SRI VENKATESWARA COLLEGE OF ENGINEERING

COURSE DELIVERY PLAN - THEORY

Department of Automobile Engineering		LP:AE18503
B.E/B.Tech : **Automobile Engineering**	**Regulation: 2018A**	**Rev. No: 00**
PG Specialisation : **Not applicable**		**Date: 12.07.2023**
Sub. Code / Sub. Name : **AE18503 DESIGN OF MACHINE ELEMENTS AND TRANSMISSION SYSTEMS**		
Unit **I**		

Unit Syllabus:

UNIT I   STEADY STRESSES AND VARIABLE STRESSES IN MACHINE MEMBERS   **12**

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 - Factor of safety - theories of failure – Design based on strength and stiffness – stress concentration – Design for variable loading.

Objective: To understand the various stresses acting in machine members.

Session No *	Topics to be covered	Ref	Teaching Aids
1	Introduction to the design process	1 – Ch.1; Pg.01 - 09	PPT, BB
2	Factors influencing machine design	1 – Ch.1; Pg.50	PPT, BB
3	Selection of materials based on mechanical properties	2– Ch.2; Pg.23	PPT, BB
4	Preferred numbers	2 – Ch.1; Pg.11	PPT, BB
5	Fits and tolerances	2– Ch.3 Pg.66 - 70	PPT, BB
6	Direct, Bending and torsional stress equations	1 – Ch.15; Pg.791	PPT, BB
7	Impact and shock loading	2 – Ch.10; Pg.402	PPT, BB
8	Calculation of principal stresses for various load combinations	1 – Ch.5; Pg.145	PPT, BB
9	Eccentric loading – curved beams	2 – Ch.4; Pg.130	PPT, BB
10	Factor of safety - theories of failure	2 – Ch.4; Pg.77	PPT, BB
11	Design based on strength and stiffness	2– Ch.2; Pg.24	PPT, BB
12	Stress concentration – Design for variable loading	2– Ch.5; Pg.141	PPT, BB

Content beyond syllabus covered (if any): -

* Session duration: 50 minutes

Sub. Code / Sub. Name: AE18503 DESIGN OF MACHINE ELEMENTS AND TRANSMISSION SYSTEMS

Unit : II

Unit Syllabus :

UNIT II   SHAFTS AND COUPLINGS

12

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

Objective: To understand the design of shafts, keys and couplings.

Session No *	Topics to be covered	Ref	Teaching Aids
13	Introduction to shafts	2 – Ch.9; Pg.330	PPT, BB
14	Strength, rigidity and critical speed	2 – Ch.9; Pg.331,332	PPT, BB
15	Design of solid and hollow shafts based on strength, rigidity and critical speed - Procedure	2 – Ch.9; Pg.333-344	PPT, BB
16	Design of solid shafts based on strength, rigidity and critical speed - Problems	2 – Ch.9; Pg.333-344	PPT, BB
17	Design of hollow shafts based on strength, rigidity and critical speed - Problems	2 – Ch.9; Pg.333-344	PPT, BB
18	Design of keys and keyways - Procedure	2 – Ch.9; Pg.346– 352	PPT, BB
19	Design of keys and keyways - Problems	2 – Ch.9; Pg.346– 352	PPT, BB
20	Couplings - Introduction	2– Ch.9; Pg.356	PPT, BB
21	Rigid couplings – Design Procedure	2– Ch.9; Pg.356 – 367	PPT, BB
22	Rigid couplings – Problems	2– Ch.9; Pg.356 – 367	PPT, BB
23	Flexible couplings - Design Procedure	2– Ch.9; Pg.368-375	PPT, BB
24	Flexible couplings - – Problems	2– Ch.9; Pg.368-375	PPT, BB

Content beyond syllabus covered (if any): -

* Session duration: 50 mins

Sub. Code / Sub. Name: AE18503 DESIGN OF MACHINE ELEMENTS AND TRANSMISSION SYSTEMS

Unit : III

Unit syllabus:

UNIT III   MECHANICAL JOINTS AND BEARINGS   12
Threaded fasteners - Bolted joints – Welded joints, riveted joints for structures. Sliding contact and rolling contact bearings - Hydrodynamic journal bearings, Sommerfeld Number, Raimondi and Boyd graphs, Selection of Rolling Contact bearings.

Objective

To have an adequate knowledge on Mechanical joints and Bearings

Session No *	Topics to be covered	Ref	Teaching Aids
25	Introduction - Mechanical Joints, Bolted joints	3– Ch.6; Pg.6.1,6.2	PPT, BB
26	Welded joints, riveted joints for structures - Procedure	3– Ch.6; Pg.7.1-7.18, Pg.6.3-6.15	PPT, BB
27	Welded joints for structures - Problems	3– Ch.7; Pg.7.1-7.18	PPT, BB
28	Riveted joints for structures - Problems	3– Ch.6; Pg.6.3-6.15	PPT, BB
29	Design of Sliding contact bearings - Procedure	3– Ch.17; Pg.17.1-17.12	PPT, BB
30	Hydrodynamic journal bearings, Sommerfeld Number, Raimondi and Boyd graphs	3– Ch.17; Pg.17.1-17.12	PPT, BB
31,32	Design of Sliding contact bearings - Problems	3– Ch.17; Pg.17.32-17.33	PPT, BB
33	Design of Rolling contact bearings - Procedure	3– Ch.17; Pg.17.12-17.32	PPT, BB
34,35	Design of Rolling contact bearings - Problems	3– Ch.17; Pg.17.33-17.35	PPT, BB
36	Selection of Rolling Contact bearings	3– Ch.17; Pg.17.28-17.29	PPT, BB
Content beyond syllabus covered (if any): --			

