
Course : PGD-PPT
Subject : Plastics Testing-II

Max. Marks: 60
Date : 05.07.2023
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 unit of Dielectric strength is given by _____
   a) V/mm or kV/mm b) Volts c) volts/mm2 d) kV/cm2
2. The unit of surface resistance (Rs) is _____
   a) ohms b) ohm - cm c) cm d) cm -1
3. The dielectric strength _____ with increase in the temperature of the specimen.
4. Dissipation factor is directly proportional to _____ and square of the applied voltage
   a) current b) frequency c) resistance d) None of these
5. The ASTM D standard for dielectric constant is _____
6. Wet arc resistance test is _____
   a) CTI b) RI c) OIT d) ROB
7. Abbe refractometer is used to measure
   a) Opacity b) Glass Index c) Refractive Index d) Yellowness Index
8. The color scale as per CIE is
   a) a,b,L b) b,L,a c) L,a,b d) all the above
9. PMMA transmits _____ of the normal incident light.
   (a) 90 % (b) 92% (c) 95 % (d) 98 %
10. The three basic angles of incidence 20°, 60°, and 85° are used for the measurement of _____of plastic parts.
11. The Standard test method for Specular Gloss is -------
    a) ASTM D 423 b) ASTM D 523 c) ASTM D 516 d) ASTM D 453
12. The instrument designed to observe the objects under the polarized light is known as _____
    a) Hazemeter b) UV spectrophotometer c) Microscope d) Polariscope
13. Dumbbell shaped test specimens are preferred for _____ Test.
    a) Tensile b) Flexural c) Izod Impact d) Charpy Impact
14. UTM is be used for the determination of _____
    a)Tensile strength b) Flexural strength c) Compressive strength d) All of above
15. The test specimen dimension for flexural test as per ASTM standard is _____
    a) 127x12.7x3.2 mm. b) 63x12.7x3.2 mm. c) 127x12.7x6 mm. d) 127x127x3.2 mm.
16. R L M E K is the scales used for _____ test.
    a) Shore A hardness b) Barcol Hardness c) Vicker Hardness d) Rockwell hardness
17. Charpy Impact Testing Machine works on principle_____
    a) Pendulum b) falling dart c) falling weight d) drop weight
18. Which type of hardness test is most suitable for flexible PVC?
    a) Durometer Shore Hardness b) Rockwell c) Barcol d) None of the above
19. The maximum load required to shear a specimen in such a manner that the resulting pieces are completely clear of each other is called . _____
20. What is the unit of strain?
    a) No unit b) g/cc c) mm2 d) N/mm2 or MPa
21. The specimen size for ESCR test is _____
    a) 38 x 16 mm b) 35 x 12 mm c) 33 x 13 mm d) 38 x 13 mm
22. The staining resistance of a material depends upon the nature of polymer & the ------ of the reagent used
    a) concentration b) color c) both (a) & (b) d) None of these
23. The temperature maintained in ESCR bath is 205°C. Say True or False.
24. Water vapour permeability is defined as the product of permeance and _____
    a) Density b) Length c) Thickness d) None of these
25. In Gas permeability test which gas is selected
    a) N_2 b) O_2 c) CO_2 d) All the above

26. Expand TGA.
27. _____method is used to find the crystallinity of polymer.
28. Expand DMA.
29. DMA measures stiffness and damping, these are reported as modulus and tan delta Say True or False.
30. Expand OIT.

PART – B

Answer **all** questions (Max. 40 words) 4 x 2 = 8

1. What are the requirements of an insulator?
2. Write down the formula for calculating flexural modulus
3. Define refractive index
4. What is TGA?

PART – C

Answer any **four** questions (Max. 100 words) 4 x 3 = 12

1. What are the various factors which affect the test results of Arc resistance?
2. What is co-efficient of friction? Explain the types of friction.
3. Explain the test method of gas permeability of plastics film.
4. Discuss in detail about colour measurement of plastics.
5. Write down the application of DSC.

PART – D

Answer any **two** questions (Max. 300 words) 2 x 5 = 10

1. What is Creep? Explain the different types of creep and the factors affected for creep?
2. Explain the Environmental StressCracking Resistance (ESCR) test method of polyolefin material.
3. What are the different types of DSC? Explain the test method in detail.

