

LESSON PLAN

SUBJECT: APPLIED CHEMISTRY & EVS (TH-3)

BRANCH: Humanities & Sciences (Common)

ACADEMIC SESSION :2026-27

NAME OF THE FACULTY: BISWANATH PADHI



GOVERNMENT POLYTECHNIC, BHADRAK

Padhi
31/07/26
HOD, Humanities & Sc

31.7.26
Academic Coordinator
Academic Co-ordinator

31-07-26
Principal
Govt. Polytechnic Bhadrak
Govt. Polytechnic
Bhadrak

COURSE OUTCOMES

CO-I Analyze real life problems associated with various environmental pollution, effects and controlling measures and to mitigate with solid wastes.

CO-II Solve the engineering problems using concepts of electrochemistry, corrosion, fuel and lubricant for domestic and industrial applications.

CO-III Solve various engineering problems applying the basic concepts of atomic structure, chemical bonding and solutions.

CO-IV Use relevant water treatment method to solve domestic and industrial problems.

CO-V Solve the engineering problems using concepts of engineering materials and properties.

CO-VI Understand ecosystem and harnessing renewable energy from various sources.

LESSON PLAN

Session: 2026-27

Course Name : Applied Chemistry & EVS	Name of the Faculty: BISWANATH PADHI, Guest Faculty (Chemistry)
Course Code : TH 3	Session : 2026-27
Periods/Week : 04	Date : 17-08-2026 to 17-04-2027
Total Periods : 128	No. of Credits : 4

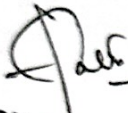
Wee k	Class/Day	Theory Topics to be Covered
1	1	1. Air and Noise pollution: 1.1 Definition of pollution and pollutant, Classification of pollutants (primary and Secondary)
	2	1.1 Natural and man-made source of air pollution.
	3	1.2 Air pollutants: Types, particulate pollutants: Effect and Control
	4	1.2 Bag filter, Cyclone Separator
2	1	1.2 Electrostatic Precipitator
	2	1.3 Gaseous pollution Control: Catalytic converter
	3	1.3 Effects of air pollution due to refrigerants
	4	1.3 Effects of air pollution due to I.C, Boiler
3	1	1.4 Noise pollution: Definition, Sources of pollution
	2	1.4 Effects and control of Noise pollution.
	3	2. Water and Soil Pollution: 2.1 Sources of Water pollution, Types of water pollutants
	4	2.1 Characteristics of water pollutants Turbidity, PH
4	1	2.2 Total suspended Solids, total Solids, BOD and COD
	2	2.3 Waste Water Treatment: Primary methods: Sedimentation, Froth flotation
	3	2.3 Secondary methods: Activated sludge treatment, Bioreactor
	4	Tertiary Method: Membrane Separation technology, RO (reverse osmosis).
5	1	2.4 Soil pollution: Definition, cause,
	2	2.4 Effects and preventive measures of soil pollution.
	3	2.5 Effects of excess use of fertilizers, pesticides and insecticides,
	4	2.5 Irrigation, E-waste on soil pollution.
6	1	3. Solid waste management: 3.0 Solid waste generation- Sources characteristics of Municipal Solid waste,
	2	3.0 E-waste, Biomedical waste, metallic waste

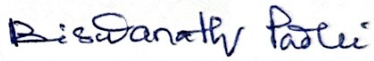
	3	3.0 Non-metallic waste (lubricants , plastic, rubber) from industries.
	4	3.1 Collection and disposal: MSW 3R Principles,
7	1	3.1 Energy recovery and sanitary landfills
	2	3.1 Hazardous waste
	3	3.2 Concept of Carbon Credit
	4	3.2 Concept of Carbon footprint
8	1	3.3 Environmental management in fabrication industry.
	2	Doubt clearing and revision
	3	Question bank discussion
	4	Internal Sessional Assessment 1 execution block
9	1	4. Electrochemistry and Corrosion:4.1 Electronic concept of oxidation, reduction and redux reactions.
	2	4.2 Definition of terms: Electrolytes with examples.
	3	4.2 Non electrolytes with examples.
	4	4.3 Faradays laws of electrolysis.
10	1	4.3 Simple numerical problems on faradays laws
	2	4.4 Industrial application of Electrolysis: Electrometallurgy
	3	4.4 Electroplating,Electrolytic refining
	4	4.5 Application of redux reactions in electrochemical cells, Primary cells
11	1	4.5 dry cell , secondary cell
	2	4.5 Commercially used lead storage battery and fuel cells.
	3	4.6 Introduction to Corrosion of metals- Definition, types of Corrosion (Chemical and Electrochemical)
	4	4.6 H ₂ liberation and O ₂ liberation mechanism of electrochemical corrosion
12	1	4.6 Factors affecting rate of Corrosion.
	2	4.7 Internal Corrosion preventive measures purification, alloying
	3	4.7 and heat treatment, External corrosion preventive measures:
	4	4.7 a)metal(anodic, cathodic coatings)b) organic inhibitors
13	1	5.Chemistry of fuels and lubricants: 5.1 Definition and classification of fuels
	2	5.1 Calorific values (HCV and LCV)
	3	5.2 Liquid fuels petrol and diesel
	4	5.2 Fuel rating(octane and cetane numbers)
14	1	5.3 Chemical Composition, calorific values and application of LPG and CNG
	2	5.3 Water gas ,coal gas
	3	5.3 Producer gas and biogas.

