

# Gujarat Technological University

**NAME OF COURSE : CHEMICAL ENGINEERING MATERIALS**

## 1 RATIONALE :

Chemical engineering materials is an important course for understanding properties of materials used for construction of equipments and piping. Chemical properties of materials affect the life and performance of equipments to the large extent. Knowledge of properties of materials helps in understanding the importance of materials with respect to cost & safety.

## 2 SCHEME OF TEACHING :

Sr.No.	NAME OF TOPICS	NO.OF HOURS		
		Lect.	Prac.	Total
1.	INTRODUCTION	1	-	1
2.	PROPERTIES OF MATERIALS	1	-	1
3.	CORROSION & ITS PREVENTION	4	-	4
4.	METALS	4	-	4
5.	CERAMIC MATERIALS	4	-	4
6.	ORGANIC MATERIALS	5	-	5
7.	ORGANIC PROTECTIVE COATING	3	-	3
8.	LUBRICANTS	3	-	3
9.	MATERIALS FOR SPECIAL APPLICATIONS	3	-	3
TOTAL		28	-	28

## 3. OBJECTIVES :

1. Identify required raw materials catalyst, intermediates for the product appropriately.

## 4. COMMUNICATION SKILLS

- \* Ask pertinent questions as well as to answer them.
- \* Describe an object, process or procedure.

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\* Write reports on experiments conducted in laboratories .

## 5. TOPICS / SUB- TOPICS :

Topic- 1 : INTRODUCTION	1 hr.
1.1 Definition & scope of materials science.	
1.2 General principles of selection of materials .	
Topic -2 : PROPERTIES OF MATERIALS	1 hr.
2.1 Definition & brief explanation of : Melting point, Boiling point, Specific heat, Thermal conductivity, Thermal expansion, Thermal insulation, Stresses, Strain.	
Topic -3. CORROSION & ITS PREVENTIONS	4 hrs.
3.1 Definition of corrosion.	
3.2 Types of corrosion : Direct corrosion, Electro-chemical corrosion, Galvenic corrosion, High temp.corrosion.	
3.3 Factors affecting corrosion rate, brief description.	
3.4 Common methods used for the control & prevention of corrosion .	
Topic-4 METALS	4 hrs.
4.1 General comparison with ferrous metals & alloys.	
4.2 General properties of metals: Cast iron, rough iron, steel, Alluminium, Zinc, Chromium, Nickel, Tin, Copper, Titanium, Tungston, Platinum & Silver.	
4.3 General properties of alloys : Duralumin, Y alloy, Brass, Bronze, Inconel, Invar, Hastalloy, B & C bearing metals.	
4.4 Important types of furnaces for purification of metal. Blast furnace, Arc.	
Topic-5 CERAMIC MATERIALS	4 hrs.
5.1 Definition of ceramic materials	
5.2 Clay	
5.2.1 General chemical composition china clay, fire clay, bentonite.	
5.3 Refractories :	
5.3.1 Definition	

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5.3.2 General properties of refractories.

5.3.3 Classification of refractories.

5.3.4 Manufacture, properties & uses of bricks.

5.4 Glasses :

5.4.1 Definition of glass

5.4.2 Brief description of raw materials used in glass making & their effect on product glass.

Manufacture of glass, Stepwise description in brief.

5.4.4 Types of glasses their general properties & uses,

Soda lime glass, borosilicate glass, high silica glass, fibre glass, glass wool, form glass.

5.5 Porcelain : general properties, composition & uses.

5.6 Cement concrete & reinforced cement concrete applications only.

Topic-6 ORGANIC MATERIALS :

5 hrs.

6.1 Polymer and their structure

6.2 Addition and condensation Polymerisation

6.3. Plastics

6.3.1 Definition of plastics

6.3.2 General properties of plastics

6.3.3 Classification of plastics.

6.4 Rubbers [Elastomers] :

6.4.1 Definition

6.4.2 Classification of rubber

6.4.3 Sources, properties & uses of natural rubber and synthetic rubber.

6.4.4 General idea about Vulcanizing

6.5 Wood:

6.5.1 General properties of wood

6.5.2 General idea about wood seasoning & its advantages & limitation.

Topic-7 ORGANIC PROTECTIVE COATING

3 hrs.

7.1 Paints :

7.1.1 Classification of paints

7.1.2 Ingredients of paints :their properties &

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importance

7.1.3 Special types of paints and their applications .

7.2 Varnishes :

7.2.1 Definition

7.2.2 Ingredients of Varnishes & their brief description

7.2.3 Classification of Varnishes

Topic-8 LUBRICANTS

3 hrs.

8.1 Importance of lubricants

8.2 Classification of lubricants.

8.2.1 Synthetic lubricants, their properties & applications

8.2.2 Semisolid lubricants, types & their applications

8.3 Methods of applying lubricants

Topic-9 MATERIALS FOR SPECIAL APPLICATIONS

3 hrs.

9.1 Insulation materials

9.1.1 General properties & applications of various :

1 Electric insulation

2 Thermal insulation

3 Sound insulation

9.2 Industrial adhesives

9.2.1 Definition and mechanism of their effect on surface.

9.2.2 Classification of adhesives

9.2.3 Advantages & limitation of adhesives .

## 6. REFERENCES :

- 1 Material science and processes S.K.Hazarachaudhary
- 2 Engg. materials handbook Mc graw hill publi.
3. Engg. materials Patel & Khakhar
- 4 Engg. materials S.C.Rangwala

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