CBCS SCHEME

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15AU43

Fourth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Kinematics of Machines

Time: 3 hrs. Max. Marks: 80

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

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-1

1 a. Difference between :
i) Machine and mechanism
ii) Machine and structure. **(04 Marks)**

b. Explain with neat sketch of Peaucellier mechanism and Geneva mechanism. **(12 Marks)**

OR

2 a. Sketch Ackerman steering mechanism and obtain condition for correct steering. **(08 Marks)**

b. Explain with neat sketch of crank and sloted lever mechanism. **(08 Marks)**

Module-2

3 In a slider crank mechanism, the crank OB = 30 mm and the connecting rod BC = 120 mm the crank rotates at a uniform speed of 300 rpm clock wise. The crank angle is 60°.
Find :

a. Velocity of piston C and angular velocity of connecting rod B

b. Acceleration of piston C and angular acceleration of connecting rod BC. **(16 Marks)**

OR

4 a. State and prove Arnold – Kennedy's theorem. **(06 Marks)**

b. For the 4-bar mechanism shown in Fig.Q4(b). Determine the angular velocity of link AB and the absolute velocity of point B by instantaneous centre method. Also locate all the centers. **(10 Marks)**

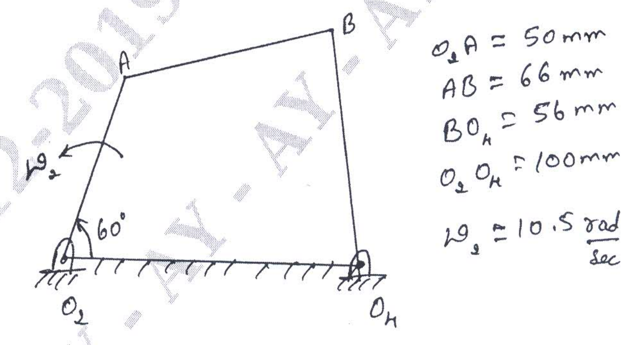

Fig.Q4(b)

Module-3

5 In a reciprocating engine length of crank is 250mm and length of connecting rod is 1000mm. The crank rotates at a uniform speed of 300rpm [CW]. Crank is at 30°from IDC. Determine

a. Velocity of piston and angular velocity of connecting rod

b. Acceleration of piston and angular acceleration of connecting rod by complex algebra method from first principal. **(16 Marks)**

OR

6 Determine the velocity and acceleration of the piston by Klein's construction to the following specifications. Stroke = 300mm, ratio of length of connecting rod to crank length = 4. Speed of the engine = 300rpm, position of crank = 45° with IDC. **(16 Marks)**

Module-4

7 a. State and prove law of gearing. **(08 Marks)**

b. Two gear wheels of module pitch 4.5mm have 24 and 33 teeth respectively. Pressure angle = 20° each wheel has a standard addendum of one module. Find :
Length of arc of contact ii) maximum velocity of sliding if the speed of smaller wheel is 120rpm. **(08 Marks)**

OR

8 a. Sketch and explain an automobile differential. **(08 Marks)**

b. In an Epicyclic gear train of sun and planet type, the pitch circle diameter of the annular wheel A is 425mm and module is 5mm. When the annular wheel is stationary, the spider which carries 3 planet gears P of equal size has to make one revolution for every 6 revolutions of the driving spindle carrying sun wheel 'S'. Determine the number of teeth on all the wheels. **(08 Marks)**

Module-5

9 a. Sketch and explain the following :
i) Disc cam with translating follower
ii) Wedge cam with translating follower. **(04 Marks)**

b. A cam with 3cm as minimum radius is rotating clockwise at a uniform speed of 1200rpm and has to give the motion to the knief Edge follower :
i) Follower to move outward through 3cm during 120° of cam rotation with SHM
ii) Dwell for the next 60°
iii) Follower to return to its starting position during the next 90° with UARM, Dwell for remaining period. Draw the cam profile, follower axis is offset to the right by 1cm. Also find the maximum velocity and acceleration during outward and inward or return stroke. **(12 Marks)**

OR

10 Draw the profile of a cam operating a roller reciprocating follower 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 declaration 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 descent period. **(16 Marks)**

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