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SARDAR PATEL UNIVERSITY

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

Tuesday, 11th April, 2017

10:00 A.M. to 1:00 P.M.

PS02CPST08: Polymer Characterization**Total Marks: 70****Note:** (1) Attempt all questions.

(2) Figures to the right indicate full marks.

Q.1 Write appropriate choice for the following. (8)

- (1) Tensile test is ASTM D _____.
(i) 638 (ii) 639 (iii) 640 (iv) 637.
- (2) Testing errors may occur from _____.
(i) test itself (ii) operator (iii) test specimen (iv) All of above.
- (3) An alternate method for measuring solvent stress cracking employs a specimen of size _____.
(i) 1.5×0.5 (ii) 4×1×0.03 (iii) 4×2×0.03 (iv) 1.5×2
- (4) Volume resistivity = _____.
(i) $\frac{A}{t(R_v)}$ (ii) $\frac{At}{\rho(R_v)}$ (iii) $\frac{A}{t(\pi R_v)}$ (iv) $\frac{At(R_v)}{\omega}$.
- (5) _____ can be used as heating media in softening point measurement technique.
(i) Glycerol (ii) paraffin oil (iii) silicon oil (iv) All.
- (6) \overline{M}_z is determined by _____.
(i) GPC (ii) sedimentation velocity method (iii) ebulliometry (iv) VPO.
- (7) _____ is the unit of relative density.
(i) gm/cc (ii) gm/ml (iii) Kg/m³ (iv) none of above
- (8) Plastics film of thickness _____ 0.05 inch is used in flammability test.
(i) > (ii) < (iii) = (iv) none of above

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

- (1) Define softening point and glass transition temperature.
- (2) Explain different precautions required during viscosity average molecular weight measurement.
- (3) Explain different classes of polymers on the basis of inherent flammability.
- (4) Define hardness. Explain factors affecting hardness test.
- (5) Describe dissipation factor in electrical properties of polymer.
- (6) Explain stress – strain plot for the polymer materials having different nature.
- (7) Write down the influence of test condition and conditioning of test specimen on the properties of polymers.
- (8) Discuss durrans mercury method.
- (9) Explain importance of material characterization test for thermoplastics.

- Q.3** (a) Explain in detail about gel permeation chromatography (GPC) technique. (6)
(b) Discuss static and dynamic equilibrium principle. (6)

OR

- (b) Write a note on following. (6)
1. Cryoscopy.
2. End group analysis.

- Q.4** (a) Discuss in detail about melt flow index test for thermoplastic polymer. (6)
(b) Explain following. (6)
1. Pyknometer method.
2. Fisher – Johns melting point method.
3. Moisture absorption test.

OR

- (b) Explain following. (6)
1. Heat deflection temperature test.
2. Vicat softening point test.

- Q.5** (a) What do you mean by impact test? Discuss in detail about izod and charpy impact test. Enlist various factors affects on test results. (6)
(b) Explain factors affecting following. (6)
1. Flexural test.
2. Dart impact test.
3. Tensile test.

OR

- (b) What do you mean by flammability test? Explain flammability test for flexible and self supporting plastics. (6)

- Q.6** (a) Explain the importance of chemical properties in polymer testing. Discuss in detail about immersion and stain resistance test. (6)
(b) Write a note on following. (6)
1. Accelerated method.
2. Arc resistance test.

OR

- (b) What are the basic requirements for an insulator? Discuss dielectric strength measurement. (6)

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SARDAR PATEL UNIVERSITY**M.Sc. Polymer Science & Technology Semester-II Examination – 2017****Thursday, 13th April 2017****10:00 a.m. to 1:00 p.m.****PS02CPST10: Polymer Additives****Note:** (1) Attempt all questions.**Total marks: 70**

(2) Figures to the right indicate full marks.

- Que. 1** **Answer the following** **08**
- (1) The function of _____ in plastics is to produce cellular material
(a) Toughening agent (b) blowing agent (c) anti ageing additive (d) none of these
 - (2) _____ is a additive which increase flexibility, elongation or workability.
(a) Filler (b) antistatic agent (c) plasticizer (d) none of these
 - (3) _____ 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
 - (4) Azodicarbonamide is used as _____ in cellular plastics
(a) physical blowing agent (b) chemical blowing agent (c) flame retardant (d) none of these
 - (5) Oxamide are used as _____
(a) blowing agent (b) flame retardant (c) chelating agent (d) none of these
 - (6) 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
 - (7) Chemical compound that modify pyrolysis reactions of polymers or oxidation reactions implies in the combustion by slowing them down or by inhibiting them are known as _____
(a) flame retardant (b) blowing agent (c) Toughening agent (d) none of these
 - (8) _____ are used as a thixotropic agent for polyester resin
(a) Dibutyl tin maleates (b) Azodicarbonamide (c) stearic acid (d) none of these
- Que. 2** **Answer the following (any seven)** **14**
- (1) Explain fungicide
 - (2) Discuss the compatibility and mobility of additives
 - (3) Explain the effect of natural radiation on ageing of plastics
 - (4) Define bleeding & blooming

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SARDAR PATEL UNIVERSITY

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

Monday, 17th April-2017

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

PS02CPST12: POLYMER PROCESSING TECHNOLOGY

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) Trapezoidal runners have a taper of _____ per side.
(i) 8° (ii) 9° (iii) 7° (iv) none of above.
- (2) Z – blade mixers are used to prepare _____ moulding compound.
(i) dough (ii) solid (iii) powder (iv) all of above.
- (3) _____ plate mould used for removal of gate, runners and sprues.
(i) Two (ii) Three (iii) both i & ii (iv) all of above
- (4) The extruder barrel is heated with _____.
(i) heating bands (ii) induction heating (iii) thermal fluids (iv) all of above
- (5) _____ parts can be produced by rotational moulding process.
(i) Hollow (ii) Seamless (iii) One piece (iv) all of above
- (6) 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
- (7) Hollow articles can be produced by _____ casting process.
(i) die (ii) dip (iii) film (iv) slush.
- (8) Blister packaging can be manufactured by _____ process.
(i) compression (ii) injection (iii) thermoforming (iv) rotational.

