III B.Tech II Semester

15AME33-ADVANCED MACHINE DESIGN

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Course Objective:

To aware the student about basic concepts design of power transmission elements, understand the design concepts of various types of keys and couplings and various types of bearings and gears. To know the students how to apply design concepts in designing of IC engine parts like Piston, cylinder, connecting rod and crank shaft.

UNIT I

Design of Keys and Couplings: Design of Rigid couplings: Muff, Split muff and Flange couplings- Design of flexible couplings.

Learning Outcome & Suggested Student Activities:

After completion of this unit students are able to design various rigid and flexible shaft couplings.

UNIT II

Design of Power Transmissions Systems: Design of Flat belt drives, V-belt drives drives, Selection of wire ropes.

Learning Outcome & Suggested Student Activities:

After completion of this unit students are able to design various belts and rope drives.

UNIT III

Design Of Sliding Bearings: Types of Journal bearings - Lubrication - Bearing Modulus-bearing materials - journal bearing design

Design Of Roller Bearings: Ball and roller bearings types - Static loading of ball & roller bearings, bearing life -Failure of bearings.

Learning Outcome & Suggested Student Activities:

After completion of this unit students are able to design journal bearings, ball bearings and roller bearings and to know the advantages of rolling contact bearings against sliding contact bearings.

UNIT IV

Design of Spur & Helical Gears: Spur gears- Helical gears, Nomenclature, Lewis equation, Load concentration factor - Dynamic load factor. Surface compressive strength - Bending strength - Design analysis of spur and Helical gears - Estimation of centre distance, module and face width. Check for dynamic and wear considerations.

Learning Outcome & Suggested Student Activities:

After completion of this unit students are able to design spur and helical gears for different input conditions.

UNIT V

Design Of Ic Engine Parts: Pistons- Construction, Design of piston. Cylinder, Cylinder block, Connecting Rod. Cranks and Crank shafts- Center and over hung cranks.

Learning Outcome & Suggested Student Activities:

After completion of this unit students are able to know various forces acting on I C engine parts and failure criteria to be adopted for various parts.

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TEXT BOOKS:

1. Machine Design, R.S. Kurmi and J.K. Gupta ,S.Chand Publishers, New Delhi.
2. Design of Machine Elements, V.B.Bhandari , TMH Publishers, New Delhi, 2 edition, 2013.
3. Machine Design, R.L. Norton, Tata McGraw Hill Publishers, 2nd edition, 2012.

REFERENCE BOOKS:

1. Machine Design, Schaum"sseries, TMH Publishers, New Delhi, 1st edition, 2011.
2. MechanicalEngineeringDesign,JosephE.Shigely,TMHPublishers,NewDelhi, 9th edition.
3. Design of Machine Elements, V.B.Bhandari , TMH Publishers, New Delhi, 2 edition, 2013.
4. Machine Design, Sadhu Singh, Khanna Publishers, New Delhi.
5. Design of Machine Elements, M.F. Spotts, PHI Publishers, New Delhi.
6. Machine Design, Pandya and Shah, Charotar Publishers, Anand, 17th edition, 2012.

NOTE: Design data books are permitted in the examinations.

SUGGESTED LINKS:

- http://www.uni.edu/~rao/Md-17%20Shaft%20Design.pdf
- http://www.uni.edu/~rao/Md-15%20Keys%20and%20Couplings.pdf
- http://machinedesign.com/
- http://www.youtube.com/watch?v=4nlQwVqruRo&list=PL3D4EECEFAA99D9BE&index=21
- http://www.youtube.com/watch?v=PEKfS2Q1WqM&list=PL3D4EECEFAA99D9BE&index=19
- http://www.youtube.com/watch?v=nMsB6Soz4Hc&list=PL3D4EECEFAA99D9BE&index=30
- http://www.mae.ncsu.edu/klang/courses/mae442/Tranmission/Journal%20Bearing.ppt
- http://nhbb.com/files/catalog_pages/HiTech_Catalog.pdf
- http://nptel.iitm.ac.in/courses/IIT-MADRAS/Machine_Design_II/pdf/2_9.pdf
- http://www.youtube.com/watch?v=8bml2pK6Ra0
- http://umpir.ump.edu.my/1778/1/Design_Of_Cooecting_Rod_Of_Internal_Combustion_Engine_A_Topology_Optimization_Approach.pdf
- http://www.d-p.com.gr/pistons/piston-designs.html