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**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

Sixth Semester B.Tech Degree Regular and Supplementary Examination July 2021

**Course Code:ME316**
**Course Name: PRINCIPLES OF MACHINE DESIGN**

Max. Marks: 100                                                         Duration: 3 Hours

**Use of approved data hand book is permitted**
**Assume any missing data**
**PART A**
*Answer any two full questions, each carries 15 marks.*                    Marks

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|---|---|---|---|
| 1 | (a) | Explain different phases in engineering design cycle. | (8) |
| | (b) | What is endurance failure? Write different methods to determine endurance limit. | (7) |
| 2 | | Find the diameter of a circular rod to be made up of C50 steel, subjected to an axial load of 20kN while transmitting 18kW at 1440rpm. Use common theories of failure. | (15) |
| 3 | | Calculate the thickness of a plate required to take an axial load varying between 12kN(T) and 10kN(C). The plate is having a hole of 40mm diameter at it's centre. The width of the plate is 100mm. The material of the plate is C40 steel | (15) |

**PART B**
*Answer any two full questions, each carries 15 marks.*

4    Find the size of the two unequal parallel steel fillet welds required for the joint    (15)
shown in figure. The load of 18kN is acting through the C. G. of the L – section



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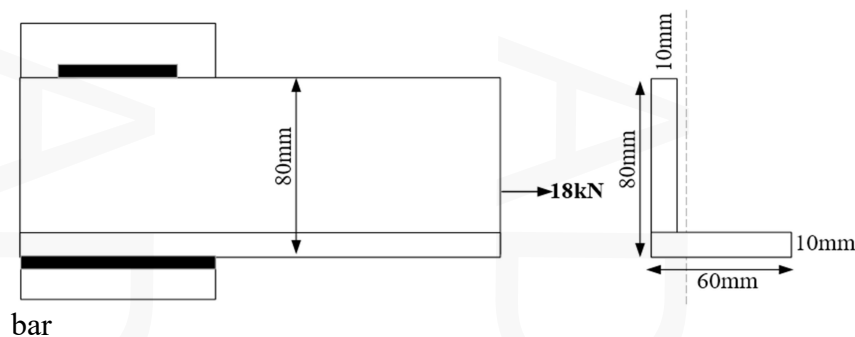
5    Find the size of steel rivets required for the joint shown in figure    (15)
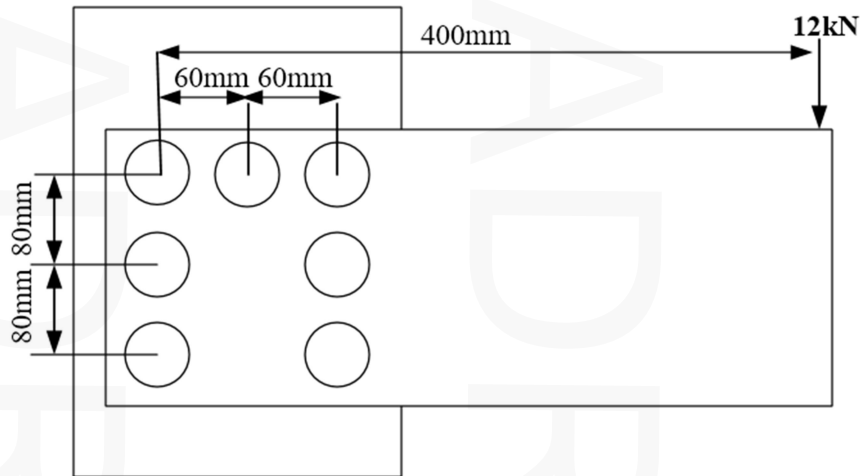


6  a)  Differentiate thin and thick pressure vessels.    (5)

   b)  Derive the expressions to determine the longitudinal and hoop stresses    (10)
       developed in thin cylindrical pressure vessel subjected to an internal pressure.

**PART C**
*Answer any two full questions, each carries 20 marks.*

7    Design a hollow shaft carrying a spur gear at its free end, having an overhung    (20)
     of 300mm from the nearest bearing. The pitch circle diameter of the gear is
     280mm and transmits 50kW at 2000rpm. Take weight of the gear as 100N.

8  a)  What is surging of helical springs? Explain.    (5)

   b)  Design a helical compression spring to support a load of 800N with a    (15)
       maximum deflection of 24mm.

9    Design a semi elliptical laminated leaf spring to support a load of 30kN. The    (20)
     span is 1.1m and the centre band is 100mm wide. The maximum deflection is
     150mm.

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