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Question Paper Code: 52106

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

Second Semester

Civil Engineering

15UCE206-BASIC ENGINEERING MECHANICS

(Regulation 2015)

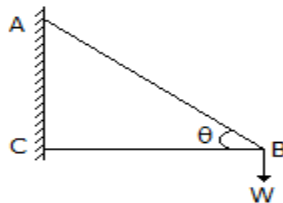
Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The rate of change of momentum is directly proportional to the impressed force, and takes place in the same direction in which the force acts. This statement is known as CO1- R
 - (a) Newton's first law of motion
 - (b) Newton's second law of motion
 - (c) Newton's third law of motion
 - (d) None of these
2. The forces, which meet at one point and their lines of action also lie on the same plane, are known as CO1- R
 - (a) coplaner concurrent forces
 - (b) coplaner non-concurrent forces
 - (c) non-coplaner concurrent forces
 - (d) non-coplaner non-concurrent forces
3. The unit of force in S.I. system of units is CO2- R
 - (a) dyne
 - (b) kilogram
 - (c) newton
 - (d) watt
4. The force induced in the string BC due to the load W as shown in the below figure is CO2- R



- (a) $W \sin \theta$
- (b) $W \cos \theta$
- (c) $W \tan \theta$
- (d) $W \cot \theta$

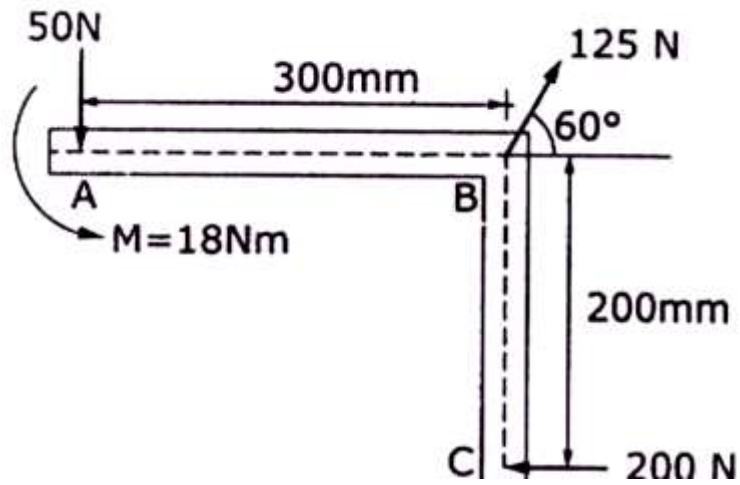
5. The friction experienced by a body, when in motion, is known as CO3- R
 (a) rolling friction (b) dynamic friction (c) limiting friction (d) static friction
6. The angle of inclination of the plane at which the body begins to move CO3- R
 down the plane, is called
 (a) angle of friction (b) angle of repose (c) angle of projection (d) none of these
7. The centre of gravity of a right angle triangle is at a distance of CO4- R
 _____ from its base, measured along the vertical axis.(where $h =$
 Height of a right angled triangle.)
 (a) $h/2$ (b) $h/3$ (c) $h/4$ (d) $h/6$
8. The point, through which the whole weight of the body acts, irrespective of CO4- R
 its position, is known as
 (a) moment of inertia (b) centre of gravity
 (c) centre of percussion (d) centre of mass
9. The unit of moment of inertia of an area is CO5- R
 (a) $\text{kg}\cdot\text{m}^2$ (b) $\text{kg}\cdot\text{m}\cdot\text{s}^2$ (c) kg/m^2 (d) m^4
10. What is the formula of theorem of perpendicular axis CO5- R
 (a) $I_{ZZ} = I_{XX} - I_{YY}$ (b) $I_{ZZ} = I_{XX} + Ah^2$ (c) $I_{ZZ} - I_{XX} = I_{YY}$ (d) None of the above

PART – B (5 x 2= 10 Marks)

11. State Varignon's theorem. CO1- R
12. What is Uniformly distributed load? Write the formula of intensity and CO2- R
 point of application of its equivalent point load.
13. What is friction? CO3- R
14. Define centre of gravity of a body. CO4- R
15. Define polar moment of inertia. CO5- R

