**43 (1) STRU (I) 1·5**

**2012**

# STRUCTURE – I

Paper : ENG 1·5

*Full Marks : 100*

*Pass Marks : 40*

Time : