

Agriculture and irrigation Engineering Branch

III SEMESTER – (REGULATIONS 2008)

AI -9202 – THEORY OF MACHINES

Time: 3 hours

Maximum marks: 100.

PART – A

(10 x 2 = 20 Marks)

1. What is the difference between radial and offset follower
2. Write the expression for maximum velocity and maximum acceleration , when the follower moves with Simple Harmonic motion
3. Write the expression of equilibrium speed for the porter governor
4. What is meant by power and effort of a governor
5. What is the difference between open and cross belt drive
6. What is meant by fast and loose pulley drive
7. A multi-disc clutch has three disc on the driving shaft and two on the driven shaft. What is the number of pairs of contact surfaces.
8. A 60 mm diameter shaft running in a bearing carries a load of 2000 N. If the coefficient of friction between the shaft and bearing is 0.03. Find the power transmitted when it runs at 1440 rpm.
9. Find the number of instantaneous centre for six bar mechanism.
10. What is the difference between self and forced closed pair

PART – B

(5 x 16 = 80 Marks)

11. What are uniform pressure and uniform wear theories? Deduce the expression for the friction torque considering both theories for a conical pivot bearing
12. (a) Explain different types of kinematic pairs giving example for each one of them
Explain different types of constrained motions with neat sketch

(OR)

- 12 (b) In the mechanism shown in fig1, the slider C is moving to the right with a velocity of 1 m/s and an acceleration of 2.5 m/s^2 . The dimensions of the various links are AB = 3m inclined at 45 deg with the vertical and BC 1.5 m inclined at 45 deg with the horizontal. Determine
 1. the magnitude of acceleration of point B. 2. The angular acceleration of the links AB and BC.

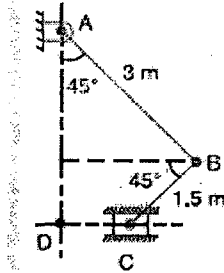


Fig 1.

13. (a) Construct the profile of a cam to the following specifications. Least radius of cam 25mm, diameter of the roller 25 mm, Angle of lift 120° , angle of fall 150° , lift of the follower 40mm, number of pauses are two of equal interval between motions. During the lift, the motion is S.H.M. During the fall the motion is uniform acceleration and deceleration. The line of stroke of the follower passes through the axis of the cam.

(OR)

13. (b) It is required to set out the profile of a cam to give the following motion to the reciprocating follower with a flat faced follower. Follower to have a stroke of 20 mm during 120° of cam rotation. Follower to dwell for 30° of cam rotation. Follower to return for remaining 90° of cam rotation. Follower to dwell for remaining 90° of cam rotation. Minimum radius of the cam is 25mm; the outstroke of the follower is performed with S.H.M. and return stroke with equal acceleration and retardation.
14. (a) A porter governor has all four arms 250 mm long. The upper arms are attached on the axis of the rotation and the lower arms are attached to the sleeve at a distance of 30mm from the axis. The mass of the each ball is 5Kg and the sleeve has a mass of 50Kg. The extreme radii of rotation are 150mm and 200mm. Determine the range of speed of the governor.

(OR)

14. (b) The turning moment for a multi-cylinder engine has been drawn to a scale $1\text{mm} = 700 \text{ Nm}$ vertically and $1\text{mm} = 5^\circ$ horizontally. The intercepted areas between the output torque and the mean resistance line, taken in order from one end, are as follows +52, -124, +92, -140, +85, -72 and +107 mm^2 , when the engine is running at a speed of 600 rpm. If the total fluctuation of speed is not exceed $\pm 2.5 \%$ of the mean, find the necessary mass of the flywheel of radius 0.5m.
15. (a) A flat belt, 8mm thick and 100mm wide transmits power between two pulleys running at 1600 m/min. The mass of the belt is 0.9kg / m length. The angle of lap in the smaller pulley

is 165° and the co-efficient of friction between the belt and the pulley is 0.3. If the maximum permissible stress in the belt is 2MN/m^2 . Find the 1. maximum power transmitted 2. initial tension in the belt

(OR)

15. (b) Derive the expression for total frictional torque on the single plate clutch considering uniform pressure theory and uniform wear theory