

Seat No. _____

Enrolment No. _____

THE CHARUTAR VIDYA MANDAL UNIVERSITY
POLYMER SCIENCE & TECHNOLOGY – SEMESTER 4
SUMMER (REGULAR) 2022 EXAMINATION

Course Title: Rubber Technology

Course Code: 101340401

Total Printed Pages : 2

Date: 11/04/2022

Time: 1:30 to 3:30 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) The most important source of natural rubber is from _____ tree.
(i) Hevea brasiliences (ii) Parthenium argentatum (iii) Castilla elastica
(iv) Funtumia elastica.
- (2) Rubber is highly impermeable to _____.
(i) water (ii) air (iii) both 1 & 2 (iv) none of above.
- (3) Rubber is planted at a typical density of _____ trees per km².
(i) 4500-5000 (ii) 400-500 (iii) 450-500 (iv) 500-600.
- (4) _____ rubber obtain from wild trees by leaf digestion method.
(i) Gutta percha (ii) Balata (iii) Guayule (iv) Both i & ii.
- (5) The major compounding ingredient is _____ in rubber compounding.
(i) filler (ii) antidegradent (iii) pigment (iv) plasticizer.
- (6) _____ mixing require high shear forces to bring physical change.
(i) Distributive (ii) Dispersive (iii) Extensive (iv) All of above.
- (7) Slate powder is used as a _____ in rubber industry.
(i) plasticizer (ii) coupling agent (iii) filler (iv) cross linker.
- (8) Sulphur having melting point _____ °C is used for vulcanization.
(i) 100 (ii) 115 (iii) 110 (iv) 120.
- (9) Pressure exerted by water inside the cell against the cell wall is known as _____ pressure.
(i) cell (ii) turgor (iii) both of above (iv) none of above.
- (10) _____ used to promote Cord-rubber adhesion.
(i) Resorcinol-formaldehyde (ii) Butadiene-styrene-vinyl pyridine emulsions (iii) Both of above (iv) None of above.
- (11) _____ catalyst used for manufacturing of SBR.
(i) sulphur (ii) s-butyl lithium (iii) Ziegler-Natta (iv) both 2 & 3.
- (12) _____ strength of elastomers is its resistance to deterioration and fracture before vulcanization.
(i) Green (ii) Tensile (iii) Flexural (iv) All.

- Q.2** Attempt **any eight** of the following. (16)
- (1) How is levulinic aldehyde formed? Explain with reaction.
 - (2) Enlist drawback of raw rubber.
 - (3) Write down important characteristics of rubber.
 - (4) Explain structure, properties and applications of chlorosulphonated polyethylene.
 - (5) Write a note on ethylene-acrylic elastomer.
 - (6) Explain classification and properties of carbon black.
 - (7) Write a note on rubber hose.
 - (8) Explain the role of sulphur donor with suitable examples.
 - (9) Draw neat labelled flow diagram of polyisoprene manufacturing.
 - (10) How acetylene black is produced? Explain.
- Q.3** Write a note on following. (08)
1. Preservation and coagulation of latex
 2. Cultivation of natural rubber
- OR**
- Q.3** Explain following. (08)
1. Cyclised rubber
 2. Chemically modified forms of natural rubber
- Q.4** Discuss in detail about Styrene-butadiene rubber (SBR). (08)
- OR**
- Q.4** Discuss about following synthetic rubber (08)
1. Ethylene-propylene-diene terpolymer
 2. Polychloroprene rubber
- Q.5** Discuss in detail about peroxides used for cross linking of elastomers. Enlist various advantages and draw backs compared to sulphur vulcanization. (08)
- OR**
- Q.5** Write a note on rubber compounding. (08)
- Q.6** Discuss in detail manufacturing of furnace and thermal black. (08)
- OR**
- Q.6** Discuss in detail about theory of sulphur vulcanization and accelerator action. (08)

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THE CHARUTAR VIDYA MANDAL UNIVERSITY
M.Sc. Polymer Science & Technology Semester-IV
Summer 2022 Examination

Course Title: SPECIALTY POLYMERS

Course Code: 101340402

Total Printed Pages : 03

Date: 12/04/2022

Time: 1:30 pm to 3:30 pm

Maximum Marks: 60

Instructions:

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

Que. 1 (a) Answer the following (12)

- (1) _____ polymer is used to make filter fabric for coal boiler
(a) polycarbonate (b) polyphenylene sulfide (c) Poly-p-phenylene (d) All of these
- (2) Chlorination of polyvinyl chloride increase its _____
(a) flexibility (b) softening point (c) Impact strength (d) None of these
- (3) Casein consist of a high number of _____
(a) amylose (b) proline peptide (c) galactose (d) none of these
- (4) _____ is the example of modify chemical structure of polymer chain for higher temperature use
(a) Polystyrene (b) Polypropylene (c) Crosslinked Polyethylene (d) None of these
- (5) The energy difference between valance band and conduction band is known as _____
(a) Carrier mobility (b) forbidden gap (c) semiconductor (d) none of these
- (6) If we add filler in lower performance polymer for higher temperature use, the disadvantage is that increase processing problem like increase in _____
(a) melt viscosity (b) flexibility (c) Impact strength (d) None of these

