

SUBJECT CODE NO:- E-336
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(MECH/PROD) Examination Nov/Dec 2017
Design of Machine Elements-I
(REVISED)

[Time: Three Hours]

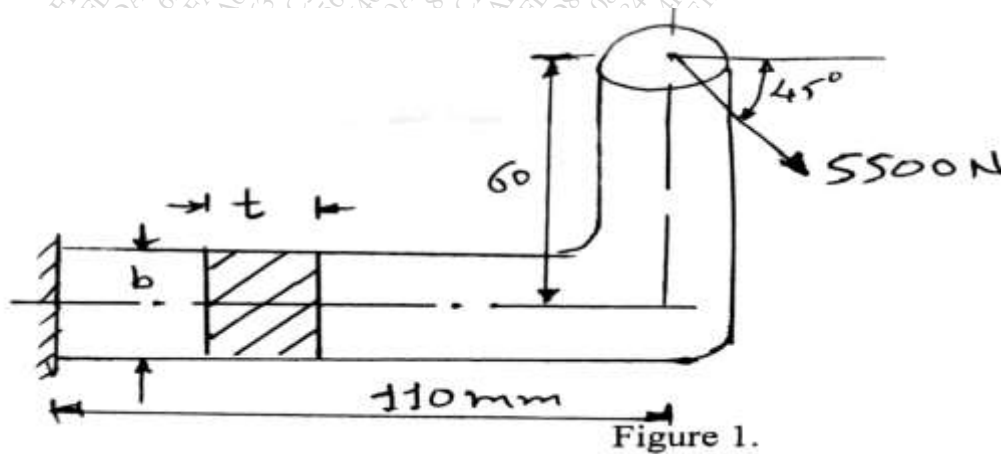
[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
1. Solve any three questions from each section.
 2. Figure to right indicate full marks.
 3. Assume suitable data if required and state it clearly.

Section A

- Q.1 a) What are the different mechanical properties of metal? Explain any three 06
b) Explain basic steps of machine design. 07
- Q.2 a) What is shaft? Derive the equation for shaft subjected to bending moment only. 05
b) A mild steel bracket as shown I figure 1 is subjected to pull of 5500 N acting at 45° to horizontal axis. The bracket has rectangular section whose depth is twice the thickness. Find the cross-sectional dimensions of bracket if the permissible stress in material of bracket is limited to 50 MPa. 08



- Q.3 Draw a neat sketch and explain in detail design procedure of knuckle joint. 13
- Q.4 a) What is function of key? What are different types of keys? 05
b) Explain in detail design procedure of rigid flange coupling. 08

Q.5 Write a short note on.(Any two)

1. Eccentric load acting parallel to the axis of the bolt
2. Aesthetic and Ergonomic consideration in design
3. Write the designation of following.
 - a) 15C8
 - b) FeE220
 - c) Fe310
 - d) XT75W18Cr4V1

14

Section B

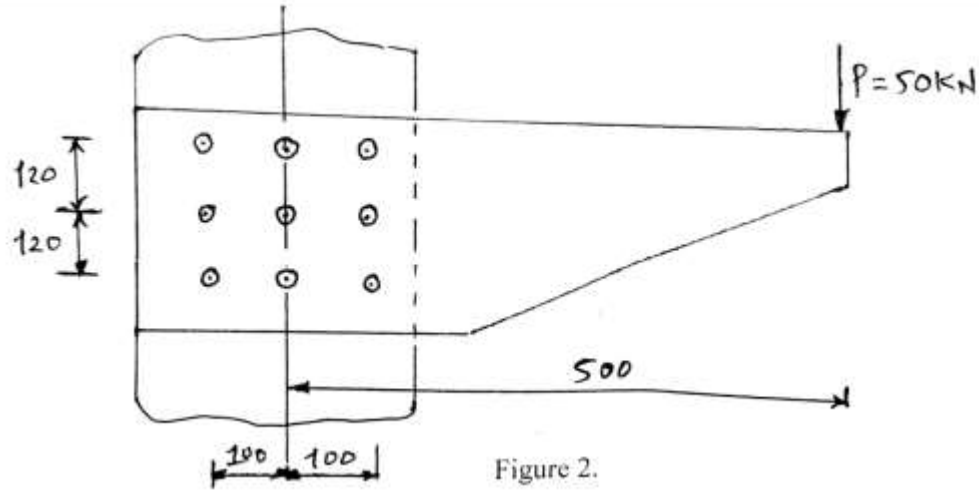
Q.6 a) What is function of spring? What are different types of springs?

05

- b) A loaded narrow gauge rail car weighting 2200 Kg and moving at 1.3 m/s velocity is brought to rest by a bumper consist of two helical compression springs of spring index 6. In bringing rail car to rest both the bumper spring gets compressed by 150 mm, spring steel has permissible shear stress of 425 N/mm^2 and $G = 84 \times 10^3 \text{ N/mm}^2$
- i. Determine diameter of spring wire
 - ii. Mean coil diameter
 - iii. Number of turns of spring coil
 - iv. Free length
 - v. Solid length

Q.7 A simply supported beam has a concentrated load at the center which fluctuates from a value of P to 4P. the span of beam is 490 mm and its cross section is circular with a diameter of 58 mm. taking for the beam material an ultimate stress of 700 Mpa, yield stress of 500 Mpa, endurance limit of 325 Mpa for reverse bending and a factor of safety as 1.4, calculate the maximum value of P by using Soderberg and Goodman equation. Take a size factor of 0.85, surface finish factor 0.9

Q.8 A bracket as shown in figure 2 is to carry a load of 50 KN. Determine the size of the rivet if the shear stress is not to exceed 45 Mpa. Assume all rivets of the same size



- Q.9 a) Describe the different factors that affects on endurance limit. 06
- b) Derive the resultant shear load equation for eccentrically loaded riveted joint. 07
- Q.10 Write a short note on. (Any two) 14
- Surge in spring and method to eliminate it
 - Caulking and fullering
 - Nipping of leaf spring