2E1012

B. Tech. (I Year) (Sem. II) (Main/Back) Examination, June/July - 2012
Common to All Branches of Engg.
204 Engineering Machanics

Time : **3** Hours]

[Maximum Marks : **80**
[Min. Passing Marks : **24**

*Attempt any five **questions**, selecting **one question** from each unit. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary.) Any data you feel missing suitably be assumed and stated clearly, Units of quantities used/calculated must be stated clearly.*

Use of following supporting material is permitted during examination. *(Mentioned in form No. 205)*

1. _____Nil_____   2. _____Nil_____

UNIT - I

1   (a)   Determine the magnitude and line of action of the resultant of parallel force system shown in **fig. 1**.
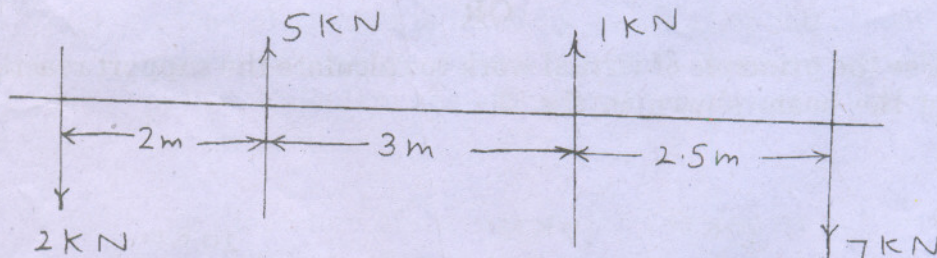

Fig. 1

8

(b)   State and prove the Lami's theorem, starting from first principle.

8

OR

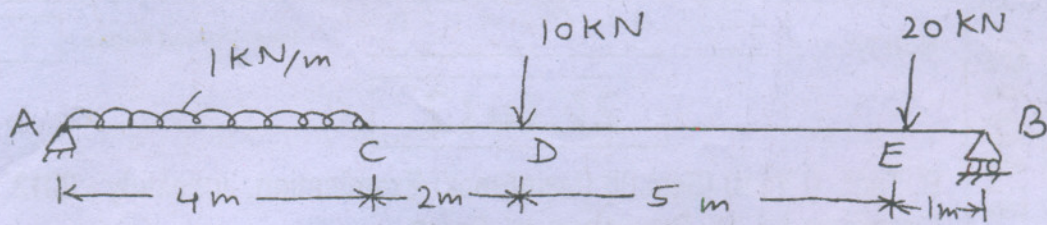1   (a)   Determine the support reactions for the beam loaded as shown in **fig. 2**.

Fig. 2

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(b) Under what conditions will you prefer, for analyzing the trusses :
   (i) Method of joints
   (ii) Method of sections.

2+2=4

UNIT - II

2 An effort of 300 N is required to just move a body up a plane inclined at an angle of 30° with horizontal. The force is acting parallel to the plane. The angle of inclination of the plane is then increased to 45° and now the effort required to move the body is 480 N, parallel to the plane. Determine the coefficient of friction and the weight of the body.

16

OR

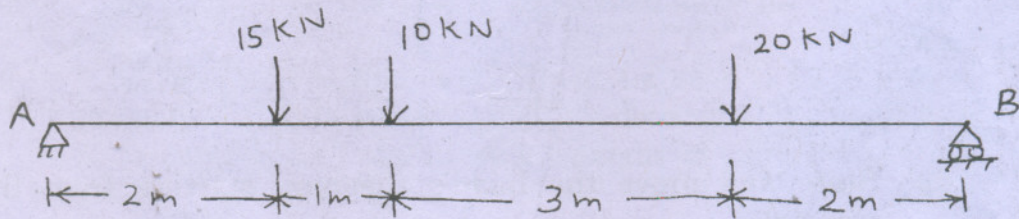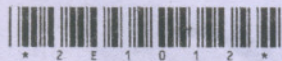2 Use the principle of virtual work to calculate the support reactions of the beam shown in **fig. 3**.

fig. 3

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UNIT - III

3 Calculate the centre of gravity and area moment of inertia of the cross-section given in fig. 4, both about x-x axis and y-y axis. All dimensions shown in fig. 4 are in mm.
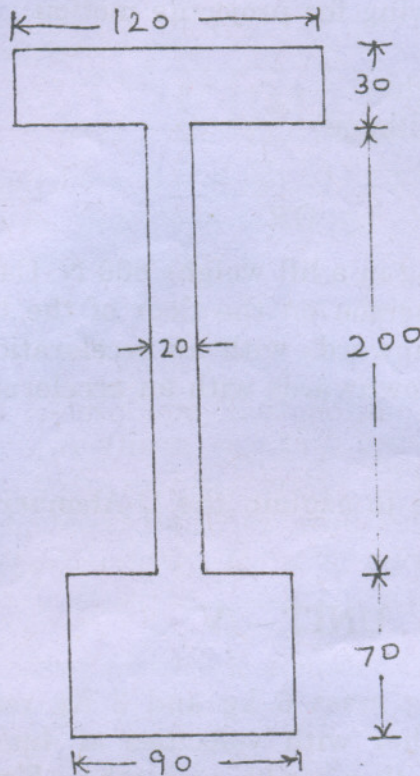
fig. 4

16

OR

3 (a) A load of 2000 N is lifted by an effort of 200 N using a first system of pulleys consisting of 4 movable and one fixed pulley. Calculate the efficiency of the system and the effort lost in friction.

4×2=8

(b) The diameters of driving pulley and driven pulley are 1800 and 600 mm respectively. The distance between the two pulleys is 12 m. Determine the length of the belt required to drive the pulley if it is :
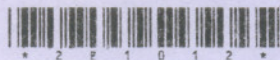
(i) Open belt drive

(ii) Cross belt drive.

4×2=8

UNIT - IV

4 (a) A mass of 10 kg moves a distance of 14 m in the 5th second and 20 m in the 8th second, when moving with uniform acceleration. Determine its acceleration and initial velocity.

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UNIT - V

5   (a)   Two balls having mass 6 kg and 3 Kg respectively move towards each other with velocities of 4m/sec and 2m/sec respectively, and they strike each other. Find the velocities of the balls after impact if the coefficient of restitution is 0.6.

$5 \times 2 = 10$

      (b)   A body weighing 600 N lies on a smooth inclined plane. The plane is inclined at an angle of 45° with horizontal. The body is pulled up the plane and distance of 5m. Calculate the work done in pulling the body.

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OR

5   (a)   State and prove the law of conservation of energy.

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      (b)   A ball is dropped from a height of 4m on a smooth floor. If the height of first source is 1.62 m, determine the coefficient of restitution and the expected height of second bounce.

$4 \times 2 = 8$