- (7) _____ is obtained from brown seaweeds
(a) Acacia gum (b) guar gum (c) alginate (d) none of these
- (8) In ionic polymer, If bound ion is sulphonate group then polymer is known as _____ exchange polymer
(a) cation (b) anion (c) Zwitter ionic (d) none of these
- (9) Udel type polymer is an example of _____
(a) polyimide (b) polysulfide (c) polysulphone (d) polyketone
- (10) Which product is formed when sodium salt of cellulose reacted with monochloro acetic acid
(a) methyl cellulose (b) sodium carboxy methyl cellulose (c) hydroxy propyl cellulose (d) none of these
- (11) Guar gum is a mixture of _____
(a) Galactose and mannose (b) amylose and amylopectin (c) glucose and fructose (d) none of these
- (12) _____ Polymer is used in analytical separation technique in gel electrophoresis
(a) polyvinyl pyrrolidone (b) Polyvinyl alcohol (c) Polyacryl amide (d) none of these

Que. 2 Answer the following (any eight)

(16)

- (1) Why we need thermally stable polymer?
- (2) Discuss Polyphenylene sulfide
- (3) Write a note on casein
- (4) How to improve low performance polymers for high temperature use?
- (5) Discuss the application of hydrophilic polymer
- (6) Explain Carbohydrate
- (7) Define LOI and Smoke
- (8) Write a note on alginate
- (9) Explain the different steps for burning processes of a polymer
- (10) Write a short note on polyvinyl pyrrolidone.

- Que. 3** Write a synthesis scheme, property and application of polysulphone (08)
OR
- Que. 3** **Discuss the following** (08)
1. Polyetherether ketone
2. Polytetrafluoroethylene
- Que. 4** Explain the synthesis of ionic polymer by post functionalization of a standard and special pre-formed polymer (08)
OR
- Que. 4** **Write a note on following** (08)
1. Semi synthetic polymer
2. hydrogel polymer.
- Que. 5** Write a note on polyelectrolyte and hydrophilicity for Ion exchange (08)
OR
- Que. 5** **Answer the following** (08)
1. Write a synthesis scheme, property and application of polyimide
2. Polyvinyl alcohol
- Que. 6** **Explain the following** (08)
1. Polyphenylene oxide
2. Nomex
OR
- Que. 6** **Discuss the following** (08)
1. Guar Gum
2. How gelatin is produced? Write properties and application of gelatin

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THE CHARUTAR VIDYA MANDAL UNIVERSITY
M.Sc. Polymer Science & Technology Semester-IV
Summer 2022 Examination

Course Title: POLYMER BLENDS, & ADHESIVES

Course Code: 101340403

Total Printed Pages : 03

Date: 13/04/2022

Time: 1:30 pm to 3:30 pm

Maximum Marks: 60

Instructions:

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

Que. 1 (a) Answer the following

12

- (1) The major difference between Small Angle Neutron Scattering and Small Angle X-ray Scattering is their _____
(a) Intensity (b) Wavelength (c) Angle (d) None of these
- (2) Polystyrene – Poly(methyl methacrylate) is an example of _____ blend
(a) Miscible blend (b) Partially miscible blend (c) Immiscible blend (d) None of these
- (3) _____ technique is used for wood surface preparation
(a) Abrasion (b) degreasing (c) both a & b (d) None of these
- (4) _____ method is used for preparation of polymer blend
(a) solution mixing (b) melt mixing (c) Interpenetrating network (d) all of these
- (5) Polymer that are similar in structure or similar in polarity are _____
(a) More miscible (b) Less miscible (c) As such (d) None of these
- (6) _____ technique is used for metal surface preparation
(a) Abrasion (b) degreasing (c) chemical method (d) all of these
- (7) In a blend, when $\alpha_1 = \alpha_2$, $\gamma_1 = \gamma_2$, Q_{12} and χ_{12} approach zero the polymer will become _____
(a) Miscible (b) Partially miscible (c) Immiscible blend (d) None of these

- (8) _____ is used as degreasing solvent for metals
 (a) Acetone (b) Methanol (c) Ethanol (d) Trichloro ethylene
- (9) _____ is the methods of adhesive application
 (a) brushing (b) spraying (c) roll coating (d) All of these
- (10) Which of the following end group polymer used to compatibilization either by block or graft copolymer
 (a) amine (b) carboxylic acid (c) hydroxyl (d) all of these
- (11) In Blending, Small amount of compatibilizer is required for _____
 (a) Interfacial action (b) Crystallinity (c) polarity (d) None of these
- (12) _____ is example of boil proof type adhesive
 (a) UF resin (b) MF resin (c) PF resin (d) None of these