Sub. Code / Sub. Name: AE18503 DESIGN OF MACHINE ELEMENTS AND TRANSMISSION SYSTEMS
Unit : IV

Unit syllabus:

UNIT IV   SPUR GEARS AND PARALLEL AXIS HELICAL GEARS   12

Speed ratios and number of teeth-Force analysis -Tooth stresses - Dynamic effects – Fatigue strength - Factor of safety - Gear materials – Design of straight tooth spur & helical gears based on strength and wear considerations – Pressure angle in the normal and transverse plane- Equivalent number of teeth-forces for helical gears.

Objective

To understand the design of spur and helical gears.

Session No *	Topics to be covered	Ref	Teaching Aids
37	Introduction to gears	5 – Ch.1; Pg.1.1-1.2	PPT, BB
38,39	Speed ratios and number of teeth-Force analysis	5 – Ch.1; Pg.1.1-1.36	PPT, BB
40	Tooth stresses - Dynamic effects	5 – Ch.1; Pg.1.1-1.36	PPT, BB
41	Fatigue strength - Factor of safety	5 – Ch.1; Pg.1.1-1.36	PPT, BB
42	Gear materials	5 – Ch.1; Pg.1.1-1.36	PPT, BB
43	Design of straight tooth spur gears based on strength and wear considerations - Procedure	5 – Ch.1; Pg.1.1-1.36	PPT, BB
44	Design of straight tooth spur gears based on strength and wear considerations - Problems	5 – Ch.1; Pg.1.1-1.36	PPT, BB
45	Design of helical gears based on strength and wear considerations- Procedure	5 – Ch.2; Pg.2.1-2.15	PPT, BB
46	Design of helical gears based on strength and wear considerations - Problems	5 – Ch.2; Pg.2.1-2.15	PPT, BB
47	Pressure angle in the normal and transverse plane	5 – Ch.2; Pg.2.1-2.15	PPT, BB
48	Equivalent number of teeth-forces for helical gears.	5 – Ch.2; Pg.2.1-2.15	PPT, BB
Content beyond syllabus covered (if any): -			

Sub. Code / Sub. Name: AE18503 DESIGN OF MACHINE ELEMENTS AND TRANSMISSION SYSTEMS

Unit : V

UNIT V   GEAR BOXES AND BRAKES

12

Geometric progression - Standard step ratio - Ray diagram, kinematics layout -Design of sliding mesh gear box - Design of multi-speed gear box for machine tool applications -Constant mesh gear box, Speed reducer unit. Variable speed gear box, Design of disc brakes

Objective

To understand the design of Gear box and Brakes.

Session No *	Topics to be covered	Ref	Teaching Aids
49	Introduction to gear box	5– Ch.6; Pg.6.1- 6.25	PPT, BB
50	Geometric progression - Standard step ratio	5– Ch.6; Pg.6.1- 6.25	PPT, BB
51	Ray diagram	5– Ch.6; Pg.6.1- 6.25	PPT, BB
52	Kinematics layout	5– Ch.6; Pg.6.1- 6.25	PPT, BB
53,54	Design of sliding mesh gear box	5– Ch.6; Pg.6.1- 6.25	PPT, BB
55,56	Design of multi-speed gear box for machine tool applications	5– Ch.6; Pg.6.1- 6.25	PPT, BB
57	Design of Constant mesh gear box	5– Ch.6; Pg.6.1- 6.25	PPT, BB
58	Speed reducer unit	5– Ch.5; Pg.5.1 – 5.4	PPT, BB
59	Variable speed gear box	5– Ch.6; Pg.6.1- 6.25	PPT, BB
60	Design of disc brakes	5 - Ch. 13; Pg. 13.1 – 13.3	PPT, BB
Content beyond syllabus covered (if any): -			

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REFERENCES:

1. Bhandari. V, "Design of Machine Elements", 4th Edition, Tata McGraw-Hill BookCo, 2016.

2. Joseph Shigley, Charles Mischke, Richard Budynas and Keith Nisbett, Mechanical Engineering Design", 10th Edition, Tata McGraw-Hill, 2015.

3. Sundararajamoorthy. T.V, Shanmugam.N, "Machine Design, Anuradha Publications, Chennai, 2003.

4. Khurmi R S., "A Text Book of Machine Design", 14th Edition, S Chand Publishing.

5. Prabhu. T.J., "Design of Transmission Elements", Mani Offset, Chennai, 2000.

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Designation	Assistant Professor	Professor & Head
Date	12.07.2023	12.07.2023
Remarks *:		

* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD