Roll No. | | | | | | | | | | |

B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2014

Agriculture & Irrigation Engineering

Third Semester

AI 9202-Theory of Machines

(Regulation 2008)

Time: 3 Hours | Answer ALL Questions | Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. What is the difference between a machine and structure?
2. State the grashof's law.
3. State the laws of dynamic friction.
4. What are the applications of antifriction bearings?
5. What are the various types of the brakes?
6. What are different types of chains?
7. Why a roller follower is preferred to that of a knife-edged follower?
8. What are the types of motion of the follower in a cam mechanism?
9. Define module of gear?
10. What is the difference between governor and flywheel?

Part – B (5 x 16 = 80 marks)

11. In a four bar chain ABCD, link AD is fixed and the crank AB rotates at 10 radians per second clockwise. Lengths of the links are AB=60 mm; BC=CD=70mm; DA= 120mm. When angle DAB=60° and both B and C lie on the same side of AD, find1.angular velocities of BC and CD; and 2. Angular acceleration of BC and CD.

12. a) A conical pivot supports a load of 26 kN, the cone angle is 120° and the intensity of normal pressure is not to exceed 0.3 N/mm^2 . The external diameter is twice the internal diameter. Find the outer and inner radii of the bearing surface. If the shaft rotates at 240 rpm and the coefficient of friction is 0.1. Find the power absorbed in friction. Assume uniform pressure.

(OR)

b) Explain with neat diagram the working and application of antifriction bearing.

13. a) Two pulleys, one 425mm diameter and the other 210mm diameter are one parallel shaft 2m apart and are connected by a crossed flat belt. Find the length of the belt required and the angle of conduct between the belt and each pulley.

What power can be transmitted by the belt when the larger pulley rotates at 200 rev/min, if the maximum permissible tension in the belt is 1 kN, and the coefficient of friction between the belt and pulley is 0.3?

(OR)

b) A car engine has its rated output of 12 kW.The maximum torque developed is 100 N-m. The clutch used is of single plate type having two active surfaces. The axial pressure is not to exceed 85 kN/m^2 .The external diameter of the friction plate is 1.25 times the internal diameter. Determine the dimensions of the friction plate and the axial force exerted by the springs. Coefficient of friction =0.3.

14. a) A cam is to give the following motion to a knife-edged follower:
1. Outstoke during 60° of cam rotation; 2. Dwell for the next 30° of cam rotation; 3.Return stroke during next 60° of cam rotation, and 4. Dwell for the remaining 210° of cam rotation. The stroke of the follower is 40mm and the minimum radius of the cam is 50mm. The follower moves with uniform velocity during both the outstroke and return strokes. Draw the profile of the cam when the axis of the follower is offset by 20mm from the axis of the cam shaft.

(OR)

b) A cam drives a flat reciprocating follower in the following manner:
During first 120° rotation of the cam, follower moves outwards through a distance of 20mm with simple harmonic motion. The follower dwells during nest 30° of cam rotation. During next 120° of cam rotation, the follower moves inwards with simple harmonic motion. The follower dwells for the nest 90° of cam rotation. The minimum radius of the cam is 25mm. Draw the profile of the cam.

15. a) A loaded Porter governor has four links each 250mm long, two revolving masses each of 3 kg and a central dead weight of mass 20 kg. All the links are attached to respective sleeves at radial distances of 40mm from the axis of rotation. The masses revolve at a radius of 150mm at minimum speed and at a radius of 200mm at maximum speed. Determine the range of speed.

(OR)

b) A, B, C and D are four masses carried by a rotating shaft at radii 100mm, 125mm, 200mm and 150mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the mass of B, C and D are 10kg, 5kg, and 4kg respectively. Find the required mass A and the relative angular settings of the masses so that the shaft shall be in complete balance.