JABALPUR ENGINEERING COLLEGE, JABALPUR (MP)
(An Autonomous Institute of Govt. of M.P.)
Affiliated to Rajiv Gandhi Technological University, Bhopal (MP)
Scheme of Study and Examination (w.e.f. July 2010)

M.E. III Sem. Branch : Mechanical Engg. Specialization : Machine Design

Course Code	Subject	Periods			EVALUATION SCHEME					Credits
					SESSIONAL EXAM				SUB	
		L	T	P	TA	CT	TOT	ESE	TOTAL	
	Elective - III									
ME-132A	Optimization Methods in Engineering Design									
ME-132B	Theory of Plates and Shells	3	1	-	10	20	30	70	100	4
ME-132C	Advanced mechanics of solids									
	Elective - IV									
ME-133A	Industrial Tribology									
ME-133B	Advanced Topics in Lubricants	3	1	-	10	20	30	70	100	4
ME-133C	Properties and Selection of Engineering Materials									
ME-133D	Experimental Stress Analysis									
(PRACTICAL/DRAWING/DESIGN)										
ME-134L	Seminar/ Project	-	-	4	100	-	100	-	100	4
ME-135L	Software Training (4 weeks)	-	-	-	-	-	-	100	100	4
ME-136L	Preliminaries of Dissertation Presentation	-		4	40	-	40	60	100	4
	Total	**6**	**2**	**8**	**160**	**40**	**200**	**300**	**500**	**20**

T.A. Teachers Assessment, CT- Class Test, ESE - End Semester Examination, Total Marks 500

Total Periods : 16 Total Credits : 20

NOTE : The students shall go on Software training at the end of second semester and the evaluation shall be done at the end of third semester. The student has to present a report on the training and also has to face a viva voice examination infront of a panel headed by head of the department. The seminar /project shall be asigned by the supervisor

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
ME MD	**OPTIMIZATION METHODS IN ENGINEERING DESIGN**	ME-132A			5.0

OPTIMIZATION METHODS IN ENGINEERING DESIGN

1. Introduction to Optimization.
2. Classical Optimization Techniques
3. Linear Programming Ⅰ: Simplex Method.
4. Linear Programming Ⅱ: Additional Topics.
5. Nonlinear Programming Ⅰ: One Dimensional Minimization Methods.
6. Nonlinear Programming Ⅱ : Unconstrained Optimization Techniques.
7. Nonlinear Programming Ⅲ : Unconstrained Optimization Techniques.
8. Geometric Programming.
9. Dynamic Programming.
10. Stochastic Programming.
11. Nontraditional Optimization Algorithms.

References :

1. Optimization and its applications by S.S. Rao
2. Optimization for Engineering Design by K.Deb

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
ME MD	**INDUSTRIAL TRIBOLOGY**	ME-133A			5.0

INDUSTRIAL TRIBOLOGY

Introduction to the concept of tribodesign :

Principles of tribodesign, Tribological problems in machine design, Plain sliding bearings, Rolling contract bearings, piston rings and cylinder liners, Cam and cam followers, Friction drives, Involute gears, Hypoid gears, Worm gears.

Basic principles of tribology :

Origins of sliding friction, Contact between bodies in relative motion, Friction due to adhesion, Friction due to ploughing, Friction due to deformation, Energy dissipation during friction, Friction under complex motion conditions, Types of wear and their mechanisms, Sliding contact between surface asperities, The probability of surface asperity contact, Wear in lubricated contacts Relation between fracture mechanics and wear, Film lubrication .

Elements of Contact mechanics :

Introduction, Concentrated and distributed forces on plane surfaces, Contact between two elastic bodies in the form of spheres, Contact between cylinders and between bodies of general shape, Failures of contacting surfaces, Design values and procedures, Thermal effects in surface contact, Contact between rough surfaces Representation of machine element contacts.

Friction, lubrication and wear in lower kinematic pairs :

Introduction, The concept of friction angle, Friction in screws with a square thread, Friction in screws with a triangular thread, plate clutch – mechanism of operation, cone clutch – mechanism of operation, Rim clutch – mechanism of operation, Centrifugal clutch – mechanism of operation, Boundary lubricated sliding bearings, Drives utilizing friction force, Frictional aspects of brake design, The role of friction in the propulsion and the braking of vehicles, Tractive resistance, Pneumatic tyres, Creep of an automobile tyre Tribo design aspects of mechanical seals.

Sliding-element bearings :

Derivation of the Reynolds equation, Hydrostatic bearings Squeeze-film lubrication bearings, Thrust bearings, Journal bearings, Journal bearings for specialized applications, Gas bearings, Dynamically loaded journal bearings Modern developments in journal bearing design, Selection and design of thrust bearings self lubricating bearings.

Friction, lubrication and wear in higher kinematic pairs :

Introduction, loads acting on contact area, Traction in the contact zone, Hysteresis losses, Rolling friction Lubrication of cylinders, Analysis of line contact lubrication, Heating at the inlet to the contact, Analysis of point contact lubrication, Cam-follower system.

Rolling contact bearings :

Introduction, Analysis of friction in rolling-contact bearings, Deformations in rolling contact bearings, Kinematics of rolling-contact bearings, Lubrication of rolling-contact bearings, Acoustic emission in rolling-contact bearings.

Lubrication and efficiency of involute gears :

Introduction, Generalities of gear design, Lubrication regimes, Gear failure due to scuffing, Gear pitting, asessment of gear wear risk, Design aspect of gear lubrication, Efficiency of gears.

References :

1. Tribology in Machine Design by T.A. Stolarski

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	SEMINAR/PROJECT	ME-134L			5.0

SEMINAR/PROJECT

The student shall take up a small project under the supervision of a supervisor and shall complete the task. He has to present the report before a committee credit by H.O.D. and answer the queries

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	SOFTWARE TRAINING	ME-135L	Min "D"	Min "D"	5.0

SOFTWARE TRAINING

The student shall go for Software Training at the end of Second Semester during summer and shall prepare a report on the Practical Training undergone there. He has to present the report at the time of practical examination of Third Semester.

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	PRELIMINARIES OF DISSERTATION PRESENTATION	ME-136L	Min "D"	Min "D"	5.0

PRELIMINARIES OF DISSERTATION PRESENTATION

The student shall prepare a literature review of the dissertation work to be undertaken. He shall also prepare the scheme of dissertation