

(DE 107)

**B. Tech. DEGREE EXAMINATION, MAY - 2015**

**(Examination at the end of First Year)**

**Paper - VII : ENGINEERING MECHANICS**

**Time : 3 Hours**

**Maximum Marks : 75**

Answer question No. 1 compulsory

(15)

Answer ONE question from each unit

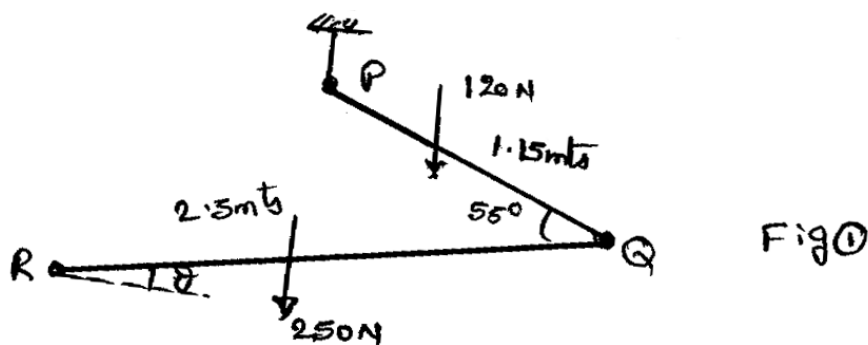
(4 x 15 = 60)

All questions carry equal marks

- 1) a) Draw a sketch to show the characteristics of forces.
- b) State different laws of mechanics.
- c) State the assumptions necessary for the analysis of a plane projectile motion.
- d) State D' Alembert's principle for a particle. How is it similar with the equilibrium equation as obtained from Newton's second law, if at all so?
- e) Explain the mechanism of impact with reference to the direct central impact.

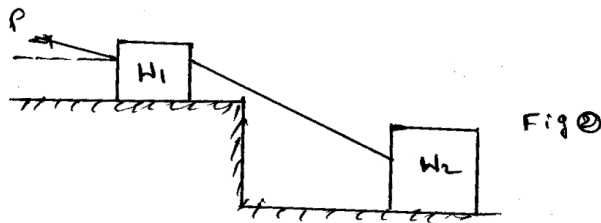
**Unit - I**

- 2) Two metallic rods PQ and QR are fixed with an internal angle  $55^\circ$ , and hung as shown in fig. (1), such that QR makes an angle ' $\theta$ ' in equilibrium condition. Determine the angle  $\theta$ .



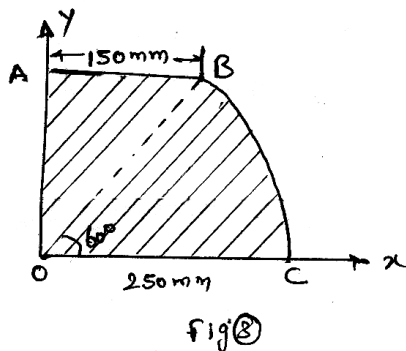
OR

- 3) Two blocks of weights  $W_1$  and  $W_2$  Connected with a string are at rest as shown in fig. (2) If the angle of friction of each block be  $\phi$ , find the magnitude and the direction of least force 'P' necessary for upper block that will induce sliding.



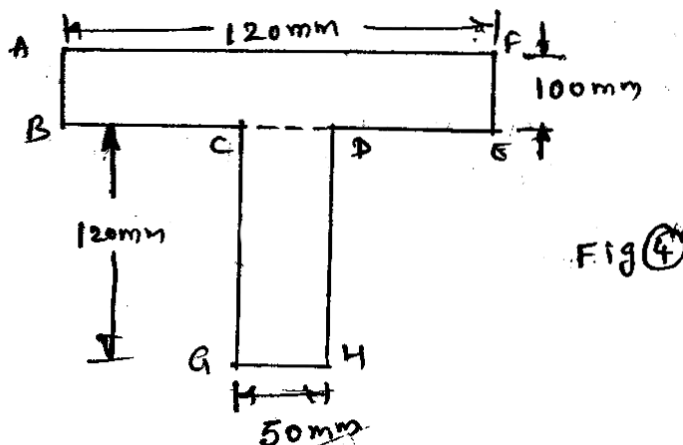
Unit - II

- 4) Locate the centroid of the composite figure OABC shown in fig (3)



