Indra Ganesan
COLLEGE OF ENGINEERING

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Accredited by NAAC with 'B+' Grade, 2(f) & 12B Status Institution by UGC
IG Valley, Madurai Main Road, Manikandam, Tiruchirappalli - 620012

NAAC DOCUMENTS

QUALITY INDICATOR FRAME WORK

CRITERION – 1

CURRICULAR ASPECTS

SUBMITTED BY

IQAC

INTERNAL QUALITY ASSURANCE CELL

INDRA GANESAN COLLEGE OF ENGINEERING

Criteria 1	Curricular Aspects	100

1.1 Curricular Planning and Implementation (20)

1.1.1 The Institution ensures effective curriculum planning and delivery through a well-planned and documented process including Academic calendar and conduct of continuous internal Assessment

Table of Content

INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India
(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF MECHANICAL ENGINEERING

PREFACE OF THE COURSE FILE

Batch	: **2016-2020**
Academic Year	: **2019-2020 / ODD**
Program	: **MECHANICAL ENGINEERING**
Year & Semester	: **3nd Year / 5th Semester**
Course Code	: **ME8593**
Name of the Course	: **Design of Machine Elements**
Faculty in-charge	: **Mr.C.Saravana Kumar, AP/Mechanical**

Signature of the Faculty in-charge

HoD / Mechanical

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

indra ganesan college of engineering

Department of Mechanical Engineering

Work Load - Odd Semester 2019-20

S.NO.	Teacher's Name	Course Code	Course Name	Semester	Lecture / week	Total
1	Mr.R.Ramesh Babu (2+0)	ME6703	Computer Integrated Manufacturing Systems	VII	4	8
		ME8501	Metrology and Measurements	V	4	
2	Mr.C Saravana Kumar (2+2)	ME8351	Manufacturing Technology - I	III	3	17
		GE6757	Total Quality Management	VII	4	
		ME8361	Manufacturing Technology 1 Lab	III	4	
		ME8511	Kinematics and Dynamics Laboratory	V	4	
			TATS	V	2	
3	Mr.A.Dinesh Antony (2+2)	ME8593	Design of Machine Elements	V	4	16
		ME8152	Engineering Graphics	I	6	
		ME6513	Metrology and Measurements Laboratory	V	4	
		ME6713	Comprehension	VII	2	
4	Dr.A.Arul Selvan (3+0)	ME8391	Engineering Thermodynamics	III	5	16
		ME6701	Power Plant Engineeering	VII	4	
		ME8595	Thermal Engineering- II	V	4	
			TATS	VII	3	
5	Mr.R.Manickam (2+2)	ME8594	Dynamics of Machines	V	5	17
		CE8394	Fluid Mechanics and Machinery	III	5	
		ME8381	Computer Aided Machine Drawing	III	4	
		ME6711	Computer Aided Simulation & Analysis Lab	VII	3	
6	Mr.J.S. Veera Jegatheeshwaran (3+1)	ME6702	Mechatronics	VII	4	17
		OIM552	Lean Manufacturing	V	4	
		ME8152	Engineering Graphics	I	6	
		ME6712	Mechatronics Lab	VII	3	
7	Mr.Josepe=h Ravi Selvan (2+1)	ME6005	Process Planning & Cost Estimation	VII	4	12
		ME8351	Manufacturing Technology - I	III	3	
		ME8512	Thermal Engineering Laboratory	V	4	

Time Table Co-ordinator

HOD

PRINCIPAL

Dr. G. Balakrishnan, M.E., Ph.D.,
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Indra Ganesan
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MADURAI MAIN ROAD (NH45 B), MANIKANDAM, TIRUCHIRAPALLI-620012

Department of Mechanical Engineering 2019-2020

II-yr/III-Sem **CC: Mr.R.Manickam**

DAY	1	2	BREAK	3	4	LUNCH	5	6	BREAK	7	CCA/SCC
	9.15 - 10.05	10.05 - 10.55		11.10 - 12.00	12.00 - 12.45		1.20 - 2.10	2.10 - 3.00		3.10 - 4.00	04.00-05.00
MON	TPDE	FMM		ETD	EDC		MT-I LAB			MT-I LAB	VJ/ETD
TUE	ETD			EDC	TPDE		FMM			MT-I	RM/EDC
WED	INTERPERSONAL SKILLS			FMM	MT-I LAB		ETD	TPDE		TPDE	NS/FMM
THU	MT-I	TPDE		ETD	EDC LAB		EDC LAB			EDC LAB	DA/MT-I
FRI	EDC	FMM		MT-I	CAMD LAB		CAMD LAB			CAMD LAB	CSK/TPDE

SUBJECT CODE	COURSE NAME	ERP CODE	CREDITS/ HOURS	STAFF IN-CHARGE
MA8353	Transforms & Partial Differential Equations	New Staff	4/60	Maths staff
ME8391	Engineering Thermodynamics	IGCE0372	4/60	Dr.A. Arul selvan
CE8394	Fluid Mechanics & Machinery	New Staff	4/60	Mr.R.Manickam
ME8351	Manufacturing Technology I	IGCE0359	3/45	Mr.C.Saravanakumar
EE8353	Electrical Drives & Control	IGCE0048	3/45	Mr.S. Vijay
ME8361	Manufacturing Technology Lab I	IGCE0359	2/60	Mr.C.Saravanakumar
ME8381	Computer Aided Machine Drawing	New Staff	2/60	Mr.R.Manickam
EE8361	Electrical Drives & Control Lab	IGCE0048	2/60	Mr.S.Vijay
HS8381	Interpersonal Skills / Listening & Speaking	New Staff	1/30	English Staff
			25/35	

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Department of Mechanical Engineering

III-yr/V-Sem **CC: Mr.Joseph Ravi Selvan**

DAY	1	2	BREAK	3	4	LUNCH	5	6	BREAK	7	CCA/SCC
	9.15 - 10.05	10.05 - 10.55		11.10 - 12.00	12.00 - 12.45		1.20 - 2.10	2.10 - 3.00		3.10 - 4.00	04.00-05.00
MON	TE-II	TATS		DME	LM		DOM			M&M	VJ/DOM
TUE	DME	DOM		M&M LAB	TE-II		M&M LAB			M&M LAB	RM/LM
WED	DOM	TE-II		M&M	LM		K&D LAB			K&D LAB	NS/TE-II
THU	LM	K&D LAB		DOM	M&M		TE-II	LIB		DME	DA/DME
FRI	DME	M&M		LM	TE LAB		TE LAB			TE LAB	CSK/M&M

SUBJECT CODE	COURSE NAME	ERP CODE	CREDITS/ HOURS	STAFF IN-CHARGE
ME8595	Thermal Engineering - II	IGCE0372	3/45	Dr.A. Arul selvan
ME8593	Design of Machine Elements	IGCE0359	2/60	Mr.C.Saravanakumar
ME8501	Metrology & Measurements	IGCE0308	3/45	Mr.R.Ramesh Babu
ME8594	Dynamics of Machines	New Staff	4/60	Mr.R.Manickam
OIM552	Lean Manufacturing	New Staff	3/45	Mr.J.S.Veera Jegatheeshwaran
ME8511	Kinematics and Dynamics Laboratory	IGCE0359	2/60	Mr.C.Saravanakumar
ME8512	Thermal Engineering Laboratory	IGCE0361	2/60	Mr.Joseph Ravi Selvan
ME8513	Metrology & Measurements Laboratory	IGCE0360	2/60	Mr.A.Dinesh Antony
	TATS	IGCE0359	0/1	Mr.C.Saravanakumar
	Library	IGCE0359	0/1	Mr.C.Saravanakumar
			24/35	

HOD/MECH

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Department of Mechanical Engineering

