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Fourth Semester B.E. Degree Examination, June/July 2024

Theory of Machines

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. What is kinematic pair? How do you classify kinematic pairs? Explain. (10 Marks)
 b. What is inversion? Explain Whitworth Quick return mechanism with sketch. (10 Marks)

OR

- 2 a. Explain Geneva wheel with sketch. (10 Marks)
 b. Explain Ackerman steering gear mechanism with sketch. (10 Marks)

Module-2

- 3 a. State and explain D'Alembert's principle. (10 Marks)
 b. What is friction? Discuss various types of friction. (10 Marks)

OR

- 4 a. Derive the relation for ratio of belt tensions in a flat belt drive. (10 Marks)
 b. Derive the relation for centrifugal tension in flat belt drive. (10 Marks)

Module-3

- 5 Four masses A, B, C and D carried by a rotating shaft at radii 80mm, 100mm 160mm and 120mm respectively are completely balanced. Masses B, C and D are 8 Kg, 4 Kg and 3Kg respectively. Determine the mass A and the relative angular positions of the 4 masses if the Planes are spaced 500mm apart. (20 Marks)

OR

- 6 Determine the unbalanced forces and couples in case of four cylinder – four – stroke engine. (20 Marks)

Module-4

- 7 a. Derive a relation to find the stiffness of the spring in hartnells governor.. (10 Marks)
 b. What is centrifugal governor? Explain the working of porter governor with sketch. (10 Marks)

OR

- 8 a. What do you mean by gyroscopic couple? Derive a relation for its magnitude. (10 Marks)
 b. Derive the gyroscopic couple for stability of a two wheel vehicle. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-5

- 9 Draw the profile of a cam operating a knife edge follower having a lift of 30mm. The cam raises the follower with SHM for 150° of the rotation followed by a period of dwell for 60° . The follower descends for the next 100° rotation of the cam with uniform velocity again followed by dwell period. The cam rotates at a uniform velocity of 120rpm and has a least radius of 20mm. (20 Marks)

OR

- 10 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 uniform acceleration and deceleration followed by a dwell period. If the cam rotates at a uniform speed of 150rpm. (20 Marks)

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