SEAT No._____

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[247] **SARDAR PATEL UNIVERSITY**

M.Sc. (Polymer Science &Technology) Semester-I Examination-2017

Monday, 6th November-2017

10:00 A.M. to 01:00 P.M.

PS01CPST22: INDUSTRIAL POLYMERS

Total Marks: 70

Note: (1) Attempt all questions.
(2) Figures to the right indicate marks.

Q. 1 Answer the following multiple choice questions. **08**

(1) _____ is a starting material for tetrafluoroethylene monomer.
(i) CH ≡ CH (ii) $CHCl_3$ (iii) $CH_2 = CH_2$ (iv) $CH_2 = CH - CH_3$

(2) Zieglar – Natta catalyst used in the synthesis of _____.
(i) polyethylene (ii) polypropylene (iii) polyisoprene (iv) all of above.

(3) _____ can be copolymerized with acrylonitrile to improve the dye ability.
(i) Vinyl acetate (ii) Methyl methacrylate (iii) 2-vinylpyridine (iv) All of above.

(4) _____ is extensively used in dentures.
(i) Poly(methyl methacrylate) (ii) Poly(vinylalcohol) (iii) Poly(vinylacetate) (iv) none of above

(5) Higher molecular weight polyols are used to make more _____ polyurethane foam.
(i) rigid (ii) flexible (iii) both of above (iv) none of above

(6) _____ provides good water resistance in unsaturated polyester resin.
(i) Neopentyl glycol (ii) Isophthalic acid (iii) Both of above (iv) None of above

(7) _____ is not an aminoplast.
(i) Novolak (ii) Urea-formaldehyde (iii) Melamine-formaldehyde
(iv) None of above.

(8) Furfural is originally derived from _____.
(i) furfuryl alcohol (ii) corn cobs (iii) both of above (iv) none of above.

Q. 2 Attempt **any seven** of the following. **14**

(1) Explain synthesis and properties of chlorosulphonated polyethylene.
(2) Write down raw material preparation and properties of poly vinyl fluoride.
(3) Explain glycidyl amine resins.
(4) Write a brief note on styrene – α – methyl styrene copolymers.
(5) Give a reaction scheme of methacrylic acid and methyl methacrylate.
(6) Write down reactions of isocynates with any four active hydrogen groups.
(7) Define pot life and intumescent coating.
(8) Explain resols.
(9) Write down a reaction scheme and properties of furfuryl alcohol.

Q. 3	(a)	Describe in detail about raw material preparation, structure and properties of Poly(vinyl chloride)	**06**
	(b)	Discuss in detail about structure properties and applications of polyethylene and polypropylene.	**06**
		OR	
	(b)	Write a note on High pressure, Phillips and Standard oil process.	**06**
Q. 4	(a)	Discuss following (1) Expanded polystyrene. (2) Polymerization, properties and application of poly acrylic acid.	**06**
	(b)	Give the reaction scheme of following (1) Polypyridine formation from polyacrylonitrile. (2) Branch formation in poly(vinylacetate). (3) Preparation of Poly(vinylalcohol).	**06**
		OR	
	(b)	Describe bulk polymerization technique for styrene and methyl methacrylate.	**06**
Q. 5	(a)	Explain general, catalyzed and uncatalyzed anhydride curing reaction of Epoxy resin.	**06**
	(b)	Write a note on following (1) Mechanism of epoxy resin synthesis. (2) Accelerator used in curing of UPE resin.	**06**
		OR	
	(b)	Explain following. (1) Flexible polyurethane foam. (2) Low shrink low profile unsaturated polyester resin.	**06**
Q. 6	(a)	Write a detail note on resinification of urea-formaldehyde resin.	**06**
	(b)	Discuss melamine formaldehyde in detail.	**06**
		OR	
	(b)	Give an account on following (1) Hardening of resole. (2) Resinification and cross linking of furan resin.	**06**

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SARDAR PATEL UNIVERSITY

M.Sc. (Polymer Science Technology) Semester-I Examination-2017

Wednesday, 08th November-2017

10:00 A.M. to 01:00 P.M.

PS01CPST23: POLYMER MATERIALS & RECYLING

Total Marks: 70

Note: (1) Attempt all questions.

(2) Figures to the right indicate marks.

Q.1 **Multiple choice questions.** **(08)**

(1) _____ can be used as starting material for the preparation of caprolactam.

(a) Cyclohexane (b) Cyclohexanol (c) Both 1 & 2 (d) None of these

(2) _____ can be used as monomer for polyimide.