IV-yr / VII-Sem **CC: Mr.J.S.Veera Jegatheeshwaran**

DAY	1 9.15 - 10.05	2 10.05 - 10.55	BREAK	3 11.10 - 12.00	4 12.00 - 12.45	LUNCH	5 1.25 - 2.10	6 2.10 - 3.00	BREAK	7 3.10 - 4.00	CCA/SCC 04.00-05.00
MON	MCT	CIMS		TQM	TATS		PPCE	ME		PPE	VJ/PPCE
TUE	TQM	ME		CIMS	PPCE		PPE	CIMS		MCT	RM/TQM
WED	PPCE	MCT		PPCE	COMP		CASA LAB			CASA LAB	NS/MCT
THU	ME	PPE		MCT	TQM		MCT LAB			MCT LAB	DA/CIMS
FRI	PPE	COMP		TATS	CIMS		ME	LIB		TQM	CSK/PPE

SUBJECT CODE	COURSE NAME	ERP CODE	CREDITS/ HOURS	STAFF IN-CHARGE
ME6701	Power Plant Engineering	IGCE0372	3/45	Dr.A. Arul selvan
ME6702	Mechatronics	New Staff	3/45	Mr.J.S.Veera Jegatheeshwaran
ME6703	Computer Integrated Manufacturing Systems	IGCE0308	3/45	Mr.R.Ramesh Babu
GE6757	Total Quality Management	IGCE0359	3/45	Mr.C.Saravanakumar
ME6005	Process Planning Cost Estimation	New Staff	3/45	New Staff
ME6012	Maintenance Engineering	IGCE0360	3/45	Mr.A.Dinesh Antony
ME6711	Simulation & Analysis Lab	New Staff	2/45	Mr.R.Manickam
ME6712	Mechatronics Lab	New Staff	2/45	Mr.J.S.Veera Jegatheeshwaran
ME6713	Comprehension	IGCE0360	1/30	Mr.A.Dinesh Antony
	TATS	IGCE0372	0/2	Dr.A. Arul selvan
	Library	IGCE0372	0/1	Dr.A. Arul selvan
			23/35	

HOD/ MECH

PRINCIPAL

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Department of Mechanical Engineering - Master Timetable ODD 2019-20

DAY	YEAR	1	2		3	4		5	6	7
		9.15 - 10.05	10.05 - 10.55		11.10 - 12.00	12.00 - 12.50		1.40 - 2.30	2.30 - 3.20	3.20 - 4.15
MON	II	TPDE	FMM		ETD	EDC		MT-I LAB		MT-I LAB
	III	TE-II	TATS		DME	LM		DOM		M&M
	IV	MCT	CIMS		TQM	TATS		PPCE	ME	PPE
TUE	II	ETD			EDC	TPDE		FMM		MT-I
	III	DME	DOM		M&M LAB	TE-II		M&M LAB		M&M LAB
	IV	TQM	ME	B	CIMS	PPCE	L	PPE	CIMS	MCT
WED	II	INTERPERSONAL SKILLS		R	FMM	MT-I LAB	U	ETD	TPDE	TPDE
	III	DOM	TE-II	E	M&M	LM	N	K&D LAB		K&D LAB
	IV	PPCE	MCT	A	PPCE	COMP	C	CASA LAB		CASA LAB
THU	II	MT-I	TPDE	K	ETD	EDC LAB	H	EDC LAB		EDC LAB
	III	LM	K&D LAB		DOM	M&M		TE-II	LIB	DME
	IV	ME	PPE		MCT	TQM		MCT LAB		MCT LAB
FRI	II	EDC	FMM		MT-I	CAMD LAB		CAMD LAB		CAMD LAB
	III	DME	M&M		LM	TE LAB		TE LAB		TE LAB
	IV	PPE	COMP		TATS	CIMS		ME	LIB	TQM

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III SEMESTER							
SL.NO	COURSE CODE	COURSE NAME	PERIODS	L	T	P	C
THEORY							
1	MA8353	Transforms & Partial Differential Equations	4	4	0	0	4
2	ME8391	Engineering Thermodynamics	5	3	2	0	4
3	CE8394	Fluid Mechanics & Machinery	4	4	0	0	4
4	ME8351	Manufacturing Technology I	3	3	0	0	3
5	EE8353	Electrical Drives & Control	3	3	0	0	3
PRACTICAL							
1	ME8361	Manufacturing Technology Lab 1	4	0	0	4	2
2	ME8381	Computer Aided Machine Drawing	4	0	0	4	2
3	EE8361	Electrical Drives & Control Lab	4	0	0	4	2
4	HS8381	Interpersonal Skills / Listening & Speaking	2	0	0	2	1
V SEMESTER							
SL.NO	COURSE CODE	COURSE NAME	PERIODS	L	T	P	C
THEORY							
1	ME8595	Thermal Engineering - II	3	3	0	0	3
2	ME8593	Design of Machine Elements	3	3	0	0	3
3	ME8501	Metrology & Measurements	3	3	0	0	3
4	ME8594	Dynamics of Machines	4	4	0	0	4
5	OIM552	Lean Manufacturing (Open Elective-I)	3	3	0	0	3
PRACTICAL							
1	ME8511	Kinematics and Dynamics Laboratory	4	0	0	4	2
2	ME8512	Thermal Engineering Laboratory	4	0	0	4	2
3	ME8513	Metrology & Measurements Laboratory	4	0	0	4	2
VII SEMESTER							
SL.NO	COURSE CODE	COURSE NAME	PERIODS	L	T	P	C
THEORY							
1	ME6701	Power Plant Engineering	3	3	0	0	3
2	ME6702	Mechatronics	3	3	0	0	3
3	ME6703	Computer Integrated Manufacturing Systems	3	3	0	0	3
4	GE6757	Total Quality Management	3	3	0	0	3
5	ME6005	Process Planning Cost Estimation (Elective-II)	3	3	0	0	3
6	ME6012	Maintenance Engineering (Elective-III)	3	3	0	0	3
PRACTICAL							
1	ME6711	Simulation & Analysis Lab	3	0	0	3	2
2	ME6712	Mechatronics Lab	3	0	0	3	2
3	ME6713	Comprehension	2	0	0	2	1

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ME8593	DESIGN OF MACHINE ELEMENTS	L	T	P	C
		3	0	0	3

OBJECTIVES

To familiarize the various steps involved in the Design Process
To understand the principles involved in evaluating the shape and dimensions of a component to satisfy functional and strength requirements.
To learn to use standard practices and standard data
To learn to use catalogues and standard machine components
(Use of P S G Design Data Book is permitted)

UNIT I STEADY STRESSES AND VARIABLE STRESSES IN MACHINE MEMBERS 9

Introduction to the design process - factors influencing machine design, selection of materials based on mechanical properties - Preferred numbers, fits and tolerances – Direct, Bending and torsional stress equations – Impact and shock loading – calculation of principle stresses for various load combinations, eccentric loading – curved beams – crane hook and 'C' frame- Factor of safety - theories of failure – Design based on strength and stiffness – stress concentration – Design for variable loading.

UNIT II SHAFTS AND COUPLINGS 9

Design of solid and hollow shafts based on strength, rigidity and critical speed – Keys, keyways and splines - Rigid and flexible couplings.

UNIT III TEMPORARY AND PERMANENT JOINTS 9

Threaded fastners - Bolted joints including eccentric loading, Knuckle joints, Cotter joints – Welded joints, riveted joints for structures - theory of bonded joints.

UNIT IV ENERGY STORING ELEMENTS AND ENGINE COMPONENTS 9

Various types of springs, optimization of helical springs - rubber springs - Flywheels considering stresses in rims and arms for engines and punching machines- Connecting Rods and crank shafts.

UNIT V BEARINGS 9

Sliding contact and rolling contact bearings - Hydrodynamic journal bearings, Sommerfeld Number, Raimondi and Boyd graphs, – Selection of Rolling Contact bearings.

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the influence of steady and variable stresses in machine component design.
CO2 Apply the concepts of design to shafts, keys and couplings.
CO3 Apply the concepts of design to temporary and permanent joints.
CO4 Apply the concepts of design to energy absorbing members, connecting rod and crank shaft.
CO5 Apply the concepts of design to bearings.
CO6 Apply the concepts of design to transmission elements.

TEXT BOOKS:

1. Bhandari V, "Design of Machine Elements", 4th Edition, Tata McGraw-Hill Book Co, 2016.
2. Joseph Shigley, Charles Mischke, Richard Budynas and Keith Nisbett "Mechanical Engineering Design", 9th Edition, Tata McGraw-Hill, 2011.

