

# LESSON PLAN

SUBJECT: APPLIED CHEMISTRY

BRANCH: COMMON TO ALL BRANCH

SEMESTER: 2<sup>ND</sup> (2024-25)

NAME OF THE FACULTY: SATYAJIT DHAL

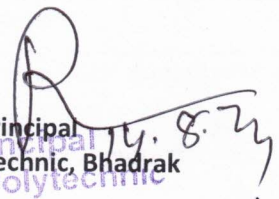


## GOVERNMENT POLYTECHNIC, BHADRAK

  
HOD, Math & Sc

H.O.D. Math & Sc (I/c)

  
Academic Coordinator

  
Principal  
Govt. Polytechnic, Bhadrak

**LESSON PLAN FOR SUMMER SEMESTER – 2025**  
**Dept. of Math & Science ,Govt. Polytechnic, Bhadrak**

Name of the Faculty : SATYAJIT DHAL

Course Code: TH-5

Theory: APPLIED CHEMISTRY

Total Periods :60

Examination: SUMMER (2025)

Sem: 2<sup>ND</sup>

Internal Assessment: 30

End Sem. Exam: 70

Total Mark :100

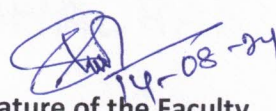
Class Start : 04.02.2025

<b>Discipline:</b> <b>Math &amp; Science</b>	<b>Semester:</b> <b>2<sup>ND</sup> (2025)</b>	<b>Name of the Teaching Faculty : Satyajit Dhal</b>
<b>Subject:</b> <b>Applied Chemistry</b>	<b>No. of Days/per week class allotted: 04</b>	<b>Semester from date: 04.02.2025 To Date: 17.05.2025</b>  <b>No. of Weeks: 15</b>
<b>Week</b>	<b>Class Day</b>	<b>Theory/ Topics</b>
1 <sup>st</sup>	1 <sup>st</sup>	<ul style="list-style-type: none"> <li>Rutherford model of atom</li> </ul>
	2 <sup>nd</sup>	<ul style="list-style-type: none"> <li>Bohr's theory, and hydrogen spectrum explanation based on Bohr's model of atom</li> </ul>
	3 <sup>rd</sup>	<ul style="list-style-type: none"> <li>Heisenberg uncertainty principle</li> </ul>
	4 <sup>th</sup>	<ul style="list-style-type: none"> <li>Quantum numbers – orbital concept. Shapes of s, p and d orbitals</li> </ul>
2 <sup>nd</sup>	1 <sup>st</sup>	<ul style="list-style-type: none"> <li>Pauli's exclusion principle, Hund's rule of maximum multiplicity Aufbau rule, electronic configuration.</li> </ul>
	2 <sup>nd</sup>	<ul style="list-style-type: none"> <li>Cause of chemical bonding, types of bonds: ionic bonding (NaCl example), covalent bond (H<sub>2</sub>, F<sub>2</sub>, HF hybridization in BeCl<sub>2</sub>, BF<sub>3</sub>, CH<sub>4</sub>, NH<sub>3</sub>, H<sub>2</sub>O)</li> </ul>
	3 <sup>rd</sup>	<ul style="list-style-type: none"> <li>Coordination bond in NH<sub>4</sub><sup>+</sup>, and anomalous properties of NH<sub>3</sub></li> </ul>
	4 <sup>th</sup>	<ul style="list-style-type: none"> <li>H<sub>2</sub>O due to hydrogen bonding, and metallic bonding.</li> </ul>
3 <sup>rd</sup>	1 <sup>st</sup>	<ul style="list-style-type: none"> <li>Solution – idea of solute, solvent and solution</li> </ul>
	2 <sup>nd</sup>	<ul style="list-style-type: none"> <li>Methods to express the concentration of solution molarity (M = mole per liter)</li> </ul>
	3 <sup>rd</sup>	<ul style="list-style-type: none"> <li>ppm, mass percentage, volume percentage and mole fraction.</li> </ul>
	4 <sup>th</sup>	<ul style="list-style-type: none"> <li>Graphical presentation of water distribution on Earth (pie or bar diagram)</li> </ul>
4 <sup>th</sup>	1 <sup>st</sup>	<ul style="list-style-type: none"> <li>Classification of soft and hard water based on soap test</li> </ul>