Que. 2 Answer the following (any Eight)

(16)

- (1) Why polyethylene and polypropylene don't mix together? Explain it
- (2) Explain the different methods for preparation of polymer blend.
- (3) Discuss the surface treatment of wood for adhesive application
- (4) Explain the type of stresses that occur on the adhesive bonded joint
- (5) Write the different reason for insufficient bonding in adhesive bonding.
- (6) Write the classification of adhesive based on durability
- (7) Discuss the surface treatment of metal for adhesive application
- (8) Discuss the advantages of blending
- (9) How the chemical modification of polymer enhancing the miscibility
- (10) Explain interphase and interface

Que. 3 Discuss briefly on reactive compatibilization

(08)

OR

Que. 3 Answer the following

(08)

1. Explain the effect of molecular weight and pressure on miscibility and immiscibility.
2. Discuss the method of studying miscibility or immiscibility

Que. 4 (a) Explain the different methods of adhesive bond curing (08)

OR

(b) Answer the following (08)

1. Explain the different factors in miscibility
2. Explain polymer modification for reactive compatibilization.

Que. 5 (a) Discuss briefly on physical additive used in compatibilization (08)

OR

(b) Answer the following (08)

1. Explain the factor affecting the adhesive selection.
2. What are the different reasons for poor adhesion bonding?

Que. 6 (a) Explain the different methods of adhesive application and adhesive bonding (08)

OR

(b) Answer the following (08)

1. Write the advantage and disadvantage of adhesive bonding.
2. What are the different additives used in adhesive formulation? Explain its role in adhesive

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THE CHARUTAR VIDYA MANDAL UNIVERSITY
POLYMER SCIENCE AND TECHNOLOGY
SEMESTER-IV
EXTERNAL EXAMINATION-2022

Course Title: ENVIRONMENTAL SCIENCE

Course Code: 101340406

Total Printed Pages : 2

Date: 14/04/2022

Time: 1:30 pm-3:30 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) Pollutants present in _____ form.
(a) solid (b) liquid (c) gas (d) all of above
- (2) The temperature range of Mesosphere is _____.
(a) 15 to -56°C (b) -2 to -92 (c) -56 to -2 (d) none of above
- (3) _____ is essential for aquatic life.
(a) DO (b) COD (c) N (d) none of above
- (4) Pathological waste content heating value of _____ J/kg.
(a) 1.5×10^5 (b) 1.5×10^6 (c) 2.5×10^5 (d) 2.5×10^6
- (5) _____ Cycle is important to maintain life cycle.
(a) Nitrogen (b) Oxygen (c) Carbon (d) Hydrogen
- (6) Biotic have components such as _____.
(a) flora (b) fauna (c) human (d) all of above
- (7) What is the most common way that nitrogen fixation occur
(a) Lighting (b) Nitrogen Fixing Bacteria (c) Fuel Combustion
(d) Forest Fires
- (8) Earth's rock and mineral heated at high temperature to produce _____.
(a) ingenious rock (b) magma (c) quarts (d) none of above
- (9) The size of Atiken particles is less than _____ μ .
(a) 0.2 (b) 0.4 (c) 0.6 (d) 0.8

- (10) The Process of converting wet waste to manure is called _____.
 (a) Incineration (b) Conservation (c) Metabolism (d) Composting.
- (11) Study of interaction between living things is known as _____.
 (a) environment (b) ecology (c) ecosystem (d) none of above
- (12) Residence time of NO in atmosphere is _____ days.

(a) four (b) five (c) six (d) seven

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

- (1) Discuss Environment Composition.
- (2) Explain weathering process.
- (3) Explain sulphur cycle.
- (4) Define the composition of Pollutant in detail.
- (5) Rapid Industrialization is the main source of pollution. Explain why?
- (6) Explain four types of equipment used to control of particulate emission.
- (7) Enlist the sign of water pollution.
- (8) Explain DO in detail.
- (9) Explain Sanitary Landfill in brief
- (10) What are the major cause of Soil pollution

Q. 3 Discuss Nitrogen Cycle in detail. **(08)**

OR

Q.3 Define Ecology & Ecosystem in detail. **(08)**

Q. 4 Explain the major source of air pollution. **(08)**

OR

Q. 4 Explain the Analysis Process of the following- **(08)**

- a.) Hydrocarbon
- b.) Carbon-Monoxide

Q. 5 Explain Bio-Chemical Oxygen demand (BOD) & Chemical Oxygen Demand (COD). **(08)**

OR

Q. 5 Explain the Following- **(08)**

- a)Organic Pollutant.
- b)Inorganic Pollutant.

Q. 6 Explain in detail about composting **(08)**

OR

Q. 6 Discuss the Potential Methods of Disposal. **(08)**