(a) Phthaleic anhydride (b) Pyromellitic dianhyride (c) maleic anhydride (d) None of these

(3) Tertiary recycling is a type of _____ recycling.

(a) chemical (b) mechanical (c) energy recovery (d) all of these

(4) _____ can be used as starting material for preparation of formaldehyde

(a) methanol (b) acetone (c) acetaldehyde (d) None of these

(5) _____ is used as a chain transfer agent in polycaprolactone.

(a) water (b) primary alcohol (c) amine (d) All of above.

(6) ____ recycling can be defined as second hand use.

(a) Primary (b) Secondary (c) Tertiary (d) Quaternary

(7) If the screen pack is blocked, _____ also increases.

(a) Temperature in the system (b) pressure in the system (c) shear on the material (d) all of above

Q.2 **Answer any seven of following.** **(14)**

(1) Write a preparation of sebacic acid

(2) Which are different reaction routes for the preparation of Nylon

(3) Why plastics need to be sorted? Explain it

(PTO)

(4) Write a note on polyacetal

(5) Explain sorting of plastics based on their identification code.

(6) Explain solid state polymerization with an example.

(7) Write a preparation of caprolactam.

(8) Write a note on polylactide

(9) Explain Styrene Ethylene Butylene Styrene (SEBS)

Q.3 **(a)** Explain the base catalysed polymerization mechanism of caprolactam for preparation of Nylon 6 **(06)**

(b) Write a reaction scheme and preparation of Polyimide. Explain its properties and applications **(06)**

OR

(b) Write a note on polycarbonate **(06)**

Q.4 **(a)** Give an account on chemical recycling with suitable examples. **(06)**

(b) Enlist thermal conversion techniques use in plastic recycling. Explain any two. **(06)**

OR

(b) Give an account on various types of recycling techniques. **(06)**

Q.5 **(a)** Give an account on polyhydroxyalkanoates. **(06)**

(b) Write a detail note on polyphosphazene. **(06)**

OR

(b) Give an account on polyanhydrides. **(06)**

Q.6 **(a)** Explain crosslinking phenomenon taking place in thermoplastic elastomer and write a note on Styrenics. **(06)**

(b) Write a note on Thermoplastic polyurethane **(06)**

OR

(b) Explain thermoplastic polyester elastomer **(06)**

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SARDAR PATEL UNIVERSITY

M.sc. (Polymer Science & Technology) Semester-I Examination - 2017
Friday, 10th November -2017
10:00 A.M. to 01:00 P.M.
PS01EPST21: INDUSTRIAL CHEMISTRY-I

Total Marks: 70

Note: (1) Attempt all questions.
(2) Figures to the right indicate marks.

Q. 1 Answer the following multiple choice questions. **08**

(1) _____ is a nitrating agents.
(1) Fuming HNO_3 (2) Fuming H_2SO_4 (3) HNO_3+ H_2SO_4 (4) All of this.

(2) The line joining composition of C in extract and Raffinateis called _____.
(1) Plait point (2) tie line (3) Raffinate (4) All.

(3) The addition of water molecule to olefin double bond will produce alcohol such reaction is known as _____.
(1) Hydration (2) Sulphonation (3) Nitration (4) Hydrolysis

(4) Separation using distillation relative volatility should be_____.
(1) 1 (2) <1 (3) >1 (4) 0

(5) Milk is dried usually in a_____ drier.
(1) Freeze (2) Spray (3) Tray (4) Rotary

(6) _____ Alcohol esterification process is faster.
(1) Primary (2) Secondary (3) Tertiary (4) None of above

(7) By adding _____% of oleum instead of sulfuric acid make benzene sulfonic acid process faster.
(1) 5% (2) 10% (3) 15% (4) 20%

(8) Water always boils when it's _____.
(1) Temperature reaches 100 °C (2) Vapour pressure equals 76 cm of Hg
(3) Saturated vapour pressure equals external pressure on its surface
(4) Saturated vapour pressure is less than the atmospheric pressure

Q. 2 Attempt **any seven** of the following. **14**

(1) Define distillate and residue.

(2) Definition of extract and Raffinate.

(3) Explain Freeze drying.

(4) Draw a neat labelled diagram of spray drier

(5) Explain acid hydrolysis in hydrolysis process.

(6) Explain heterogeneous catalyst mechanism of hydrogenation process.

(7) Explain direct fluorination.

(8) Write any four type of oxidative reaction.

(9) Write only names of principal sulfonating and sulphating agents.