REFERENCES:

1. Alfred Hall, Halowenko, A and Laughlin, H., "Machine Design", Tata McGraw-Hill BookCo.(Schaum's Outline), 2010
2. Ansel Ugural, "Mechanical Design – An Integral Approach", 1st Edition, Tata McGraw-Hill Book Co, 2003.
3. P.C. Gope, "Machine Design – Fundamental and Application", PHI learning private ltd, New Delhi, 2012.
4. R.B. Patel, "Design of Machine Elements", MacMillan Publishers India P Ltd., Tech-Max Educational resources, 2011.
5. Robert C. Juvinall and Kurt M. Marshek, "Fundamentals of Machine Design", 4th Edition, Wiley, 2005
6. Sundararajamoorthy T. V. Shanmugam .N, "Machine Design", Anuradha Publications, Chennai, 2015.

Hod/Mech

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DEPARTMENT OF MECHANICAL ENGINEERING

Lecture Schedule

Degree/Program: **B.E / MECHANICAL** Course code &Name: ME 8593-Design of Machine Element
Duration: **Dec 2019 - Apr 2020** Semester: **V** Faculty: **Mr. C. Saravana Kumar**

AIM:

To expose the students to basics mechanics of metal cutting, turning, reciprocating & CNC machines and programming of CNC machine tools.

OBJECTIVES:

To impart knowledge on

(i) To familiarize the various steps involved in the Design Process

(ii) To understand the principles involved in evaluating the shape and dimensions of a component to satisfy functional and strength requirements.

(iii) To learn to use standard practices and standard data

(iv) To learn to use catalogues and standard machine components

PREREQUISITES: Design of Machine Element

COURSE OUTCOMES:

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C213.1	Explain the influence of steady and variable stresses in machine component design.	2,4,7,8,9	1,2,3
C213.2	Apply the concepts of design to shafts, keys and couplings.	2,7,8,9	1,2,3
C213.3	Apply the concepts of design to temporary and permanent joints.	2,7,8,9	1,2,3
C213.4	Apply the concepts of design to energy absorbing members, connecting rod and crank shaft.	2,4,7,8,9	1,2,3
C213.5	Apply the concepts of design to bearings.	2,4,7,8,9	1,2,3
C213.6	Apply the concepts of Rolling Contact bearing for selective application	2,4,7,8,9	1,2,3

S.No	Date	Period	Topics to be Covered	Book & Page. No.
UNIT -I - STEADY STRESSES AND VARIABLE STRESSES IN MACHINE MEMBERS				**Target periods :09**
1	01.07.19	3	Introduction to the design process	T1
2	02.07.19	1	factors influencing machine design, selection of materials based on mechanical properties	T1
3	04.07.19	7	Preferred numbers, fits and tolerances	T1
4	05.07.19	1	Direct, Bending and torsional stress equations	T1
5	08.07.19	3	Impact and shock loading	T1
6	09.07.19	1	calculation of principle stresses for various load combinations, eccentric loading	R2

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7	11.07.19	7	curved beams	R2
8	12.07.19	1	crane hook and 'C' frame	R2
9	15.07.19	3	Factor of safety - theories of failure	R2
10	16.07.19	1	Design based on strength and stiffness	T1
11	18.07.19	7	stress concentration and Design for variable loading	T1
12	19.07.19	1	Problems	T1
UNIT II -SHAFTS AND COUPLINGS				**Target periods :09**
13	22.07.19	3	Design of solid and hollow shafts based on strength	T1
14	23.07.19	1	Design of solid and hollow shafts based on rigidity	T1
15	25.07.19	7	Design of solid and hollow shafts based on critical speed	T1
16	26.07.19	1	Keys	T1
17	29.07.19	3	keyways	R1
18	30.07.19	1	splines	R1
19	31.07.19	7	Rigid couplings.	R1
20	02.08.19	1	flexible couplings	R1
21	05.08.19	3	Problems on strength	T1
22	06.08.19	1	Problems on rigidity and critical speed	T1
23	08.08.19	7	Problems on couplings	T1
UNIT III - TEMPORARY AND PERMANENT JOINTS				**Target Periods :09**
24	09.08.19	1	Threaded fastners	T1
25	12.08.19	3	Bolted joints including eccentric loading	T1
26	13.08.19	1	Knuckle joints	T1
27	16.08.19	1	Cotter joints	T1
28	19.08.19	3	Welded joints	T1
29	20.08.19	1	riveted joints for structures	T1
30	22.08.19	7	theory of bonded joints	T1
31	23.08.19	1	Problems on Bolted joints	R3
32	26.08.19	3	Problems on Knuckle joints	R3
33	27.08.19	1	Problems on Cotter joints	R3
34	29.08.19	7	Problems on Welded joints	R2
35	30.08.19	1	Problems on Riveted joints for structures	R3
UNIT IV - ENERGY STORING ELEMENTS AND ENGINE COMPONENTS				**Target Periods :09**
36	02.09.19	3	Various types of springs	T2
37	03.09.19	1	optimization of helical springs	T2
38	05.09.19	7	rubber springs	T2
39	06.09.19	1	Flywheels considering stresses in rims	T2
40	09.09.19	3	Stresses in arms for engines	T2
41	10.09.19	1	Stresses in punching machines	T2
42	12.09.19	7	Stresses in Connecting Rods	T2
43	13.09.19	1	Stresses in Crank shafts	R4
44	16.09.19	3	Problems	R4
45	17.09.19	1	Problems	R4
UNIT V – BEARINGS				**Target Periods:09**
46	19.09.19	7	Sliding contact and rolling contact bearings	T2
47	20.09.19	1	Hydrodynamic journal bearings	T2
48	23.09.19	3	Sommerfeld Number, Raimondi and Boyd graphs	T2
49	24.09.19	1	Selection of Rolling Contact bearings	T2
50	26.09.19	7	Problems	T2

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51	27.09.19	1	Problems	R5
			Content Beyond the Syllabus	
52	30.09.19	3	Machine Design Modern Techniques & Innovative Technologies	Material

Book Reference - Text Books

Sl.	Title of the Book	Author	Publisher	Year
1.	Design of Machine Elements	Bhandari V,	4th Edition, Tata McGraw-Hill Book Co	2016.
2.	Mechanical Engineering Design	Joseph Shigley, Charles Mischke, Richard Budynas and Keith Nisbett	9th Edition, Tata McGraw-Hill	2011.

Book Reference – References

Sl	Title of the Book	Author	Publisher	Year
1.	Machine Design	Alfred Hall, Halowenko, A and Laughlin, H.	Tata McGraw-Hill BookCo.(Schaum's Outline)	2010
2.	Mechanical Design – An Integral Approach	Ansel Ugural	1st Edition, Tata McGraw-Hill Book Co	2003.
3.	Machine Design – Fundamental and Application	P.C. Gope	PHI learning private ltd, New Delhi	2012
4	Design of Machine Elements	R.B. Patel	MacMillan Publishers India P Ltd., Tech-Max Educational resources	2011
5	Fundamentals of Machine Design	Robert C. Juvinall and Kurt M. Marshek	4th Edition. Wiley	2005
6	Machine Design	Sundararajamoorthy T. V. Shanmugam .N,	Anuradha Publications, Chennai,	2015

Website Reference:
https://archive.nptel.ac.in/courses/112/105/112105124/
https://www.ucpesbam.in/public/images/lecture_notes_pdf/77680-DME%20LECT.NOTE-converted.pdf

Signature of the Faculty in-charge

HoD/ Mechanical

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DEPARTMENT OF MECHANICAL ENGINEERING

Proof of Conduct of Content Beyond Syllabus(CBS)

Name of the Faculty : Mr.C.Saravana Kumar **Course Code & Name: ME8593 Design of M/c Elements**
Degree & Program: B.E. /Mechanical **Semester: V** **Academic Year: 2019 -2020 /ODD**

TOPIC: MACHINE DESIGN MODERN TECHNIQUES AND INNOVATIVE TECHNOLOGIES

INTRODUCTION:

The manufacturing sector is facing a challenge in this 21st century to continue developing their business by applying a new and innovative production technology and system. This is to help thenovel ways of manufacturing process to move forward, where, the Machine Design will feature and compile the newest product line with an inventive technology to keep modernized techniques at the top of mind for our OEMs, end-users, integrators, and the entire supply community. This research paper will explore how the simulation derived model of Mechatronic could manage the most complex scheme of the machinery profile with a systematic approach by understanding the concept with precise machine design actions, dynamic behavior, and effective interaction with the various components of the machine. Mainly, the Mechatronic engineers will unite the mechanics and electronics principles and compute them to generate more economical,a simpler, and reliable system.

