BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, Pilani
Pilani Campus

INSTRUCTION DIVISION
FIRST SEMESTER 2016-2017
Course Handout (Part II)

Date: 02/08/2016

In addition to part I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. : **ME G532**
Course Title : **MACHINE TOOL ENGINEERING**
Instructor-in-charge : **ABHIJEET K. DIGALWAR**

1. Course Description:

Machine tool drives and mechanisms, Principles of machine tool design, Regulation of speed and feed rates, Design of machine tool structures (bed, columns, housings, base and tables, cross rail, arms, saddle, carriage and Rams), Design of power screws and guideways, Design of spindle and spindle supports, Dynamics of machine tools, Control systems in machine tools, Numerical control of machine tools.

2. Scope and objective of the course:

The Course is intended to focus the student's attention on the concepts of design, analysis and features of different types of machine Tools, different machine elements to make a machine tool and new concepts in machine tool engineering. The course covers Design principles of Machine Tools, stiffness, and rigidity of the construction elements, their combined behavior under load, design of stepped and step-less drives and electric and hydraulic drives, electric/mechanical/ hydraulic drives, bearings and slide-ways, machine tool controls, dynamics, and recent developments in machine tool design.
The students are encouraged to select seminar topics of current interest and developments in the fields of technology of construction of Machine Tools and present them in the class apart from the regular classroom learning.

3. Text Book:

T1. N. K. Mehta," **Machine Tool Design and Numerical Control**', Third edition, Tata McGraw Hill Pvt. Ltd, New Delhi, 2012.
T2. G. C. Sen & A. Bhattacharya, "**Principles of Machine Tools"**, New central book agency, Calcutta, 1998

4. Reference Books:

R1. P. H. Joshi, "**Machine Tools Handbook Design and Operation**", Tata Mcgraw-Hill Pvt. Ltd, New Delhi,2010.
R2. A. B. Chattopadhyay, "**Machining and Machine Tools**" First Edition, Wiley-India, 2011.
R3. S. K. Basu, D. K. Pal, **"Design of Machine Tools"**, Oxford & IBH Publication Co Pvt Ltd, New Delhi, 1995.

5. Course Plan:

Lecture No.	Learning objectives	Description	Reference * Chap./Sec. # (Book)
1-4	Understanding the machine tools, their functions and drive systems.	Fundamentals of Machine Tool Design, Design Considerations, General requirements, Review of the mechanisms for transmission of motion. layout	(Ch 1) T1
5-15	Understanding the gear box design.	Design of Speed & Feed boxes and Ray diagrams.	(Ch 2) T1 (Ch 3) T2
16-20	Understanding machine tool structural design	Design of machine Tool structures for forces, stresses, and deflection.	(Ch 3) T1 (Ch 5) T2
21-24	Understanding the functions of guide-ways, Power screws	Design of Machine tool Guide ways, and Power screws, Analysis of slides and Guides.	(Ch 4) T1 (Ch 13) T2
25-27	Understanding the machine tool spindles and supports	Spindles and spindle supports, Bearings and load and deflection analysis .	(Ch 5) T1 (Ch 5) T2
28-30	Overview of all machine tool vibrations	Dynamics of Machine Tools, Vibrations and dynamic rigidity.	(Ch 6) T1 (Ch 6) T2
31-33	Understanding control systems employed	Machine Tool control Systems.	(Ch 7) T1 (Ch 8) T2
34-38	Understanding the CNC/DNC machine tools	Numerical control of Machine Tools, NC, DNC Machining Centers.	(Ch 8 & 9) T1
39-40	Overview of acceptance test for machine tools	Object and procedure for acceptance test, instruments, sequence, Standard acceptance test charts.	(Ch 9) T2
41-42	Advances in Machine Tools	Development in the machine tools	Research Papers

6. Evaluation Scheme:

S. No	Evaluation Component	Duration	Weightage	Date, Time & Venue	Nature of Component
1	Mid Semester Test	90 minutes	30	8/10 4:00 - 5:30 PM	CB
2	Project, Seminars / Assignments/Class Tests	-	30	Dates to be announced in the class	-
3	Comprehensive Examination	3 Hrs	40	14/12 AN	CB/OB

7. Chamber Consultation Hours:

To be announced in the class.

8. Notices:

All notices related to the course will be displayed on Notice Board of Mechanical Engineering Department only.

9. Make-up Policy:

Make-up will be granted **ONLY** in genuine cases with prior permission. The request application for make-up test **MUST** be reached to the Instructor-in-charge before commencement of the scheduled test along with **DOCUMENTARY PROOF**. No make-up will be allowed for the Surprise Quiz Tests.

Instructor-in-charge
ME G532