

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Summer 2018 - 19 Examination

Semester: 4**Subject Code: 03109254****Subject Name: Machine Design & Drawing****Date: 06/05/2019****Time: 2:00pm to 4:30pm****Total Marks: 60****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions**(15)**

1. The centre to centre distance between two consecutive rivets in a row, is called _____.
2. The ratio of linear stress to linear strain is called _____.
3. Rankine's theory is used for _____.
4. The strain energy stored in a body, when suddenly loaded, is _____ times the strain energy stored when same load is applied gradually.
5. In cyclic loading, stress concentration is more serious in _____ Materials
6. The neutral axis of a beam is subjected to
 - (a) zero stress
 - (b) maximum tensile stress
 - (c) maximum compressive stress
 - (d) maximum shear stress
7. Stress concentration factor is defined as the ratio of
 - (a) maximum stress to the endurance limit
 - (b) nominal stress to the endurance limit
 - (c) maximum stress to the nominal stress
 - (d) nominal stress to the maximum stress
8. A rivet is specified by
 - (a) shank diameter
 - (b) length of rivet
 - (c) type of head
 - (d) length of tail
9. A key made from a cylindrical disc having segmental cross-section, is known as
 - (a) feather key
 - (b) gib head key
 - (c) woodruff key
 - (d) flat saddle key
10. In levers, the leverage is the ratio of
 - (a) load lifted to the effort applied
 - (b) mechanical advantage to the velocity ratio
 - (c) load arm to the effort arm
 - (d) effort arm to the load arm
11. The transverse fillet welded joints are designed for which type of stress?
12. In a steam engine, the valve rod is connected to an eccentric by means of which joint ?
13. Hooke's law holds good up to which point?
14. What is the cross-section of the arm of a bell crank lever?
15. Which of the screw thread is adopted for power transmission in either direction?

Q.2 Answer the following questions. (Attempt any three)**(15)**

- A) What is lever explain its types with applications.
- B) A plate 100 mm wide and 12.5 mm thick is to be welded to another plate by means of parallel fillet welds. The plates are subjected to a load of 50 kN. Find the length of the weld so that the maximum stress does not exceed 56 MPa. Consider the joint first under static loading and then under fatigue loading.

C) Determine the diameter of a circular rod made of ductile material with a fatigue strength (complete stress reversal), $\sigma_e = 265$ MPa and a tensile yield strength of 350 MPa. Member is subjected to a varying axial load from $W_{min} = -300 \times 10^3$ N to $W_{max} = 700 \times 10^3$ N and has a stress concentration factor = 1.8. Use factor of safety as 2.0

D) Explain Goodman Criteria for fatigue with neat sketch.

Q.3 A) Find the diameter of a solid steel shaft to transmit 20 kW at 200 r.p.m. The ultimate shear stress for the steel may be taken as 360 MPa and a factor of safety as 8. If a hollow shaft is to be used in place of the solid shaft, find the inside and outside diameter when the ratio of inside to outside diameters is 0.5. **(07)**

B) Design a cast iron protective type flange coupling to transmit 15 kW at 900 r.p.m. from an electric motor to a compressor. The service factor may be assumed as 1.35. The following permissible stresses may be used : **(08)**

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 the coupling.

OR

B) What is key? Explain types of key with neat sketch. **(08)**

Q.4 A) Design and draw a cotter joint to support a load varying from 30 kN in compression to 30 kN in tension. The material used is carbon steel for which the following allowable stresses may be used. The load is applied statically. Tensile stress = compressive stress = 50 MPa ; shear stress = 35 MPa and crushing stress = 90 MPa. **(07)**

OR

A) 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)**

B) Explain Following: i) Limit & Types of limit ii) Hole & Shaft Basis system **(08)**