Keywords: Machine Design, Innovative Machining Technologies, Mechatronic Engineers, Smart Machines

There is a mounting demand for more complex systems, development of new product lines. The productivity of manufacturing machines, which have created a steady growth of technological significance, necessitates the new ideas with an appropriate application in the production and development process. The system offers better possibilities of optimizing and evaluating the dynamic movement, action and performance of the entire automated arrangement in the preliminary stages of the machine design process. The smart machines can take decisions regarding the manufacturing processes in real-time with sufficient adaptive controls. All the machine design simulations are based on Mechatronic model, which processes and implements complex structures and systems with a dynamic behavior, better understanding, and effective interactions of all the components (Wang & Li, 2010). Mechatronics, is a multidisciplinary engineering branch that focuses on both mechanical and electrical engineering systems, including the combination of telecommunications, computer systems, robotics, electronic control arrangements, and product engineering (Abed, Abdullah, & Dikhil, 2019). Their effective interaction influences different machine components and achieves precision machine dynamics to produce better quality components. There are distinguishing features of Mechatronic system that can be demonstrated by an intensive integration of all the systems (Yun & Li, 2011). It optimizes the entire manufacturing process and production line, by an effective machine component to interact and influence the complete control system, while machine component design process continues with the coordination of the frame structure of each component and feed drive (Huang & Tang, 2012).

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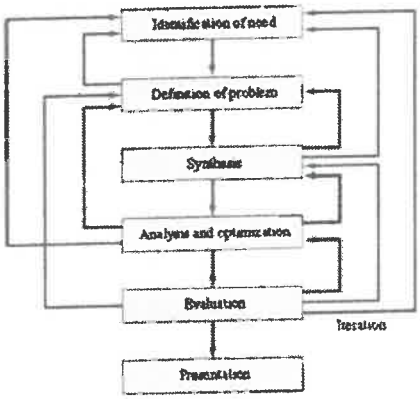
Investigating the problem of modern techniques in Machine Design

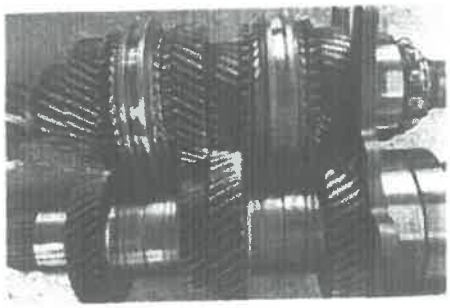
Disruptive innovations in optimization of machine design are motivated by the modern, emerging trends. The computer science progress and improvements in mathematics have helped more elaborate optimization scenarios to include ever more features of physics. Previously, machine design was corresponding to magnetic performance, while the modern techniques involve synchronized investigation of mechanical and electrical engineering, together with power electronics, rotor dynamics, and control features are included (Aiyu Gu, et al., 2019). The engineering and material science have brought new dimensions to the impact of manufacturingin the optimization process, when the unavoidable tolerances are considered. As a result, improvements in multifaceted settings are analyzed in numerous fields that take effect. The academic and practicing engineers are forced to include the recent innovative developments, while taking into account the future trends (Abed, Fadhil, & Al-Yaseen, 2020). It includes the entire optimization scenarios, geometry specifications, target setting to illustrate comprehensively (Bramerdorfer, et al., 2018).

Importance of Machine Design and its modern techniques



The Concept and Purpose of Machine Design

In Mechanical Engineering, the Machine Design, is the very crucial branch of Engineering Design. For instance, the Car or vehicle gearbox helps in transmitting the motion, backward, neutral or forward movement and the power to the vehicle wheels. The gearbox (Figure 3) is normally bolted to the rear part of the engine, having the clutch between them (Tang & Li, 2011).

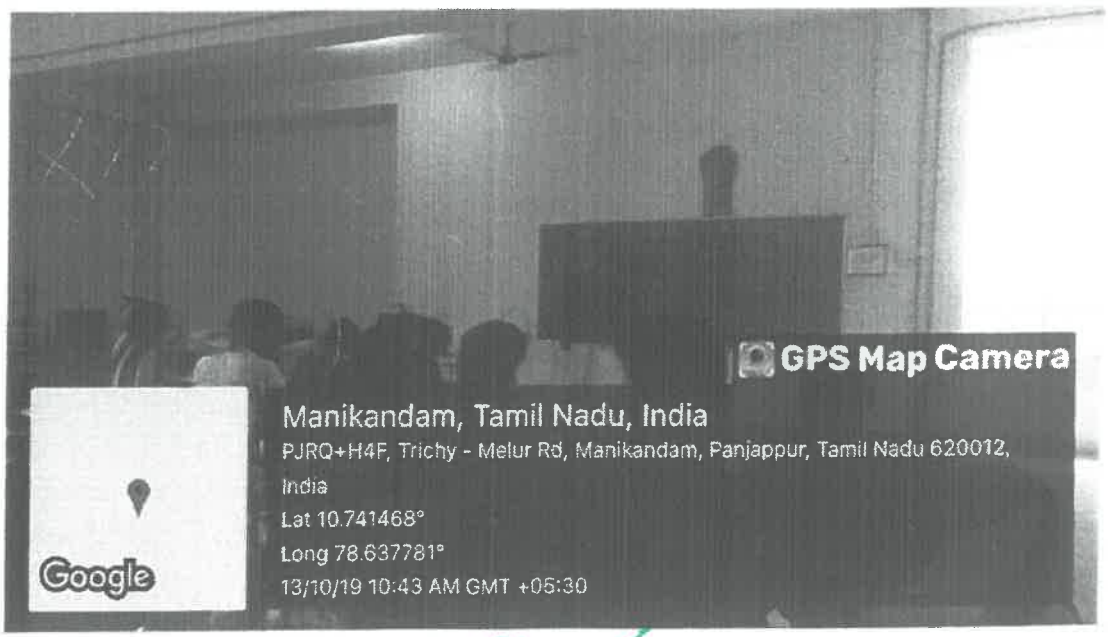


The gearbox is comprised of many gears, subjected to motion, and they have the load sustaining capacity of the vehicle. The gears help to move the vehicle at a desired speed, while taking desired loads. Hence, they are designed accordingly. Numerous calculations are performed while designing, considering loads, speeds and the materials of the gear of specific dimensions and thereafter, manufactured at the minimum cost to give optimum performance. In the same manner, all the parts and components including engine, of the vehicle are designed to meet the optimum functional requirements, with an innovative technology, at minimum possible cost. Such designing technology is known as mechanical design or machine design in mechanical engineering (Schreiber, et al., 2020).

Machine Designing is the dimensional drawing procedure by which the energy resources are converted into requisite mechanisms, to obtain a desired output yield from the machines in the required format as per the specified needs. Machine designing leads to creating the entirely new machine leading to innovations, improvement, up-gradation of the prevailing machine. For example, in case the present gearbox is very heavy or unable to sustain the requisite loads, the entire gearbox can be redesigned. However, in case the same gearbox carries the capability to lift higher loads, the up gradation with essential changes can be made in its design (Tang & Li, 2011).

