|  |  |
| --- | --- |
| Programme:B.Tech | AcademicYear:2023-24 |
| Year: I | Semester:II |
| CourseTitle:ENGGCHEMISTRY | CourseCode: P231209 |
| NameofFaculty: S.HIMABINDU Asst Professor |  |

**UNIT-I**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S.No** | **Topics** | **No.ofSe**  **ssion Planned** | **Teaching**  **Method/ Aids** | **Refer ence** |
| 1 | Introduction | 1 | BB | T1,R1 |
| 2 | Soft and hard water | 1 | BB | T1,R1 |
| 3 | Estimation of hardness of water by EDTA Method | 2 | BB | T1,R1 |
| 4 | Estimation of dissolved Oxygen | 1 | BB | T1,R1 |
| 5 | Boiler troubles**–**Priming, foaming**,** scale and sludge | 1 | BB | T1,R1 |
| 6 | Caustic embrittlement, | 2 | BB | T1,R1 |
| 7 | Industrial water treatment | 1 | BB | T1,R1 |
| 8 | Specifications for drinking water | 1 | BB | T1,R1 |
| 9 | Bureau of Indian Standards (BIS) and World health organization (WHO) standards | 1 | BB | T1 |
| 10 | Ion-exchange processes - | 1 | BB | T1,R1 |
| 11 | desalination of brackish water | 1 | BB | T1,R1 |
| 12 | Reverse Osmosis, and electrodialysis. | 1 | BB | T1 |

**UNIT-II**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S.No** | **Topics** | **No.of**  **Sessions Planned** | **Teaching**  **Method/ Aids** | **Refere nce** |
| 1 | Electrodes–electrochemical cell | 1 | BB | T1,R1 |
| 2 | Nernst equation, cell potential calculations | 1 | BB | T1,R1 |
| 3 | Primary cells – Zinc-air battery | 2 | BB | T1,R1 |
| 4 | Secondary cells – Nickel-Cadmium (NiCad) battery working principle of the batteries including cell reactions | 1 | BB | T1,R1 |
| 5 | lithium ion battery working principle of the batteries  including cell reactions | 1 | BB | T1,R1 |
| 6 | Fuelcells- Basic Concepts, the principle and working of hydrogen-oxygen Fuel cell. | 1 | BB | T1,R1 |
| 7 | Corrosion: Introduction to corrosion | 1 | BB | T1,R1 |
| 8 | Electrochemical theory of corrosion | 1 | BB | T1,R1 |
| 9 | Differential aeration cell corrosion, galvanic corrosion | 1 | BB | T1,R1 |
| 10 | Metal oxide formation by dry electrochemical corrosion | 1 | BB | T1,R1 |
| 1**1** | Pilling Bed worth ratios and uses | 1 | BB | T1,R1 |
| 12 | Factors affecting the corrosion | 1 | BB | T1,R1 |
| 13 | Cathodic and anodic protection, | 1 | BB | T1,R2 |
| 14 | Electroplating and electroless plating (Nickel and Copper) | 1 | BB | T1,R2 |

**UNIT-III**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S.No** | **Topics** | **No.ofSe ssions Planned** | **Teaching Method/ Aids** | **Refere nce** |
| 1 | Introduction to polymers | 1 | BB | T1,R1 |
| 2 | Functionality of monomers | 2 | BB | T1 |
| 3 | Mechanism of chain growth, step growth polymerization. | 2 | BB | T1,R2 |
| 4 | Thermoplastics and Thermo-setting plastics | 1 | BB | T1,R1 |
| 5 | Preparation, properties and applications of polystyrene. PVC Nylon 6,6 | 1 | BB | T1,R1 1 |
| 6 | Preparation, properties and applications of Bakelite | 2 | BB | T1,R1  ` |
| 7 | Elastomers-properties and applications of BunaS, BunaN, Thiokol rubbers | 1 | BB | T1,R1 |
| 8 | Fuels **–** Types of fuels, Preparation calorific value of fuels | 1 | BB | T1,R1 |
| 9 | Numerical problems based on calorific value | 1 | BB | R1 |
| 10 | Analysis of coal (Proximate and Ultimate analysis), | 1 | BB | T1,R1 |
| 11 | Liquid Fuels, refining of petroleum, | 1 | BB | T1,R1 |
| 12 | Octane and Cetane number | 1 | BB | T1,R1 |
| 13 | Alternative fuels- propane, methanol, ethanol and bio fuel-bio diesel. | 2 | BB | T1,R1 |

