

B. Tech. 5th Semester (F) Scheme (ME) Examination,
December-2018

MECHANICAL MACHINE DESIGN-I

Paper-ME-303-F

Time allowed : 4 hours]

[Maximum marks : 100

Note : Question one is compulsory and attempt one question from each section.

1. (a) Mechanical properties of metals
- (b) F.O.S.
- (c) Basic procedure of Machine design
- (d) Fits. 4×5=20

Section-A

2. Design and draw a cotter joint to transmit 70 kN. The design stresses may be taken as 70 MPa in tension; 80 MPa in shear; 135 MPa in crushing.

$$P=70 \text{ KN}; \sigma_t = 70 \text{ MPa}; \tau = 80 \text{ MPa}; \sigma_c = 135 \text{ MPa.}$$

20

3. Design and draw a knuckle joint to transmit 160 kN. The design stresses may be taken as 85 MPa in tension; 70 MPa in shear; 160 MPa in crushing.

$$P=160 \text{ KN}; \sigma_t = 85 \text{ MPa}; \tau = 70 \text{ MPa}; \sigma_c = 160 \text{ MPa.}$$

20

Section-B

4. (a) Types of keys
 (b) Muff Coupling
 (c) Flange coupling. 20
5. Design a cast iron protective type flange coupling to transmit 15 kw at 900 rpm from an electric motor to a compressor. The service factor may be assumed as 1.35. The following permissible stress may be used.
 Shear stress for shaft, bolt and key material = 40 MPa
 Crushing stress for bolt and key = 80 MPa
 Shear stress for cast iron = 8 MPa
 Draw a neat sketch of coupling. 20

Section-C

6. Design and draw all types of clutches :
 (a) Single plate clutch
 (b) Multiplate clutch
 (c) Cone clutch
 (d) Centrifugal clutch. 20
7. A flywheel of mass 100 kg and radius of gyration, 350 mm is rotating at 720 r.p.m. It is brought to rest by means

kg. The brake drum is made of cast iron FG 260 having specific heat 460 J/kg°C. Assuming that the total heat generated is absorbed by the brake drum only, calculate the temperature rise. 20

8. Explain the design consideration of casting, forging and machining with neat diagram. 20
9. (a) Fatigue and endurance limit
 (b) Stress concentration factor
 (c) Notches sensitivity
 (d) Fatigue stress concentration factor. 20