Website Reference:

https://iopscience.iop.org/article/10.1088/1742-6596/1897/1/012072/pdf



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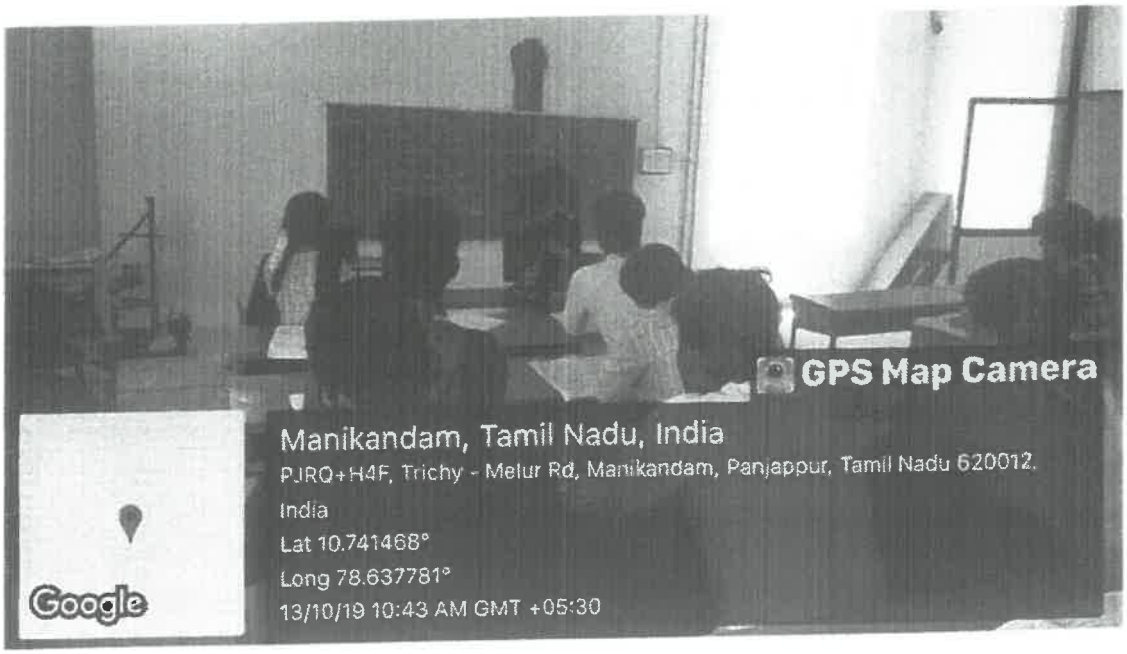

Signature of the Faculty in-charge

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DEPARTMENT OF MECHANICAL ENGINEERING

Identification of Curricular Gap & Content Beyond Syllabus(CBS)

Name of the Faculty : Mr.C.Saravana Kumar Course Code & Name:ME8593-Design of M/C Elements
Degree & Program: B.E. /Mechanical Semester: V Academic Year: 2019 -2020 /ODD

I.Mapping of Course Outcomes with POs & PSOs.(before CBS)

Table.1 Mapping of COs, C, PSOs with POs - before CBS.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO302.1	-	3	-	2	-	-	2	2	1	-	-	-	3	3	2
CO302.2	-	3	-	-	-	-	2	2	1	-	-	-	3	2	2
CO302.3	-	3	-	-	-	-	2	2	1	-	-	-	3	2	2
CO302.4	-	3	-	2	-	-	2	2	1	-	-	-	3	2	2
CO302.5	-	3	-	2	-	-	2	2	1	-	-	-	3	2	2
CO302.6	-	3	-	2	-	-	2	2	1	-	-	-	3	2	2
CO302	-	3	-	2	-	-	2	2	1	-	-	-	3	2	3

II. Identification of content beyond syllabus.

Table.2 Identification of content beyond syllabus

Details of Content Beyond Syllabus(CBS) added	POs strengthened/ vacant filled	CO/Unit
Machine Design Modern Techniques & Innovative Technologies	PO3 & PO4 (2) Vacant filled	CO302.2 &CO302.3 II & III

III. Mapping of Course Outcomes with POs & PSOs. (After CBS)

Table.3 Mapping of COs, C, PSOs with POs- after CBS.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO302.1	-	3	-	2	-	-	2	2	1	-	-	-	3	2	2
CO302.2	-	3	*2	*2	-	-	2	2	1	-	-	-	2	2	2
CO302.3	-	3	*2	*2	-	-	2	2	1	-	-	-	2	2	2
CO302.4	-	3	-	2	-	-	2	2	1	-	-	-	2	2	2
CO302.5	-	3	-	2	-	-	2	2	1	-	-	-	2	2	2
CO302.6	-	3	-	2	-	-	2	2	1	-	-	-	2	2	2
CO302	-	3	2	2	-	-	2	2	1	-	-	-	2	2	2

Signature of the Faculty

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DEPARTMENT OF MECHANICAL ENGINEERING

Assignment Question Paper

Assignment – 01			Date of Issue:	10.07.2019	Marks	10
Course code	ME8593	Course Title	Design of Machine Elements			
Year	III	Semester/Section	V/A	Date of Submission:	14.7.2019	

Q.No	Questions	CO
1	The load on a bolt consists of an axial pull of 10kN together with a transverse shear force of 5Kn. Find the diameter of bolt required according to 1. Maximum principal stress theory; 2.Maximum shear stress theory; 3. Maximum principal strain theory; 4. Maximum strain energy theory and 5. Maximum distortion energy theory.	C302.1
2	A leaf spring in an automobile is subjected to cyclic stresses. The average stress = 150 MPa; variable stress = 500 MPa; ultimate stress = 630 MPa; yield point stress = 350 MPa and endurance limit = 150 MPa. Estimate, under what factor of safety the spring is working, by Goodman and Soderberg formulae.	C302.1

Name and Signature of the Faculty Incharge

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DEPARTMENT OF MECHANICAL ENGINEERING

Assignment Answer Sheet

Name of the Student : J. Kingsley

AU Register Number: 811216114016

Assignment – 01			Date of Issue:	10.07.2019	Marks	10
Course code	ME8593	Course Title	Design of Machine Elements			
Year	III	Semester/Section	V/A	Date of Submission:	14.7.2019	

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Mark Allocation

Rubrics	Marks Allocated	Marks obtained
Content Quality	6	5
Presentation Quality	2	2
Timely submission	2	2
Total marks	10	9

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IGCE/EXAMCELL/IA/MECH/2019-20/Even/UT/001

INTERNAL ASSESSMENT TEST – I

Test Time: (FN) 11.30 am to 1.00 pm - (AN) 3.30 pm to 5.00 pm

DATE		01.08.2019		02.08.2019		03.08.2019	
BRANCH	YEAR / SESSION	FN	AN	FN	AN	FN	AN
MECH	II	MA8353	ME8391	CE8394	ME8351	EE8353	-
	III	ME8595	ME8593	ME8501	ME8594	ME8691	-
	IV	ME6701	ME6702	ME6703	GE6757	ME6005	ME6012

Google Classroom Link: ***https://classroom.google.com/c/MjI5MDcxNDIwMjc4?cjc=aobyf7u***

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MODEL TEST – I

Test Time: (AN) 2.00 pm to 5.00 pm

DATE / BRANCH	YEAR / SESSION	12.09.2020 AN	13.09.2020 AN	14.09.2020 AN	16.09.20 AN	17.09.20 AN	18.09.20 AN
MECH	II	MA8353	ME8391	CE8394	ME8351	EE8353	-
	III	ME8595	ME8593	ME8501	ME8594	ME8691	-
	IV	ME6701	ME6702	ME6703	GE6757	ME6005	ME6012

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Internal Assessment Exam – Model - I			Date	30/09/2020	Marks	100
Course code	ME 8593	Course Title	Design of Machine Elements			
Regulation	2017	Duration	180 minutes	Academic Year	2019-20	
Year	III	Semester	V	Department	Mechanical Engg	

COURSE OUTCOMES

CO1:	Explain the influence of steady and variable stresses in machine component design.
CO2:	Apply the concepts of design to shafts, keys and couplings
CO3:	Apply the concepts of design to temporary and permanent joints
CO4:	Apply the concepts of design to energy absorbing members, connecting rod and crank shaft
CO5:	Apply the concepts of design to bearings.
CO6:	Acknowledged the enriched knowledge about the fundamental concepts, which adopt in real-time in Industry, applying artificial Intelligence to this systems.

