Seat No. _____ Enrolment No. _____

THE CHARUTAR VIDYA MANDAL UNIVERSITY

POLYMER SCIENCE AND TECHNOLOGY – SEMESTER 2

SUMMER (REGULAR) 2022 EXAMINATION

Course Title: Polymer Characterization

Course Code: 101340201

Total Printed Pages : 2

Date: 05/05/2022 **Time: 2.00 pm to 4.00 pm** **Maximum Marks: 60**

Instructions:

- Attempt all questions.
- Numbers to the right indicate full marks for each question.
- Make suitable assumptions wherever necessary.

Q. 1 Answer the following multiple choice questions. **(12)**

(1) Rockwell hardness test is ASTM D _____.
(i) 785 (ii) 780 (iii) 815 (iv) 786.

(2) Testing errors may occur from _____.
(i) test itself (ii) operator (iii) test specimen (iv) all of above.

(3) Volume resistivity = _____.
(i) $\frac{A}{t(R_v)}$ (ii) $\frac{At}{\rho(R_v)}$ (iii) $\frac{A}{t(\pi R_v)}$ (iv) $\frac{At(R_v)}{\omega}$.

(4) Sinker is used in _____ method.
(i) displacement (ii) sink & float (iii) water absorption (iv) MFI

(5) Polytetrafluoroethylene is highly chemical resistant because of _____
(i) high crystalline structure (ii) lack of branching
(iii) strong bond of C-F (iv) all of above.

(6) Polycarbonate has limited applications due to its poor _____.
(i) thermal resistance (ii) chemical resistance
(iii) both a & b (iv) none of above

(7) Standard laboratory testing conditions are _____ temperature and relative humidity.
(i) 230+ 20, 50 + 5% (ii) 330+ 20, 50 + 5%
(iii) 230+ 20, 50 + 0.5% (iv) 230+ 0.50, 50 + 5%.

(8) _____ is the unit of relative density.
(i) gm/cc (ii) gm/ml (iii) Kg/m3 (iv) none of above

(9) Bromo compounds are used as _____.
(i) plasticizer (ii) filler (iii) flame initiator (iv) flame retardant.

(10) _____ can be used as heating media in softening point measurement technique.
(i) Glycerol (ii) Paraffin oil (iii) Silicon oil (iv) All.

(11) Insulator must have _____.
(i) strong mechanical properties (ii) good dielectric strength
(iii) good arc resistance (iv) all of above

(12) Ultracentrifugation method used for _____ average molecular weight of polymer.

(i) $\overline{Mn}$ (ii) $\overline{Mw}$ (iii) $\overline{Mv}$ (iv) $\overline{Mz}$

Q.2 Attempt **any eight** of the following. **(16)**

(1) Explain importance of material characterization test for thermoplastics.

(2) Why test conditions and conditioning of samples are important during characterization of polymer?

(3) Explain measurement procedure and calculation for pyknometer method.

(4) Explain cryoscopy technique used for number average molecular weight determination.

(5) Enlist requirements of plastic for effective insulator.

(6) Explain different precautions required during viscosity average molecular weight measurement.

(7) Write down flammability test for self supporting polymer samples.

(8) Explain stress – strain plot for the different nature of polymeric materials.

(9) How hardness is measured by durometer hardness tester? Explain.

(10) Enlist various semipermeable membrane used in membrane osmometry.

Q. 3 Answer following. **(08)**

1. Neat labeled flow diagram of GPC apparatus.
2. Sedimentation velocity method.

OR

Q.3 Write a note on vapour phase osmometry. **(08)**

Q. 4 Explain following test methods. **(08)**

1. Ring and ball method
2. Heat deflection temperature.

OR

Q. 4 Explain following test methods. **(08)**

1. Sieve Analysis.
2. Moisture Analysis.

Q. 5 Explain flexural property of polymers. Write a detail procedure for the measurement of flexural property with factors affecting the test results. **(08)**

OR

Q. 5 What do you mean by impact test? Discuss in detail about izod impact test. Enlist various factors affecting on test results. **(08)**