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

- (1) Discuss dispersive and distributive mixing.
- (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) Write a note on 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.

- Q. 3** (a) Define polymer processing. Explain hygroscopic behaviour, granule characteristic and thermal stability of polymer compound to be considered before processing. 06
- (b) Explain following. 06
1. High speed mixture.
 2. Z-blade mixers.

OR

- (b) Write a note on following. 06
1. Orientation and Shrinkage.
 2. Melt processing of thermosetting plastics.
- Q. 4** (a) Describe about flash mould, positive mould and semi positive mould used in compression moulding process. 06
- (b) Explain the steps involved in blow-moulding process with suitable diagram. 06

OR

- (b) Give an account on the rotational moulding process with relevant diagram. 06
- Q. 5** (a) Define nozzle. Explain alignment of nozzle with suitable diagram. Discuss any two types of nozzle used in injection moulding machine. 06
- (b) Discuss in detail about in line reciprocating screw based injection moulding machine. 06

OR

- (b) What do you mean by toggle system? Explain with neat labeled diagram. Write down advantages and disadvantages of toggle system. 06
- Q. 6** (a) Define casting? Enlist advantages of casting. Write a detail note on die casting. 06
- (b) Describe thermoforming process in detail. 06

OR

- (b) Describe PVC calendering plant with neat labelled diagram. 06

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SARDAR PATEL UNIVERSITY

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

Wednesday, 19th April-2017

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

PS02EPST05: APPLIED & INDUSTRIAL CHEMISTRY – II

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) A detergent solution is dried to powder in a _____ drier.
(i) Freeze (ii) Spray (iii) Tray (iv) Rotary.
 - (2) In Mier Super saturation Theory Curve AB Represent _____.
(i) Solubility Curve (ii) Super Solubility Curve (iii) Reflected Solubility Curve (iv) None
 - (3) Filtration is _____ Process.
(i) Physical (ii) Biological (iii) Mechanical (iv) All
 - (4) Liquid solvent used in absorption is _____.
(i) At its boiling point (ii) below its boiling point
(iii) above its boiling point (iv) none of this.
 - (5) Rotameter is _____.
(i) Variable Head Meter (ii) Variable Area Meter
(iii) Variable Pressure Meter (iv) None of this
 - (6) In a shell & tube heat exchanger _____.
(i) Square pitch gives more heat transfer area than triangular pitch.
(ii) Triangular pitch gives more heat transfer area than square pitch.
(iii) Both square & triangular pitch give same heat transfer area.
(iv) Cleaning facility is same in both square & triangular pitch.
 - (7) Rotor disk diameter ranges _____ to _____ of hammer mill.
(i) 150mm, 180mm (ii) 150mm, 250mm
(iii) 100mm, 200mm (iv) 250mm, 300mm.
 - (8) _____ less maintenance is required.
(i) Jaw crusher (ii) Gyrotory crusher (iii) both of this (iv) None of this.

- Q. 2** Attempt any seven of the following. 14
- (1) Define distillate and residue.
 - (2) How Super Saturation can be achieved?
 - (3) Explain Freeze drying.
 - (4) What is Cold Filtration?
 - (5) Distinguish between gas absorption & desorption with examples.
 - (6) What is Boundary Layer Concept?

- (7) In which side will you take corrosive fluid in a shell & tube exchanger?
Justify your answer.
- (8) Advantages of the ball mill.
- (9) Draw only diagram of black jaw crusher.
- Q. 3** (a) Explain the various parts and functions of fractionator. 06
(b) Draw and explain the working of spray drier 06
- OR**
- (b) Answer the following. 06
1. Differentiate between cross circulation and through circulation drying.
2. Explain limitation of miers theory.
- Q. 4** (a) Discuss in detail Filtration and its application. 06
(b) Write a note on Dorr thickener. 06
- OR**
- (b) Answer the following. 06
1. What is the importance of minimum L/V ration in absorption?
2. Discuss the criteria for selecting solvents in gas absorption.
- Q. 5** (a) With the help of a neat figure, explain the working of shell & tube heat exchanger. 06
(b) 8000kg/hr of air at 105°C is cooled by passing it through a counter flow heat exchanger. Find exit temperature of air and $(\Delta T)_{lm}$. If water enters at 15°C and flow rate of 7500kg/hr. Overall heat transfer co. Efficient is 521.24KJ/m² kg k and surface area is 20m². 06
- OR**
- (b) Explain following. 06
1. Orificemeter.
2. Venturimeter.
- Q. 6** (a) Write a principle, construction and working of smooth roll crusher. 06
(b) Explain following. 06
1. Factors influencing the size of the product of ball mill.
2. Write a note on tumbling mills.
- OR**
- (b) Write a comparison of crushing and grinding operation. 06
