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[Total No. of Pages : 03

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

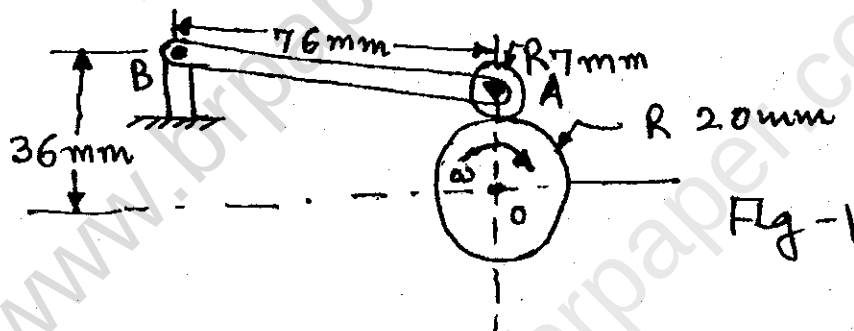
(10 × 2 = 20)

- a)** Explain elliptical trammel.
- b)** What are the conditions for Coriolis acceleration?
- c)** Explain Ackermann steering mechanism.
- d)** What is idle pulley?
- e)** What is pressure angle of cam?
- f)** What is the difference between brake and dynamometer?
- g)** What is the difference between flywheel and governor?
- h)** What is the difference between Watt and Porter governor?
- i)** Prove that a Porter governor can not be isochronous.
- j)** Explain power of governor.

Section - B

(4 × 5 = 20)

- Q2)** Name various inversions of single slider crank chain. Explain any one.
- Q3)** Design a pantograph for an indicator to be used to obtain the indicator diagram of an engine. The distance between the fixed point and the tracing point is 160 mm. The indicator diagram should be four times the gas pressure inside the cylinder of the engine.
- Q4)** An open belt drive running at 2.5 m/sec transmits 2.5 kW. The angle of lap on the smaller pulley is 165° and coefficient of friction between belt and pulley being 0.30. Determine the effect on power transmission if initial tension is increased by 10%.
- Q5)** For a cam follower system shown in Fig - 1, draw the displacement diagram for the follower and cam profile.
Motion of the follower is as follows: Rise through 20° in 90° cam rotation in S. H. M, dwell in 90° cam rotation, S.H.M fall in 90° cam rotation, dwell during 90° cam rotation. If $N = 2500$ rpm, find the maximum angular velocity and angular acceleration of the pivoted follower.

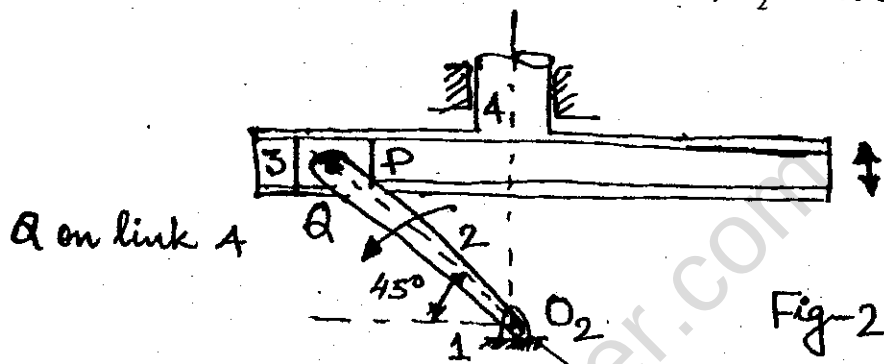


- Q6)** In a laboratory experiment, the following were recorded with rope brake: Diameter of flywheel 1.25 m, diameter of rope 12 mm, dead load on the brake 800 N, spring load 200 N and the engine speed 240 r.p.m. Determine the brake power of the engine.

Section - C

(2 × 10 = 20)

- 27) In a spring controlled governor mass of each governor ball is 6.8 kg and moves radially under the action of a controlling force $F = a + br$ where 'r' is the ball path radius. If the speed range is 42.5 to 44 rad/sec, and corresponding values of r are 12.38 cm and 13.1 cm. Obtain the values of 'a' and 'b'. Find the equilibrium speed in rad/sec for $r = 12.7$ cm.
- 28) Find the velocity of link 4 of the scotch yoke mechanism in Fig - 2. Angular speed of link 2 is 200 rad/sec counter clockwise, $O_2P = 40$ mm.



- 29) Two stroke engine with a mean speed of 400 rpm. Coupled to a machine produces a torque of $(1800 + 180 \sin 3\theta)$ N - m, θ being the crank angle. The flywheel attached to the engine has a mass of 350 kg at a radius of 220 mm. Calculate
- Engine power.
 - Total fluctuation of flywheel speed when resisting torque is $(1800 + 80 \sin \theta)$ N - m.