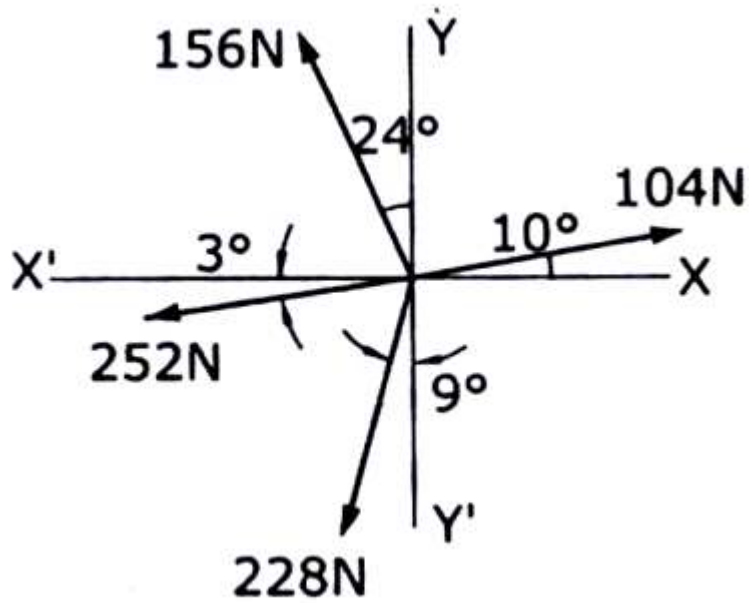
PART – C (5 x 16= 80 Marks)

16. (a) The three forces and a couple of magnitude, $M=18\text{Nm}$ are CO1- App (16)
 applied to an angled bracket as shown below.
 (a) Find the resultant of this system of forces.
 (b) Locate the points where the line of action of the resultant
 intersects line AB and line BC.

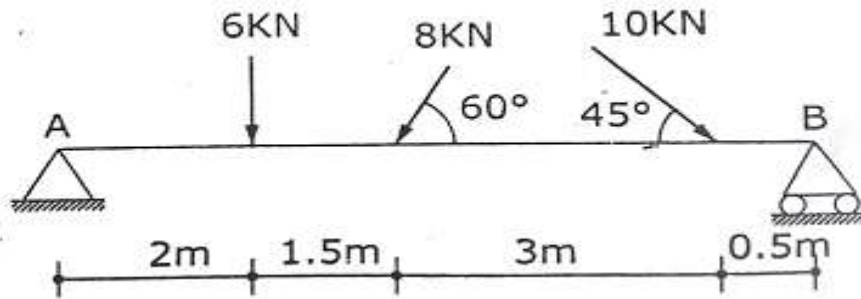


Or

- (b) The four coplanar forces are acting at a point as shown below. CO1- App (16)
 Determine the resultant in magnitude and direction?

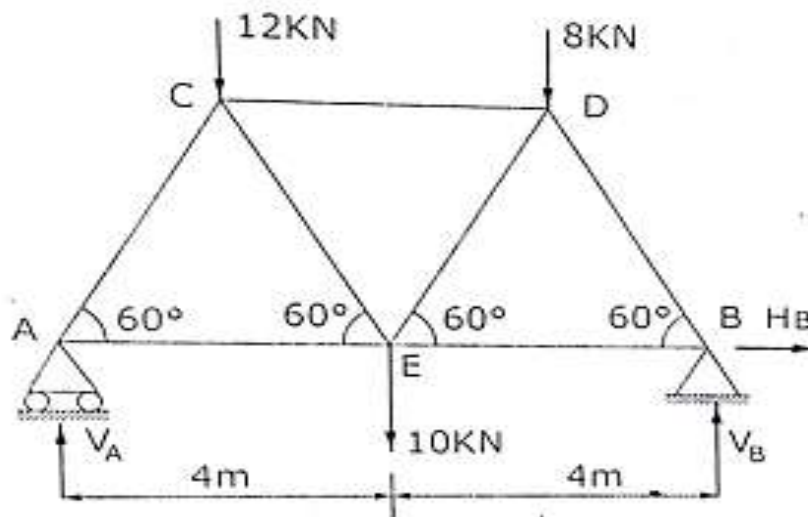


17. (a) Determine the support reactions of the beam shown in below figure. CO2- App (16)

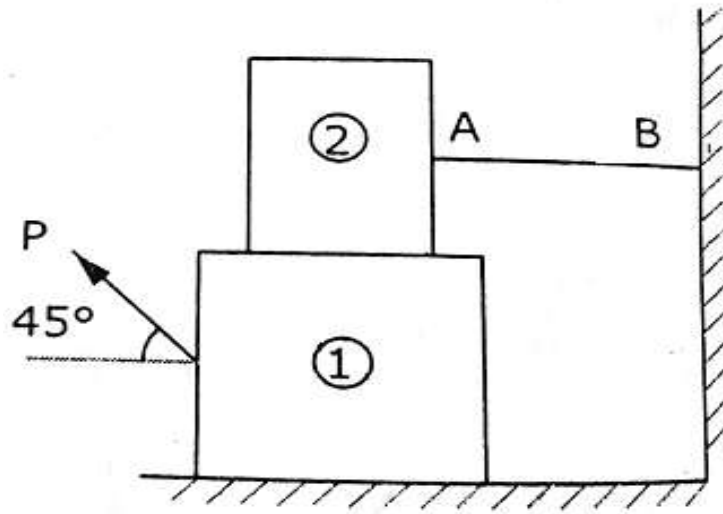


Or

- (b) A truss of 8 m span is loaded as shown in below figure. Find the support reactions. CO2- App (16)