	2 <sup>nd</sup>	<ul style="list-style-type: none"> <li>Salts causing water hardness, unit of hardness and simple numerical on water hardness.</li> </ul>
	3 <sup>rd</sup>	<ul style="list-style-type: none"> <li>Cause of poor lathering of soap in hard water</li> </ul>
	4 <sup>th</sup>	<ul style="list-style-type: none"> <li>Problems caused by the use of hard water in boiler (scale and sludge, foaming and priming, corrosion etc)</li> </ul>
5 <sup>th</sup>	1 <sup>st</sup>	<ul style="list-style-type: none"> <li>Quantitative measurement of water hardness by ETDA method, total dissolved solids (TDS) alkalinity estimation</li> </ul>
	2 <sup>nd</sup>	<ul style="list-style-type: none"> <li>Water softening techniques – soda lime process, zeolite process and ion exchange process.</li> </ul>
	3 <sup>rd</sup>	<ul style="list-style-type: none"> <li>Municipal water treatment (in brief only) – sedimentation, coagulation, filtration, sterilization.</li> </ul>
	4 <sup>th</sup>	<ul style="list-style-type: none"> <li>Natural occurrence of metals – minerals, ores of iron</li> </ul>
6 <sup>th</sup>	1 <sup>st</sup>	<ul style="list-style-type: none"> <li>Aluminium and copper, gangue (matrix)</li> </ul>
	2 <sup>nd</sup>	<ul style="list-style-type: none"> <li>Flux, slag, metallurgy – brief account of general principles of metallurgy</li> </ul>
	3 <sup>rd</sup>	<ul style="list-style-type: none"> <li>Extraction of - iron from haematite ore using blast furnace</li> </ul>
	4 <sup>th</sup>	<ul style="list-style-type: none"> <li>Aluminium from bauxite along with reactions</li> </ul>
7 <sup>th</sup>	1 <sup>st</sup>	<ul style="list-style-type: none"> <li>Alloys – definition, purposes of alloying</li> </ul>
	2 <sup>nd</sup>	<ul style="list-style-type: none"> <li>Ferrous alloys and nonferrous with suitable examples, properties and applications</li> </ul>
	3 <sup>rd</sup>	<ul style="list-style-type: none"> <li>General chemical composition</li> </ul>
	4 <sup>th</sup>	<ul style="list-style-type: none"> <li>Composition based applications (elementary idea only details omitted)</li> </ul>
8 <sup>th</sup>	1 <sup>st</sup>	<ul style="list-style-type: none"> <li>1<sup>ST</sup> INTERNAL ASSESSMENT</li> </ul>
	2 <sup>nd</sup>	<ul style="list-style-type: none"> <li>Port land cement and hardening</li> </ul>
	3 <sup>rd</sup>	<ul style="list-style-type: none"> <li>Glasses Refractory and Composite materials</li> </ul>
	4 <sup>th</sup>	<ul style="list-style-type: none"> <li>Polymers – monomer, homo and co polymers</li> </ul>
9 <sup>th</sup>	1 <sup>st</sup>	<ul style="list-style-type: none"> <li>degree of polymerization</li> </ul>
	2 <sup>nd</sup>	<ul style="list-style-type: none"> <li>Simple reactions involved in preparation of polymer</li> </ul>
	3 <sup>rd</sup>	<ul style="list-style-type: none"> <li>Application of thermoplastics and thermosetting plastics (using PVC, PS, PTFE, nylon – 6, nylon-6,6 and Bakelite)</li> </ul>
	4 <sup>th</sup>	<ul style="list-style-type: none"> <li>Rubber and vulcanization of rubber</li> </ul>
10 <sup>th</sup>	1 <sup>st</sup>	<ul style="list-style-type: none"> <li>Definition of fuel and combustion of fuel</li> </ul>
	2 <sup>nd</sup>	<ul style="list-style-type: none"> <li>Classification of fuels, calorific values (HCV and LCV)</li> </ul>
	3 <sup>rd</sup>	<ul style="list-style-type: none"> <li>Calculation of HCV and LCV using Dulong's formula.</li> </ul>
	4 <sup>th</sup>	<ul style="list-style-type: none"> <li>Proximate analysis of coal solid fuel</li> </ul>
11 <sup>th</sup>	1 <sup>st</sup>	<ul style="list-style-type: none"> <li>Petrol and diesel - fuel rating (octane and cetane numbers)</li> </ul>
	2 <sup>nd</sup>	<ul style="list-style-type: none"> <li>Chemical composition, calorific values</li> </ul>
	3 <sup>rd</sup>	<ul style="list-style-type: none"> <li>Applications of LPG, CNG, water gas, coal gas, producer gas and biogas</li> </ul>
	4 <sup>th</sup>	<ul style="list-style-type: none"> <li>Lubrication – function and characteristic properties of good lubricant</li> </ul>

