Total No. of Questions—**8**] [Total No. of Printed Pages—**4**

Seat No.	

[5057]-219

S.E. (Mech./Mech. Sand/Automobile) (Second Semester)
EXAMINATION, 2016
THEORY OF MACHINES—I
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. **:—** (*i*) Answer Q. No. **1** *or* Q. No. **2,** Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6,** Q. No. **7** *or* Q. No. **8**.
(*ii*) Neat diagrams must be drawn wherever necessary.
(*iii*) Figures to the right indicate full marks.
(*iv*) Use of calculator is allowed.
(*v*) Assume suitable data, if necessary.

1. (*a*) Write a short note on elliptical trammel. State and explain the condition for which it will trace circle. [6]

(*b*) Write a short note on pantograph, with its application. [4]

Or

2. (*a*) Draw and explain in brief Turning moment diagram of a 4-stroke single cylinder engine. State the utility of this diagram. [4]

(*b*) A small connecting rod 250 mm long between the centres, mass 3 kg and has mass moment of intertia of 2.5×10^4 kg-mm^2 about its C.G. C.G. of connecting rod is located at a distance of 175 mm from the small end centre. Determine dynamically equivalent two masses, when any *one* mass is located at small end. Also find location of the second mass. [6]

P.T.O.

3. (*a*) What do you mean by brakes and dynamometers ? State the types of brakes and dynamometers. [6]

(*b*) What is clutch ? State the functions of clutch and give classification of clutchs. [4]

Or

4. (*a*) What is loop closure equation ? Derive the same for offset slider crank mechanism. [6]

(*b*) Write a short note on Double Hooke's Joint. [4]

5. (*a*) In a slider crank mechanism, the stroke of the slider is 200 mm and obliquity ratio is 4.5. The crank rotates uniformly at 400 rpm clockwise, while the crank is approaching the inner dead centre and away at 30° from it (IDC). Find velocity and acceleration of piston and the angular velocity and angular acceleration of the connecting rod. [12]

(*b*) Explain the method of calculating rubbing velocity at a pin joint when two links move in the same and opposite direction. [3]

Or

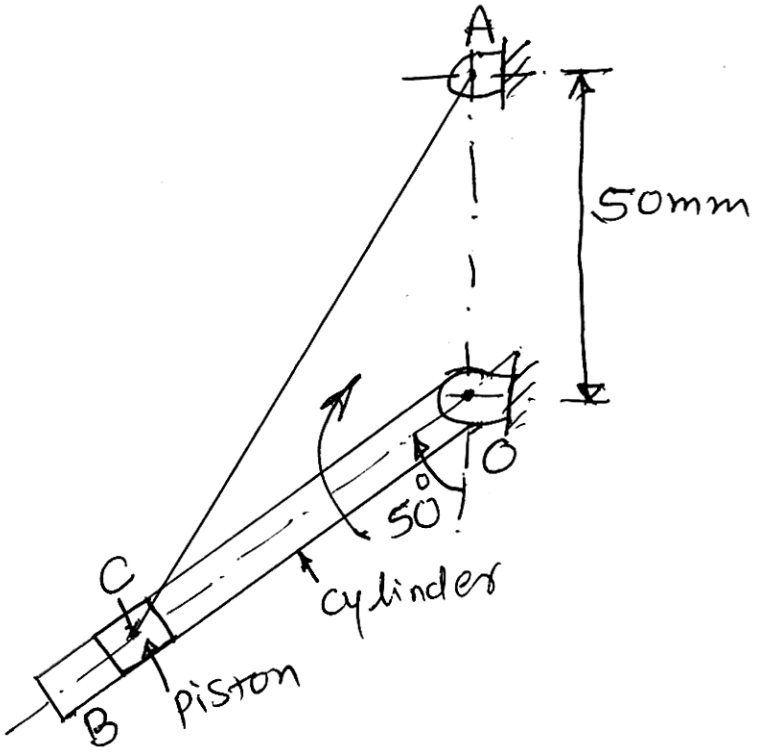
6. (*a*) In a four bar mechanism, AB = 20 cm, BC = 30 cm, CD = 32 cm and AD = 60 cm. Crank AB rotates at a uniform speed of 300 rpm in anticlockwise direction. When the crank AB has turned 60°, locate all the instantaneous centres (ICRS) and find the angular velocity of the link B.C. [12]

(*b*) State and explain angular velocity ratio theorem. [3]

7. (*a*) The kinematic diagram of one of the cylinders of a rotary engine is shown in Fig. 1. The crank OA which is vertical and fixed, is 50 mm long. The length of the connecting rod is 125 mm. The line of the stroke OB is inclined at 50° to the vertical. The cylinders are rotating at a uniform speed of 300 rpm in a clockwise direction, about the fixed centre O. Determine :

(*i*) Acceleration of the piston inside the cylinder

(*ii*) Angular acceleration of the connecting rod. [12]



(*b*) State whether the following statements are true or false, and justify your answer : [3]

(*i*) We will have to consider 'Coriolis component of Acceleration' while analyzing a normal Scotch yoke mechanism.

(*ii*) Shape of acceleration polygon remians unchanged if we reverse the direction of rotation of input link.

(*iii*) In all mechanism involving Trunnion, Coriolis component must be considered in the acceleration analysis.

Or

8. (*a*) The crank of reciprocating engine is 250 mm long and connecting rod is 950 mm long. The crank rotates at 200 rpm in clockwise direction. Find velocity and acceleration of piston. Also find angular acceleration and angular velocity of the connecting rod when the crank makes :

(*i*) 30°

(*ii*) 120°

with IDC using Klein's construction method. [12]

(*b*) Derive the equation for magnitude of Coriolis component of acceleration. [3]