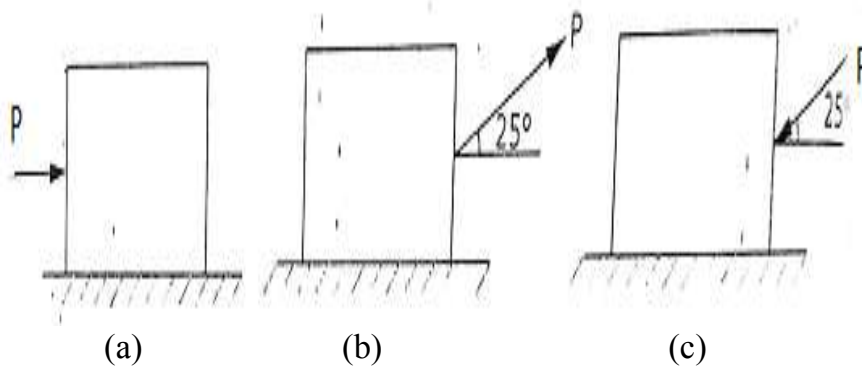


18. (a) Block (2) rest on block (1) and is attached by a horizontal rope AB to the wall as shown in below figure. What force P is necessary to cause motion of block (1) to impend? The co-efficient of friction between the blocks is $\frac{1}{4}$ and between the floor and block (1) is $\frac{1}{3}$. Mass of block (1) and (2) are 14 kg and 9kg respectively. CO3- Ana (16)



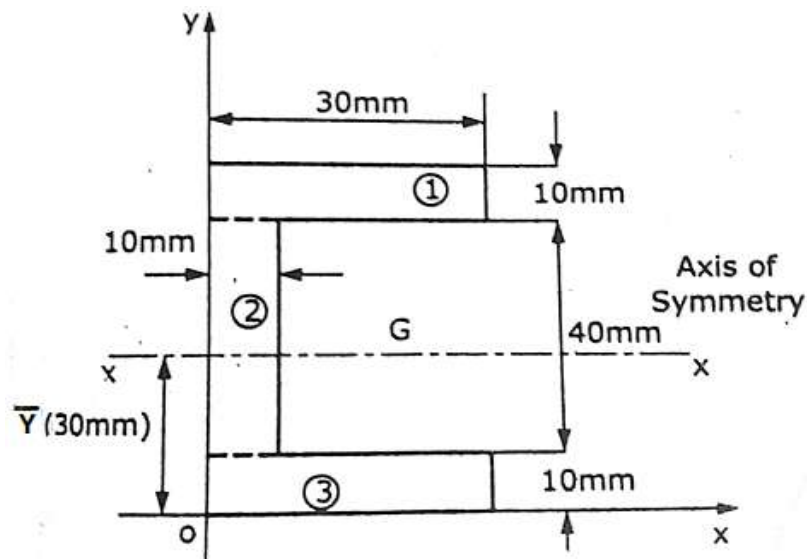
Or

- (b) A body of weight 100N is placed on a rough horizontal plane and pushed by a force of 45N as shown in below figure, to just cause sliding over the horizontal plane .determine the coefficient of friction in all the three cases. CO3- Ana (16)



19. (a) Locate the centroid of the channel section shown in figure below.

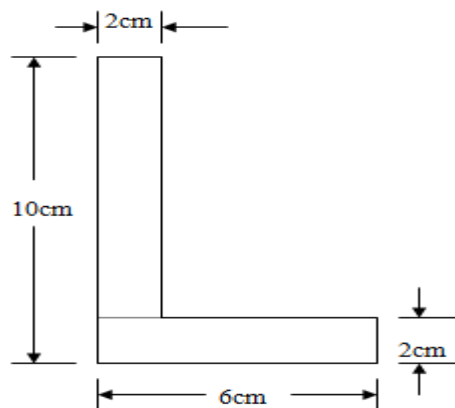
CO4- U (16)



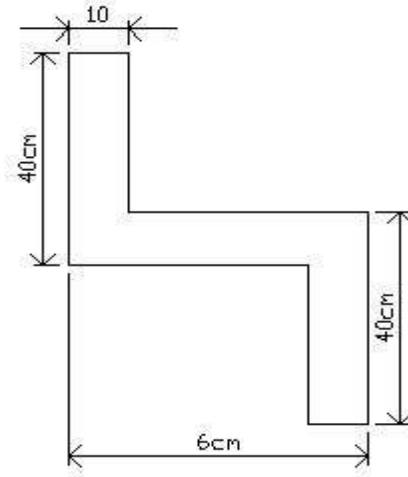
Or

- (b) Locate the centroid of the L-section shown in below figure.

CO4- Ana (16)



20. (a) Design Moment of Inertia about the co-ordinate axes of plane area shown in below figure. Also find Polar Moment of Inertia. CO5- U (16)



Or

- (b) Find the moment of inertia of a un symmetrical I section shown CO5- U (16)
in figure below about its centroidal axes.

