Sr. No. 001304

March 2022
B.Tech.(AE/ME)- III SEMESTER
Engineering Mechanics (ESC-203)

Time: 90 Minutes **Max. Marks:25**

Instructions:
1. *It is compulsory to answer all the questions (1 mark each) of Part -A in short.*
2. *Answer any three questions from Part -B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART –A

Q1 (a) What are coplanar forces? (1)

(b) What are concurrent forces? (1)

(c) What is Limiting friction? (1)

(d) Define zero force members in truss analysis. (1)

(e) Name different types of beams. (1)

(f) Define area moment of inertia. (1)

(g) Define mass moment inertia. (1)

(h) What is the energy method for equilibrium? (1)

(i) Give an example of 3-D curvilinear motion. (1)

(j) What is the Instantaneous center of rotation? (1)

PART –B

Q2 (a) Two concurrent 100 N and 50 N forces act on the body along with directions at 0^0 and 60^0 to X-axis respectively. Find the magnitude and direction of the resultant. (3)

(b) State Varignon's theorem. (2)

Q3 (a) Explain the method of section of truss analysis. (3)

(b) Explain the Principle of virtual work for particles. (2)

Q4 The pitch and mean diameter of the square threads of a screw jack are 24mm and 60mm respectively. If the coefficient of friction is 0.1, find the effort required at the end of the handle 600mm long to lift the load of 1 KN. Also, calculate the effort required if this load were to be lowered. (5)

Q5 The moment of inertia of the rotor of a traction motor is 500 kgm^2. When the motor is started it attains the speed of 720 rpm from rest in 10 sec. Find the accelerating torque and change in kinetic energy in this direction. (5)

Q6 (a) On a national highway, a car is moving at a velocity of 120km/hr. The car is brought to rest by applying brakes in 5 sec. Find the distance covered by the car before coming to rest and the value of the retardation. (3)

(b) Write a short note on relative velocity. (2)