Morning

D: 16/05/2014.

Student's Exam. No.: _____

Ganpat University

B.Tech. 2nd Semester – (CE/IT/EC/BM&I/MARINE)

Regular Examination : May 2014,

2CI 102 Mechanics of Solids

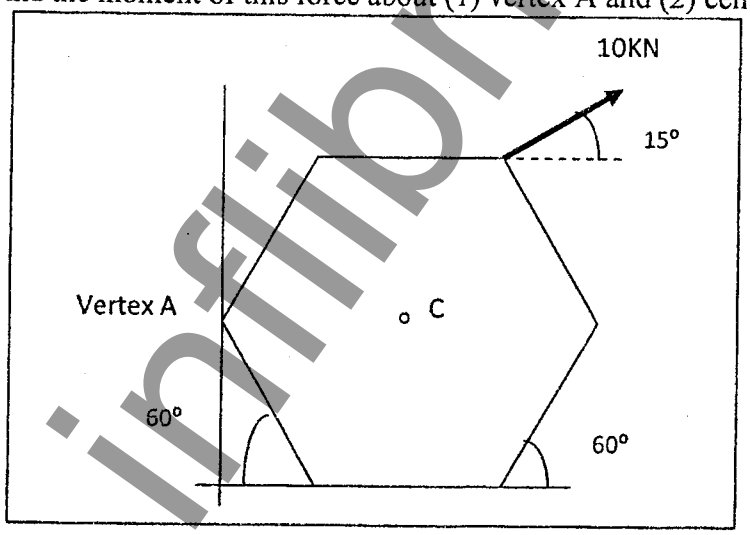
Time: 3 Hours **Max. Marks: 70**

Instructions: - (1) Answer to the two sections must be written in separate answer books.
(2) Assume suitable data if required.
(3) Figures to the right indicate full marks.

Section - I

1 (A) Define the term "Force" and state clearly the effect of force. Also list the characteristics of force. **6**

(B) A regular hexagon of dimension 100mm as shown in **Figure below** is subjected to a 10 KN force. Find the moment of this force about (1) vertex A and (2) centre C. **6**



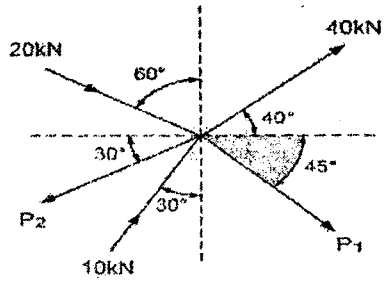
OR

1 (A) State and explain "Law of Parallelogram of Forces" **6**

(B) Find the magnitude of the two forces such that if they act at right angles, their resultant is 5.50N.But if they act at 60°, their resultant is 6.5N. **6**

2 (A) Define: Equilibrant Force and Prove that, a body will not be in equilibrium under the action of two equal and opposite parallel forces. **6**

(B) A force system shown in **Figure below** is in equilibrium. Calculate unknown forces P1 and P2. **6**



OR

2 (A) Define:(i) Statics (ii) Dynamics (ii) Kinetics (iv) kinematics **6**

(B) Derive the equation for the tension in the string, when one is hanging free and the other is lying on a smooth incline plane. **6**

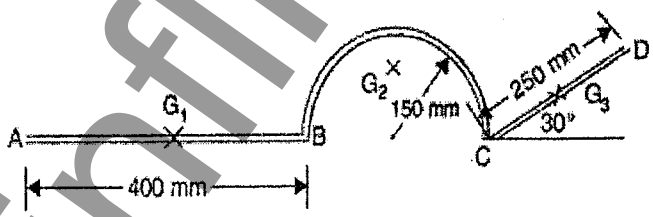
3 (A) Explain statically determinate & indeterminate beams with examples. **4**

(B) A cantilever beam of span of 6m carries an UDL of 6 KN/m over length of 3m from the fixed end and point load of 20KN (acting downward) and 10 KN(acting upward) at distance 2m and 4m respectively from fixed end. Draw S.F and B.M diagrams. **7**

Section II

4 (A) Define: Axis of Symmetry and Derive an equation for finding out centroid of Triangle by method of Double Integration. **5**

(B) Find out Centroid of One Dimensional object as shown below. **7**



OR

4 (A) Define: Friction, limiting friction, coefficient of static friction, coefficient of kinetic friction **6**

(B) Block A weighing 1500 N rests over block B which weighs 2000 N. Block A is tied to a wall with a horizontal string. If the coefficient of friction between A and B is 1/4 and that between B and the floor is 1/3, what value of force P is required to create impending motion if (a) P is horizontal, (b) P acts 25° upwards to horizontal. **6**

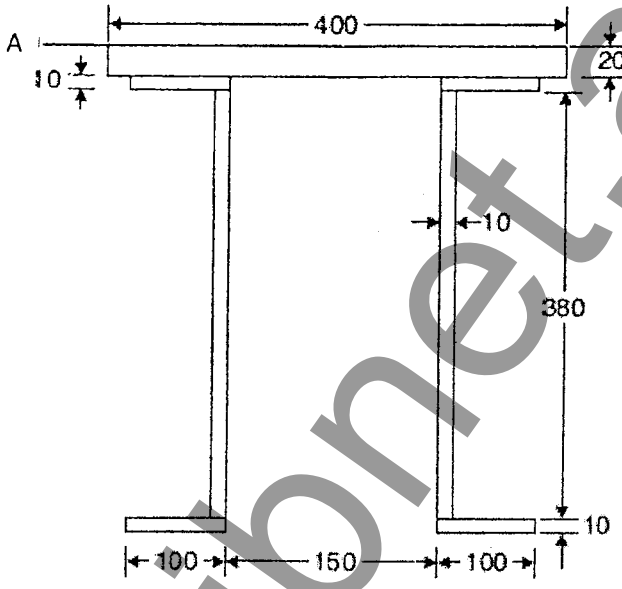
5 (A) With neat sketches derive an expression for finding out Velocity Ratio of Wheel and Differential Axle. **6**

(B) In a simple machine, whose velocity ratio is 30, a load of 650 N is lifted by an effort of 120 N and a load of 2000 N is lifted by an effort of 180 N. Find the law of machine and calculate the load that could be lifted by a force of 200 N. Calculate also:(1) The amount of effort wasted in overcoming the friction,(2) Mechanical advantage, and(3) The efficiency. 6

OR

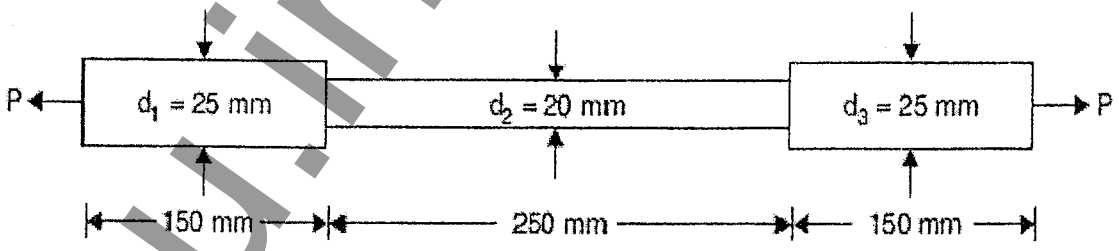
5 (A) State and Prove: Method for Parallel Axes for Moment of Inertia. 4

(B) Determine the moment of inertia of the built-up section shown in the **Figure below.** About an axis AB passing through the top most fibre of the section as shown. 8



6 (A) Discuss: Stress – Strain Curve of Mild Steel specimen. 5

(B) The bar shown in Figure below is tested in universal testing machine. It is observed that at a load of 25 kN the total extension of the bar is 0.250 mm. Determine the Young's modulus of the material. 6



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