

AMAE-14 DESIGN OF MACHINE ELEMENTS

UNIT-1 STEADY STRESSES AND VARIABLE STRESSES IN MACHINE MEMBERS

- 1.1 Introduction to the design process-
- 1.2 Factors influencing machine design,
- 1.3 Selection of materials based on mechanical properties
- 1.4 Preferred numbers, fits and tolerances- Direct, Bending and torsional stress equations-
- 1.5 Impact and shock loading- calculation of principle stresses for various load combinations,
- 1.6 Eccentric loading- curved beams- crane hook and 'C' frame-
- 1.7 Factor of safety- theories of failure
- 1.8 Design based on strength and stiffness-stress concentration
- 1.9 Design for variable loading.

UNIT-2 HAFTS AND COUPLINGS

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

UNIT-3 TEMPORARY AND PERMANENT JOINTS

- 3.1 Threaded fasteners
- 3.2 Bolted joints including eccentric loading,
- 3.3 Knuckle joints,
- 3.4 Cotter joints- Welded joints, riveted joints for structures - theory of bonded joints.

UNIT-4 ENERGY STORING ELEMENTS AND ENGINE COMPONENTS

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

UNIT-5 BEARINGS

- 5.1 Sliding contact and rolling contact bearings
- 5.2 Hydrodynamic journal bearings,
- 5.3 Sommerfeld Number,
- 5.4 Raimondi and Boyd graphs,
- 5.5 Selection of Rolling Contact bearings.

Reference Books:

1. Sundararajamoorthy T. V. Shanmugam .N, "Machine Design", Anuradha Publications, Chennai, 2003.
2. Robert C. Juvinall and Kurt M. Marshek, "Fundamentals of Machine Design" ,4th Edition, Wiley, 2005
3. Alfred Hall, Halowenko, A and Laughlin, H., "Machine Design", Tata McGraw-Hill Book Co. (Schaum's Outline), 2010