Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **B.Tech**

PME3I104

3rd Semester Regular / Back Examination 2018-19
KINEMATICS & DYNAMICS OF MACHINES
BRANCH : MECH
Time : 3 Hours
Max Marks : 100
Q.CODE : E797

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part- I

Q1 Short Answer Type Questions (Answer All-10) **(2 x 10)**

a) Distinguish between mechanism and machine.
b) What is Gruebler's criterion?
c) Define mechanical advantage and transmission angle of a mechanism.
d) What is Aronhold-Kennedy theorem? Explain.
e) What is a precision point?
f) Discuss the various types of gear trains.
g) What is compound pendulum?
h) What is meant by the expression 'friction circle' and friction axis?
i) What is creep in belt drive?
j) Distinguish between brakes and dynamometers.

Part- II

Q2 Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) **(6 x 8)**

a) Explain different kinds of kinematic pairs giving example for each one of them.
b) Define the terms: 1. Lower pair, 2. Higher pair, 3. Kinematic chain, and 4. Inversion.
c) Describe an inversion of a double slider crank chain (any one).
d) Explain the Chebychev spacing.
e) What is the difference between piston effort, crank effort and crank-pin effort?
f) Derive from first principles an expression for the effort required to raise a load with a screw jack taking friction into consideration.
g) Derive from first principles an expression for the friction moment of a conical pivot assuming Uniform pressure.
h) Derive the condition for transmitting the maximum power in a flat belt drive.
i) Describe (with sketch) the working principle of Differential gear of an automobile.
j) What is the difference between absorption and transmission dynamometers? What are torsion dynamometers?
k) Explain with neat sketches the Bevis-Gibson flash light dynamometer.
l) Describe the Freudenstein's equation.

Part-III

Long Answer Type Questions (Answer Any Two out of Four)

Q3 **a)** Derive an expression for the magnitude and direction of coriolis component of acceleration. **(8)**

b) Draw the acceleration diagram of a slider crank mechanism. **(8)**

Q4 **a)** Explain the sun and planet gear. Where it is used? **(4)**

b) In a reverted epicyclic gear train, the arm A carries two gears B and C and a compound gear D - E. The gear B meshes with gear E and the gear C meshes with gear D. The number of teeth on gears B, C and D are 75, 30 and 90 respectively. Find the speed and direction of gear C when gear B is fixed and the arm A makes 100 r.p.m. clockwise. **(12)**

Q5 **a)** A multiplate clutch has three pairs of contact surfaces. The outer and inner radii of the contact surfaces are 100 mm and 50 mm respectively. The maximum axial spring force is limited to 1 kN. If the coefficient of friction is 0.35 and assuming uniform wear, find the power transmitted by the clutch at 1500 r.p.m. **(8)**

b) A conical pivot bearing 150 mm in diameter has a cone angle of 120º. If the shaft supports an axial load of 20 kN and the coefficient of friction is 0.03, find the power lost in friction when the shaft rotates at 200 r.p.m., assuming 1. Uniform pressure and 2. Uniform wear. **(8)**

Q6 The following data refer to an open belt drive : **(16)**

Diameter of larger pulley = 400 mm; Diameter of smaller pulley = 250 mm; Distance between two pulleys = 2 m; Coefficient of friction between smaller pulley surface and belt = 0.4; Maximum tension when the belt is on the point of slipping = 1200 N.

Find the power transmitted at speed of 10 m/s.

It is desired to increase the power. Which of the following two methods you will select?

1. Increasing the initial tension in the belt by 10 per cent.
2. Increasing the coefficient of friction between the smaller pulley surface and belt by 10 per cent by the application of suitable dressing on the belt.

Find, also, the percentage increase in power possible in each case.