Q. 3 (a) With the help of a neat diagram, explain the construction & working of mixer-settler cascade & rotary disc contactor. **06**

(b) What are the various variables affecting rate of drying in a cross circulation drier? **06**

OR

(b) Answer the following. **06**

1. Draw and explain the working of rotary drier.
2. Differentiate between cross circulation and through circulation drying.

Q. 4 (a) Explain the various parts and functions of fractionator. **06**

(b) What do you mean by liquid-liquid extraction? With the help of block diagrams, differentiate between multistage cross current & counter current extraction. **06**

OR

(b) Answer the following. **06**

1. Explain simple distillation with an example.
2. Discuss the importance of optimum reflux ratio.

Q. 5 (a) Explain reactors for liquid-phase oxidation. **06**

(b) Raw material, reaction, manufacture of ethanol. **06**

OR

(b) Discus about chlorination process. **06**

Q. 6 (a) Explain alkylating agents. **06**

(b) Write a note on reactor used in esterification process. **06**

OR

(b) Explain following reactor. **06**

1. Biazzinitrator.
2. Schmidnitrator

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SARDAR PATEL UNIVERSITY

M.Sc. (Polymer Science & Technology) Semester-I Examination-2017

Thursday, 2nd November-2017
10:00 A.M. to 01:00 P.M.

PS01CPST21: BASIC CONCEPT IN POLYMER SCIENCE

Total Marks: 70

Note: (1) Attempt all questions.
(2) Figures to the right indicate marks.

Q. 1 Answer the following multiple choice questions. **08**

(1) _____ can be shaped in to hard utility articles by application of heat & pressure.
(i) Plastics (ii) Fiber (iii) Elastomer (iv) All.

(2) _____word derived from Greek.
(i) Polymer (ii) Plastics (iii) Both 1 & 2 (iv) none of above.

(3) Water insoluble monomer used in _____ polymerization technique.
(i) suspension (ii) solution (iii) bulk (iv) all of above.

(4) _____ is an initiator in free radical chain polymerization.
(i) PVA (ii) Benzoyl peroxide (iii) BF_3 (iv) Ethyl alluminium

(5) Deterioration in properties of polymer is called _____.
(i) decomposition (ii) degradation (iii) brittle (iv) none of above.

(6) Polyphenylene is thermally _____ stable than polycarbonate.
(i) less (ii) more (iii) average (iv) none of above.

(7) _____ is the example of natural polymer.
(i) Wool (ii) Natural rubber (iii) Starch (iv) All of above.

(8) _____ used in ionic polymerization.
(i) BF_3 (ii) Benzoyl peroxide (iii) Triethyl aluminium (iv) All of above.

Q. 2 Attempt **any seven** of the following. **14**

(1) Write down repeating unit structure for PMMA and PAN.
(2) Explain nomenclature of polymers.
(3) Define polymer and glass transition temperature.
(4) Explain thermal polymerization method used for initiation of free radical polymerization.
(5) Enlist various classifications of polymers.
(6) Explain natural polymers with its limitations.
(7) How photo stabilisers protect polymers from degradation?
(8) Molecular weight of polymer is considered as an average value. Explain
(9) Anionic polymerization also known as living polymerization. Justify

Q. 3 (a) Discuss in detail about Stereo – Regular polymers. **06**

(b) Answer following. **06**

1. Explain linear, branched and cross linked polymers.
2. Polymers differing in composition.

OR

(b) Differentiate following. **06**

1. Simple molecule and Polymer molecule.
2. Thermoplastic polymer and thermosetting polymer

Q. 4 (a) Describe bulk and suspension polymerization techniques. **06**

(b) Write a note on polycondensation. **06**

OR

(b) Discuss in detail about co-ordination polymerization by using Ziegler – Natta catalyst. **06**

Q. 5 (a) Write down mechanism of rubber oxidation. **06**

(b) Write a detail note on thermal degradation. **06**

OR

(b) What do you mean by polymer degradation? Discuss in detail about chain end and random degradation. **06**

Q. 6 (a) Write a detail note on states of phase. **06**

(b) Discuss structural regularity and crysllisability. **06**

OR

(b) Solve following. **06**

1. A sample containing 10% by weight of polymer having molecular weight 10000 and 90% by weight of polymer having molecular weight 100000. Calculate polydispersity.
2. Calculate polydispersity for a polymer sample containing chain of different mass as follows.

Number	10	20	30	50	60
Mass	500	1000	5000	10000	20000

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