GUJARAT TECHNOLOGICAL UNIVERSITY

MECHANICAL (PRODUCTION ENGINEERING) (28)

TOOL & DIE DESIGN

SUBJECT CODE: 2722807

SEMESTER: II

Type of course: MAJOR ELECTIVE - II

Prerequisite: NIL

Rationale: This course provides the knowledge and practice regarding different Cutting Tool Design and Analysis. This course gives practice for various Drilling Jig, Milling Fixture Design helping in Industries for Big Job Locating and Clamping work also Design Forging Die, Casting Die and Press Tools Design.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks		Practical Marks				
				ESE (E)	PA (M)	ESE (V)		PA (I)		
						ESE	OEP	PA	RP	
3	2#	2	5	70	30	20	10	10	10	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Cutting Tool Design** Fundamentals of Cutting tools design, cutting tools and their principal elements, Tool geometry, system of nomenclatures and their interrelations, setting for the grinding of various basic cutting tool (turning, drilling, milling)	**04**	11
2	**Analyses and Design of Jigs and Fixture** Principles of jig and fixture design, Dual cylinder location, diamond pin analysis, V-block analysis, design principles of centralizers, various mechanisms and design of equalizers, analysis for optimum number of clamping forces required and calculation of their magnitudes, concept of modular fixtures, design of fixtures for NC/CNC machines, computer Applications in fixture design and analysis.	**10**	27
3	**Design of press tools:** Components of die design, design of die blocks, punches and strippers, methods of holding punches, sketches of stock stops, Design procedure for progressive dies, compound dies and combination dies for press tool operation forging die design for drop and machine forging parts. Computer applications in press tool design.	**06**	17
4	**Design of forging dies:** Grain flow considerations, parting line selection, draft, design problems involving ribs, bosses and fillets. Flash and flash control, determination of number of impressions required and their sequence, design steps and analysis of forging dies, detail calculations, shrinkage, cavity shapes, heat transfer considerations, cooling and ejection systems, automation	**06**	17

	in forging operations, computer aided design and analysis.		
5	**Design of injection molds** Principles of melt processing, product considerations, determination of economical number of cavities, temperature control of injection molds, calculation of mold opening force and ejection force. Detail design of cooling system, ejection system and gating system. Moldability features, mold flow analysis.	**06**	17
6	**Die casting die design** Metals for die casting, specific details of die construction, casting ejectors, side cores, loose die pieces, slides, types of cores, directional solidification, types of feeders, die venting, water cooling, design aspects of die casting dies, defects.	**04**	11

Reference Books:

1. Cole: "Tool Design"
2. Donaldson: "Tool Design", Tata McGraw Hill.
3. ASTEM: "Fundamentals of Tool Design"
4. P.C.Sharma: "A Textbook of Production Engineering"., S.Chand Publication, N.Delhi
5. Ivana Suchy, "Handbook of Die Design", 2nd edition McGraw Hill.
6. Ventatraman, "Design of Jigs, Fixtures and Press Tools", Ascent Series Tata McGraw Hill.
7. Deshpande D. L., "Basic Tools", 2nd edition University Press.

List of Experiments:

1. Design of Jigs and Fixture
2. Design of press tools
3. Design of forging dies
4. Design of injection moulds
5. Die casting die design

Open Ended Problems:

Major Equipments:

1. Drill Jigs For heavy duty Radial Drill Machine
2. Milling Fixture for Profile Cutting
3. Forging Machine
4. Combination Press

List of Open Source Software/learning website:

I. http://www.wisetool.com/tdesign.html
II. http://nptel.ac.in/courses/112106153/Module%203/Lecture%205/MF_Module_3_Lecture_5.pdf
III. http://nptel.ac.in/video.php?subjectId=112105126

Review Presentation (RP): The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first

two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website.