



RN-8123

B. E. II (Sem. III) (Mechanical) Examination
May / June – 2010
Machine Design & Industrial Drafting
(New Syllabus)

Time : 4 Hours]

[Total Marks : 100

Instructions :

(1)

नीचे दृश्यावले निशानीवाणी विगतो उत्तरवडी पर अवश्य लखवी.
Fillup strictly the details of signs on your answer book.

Name of the Examination :
B. E. 2 (Sem. 3) (Mechanical)

Name of the Subject :
Machine Design & Industrial Drafting (New Syllabus)

Subject Code No. : **8 1 2 3** Section No. (1, 2,.....): **1&2**

Seat No. :

Student's Signature

- (2) Attempt all the questions.
- (3) Assume suitable data, if it is necessary.
- (4) Write down each section in the separate answer books.
- (5) Draw the figures without scale wherever it is not specified.

Section – I

Q.1 Attempt any five

(10)

- (I) Write down the brief basic procedure of machine design.
- (II) What is the factor of safety? What is the importance of FOS machine design?
- (III) Draw the stress- strain curve for the ductile and brittle material.
- (IV) Write down the various names of command used in Auto Cad.
- (V) Determine the shear stress induced in a Knuckle pin of Knuckle joint subjected to axial pull of 100KN. The pin diameter is 50mm and it is in double shear.
- (VI) Explain: Resilience and Proof resilience
- (VII) Write down equation to find out maximum tensile and maximum compressive stress in eccentric loading.

Q.2 Attempt any one

(10)

- (a) Write down the names and its application of theories of Failures and explain any one in detail.
- (b) Design the bell crank lever to raise a vertical load of 600kgf. The longer and shorter arms of the lever are 40 cm and 10 cm from the fulcrum, respectively. Consider the Tensile stress :850 kgf/cm² ,Shear stress 700 kgf/cm²,Bearing pressures on pins 100 kgf/ cm²

Q.3 Attempt any Two

(30)

- (1) Design and draw cotter joint to support a load varying from 30kN in tension to 30kN in compression. The material used in carbon steel for which the following allowable stresses may be used. The load is applied statically. Tensile stress = compressive stress = 50Mpa; Crushing stress = 90Mpa and Allowable shear stress = 35 Mpa
- (2) A single riveted double strap butt joint is used to connect two plates of 10 mm thickness. If the diameter of the rivet is 20 mm and its pitch is 60mm, determine the efficiency of the joint. Consider the permissible tensile stress for plate: 100N/mm², the permissible shear stress for rivet : 80N/mm², the permissible crushing stress for plate and rivet: 1600N/mm²
- (3) Explain the design procedure of welding joint with eccentric loading.

Section – II

Q.4 Attempt any four

20

- (i) Explain the design of shaft based on critical speed.
- (ii) Explain self locking and over-hauling of the screw.
- (iii) Explain the various types of the fits with example.
- (iv) What is the surface roughness? Write down its characteristics and draw its symbol.
- (v) Write down short notes on: Oldham's Coupling
- (vi) Draw Buttress, ACME, Square and Trapezoidal threads, show their details and write one advantageous feature of each.

- Q.5** Figure 1 shows the lay shaft driven by pulley 'B' from an electric motor. **15**
 Another belt drive from pulley 'A' is running a compressor. The permissible shear stress of the shaft material is 85.5 N/mm^2 . Determine the diameter of the shaft. $T_3=1500\text{N}$, $T_4=600\text{N}$, $K_b=1.75$, $K_t=1.25$ and ratio of belt tension for pulley 'B' = 3.5

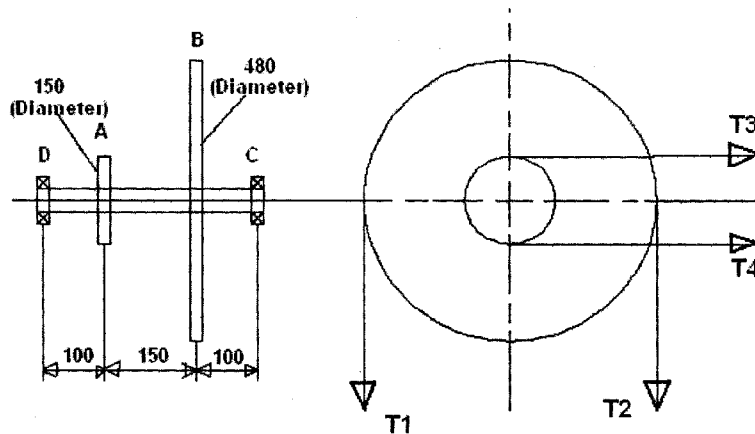


Figure 1

OR

- Q.5** Design a protective type of cast iron flange coupling for a steel shaft **15**
 transmitting 15 kW at 200 rpm and having an allowable shear stress of 40 MPa. The working stress in the bolts should not exceed 30 MPa. Assume that the same material is used for shaft and key and that the crushing stress is twice the value of its shear stress. The maximum torque is 25% greater than the full load torque; the shear stress for the cast iron is 14 MPa.
- Q.6** A screw jack is to lift a load of 80 kN through a height of 400 mm. The **15**
 elastic strength of screw material in tension and compression is 200 MPa and in shear 120 MPa. The nut material is phosphor-bronze, for which the elastic limit is 100 MPa in tension, 90 MPa in compression and 80 MPa in shear. The Bearing pressure is 18 N/mm^2 . Find the dimensions of nut and screw. Also check the stresses for screw and nut. Take FOS=2

OR

- Q.6** Draw the Toggle jack and explain the design procedure of Toggle jack in **15**
 detail.