Q.No.	Question	CO	BTS
	PART A		
	(Answer all the Questions 10 x 2 = 20 Marks)		
1	How is a bolt designated? Give example. (Dec 2006,Apr 2009)	CO1	K3
2	Why are welded joints preferred over riveted joints? (Nov 2003, Apr2008, Apr 2009)	CO1	K3
3	Define the term self-locking of power screws? (Apr 2004,Dec 2012, May 2013)	CO2	K3
4	Name the possible modes of failure of riveting joint. (Nov 2008, Dec 2012,May 2012)	CO2	K3
5	Differentiate with a neat sketch the fillet welds subjected to parallel loading and transverse loading. (Apr-04, May-14)	CO3	K3
6	What is meant by the efficiency of the riveted joint? (Dec 2010)	CO3	K3
7	Discuss the forces on key? (Dec 2012, Dec 2014)	CO4	K2
8	How is the strength of a shaft affected by the keyway? (May2014)	CO4	K2
9	Differentiate simple stresses and principal stresses.	CO5	K1
10	What do you understand by factor of safety and briefly explain.	CO5	K1
	PART B		
	(Answer all the Questions 5 x 13 = 65 Marks)		
11a	A rectangular steel plate is welded as a cantilever to a vertical column and supports a single contracted load P, as shown in figure.1. Determine the weld size if shear stress in the same is not to exceed 80 N/mm^2. (May / June 2013)	CO1	K1
	OR		
11b	A mild steel plate of 10 mm thickness is joined with another plate by a single transverse weld and double parallel fillet welds as shown in figure.2. Find the width of the plate and the length of the welds if the joint is subjected to a static load of 65 kN. (April / May 2010)	CO1	K1
12a	A 50 mm diameter solid shaft is welded to a flat plate as shown in figure.3. If the size of the weld is 15 mm, find the maximum normal and shear stress in the weld. (May / June 2009)	CO2	K1
	OR		
12b	Design a cotter joint to support a load varying from 120 kN in compression to 120 kN in tension. The material used is carbon steel for which the following allowable stresses may be used. Tensile stress = 85 N/mm^2; shear stress = 70 MPa, crushing stress = 165 N/mm^2. The load is applied statically. (May / June 2013)	CO2	K2
13a	Design a knuckle joint to transmit a load of 120 kN. The design stresses may be taken as 85 MPa in tension, 70 MPa inshear and 165 MPa in compression. (Nov / Dec 2012)	CO3	K2
	OR		
13b	Design a knuckle joint to with stand a tensile load of 70 kN using steel with the following permissible stresses in tension is 60 N/mm^2; in crushing is 72 N/mm^2; and in shear is 48 N/mm^2. Nov / Dec 2016)	CO3	K2
14a	Write down the design procedure for pin type flange couplings.	CO4	K2
	OR		

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14b	A MS shaft transmits 23 kW at 200 rpm. It carries a central load of 900 N and in simply supported between the bearings 2.5 m apart. Determine the size of the shaft if the allowable shear stress is 42 MPa and maximum tensile stress is 56+ MPa. What size of the shafts will be required if it is subjected to gradually applied load. Nov / Dec 2016)	CO4	K1
15a	Write down design procedure for bushed type flexible couplings.	CO5	K2
	OR		
15b	Determine the maximum shear stress at section A-A for the crank shown in figure.4, when a load 10 kN is assumed to be concentrated at the center of the crank pin.	CO5	K1
	PART C		
	(Answer all the Questions 1 x 15 = 15 Marks)		
16a	A socket type cotter joint is to be designed for a pull of 32 kN. A steel having the following maximum permissible stresses is used. Permissible stress in tension is 56 MPa, in compression is 70 MPa, and in shear is 39 MPa. Nov / Dec 2014)	CO2	K2
	OR		
16b	A circular rod 45 mm diameter and 210 mm long is welded to a steel plate with axis of the rod perpendicular to the plate. The rod is subjected to a load of 10 kN at the free end, the direction of the load being perpendicular to the axis of the rod. The material of the plate & the rod are Mild Steel. Determine the size of the weld to withstand the loading.	CO2	K2

Course Faculty
(Name /Sign / Date)

HoD
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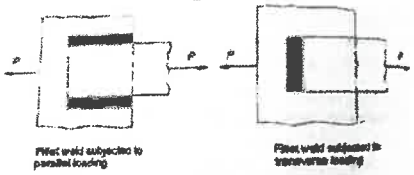
Key Notes

ME8593 – Design of Machine Elements

1	How is a bolt designated? Give example. (Dec 2006,Apr 2009) A thread is designated with Letter M followed by Nominal diameter in mm and Pitch in mm [for fine pitches only].If coarse pitches are used then P value is omitted. Thus M20×2.5 means, Nominal diameter is 20mm, 2.5mm pitch, fine thread. M20 means, 20mm nominal diameter with coarse threads
2	Why are welded joints preferred over riveted joints? (Nov 2003, Apr2008, Apr 2009) Material is saved in welded joints and hence the machine element will be light if welded joints are used instead of riveted joints. Leak proof joints can be easily obtained by welded joints compared riveted joints.
3	Define the term self-locking of power screws? (Apr 2004,Dec 2012, May 2013) If the friction angle is greater than helix angle of the power screw, the torque required to lower the load will be positive, indicating that an effort is applied to lower the load. This type is screw is known as self locking screw. The efficiency of the self locking screw is less than 50%.
4	Name the possible modes of failure of riveting joint. (Nov 2008, Dec 2012,May 2012) 1. Crushing of rivets 2. Shear of rivets 3. Tearing of the plate at the edge 4. Tearing of the plate between rivets.
5	Differentiate with a neat sketch the fillet welds subjected to parallel loading and transverse loading. (Apr-04, May-14) 
6	What is meant by the efficiency of the riveted joint? (Dec 2010) The efficiency of a riveted joint is defined as the ratio of the strength of riveted joint to the strength of the un-riveted or solid plate. η = Least of Tearing Resistance, Shearing resistance and Crushing Resistanace / $p \times t \times \sigma_t$ Where, p = Pitch of rivets, t= thickness of plate and σ_t = Permissible Tensile stress of the plate material.
7	Discuss the forces on key? (Dec 2012, Dec 2014)

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		(a) Shear force (b) Bearing force (c) Tensile force
8		How is the strength of a shaft affected by the keyway? (May2014) The keyway cut into the shaft reduces the load carrying capacity of the shaft. This is due to the stress concentration near the corners of the keyway and reduction in the cross-sectional area of the shaft. It other words, the torsional strength of the shaft is reduced.
9		Differentiate simple stresses and principal stresses. Stress is defined as the strength of a material per unit area. It is also called the unit strength , Stress = Load /Unit area Principal stress is the maximum or minimum normal stress which may be developed on a loaded body. It is classified as major principal stress and minor principal stress. On the plane of principal stress, shear stress value is termed as zero.
10		What do you understand by factor of safety and briefly explain. **While designing a component, it is necessary to provide sufficient reserve strength in case of an accident. This is achieved by taking a suitable factor of safety (fs).** **The factor of safety is defined as** $$(fs) = \frac{\text{failure stress}}{\text{allowable stress}}$$ or $$(fs) = \frac{\text{failure load}}{\text{working load}}$$
11	a	A rectangular steel plate is welded as a cantilever to a vertical column and supports a single contracted load P, as shown in figure.1. Determine the weld size if shear stress in the same is not to exceed 80 N/mm^2. (May / June 2013) Key - Diagram - 5 Marks Design Procedure - 5 Marks Formulae - 3 Marks
11	b	A mild steel plate of 10 mm thickness is joined with another plate by a single transverse weld and double parallel fillet welds as shown in figure.2. Find the width of the plate and the length of the welds if the joint is subjected to a static load of 65 kN. (April / May 2010) Key - Diagram - 5 Marks Design Procedure - 5 Marks Formulae - 3 Marks
12	a	A 50 mm diameter solid shaft is welded to a flat plate as shown in figure.3. If the size of the weld is 15 mm, find the maximum normal and shear stress in the weld. (May / June 2009) Key - Diagram - 5 Marks Design Procedure - 5 Marks