**UNIT-IV**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S.No** | **Topics** | **No.of Sessions**  **Planned** | **Teaching Method/**  **Aids** | **Reference** |
| **1** | Composites- Definition, Constituents, Classification | **1** | BB | T1,R1 |
| 2 | Particle, Fiber and Structural reinforced composites, properties and Engineering applications | 2 | BB | R1 |
| 3 | Refractories-Classification, Properties, Factors  affecting the refractory materials and Applications | 2 | BB | T1,R1 |
| 4 | Lubricants-Classification, Functions of lubricants, Mechanism | 1 | BB | T1,R1 |
| 5 | Properties of lubricating oils –Viscosity, Viscosity Index, Flashpoint, Firepoint, Cloudpoint, saponification and Applications. | 2 | BB | T1,R1 |
| 6 | Building materials-Portland Cement | 1 | BB | T1,R1 |
| 7 | Portland Cement, constituents | 1 | BB | T1,R1 |
| 8 | Setting and hardening of cement. | 1 | BB | T1,R1 |

**UNIT-V**

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| --- | --- | --- | --- | --- |
| **S.No** | **Topics** | **No.of**  **Sessions Planned** | **Teaching**  **Method/ Aids** | **Reference** |
| **1** | Introduction to surface chemistry, | **1** | BB | T1,R1 |
| 2 | Colloids, micelle formation, synthesis of colloids (Braggs Method), | 2 | BB | R1 |
| 3 | Nanometals and Nanometal Oxides | 2 | BB | T1,R1 |
| 4 | Chemical and biological methods of preparation of nanometals and metal oxides | 1 | BB | T1,R1 |
| 5 | Stabilization of colloids and nanomaterials by stabilizing agents, | 2 | BB | T1,R1 |
| 6 | Adsorption isotherm (Freundlichand Longmuir), BET equation (no derivation) | 1 | BB | T1,R1 |
| 7 | Applications of colloids and nanomaterials– catalysis, medicine,  sensors, etc. | 1 | BB | T1,R1 |

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| **Text Books** | |
| Text1 | Jain and Jain, EngineeringChemistry,16/e,DhanpatRai,2013. |
| Text2 | Peter Atkins, Juliode Paula and James Keeler, Atkins’PhysicalChemistry,10/e,  Oxford University Press, 2010. |

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| --- | --- |
| **Reference Books** | |
| Ref-1 | Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007. |
| Ref-2 | J.D.Lee, Concise Inorganic Chemistry, 5th Edition,WileyPublications,Feb.2008 |
| Ref-3 | Textbook of Polymer Science, Fred W.BillmayerJr,3rdEdition |

WEB REFERENCES :

* 1. [**https://www.thermodyneboilers.com/boiler-problems/**](https://www.thermodyneboilers.com/boiler-problems/)
  2. [**https://www.sciencedoze.com/2022/03/conducting-polymers-definition-**](https://www.sciencedoze.com/2022/03/conducting-polymers-definition-examples.html)[**examples.html**](https://www.sciencedoze.com/2022/03/conducting-polymers-definition-examples.html)
  3. [**https://www.scribd.com/presentation/497847401/Analysis-of-Coal**](https://www.scribd.com/presentation/497847401/Analysis-of-Coal)
  4. [**https://www.atriainnovation.com/en/what-are-shape-memory-materials/**](https://www.atriainnovation.com/en/what-are-shape-memory-materials/) **VIDEO REFERENCES:**

1. [**https://youtu.be/ctlHNf1s6RM?si=FnrLSa3uXqzPZtDR**](https://youtu.be/ctlHNf1s6RM?si=FnrLSa3uXqzPZtDR) **–Ion exchange process**
2. [**https://www.youtube.com/live/rPv35HuWLW0?si=8pIqwhWd8IWyHOZZ**](https://www.youtube.com/live/rPv35HuWLW0?si=8pIqwhWd8IWyHOZZ) **–Corrosion**
3. [**https://youtu.be/1dG0PmKFsQA?si=u83MUinL3KQs4mKd**](https://youtu.be/1dG0PmKFsQA?si=u83MUinL3KQs4mKd) **–Conducting polymers**
4. [**https://youtu.be/SayZyTMROxk?si=CCB22VarlU6SIygw**](https://youtu.be/SayZyTMROxk?si=CCB22VarlU6SIygw) **–moving bed catalytic cracking**
5. [**https://youtu.be/I7doX1zWGdw?si=NhhkbRfuJ24j0QvM**](https://youtu.be/I7doX1zWGdw?si=NhhkbRfuJ24j0QvM) **–shape memory materials**

