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B.E/B.TECH (Full-time) End Semester Arrear Examinations, April/May 2013

Third Semester

Common to Manufacturing Engg./ Industrial Engg./Printing Technology

ME 9211 – MACHANICS OF MACHINES

(Regulation 2008)

Time: 3 Hours

Answer All Questions

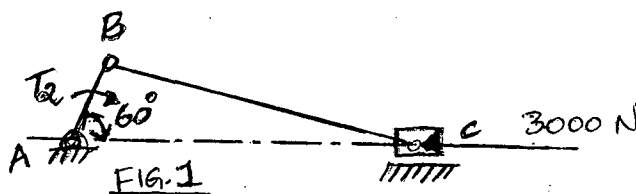
Max. Marks: 100

PART-A (10 x 2 = 20 Marks)

1. List down the differences between a machine and a mechanism.
2. What are the types of motion does a follower execute?
3. What is interference in a gear pair? How to avoid it?
4. Bring out the difference between simple and compound gear train.
5. State the conditions under which maximum power is transmitted by a belt drive.
6. What is self-locking condition in brakes?
7. State D'Alembert's principle.
8. How does dynamic force analysis differ from static force analysis?
9. What is meant by hammer blow?
10. What is critical speed of shafts?

Part-B (5 x 16 = 80 Marks)

11. In a slider crank mechanism shown in Fig. 1, the force applied on the slider is 3000 N. Determine the forces on various links. Also calculate the driving torque.



12(a) What do you understand from the term inversion of a mechanism. State and explain the different inversions of a double slider-crank chain.

[OR]

12 (b) A cam rotating at 150 rpm, operates a reciprocating roller follower of radius 25 mm. The follower axis is offset by 25 mm to the right. The least radius of the cam is 50 mm and the stroke of the follower is

50 mm. Ascent and descent, both take place by uniform acceleration and retardation. Ascent takes place during 75° and descent during 90° of cam rotation. Dwell between ascent and descent is 60° . Draw the cam profile.

13(a) A pair of 20° full depth involute spur gears having 30 and 50 teeth respectively of module 4 mm are in mesh. The smaller gear rotates at 1000 rpm. Find

1. the sliding velocity at engagement and at the disengagement of pair of a teeth (14)
2. contact ratio (2)

[OR]

13(b) An epicyclic gear train is shown in Fig. 3. Find out the rpm of the pinion D if the arm A rotates at 60 rpm in anticlockwise direction. The number of teeth on wheels B, C and D are 120, 60 and 40 respectively.

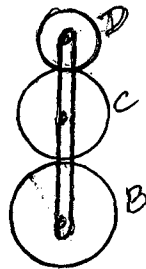


FIG. 3

14(a) The following data relate to a screw jack:

Pitch of the threaded screw = 8 mm

Diameter of the threaded screw = 40 mm

Coefficient of friction between screw and nut = 0.1

Load = 20 kN

Assuming that the load rotates with screw, determine

1. the ratio of torques required to raise and lower the load (14)
2. the efficiency of the machine (2)

[OR]

14(b) A flat belt is required to transmit 35 kW from a pulley of 1.5 m effective diameter running at 300 rpm. The angle of contact is spread over $11/24$ of the circumference and the coefficient of friction between the belt and the pulley surface is 0.3. Determine, taking centrifugal tension into account, width of the belt required. The thickness of the belt is 9.5 mm, the density of the belt material is 1.1 kg/m^3 and the permissible working stress is 2.5 N/mm^2 .

15(a) Four masses m_1 , m_2 , m_3 and m_4 are 200 kg, 300 kg, 240 kg and 260 kg respectively. The corresponding radii of rotation are 0.2 m, 0.15 m, 0.25 m and 0.3 m respectively and the angles between successive masses are 45° , 75° and 135° . Find the position and magnitude of the balance mass required, if its radius of rotation is 0.2 m.

[OR]

15(b) In a vibrating system, a mass of 3 kg vibrates in a viscous medium. A harmonic force of 30 N acts on the system and causes resonant amplitude of 15 mm with a period of 0.25 sec. Find the damping coefficient. If the frequency of the exciting force is changed to 5 Hz, determine the increase in the amplitude of the forced vibration upon the removal of the damper.