

<b>Devi Ahilya University, Indore, India</b>				<b>IV Year B.E. (Mechanical Engg.)</b>			
<b>Institute of Engineering &amp; Technology</b>				<b>(Full Time)</b>			
<b>Subject Code &amp; Name</b>	<b>Instructions Hours per Week</b>			<b>Credits</b>			
<b>7MERC2</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>
<b>Machine Design III</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>5</b>
<b>Duration of Theory Paper:</b>							
<b>4 Hours</b>							

**Course Objectives:**

1. The objective of the subject to introduce the students about the new and advanced methods of design like optimization in design.
2. The objective of the subject to introduce the students about the new and advanced methods of design like reliability based design,
3. The objective of the subject to introduce the students about the new and advanced methods of design like high temperature resistance part design etc.
4. The objective of the subject to introduce the students about design of Journal Bearing and selection of Anti frictional Bearings from manufacturing catalogues.

**Pre requisite(s):** Machine Design I, Machine Design II.

**COURSE CONTENTS**

**UNIT-I**

**Design for Bearings:** Introduction about different types of bearings, Design for Journal bearing: Specifying bearing modulus, minimum oil film thickness, flow of oil, bearing heat balancing. Elementary treatment of contact stress, Selection of antifriction bearings.

**UNIT-II**

**Reliability and Optimum based Design:** Introduction to optimum design, analysis of simple machine members based on optimum design. Fundamentals of reliability, System concepts in Reliability engineering. Failure distributions, Statistical analysis of failure data, Weibull analysis, dimensioning.

**UNIT-III**

**Design for Tool Drive:** Design of machine tool drives such as lathe, drilling and milling machine, speed diagram, ray diagram, preferred number.

**UNIT-IV**

**Design for Creep:** Introduction to Design for creep. Combined creep and fatigue failure prevention. Design for low temperature (Brittle failure). Design for corrosion, wear, hydrogen embrittlement, fretting fatigue and other combined modes of mechanical failure.

**UNIT-V**

**Design for Un-symmetrical Bending:** Design of parts of unsymmetrical sections, shear center, parts subjected to unsymmetrical bending.

**Note:** Only Mechanical Engineer's Handbook, Data-books and certified notes are allowed in the examination hall.

**Course Outcomes:**

Upon completing the course, student will be able to:

- CO1. Design the machine components on the basis of Reliability.
- CO2. Optimize the mechanical component design.
- CO3. Design the component under high temperature condition.
- CO4. Determine the arrangement and layout for tool drive design.
- CO5. Evaluate and Design the Unsymmetrical component subjected to loading condition.

**BOOKS RECOMMENDED:**

- [1] Shingley J.E., *Mechanical Engineering Design*, McGraw-Hill ,4e,2003.
- [2] Spotts M.F.,Shoup T.E., Hrnberger L.E., *Design of Machine Elements*, Pearson Education ,8e,2006.
- [3] Sharma P.C. and Aggarwal D.K., *Machine Design*,S.K.Kataria & Sons,11e,2006.
- [4] Shariff A.,*Design of Machine Elements*,Dhanpat Rai Publications(P) Ltd.,3e,1995.
- [5] Maleev V.L., *I.C.Engine Design*, , Mc.Graw Hill ,1e,1945.
- [6] Black and Adams, *Machine Design*, Mc.Graw Hill, 2e, 1968.
- [7] Mubeen A., *Machine Design*, Khanna Publishers, 4e, 2005.

**LIST OF PRACTICAL ASSIGNMENTS**

1. Problem on Design of Journal Bearing.
2. Problem on selection of Antifriction Bearing.
3. Problem on Reliability based design.
4. Problem on Dimensioning of parts.
5. Problem on Optimum based design.
6. Problem on Design for Tool Drive.
7. Problem on Design for creep.
8. Problem on Design for Un-symmetrical Bending.

**Course Objectives:**

1. The objective of the subject to introduce the students about the new and advanced methods of design like optimization in design.
2. The objective of the subject to introduce the students about the new and advanced methods of design like reliability based design,
3. The objective of the subject to introduce the students about the new and advanced methods of design like high temperature resistance part design etc.
4. The objective of the subject to introduce the students about design of Journal Bearing and selection of Anti frictional Bearings from manufacturing catalogues. .

**Course Outcome:**

Students earned credits will develop ability to

CO. No.	CO	PO
CO1	Design the machine components on the basis of Reliability.	PO1, PO3, PO4
CO2	Optimize the mechanical component design.	PO1, PO2, PO5
CO3	Design the component under high temperature condition.	PO1, PO4, PO5, PO12
CO4	Determine the arrangement and layout for tool drive design.	PO1, PO2, PO3 PO11
CO5	Evaluate and Design the Unsymmetrical component subjected to loading condition.	PO1, PO2, PO11

**CO-PO Relationship**

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3		3	3								
CO2	3	3			3							
CO3	3			3	3							2
CO4	3	3	3								3	
CO5	3	3									2	

\* CO (rows) mention nil/very small/insignificant contribution to the PO(column)

1 → relevant and small significance    2 → medium or moderate    and    3 →strong