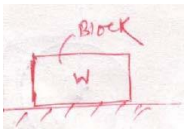
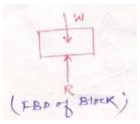
QUESTION BANK

SUBJECT- ENGINEERING MECHANICS **2nd SEM**

SHORT QUESTION: - (2 MARKS)

1. Define rigid body.
2. Define force and types of force.
3. State the characteristics of force.
4. Define transmissibility of force.
5. Define superstition of force.
6. What is free body diagram?
7. Draw the free body diagrams of the following figures.



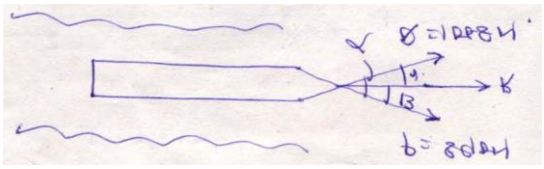


8. What is resolution of force?
9. What is composition of force?
10. State parallelogram law of forces.
11. State polygon law of forces.
12. Define moment and its unit.
13. Define couple and its units.
14. State of varignon's theorem.
15. State of lami's theorem.
16. Define friction.
17. Define limiting friction.
18. Define angle of repose.
19. Define centroid.
20. What is moment of inertia?
21. State parallel axis theorem.
22. State perpendicular axis theorem.
23. Define lifting machine.
24. Define M.A, V.R &Efficiency.
25. State law of machine.
26. What is reversibility of machine?
27. What is self locking of machine?
28. Define kinetics and kinematics.
29. State D'Alemberts principle.
30. Define collision.
31. Define momentum and its unit.
32. Define coefficient of restitution.

LONG QUESTIONS:- (6 MARKS)

1. State and explain parallelogram law of forces.
2. Define force and explain different types of forces.
3. State and explain triangle law of forces
4. State and explain varignon's theorem.

5. A boat is moved uniformly along a canal by two horses pulling with forces P = 890 N and Q = 1068 N acting under an angle $\alpha = 60^{\circ}$. Determine the magnitude of the resultant pull on the boat and the angles β and ν.



6. A triangle ABC has its side AB=40mm along positive x axis and side BC=30mm in positive y axis. Three forces 40N,50N & 30N acts along the sides AB, BC& CA respectively. determine magnitude of the resultant of such system of forces.

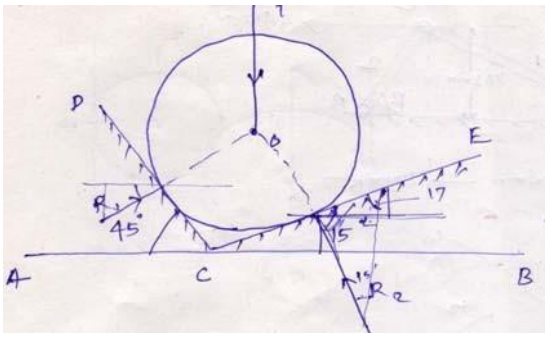
7. A number of forces 2N,3N,4N,5N,6N&7N are acting six sides of a regular hexagon. determine the magnitude of the resultant force.

8. A uniform wheel of 600mm dia weighing 5KN rest against a rigid block of 150mm height. find the least pull through the centre of the wheel required to just turn the wheel over the corner A of the block. also find the reaction on the block. take all surface smooth.

9. Three forces 2P,3P&4P acts along three sides of a equilateral triangle of sides 100mm taken in order.find the magnitude and position of the resultant force.

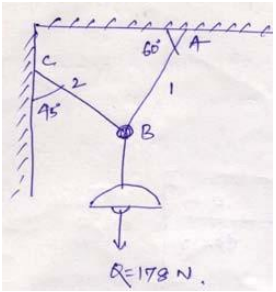
10. Four forces P,2P,3P&4P acts along four sides of a square of sides 100mm taken in order. find the magnitude, direction and position of the resultant force.

11. Take radius of cylinder=1.5m, weight of the cylinder=100N.find the reactions at the surface of contact.



12. State and explain lami's theorem.

13. An electric light fixture of weight Q = 178 N is supported as shown in figure. Determine the tensile forces S_1 and S_2 in the wires BA and BC, if their angles of inclination are given.



14. State the laws of static and dynamic friction.

15. Show that angle of repose is equal to angle of friction.

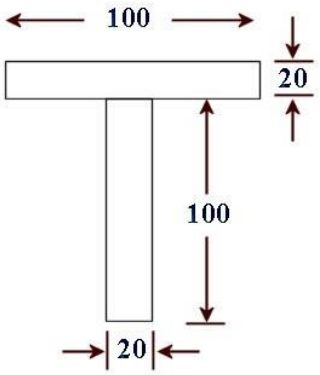
16. Derive for the minimum force acting along the inclined plane required which will keep the body in equilibrium if the body is sliding downward.

17. Derive for the minimum force acting horizontally the inclined plane required which will keep the body in equilibrium if the body is sliding downward.

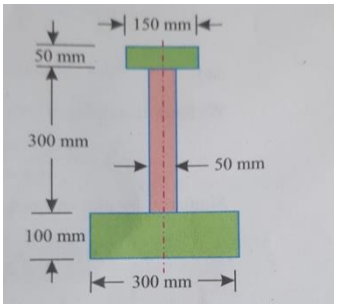
18. Derive for the minimum force acting at some angle to the inclined plane required which will keep the body in equilibrium if the body is sliding downward.

