GUJARAT TECHNOLOGICAL UNIVERSITY

Diploma in Automobile Engineering

Semester: 4

Subject Name: BASIC AUTOMOBILE DESIGN

Sr. No.	Course Content
1.	**GENERAL :** 1.1 General consideration in Machine Design. 1.2 General procedure in Machine Design. 1.3 S. I. units: Fundamental units: Length, Mass, Time, Temperature, Electric current. Derived units: Velocity, Acceleration, Mass-density, Force, Weight, Pressure, Work, Power, Energy, Frequency, Thermal Conductivity, Specific heat. 1.4 Definitions: Mass, Weight, Inertia, Force, Couple, Momentum, Torque, Power, Work, Energy. 1.5 Stress & Strain: Tensile, Compressive, Shear. 1.6 Young Modulus, Shear Modulus. 1.7 Stress-Strain Diagram, Hook's Law. 1.8 Bearing Stress. 1.9 Factor of safety. 1.10 Torsional & Bending stress.
2.	**DESIGN OF PISTON :** 2.1 Piston nomenclature. 2.2 Function of Piston. 2.3 Design consideration for Piston. 2.4 Material for Piston. 2.5 Design of Piston head, rings, pin, skirt and barrel.
3.	**DESIGN OF CONNECTING ROD :** 3.1 Function of Connecting rod. 3.2 Material for Connecting rod. 3.3 Shape of Connecting rod. 3.4 Length of Connecting rod. 3.5 Force on Connecting rod. 3.6 Design consideration for Connecting rod. 3.7 Design of cross-section of Connecting rod: I-section & Circular. 3.8 Design of Crank pin. 3.9 Design of Big end cap & bolts.
4.	**DESIGN OF CRANKSHAT :** 4.1 Function of crankshaft 4.2 Types of crankshaft 4.3 Materials and manufacturing processes for crankshaft

	4.4 Bearing pressure and stresses in crankshaft 4.5 Design consideration for crankshaft 4.6 Design of crankpin, crank webs and shat under flywheel: (i) Crank on dead centers (ii) Cranks at angle of maximum twisting moment.
5.	**DESIGN OF FLYWHEEL :** 5.1 Function of flywheel. 5.2 Fluctuation of speed. 5.3 Fluctuation of energy. 5.4 Energy stored in flywheel. 5.5 Weight of the flywheel. 5.6 Rim and arm dimensions
6.	**DESIGN OF CLUTCH :** 6.1 Function of clutch. 6.2 Types of clutch. 6.3 Materials for friction surfaces. 6.4 Design consideration for friction clutch. 6.5 Design of disc clutch: (i) Single plate; (ii) Multiplate.
7.	**DESIGN OF GEARS :** 7.1 Function of gears and gearbox. 7.2 Classification of gears. 7.3 Gear terminology. 7.4 Materials for gears. 7.5 Design consideration for gear drive. 7.6 Types of gear box (i) Sliding mesh (ii) Constant mesh (iii) Synchromesh. 7.7 Relation between number of teeth, speed and torque in meshing gears. 7.8 Calculation of number of teeth and torque transmitted.

Note:

All formulas, examples and mathematical expressions are in SI units only.

TUTORIAL WORK:

1. Report writing on general design procedure.
2. Examples based on design of piston.
3. Examples based on design of connecting rod.
4. Examples based on design of crank shaft.
5. Examples based on design of flywheel.
6. Examples based on design of clutch.
7. Examples based on design of gears.

REFERENCE BOOKS:

Sr no.	Title	Author	Publisher
1	Auto Design	R B Gupta	Satya Prakashan;Delhi
2	A Text Book of Machine Design	R S Khurmi J K Gupta	S Chand & Co.;Delhi
3	Machine Design	P C Sharma D K Agrwal	S K Katria & Sons;Delhi
4	Internal Combustion Engines and Air Pollution	R Yadav	Central Publishing House;Allahbad
5	Machine Design	R K Jain	Khanna Publishers;Delhi
6	Machine Design	Dr Sadhu Singh	Khanna Publishers;Delhi
7	Design of Machine Elements	M.F Spotts, C.Ventkatesh	Pearson Education Ltd.
8	Machine Design : An Integrated Approach	Robert L Norton	Pearson Education Ltd.
9	Machine Design;Vol I & II	A D Pandya R C Patel	
10	Automobile Design Problem	K M Agrwal	