15	4	5.4 Lubricant - Definition , function classification with examples.
	1	5.5 Lubrication - Definition and Mechanism (hydrodynamic and boundary lubrication)
	2	5.6 Physical properties - Viscosity and Viscosity index,oiliness
	3	5.6 Flash and fire point, cloud and pour point only.
	4	5.6 And Chemical properties (coke number, total acid number saponification value) of lubricants.
16	1	5.6 Characteristic properties of good lubricant.
	2	5.6 Doubt clearing and question bank discussion
	3	Internal Sessional Assessment 2 execution block
	4	6.Atomic Structure: 6.1 Rutherford model of atom and it's failures
17	1	6.2 Bohrs theory (expression of energy and radius to be omitted)
	2	6.2 Hydrogen spectrum explanation based on Bohr's model of atom
	3	6.3 Quantum numbers - orbital concept
	4	6.3 Shapes of s,p and d orbitals.
18	1	6.4 Pauli's exclusion principle, Heisenberg's uncertainty principle
	2	6.4 Aufbau's principle
	3	6.4 Electronic Configurations(upto atomic number 30)
	4	6.4 Hunds rule of maximum multiplicity.
19	1	6.5 Concept of Chemical bonding - cause of chemical bonding
	2	6.5 Types of bonds: ionic bonding (NaCl example)
	3	6.5 Covalent bond (H_2 , F_2 , HF)
	4	6.6 Basic concept of orbital overlapping sigma and pi bonds
20	1	6.6 Concept of hybridization
	2	6.6 Hybridization in $BeCl_2$, BF_3 , CH_4 , NH_3 , H_2O
	3	6.7 Coordination bond in NH_4^+ ion , metallic bonding.
	4	6.8 Hydrogen bond and anomalous properties of NH_3 , H_2O due to hydrogen bonding.
21	1	6.9 Solution - idea of solute, solvent and solution,
	2	6.9 Method to express the concentration of solution normality, molarity,
	3	6.9 Morality, ppm, Mass percentage,
	4	6.9 Volume percentage and Mole fraction (with simple numerical)
22	1	7. Water and Water Treatment: 7.1 Graphical presentation of water distribution on Earth (pie or bar diagram)
	2	7.1 Classification of soft and hard water
	3	7.2 Cause of hardness,unit of hardness
	4	7.2 and simple numerical on water hardness and conversion.
23	1	7.3 Cause of poor lathering of soap on hard water

