PRESIDENCY UNIVERSITY, BENGALURU

SCHOOL OF ENGINEERING

TEST 2

Odd Semester: 2018-19

Course Code: MEC 216

Course Name: Design of Transmission systems

Branch & Sem: MEC & VII Sem Group-1

Date: 24 November 2018

Time: 1 Hour 15 minutes

Max Marks: 40

Weightage: 20%

Instructions:
(i)   Read the question properly and answer accordingly.
(ii)   Question paper consists of 3 parts.
(iii) Scientific and Non-programmable calculators are permitted.
(iv)   Design hand book is permitted

Part A

Answer the Questions. Question carries **four** marks.   (1x4=4)

1. Derive an expression for the stress induced in a helical spring, with usual notation.

Part B

Answer **all** the Questions. **Each** question carries **Thirteen** marks.   (2x13=26)

2 A pair of carefully cut spur gear with 20° full depth involute profile is used to transmit 12 kW at 1200 rpm of pinion. The gear has to rotate at 300 rpm. The material used for both pinion and gear is medium carbon steel whose allowable bending stress may be taken as 230 N /mm². Determine the module, face width of spur pinion and gear. Suggest suitable hardness. Take 24 teeth on pinion.

3. A pair of 20° full depth involute teeth bevel gears connect two shafts at right angles have Velocity ratio 3:1. The gear is made of cast steel 0.20% untreated and the pinion material is of steel, C-30 heat treated. The pinion has 20 number of teeth and transmits 40 kW at 750 rpm. Determine module, face width pitch diameter, and assume width of gear face as 1/3 of the length of pitch of cone. Suggest suitable hardness for the gears

Part C

Answer the Question. Question carries **Ten** marks.   (1x10=10)

4. A helical valve spring is to be designed for an operating load range of approximately 90 to 135 N. The deflection of the spring for the load range is 7.5 mm. assuming a spring Index is 10 Factor of safety 2, yield strength in shear is 690 N/mm² and rigidity modulus (G)= 78450 N/mm²

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END TERM FINAL EXAMINATION

Odd Semester: 2018-19   **Date**: 26 December 2018

Course Code: MEC 216   **Time**: 2 Hours

Course Name: Design of Transmission Systems   **Max Marks**: 80

Programme & Sem: MECH & VII Sem (Group-1)   **Weightage**: 40%

Instructions:

(i)   *Read the question properly and answer accordingly.*

(ii)   Scientific and Non-programmable calculators are permitted.

(iii)   Design hand book is permitted

Part A

Answer **all** the Questions. **Each** question carries **five** marks.   (4Qx5M=20)

1. Derive the equation for torque transmitted by friction clutches based on uniform Wear theory.
2. Explain the mechanism of hydrodynamic journal bearing.
3. A plate clutch consists of a pair of contacting surfaces. The inner and outer diameter of the fulcrum disk are 100 mm and 200 mm respectively. The coefficient of friction is 0.2 and the permissible intensity of pressure is 1 N/mm^2. Assume the uniform wear criterion, calculate the power transmitting capacity of the clutch at 750 rpm.
4. Explain the procedural steps for the Design of simple block brakes.

Part B

Answer **all** the Questions. **Each** question carries **ten** marks.   (4Qx10M=40)

5. A multi plate clutch has steel on bronze is to transmit 8 kW at 1440 rpm. The inner Diameter of the contact is 80 mm and the outer diameter of contact is 140 mm. The Clutch operates in oil with expected coefficient of friction 0.1, the average allowable Pressure 0.35 N/mm^2. Assume uniform wear theory and determine the following
   (i)   Number of steel and bronze plates. (ii) Axial force required.
6. In block brake shown in figure 1. Is to balance a torque of 500 N.m on a drum shaft at 1000 rpm assuming coefficient of friction between brake shoe and drum to be 0.25 and 2Θ<60°. Determine (i) Tangential force on the shoe (ii) Normal force on shoe (iii) Force F applied to the brake for Clockwise and anti-clockwise rotation. (iv) The dimension 'c' required to make the brake self-locking assuming other dimensions remains the same. (v) Heat generated.
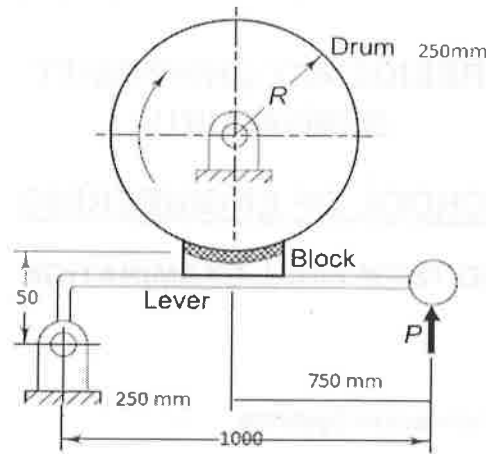
Figure : 1

7. A simple band brake is shown in figure 2. And assume the following b= 250 mm, a= 750 mm θ = 225° , R= 250 mm, the width of the friction lining is 60 mm and coefficient of friction is 0.4, the maximum intensity of pressure is 0.25 N/mm^2 . Calculate (Band tensions on tight and loose ends (ii) Actuating force (iii) Torque capacity of the brake.
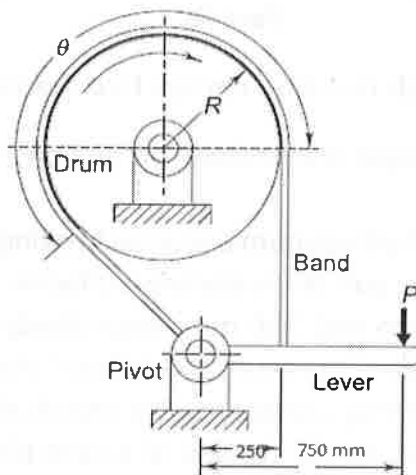

Figure : 2

8. A journal bearing 150 mm in diameter, 300 mm long carried a radial load of 9000 N at 1200 rpm. The radial clearance if 0.0375 mm. If 6 kW is wasted in friction, what is the viscosity of the oil being used at operating temperature and what is Somerfield number.

Part C

Answer **all** the Questions. (2Q=20)

9. Design a worm gear drive to transmit 30 kW, the velocity ratio is 25:1. The speed of worm is 600 rpm. The worm is made of Hardened Steel with static stress 220.6 N/mm^2 and worm gear made of Phosphor Bronze with static stress 82.4 N/mm^2. Assume Cs= 1.25 .Also determine the temperature to which the gears may be heated and the efficiency. (14 M)

10. A pair of 20° full depth involute teeth bevel gears connect two shafts at right angles have Velocity ratio 3:1. The gear and the pinion is made of cast steel 0.20% untreated material with static stress 220.6 N/mm^2. The pinion has 20 number of teeth and transmits 15 kW at 750 rpm. Determine module, face width pitch diameter, and assume width of gear face as 1/3 of the length of pitch of cone. (06 M)