3. (a) With the help of neat sketches explain major differences between Davis steering gear and Ackerman steering gear. **8**

(b) The kinematic diagram of one of the cylinders of rotary engine is shown in the below figure. The crank OA which is vertical and fixed, is 50 mm long. The length of the connecting rod AB is 125 mm. The line of the stroke OB is inclined at 50° to the vertical. **12**

The cylinders are rotating at a uniform speed of 300 rpm in a clokwise direction, about the fixed centre O.
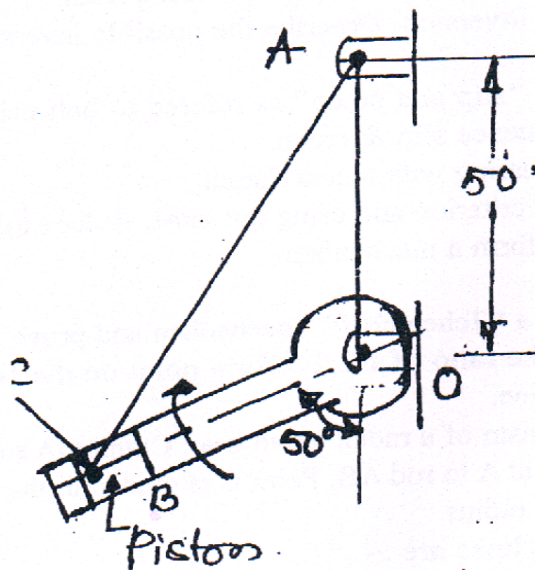
Determine :—
(1) Acceleration of the piston inside the cylinder.
(2) Angular acceleration of the connecting rod.

4. (a) The following data relates to a connecting rod of a reciprocating engine. Mass = 55 kg, distance between centres = 850 mm, diameter of small end bearing = 75 mm, Diameter of big end bearing = 100 mm. Time of oscillation when the connecting rod is suspended from small end = 1.83s. Time of oscillation when the connecting rod is suspended from big end = 1.68s. **14**

Determine :—
(1) The radius of gyration of the rod about an axis passing through the centre of gravity and perpendicular to the plane of osciallation.
(2) The moment of Inertia of the rod about the same axis.
(3) The dynamically equivalent system for the connecting rod, constituted of two masses, one of which is situated at the small end centre.

(b) Two shafts are connected by hook joint. The driving shaft rotates at a uniform speed of 1200 rpm. Determine the greatest permissible angle between the shaft axes so that the total fluctuation of speed does not exceed 100 rpm. Also calculate the maximum and minimum speed of the driven shaft. **6**

[TURN OVER