GUJARAT TECHNOLOGICAL UNIVERSITY

Diploma in Mechatronics Engineering

Semester: 4

Subject Name **THEORY OF MACHINE**

Sr. No.	Course content
1.	**INTRODUCTION** 1.1 Need, Scope & importance of Theory of Machine in Design and Analysis. 1.2 Need of developing analytical attitude, Knowledge & skill required for design and analysis. 1.3 Basic terminology related to machines and mechanisms. 1.4 Development of different mechanisms. - Four bar mechanism. - Slider crank mechanisms. - Inversion.
2.	**VELOCITY AND ACCELERATION DIAGRAMS** 2.1 Basic concept used in solving velocity and acceleration problems. 2.2 Approach to solve velocity and acceleration problems related to mechanisms using - Graphical Methods - Klein's Construction
3.	**CAMS AND CAM PROFILES** 3.1 Introduction, function and types of cams and cam followers. 3.2 Types of motions and displacement for different types of cam and cam followers. 3.3 Construction of different types of cam profile for given data.
4.	**FRICTION** 4.1 Introduction and basic concept of friction related to body motion on: - Horizontal plane - Inclined plane (up and down) 4.2 Appreciate the role of friction in thrust bearing, pivot bearing and collars, considering - uniform wear and uniform pressure. 4.3 Function and working of different types of clutches. 4.4 Types and working of simple friction brakes. 4.5 Different types of dynamometers, operational principles and working.

5.	**POWER TRANSMISSION** 5.1 Introduction, need, modes and applications. 5.2 Rope –types, applications. 5.3 Belt drive-types, terminology, ratio of tensions, effect of centrifugal forces and initial tension. 5.4 Gear trains- types and application.
6.	**FLY WHEEL AND GOVERNOR** 6.1 Turning moment diagram, Use, T.M. diag. for different machines and torque determination. 6.2 Coefficient of fluctuation of speed and energy . 6.3 Flywheel : Functions , types and moment of inertia and weight calculation. 6.4 Governor : functions, types and terminology associated.
7.	**BALANCING AND VIBRATION** 7.1 Concept, types of balancing, balancing of masses revolving in the same plane.(only description),basic concept of balancing reciprocating masses. 7.2 Terminology of vibration, causes and remedies of vibration.

LABORATORY EXPERIENCES:

Experience Type	Experience Number	DESCRIPTION OF LABORATORY EXPERIENCE
PREPERATORY ACTIVITY	1	a. Scalar and vector quantity. b. Various subject related units and their important equations and conversions. c. Sketch various elements (like piston, crank, connecting rod, screw, cam, clutch, brake, flywheel, governor, etc.)covered in this subject from actual items and with functions of each.
DEMONSTRATION AND STUDY	2	a. Kinematics and motion transmission of at least five mechanisms including single slider crank mechanism and any one four bar mechanism. b. Working of any one type of clutch and any one type of brake. c. Working of flywheel and governor. d. Working of any one type of cam with follower.
SHEET PREPERATION AND REPORT	3	2 Problems on single slider crank - mechanism. (Relative –velocity method).
	4	2 Problems on single slider crank Mechanism . (By Klein's construction method).

	5	2 Problems on four bar chain mechanism.
	6	2 Problems on drawing cam profile(for Knife edge and Roller types followers - offset type).
TUTORIAL SOLUTION	7	a. Calculation of frictional torque and power from given data assuming uniform wear and uniform pressure condition. b. Example on belt drive . c. Example on gear drive. d. Types of Turning moment diagram and example on calculation of fly wheel weight. e. Example on balancing using graphical and analytical methods. f. Example on vibration.
PREPERATION OF MODEL AND /OR CHART	8	Individually or in a group, prepare subject related mechanism model and / or chart. This has to be proposed by student/s and has to be approved by teacher.
SEMINAR PRESENTATION AND GROUP DISCUSSION	9	a) 10 minutes individual seminar presentation on given topic. b) Group discussion on given topic.
SCHOOL WITHIN SCHOOL	10	Guiding / Sharing /Mentoring the know-how by meritorious students to lower performing students.
SELF LEARNING AND LITURATURE SURVEY	11	1. Contact with field expert ,seniors, alumni and get further know-how individually or in a group. 2. Read /Refer related book / magazine / article / literature / Product Pamphlets-catalogues and share the content. 3. Surf internet and download related movies/articles and share the content. 4. Visit individually any exhibition/industry/Institute's workshop and find various mechanisms. Prepare the report on this and share the content.
PAPER SOLUTION	12	Given model paper by concerned teacher,(Not old papers), prepare solution.
ASSIGNMENT	13	Solve given assignments.

NOTES :

1. Prepare term work report for each experience.

2. Term work report content of each experience should also include following. (As applicable).
   a. Experience description / data and objectives.
   b. Skill/s which is / are expected to be developed in student after completion of experience.
   c. Drawing of experience / setup with labels/nomenclature to carry out the experience

   d. The specifications of machines / equipments / devices / tools / instruments /items/elements which is / are used to carry out and to check experience.
   e. Process parameters / setup settings' values applied to carry out experience.
   f. Steps / Process description to execute experience.
   g. Information on recent machines / equipments / devices / tools / instruments /items available in market to carry out the experience. h. Problems occurred/faced ,their causes and solution/s applied.
   i. Special / Additional notes or remarks.
3. Distance Learning manual, photocopies, printed content, etc. are not permitted in Term work report of student of regular mode. Focus should be on developing the term work as original efforts of students.
4. Term work content of industrial visit report should also include following.
   a. Brief details of industry visited.
   b. Type ,location, products, rough layout, human resourse, etc of industry.
   c. Details, description and broad specifications of machineries/processes observed.
   d. Safety norms and precautions observed.
   e. Student's own observation on Industrial environment, culture and attitude.
   f. Any other details / observations asked by accompanying faculty.
5. Term work includes experience logbook duly certified by subject teacher.

REFERENCES BOOKS:

Sr. No	Name of Books	Author
1.	Theory of Machines	Jagdishlal
2.	Theory of Machines	C.S.Shah & N.C.Pandya
3.	Theory of Machines	Abdulla Shariff
4.	Theory of Machines	Shah & Jadvani
5.	Theory of Machines Simplified	K.C.Narang
6.	Theory of Machines	R.S.Khurmi
7.	Theory of Machines	P.L.Bellaney
8.	Theory of Machines	R.C.Patel B.M.Patel & L.B Shah
9.	Technical Dynamics	L.B. Shah