

CBCS Scheme

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15MR42

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

Time: 3 hrs.

Max. Marks: 80

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

Module-1

1 a. Define :

- Link
- Kinematic pair
- Degrees of freedom
- Kinematic chain.

b. What is inversion? Explain elliptical Trammel with neat sketch.

(08 Marks)

(08 Marks)

OR

2 a. What is principle of virtual work? Explain with necessary sketch.

(08 Marks)

b. In a four bar mechanism shown in Fig Q2(b) Torque T_3 and T_4 have magnitudes of 3000 Nm and 2000 Nm respectively. Take $AD = 800$ mm, $AB = 300$ mm, $BC = 700$ mm and $CD = 400$ mm. For static equilibrium of mechanism, find the required input torque on the crank.

(08 Marks)

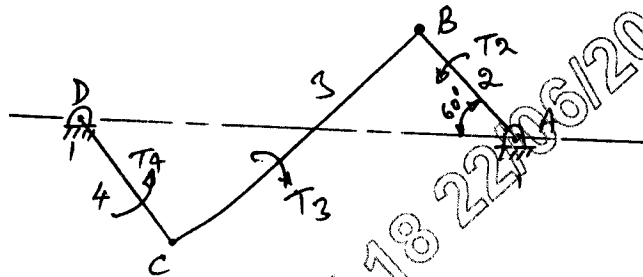


Fig Q2(b)

Module-2

3 a. When the crank is 45° from the inner dead centre on the down stroke, the effective steam pressure on the Piston of a vertical steam engine is 2.5 bar. The diameter of the cylinder = 0.75m, stroke of the piston = 0.50m and length of connecting rod = 1m. Determine the torque on the crank shaft, if the engine runs at 350 rpm and the mass of reciprocating parts is 200kg.

(08 Marks)

(08 Marks)

b. Explain D'Alembert's principle with suitable example.

OR

4 a. Derive the expression for friction in flat pivot bearing considering uniform wear. (08 Marks)

b. Derive the expression for length of open belt drive. (08 Marks)

(08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification marks on the remaining pages, if any, will be treated as malpractice.

Module-3

- 5 A rotating shaft carries four masses 1, 2, 3 and 4 which are radially attached to it. The mass centers are 30mm, 38mm, 40mm and 35mm respectively from the axis of rotation. The masses 1, 3 and 4 are 7.5, 5 and 4 kg respectively. The axial distance between the planes 1 and 2 is 400mm and 2 and 3 is 500mm. The masses 1 and 3 are at right angles to each other. Find the complete balance.
- Angle between 1, 2 and 1, 4
 - Axial distance between 3 and 4
 - Magnitude of mass 2

(16 Marks)

OR

- 6 a. Define static and dynamic balancing. (06 Marks)
 b. Explain partial primary balancing with neat sketch and expression. (10 Marks)

Module-4

- 7 a. Derive the expression for height of porter governor. (10 Marks)
 b. Explain briefly:
 i) Hunting
 ii) Stability
 iii) Governor effort.

(06 Marks)

OR

- 8 a. What is Gyroscopic couple? Briefly explain. (06 Marks)
 b. Derive the relation between overturning couple and balancing couple in two wheeler. (10 Marks)

Module-5

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

OR

- 10 Derive the expression for displacement, velocity and acceleration of follower when the roller is in contact with straight flank. (16 Marks)

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