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

Duration : 3 Hours
Course : PGD-PPT
Subject : Machine Maintenance

Max. Marks: 60
Date : 06.07.2023
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. What is the primary goal of machine maintenance?
   a) Increasing machine downtime b) Maximizing machine efficiency and reliability
   c) Reducing the lifespan of the machine d) Minimizing maintenance costs
2. Which of the following is an example of a routine maintenance task?
   a) Repairing a major machine breakdown b) Conducting regular inspections and lubrication
   c) Upgrading the machine's software system d) Replacing the entire machine component
3. What is the purpose of a maintenance log or record?
   a) To keep track of the number of machines in a facility
   b) To document the maintenance activities performed on a machine
   c) To list the spare parts available for the machine
   d) To schedule machine replacement
4. Gears are primarily used for:
   a) Transmitting power and motion between rotating shafts
   b) Storing energy for later use
   c) Increasing friction in mechanical systems
   d) Reducing the efficiency of machines
5. What is the purpose of gear teeth?
   a) To provide a smooth surface for gears to rotate
   b) To reduce the rotational speed of the gears
   c) To provide a mechanical advantage and transfer torque
   d) To increase the noise produced by the gears
6. The most common type of gear used for transmitting motion between parallel shafts is the:
   a) Spur gear b) Helical gear c) Bevel gear d) Worm gear
7. Which type of gear is used when the direction of rotation needs to be changed by 90 degrees?
   a) Spur gear b) Helical gear c) Bevel gear d) Worm gear
8. Which of the following is a key advantage of hydraulic systems?
   a) Low operating pressures b) Limited power transmission capabilities
   c) High power density d) Minimal risk of leakage
9. Which type of valve is commonly used to control the direction of fluid flow in a hydraulic system?
   a) Relief valve b) Check valve c) Flow control valve d) Directional control valve
10 What is the purpose of a hydraulic accumulator in a hydraulic system?
   a) To regulate the pressure of the hydraulic fluid b) To store energy and maintain system pressure
   c) To filter and clean the hydraulic fluid d) To control the flow rate of the hydraulic fluid
11 Which of the following is NOT a type of electric motor?
   a) DC motor b) AC motor c) Induction motor d) Magnetic motor
12. The function of the commutator in a DC motor is to:
   a) Control the speed of the motor b) Reverse the direction of current flow
   c) Generate electricity d) Increase the motor's efficiency
13. Which type of motor is commonly used in household appliances like fans and refrigerators?
   a) DC motor b) AC motor c) Stepper motor d) Universal motor
14. What is the principle behind the operation of an induction motor?
   a) Electromagnetic induction b) Electrostatic induction
   c) Magnetic resonance d) Quantum mechanics
15. Which of the following is a disadvantage of a stepper motor?
   a) High torque at low speeds b) Easy speed and position control
   c) Limited speed range d) High efficiency
16. Hydraulic cylinders are used to convert fluid pressure into linear mechanical force. Say True or False.
17. Hydraulic systems are typically used in applications that require precise control and high force output, such as heavy machinery and construction equipment. Say True or False.

18. Proper cleaning and lubrication of machine components can help prevent premature wear and damage. Say True or False.
19. Preventive maintenance is performed on machines to prevent unexpected breakdowns and prolong their operational life. Say True or False.
20. Actuators are devices that convert energy into mechanical motion to operate valves. Say True or False.
21. ..... are mechanical devices used to control the flow of fluids or gases.
22. ..... actuators use compressed air to generate mechanical motion for operating valves.
23. ..... actuators are suitable for applications that require high force and precise control of valve operation.
24. ..... convert electrical energy into mechanical energy.
25. DC motors operate on the ..... hand rule.
26. Full form of NC .....
27. Full form of AI.....
28. Full form of SOP.....
29. Full form of PM.....
30. Full form of PLC.....

PART – B

Answer **all** questions (Max. 40 words) 4 x 2 = 8

1. Describe heat exchangers.
2. What are the function of lubrication system.
3. Differentiate between hydraulic and pneumatic pumps.
4. What do you mean by hydraulic and pneumatic actuators.