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| Name of the facult |  | | | Academic Year: | 2023-2024 |  |
| Branch & Section: | CIVIL | | | Examination: | 1-Internal |  |
| Course Name: | Engineering chemistry | | | Year: | I  II |  |
|  |  |  |  | Semester: |  |
| **Course Outcomes** | **1st**  **Internal Exam** | **2nd Internal Exam** | **Internal Exam** | **University Exam** | Attainment Level | |
| **CO1** | 3.00 |  | 3.00 | 2.00 | 2.30 |  |
| **CO2** | 3.00 |  | 3.00 | 2.00 | 2.30 |  |
| **CO3** | 3.00 |  | 3.00 | 2.00 | 2.30 |  |
| **CO4** | 3.00 | 3.00 | 3.00 | 2.00 | 2.30 |  |
| **CO5** |  | 3.00 | 3.00 | 2.00 | 2.30 |  |
| **CO6** |  | 3.00 | 3.00 | 2.00 | 2.30 |  |
| **Internal & University Attainment:** | | | 3.00 | 2.00 |  |  |
| **Weightage** | | | 30% | 70% |  |  |
| **CO Attainment for the course (Internal, University** | | | 0.90 | 1.40 |  |  |
| **CO Attainment for the course (Direct Method)** | | | 2.30 | |  |  |
|  |  |  |  |  |  | |
| Overall course attainment level | | | | | **2.30** | |
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| **Program Outcome Attainment (from Course)** | | | | | | | | | | | | | | |  |  |
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| Name of Faculty: | | |  | | |  |  | Academic Year: | | | 2023-2024 | |  |  |  |  |
| Branch& Section: | | | CIVIL | |  |  |  | Year: |  |  | I |  |  |  |  |  |
| Course Name: | | | Engineering chemistry | | | |  | Semester: | |  | II |  |  |  |  |  |
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| **CO-PO mapping** | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |  |  |
| CO1 | 3 | 2 |  |  |  | 1 | 1 |  |  |  |  | 2 |  |  |  |  |
| CO2 | 3 | 2 |  |  | 1 | 1 | 1 |  |  |  |  | 1 |  |  |  |  |
| CO3 | 2 | 2 |  |  |  |  | 2 |  |  |  |  | 1 |  |  |  |  |
| CO4 | 3 | 2 |  |  |  |  | 1 |  |  |  |  | 1 |  |  |  |  |
| CO5 | 2 | 2 |  |  |  |  | 1 |  |  |  |  |  |  |  |  |  |
| CO6 | 3 | 2 |  |  | 1 |  | 1 |  |  |  |  | 2 |  |  |  |  |
| **Course** | **2.60** | **2.00** |  |  | **1.0** | **1.0** | **1.10** |  |  |  |  | **1.10** |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO** | **Course Outcome Attainment** | | | | | | | | | | | | |  |  |  |
| **CO1** | 2.30 | | | | | | | | | | | | |  |  |  |
| **CO2** | 2.30 | | | | | | | | | | | | |  |  |  |
| **CO3** | 2.30 | | | | | | | | | | | | |  |  |  |
| **CO4** | 2.30 | | | | | | | | | | | | |  |  |  |
| **CO5** | 2.30 | | | | | | | | | | | | |  |  |  |
| **CO6** | 2.30 | | | | | | | | | | | | |  |  |  |
| **Overall course attainment level** | | | | | | **2.30** | | | | | | | |  |  |  |
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| **PO-ATTAINMENT** | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |  |  |  |  |
| **CO**  **Attainm ent** | **1.99** | **1.53** |  |  | **0.77** | **0.77** | **0.84** |  |  |  |  | **0.84** |  |  |  |  |
| **CO contribution to PO - 33%, 67%, 100% (Level 1/2/3)** | | | | | | | |  |  |  |  |  |  |  |  |  |

# PRAKASAMENGINEERING COLLEGE

(AUTONOMOUS)

B.Tech I Year II Semester (R23) Regular Examinations July-2024

**ENGINEERINGCHEMISTRY**

(Common to CE, ME)

Time:3hours Max.Marks:70

# PART– A

(Compulsory Question)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Answerthefollowing:(10 X02=20 Marks) | | | **BTL** | **CO** | **Marks** |
| 1 | a | Definethetemporaryandpermanenthardnessofwater? | **BTL 1** | **CO1** | 2M |
|  | b | Writeanyfour specificationsofpotablewater? | **BTL 1** | **CO1** | 2M |
|  | c | DefineNernstequation? | **BTL 1** | **CO2** | 2M |
|  | d | WhatisPilling-Bedworthrule? | **BTL 1** | **CO2** | 2M |
|  | e | WhatistheFunctionalityofapolymer? | **BTL 1** | **CO3** | 2M |
|  | f | DefineCetanenumberofdiesel? | **BTL 1** | **CO3** | 2M |
|  | g | WhatisthecompositionofPortlandcement? | **BTL 1** | **CO4** | 2M |
|  | h | DefineCloudpointandSaponification? | **BTL 1** | **CO4** | 2M |
|  | i | Whatarecolloids?Givetwoexamples? | **BTL 1** | **CO5** | 2M |
|  | j | Distinguishbetweenphysicaladsorptionandchemisorption? | **BTL 2** | **CO5** | 2M |

