GUJARAT TECHNOLOGICAL UNIVERSITY

PRODUCTION ENGINEERING
DESIGN OF PRODUCT AND MACHINE TOOLS
SUBJECT CODE: 2182503
B.E. 8th SEMESTER

Type of course: Under Graduate

Prerequisite: Nil

Rationale: The course aims to impart basic skills of Machine Tool Design & Product Design.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
				Theory Marks			Practical Marks			
L	T	P	C	ESE (E)	PA (M)		ESE (V)		PA (I)	
					PA	ALA	ESE	OEP		
3	1	0	4	70	20	10	30	0	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Introduction and design of Machine Tool Drives using Design Data Book** Introduction, Machine tool types, machine tool drives, requirements of machine tool design, machine tool design process, need for speed regulation, stepped regulation of speed, design of speed box and feed box, classification of speed and feed box, step less regulation of speed and feed rates, Machine tool chatters, sources and effects of vibration, methods of controlling vibrations in machine tools.	**15**	30
2	**Design of Bearings and Spindles using Design Data Book** Introduction, classification of bearing, criteria for design and selection, Design of hydrostatic, hydrodynamic bearings, design/selection of antifriction bearing, radial and axial clearance adjustment of bearings. Functions and requirements of Spindle unit, materials of spindles, Design calculations of spindles.	**10**	20
3	**Design of machine tool structures and Guide ways** Functions, design criteria, Types and uses of stiffness, profile, design procedure, design for strength and stiffness, design of beds, design of columns, design of cross rails, arms, saddles and carriages, function and types of guide ways, design of slide ways, methods of adjusting clearances in slide ways, design of slide ways for stiffness, Guide ways operating under liquid friction conditions, design of Anti-friction Guide ways, protecting devices for slide ways.	**10**	20
4	**Material Handling Equipment' design using Design Data Book** Introduction, Design of Hoisting Machinery: Design of fiber ropes, pulley system, steel wire ropes, rope sheaves, rope drums, hooks and	**09**	18

	Chain & Sprocket.		
5	**Product design** Introduction, Structure of product design, product design research, Preliminary product design Evaluation, Product development and the prototype stage, Economic evaluation of the design, preparation of Product design specifications, final product design specifications, Other design considerations, Computer assisted design and robotics. Case study on product design.	**06**	12

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
7	**14**	**14**	**21**	**14**	**0**

Legends: R : Remembrance ; U = Understanding; A = Application and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table

Reference Books:

1. Machine Tool design By N.K.Mehta
2. Design of Machine tools by S.K.Basu
3. Principles of Machine tools by Sen and Bhattacharya
4. Machine Design Vol-II by R.C.Patel
5. Operation and Industrial Management by Donald Delmar
6. P.S.G. Design Data Book

Course Outcome:

After learning the course the students should be able to:

1. Understand use of Design Data Book to design Machine Tool Drives, Bearings & Material Handling Equipments.
2. Understand Design Of Machine Tool Structure.
3. Evaluate Product Design Concept.

List of Experiments:

Tutorials based on above syllabus.

List of Open Source Software/learning website:

www.nptel.ac.in/

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should be submitted to GTU.