

CBCS Scheme

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15MA42

Fourth Semester B.E. Degree Examination, June/July 2018 Theory of Machines

Time: 3 hrs.

Max. Marks: 80

Note: Answer FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Explain types of links. (06 Marks)
b. Explain the following mechanism with neat sketches : (i) Watt's indicator mechanism (10 Marks)
(ii) Oscillating cylinder engine

OR

- 2 a. Explain Crank and slotted lever motion mechanism, with a neat sketch. (10 Marks)
b. Explain Geneva wheel mechanism with a neat sketch. (06 Marks)

Module-2

- 3 In a four-link mechanism, the dimensions of the links are as under, $AB = 50$ mm, $BC = 66$ mm, $CD = 56$ mm and $AD = 100$ mm. At the instant when $\hat{DAB} = 60^\circ$, the link AB has an angular velocity of 10.5 rad/sec in counter clockwise direction. Determine the
(i) Velocity of the point C.
(ii) Velocity of the point E on the link BC when $BE = 40$ mm
(iii) Angular velocities of the links BC and CD.
(iv) Velocity of an offset point F on the link BC if $BF = 45$ mm, $CF = 30$ mm and BCF is read clockwise.
(v) Velocity of an offset point G on the link CD if $CG = 24$ mm, $DG = 44$ mm and DCG is read clockwise.
(vi) Velocity of rubbing at pins A, B, C and D when the radii of the pins are 30, 40, 25 and 35 mm respectively. (16 Marks)

OR

- 4 a. Explain the mechanism illustrating Coriolis component of acceleration. (10 Marks)
b. Explain velocity of rubbing. (06 Marks)

Module-3

- 5 a. Calculate (i) Length of path of contact (ii) Arc of contact (iii) Contact ratio when a pinion having 17 teeth drives a gear having 49 teeth. The profile of the gear is involute with pressure angle 20° , module 6 mm and addendum on pinion and gear wheel equal to 1 module. (10 Marks)
b. Explain the following:
(i) Pressure angle.
(ii) Circular pitch.
(iii) Contact ratio. (06 Marks)

OR

- 6 a. An epicyclic gear train is composed of fixed annular wheel A having 150 teeth. Meshing with A is wheel B which drives wheel D through an Idler wheel C, D being concentric with A wheels B and C are carried on an arm which rotates clockwise at 100 rpm about the axis of A and D. If the wheels B and D have 25 and 40 teeth respectively find the number of teeth on C and speed and sense of rotation of C. (10 Marks)
- b. Explain the followings:
- Reverted gear train.
 - Epicyclic gear train.

Module-4

- 7 a. Derive the equation for coefficient of friction. (06 Marks)
- b. The force required just to move a body on a rough horizontal surface by pulling is 320 N inclined at 30° and by pushing 380 N at the same angle. Find the weight of the body and the coefficient of friction. (10 Marks)

OR

- 8 a. A shaft runs at 80 rpm and drives another shaft at 150 rpm through belt drive. The diameter of the driving pulley is 600 mm. Determine the diameter of the driven pulley in the following cases:
- Neglecting belt thickness.
 - Taking belt thickness as 5 mm.
 - Assuming for cases (ii) a total slip of 4%
 - Assuming for cases (ii) a slip of 2% on each pulley.
- b. In a belt drive, the mass of the belt is 1 kg/m length and its speed is 6 m/s. The drive transmits 9.6 kW of power. Determine the initial tension in the belt and the strength of the belt. The coefficient of friction is 0.25 and the angle of lap is 220° . (06 Marks)

Module-5

- 9 Draw the profile of a cam operating a roller reciprocating follower and with the following data:
- Minimum radius of cam = 25 mm
Lift = 30 mm
Roller diameter = 15 mm
- The cam lifts the follower for 120° SHM followed by a dwell period of 30° . Then the follower lowers down during 150° of the cam rotation with uniform acceleration and deceleration followed by a dwell period. If the cam rotates at a uniform speed of 150 rpm. Calculate the maximum velocity and acceleration of the follower during the descent period. (16 Marks)

OR

- 10 What is tangent cam? Find the expression for the velocity and acceleration of a roller follower for such a cam. (16 Marks)
