2300101055

Sr. No - 008304

December 2024

B.Tech- lII SEMESTER

Engineering Mechanics (ESC01)

Time: 3 Hours **Max. Marks:75**

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.*
2. *Answer any four questions from Part -B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*
4. *Symbols have their usual meanings.*

PART -A

Q1 (a) What is free body diagram? (1.5)

(b) Differentiate between static friction and dynamic friction. (1.5)

(c) What are zero force members in a truss structure? (1.5)

(d) How do you determine the centroid of a composite section? (1.5)

(e) What is the principle of virtual work? (1.5)

(f) Define the work-energy principle. (1.5)

(g) What is D'Alembert's principle? (1.5)

(h) What is the concept of resonance in mechanical vibrations? (1.5)

(i) What is coplanar system of forces? (1.5)

(j) Define wedge friction. (1.5)

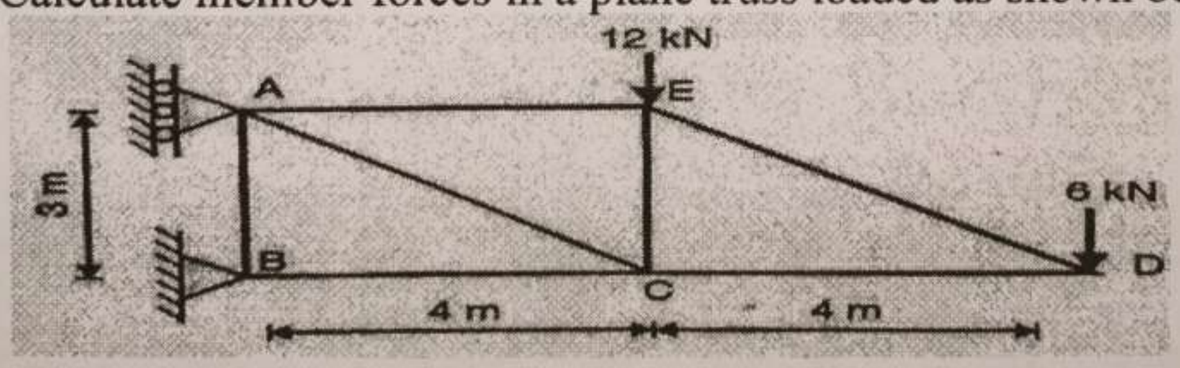
PART -B

Q2 (a) Two concurrent 120 N forces and 60 N act on the body along directions at 0^0 and 60^0 to X-axis respectively. Find the magnitude and direction of the resultant. (10)

(b) Write short notes on the parallelogram law of forces. (5)

Q3 A body of weight W is placed on a rough inclined plane having an inclination $\propto$ to the horizontal. The force P is applied to the horizontal to drag the body. If the body is on the point of motion up the plane, prove that P is given by P = W $\tan(\propto + \emptyset)$. Where $\emptyset$ = Angle of friction. (15)

Q4 Calculate member forces in a plane truss loaded as shown below in figure: (15)



Q5 (a) Derive a relationship for finding the moment of inertia of a triangle. (10)

(b) Explain the principle of virtual work for particles and ideal system of rigid bodies. (5)

Q6 (a) Explain the impulse-momentum theorem with a suitable example. (10)

(b) State newton's 2nd law of motion. (5)

Q7 (a) A train of weight 5000 KN is pulled by an electric engine on a level track at a constant speed of 100 km/hr. The air resistance on train to be overcome by engine, is 12 N/KN of the train weight. Find the power. (10)

(b) Explain single degree of freedom system with a suitable example. (5)

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