

Roll No.

Total No. of Questions : 09]

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B.Tech. (Sem. - 3rd)

THEORY OF MACHINES - I

SUBJECT CODE : ME - 203

Paper ID : [A0802]

[Note : Please fill subject code and paper ID on OMR]

Time : 03 Hours

Maximum Marks : 60

Instruction to Candidates:

- 1) Section - A is **Compulsory**.
- 2) Attempt any **Four** questions from Section - B.
- 3) Attempt any **Two** questions from Section - C.

Section - A

Q1)

(10 x 2 = 20)

- a) Sketch the four-bar mechanism and locate all its instantaneous centers?
- b) Define coefficient of friction?
- c) Define rolling pair with one example?
- d) What is the need of governors?
- e) List four types of followers?
- f) Spur gears have which type of teeth?
- g) Define Effort and power of a governor?
- h) Classify the chains?
- i) Write the functions of a flywheel?
- j) In a ----- cam, the follower moves in direction perpendicular to the cam axis?

Section - B

(4 × 5 = 20)

- Q2) Define link and kinematic pair. Classify kinematic pair on various accounts?
- Q3) A flat belt is required to transmit 35 kW from a pulley of 1.5 m effective diameter running at speed of 300 rpm. The angle of contact is spread over $11/24$ of the circumference. Coefficient of friction for the surface is 0.3. Determine the maximum tension in the belt.
- Q4) Distinguish between flywheel and governor on the basis of
- (a) Load (b) Speed
(c) Turning moment diagram (d) Application
- Q5) A single plate friction clutch with both sides of plate being effective is used to transmit power at an engine speed of 2000 rpm. It has outer and inner radii 10 cm and 8 cm respectively. Find
- (a) Maximum axial thrust
(b) Torque transmitted. Assume $\mu = 0.25$
- Q6) Distinguish between flat belt and V belt on the basis of power transmitted, space, grip and application.

Section - C

(2 × 10 = 20)

- Q7) Cam with 25mm minimum radius has to give the motion to the roller follower 10 cm dia as follows:
- (a) Follower to complete outward stroke of 25 mm during 110° of cam rotation with S.H.M
(b) Follower to return to its initial position during next 90° of cam rotation with uniform acceleration and retardation. Lay out the cam profiles when:
- (i) The follower axis passes thro' centre of cam.
(ii) The follower axis is offset by 20 mm w.r.t. cam centre.
- Q8) Derive an expression for the ratio of driving tensions in the rope drive, assuming that the angle of the groove of the pulley to be 2β .
- Q9) A band brake acts on the $3/4$ th circumference of drum of 450-mm diameter that is keyed to the shaft. The band brake provides a braking torque of 225 N-m. One end of the band is attached to the fulcrum pin of the lever and the other end to a pin 100 mm from the fulcrum. If the operating force is applied at 500 mm from the fulcrum and $\mu = 0.25$, find the operating force when the drum rotates in:- (a) Anticlockwise direction (b) Clockwise Direction.

