

Roll No.

OLE-3044
B. Tech. 3rd Semester (EE)
Examination – April, 2021

ENGINEERING MECHANICS

Paper : ESC-EE-202-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* question in all, selecting *one* question from each Section. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) What is a tensor in simple terms ? $1.5 \times 10 = 15$
- (b) Define eigenvalues and eigenvectors.
- (c) Define linear and angular momentum equations.
- (d) State work-energy equation.
- (e) Difference between area moment of inertia and mass moment of inertia.

- (f) Write the assumptions, which are made, while finding out the reactions of a beam or a frame having both ends fixed.
- (g) Define the term "support reaction".
- (h) State laws of Coulomb friction.
- (i) Differentiate between center of mass and center of gravity.
- (j) State parallel and perpendicular axes theorems.

SECTION – A

- 2. State and prove Euler's theorem. 15
- 3. A force F acts at the origin of a coordinate system in a direction defined by the angles $\theta_x = 68^\circ$ and $\theta_z = 55^\circ$. The component of force F along y direction is -125N . find out : 15
 - (a) angle θ_y (b) Magnitude of force F
 - (c) Component of force along X and Z direction

SECTION – B

- 4. Three links are hinged together to form a triangle ABC as shown in fig. 1. At a certain instant, the point A is

moving towards the mid-points of BC with a velocity of 5 m/s and B is moving at a perpendicular direction to AC. Find the velocity of C. 15

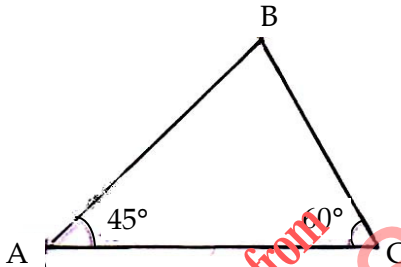


Fig. 1

5. State and prove parallel and perpendicular axis theorem. 15

SECTION – C

6. Explain free body diagrams with examples. What are the forces included and excluded in when drawing F.B.D ? Also state the method used for the analysis of F.B.D. 15
7. Explain the following with diagram : 15
- (a) General planar motions
 - (b) General 3-D motions
 - (c) Free precession

SECTION – D

8. Draw the S.F. and B.M. diagrams for the overhanging beam carrying uniformly distributed load of 2 kN/m over the entire length and a point load of 2 kN as shown in fig.2. 15

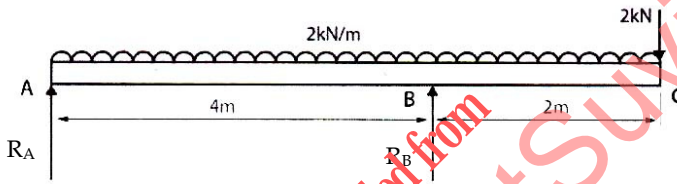


Fig. 2

9. (a) Derive equation of torsion. 7.5 × 2
(b) State laws of static and dynamic friction.