Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SIXTH SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018

Course Code: ME 314

Course Name: MACHINE DESIGN II (AU)

Max. Marks: 100 Duration: 3 Hours

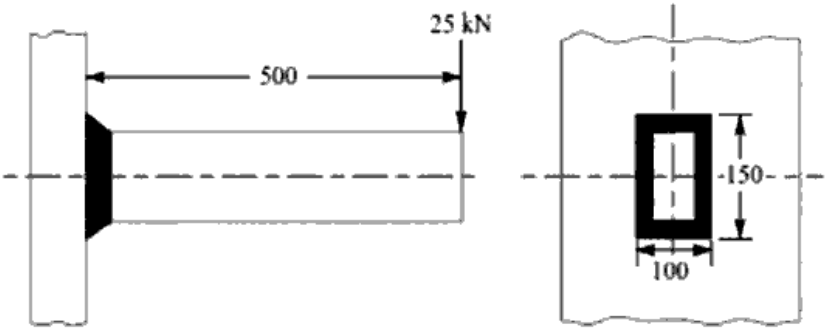
Instructions:

- ***Recommended Design data book is allowed for the examination***
- ***Suitably assume any data not provided***

PART A

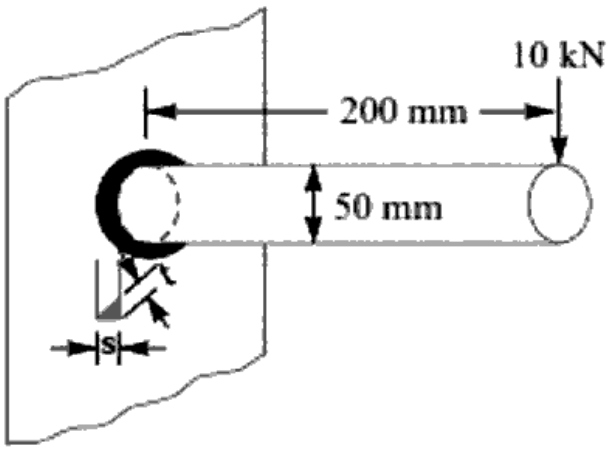
Answer any two full questions, each carries 15 marks. Marks

1 a) A rectangular cross-section bar is welded to a support by means of fillet welds as shown in Fig.3. Determine the size of the welds, if the permissible shear stress in the weld is limited to 75 MPa. (5)



All dimensions in mm

b) A 50 mm diameter solid shaft is welded to a flat plate as shown in Fig.2. If the size of the weld is 15 mm, find the maximum normal and shear stress in the weld. (5)



c) Discuss about classification of welded joints (5)

2 a) A hollow shaft of 0.5m outside diameter and 0.3m inner diameter is used to drive the propeller of a marine vehicle. The shaft is mounted on a bearing 6m apart, and it transmits 5600kW at 150rpm. Weight of the shaft is 70kN. (15)

Find(a)Maximum stress developed in the shaft; (b) Angular twist between the bearings

3 a) Explain the Soderberg and Goodman's line for the evaluation of endurance limit of a material (7.5)

b) Explain why the fillet radius and corner radius are given for a component (7.5)

PART B

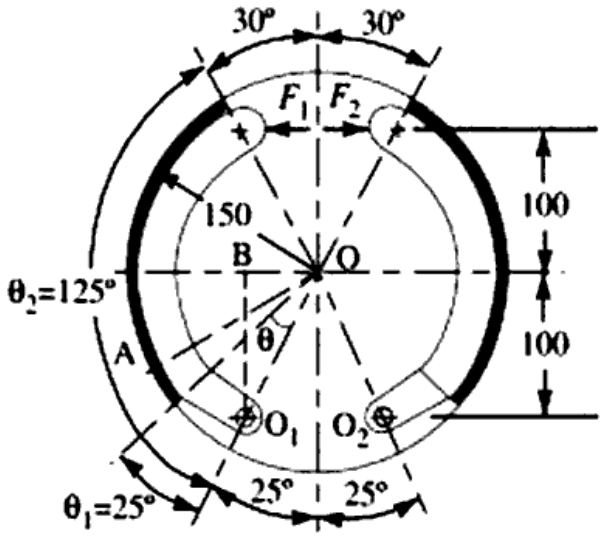
Answer any two full questions, each carries 15 marks.

4 a) A cone clutch with a cone angle of 24° has to transmit 12kW @1200 rpm. The mean diameter of the friction lining is 300mm.The normal intensities of pressure between the contact surfaces is not to exceed 1.5 bar. Co-efficient of friction is 0.24. Design the clutch (8)

b) Explain the design procedure for multiplate clutch. (7)

5 a) Design the main bearings of a 4stroke diesel engine to sustain a load of 6kN. The operating speed of the shaft is 100rpm. (15)

6 a) Fig.4 shows the arrangement of two brake shoes which act on the internal surface of a cylindrical brake drum. The braking force F1 and F2 are applied as shown and each shoe pivots on its fulcrum O1 and O2. The width of the brake lining is 35 mm. The intensity of pressure at any point A is 0.4 sin Θ N/mm^2, where Θ is measured as shown from either pivot. The coefficient of friction is 0.4. Determine the braking torque and the magnitude of the forces F2 and F1 (10)



All dimensions in mm.

Fig.4

b) Find the co-efficient of friction of the following materials when it is used for driving and driven discs in a multidisc clutch (5)

(i) Cast iron and steel

(ii) Wood and cast iron or steel

(iii) Woven asbestos and hard steel, chromium plated

(iv) Impregnated asbestos and cast iron or steel

(v) Cast bronze and cast iron or steel

PART C

Answer any two full questions, each carries 20 marks.

7 a) A pair of helical gears is to transmit 15 kW. The teeth are 20° stub in diametral plane and have a helix angle of 45°. The pinion runs at 10000 r.p.m. and has 80 mm pitch diameter. The gear has 320 mm pitch diameter. If the gears are made of cast steel having allowable static strength of 100 MPa; determine a suitable module and face width from static strength considerations and check the gears for wear, given surface endurance limit= 618 MPa. (20)

8 a) A pair of cast iron bevel gears connects two shafts at right angles. The pitch diameters of the pinion and gear are 80 mm and 100 mm respectively. The tooth profiles of the gears are of 14 1/2° composite form. The allowable static stress for both the gears is 55 MPa. If the pinion transmits 2.75 kW at 1100 r.p.m., find the module and number of teeth on each gear from the standpoint of strength and check the design from the standpoint of wear. Take surface endurance limit as 630 MPa and modulus of elasticity for cast iron as 84 kN/mm^2. (20)

9 a) Explain the reason behind connecting rods are made of I section and provide the dimensions of the cross section based on thickness with a neat sketch (10)

b) Explain the parts of a piston with a neat sketch. (10)

****