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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: ME301

Course Name: MECHANICS OF MACHINERY (ME, MP, PE)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any three full questions, each carries 10marks. Marks

1 a) Distinguish between lower and higher kinematic pairs with ONE example each. (2)

b) Sketch and explain slider-crank chain; Show with sketch any two inversion mechanisms obtained from it. (8)

2 a) Explain any ONE exact straight line mechanism with suitable diagram. (5)

b) Sketch and explain Geneva mechanism; List any ONE use of this mechanism. (5)

3 A slider crank mechanism is having following dimensions crank 480mm, connecting rod 1600mm. If crank is rotating at 20rad/s counter clockwise (CCW) and is at 60 from the IDC measured counter clock wise, calculate following (10)

i) Velocity of slider ii) Acceleration of slider

iii) Angular acceleration of connecting rod

4 a) What is coriolis component of acceleration; How its magnitude and directions are calculated? (4)

b) Perform displacement, velocity and acceleration analysis of cam-follower subjected to uniform acceleration/deceleration motion (6)

PART B

Answer any three full questions, each carries 10marks.

5 a) Obtain the profile of a disc cam operating roller follower having the following motions; Cam lifts the follower for 120° with SHM followed by 30° dwell. During next 150° follower is lowered with uniform acceleration and deceleration and then dwell. Assume minimum radius of cam as 25mm, lift as 30mm and roller diameter 15mm (8)

b) Draw the profile of tangent cam with roller follower; why such cams are preferred? (2)

6 a) For the case of gears, What is meant by i) Pressure angle, ii) Circular pitch, iii) Module. (3)

b) A pinion having 30 teeth drives a gear having 80 teeth. The profile of gears is involute with 20° pressure angle, 12 module and 10mm addendum. Find the length of the path of contact, arc of contact and the contact ratio. (7)

7 a) What is meant by backlash in gears; How it can be reduced? (3)

b) With reference to helical gears with the help of a sketch; define (7)

i) Helix angle ii) Circular pitch iii) Normal circular pitch.

8 a) Distinguish between internal and external gears, rack and pinion with sketch. (4)

b) Describe with diagram: (6)
i) Axial pitch ii) Lead iii) Lead angle for a worm gear

PART C

Answer any four full questions, each carries 10marks.

9 a) What is the difference between simple and compound gear trains? (2)

b) In an epicyclic gear train, an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 rpm in the counter clockwise direction about the centre of the gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed makes 300rpm in the clockwise direction, what will be the speed of gear B. (8)

10 a) Explain with neat sketch working of differential gears. (7)

b) How precision points are obtained using Chebychev spacing? (3)

11 a) List the differences between type, number and dimensional synthesis. (2)

b) Perform 2 position graphic synthesis of slider crank mechanism for any convenient dimensions of crank and coupler. (8)

12 a) Discuss overlay method. (4)

b) Explain 3 position synthesis of four-link mechanism. (6)

13 a) Design a four bar mechanism with the help of Frudenstein's equation to coordinate the input and output angles as follows input angle =20^o, 30^o, and 45^o output angles = 30^o, 45^o and 60^o. Assume input link length = 1m (8)

b) What is meant by function generator? (2)

14 Explain the procedure of analytical synthesis of mechanism of your choice with sketch. (10)

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