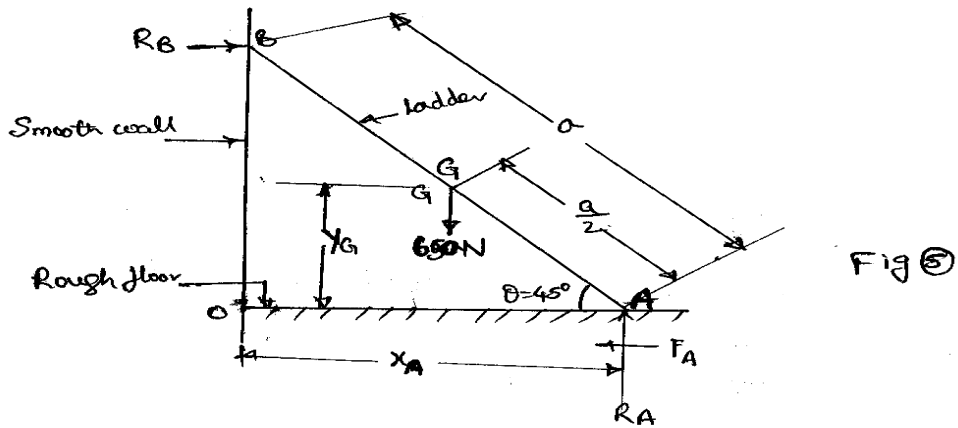
OR

- 5) A 'T' section is shown in fig(4). Find the moment of inertia of this section about X-X axis passing through the CG of the section.



**Unit - III**

- 6) A ladder of weight 650 N and length 'a' rests against a smooth vertical wall and a rough horizontal floor making an angle of  $45^\circ$  with the Horizontal shown in fig(5). Using the method of virtual wall, find the force of friction of the floor.

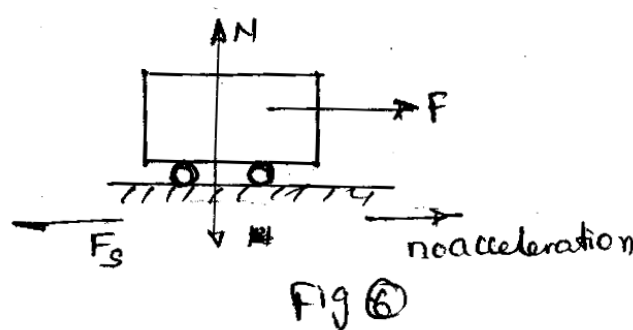


OR

- 7) a) Explain the term inertia of a body. What do you mean by Inertial force and inertial torque?  
 b) Derive the expressions for velocity and acceleration of a particle subjected to a force as a function of velocity.

**Unit - IV**

- 8) A train of weight 25000kg is pulled by an engine on a level track at a constant speed of 58 kmph (as shown is fig(6)). The frictional resistance is 1kg per 100kg of the weight of the train. Determine the power of the engine. If the train is to move with uniform acceleration of  $1.2\text{m/s}^2$  on the track after attaining the speed of 58kmph, determine the power of the engine.



