

Basavarajeswari Group of Institutions

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

2022 SCHEME

USN

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Course Code

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First / Second Semester B.E. Degree Examinations, February 2025

CHEMISTRY FOR CIVIL ENGINEERING STREAM

Duration: 3 hrs

Max. Marks: 100

- Note:*
1. Answer any FIVE full questions, choosing ONE full question from each module.
 2. Use of Chemistry Formula Handbook is permitted.
 3. Missing data, if any, may be suitably assumed.

<u>Q. No</u>	<u>Question</u>	<u>Marks</u>	<u>(RBTL:CO:PI)</u>
<u>Module-1</u>			
1.	a. Explain composition and properties of cement.	06	(2:1:1.2.1)
	b. List out the properties and applications of aluminium and its alloys.	06	(2:1:1.2.1)
	c. On burning of 1.25 g of a coal sample in a bomb calorimeter, the temperature of 1000 g of water in the calorimeter increased from 25.5 °C to 28.5 °C. Water equivalent of calorimeter is 300 g. Specific heat of water 4.187 kJ/kg/°C. Latent heat of steam is 2454 kJ/kg. If the fuel contains 3% of hydrogen, calculate gross and net calorific value.	08	(3:1:1.2.1)
(OR)			
2.	a. Explain synthesis and applications of biodiesel.	06	(2:1:1.2.1)
	b. Explain the production of hydrogen by electrolysis of water and its advantages.	06	(2:1:1.2.1)
	c. Define calorific value. Illustrate the determination of calorific value using bomb calorimeter.	08	(3:1:1.2.1)
<u>Module-2</u>			
3.	a. Define fuel cell. Explain construction and working of methanol-oxygen fuel cell.	06	(2:2:1.2.1)
	b. Write the differences between electroplating and electroless plating.	06	(2:2:1.2.1)
	c. Define corrosion. Apply electrochemical theory of corrosion to explain the corrosion of steel.	08	(3:2:1.2.1)
(OR)			
4.	a. Explain the construction, working and applications of Li-ion battery.	06	(2:2:1.2.1)
	b. Describe the construction, working and applications of photovoltaic cells.	06	(2:2:1.2.1)
	c. Apply the anodization and galvanization method to control the corrosion.	08	(3:2:1.2.1)
<u>Module-3</u>			
5.	a. What is reverse osmosis? Describe the process and application of reverse osmosis.	06	(2:3:1.2.1)
	b. Explain the synthesis of nanomaterial by sol-gel method.	06	(2:3:1.2.1)
	c. Define COD. In a COD determination 26.5 mL and 20.0 mL of 0.03 N ferrous ammonium sulphate were required for blank and sample titration respectively. Volume of water sample taken is 20 mL. Calculate COD of the water sample.	08	(3:3:1.2.1)

(OR)

6. a. List out the properties and applications of carbon nanotubes. 06 (2:3:1.2.1)
b. Describe the desalination of water by electro-dialysis. 06 (2:3:1.2.1)
c. A sample of water found to contain following dissolved salts in mg/L 08 (3:3:1.2.1)
 $\text{Mg}(\text{HCO}_3)_2=70$, $\text{CaCl}_2=180$, $\text{Ca}(\text{HCO}_3)_2=98$, $\text{MgSO}_4=65$ and $\text{MgCl}_2=115$. Calculate temporary, permanent and total hardness of water. Given that molecular weight of $\text{Mg}(\text{HCO}_3)_2=146$, $\text{CaCl}_2=111$, $\text{Ca}(\text{HCO}_3)_2=162$, $\text{MgSO}_4=120$, and $\text{MgCl}_2=95$.

Module-4

7. a. Discuss the addition and condensation methods of polymerization. 06 (2:4:1.2.1)
b. Describe the synthesis, properties and industrial applications of Kevlar. 06 (2:4:1.2.1)
c. Calculate number average and weight average molecular weight of the polymer sample consisting of 7, 6, 4 and 3 molecules having molecular weight 4×10^4 , 3×10^4 , 5×10^4 and 6×10^4 respectively. 08 (3:4:1.2.1)

(OR)

8. a. Explain synthesis, properties and applications of Teflon. 06 (2:4:1.2.1)
b. Explain synthesis, properties and applications of polylactic acid (PLA). 06 (2:4:1.2.1)
c. What are lubricants and give the classification of lubricants. 08 (3:4:1.2.1)

Module-5

9. a. Explain theory and instrumentation of potentiometry. 06 (2:5:1.2.1)
b. List the advantages and disadvantages of instrumental methods of analysis. 06 (2:5:1.2.1)
c. Apply the phase diagram to two component-lead-silver system and explain the area, curve and points. 08 (3:5:1.2.1)

(OR)

10. a. Define the following terms: 06 (2:5:1.2.1)
(i) Phase (ii) Components (iii) Degree of freedom
b. Discuss the instrumentation of Conductometry and its application in the estimation of acid mixture. 06 (2:5:1.2.1)
c. Describe the principle of optical sensor (calorimetry) and apply its principle in the estimation of beverage. 08 (3:5:1.2.1)

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