12 <sup>th</sup>	1 <sup>st</sup>	<ul style="list-style-type: none"> <li>Classification with examples, lubrication mechanism –hydrodynamic and boundary lubrication</li> </ul>
	2 <sup>nd</sup>	<ul style="list-style-type: none"> <li>Physical proper- ties (viscosity and viscosity index, oiliness, flash and fire point, could and pour point only)</li> </ul>
	3 <sup>rd</sup>	<ul style="list-style-type: none"> <li>Chemical properties (coke number, total acid number saponification value) of lubricants.</li> </ul>
	4 <sup>th</sup>	<ul style="list-style-type: none"> <li>Electronic concept of oxidation, reduction and redox reactions</li> </ul>
13 <sup>th</sup>	1 <sup>st</sup>	<ul style="list-style-type: none"> <li>2<sup>ND</sup> INTERNAL ASSESSMENT</li> </ul>
	2 <sup>nd</sup>	<ul style="list-style-type: none"> <li>Definition of terms: electrolytes, non-electrolytes with suitable examples</li> </ul>
	3 <sup>rd</sup>	<ul style="list-style-type: none"> <li>Faradays laws of electrolysis and simple numerical problems.</li> </ul>
	4 <sup>th</sup>	<ul style="list-style-type: none"> <li>Industrial Application of Electrolysis – • Electrometallurgy • Electroplating • Electrolytic refining.</li> </ul>
14 <sup>th</sup>	1 <sup>st</sup>	<ul style="list-style-type: none"> <li>Application of redox reactions in electrochemical cells – • Primary cells – dry cell, • Secondary cell - commercially used lead storage battery, fuel and Solar cells</li> </ul>
	2 <sup>nd</sup>	<ul style="list-style-type: none"> <li>Introduction to Corrosion of metals – • definition, types of corrosion (chemical and electrochemical), H<sub>2</sub> liberation and O<sub>2</sub> absorption mechanism of electrochemical corrosion, factors affecting rate of corrosion.</li> </ul>
	3 <sup>rd</sup>	<ul style="list-style-type: none"> <li>Internal corrosion preventive measures – • Purification, alloying and heat treatment</li> </ul>
	4 <sup>th</sup>	<ul style="list-style-type: none"> <li>External corrosion preventive measures: a) metal (anodic, cathodic) coatings, b) organic inhibitors.</li> </ul>
15 <sup>th</sup>	1 <sup>st</sup>	<ul style="list-style-type: none"> <li>Previous year question discussion</li> </ul>
	2 <sup>nd</sup>	<ul style="list-style-type: none"> <li>Short type question discussion</li> </ul>
	3 <sup>rd</sup>	<ul style="list-style-type: none"> <li>Important question discussion</li> </ul>
	4 <sup>th</sup>	<ul style="list-style-type: none"> <li>Important question discussion</li> </ul>

  
 Signature of the Faculty