

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Winter 2019 - 20 Examination

Semester: 5**Subject Code: 03110308****Subject Name: Machine Design****Date: 26/11/2019****Time: 10:30am to 01:00pm****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. Cotter Joint can handle _____
(a) Axial Tensile Load (b) Axial Compressive Load
(c) Axial Tensile and Axial Compressive Load (d) None of the above
2. 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
3. Factor of safety is the ratio of _____
(a) Working stress and ultimate strength (b) Yield strength and endurance strength
(c) Ultimate strength and yield strength (d) Yield Point Stress and working stress
4. A steel with 0.8 per cent carbon is known as _____
(a) eutectoid steel (b) hypereutectoid steel
(c) hypoeutectoid steel (d) none of these
5. Which of the following material has the maximum ductility?
(a) Mild steel (b) Copper
(c) Zinc (d) Aluminium

Fill in the Blanks.

1. Rankine's theory is used for _____ material.
2. _____ spring is used in automobile to absorb shocks.
3. In _____ loading, stress concentration is more serious in Ductile Material.
4. The ratio of linear stress to linear strain is called _____
5. Moment of Inertia (I) for Circular Cross Section is _____

Give answer in one word.

1. What is the shape of the cross section of cotter?
2. Which Process improves the machinability of steels, but lower the hardness and tensile strength?
3. Tresca and Guest Theory is used for which type of materials?
4. In Stress-Strain diagram, up to proportional limit, stress is Inversely proportional to strain. Yes or No?
5. The ease with which a metal can be machined with an acceptable surface finish is called as Machinability. (True / False)

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

(15)

- A) Explain Different Theories of Failure in Short With their Applications.
- B) Explain classification of engineering materials. Write any five mechanical properties of materials.
- C) A rectangular bar of 40mm x 60 mm size is subjected to tensile load of 100 kN. The factor of safety is 2. Select the Suitable material from below given materials.
Mild Steel: Permissible Tensile Stress = 90 N/mm^2
Cast Iron: Permissible Tensile Stress = 20 N/mm^2
- D) Define Machine Design. Explain the Phases of Machine Design.

Q.3 A) Write down the Design procedure of Cotter joint with neat sketch.

(07)

B) A mild steel rod of 12 mm diameter was tested for tensile strength with the gauge length of 60 mm. Following observations were recorded:

(08)

Final length = 80 mm; Final diameter = 7 mm; Yield load = 3.4 kN and
Ultimate load = 6.1 kN.

Calculate:

- 1. yield stress, 2. ultimate tensile stress, 3. percentage reduction in area, &
- 4. percentage elongation.

OR

B) Draw the Stress Strain Curve for Ductile Material and Explain about it in Brief.

(08)

Q.4 A) A bar of circular cross-section is subjected to alternating tensile forces varying from a minimum of 200 kN to a maximum of 500 kN. It is to be manufactured of a material with an ultimate tensile strength of 900 MPa and an endurance limit of 700 MPa. Determine the diameter of bar using safety factors of 3.5 related to ultimate tensile strength and 4 related to endurance limit and a stress concentration factor of 1.65 for fatigue load. Use Goodman straight line as basis for design.

(07)

OR

A) Design a Knuckle Joint to connect two mild steel bars under the tensile load of 25 kN. The allowable stresses are 65 MPa in Tension, 50 MPa in Shear and 83 MPa in Crushing.

(07)

B) Define shaft and types of shaft. Also write down the design procedure of a shaft subjected to twisting moment only

(08)