

# GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Semester: 1

**Mechanical Engineering (CAD/CAM)**

Subject Name   Advanced Materials And Processes

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Sr.No	Course content
1.	ADVANCED MATERIALS:Super alloys, Ferro electric and piezoelectric materials, Advanced magnetic materials, Advanced engineering polymer materials, Advanced ceramic and composite materials, photo conducting and photovoltaic materials, electro-optic materials, Lasers, smart materials
2.	PROCESSING OF MATERIALS:Conventional processing techniques for advanced materials, special processing techniques, use of computers in metal processing
3.	CHARACTERIZATION AND EVALUATION TECHNIQUES:Destructive and Non-destructive evaluation techniques, Electron and X-ray techniques, Distortion and Residual stress measurement.
4	PERFORMANCE OF MATERIALS IN SERVICE:Service performance, corrosion and its control, Delayed fracture, Performance of materials at High & low temperatures, Radiation damage and recovery.
5	DESIGN:Introduction :Design philosophy – steps in Design process – General Design rules for manufacturability – basic principles of designing for economical production – creativity in design.
6	MATERIALS: Selection of Materials for design – Developments in Material technology –criteria for material selection – Material selection interrelationship with process selection – process selection charts
7	MACHINING PROCESS: Overview of various machining processes – general design rules for machining - Dimensional tolerance and surface roughness – Design for machining – Ease – Redesigning of components for machining ease with suitable examples. General design recommendations for machined parts
8	METAL CASTING: Appraisal of various casting processes, selection of casting process, - general design considerations for casting – casting tolerances – use of solidification simulation in casting design – product design rules for sand casting
9	METAL JOINING: Appraisal of various welding processes, Factors in design of weldments – general design guidelines – pre and post treatment of welds – effects of thermal stresses in weld joints – design of brazed joints
10	FORGING:Design factors for Forging – Closed die forging design – parting lines of dies – drop forging die design – general design recommendations .
11	EXTRUSION & SHEET METAL WORK:Design guidelines for extruded sections - design principles for Punching, Blanking, Bending, Deep Drawing – Keeler Goodman Forming Line Diagram – Component Design for Blanking
12	PLASTICS: Viscoelastic and creep behavior in plastics – Design guidelines for Plastic components – Design considerations for Injection Moulding – Design guidelines for machining and joining of plastics

### **Reference Books:**

1. Design for Manufacture / John Cobert / Adisson Wesley, 1995.
2. ASM Handbook, Vol.20.
3. Engineering Design- A Material and Processing Approach / George E. Deiter / McGraw Hill Intl., 2nd Edition, 2000.
4. Product design and Manufacturing / A.K Chitale and R.C Gupta / Prentice – Hall of India, New Delhi, 2003.
5. Design and Manufacturing / Surender Kumar & Goutham Sutradhar / Oxford &IBH Publishing Co. Pvt .Ltd., New Delhi, 1998.