

B.Tech. Degree IV Semester Supplementary Examination in Marine Engineering May 2016

MRE 401 MECHANICS OF MACHINERY

Time : 3 Hours

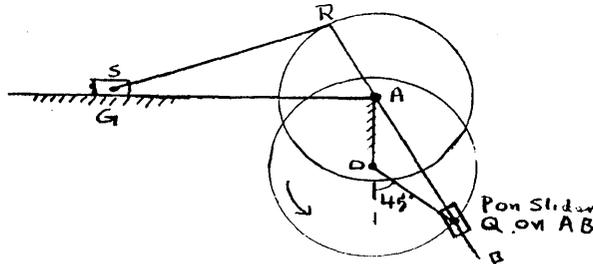
Maximum Marks : 100

(5 × 20 = 100)

- I. (a) Explain different types of Kinematic pairs. How are they classified? (10)
 (b) Derive the expression for the Coriolis acceleration when a slider is moving in a rotating link. (10)

OR

- II. A Whitworth quick return mechanism has been shown in figure. The dimensions of the link are: (20)
 OP (Crank) = 240 mm, OA = 150 mm, AR = 165 mm and RS = 430 mm. The Crank rotates at an angular velocity of 2.5 rad/s. At the moment when the crank makes an angle of 45° with the vertical, calculate (i) Velocity of the ram 'S' (ii) Velocity of the slider 'P' on the slotted lever (iii) The angular velocity of the link RS.



- III. Explain: (20)
 (i) Pantograph.
 (ii) Paucellier Mechanism.
 (iii) Thompson indicator mechanism.

OR

- IV. Draw the profile of a cam operating a roller reciprocating follower and with the following data. (20)
 Minimum radius of the cam = 27 mm
 Lift = 34 mm
 Roller dia = 14 mm.
 The cam lifts the follower for 120° with SHM followed by a dwell period of 30°. Then the follower lowers down during 150° of cam rotation with uniform acceleration and deceleration followed by a dwell period. If the cam rotates at a uniform speed of 180 rpm, calculate the maximum velocity and acceleration of the follower during the descent period.

- V. Describe any two types of governor in detail. (20)

OR

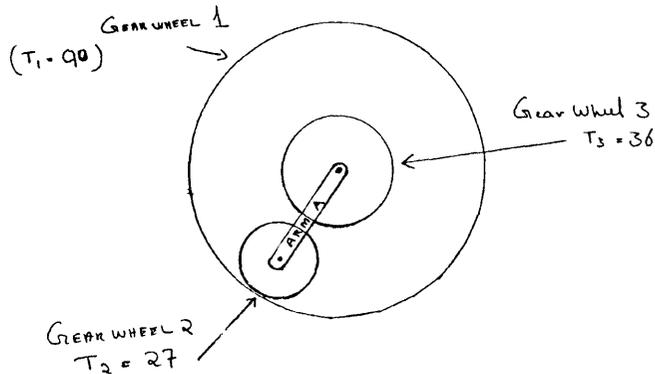
(P.T.O.)

VI. Each arm of a porter governor is 250 mm long. The upper and lower arms are pivoted to links of 40 mm and 50 mm respectively from the axis of rotation. Each ball has a mass of 5 kg and the sleeve mass is 50 kg. The force of friction on the sleeve of the mechanism is 40 N. Determine the range of speed of the governor for extreme radii of rotation of 125 mm and 150 mm. (20)

VII. Describe the generation of gear teeth profile. Also compare involute profile and cycloidal profile. (20)

OR

VIII. An epicyclic gear train shown in fig. Wheel '1' has 90 internal teeth and wheel '3' has 36 external teeth. The wheel '2' is carried on an arm which rotates about the centre of wheel 1 at 20 rpm and it also gears with both the wheels 1 and 3. Determine at what r.p.m. the wheels 2 and 3 rotate if the wheel 1 is fixed. (20)



IX. (a) Describe with a sample sketch, the constructional details, working and advantages of a cone clutch. (10)

(b) A single-plate clutch transmits 25 kW at 900 rpm. The maximum pressure intensity between the plates is 85 kN/m². The outer diameter of the plate is 360 mm. Both the sides of the plate are effective and the coefficient of friction is 0.25. Determine (i) Inner diameter of the plate (ii) The axial force to engage the clutch. (10)

OR

X. Write notes on: (20)

- Dynamometers.
- Different types of brakes.
- V-belts and flat belts.