Code: R7100306

R07

B.Tech I Year (R07) Supplementary Examinations December/January 2015/2016

CLASSICAL MECHANICS

(Mechanical Engineering)

(For 2008 Regular admitted batch only)

Time: 3 hours Max. Marks: 80

Answer any FIVE questions

All questions carry equal marks

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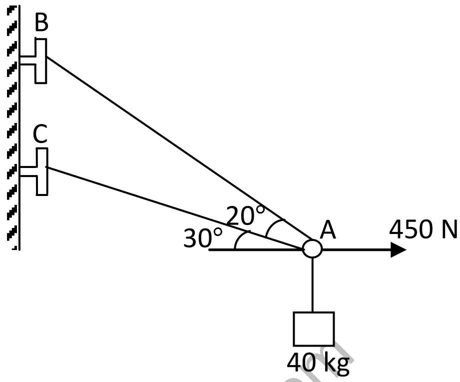
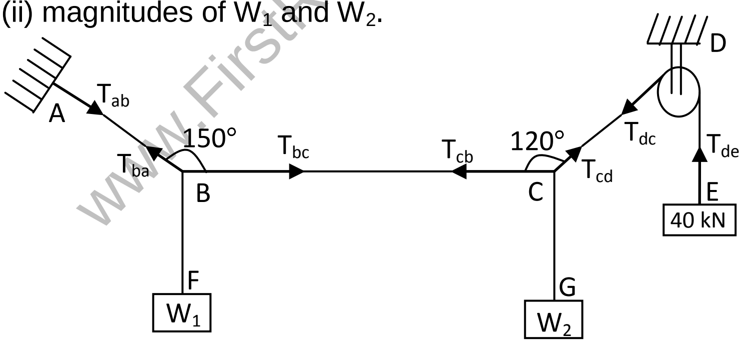
1 (a) Find the resultant of system of forces acting on a hook is given below. Find the resultant force and its direction.

Force (N)	200	185	130	100
Inclination with x-axis	N35°E	S40°E	N45°W	S30°W

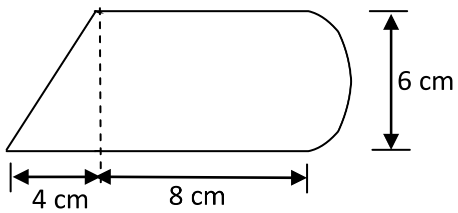
(b) Determine the tension in cables AB and AC required to hold the 40 kg crate shown in figure.



2 ABCDE is a light string whose end A is fixed. The weights W_1 and W_2 are attached to the string at B and C and the string passes round a small smooth wheel at D carrying a weight 40 kN at the free end E. In the position of equilibrium, BC is horizontal and AB and CD make angles 150° and 120° with horizontal. Find (i) the tension in AB, BC and DE of the given string (ii) magnitudes of W_1 and W_2.



3 For the plane area shown in figure below locate the centroid of the area.



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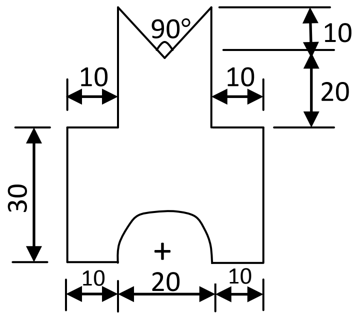
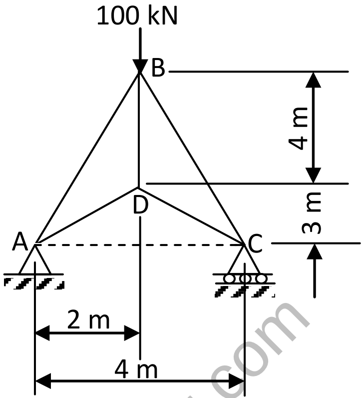
4 For the plane section shown in figure below determine the moment of inertia about its horizontal and vertical centroidal axes.



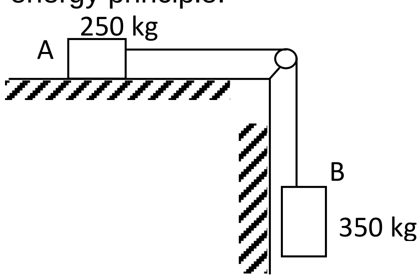
All dimensions are in mm

5 Tabulate the member forces for the structure shown in figure below.



6 A train is traveling from A to D along the track. Its initial velocity at A is zero. The train takes 5 mins to cover the distance AB 2250 m length and 2.5 mins to cover the distance BC 3000 m in length. On reaching the station the brakes are applied and the train stops 2250 m beyond at D. Find the retardation on CD and time it takes the train to get from A to D and average speed for the whole distance.

7 An inextensible string passing over a smooth pulley as shown in figure joins two blocks. If the blocks are released simultaneously from rest, determine the velocity of block A after it has moved over 2 m and the tension in the string. Assume the coefficient of friction at the contact surface is 0.2. Use work-energy principle.



8 Derive an expression for the equation of motion of a simple pendulum employing the principle of conservation of energy. Also find the frequency and time period.

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