19. A body of weight300N laying on a rough horizontal plane .whereμ=0.3.findthe magnitude of force which can move the body while acting at an angle 25^{o}.

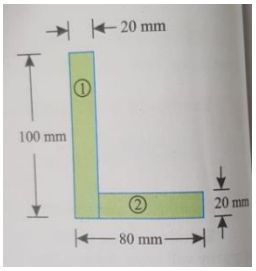
20. Find the centroid of the T-section as shown in figure from the bottom.



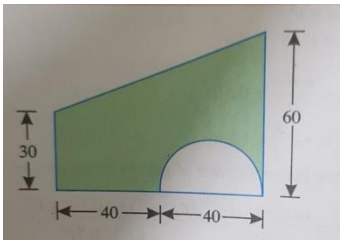
21. Locate the centroid of the I-section.



22. Locate the centroid of the L-section.



23. Locate the centroid of the coloured setion.



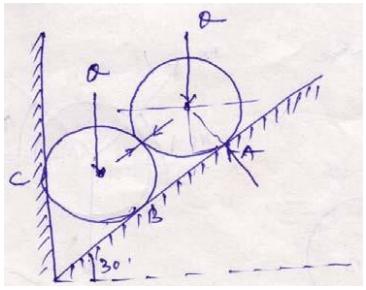
24. State and explain parallel axis theorem.
25. State and explain perpendicular axis theorem.
26. Find the M.I square section.
27. Find the M.I triangular section.
28. Find the M.I circular section.
29. Explain any two lifting machine.
30. Derive the velocity ratio for compound gear train.

31. A ball of 1kg moving with velocity 2m/s impinges directly on a ball mass 2kg at rest. after collision the 1st ball comes to rest. find the velocity of 2nd all after impact and coefficient of restitution.
32. State and explain conservation of energy.

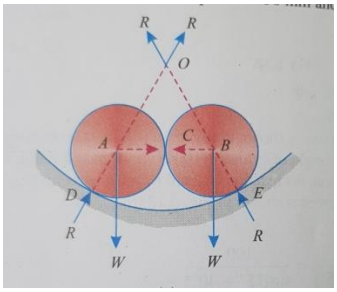
LONG QUESTION:- (10 MARKS)

1. A block weighing 500N just starts moving down a rough inclined plane when supported by a force of 200N acting parallel to the plane in upward direction. The same block is on the verge of moving up the plane when pulled by a force of 300N acting parallel to the plane. Find the inclination of the plane and coefficient of friction between the inclined plane and the block.

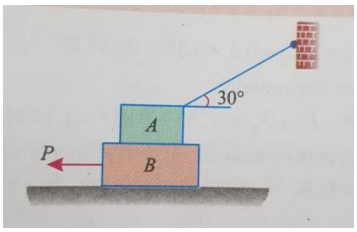
2. Two identical rollers each of weight Q = 445 N are supported by an inclined plane and a vertical wall as shown in the figure. Assuming smooth surfaces, find the reactions induced at the points of support A, B and C.



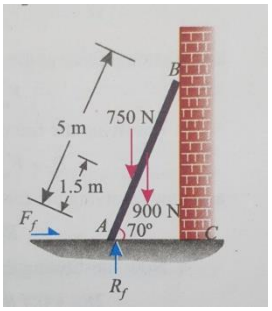
3. Two heavy spheres 0f 50mm radius are in equilibrium with in a smooth up of radius 150mm.show that the reaction between the cup and one sphere is double than that between the two sphere.



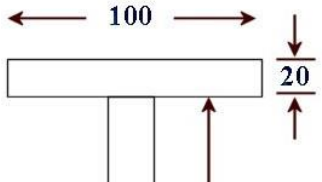
4. Two blocks A & B of weight 1N and 2N are in equilibrium as shown in the fig.if μ=0.3 between block A & B as well as between B& floor. find force P.



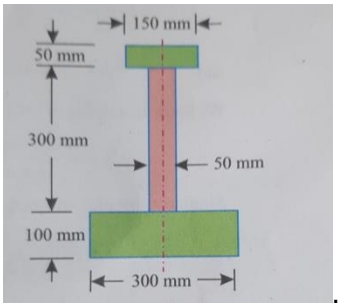
5. Calculate friction between the ladder and floor.



6. Find the M.I of of the given section, about XX & YY axis through centre of gravity.



7. 6. Find the M.I of of the given section, about the horizontal axis through centre of gravity of the section.



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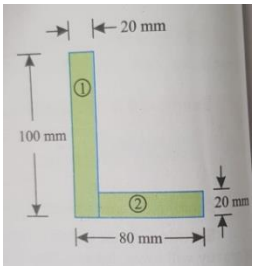
8. Find the M.I of of the given section, about XX & YY axis through centre of gravity.



9. In a lifting machine whose velocity ratio is 50 and effort is 100N is required to lift a load of 4 KN. is the machine is reversible? If so what effort should be applied, so that the machine will be reversing?
10. What load can be lifted by an effort 120N if velocity ratio is 18 and efficiency is 60%?determine the law of machine if it is observed that if the effort is 200N is required to lift load of 2600N & find the effort required to run the machine at a load of 3.5 KN.

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