Q. 6 Explain the importance of chemical properties in polymer testing. Discuss in detail about immersion and stain resistance test. **(08)**

OR

Q. 6 Write a note on following. **(08)**

1. Dielectric strength test.
2. Volume and surface resistivity test.

Seat No. _____ Enrolment No. _____

THE CHARUTAR VIDYA MANDAL UNIVERSITY

POLYMER SCIENCE AND TECHNOLOGY – SEMESTER 2

SUMMER (REGULAR) 2022 EXAMINATION

Course Title: Polymer Processing Technology

Course Code: 101340202

Total Printed Pages : 2

Date: 06/05/2022 **Time: 2.00 pm to 4.00 pm** **Maximum Marks: 60**

Instructions:

- Attempt all questions.
- Numbers to the right indicate full marks for each question.
- Make suitable assumptions wherever necessary.

Q. 1 Answer the following multiple choice questions. **(12)**

(1) Complex shape of plastics done in one piece by _____ method.
(i) rotational moulding (ii) calendaring (iii) casting (iv) all of above

(2) Trapazoidal runners have a taper of _____ per side.
(i) 80 (ii) 90 (iii) 70 (iv) none of above.

(3) Solidification time of crystalline polymers depend on _____.
(a) Ti-Tc (b) Tm (c) Ti-Tm (d) all of above

(4) _____ plate mould used for removal of gate, runners and sprues.
(i) Two (ii) Three (iii) both i & ii (iv) all of above

(5) Air can be injected in to the sealed parison by using _____.
(i) blow pin (ii) hypodermic needle (iii) both of above (iv) none of above

(6) Material is compressed by the pushing action of injection _____.
(i) ram (ii) plunger (iii) piston (iv) all of above.

(7) Compression ratio = _____.
(i) $\frac{H_F}{H_M}$ (ii) $\frac{H_F}{H_M} D$ (iii) $\frac{H_M}{H_F}$ (iv) $\frac{HF}{HM}$.

(8) _____ is the oldest processing technique of polymer.
(i) Injection moulding (ii) Extrusion moulding
(iii) Casting (iv) Compression moulding

(9) In calendaring process rubber sheet thickness is slightly _____ than fine roll gap.
(i) lower (ii) greater (iii) similar (iv) none of above

(10) The role of screen pack in extrusion process is _____.
(i) to carry product away from the die (ii) to prevent foreign matter (iii) to prevent heat loss during processing (iv) none of above

(11) Dip mixer is also known as_____
(i) cowles dissolver (ii) henschel mixer (iii) i & ii both (iv) none of above

(12) Photographic films are produce by _____.
(i) slush casting (ii) dip casting (iii) die casting (iv) none of above.

Q.2		Attempt **any eight** of the following.	**(16)**
	(1)	Define polymer processing. Enlist various processing techniques used for polymer.	
	(2)	Write a note on twin drum tumbler.	
	(3)	Define Gate. Enlist main functions of gate.	
	(4)	Explain the significance of screen pack in the extrusion process.	
	(5)	Enlist the advantages of rotational moulding process.	
	(6)	Explain moulding cycle.	
	(7)	Explain any four compression mould parts and their function.	
	(8)	Explain significance of vented barrel in injection moulding process.	
	(9)	Enlist disadvantages of single stage inline plunger injection moulding machine.	
	(10)	Explain function of hopper and heating cylinder in injection moulding machine.	
Q. 3		Explain following. 1. High speed mixture. 2. Z-blade mixers.	**(08)**
		OR	
Q.3		Write a note on following. 1. Orientation and Shrinkage. 2. Melt processing of thermosetting plastics.	**(08)**
Q. 4		Explain the steps involved in blow-moulding process with suitable diagram.	**(08)**
		OR	
Q. 4		Give an account on the rotational moulding process with relevant diagram.	**(08)**
Q. 5		Define Nozzle. Explain alignment of nozzle with suitable diagram. Discuss any two types of nozzle used in injection moulding machine.	**(08)**
		OR	
Q. 5		What do you mean by toggle system? Explain with neat labeled diagram. Write down advantages and disadvantages of toggle system.	**(08)**
Q. 6		Define casting? Enlist advantages of casting. Write a detail note on die casting.	**(08)**
		OR	
Q. 6		Describe PVC calendaring plant with neat labelled diagram.	**(08)**

