

Code: 9A21506

B.Tech III Year I Semester (R09) Supplementary Examinations June 2017

MECHANISMS & MECHANICAL DESIGN

(Aeronautical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) What are the different types of links? Explain.
(b) Sketch and explain any two inversions of a single slider crank chain. Give their applications.
- 2 (a) Derive an expression for the magnitude and direction of coriolis component of acceleration.
(b) Explain the procedure to construct Klein's construction to determine the velocity and acceleration of a slider-crank mechanism.
- 3 Explain in detail, the procedure to determine instantaneous centres of mechanisms with the help of examples.
- 4 The turbine motor of a ship has a mass of 2.2 tonnes and rotates at 1800 rpm clockwise when viewed from the aft. The radius of gyration of the rotor is 320 mm. Determine the gyroscopic couple and its effect when the:
(i) Ship turns right at a radius of 250 m with a speed of 25 km/h.
(ii) Ship pitches with the bow rising at an angular velocity of 0.8 rad/s.
(iii) Ship rolls at an angular velocity of 0.1 rad/s.
- 5 Describe how to draw displacement diagram for cycloidal motion of follower. Also deduce expressions for velocity and acceleration of the follower and find their maximum values.
- 6 A tangent cam with straight working faces is tangential to a base circle of 80 mm diameter. It operates a roller follower of 32 mm diameter. The line of stroke of the follower passes through the axis of the cam. The nose circle radius of the cam is 10 mm and the angle between the tangential faces of the cam is 90° . If the speed of the cam is 315 rpm, determine the acceleration of the follower when: (i) During the lift, the roller just leaves the straight flank.
(ii) The roller is at the outer end of its lift, i.e. at the top of the nose.
- 7 Determine the commercial size for a stationary shaft made of C40 steel supported by two bearings 0.9 m apart when a load of 3.6 kN is applied 60° to the horizontal and normal to the shaft axis and is half way between the bearings. What is the deflection of the shaft? Determine the diameter, if the deflection should not exceed 0.25 mm.
- 8 (a) State and derive the law of gearing.
(b) An epicyclic gear train consists of an arm and two gears A and B 30 and 40 teeth respectively. The arm rotates about the centre of the gear A at a speed of 80 rpm counterclockwise. Determine the speed of the gear B if: (i) The gear A is fixed. (ii) The gear A revolves at 240 rpm clockwise instead of being fixed.