	2	7.3 problems caused by the use of hard water in boiler(scale and sludge)
	3	7.3 Foaming and priming , corrosion etc
	4	7.4 Quantitative measurement of water hardness by EDTA method
	1	7.4 Total dissolved solids (TDS) alkalinity estimation.
24	2	7.5 water softening techniques - lime soda process , zeolite process
	3	7.5 Ion exchange process
	4	7.6 municipal water treatment (in brief only) - Sedimentation, coagulation
	1	7.6 Filtration, sterilization
25	2	8. Engineering materials: 8.1 natural occurrence of metals-minerals, ores of iron, aluminium and copper.
	3	8.1 Gangue (matrix) ,flux, slag
	4	8.2 Metallurgy - brief account of general principles of metallurgy.
	1	8.3 Alloys - definition, purposes of alloying, ferrous alloys and non ferrous alloys with suitable examples.
26	2	8.3 Properties and application of brass, bronze , Stainless steel,
	3	8.3 Alnico, Duralumin
	4	8.4 Polymers - monomer , homo and co polymers, degree of polymerization
	1	8.4 Addition and condensation polymerization
27	2	8.5 Simple reactions involved in preparation and their application of thermoplastics and thermo setting plastics
	3	8.5 (using PVC ,PS,PTFE, nylon -6 , nylon- 6,6 and bakelite)
	4	8.6 Rubber and vulcanization of rubber. Advantages of vulcanized rubber over natural rubber.
	1	9. Ecosystem : 9.1 Structure of ecosystem, Biotic and Abiotic components
28	2	9.1 Food chain and food web
	3	9.2 Aquatic (Lentic and lotic) and terrestrial ecosystem (Grassland, forest, desert)
	4	9.3 Carbon , Nitrogen cycle
	1	9.3 Sulphur, Phosphorus cycle
29	2	9.4 Global warming - cause , effects, process
	3	9.5 Green House Effect, Ozone layer depletion.
	4	10. Renewable resources of energy: 10.1 Solar Energy: Basics of Solar Energy. Flat plate collector (Liquid & Air) . Theory of flat plate collector
	1	10.1 Importance of coating. advanced collector. Solar pond
30	2	10.1 Solar water heater, solar dryer,solar drills.
	3	10.2 Biomass : Overview of Biomass as energy source. Thermal characteristics of Biomass as fuel.

31	4	10.3 Anaerobic digestion. Biogas production mechanism and utilisation.
	1	10.4 Wind energy: Future prospects of wind energy. Wind energy in India.
	2	10.4 Environmental benefits and problems of wind energy.
	3	10.5 New energy sources: Need of new sources. Different types of new energy sources
32	4	10.5 Application of (Hydrogen energy and Tidal energy conversion)
	1	10.5 Concept, origin and Power plants of geothermal energy.
	2	Question bank discussion
	3	Doubt Clearing ,remedial class
	4	Internal sessional assessment 3 execution block


 31/07/26
 Signature of HOD, Humanities & Sc Dept.


 Signature of the Faculty 31/07/26

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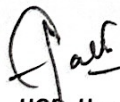
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Course Outcomes:

After completion of the course the students will be able to:

- 1) Explain various methods of volumetric analysis i.e., Redox, Iodometric, complexometric, Neutralization etc. and use of conductivity meter for measurement of conductance of water sample.
- 2) Apply the use of internal and external indicators and their comparison for redox titrations and mechanisms of iodometric titrations and use of double indicator method in a single titration.
- 3) Estimate the % values of moisture, volatile matter, ash and carbon of fuel by Proximate analysis and instrument handling.
- 4) Analyze the properties of lubricants viz. Flash & fire point, viscosity, cloud & pour point and their significance.
- 5) Estimate the various water quality parameters viz. BOD, COD, DO, Chlorine, TDS, etc. of the sample water.

LESSON PLAN

Session: 2026-27

Course Name : Applied Chemistry & EVS Lab	Name of the Faculty: BISWANATH PADHI, Guest Faculty (Chemistry)
Course Code : PR 3	Date : 17-08-2026 to 17-04-2027
Periods/Week : 02	No. of Credits : 1
Total Periods : 64	

Week	Class/Day	Practical Topics to be Covered
1	1	Preparation of standard solution of oxalic acid.
	2	
2	1	Preparation of standard solution of potassium permanganate.
	2	
3	1	Demonstration of, To determine strength of given sodium hydroxide solution by titrating against Oxalic acid solution by using phenolphthalein indicator.
	2	
4	1	To determine strength of given sodium hydroxide solution by titrating against Oxalic acid solution by using phenolphthalein indicator
	2	
5	1	Standardization of KMnO_4 solution using oxalic acid and determine the percentage of iron present in given Haematite Ore by KMnO_4 solution.
	2	
6	1	Record checking, Awareness about lab safety and precautions.
	2	
7	1	Iodometric estimation of copper in the Copper pyrite ore.
	2	
8	1	Demonstration of, Volumetric estimation of total acid number (TAN) of given oil.
	2	
9	1	Volumetric estimation of total acid number (TAN) of given oil.
	2	
10	1	Volumetric estimation of total hardness of given water sample using standard EDTA solution.
	2	
11	1	Volumetric estimation of alkalinity of given water sample using 0.01M sulphuric acid.
	2	
12	1	Proximate analysis of coal, a) Gravimetric estimation moisture in a given coal sample.
	2	
13	1	b) Gravimetric estimation of ash in a given coal sample.
	2	
14	1	Determine the Conductivity of a given water sample.
	2	
	1	Record checking