

- (d) mild steel
- n) In shaft-basis system, the basis shaft is one (01)
- (a) whose upper deviation is zero (b) whose upper and lower deviations are zero
- (c) whose lower deviation is zero (d) none of the above

Attempt any four questions from Q-2 to Q-8

- Q-2 Attempt all questions**
- a) Define standardization in design and its types also write about the standards are used in mechanical engineering design. (07)
- b) Explain general considerations in designing a machine components. (07)
- Q-3 Attempt all questions**
- a) Design a sleeve & cotter joint to resist a tensile load of 60 kN. All parts of the joint are made up of same material with the following allowable stresses:
 $\sigma_t = 60 \text{ MPa}$, $\tau = 70 \text{ MPa}$, $\sigma_c = 125 \text{ MPa}$ (07)
- b) Design a knuckle joint to transmit 150 kN. The design stresses may be taken as 75 MPa in tension, 60 MPa in shear and 150 MPa in compression. (07)
- Q-4 Attempt all questions**
- a) Define caulking & fullering and write about the failures of riveted joints. (07)
- b) A double riveted lap joint with zig-zag riveting is to be designed for 13mm thick plates. Assume (07)
- $\sigma_t = 80 \text{ MPa}$, $\tau = 60 \text{ MPa}$, $\sigma_c = 120 \text{ MPa}$
state how the joint will fail and find the efficiency of the joint.
- Q-5 Attempt all questions**
- a) Derive the expression for the design of shaft on strength & torsional rigidity basis. (07)
- b) Design a muff coupling which is used to connect two steel shafts transmitting 40 kW at 350 rpm. The material for the shaft and key is plain carbon steel for which allowable shear and crushing stresses may be taken as 40 MPa and 80 MPa respectively. The material for the muff is cast iron for which the allowable shear stress may be assumed 15 MPa. (take width & thickness of key = 18 mm) (07)
- Q-6 Attempt all questions**
- a) Illustrate types of keys with sketch and their applications in shaft design. (07)
- b) Explain design of flange coupling with neat sketch. (07)
- Q-7 Attempt all question**
- a) Define lever and discuss general procedure for the design of lever. (07)
- b) Discuss self-locking, over hauling & efficiency of power screw. (07)
- Q-8 Attempt all questions**
- a) Explain various types of fits & tolerances and why its importance in production drawing. (07)
- b) Explain the role of AUTO CAD software in industrial drafting & design & write its applications in modifying & creating of 3-D objects. (07)

