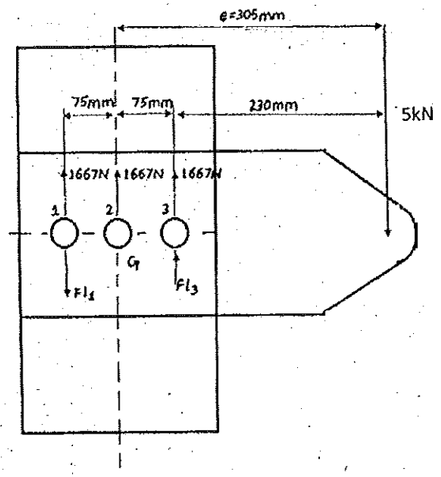
(b) A roller bearing is to be selected to withstand a radial load of 4000 N and have an L_{10} life of 1200 hours at a speed of 600 rpm.

(i) What is the basic dynamic load rating of the bearing to be selected?

(ii) If the reliability requirement is 99%, what load rating would be used? Take $b = 1.17$ and $V = S = 1$. (13)

PART C — (1 × 15 = 15 marks)

16. (a) A steel plate is subjected to a force of 5 kN and fixed to a channel by means of 3 identical bolts as shown in figure. The bolts are made from plain carbon steel for which yield stress in tension is 380 N/mm² and factor of safety is 3. Determine the size of the bolts. (15)



Or

(b) A 50 mm wide, 5 mm high rectangular plate has 5 mm diameter central hole. The allowable tensile stress is 700 MPa. Find (i) The maximum tensile force that can be applied (ii) the maximum bending moment that can be applied to reach the maximum stress (iii) the maximum tensile force and the maximum bending moment if the hole is not present. Express the results as a ratio when compared to parts (i) and (ii). (15)

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 20814

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Fourth/Fifth/Sixth Semester

Mechanical Engineering

ME 6503 — DESIGN OF MACHINE ELEMENTS

(Common to Mechanical Engineering (Sandwich)/Automobile Engineering/ Industrial Engineering/Mechanical and Automation Engineering/ Mechatronics Engineering)

(Regulations 2013)

(Also Common to PTME 6503 — Design of Machine Elements for B.E. (Part-Time) Fourth Semester – Mechanical Engineering – Regulations 2014)

Time : Three hours Maximum : 100 marks

(Usage of approved design data book is permitted)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define shock factor and what does it indicate.

2. Distinguish hardness and toughness.

3. Differentiate between rigid and flexible couplings.

4. List the different types of sunk keys and draw any one.

5. State the disadvantages of welded joints.

6. What is known as "bolt of uniform strength"?

7. While designing helical springs, K is introduced in the shear stress equation, why?

8. What is nipping in leaf springs?

9. List the advantages of hydrostatic bearings.

10. Give two applications where the inner race is rotating and outer race is stationary in rolling contact bearings.