

**BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT**

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

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Course Code 

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First Semester B.E. Degree Examinations, April/May 2023

**CHEMISTRY FOR MECHANICAL ENGINEERING STREAM-I**

Duration: 3 hrs

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.**2. Missing data, if any, may be suitably assumed*

<u>Q. No</u>	<u>Question</u>	<u>Marks</u>	<u>(RBTL:CO:PI)</u>
<b><u>MODULE – 1</u></b>			
1.	a. Explain construction and working of pv cell.	06	(2 :1 : 1.2.1)
	b. Explain the determination of calorific value by using bomb calorimeter.	06	(2 :1 : 1.2.1)
	c. Calculate the gross and net calorific value of a sample of coal from the following data; Weight of coal = 0.80 g; Weight of water = 2000 g ; Water equivalent of calorimeter = 500 g ; Rise in temperature = 2.5 °C ; Specific heat of water = 4.18 kJ/kg/ °C ; % hydrogen = 5 % : Latent heat of steam = 2457 kJ/ °C	08	(3 :1 : 1.2.1)
<b>OR</b>			
2.	a. Discuss synthesis and applications of biodiesel.	06	(2 :1 : 1.2.1)
	b. Explain the construction and working of Li-ion battery.	06	(2 :1 : 1.2.1)
	c. Apply electrolysis of water for the production of hydrogen and mention its advantages.	08	(3 :1 : 1.2.1)
<b><u>MODULE – 2</u></b>			
3.	a. Define corrosion. Apply electrochemical theory of corrosion for rusting of iron.	07	(3 :2 : 1.2.1)
	b. Mention the technological importance of metal finishing.	06	(2 :2 : 1.2.1)
	c. Discuss the electro less plating of nickel.	07	(2 :2 : 1.2.1)
<b>OR</b>			
4.	a. Explain cathodic protection by sacrificial anode method.	07	(2 :2 : 1.2.1)
	b. Discuss the electroplating of Chromium.	06	(2 :2 : 1.2.1)
	c. A thick brass sheet of area 400 inch <sup>2</sup> is exposed to moist air. After 2 years of period, it was found to experience a weight loss 375 g due to corrosion. If the density of brass is 8.73 g/cm <sup>3</sup> . Calculate CPR in mpy and mmpy.	07	(3 :2 : 1.2.1)
<b><u>MODULE – 3</u></b>			
5.	a. What is polymerization? Explain the types of polymerization.	07	(2 :3 : 1.2.1)
	b. A polymer sample contains 20, 35, 45 molecules having molecular mass of 150, 250 and 300 respectively. Calculate $\bar{M}_n$ and $\bar{M}_w$ .	07	(3 :3 : 1.2.1)
	c. Discuss the synthesis, properties and industrial applications of Kevlar.	06	(2 :3 : 1.2.1)
<b>OR</b>			
6.	a. Discuss the Synthesis, properties and industrial applications of polyvinylchloride.	07	(2 :3 : 1.2.1)

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|----|---|----|----------------|
| b. | Explain the synthesis, properties and industrial applications of poly (methyl methacrylate) | 07 | (2 :3 : 1.2.1) |
| c. | Discuss the properties and the applications of carbon nanotubes.                            | 06 | (2 :3 : 1.2.1) |

#### **MODULE – 4**

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|----|----|---|----|----------------|
| 7. | a. | Define phase, components and degree of freedom.                               | 06 | (2 :4 : 1.2.1) |
|    | b. | Discuss principle and instrumentation of potentiometric sensors.              | 07 | (2 :4 : 1.2.1) |
|    | c. | What are optical sensors? Explain its application in determination of copper. | 07 | (2 :4 : 1.2.1) |

**OR**

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|----|----|---|----|----------------|
| 8. | a. | List the advantages of analytical sensor techniques over classical methods of analysis. | 06 | (2 :4 : 1.2.1) |
|    | b. | Elucidate the application of PH sensor in determination of pH of a beverage.            | 07 | (2 :4 : 1.2.1) |
|    | c. | Discuss the phase diagram of Lead Silver system.  | 07 | (2 :4 : 1.2.1) |

#### **MODULE – 5**

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|----|----|--|----|----------------|
| 9. | a. | Discuss composition, properties and applications of Stainless Steel. | 07 | (2 :5 : 1.2.1) |
|    | b. | Discuss the classification of Ceramics.                              | 06 | (3 :5 : 1.2.1) |
|    | c. | Discuss the size dependent properties of Nano materials.             | 07 | (2 :5 : 1.2.1) |

**OR**

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|-----|----|--|----|----------------|
| 10. | a. | Explain the properties, composition and application of the Brass     | 07 | (2 :5 : 1.2.1) |
|     | b. | Discuss the Sol Gel method of preparation of Nano Materials          | 07 | (3 :5 : 1.2.1) |
|     | c. | Mention properties and engineering applications of carbon nanotubes. | 06 | (2 :5 : 1.2.1) |

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