

Time: 1.30 hour

Maximum marks: 45

NB:

- 1) Question No.1 is Compulsory
- 2) Attempt any two questions from Question No.2 to Question No.5
- 3) Draw neat diagrams and write chemical equations wherever necessary.
- 4) Figures to the right indicate full marks.

Q. 1 Attempt any five of the following:

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- a) Define fuels. How are they classified? Give examples.
- b) Explain why zinc gives better protection for iron than tin.
- c) What are the merits of phase rule?
- d) Write significance of glass transition temperature of polymer.
- e) Define composite materials. Write four important characteristic properties of composite materials?
- f) What are the main advantages of biodiesel?
- g) A sample of coal contains C=80%, H=7%, O=3%, S=3.5%, N=2.1% and Ash= 4.4%. Calculate gross calorific value of coal.

Q.2 What is corrosion? Explain the mechanism of electrochemical corrosion by

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- a) evolution of hydrogen with suitable example and reactions.
- b) How proximate analysis conducted and what is its significance in determining the utility of a coal for particular purpose?
- c) Explain conventional and greener route of synthesis of carbaryl. Also write the principle of green chemistry involved in this reaction.

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Q.3 In a sample of polymer has following molar mass:

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a)

Number of Molecules	Molar mass(g/mole)
20	20000
30	30000
50	60000

Calculate the number average, weight average and polydispersity index of above sample polymer.

- b) Define the following terms involved in phase rule with suitable examples:
 - i) Phase ii) Components iii) Degree of freedom.
- c) What is matrix phase of composites? Write functions of matrix phase with examples.

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- Q.4** Give the definitions and significance of following properties of polymer. **6**
- a)** Tensile strength, insulation resistance and refractive index.
 - b)** What is green fuel? Explain the manufacture of power alcohol from molasses with reactions and write its advantages. **5**
 - c)** Calculate the weight and volume of air required for complete combustion of 1 kg of coal containing C = 75%, H = 12%, O = 6%, S = 4% and remaining ash. (Mol. Wt. of air = 28.949 kg) **4**
- Q.5** How material selection and proper design of equipment's can prevent **6**
- a)** corrosion. Explain with the help of diagram and designing principles.
 - b)** What are laminates? Explain it with the help of diagram and functions. **5**
 - c)** 1000 kg of a sample of argentiferous lead containing 0.1% silver is melted and then allowed to cool. If eutectic contains 2.6% silver, what mass of:
i) Eutectic will formed and ii) Mass of lead will separate out? **4**
