Faculty of Engineering & Technology, SRM University, Kattankulathur – 603203

School of Mechanical Engineering

Department of Mechanical Engineering

Course plan

Course code : **ME1020** Date : 01.02.2016

Course title : **MECHANICAL ENGINEERING DESIGN**

Semester : VI

Academic year / : 2015 - 2016/ Even

Semester :(Jan 2016 – May 2016)

Faculty details:

Batch/ Group	Class room No	Details of Faculty member				
		Name	Room No.	Cell No.	e-mail id (@ktr.srmuniv.ac.in)	Student contact time
	M9	Mr.M.Kamaraj	MEB 305A	9962189209	kamaraj.m	12:45pm-1:15pm
	M11	Mr.R.Santhanakrishnan	MEA 202/A	9444718578	santhanakrishnan.r	
	MB 23	Mr.A.Thirugnanam	MEH 102/B	9884156446	thirugnanam.a	
	M15	Mr.S.Balamurugan	BEL 401/A	9626666110	balamurugan.sr	
	M12	Mr.R.Harrissamuel	MEH102/C	9443455216	harrissamuel.r	
	MB24	Mr.V.Raghavendra Rao	MEHA207	9884889264	raghavendra.v	
	MB 27/B	Mr.D.Vamsikrishna	MEH 101/C	8148263356	vamsikrishna.d	
	M13	Mr.N.Arun	MEHA207	9789233486	arun.n	
	MB 28	Mr.M.Balaji	BEL401/A	9788454625	balaji.m	
	M14	Mr.V.N.B. Prasad sodisetty	H501	8122523325	prasadsodisetty.m	
	M10	Mr.E.Muthu	MEHA105/C	9789497985	muthu.e	
	M8	Dr. R.Prabhusekar	MEHA105/A	9894986396	prabhusekar.r	

Direct assessment details:

Name of assessment	Marks	Topics	Tentative date	Duration
Cycle test - I	10	Fundamentals Of Mechanical Design, Design For Variable Stresses	24.02.16	100 minutes
Surprise test	05	Design of cotter joints and knuckle joints	Second week of March	15 minutes
Cycle test - II	10	Design of bolted joints, Curved beams, Design of riveted joints and welded joints	23.03.16	100 minutes
Model examination	20	Entire Syllabus	25.04.16	3 hours
End semester examination	50	Entire Syllabus	16.05.16	3 hours
Attendance	05	N/A		

Syllabus of the course

		L	T	P	C
ME1020	**MECHANICAL ENGINEERING DESIGN**				
	Total contact hours - 60	2	2	0	3
	Prerequisite				
	Nil				

PURPOSE

To study the basic design principles and apply the principles to the design of various elements encountered in Mechanical machines and structures.

INSTRUCTIONAL OBJECTIVES

1	To determine the strength of the components.
2	To determine the failure conditions and apply them to real life Problems.
3	To design simple joints, fasteners, levers and springs.

UNIT I - FUNDAMENTALS OF MECHANICAL DESIGN (12 hours)

Basic Definitions - Phases of Design - Types of Loads. Types of stresses: Normal, shear, and combined stresses. Criteria for Design: strength, contact fatigue, stiffness, wear resistance, vibration resistance, heat resistance, reliability. Overview of engineering materials, theories of failure. Design of members subjected to simple stresses and combined stresses.

UNIT II - DESIGN FOR VARIABLE STRESSES (12 hours)

Members subjected to variable stresses. Failure and endurance limit – Factors affecting endurance limit. Stress concentration - Methods of reducing stress concentration - Notch sensitivity. Combined steady

and Variable stresses - Soderberg, Gerber and Goodman methods for combination of stresses and their application in design problems. Members subjected to impact loads and dynamic loads.

UNIT III - DESIGN OF TEMPORARY JOINTS AND CURVED BEAMS **(12 hours)**

Design of cotter joints and knuckle joints. Design of bolted joints. Curved beams - crane hook - Frames, clamps.

UNIT IV - DESIGN OF PERMANENT JOINTS **(12 hours)**

Design of riveted joints, welded joints and its application to pressure vessels.

UNIT V - DESIGN OF LEVERS AND SPRINGS **(12 hours)**

Design of levers - Design of springs - Helical and leaf springs

TEXT BOOKS

1. Prabhu.T.J, *"Design of machine elements"*, Kasthuri Publication, Chennai, 2007.
2. Patel.R.C, Sikh.S.S and Pandya, *"Machine Design"*, Volume I, C. Jamdan & Co., 1999.
3. Khurmi.R.S, and Gupta.J.K,*"Machine Design"*, S.Chand Publishing., 2011.

REFERENCES

1. Norton.R.L, *"Design of Machinery"*, McGraw Hill, 2004.
2. Robert.C.Juvinall, *"Fundamentals of Machine Component Design"*, John Wiley & sons, 3rd Edition, 2002.
3. Spots.M.F, Soup.T.E, *"Design of Machine Elements"*, Prentice Hall of India Private Limited, New Delhi, 2006.
4. William Orthwein, *"Machine Component Design"*, Vol. I and II, Jaico Publising House, Chennai, 1996.
5. Maitra (Gitin M), *"Handbook of Gear Design"*, Tata Mcgraw-Hill, New Delhi, 1994.
6. Design Data, *"PSG College of Technology"*, Coimbatore, 2006.