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| **PART– B** | | | | | | | |
| Answer all five units:(5 X10 =50Marks) | | | | | **BTL** | **CO** | **Marks** |
| **UNIT-I** | | | | | | | |
| 2 | a | | Explaintheformationofscalesandsludgesinboilerfeed water? | | **BTL 3** | **CO1** | 5M |
|  | b | | DescribetheIonexchangeprocessfordemineralizationofhardwater? | | **BTL 2** | **CO1** | 5M |
| **OR** | | | | | | | |
| 3 | a | | Howtoestimatethedissolvedoxygeninwater byWinkler’s method? | | **BTL 2** | **CO1** | 5M |
|  | b | | ExplainthedesalinationofbrackishwaterbyReverseOsmosis? | | **BTL 3** | **CO1** | 5M |
| **UNIT– II** | | | | | | | |
| 4 | a | | DescribetheConstructionandWorkingofelectrochemicalcell? | | **BTL 2** | **CO2** | 5M |
|  | b | | Explainvariousfactorsaffectingtherateofcorrosion? | | **BTL 3** | **CO2** | 5M |
| **OR** | | | | | | | |
| 5 | a | | Writeshort notes onworkingofLi-ionBatteries? | | **BTL 2** | **CO2** | 5M |
|  | b | | WhatisElectroplating?ExplainelectroplatingofCopper? | | **BTL 3** | **CO2** | 5M |
| **UNIT– III** | | | | | | | |
| 6 | a | | DistinguishbetweenThermoplasticsandThermosettingplastics? | | **BTL 2** | **CO3** | 5M |
|  | b | | Giveanaccountonthesynthesis,propertiesandapplicationsofBakelite? | | **BTL 2** | **CO3** | 5M |
| **OR** | | | | | | | |
| 7 |  | | ExplaintheUltimateanalysisofcoalanditssignificance | | **BTL 3** | **CO3** | 10M |
| **UNIT– IV** | | | | | | | |
| 8 | a | | Giveanaccount onthepropertiesofrefractorymaterials? | | **BTL 2** | **CO4** | 5M |
|  | b | | Classifylubricantsandgiveexamplesforeach? | | **BTL 2** | **CO4** | 5M |
| **OR** | | | | | | | |
| 9 | a | | Discussthefunctionsandpropertiesoflubricants? | | **BTL 2** | **CO4** | 5M |
|  | b | | Writeabriefaccount onsettingandhardeningofPortlandcement? | | **BTL 2** | **CO4** | 5M |
| **UNIT– V** | | | | | | | |
| 10 | | a | | ExplainthesynthesisofcolloidsbyBragg’smethod? | **BTL 3** | **CO5** | 5M |
|  | | b | | Discussvariousapplicationsofnanomaterialsincatalysisandmedicine?? | **BTL 2** | **CO5** | 5M |
| **OR** | | | | | | | |
| 11 | | a | | Writeanoteonstabilizationofnanomaterialsbystabilizingagents? | **BTL 2** | **CO5** | 5M |
|  | | b | | Outlinethedifferenttypesofadsorptionisotherms? | **BTL 3** | **CO5** | 5M |

# I B.TECH II SEM MID-I EXAMINATIONS

**SUB: ENGINEERING CHEMISTRY**

**BRANCH: CIVIL DATE: 18 /04/2024**

3\*5=15M

Write the following questions

* 1. How do you estimate Disolved Oxygen (DO) in water is determinedby Winkler’s Method

Or

* 1. Describe the estimation of hardness of water by EDTA Method
  2. Briefly Explain about the Boiler troubles and their treatment

Or

* 1. Explain various factors influencing the state of corrosion
  2. Write a note on sacrificial anodic protection

Or

* 1. Discuss in detail about chemical loss by corrosion

# I B.TECH II SEM MID-II EXAMINATIONS

**SUB: ENGINEERING CHEMISTRY**

BRANCH:CIVIL DATE: **22/06/2024**

Write the following questions

* + 1. Define plastics. Write the difference between thermos and thermos setting plastics.

Or

* + 1. Write the preparation, properties and applications of Bakelite.
    2. Write the proximate analysis of Coal.

Or

* + 1. Write the refining of Petroleum with neat sketch.
    2. Define Refractories. Write the properties of refractories.

Or

* + 1. Define lubricants. Write the properties of lubricants