

Reg No.: _____

Name: _____

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

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|---|------|---|------|
| 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.

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|---|----|---|-----|
| 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 i) Helix angle ii) Circular pitch iii) Normal circular pitch. | (7) |
| 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° , 30° , and 45° output angles = 30° , 45° and 60° . 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)