Course designed by		Department of Mechanical Engineering										
1	Student outcome	a	b	c	d	e	f	g	h	i	j	K
		×	×	×		×					×	
2	Mapping of instructional objectives with student outcome	1	2	3		3					2	
3	Category	General (G)		Basic Sciences (B)			Engineering Sciences And Technical Arts (E)				Professional Subjects (P)	
											X	
4	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing			Design		Thermal		General			
					X							
5	Course Coordinator	Mr.M.KAMARAJ										

SESSION PLAN

Session No.	CONTENTS	Text / Ref. book
	FUNDAMENTALS OF MECHANICAL DESIGN	
1	Introduction to mechanical engineering design, Basic Definitions, Phases of Design	T1 – 1
2	Types of Loads. Types of stresses: Normal, shear, and combined stresses	T1 – 4
3	Normal, shear, and combined stresses - Problems	
4	Criteria for Design: strength, contact fatigue, stiffness, wear resistance, vibration resistance, heat resistance, reliability	T1 – 5
5	Overview of engineering materials, theories of failure	T1 – 3, T3 - 5
6	Theories of failure - Problems	T3 – 5
7	Design of members subjected to simple stresses	
8	Simple stresses- Problems	
9	Design of members subjected to combined stresses	
10	Combined stresses - Problems	
11	Combined stresses - Problems	
12	Combined stresses - Problems	
	DESIGN FOR VARIABLE STRESSES	
13	Introduction to variable stresses, Failure and endurance limit, Factors affecting endurance limit	T3 – 6
14	Stress concentration, Methods of reducing stress concentration, Notch sensitivity	
15	Stress concentration and Notch sensitivity - Problems	
16	Stress concentration and Notch sensitivity - Problems	

17	Combined steady and Variable stresses - Soderberg, Gerber and Goodman methods and their applications	
18	Variable stresses using Soderberg method - Problems	
19	Variable stresses using Gerber method - Problems	
20	Variable stresses using Goodman method - Problems	
21	Variable stresses using Goodman and Soderberg method - Problems	
22	Members subjected to impact loads and dynamic loads	T1 – 4, 7
23	Impact loads - Problems	
24	Dynamic loads - Problems	
DESIGN OF TEMPORARY JOINTS AND CURVED BEAMS		
25	Cotter joints – Introduction, types, design procedure for sleeve and cotter joint	T3 – 12
26	Sleeve and cotter joint - Problems	
27	Design procedure of gib and cotter joint and problems	
28	Knuckle joint – Introduction, design procedure for knuckle joint	
29	Knuckle joint - Problems	
30	Bolted joint – Introduction, stresses in bolted joint due to static loading	T3 – 11
31	Stresses in bolted joint - Problems	
32	Bolted joints under eccentric loading – parallel to the axis of bolts - Problems	
33	Bolted joints under eccentric loading – perpendicular to the axis of bolts - Problems	
34	Bolted joints under eccentric loading – in the plane containing bolts - Problems	
35	Introduction to curved beams – crane hook - Problems	T3 – 5
36	Frames and clamps - Problems	

DESIGN OF PERMANENT JOINTS		
37	Riveted joints – Introduction, types, failure and strength	T3 – 9
38	Design procedure of longitudinal butt joint for pressure vessels - Problems	
39	Design procedure of circumferential lap joint for pressure vessels - Problems	
40	Eccentric loaded riveted joint – Introduction, design procedure	
41	Eccentric loaded riveted joint - Problems	
42	Eccentric loaded riveted joint – Problems	
43	Welded joints – Introduction, strength of transverse, parallel and circular fillet welded joints	T3 – 10
44	Fillet welded joints - Problems	
45	Fillet welded joints - Problems	
46	Eccentric loaded welded joint – design procedure	
47	Eccentric loaded welded joint – Problems	
48	Eccentric loaded welded joint – Problems	
DESIGN OF LEVERS AND SPRINGS		
49	Levers – Introduction, types, applications and design procedure	T3 – 15
50	Design procedure for hand lever - Problems	
51	Design procedure for foot lever - Problems	
52	Design procedure for cranked lever - Problems	
53	Design procedure for bell crank lever - Problems	
54	Introduction to springs and its types, design procedure for helical spring	T3 – 23
55	Helical springs - Problems	
56	Helical springs - Problems	
57	Helical springs subjected to fatigue loading – design procedure	
58	Helical springs subjected to fatigue loading – Problems	
59	Design procedure for leaf springs	
60	Leaf springs – Problems	

TEXT BOOKS

1. Prabhu.T.J, "*Design of machine elements*", Kasthuri Publication, Chennai, 2007.
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5. Maitra (Gitin M), "*Handbook of Gear Design*", Tata Mcgraw-Hill, New Delhi, 1994.
6. Design Data, "*PSG College of Technology*", Coimbatore, 2006.

Name and Signature of Faculty:

Batch / Group	Name	Signature
	Mr.M.Kamaraj	
	Mr.R.Santhanakrishnan	
	Mr.A.Thirugnanam	01/02/2016
	Mr.S.Balamurugan	
	Mr.R.Harrissamuel	
	Mr.V.Raghavendra Rao	
	Mr.D.Vamsikrishna	
	Mr.N.Arun	
	Mr.M.Balaji	
	Mr.V.N.B. Prasad sodisetty	1/2/16
	Mr.E.Muthu	
	Dr. R.Prabhusekar	

2/2/2016

HOD / Mechanical