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		Formulae - 3 Marks
13	a	Design a knuckle joint to transmit a load of 120 kN. The design stresses may be taken as 85 MPa in tension, 70 MPa inshear and 165 MPa in compression. (Nov / Dec 2012) Key - Diagram - 5 Marks Design Procedure - 5 Marks Formulae - 3 Marks
13	b	Design a knuckle joint to with stand a tensile load of 70 kN using steel with the following permissible stresses in tension is 60 N/mm2; in crushing is 72 N/mm2; and in shear is 48 N/mm2. Nov / Dec 2016) Key - Diagram - 5 Marks Design Procedure - 5 Marks Formulae - 3 Marks
14	a	Write down the design procedure for pin type flange couplings. Key - Diagram - 5 Marks Design Procedure - 5 Marks Formulae - 3 Marks
14	b	A MS shaft transmits 23 kW at 200 rpm. It carries a central load of 900 N and in simply supported between the bearings 2.5 m apart. Determine the size of the shaft if the allowable shear stress is 42 MPa and maximum tensile stress is 56+ MPa. What size of the shafts will be required if it is subjected to gradually applied load. Nov / Dec 2016) Key - Diagram - 5 Marks Design Procedure - 5 Marks Formulae - 3 Marks
15	a	Write down design procedure for bushed type flexible couplings. Key - Diagram - 5 Marks Design Procedure - 5 Marks Formulae - 3 Marks
15	b	Determine the maximum shear stress at section A-A for the crank shown in figure.4, when a load 10 kN is assumed to be concentrated at the center of the crank pin. Key - Diagram - 5 Marks Design Procedure - 5 Marks Formulae - 3 Marks
16	a	A socket type cotter joint is to be designed for a pull of 32 kN. A steel having the following maximum permissible stresses is used. Permissible stress in tension is 56 MPa, in compression is 70 MPa, and in shear is 39 MPa. Nov / Dec 2014) Key - Diagram - 5 Marks Design Procedure - 5 Marks Formulae - 5 Marks
16	b	A circular rod 45 mm diameter and 210 mm long is welded to a steel plate with axis of the rod perpendicular to the plate. The rod is subjected to a load of 10 kN at the free end, the direction of the load being perpendicular to the axis of the rod. The material of the plate & the rod are Mild Steel. Determine the size of the weld to withstand the loading. Key - Diagram - 5 Marks

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Internal Assessment Test Answer Book

Name	Dhinakaran. S			Year/ Semester	II/IV
Reg. No.	811716114007	Date/Session	[illegible]	Department	Mech
Course code	MC8593	Course Title	DME		
Internal Assessment Test	IAT 1 ☐	IAT 2 ☐	IAT 3 ☐	Model ☑	
Name and Signature of the Invigilator with date	30/9/2020 (C. Vamsi)				

Instruction to the Student: Put tick mark to the question attended in the column against question.

Part A			Part B / Part C					Total Marks
Q. No.	✓	Marks	Q. NO.	✓	a Marks	✓	b Marks	
1	✓	1	11			✓	10	10
2	✓	1	12	✓	8			8
3	✓	2	13			✓	13	13
4	✓	2	14	✓	13			13
5	✓	1	15			✓	8	8
6	✓	1	16	✓	12			12
7	✓	1					Total	64
8	✓	1	Grand Total			Name and Signature of the Examiner with date		
9	✓	2	78/100			[illegible]		
10	✓	1						
Total		14						

To be filled by the examiner

Course Outcomes	1	2	3	4	5	6	Total
Marks allotted	17	32	17	17	17	0	100
Marks Obtained	13	24	15	15	11	0	78

IQAC Audit - Remarks

Name and Signature of the IQAC member

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
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Manikandam, Trichy-620 012.

		Design Procedure - 5 Marks Formulae - 5 Marks

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INDRA GANESAN COLLEGE OF ENGINEERING

IG VALLEY, MANIDANDAM, TIRUCHIRAPPALLI – 620 012

DEPARTMENT OF MECHANICAL ENGINEERING

ACADEMIC YEAR 2019 – 2020 (ODD SEMESTER)

STUDENTS MARK STATEMENT- CO BASED

MODEL EXAM

SUBJECT CODE &TITLE: ME 8593-DESIGN OF MACHINE ELEMENT

YEAR/SEM: III/V MONTH & YEAR: SEP & 2019

S.NO	REG NO	STUDENT NAME	Marks Alloted COX						Marks Obtained COY						Total (100)
			CO 1	CO 2	CO 3	CO 4	CO 5	CO 6	CO 1	C 02	CO3	CO 4	CO 5	CO 6	
1.	811216114001	Ajmalkhan K	17	32	17	17	17	0	15	20	12	17	16	0	80
2.	811216114002	Amar Praveen D	17	32	17	17	17	0	10	23	15	15	08	0	72
3.	811216114003	Anandaperumal P	17	32	17	17	17	0	16	31	15	15	14	0	91
4.	811216114004	Chinnappan A	17	32	17	17	17	0	11	25	15	16	13	0	72
5.	811216114005	Dayas Kumar M	17	32	17	17	17	0	05	7	8	2	2	0	25
6.	811216114006	Dhinakaran K	17	32	17	17	17	0	10	12	3	4	2	0	31
7.	811216114007	Dhinakaran S	17	32	17	17	17	0	13	24	15	15	11	0	78
8.	811216114008	Dinesh Babu M	17	32	17	17	17	0	15	26	13	14	14	0	82
9.	811216114009	Gobi P	17	32	17	17	17	0	08	25	14	13	9	0	69
10.	811216114010	Gopinath N	17	32	17	17	17	0	13	28	10	14	13	0	78
11.	811216114011	Gunaseelan G	17	32	17	17	17	0	12	22	10	15	11	0	70
12.	811216114012	Hariram S	17	32	17	17	17	0	15	12	18	14	10	0	69
13.	811216114013	Harish M	17	32	17	17	17	0	03	04	03	02	0	0	12
14.	811216114014	Karan K	17	32	17	17	17	0	13	27	14	12	17	0	83
15.	811216114015	Karthick A	17	32	17	17	17	0	11	25	14	16	12	0	78
16.	811216114016	Kingsley J	17	32	17	17	17	0	05	05	12	02	03	0	27
17.	811216114017	Kiruthikeyan P	17	32	17	17	17	0	10	28	14	11	12	0	75
18.	811216114018	Krishna Prakash N	17	32	17	17	17	0	13	28	10	14	13	0	78
19.	811216114019	Mahendran A	17	32	17	17	17	0	08	09	05	05	05	0	32
20.	811216114020	Mahendran K	17	32	17	17	17	0	08	25	14	13	9	0	69
21.	811216114021	Nagarajan K	17	32	17	17	17	0	12	08	05	06	09	0	40
22.	811216114022	Nambiyappan K	17	32	17	17	17	0	08	25	14	13	9	0	69
23.	811216114023	Nandha Kumar P	17	32	17	17	17	0	15	28	10	12	13	0	78
24.	811216114024	Naveen Kumar K	17	32	17	17	17	0	03	05	06	01	03	0	18
25.	811216114025	Palanisamy K	17	32	17	17	17	0	12	22	10	15	11	0	70
26.	811216114026	Pulamadan K	17	32	17	17	17	0	13	25	12	14	14	0	78
27.	811216114027	Ramkumar R	17	32	17	17	17	0	13	27	14	12	17	0	83
28.	811216114028	Robert A	17	32	17	17	17	0	08	07	06	08	04	0	33
29.	811216114029	Sasi Kumar S	17	32	17	17	17	0	16	31	15	15	14	0	91
30.	811216114030	Senthil Kumar B	17	32	17	17	17	0	05	04	08	02	07	0	26
31.	811216114031	Subash Salamon S	17	32	17	17	17	0	10	09	07	08	04	0	38

