GUJARAT TECHNOLOGICAL UNIVERSITY
B.E. SEMESTER : VIII
METALLURGICAL ENGINEERING

Subject Name: **COMPOSITE MATERIALS**

Sr. No.	Course Contents	Total Hrs
1.	Introduction to Composites, Matrices, Reinforcements, Classifications, Applications, review of current developments; design fabrication and economic consideration, Importance of composites over other materials. Advantages and characteristics of composite materials, General requirements of composite materials.	**6**
2.	Classification of composites on the basis of reinforcement and matrix, Form and functions of reinforcement, Functions of matrices. Dispersion strengthened, particle strengthened and fiber-reinforced composites. Fibres and resin materials.	**10**
3.	Strengthening mechanisms, Aspect Ratio, Rule of Mixture, discontinuous and continuous fiber composites. Comparison of above composites. Characteristics and materials of reinforcements and matrices. Critical Fiber Length, Short and Continuous Fibers, Fiber Orientation. Matrix and Reinforcement Materials.	**10**
4.	Major composite classes: polymer matrix, métal matrix, ceramic matrix, carbon-carbon, and intermetallic composites. Hybrid composites, Laminated composites. Examples of each class of composites. Particulates, Flakes, Whiskers, Fibers.	**10**
5.	Role of interfaces in composites, Toughening mechanisms in PMCs, MMCs, and CMCs.	**8**
6.	Fabrication of fiber reinforced plastic and metal matrix composites: Fiber Forms, Prepregs, Molding Compounds-Processes, Lay-Ups, Filament Winding, Pultrusion, and Recycling. ; Matrix –Reinforcement Interface, Wettability	**10**
7.	Applications of advanced composite materials. Environmental effects in Composites, Green composites. ; Synthesis and Properties of Nanocomposites.	**6**

TEXT/REFRENCES:

1. K.K. Chawla, Composite Materials – Science & Engg., Springer- Veslag, New York, 1988.
2. Mel M. Schwartz, Composite Materials: Properties, Non-destructive testing and Repair, Prentice Hall, New Jersey
3. L.J. Broutman and R.M. Krock, Modern Composite Materials, Addison-Wesley, 1967.
4. David A Colling & Thomas Vasilos, Industrial Materials: Polymers, Ceramics and Composites, vol. 2, Prentice Hall, N. Jersey, 1995.