Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIFTH SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019

Course Code: ME307

Course Name: MACHINE DESIGN - I

Max. Marks: 100 Duration: 3 Hours

PART A

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

1 Explain with neat figures the different inversions of four bar chain with examples substantiated with neat figures (10)

2 You are being asked to generate exact straight line for a research purpose. Explain any four mechanisms which will help you for the same (10)

3 In a slider crank mechanism, the crank is 480 mm long and rotates at 20 rad/s in the counter clockwise direction. The length of the connecting rod is 1.6 m. When the crank turns 60° from the inner dead centre, determine the (10)

i. Velocity of the slider
ii. Velocity of a point E located at a distance 450 mm extended from the connecting rod
iii. Position and velocity of a point F on the connecting rod having the least absolute velocity

4 Explain the different static equilibrium conditions used for static force analysis (10)

PART B

Answer any three full questions, each carries 10marks.

5 Explain any four types of centrifugal governors with neat figures (10)

6 Derive an expression to find out the gyroscopic couple from the concept of angular velocity and angular acceleration (10)

7 a) Define the terms for a flywheel- (4)

i. Fluctuation of speed
ii. Fluctuation of energy
iii. Coefficient of fluctuation of speed
iv. Coefficient of fluctuation of energy

b) A flywheel with a mass of 3kN has a radius of gyration of 1.6 m. Find the energy stored in the flywheel when its speed increases from 315 rpm to 340 rpm (6)

8 Explain the different parameters considered for engine force analysis (10)

PART C

Answer any four full questions, each carries 10marks.

9	Define the basic terms for a cam with the help of neat figure	(10)
10	Find the expression for maximum velocity and maximum acceleration for cams under simple harmonic motion along with plotting displacement, velocity and acceleration diagrams for the same	(10)
11	Draw the profile of a cam operating a knife- edge follower having a lift of 30 mm. The cam raises the follower with SHM for 150° of the rotation followed by a period of dwell for 60°. The follower descents for the next 100° rotation of the cam with uniform velocity again followed by a dwell period. The cam rotates at a uniform velocity of 120 rpm and has a least radius of 20 mm. What will be the maximum velocity and acceleration of the follower during the lift and the return?	(10)
12	Explain law of gearing and satisfy the condition of constant angular velocity ratio between the gears. Also derive the expression for velocity of sliding	(10)
13	Two involute gears in mesh have a module of 8 mm and a pressure angle of 20°. The larger gear has 57 teeth while the pinion has 23 teeth. If the addenda on pinion and gear wheels are equal to one module, find the (i) Contact ratio (ii) Angle of action of the pinion and gear wheel (iii) Ratio of sliding to rolling velocity at the beginning of contact	(10)
14	Explain the different classification of gear trains with neat figures. Also find the expression for speed ration in each case	(10)

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