SCHEME OF COURSE WORK

Course Details:

Course Title	**: CHEMISTRY OF MATERIALS**		
Course Code	**: 20BC1103**	**L T P C**	**3 0 0 3**
Program:	**: B.Tech.**		
Specialization:	**: CIVIL ENGINEERING**		
Semester	**: I**		
Prerequisites	**:Fundamentals of chemistry**		
Courses to which it is a prerequisite	**-**		

Course Outcomes (COs):

After completion of the course, student shall be able to:

Course Outcomes (COs):		**Learning Outcomes**
CO-1	Illustrate the working of energy storage devices (L3).	1. apply standard reduction potential data to calculate the standard cell potential (L3) 2. apply redox principles for construction of batteries and fuel cells (L3) 3. illustrate the construction and working of a pv cell (L3)
CO-2	Apply the principles involved in corrosion to predict and prevent corrosion in real life systems (L3).	1. explain theories of corrosion (L2) 2. discuss various factors affecting corrosion (L2) 3. apply the principles of corrosion control methods (L3)
CO-3	Determine the water quality and prescribe the remedial measures for domestic as well as industrial usage (L3).	1.determine total hardness of a water sample (L3) 2.illustrate problems associated with hard water (L3) 3.explain the principles of reverse osmosis and electrodialysis (L2) 4. demonstrate the Industrial water treatment processes (L3)
CO-4	Use different types of polymers to specific purposes (L3).	1. explain the properties of refractories and lubricants (L2) 2.illustrate the chemical reactions involved in the manufacturing of cement (L3) 3. differentiate thermoplastic and thermosetting resins (L3)
CO-5	Explain the importance of nano and smart materials (L2)	1. classify nano and smart materials (L2) 2. explain the synthesis and characterization methods of nano materials (L2) 3. explain the importance of different types of smart materials (L2)

Program Outcomes (POs):

A graduate of Civil engineering will be able to

1	Graduates will be able to apply the knowledge of mathematics, science, engineering fundamentals to solve complex civil engineering problems.
2	Graduates will attain the capability to identify, formulate and analyse problems related to civil engineering and substantiate the conclusions
3	Graduates will be in a position to design solutions for civil engineering problems and design system components and processes that meet the specified needs with appropriate consideration to public health and safety.
4	Graduates will be able to perform analysis and interpretation of data by using research methods such as design of experiments to synthesize the information and to provide valid conclusions.
5	Graduates will be able to select and apply appropriate techniques from the available resources and modern civil engineering and software tools, and will be able to predict and model complex engineering activities with an understanding of the practical limitations.
6	Graduates will be able to carry out their professional practice in civil engineering by appropriately considering and weighing the issues related to society and culture and the consequent responsibilities.
7	Graduates will be able to understand the impact of the professional engineering solutions on environmental safety and legal issues.
8	Graduates will transform into responsible citizens by resorting to professional ethics and norms of the engineering practice.
9	Graduates will be able to function effectively in individual capacity as well as a member in diverse teams and in multidisciplinary streams.
10	Graduates will be able to communicate fluently on complex engineering activities with the engineering community and society, and will be able to prepare reports and make presentations effectively.
11	Graduates will be able to demonstrate knowledge and understanding of the engineering and management principles and apply the same while managing projects in multidisciplinary environments.
12	Graduates will engage themselves in independent and life-long learning in the broadest context of technological change while continuing professional practice in their specialized areas of civil engineering.

PROGRAMME SPECIFIC OUTCOMES(PSOs):

1. Collect, process and analyse the data from topographic surveys, remote sensing, hydrogeological investigations, geotechnical explorations, and integrate the data for planning of civil engineering infrastructure.

