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BCHEC102/202

**First/Second Semester B.E./B.Tech. Degree Examination, June/July 2025**
**Applied Chemistry for Civil Engineering Stream**

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.*
*2. VTU Formula Hand Book is permitted.*
*3. M : Marks , L: Bloom's level , C: Course outcomes.*

| | | Module – 1 | M | L | C |
|---|---|---|---|---|---|
| Q.1 | a. | What are alloys? Write the properties and applications of stainless steel and duralumin. | 07 | L2 | CO1 |
| | b. | Explain the classification of refractories based on chemical composition. | 06 | L2 | CO1 |
| | c. | What is glass? Describe the preparation of soda lime glass. | 07 | L2 | CO1 |
| | | OR | | | |
| Q.2 | a. | What is cement? Give the classification of cement. | 07 | L2 | CO1 |
| | b. | What are refractories? Mention the properties and applications of refractories. | 06 | L2 | CO1 |
| | c. | With a neat diagram explain the various steps involved in the manufacture of cement by wet process. | 07 | L2 | CO1 |
| | | Module – 2 | | | |
| Q.3 | a. | Describe the electrochemical corrosion of steel in concrete. | 06 | L2 | CO2 |
| | b. | Define PV cell. Explain the construction and working of photovoltaic cell. | 07 | L2 | CO2 |
| | c. | What is anodizing? Explain the anodizing of aluminium and mention its applications. | 07 | L2 | CO2 |
| | | OR | | | |
| Q.4 | a. | With a neat diagram, explain the construction and working of Li-Ion battery. Mention its applications. | 07 | L2 | CO2 |
| | b. | What is corrosion? Explain the differential metal corrosion with an example. | 06 | L2 | CO2 |
| | c. | Explain the construction, working and applications of Methanol-Oxygen fuel cell. | 07 | L2 | CO2 |
| | | Module – 3 | | | |
| Q.5 | a. | What is desalination? With a neat diagram describe the desalination of water by electrodialysis method. | 07 | L2 | CO3 |
| | b. | What are nano materials? Explain the following size dependent properties of nano materials : (i) Surface area   ii) Catalytic property | 06 | L2 | CO3 |
| | c. | Define COD. In a COD test, 30.2 $cm^3$ and 14.5 $cm^3$ of 0.04 N FAS solutions are required for a blank and sample titration respectively. The volume of sample solution used is 25 $cm^3$. Calculate the COD of the sample solution. | 07 | L3 | CO3 |

**OR**

| Q.6 | a. | Explain the synthesis of nano materials by Sol-Gel method. | 07 | L2 | CO3 |
|---|---|---|---|---|---|
| | b. | Write a note on :<br>i)  Carbon nano tubes        ii)  Graphenes | 06 | L2 | CO3 |
| | c. | 100 ml of water requires 18 ml of 0.01 M  EDTA on titration using EBT indicator. In another experiment 100 ml of the sample water was boiled and filtered required 9 ml of 0.01 M EDTA  using EBT indicator. Calculate temporary, permanent and total hardness of sample water. | 07 | L3 | CO3 |

### Module – 4

| Q.7 | a. | What is polymerization? Discuss the free radical mechanism of addition polymerization. | 06 | L2 | CO4 |
|---|---|---|---|---|---|
| | b. | Explain the synthesis, properties and applications of Chloro polyvinyl chloride. | 07 | L2 | CO4 |
| | c. | What are fibres? Describe the synthesis, properties and applications of Nylon fibers. | 07 | L2 | CO4 |

**OR**

| Q.8 | a. | What are adhesives? Discuss the synthesis, properties and applications of epoxy resin. | 06 | L2 | CO4 |
|---|---|---|---|---|---|
| | b. | Define biodegradable polymer. Discuss the steps involved in the preparation of poly lactic acid and mention the applications. | 07 | L2 | CO4 |
| | c. | A polymer sample contains 2 molecules of molecular mass 2000 g/mol, 4 molecules of molecular mass 3000 g/mol and  6 molecules of molecular mass 4000 g/mol. Calculate the number average and weight average molecular mass of polymer sample. | 07 | L3 | CO4 |

### Module – 5

| Q.9 | a. | State phase rule. Explain the terms involved in the phase rule equation. | 07 | L2 | CO5 |
|---|---|---|---|---|---|
| | b. | What is conductometric sensor? Discuss the principle and instrumentation of conductometric sensor. | 07 | L2 | CO5 |
| | c. | What is pH sensor? Explain its application in the determination of a soil sample. | 06 | L2 | CO5 |

**OR**

| Q.10 | a. | With the help of a neat phase diagram, describe the Lead-Silver system. | 06 | L2 | CO5 |
|---|---|---|---|---|---|
| | b. | What is potentiometric sensor? Explain the principle and instrumentation of potentiometric sensor. | 07 | L2 | CO5 |
| | c. | Explain the principle, instrumentation and working of pH sensor. | 07 | L2 | CO5 |

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