Elements of Civil Engineering & Engineering Mechanics
(101104)

P. Pages : 4

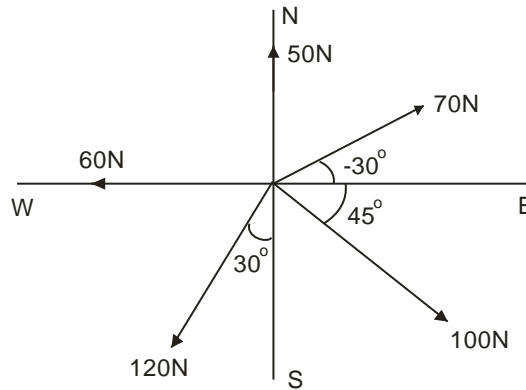**Time : Three Hours**   **Max. Marks : 80**
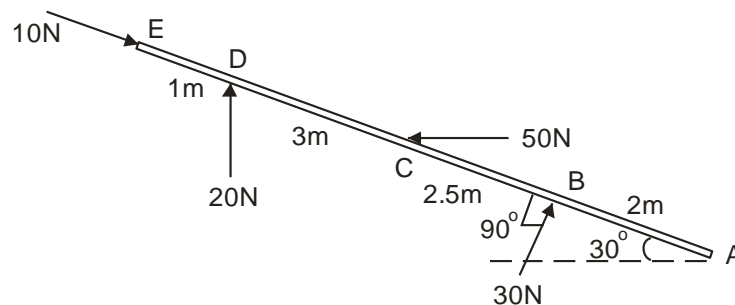
Instructions to Candidates :
1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** subquestions from each unit.
5. Figures to the right indicate full marks.
6. Use of nonprogrammable calculator is allowed.
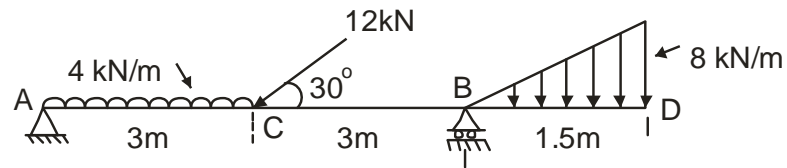7. Assume suitable data wherever necessary.

UNIT - I

1. a) Determine the resultant of five forces acting at a point and locate it on G sketch. **8**

b) A bar ABCDE is subjected to forces as shown. **8**
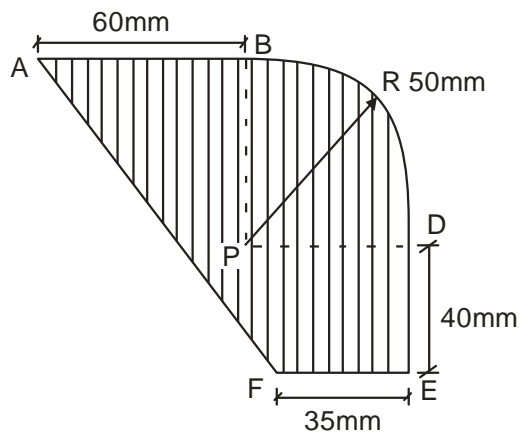Find the magnitude, direction and point of application of resultant.

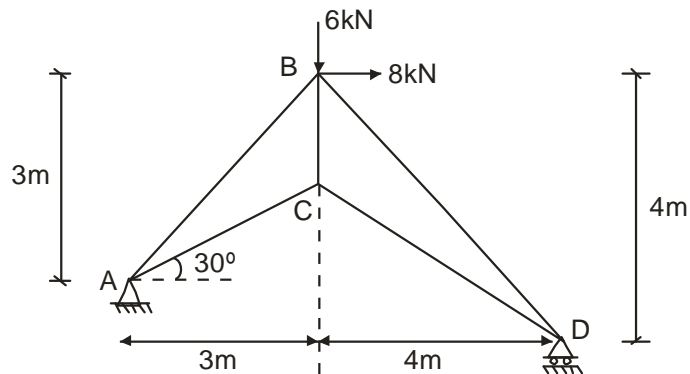c) Calculate the reation at supports of the beam loaded as shown.　　**8**
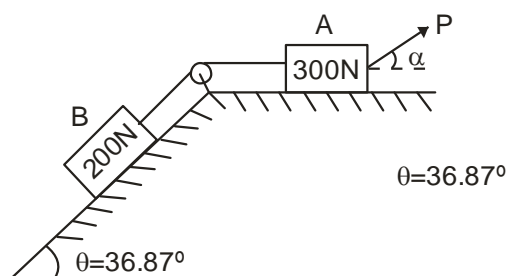

UNIT - II

2. a) Determine the centroid of the shaded area shown.　　**8**

b) Find out forces in all the members of a truss.　　**8**

c) Find the least value of P that will just start the system of blocks moving to the right. Take $\mu=0.3$. Assume smooth pulley.　　**8**
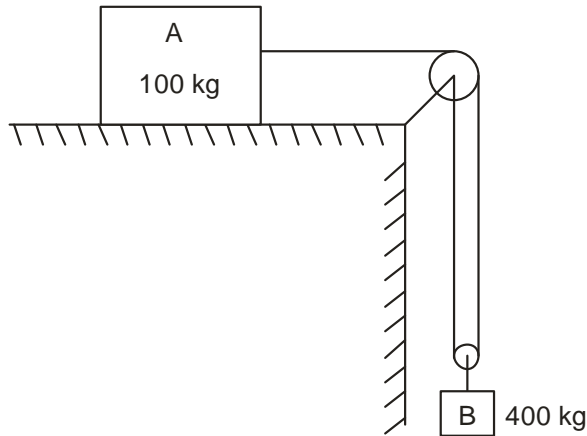
UNIT - III

3. a) Derive the equations for tangential & normal components of velocity and acceleration.   **8**

    b) A projectile is aimed at an object on the horizontal plane through the point of projection and falls 10m short when angle of rojection is 15^0, while it overshoots the object by 20m when angle of projection is 45^0. Determine the angle of projection to hit the object correctly.   **8**

    c) A vehicle moves with a constant velocity of 45 kmph for the first 1.5 minute. Later it accelerates uniformly at 1.5 m/s^2 and attains maximum velocity of 153 kmph. It proceeds further with the maximum velocity for the next 3 minutes and comes to rest with constant declaration in 20 seconds. Find the total time of travel and total distance covered.   **8**

UNIT - IV

4. a) The system shown in fig. is released from rest. Find the velocity and acceleration of block B after A has moved through 10cm. The coefficient of friction between block A & table is 0.2 and pulleys are assumed to be friction less and weightless.   **8**

    b) i) Explain the principles of surveying.   **4**

       ii) Explain the principles of work energy and Impulse momentum.   **4**

c) A compan traverse ABCDEA was run anticlockwise and the following are the observed bearings.
Determine the correct included angle.

8

Line	FB	BB
AB	150° 30'	329° 45'
BC	78° 0'	256° 30'
CD	42° 30'	223° 45'
DE	315° 45'	134° 75'
EA	220° 15'	40° 15'

UNIT – V

5. a) i) Enlist the principles & planning. **4**

ii) Explain any one of the principles of planning. **4**

b) Write short notes on : **8**

i) Environmental Engineering.

ii) Geotechnical Engineering.

c) i) What is the necessity of Building bye laws. **4**

ii) State & Explain various types of structures. **4**

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