PART – C

Answer any **four** questions (Max. 100 words) 4 x 3 = 12

1. Explain the working of chain drive.
2. How proper maintenance effect the productivity?
3. What are the elements of hydraulic system? Explain any one in detail.
4. Differentiate between maintenance and overhauling.
5. What do you mean by CNC machine?

PART – D

Answer any **two** questions (Max. 300 words) 2 x 5 = 10

1. What is the basic principle of electric motor?
2. What is the basic principle of electric generator?
3. What are the safety rules on shop floor.

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

Duration : 3 Hours
Course : PGD-PPT
Subject : Environmental Science and Plastics Waste Management

Max. Marks: 60
Date : 07.07.2023
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. World Environment Day is celebrated on ----------
2. ----------teaches us how to respect nature.
3. The part of the earth and its atmosphere in which organisms live is the
   (a) Biosphere (b) Biomass (c) Biota (d) Biome
4. The most stable ecosystem is
   (a) Mountain (b) Desert (c) Forest (d) Ocean
5. Which one of the following is an abiotic component of the ecosystem?
   (a) Plants (b) Fungi (c) Humus (d) Bacteria
6. Which of the following conceptual sphere of the environment has the least storage capacity of matter?
   (a) Lithosphere (b) Atmosphere (c) Biosphere (d) Hydrosphere
7. Increase in fauna and decrease in flora would be harmful due to increase in
   (a) CO_2 (b) O_2 (c) N_2 (d) SO_2
8. The largest reservoir of nitrogen in our planet is the
   (a) fossil fuel (b) atmosphere (c) biosphere (d) ocean
9. Troposphere is located _____ stratosphere.
10. World Food Day is recalled on _____.
11. The term ecology was introduced by _____.
12. Biosphere is made of atmosphere, hydrosphere and lithosphere. (True/False)
13. Environmental studies are multidisciplinary in nature. (True/False)
14. Public awareness is a must for the protection of environment. (True/False)
15. Temperature in thermosphere can be as high as 1200°C. (True/False)
16. The term ecology is not derived from the Greek word 'Oekologie'. (True/False)
17. Write full form of "E.P.R."
18. Write Full form of "P.C.C."
19. Write Full form of "S.P.C.B."
20. Write Full form of "H.A.P."
21. Write Full form of "R.V.M."
22. Write Full form of "P.W.M."
23. Write Full form of "P.T.F."
24. Write Full form of "P.P.T."
25. Write Full form of "A.F.R."
26. Biogas predominantly contains
   (a) CH_4 (b) NH_3 (c) SO_2 (d) Ethane
27. Both power and manure are provided by a
   (a) thermal plant (b) biogas plant (c) nuclear plant (d) hydroelectric plant
28. Steam reforming is currently the least expensive method of producing
   (a) CNG (b) petrol (c) hydrogen (d) biogas
29. Peat, lignite, bituminous and anthracite are different types of
   (a) biogas (b) natural gas (c) nuclear fuel (d) coal
30. Identify the nonrenewable energy resource from the following:
   (a) Coal (b) Tidal power (c) Wind power (d) Solar energy

PART – B

Answer **all** questions (Max. 40 words) 4 x 2 = 8

1. What is Primary Recycling and Secondary Recycling?
2. What is the difference between Down cycling and Up cycling in recycling method?
3. Which types of operations are performed during mechanical recycling techniques of polymer waste?
4. Match the following which polymer waste is created by which product:

Product	Polymer Waste Creation
A) Electrical Cables	1) Polyurethane
B) Electrical Switches	2) Poly(Methylmethacrylate)
C) Optical Lenses	3) CrossLinked Polyethylene
D) Shoe Soles	4) Phenol Formaldehyde Resin

PART – C

Answer any **four** questions (Max. 100 words) 4 x 3 = 12

1. Discuss about the soil texture, structure and its composition.
2. What are renewable and nonrenewable energy sources?
3. Explain the limitations and importance of solar energy.
4. What is the role of geothermal energy in India?
5. List the different nonconventional energy sources. What new thrusts are being given to renewable energy programme in India?

PART – D

Answer any **two** questions (Max. 300 words) 2 x 5 = 10

1. Explain the impact of technology and development on environment.
2. Write a short note on desertification.
3. What are the causes of land degradation?

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