Code No: R1631243 **R16** SET - 1

III B. Tech I Semester Supplementary Examinations, May - 2019

DESIGN OF MACHINE ELEMENTS

(Automobile Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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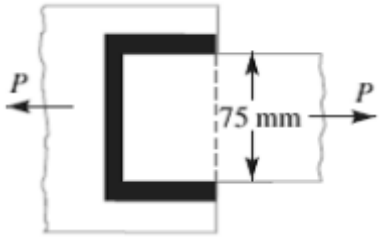
PART –A

1. a) Type question here [2M]
   b) What is the efficiency of riveted joint? [2M]
   c) Give at least three practical applications of couplings. [2M]
   d) What is helical torsion spring? How does it differ from helical compression spring? [3M]
   e) State any advantages and disadvantages of deep groove ball bearings. [3M]
   f) What is the difference between the center and overhung crankshafts? [2M]

PART –B

2. a) Explain the effects of stress concentration in fatigue loading. [7M]
   b) Determine the diameter of a circular rod made of ductile material with a fatigue (complete stress reversal), σ_e = 265 MPa and a tensile yield strength of 350 MPa. The member is subjected to a varying axial load from W_{min}= -300 kN to W_{max}= 700 kN and has a stress concentration factor = 1.8. Use factor of safety as 2.0 [7M]

3. a) Discuss the methods of failure of riveted joints. [6M]
   b) A plate 75 mm wide and 12.5 mm thick is joined with another plate by a single transverse weld and a double parallel fillet weld as shown in Fig. the maximum tensile and shear stresses are 70 MPa and 56 MPa respectively. Find the length of each parallel fillet weld, if the joint is subjected to both static and fatigue loading. [8M]



4. Design a cotter joint of socket and spigot type, which may be subjected to a pill or push of 30 kN. All the parts of the joint are made of the same material with the permissible stresses, 55 MPa in tension, 70 MPa compression and 40 MPa in shear. [14M]

5. a) A semi elliptical truck spring has 12 leaves of which two are full length leaves. The spring supports are 0.7 m apart. The width of the central band is 80 mm and the load on the spring is 30 kN. The permissible stress is 460 MPa. The ratio of total depth to width of the spring is 3. Determine the thickness and width of the spring leaves. Also determine the deflection of the spring. Assume that the extra full length leaf is not pres stressed. Take E= 2.1 X10^5 MPa. [8M]
   b) Classify the springs and name the principal stresses induced each. [6M]
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6. a) Explain design procedure of ball bearings. Design a Cast iron piston for a single acting four stroke engine for the following specifications : [6M]
Cylinder bore = 100mm, Stroke = 120mm, Maximum gas pressure = 5N/mm^2, Break mean effective pressure= 0.65N/mm^2; Fuel consumption = 0.227kg/kW/hr, speed=2200 rpm, Assume suitable data.

b) Following data are given for a 360^o hydrodynamic bearing: [8M]
Radial load=3.2 kN
Journal speed= 1490 r.p.m.
Journal diameter=50 mm
Bearing length=50mm
Radial clearance=0.05 mm
Viscosity of the lubricant= 25 centi Poise
Assuming that the total heat generated in the bearing is carried by the total oil flow in the bearing, calculate:
i) Power lost in friction; ii) The coefficient of friction; iii) Minimum oil film thickness iv) Flow requirement in 1/min; v) Temperature rise.

7. Design a Cast iron piston for a single acting four stroke engine for the following specifications: [14M]
Cylinder bore = 100mm, Stroke = 120mm, Maximum gas pressure = 5N/mm^2, Break mean effective pressure= 0.65N/mm^2; Fuel consumption = 0.227kg/kW/hr, speed=2200 rpm, Assume suitable data.

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