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32.	811216114032	Tamilselvan C	17	32	17	17	17	0	10	23	15	15	08	0	72
33.	811216114033	Vairavel A	17	32	17	17	17	0	12	08	06	07	09	0	42
34.	811216114034	Vasudevan A`	17	32	17	17	17	0	13	27	14	12	17	0	83
35.	811216114035	Vengatraman V	17	32	17	17	17	0	11	25	14	16	12	0	78
36.	811216114036	Vignesh K	17	32	17	17	17	0	06	04	09	03	07	0	29
37.	811216114037	Yanatharan T	17	32	17	17	17	0	08	09	07	07	03	0	34
38.	811216114301	B.Gokul	17	32	17	17	17	0	15	28	13	10	14	0	74
39.	811216114302	S.Hariharan	17	32	17	17	17	0	13	24	15	15	11	0	84
40.	811216114304	J.Karunakaran	17	32	17	17	17	0	15	26	13	14	14	0	82
41.	811216114305	Manoj Kumar K	17	32	17	17	17	0	10	22	13	14	09	0	68
42.	811216114701	S.Vasanth	17	32	17	17	17	0	08	25	14	13	09	0	69
43.	811216114702	V.K.Karthekeyan	17	32	17	17	17	0	13	28	10	14	13	0	78
44.	811216114501	Parthiban R	17	32	17	17	17	0	13	28	10	14	13	0	78
45.	811216114502	Revanth S	17	32	17	17	17	0	12	22	10	15	11	0	70
46.	811216114503	Deepak P	17	32	17	17	17	0	15	15	15	14	10	0	69
47.	811216114504	Prasanth C	17	32	17	17	17	0	15	20	12	17	16	0	80
48.	811216114505	Wanten Berck K	17	32	17	17	17	0	15	26	13	14	14	0	82

MARKS RANGE:

<20	20-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
2	4	6	1	0	10	16	7	2

Total No.of Candidates Present	**48**
Total No.of Candidates Absent	**0**
Total No.of Students Pass	**35**
Total No. of Students Fail	**13**
Percentage of Pass	**73%**

STAFF INCHARGE **HOD/MECH** **PRINCIPAL**

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Principal
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IG Valley, Madurai Main Road
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INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India

(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF MECHANICAL ENGINEERING

ROOT CAUSE ANALYSIS

Name of the Faculty : Mr. C. Saravan Kumar
Degree & Program : B.E - Mechanical
IA Test : Model Examination
Target : 95%

Course Code & Name : ME8593 - Design of M/c Elements
Semester : V
University Exam/Month & Year: Nov/DEC 2020
Achieved : 72%

S.NO	ROLL NO	NAME OF THE STUDENT	CAUSES FOR FAILURE	CORRECTIVE ACTION TAKEN	PREVENTIVE ACTION TAKEN
1.	5	Dayas kumar. M	Health issue	Retest conducted	Advised to take care of health
2.	6	Dhinakaran. K	Health issue	"	Advised to take care of health
3.	13	Hanish. M	Attended family function	"	advised to avoid
4.	16	Kingsley. J	Health issue	"	advised to take care of health
5.	19	Mahendran. A	Health issue	"	"
6.	21	Nagarajan. K	Health issue	"	"
7	24	Naveen Kumar. K	Attended family funct.	"	advised to avoid
8	28	Robert. A	Health issue	"	advised to take care of health

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9.	30	Senthilkumar. B	Health issue	"	advised to take care of health
10.	31	SubashSalamon.S	Health issue	"	"
11.	33	Vairavel. A	Adverse family function	"	advised to avoid
12.	36	Vignesh. K	Health issue	"	advised to take care of health
13.	37	Yanatharan. T	Health issue	"	"

Signature of the Faculty Member

Dr. G. Balakrishnan, M.E., Ph.D.
Principal
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Signature of the HoD/Mechanical

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IQAC Academic Audit Form

ACADEMIC YEAR:2019-2020 ODD SEMESTER

Name of Department : MECH Year / Sem: III / V No. of Students Registered : 48

Details of Examination : Model Examination

S.No.	Course Code	List of Reg.No Verified	Course Log Book Verified (Y / N)	Course File Verified (Y / N)	No of students Attended	No of Absentees	No of Failures	Pass %	Remarks
1	ME 8593	811216114001	Y	Y	48	-	12	75	-
2		811216114002	Y	Y					
3		811216114003	Y	Y					
4		811216114004	Y	Y					
5		811216114005	Y	Y					
6		811216114006	Y	Y					
7		811216114007	Y	Y					
8		811216114008	Y	Y					
9		811216114009	Y	Y					
10		811216114010	Y	Y					
11		811216114011	Y	Y					

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12		8112161140l2	Y	Y						
13		8112161140l3	Y	Y						
14		8112161140l4	Y	Y						
15		8112161140l5	Y	Y						
16		8112161140l6	Y	Y						
17		8112161140l7	Y	Y						
18		8112161140l8	Y	Y						
19		8112161140l9	Y	Y						
20		8112161140202	Y	Y						
21		8112161140221	Y	Y						
22		8112161140222	Y	Y						
23		8112161140223	Y	Y						
24		8112161140224	Y	Y						
25		8112161140225	Y	Y						
26		8112161140226	Y	Y						
27		8112161140227	Y	Y						

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28		811216114028	Y	Y					
29		811216114029	Y	Y					
30		811216114030	Y	Y					
31		811216114031	Y	Y					
32		811216114032	Y	Y					
33		811216114033	Y	Y					
34		811216114034	Y	Y					
35		811216114035	Y	Y					
36		811216114036	Y	Y					
37		811216114037	Y	Y					
38		811216114301	Y	Y					
39		811216114302	Y	Y					
40		811216114304	Y	Y					
41		811216114305	Y	Y					
42		811216114701	Y	Y					
43		811216114702	Y	Y					

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44		8112114501	Y	Y					
45		8112114502	Y	Y					
46		8112114503	Y	Y					
47		8112114504	Y	Y					
48		8112114505	Y	Y					
49	-	-	-	-	-	-	-	-	-
50	-	-	-	-	-	-	-	-	-

Verified by

External Member Name and Signature:

Internal Member Name and Signature:

Overall Remarks

HoD/MECHANICAL **NBA Coordinator** **Principal**

Dr. G. Balakrishnan, M.E., Ph.D.
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INDRA GANESAN COLLEGE OF ENGINEERING

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STUDENT FEEDBACK ON FACULTY
THEORY COURSE

ACADEMIC YEAR: 2019 - 20 SEMESTER V / 10:00

Name of Department : MECH | Year / Sem: III / V | Faculty Name: Mr. C Saravana Kumar.

Subject Code & Name: ME 8593 - Design of machine element | STUDENT NAME: A. chinnappan

S.No.	QUESTIONS	Excellent	Very Good	good	Satisfactory	Somewhat Satisfactory	Not Satisfactory
		5	4	3	2	1	0
1.	Delivery of Lectures by Interactive Communication	✓					
2.	Use of Teaching Aids and ICT		✓				
3.	Level of Preparedness & Knowledge Level	✓					
4.	Involvement in mentoring and guiding	✓	✓				
5.	Effective Time management	✓					
6.	Is the teacher completing syllabus as per lecture schedule?	✓					
7.	Is the teacher distributing answer scripts of students as per schedule?		✓				
8.	Is the teacher addressing grievances on answer scripts of IA while distributing?	✓					
9.	Is the teacher covering content beyond syllabus (CBS)?		✓				
10.	Is the teacher punctual to class?	✓					

HoD/ MECHANICAL

IQAC Co-ordinator

Principal

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Principal
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STUDENT FEEDBACK ON FACULTY
THEORY COURSE (Online Mode)

ACADEMIC YEAR: 2019 – 2020 SEMESTER FIFTH

Name of Department	MECH	Year / Sem:	III / V	Faculty Name	MR. C. SARAVANA KUMAR
Subject Code & Name	ME8593 – Design of Machine Element				

S.No.	QUESTIONS	Excellent	Very Good	good	Satisfactory	Somewhat Satisfactory	Not Satisfactory	Total Weightage	Percentage
		5	4	3	2	1	0		
1	Delivery of Lectures by Interactive Communication								
2.	Use of Teaching Aids and ICT								
3	Level of Preparedness & Knowledge Level								
4	Involvement in mentoring and guiding								
5	Effective Time management								
6	Is the teacher completing syllabus as per lecture schedule?								
7	Is the teacher distributing answer scripts of students as per schedule?								
8	Is the teacher addressing grievances on answer scripts of IA while distributing?								
9	Is the teacher covering content beyond syllabus (CBS)?								
10	Is the teacher punctual to class?								

HoD/ MECHANICAL

IQAC Co-ordinator

Principal

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