GUJARAT TECHNOLOGICAL UNIVERSITY
DIPLOMA IN MECHANICAL ENGINEERING
SEMESTER- VI

Subject Name: **Advance Machine Design (Elective-I)**
Subject Code: **2361911**

Sr. No.	Subject Content	Hrs.
1	**INTRODUCTION.** 1.1 Know the objectives of learning this subject. 1.2 Need, Scope & importance of Advance Machine Design (AMD). 1.3 Need of attitude, knowledge & skill required for application of AMD. 1.4 Machine design-meaning, objectives and methodology adopted in industries. 1.5 Design considerations-codes and standards, reliability, design economics, safety, productivity, etc.	3
2	**DESIGN BASICS.** 2.1 Plastic deformation, its effect on strength when cold worked. 2.2 Familiarity with: flexure strength in cylinder, rotating ring, stress in press and shrink fits, temperature effect, contact stress, area moment, method to find deflection- simple cases- examples, Castigliano's theorem- simple cases and examples. 2.3 Statistical considerations in design-meaning, simple cases of applications. 2.4 Familiarity with failure of ductile and brittle materials, stress in crack area, stress intensity factors. 2.5 Variable loading-SN diagram of steel, endurance limit, fatigue strength, endurance limit modifying factors, fluctuating stresses, fatigue strength in fluctuating stresses, Goodman, Soderberg and Geber criteria(simple examples on these), flexural endurance limit. **Note**: one simple example (application) from 2.5 of 3-4 marks.	5
3	**DESIGN OF WELDED JOINTS.** 3.1 Recall welded joints particularly fillet and butt joints. 3.2 Stresses in welded joints under direct, bending and torsional loading, strength of welded joints, simple examples on welded joints. **Note**: one simple example (application) of 4-6 marks.	4

4	**DESIGN OF GEARS.** 4.1 Gears-types, classification, terminology and applications. 4.2 Design steps and design of spur gears, examples. **Note**: one simple example (application) of 4-6 marks.	4
5	**DESIGN OF CLUTCH AND BRAKE.** 5.1 Clutch- types, terminology and applications. 5.2 Brake- types, terminology and applications. 5.3 Design steps and examples for plate and cone clutch. 5.4 Design steps and examples for shoe brake. **Note**: one example (application) of 6-8 marks.	6
6	**DESIGN OF CONNECTING ROD.** 6.1 Design steps for connecting rod, crank shaft, piston and gudgen pin.	4
7	**COMPUTER AIDED DESIGN.** 7.1 CAD softwares and programming languages. 7.2 Introduction to C++: 1. Fundamentals and features of object oriented programming. 2. Structure of C++, library and header files. 3. Keywords, constants, variables, strings, expressions, operators and manipulators. 4. Input, output and assignments statements. 5. Control statements for looping and decision making. 6. Structure and functions. 7.3 Simple design programmes using C++. **Note:** one simple programme (application) of 5-7 marks.	12
8	**TRENDS IN DESIGN.** 8.1 Stress analysis and photo analysis for actual stress, stress pattern in loaded components, stress components, photo elastic effect, polariscope. 8.2 Finite Element Analysis (FEA)-introduction, applications. 8.3 Industrial and visual design- introduction to basic elements and concept of visual design, study of geometry of elements in products and its applications in object drawing, significance of form in structural strength of products. 8.4 Design optimization-concept, meaning, need and importance. 8.5 Concurrent engineering-design aspect meaning, objectives, need, importance and design schemes-DFA, DFM.	4
	Total	42

Notes:

A. FOR STUDENTS.

a. It is advised that student download this copy of syllabus and plan to achieve the objectives of learning this subject.
b. Design data book by K.Mahadevan & B.Reddy (CBS Publication) is also permitted in theory examination.

B. FOR PAPER SETTER/MODERATOR.

a. Refer GTU syllabus and do not take reference of previous TEB question papers.
b. Ask the questions from each topic having marks weightage proportionate to hours allotted to that topic.
c. Optional questions must be asked from the same topic. That is weightage of compulsory attendance part of questions will be equal to proportionate to hours allotted to each topic.
d. Marks ratio of knowledge: comprehension: application types questions must be 30:30:40 respectively.
e. Submit solution / answer keys along with distribution of marks in each question for the paper being submitted.
f. Design data book by K.Mahadevan & B.Reddy (CBS Publication) is also permitted in theory examination.

Reference Books:

1.	Machine design	Khurmi and Gupta.
2.	Design data book	PSG College & Technology, Coimbtore.
3.	Handbook of machine design	G.N.Maitra & L.G.Prasad
4.	Turbo C++	Robert Lafore
5.	Design fundamentals	R.G.Scott
6.	Design data book	Mahadevan and Reddy
7.	Mechanical Engineering Design	J.E.Shigle, R.Mische

Additional Reference Books:

1.	Machine design	TVS Mucthy, N.Shanmugam
2.	Theory of elasticity	S.Timoshanko
3.	Fundamentals of finite element method	Grandin
4.	Graphic diagrams	Herdeg
5.	Production, treatment and finishes	John D.Deadle, McMillan
6.	Design Management	Farr Michael
7.	Computer Aided Design and Mfg.	Anderson, Wolfe & Bedworth.