

## Instruction to Candidates:

- 1) Section- A is compulsory consisting of ten questions carrying two marks each.
- 2) Section-B contains five questions carrying five marks each and students have to attempt any four questions.
- 3) Section-C contains three questions of ten marks each and students have to attempt any two questions.

## Section-A

Q. 1

- (i) What is role of Ergonomics in Design.
- (ii) Differentiate between rigid and flexible coupling.
- (iii) Short note on fatigue strength.
- (iv) What is the role of gib in cotter joint.
- (v) What are different types of riveted joints?
- (vi) Anti friction bearings.
- (vii) What is knuckle joint?
- (viii) What is efficiency of a riveted joint?
- (ix) How fatigue strength of a shaft can be improved?
- (x) What are the materials used for lining of friction surfaces in clutches?

## Section -B

Q. 2 (i) What are the different types of Fits &amp; Tolerances?

(ii) What are the factors influencing the selection of material?

Q. 3 (i) What are the assumptions made in design of welded joints?

(ii) Describe the procedure for designing a diamond riveting joint.

Q. 4 Design a sleeve & cotter joint to resist a tensile load of 60 KN. All parts of the joint are made of same material with following allowable stresses: Tensile=60 MPa, Shear=70 MPa, and Crushing=125 MPa.

Q. 5 Discuss the design procedure for Bell crank lever.

Q. 6 A cast iron cylinder of internal diameter 200 mm and thickness 50 mm is subjected to a pressure of  $5 \text{ N/mm}^2$ . Calculate the tangential and radial stresses at the inner, middle and outer surfaces.

### Section-C

- Q. 7 A mild steel shaft transmits 20 KW at 200 rpm. It carries a central load of 900 N and is simply supported between the bearings 2.5 m apart. Determine the size of the shaft if the allowable shear stress is 42 MPa and the maximum tensile/compressive stress is not to exceed 56 MPa. What size of the shaft will be required if it is subjected to gradually applied loads?
- Q. 8 Design a double riveted, double strap butt joint for the longitudinal seam of a boiler shell 1.5 m diameter subjected to a steam pressure of  $0.95 \text{ N/mm}^2$ . Assume joint efficiency as 75%, allowable tensile stress is 90 MPa, compressive stress is 140 MPa and shear stress in the rivet is 56 MPa.
- Q. 9 Design completely a square flanged pipe for pipes of internal diameter 50 mm subjected to a fluid pressure of  $24 \text{ N/mm}^2$ . The pipes used are seamless steel tubing. The flanges are of mild steel screwed on the pipes and the joint is secured by four bolts.

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