OR

- 9) The speed of a fly wheel rotating at 250rpm is uniformly increased to 300rpm in 5 seconds. Determine the work done by the driving torque and the increase in kinetic energy during this time. What do you infer from the result? Take mass of the fly wheel as 25kg and its radius of gyration as 20cm



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**(Examination at the end of First Year)**

**Paper - VIII : Engineering Graphics**

**Time : 3 Hours**

**Maximum Marks : 75**

Answer ONE question from each unit

(5 x 15 = 75)

**Unit - I**

- 1) a) Construct a diagonal scale of R.F. =  $\frac{1}{4000}$  to show metres and long enough to measure upto 500metres. Indicate on the scale, a distance of 374 metres.
- b) Two points A & B are 100 mm apart. Trace the complete path of a point P moving (in the same plane as that of A and B) in such a way, that the sum of its distances from A and B is always the same and equal to 125 mm.

OR

- 2) a) Draw a Vernier scale of R.F. =  $\frac{1}{25}$  to read centimeters upto 4 mts and on it, show lengths representing 2.39 m and 0.91 m.
- b) A circle of 50 mm diameter rolls along a straight line without slipping. Draw the curve traced out by a point P on the circumference, for one complete revolution of the circle.

**Unit - II**

- 3) A line PQ 100 mm long, is inclined at 30° to the H.P and at 45° to the V.P. Its midpoint is in the V.P and 20 mm above H.P. Draw its projections, if its end P is in the third quadrant and Q is in the first quadrant.

OR

- 4) A circular plate of negligible thickness and 50 mm diameter appears as an ellipse in the front view, having its major axis 50 mm long and minor axis 30 mm long. Draw its top view when the major axis of the ellipse is horizontal.

### Unit - III

- 5) Draw the projections of a cone, base 45 mm diameter and axis 50 mm long, when resting on the ground on a point on its base circle with the axis making an angle of  $30^\circ$  with the H.P and  $45^\circ$  with the V.P.

OR

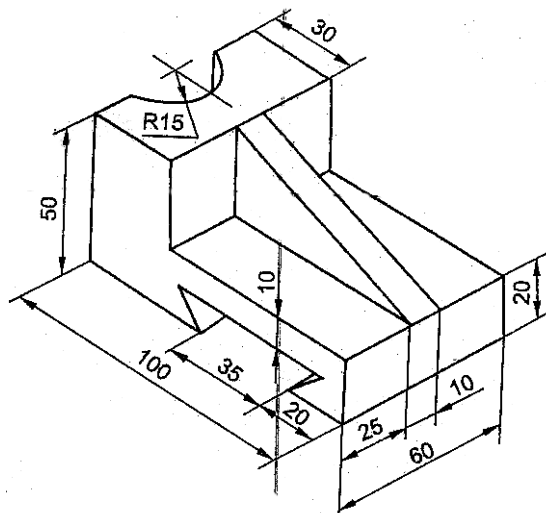
- 6) A cylinder, with a 60 mm base diameter and 70 mm long axis, is lying on a generator on the H.P. with its axis parallel to the V.P. A vertical section plane, the H.T of which makes an angle of  $30^\circ$  with V.P and passes through a point at a distance of 25 mm from one of its ends, cuts the cylinder. Draw its sectional front view and obtain the true shape of the section.

### Unit - IV

- 7) A cone of 95 mm diameter of base and 90 mm height stands on its base on the ground. A semi-circular hole of 50 mm diameter is cut through the cone. The axis of the hole is horizontal and intersects the axis of the cone. It is 30 mm above the base of the cone. The flat surface of the hole contains the axis of the cone and is perpendicular to the V.P. Draw the three views of the cone and also develop the surface of the cone.
- 8) A vertical cylinder of diameter 55 mm resting on the ground is penetrated by another cylinder of 40 mm diameter such that the axis of the penetrating cylinder is 10 mm in front of the axis of the vertical cylinder and is inclined to the H.P. at  $30^\circ$  and parallel to the V.P. Draw the elevation, plan of the solids showing the curves of intersection

### Unit - V

- 9) Draw the orthographic view of the given figure. All dimensions are in mm.



OR

10) Draw the isometric view of the given figure. All dimensions are in mm.