Seat No. _____ Enrolment No. _____

THE CHARUTAR VIDYA MANDAL UNIVERSITY
POLYMER SCIENCE AND TEACHNOLOGY
SEMESTER-II
EXTERNAL EXAMINATION-2022

Course Title: POLYMER ADDITIVES
Course Code:101340203
Total Printed Pages : 3
Date: 07/05/2022 **Time: 2:00 pm - 4:00 pm** **Maximum Marks: 60**

Instructions:

- Attempt all questions.
- Numbers to the right indicate full marks for each question.
- Make suitable assumptions wherever necessary.

Q. 1 Answer the following multiple choice questions. **(12)**

(1) _____are used as antistatic agent

(a) Polyhydric alcohols and derivatives (b) silica flour (c) magnesium oxide (d) none of these

(2) _____are used as chelating agent

(a) melamine (b) Stearic acid (c) Dibutyl tin maleates (d) None of these

(3) _____type of lubrication used in polymer processing

(a) fluid (b) boundary (c) both a & b (d) None of these

(4) According to additive classification based on specific function, _____ type of additive used in modify bulk mechanical property

(a) Toughening agent (b) antistatic agent (c) lubricant (d) none of these

(5) _____is an additive which increase flexibility, elongation or workability.

(a) Filler (b) plasticizer (c) antistatic agent (d) none of these

(6) _____can absorb the energy generated by impact and dissipate it in nondestructive fashion

(a) Toughening agent (b) adhesion promoter (c) anti-ageing additive (d) none of these

(7) Methylene chloride is used as _____in cellular plastics

(a) Blowing agent (b) Plasticizer (c) Flame retardant (d) None of these

(8) An additive that increase the viscosity at low shear rates of a resin as result of the _____with polar group of the resin

(a) Hydrogen bond (b) Ionic bond (c) coordination bond (d) none of these

(9) Degradation of polymer occurs by a _____mechanism

(a) cationic (b) Anionic (c) free radical (d) All of these

(10) _____is the adhesion of two adjacent layers of film

(a) lubrication (b) blocking (c) friction (d) none of these

(11) _____stabilizer is known as peroxide decomposer

(a) primary (b) secondary (c) both a & b (d) None of these

(12) In the thermal degradation, oxidation reaction may be accelerated by presence of _____

(a) Stearic acid (b) Heavy metal ion impurities (c) Inhibitor (d) none of these

Q.2 Attempt **any eight** of the following. **(16)**

(1) Explain Toughening agent

(2) Define bleeding & blooming

(3) Discuss unavoidable side effect of additive

(4) Explain the different factor on which lubricant effectiveness depend?

(5) Explain adhesion promoter

(6) Discuss the synergistic stabilizer system

(7) Write the resonance stabilization in primary antioxidant

(8) Explain the different factor on which lubricant effectiveness depend?

(9) Explain chelating agent as metal deactivator

(10) Define additive and write the classification of additive according to their specific function.

Q. 3 Write the mechanism for polymer degradation. Explain the role of primary and secondary stabilizer **(08)**

OR

Q.3 Write the requirement of stabilizer for halogenated polymer. Explain the special stabilizer for halogenated polymer with degradation mechanism. **(08)**

Q. 4	Define lubricant and Explain external, internal and solid lubricants	**(08)**
	OR	
Q. 4	**Answer the following** 1. Explain the Antiblock additives 2. Write a note on antistatic agents	**(08)**
Q. 5	Discuss the physical and chemical blowing agent	**(08)**
	OR	
Q. 5	Explain the mechanism of natural radiation on ageing of plastics and Explain the role of carbon black, pigment and UV absorbers	**(08)**
Q. 6	Discuss the burning mechanism of plastics and Explain flame retardant agents	**(08)**
	OR	
Q. 6	**Answer the following** 1. Write a note on plasticizer 2. Explain thixotropic agents	**(08)**

