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Total No. of Questions : 09] [Total No. of Pages : 02

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 × 2 = 20)*

a) Define a mechanism.

b) Write four inversions of single slider crank chain.

c) Explain engine indicator.

d) Explain quarter turn drive.

e) Name various types of cams and followers.

f) What is the difference between absorption and transmission dynamometers?

g) Define coefficient of fluctuation of speed in flywheel.

h) What is stability in case of governors?

i) What is the difference between watt and porter governor?

j) Explain the condition when coriolis acceleration exists.

Section - B

(4 × 5 = 20)

Q2) For the mechanism shown in Fig.1, locate all instantaneous centres and find V_B if N_2 = 160 r.p.m.

Q3) In a davis steering gear, the distance between the pivots of the front axle is 1.2 m and the wheel base is 2.7 m. Find the inclination of the track arm to the longitudinal axis of the car, when it is moving along a straight path.

Q4) Determine the number of turns a hauling rope must be wound round a rotating capstan in order to haul 10 trucks, each having a mass of 30,000kg up a gradient of 1 in 30. Rolling resistance is 45N/1000kg and pull on the free end of the rope, is 180N. Take $\mu = 0.40$.

Q5) Explain graphical design of cam with cycloidal motion of follower.

Q6) Derive suitable mathematical expression for retardation of the vehicle when brakes are applied on front wheels only.

Section - C

(2 × 10 = 20)

Q7) A constant torque 4 kW motor drives a riveting machine. A flywheel of mass 130kg and radius of gyration 0.5 m is fitted to the riveting machine. Each riveting operation takes 1 second and requires 9000 Nm of energy. If the speed of the flywheel is 420 r.p.m, before riveting, find :

(a) The fall in the speed of flywheel after riveting.
(b) Number of rivets fitted per hour.

Q8) The upper arms of a porter governor are pivoted on the axis of rotation, their lengths being 30cm. The lower arms are pivoted on the sleeve at a distance of 3cm from the axis, their lengths being 27cm. Mass of each ball is 6kg and the sleeve mass is 50kg. Determine the equilibrium speed for a radius of rotation of 17cm and also the effort and power for 1% change of speed.

Q9) (a) Explain various inversions of double slider crank chain.
(b) Explain why cycloidal profile is preferred over SHM profile for cams used in high speed applications

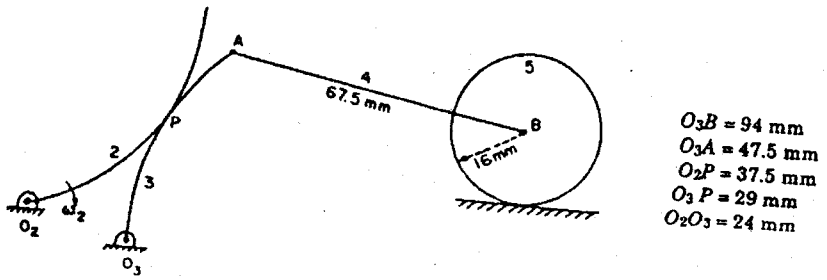

Fig - 1