

[Time: 2.5 Hours]

[Marks:60]

Please check whether you have got the right question paper.

- N.B:
1. All questions are compulsory.
 2. Figures to the right indicate full marks.
 3. Use of non-programmable scientific calculator is allowed.

- 1 A] Attempt any **two** of the following: 08
- i] Explain in brief the polymer processing techniques with respect to any two moulding processes.
 - ii] 'LDPE is used mainly as a thin film for packaging and sheets while HDPE is used in injection moulding of crates, automobile gas tanks etc.' Explain.
 - iii] Name two properties and two applications of- (a) ABS group (b) acrylic polymers
 - iv] What do you understand by the term 'glass transition temperature'? Discuss the factors influencing glass transition temperature.
- B] Attempt any **one** of the following: 04
- i] Discuss use of fillers and plasticizers to improve polymer properties.
 - ii] Draw typical DSC and DTA thermogram for a semicrystalline polymer, showing the glass transition temperature, melt temperature and distortion or degradation temperature. Define the terms involved.
- 2 A] Attempt any **two** of the following: 08
- i] How does a membrane potential develop?
 - ii] Explain the mechanism of membrane hydrolysis on the basis of Donnan effect.
 - iii] What is electrophoresis? Explain the principle of separation by paper electrophoresis.
 - iv] 'The process of dissolution of a polymer differs from that of a low molecular weight substance'. Explain.
- B] Attempt any **one** of the following: 04
- i] Explain the terms: 1) Isotonic solutions 2) Hypotonic solutions 3) Hypertonic solutions.
 - ii] Prove the statement: 'The larger is the number of independent segments in a polymer sample, the greater is the coiling of a polymer chain'.
- 3 A] Attempt any **two** of the following: 08
- i] What is biocatalysis? What are the green advantages of using enzymes as catalysts?
 - ii] What are ionic liquids? Mention their important properties.
 - iii] Write a note on- speciality polymers.
 - iv] Explain the importance of biodegradation with suitable examples.
- B] Attempt any **one** of the following: 04
- i] What are supercritical fluids? Draw a neat, labelled phase diagram showing supercritical fluid region.
 - ii] Explain the terms - (a) Electronic shielding (b) Drag reduction.

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- 4 A] Attempt any **two** of the following: 08
i) Explain the mechanism of fluorescence quenching brought about by inert gases and due to abstraction by H – atom.
ii) Give a brief account of the Calvin cycle involved in photosynthesis.
iii) Mention some of the important applications of photochemistry in science and technology.
iv) Explain the deviation from the Stern -Volmer equation in the presence of static quenching.
- B] Attempt any **one** of the following: 04
i) Describe the construction and working of single layer organic solar cell. What are its disadvantages?
ii) Describe the working of a photo electrochemical device used to convert light energy into electrical energy. Give one example of this type of device.
- 5 Attempt any **four** of the following: 12
A] In identification and characterization of polymers, what are applications of IR spectroscopy?
B] Write a note on- viscoelasticity.
C] Give an account of the bonds that are responsible for protein structure.
D] Discuss the effect of following factors on electrophoretic mobility: (a) charge/mass ratio of sample (b) pH of buffer.
E] What are conducting polymers? Explain it with suitable examples.
F] Given an account of solvent free reactions using microwave radiations.
G] What is excimer? Why is excimer formation essential in the concentration quenching?
H] What are the objectives of the solar energy conversion devices?