****

Seat No. _____ Enrolment No. _____

THE CHARUTAR VIDYA MANDAL UNIVERSITY

POLYMER SCIENCE AND TEACHNOLOGY

SEMESTER-II

EXTERNAL EXAMINATION-2022

Course Title: INDUSTRIAL CHEMISTRY-II

Course Code:101340207

Total Printed Pages : 3

Date: 09/05/2022 **Time: 2:00 pm - 4:00 pm** **Maximum Marks: 60**

Instructions:

- Attempt all questions.
- Numbers to the right indicate full marks for each question.
- Make suitable assumptions wherever necessary.

Q. 1 Answer the following multiple choice questions. **(12)**

(1) _____ is a separation technique.

(a) Crystallization (b) Extraction (c) Both a & b (d) Only a

(2) _____ involved transfer of material from one phase to another phase.

(a) Mass transfer operation (b) Mechanical operation (c) Both a & b

(d) none of above

(3) In Grizzly the spacing between the bar are-

(a) 25 to 200mm (b) 50 to 200mm (c)50 to 150 mm (d) 25 to 150 mm

(4) The operating speed of Trommel is _____ of the critical speed.

(a) 25-50% (b) 50-75% (c) 30-50% (d) 35-55%

(5) For changing the diameter____ is used.

(a) Reducer (b) Elbow (c) Tee (d) None of these.

(6) Heat transfer per unit time per degree temperature is called _____.

(a) Heat flux (b) LMTD (c) Heat transfer co-efficient (d) Specific heat .

(7) A _____ valve is a linear motion valve used to stop, start and regulate fluid flow.

(a) Gate valve (b) Globe Valve (c) Ball Valve (d) Butterfly Valve

(8) Orifice meter is _____.

(a) Variable head meter (b) Variable Temperature meter (c)Variable area-meter (d) none of these.

(9) The product of mass flow rate and specific heat of fluid are known as-

(a) Capacity Ratio (b) Capacity rate (c) Correction Factor

(d) None of these

(10) Intermediate hammer mills give a product _____mesh in particles size.

(a) 25-20 mm (b) 50-25 mm (c) 50-30 mm (d) 25 mm

(11) The characteristics of Filter aids is -

(a)Chemically inert (b) Recoverable (c) Low specific gravity

(d) all of above

(12) Rota meter can directly measure flows as high as_____ gpm.

(a) 500 (b) 400 (c) 900 (d) 700

Q.2 Attempt **any eight** of the following. **(16)**

(1) Explain the methods of crystallization.

(2) Discuss the difference between Grizzly and Trommel

(3) Discuss the criteria for selecting solvent in gas absorption.

(4) What are filter aids? Why are they used?

(5) Explain the electrostatic separator.

(6) Explain the super – saturation step in crystallization.

(7) What is flow? What are the types of flow?

(8) Define Capacity Ratio , Capacity Rate & Correction Factor.

(9) Explain the importance of minimum L/v Ratio in absorption.

(10) Explain fouling and its types.

Q. 3 Explain Vibrating Screen in detail. **(08)**

OR

Q.3 Explain crystallization, its mechanism, method and application with uses. **(08)**

Q. 4 Explain Rotary Drum Filter. **(08)**

OR

Q. 4 Explain- **(08)**

i. Difference between adsorption and absorption.

ii. Compare distillation and absorption.

Q. 5	Derived Logarithmic Mean Temperature Difference for parallel flow.	**(08)**

OR

Q. 5	Explain Rota meter in detail.	**(08)**
Q. 6	Explain the following- i. Hammer mill ii. Ball mill	**(08)**

OR

Q. 6	Discuss about Banbury mixer and Ribbon blender in detail.	**(08)**

****