2. Analyse and design of substructures and superstructure for buildings, bridges, irrigation structures and pavements.

3. Estimate, cost evaluation, execution and management of civil engineering projects.

Course Outcome Versus Program Outcomes:

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO 6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	1	-	-	-	-	-	-	-	1
CO2	3	3	-	2	-	-	-	-	-	-	-	2
CO3	3	3	-	2	-	-	-	-	-	-	-	2
CO4	3	3	-	2	-	-	-	-	-	-	-	2
CO5	3	3	-	2	-	-	-	-	-	-	-	2

Mapping Levels:

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), put -: No Correlation

Course outcomes vs Program Specific Outcomes

COs	PSO1	PSO2	PSO3
CO-1	-	-	-
CO-2	-	-	-
CO-3	-	-	-
CO-4	-	-	-
CO-5	-	-	-

Course Outcome-Assessment

Week	TOPIC / CONTENTS	Course Outcomes	Sample questions	Teaching-learning strategy	Assessment Method & Schedule
1	Electrode potential, type of electrochemical cells.	CO1	Q) Derive Nernst equation for electrode potential.	▫ Lecture / Discussion ▫ Problem solving	Assignment-I (Week - 4) Mid test-I (Week-8)
2	Reference Electrodes- NHE, Reference electrodes, Weston	CO1	Q) Write construction and working of calomel electrode	▫ Lecture / Discussion ▫ Problem solving	Assignment-I (Week - 4) Mid test-I (Week-8)

	cadmium cell.				
3	Construction and working principles of batteries	CO1	Q) Explain Construction and working principles of lead acid battery	▫ Lecture / Discussion ▫ Problem solving	Assignment-I (Week - 4) Mid test-I (Week-8)
4	Definition of corrosion-Types of corrosion	CO2	Q) Illustrate the mechanism of electrochemical corrosion.	▫ Lecture / Discussion	Quiz-I (Week-7) Mid test-I (Week-8)
5	factors influencing corrosion, corrosion controlling methods	CO2	Q) Explain factors influencing corrosion Q) Explain the process of galvanizing	▫ Lecture / Discussion	Quiz-I (Week-7) Mid test-I (Week-8)
6	Organic coatings-paints and varnishes	CO2	Q) Discuss the constituents of paints and varnishes	▫ Lecture / Discussion	Quiz-I (Week-7) Mid test-I (Week-8)
7	Hardness-types, disadvantages and their determining methods	CO3	Q) Explain the determination of hardness by EDTA method.	▫ Lecture / Discussion	Mid test-I (Week-8)
8	**MID TEST-I**			▫	
9	Boiler troubles- Priming and foaming, Scale and sludge Desalination of brackish water,	CO3	Q) Write the drawbacks of priming and foaming	▫ Lecture / Discussion	Assignment-II (Week - 12)
10	Water softening methods-Zeolite, ion exchange methods	CO3	Q) Explain the ion exchange method for softening the hard water.	▫ Lecture / Discussion	Mid test-II (Week-16) Assignment-II (Week - 12)
11	Polymers- Types of polymers-Mechanism of addition polymerization Plastics-differences between thermoplastic and thermosetting resins. Nylon 6,6 and Polystyrene	CO4	Q)Distinguish thermoplastic and thermosetting resins Q)Describe the mechanism of free radical addition polymerisation	▫ Lecture / Discussion	Mid test-II (Week-16) Assignment-II (Week - 12

12	Cement- Manufacture of Portland cement –setting and hardening of cement,	CO4	Q) Write setting and hardening reactions of cement	▫ Lecture / Discussion	Mid test-II (Week-16) Assignment-II (Week - 12
13	Lubricants-classification, Mechanism of lubrication and Properties. Refractories-Properties	CO4	Q) Describe the mechanism of lubrication.	▫ Lecture / Discussion	Mid test-II (Week-16) Assignment-II (Week - 12
14	Nano Materials: Introduction to Nano materials, Classification, Properties.	CO5	Q) Classify Nano materials based on dimension.	▫ Lecture / Discussion	Quiz-II (Week-15) Mid test-II (Week-16)
15	Synthesis of nano materials-Sol gel and Reverse Micellar Method Types of smart materials-Applications.	CO5	Q).Describe Sol gel method of synthesis of nano particles	▫ Lecture / Discussion	Quiz-II (Week-15) Mid test-II (Week-16)
16	**MID TEST-II**				
17	**END EXAM**				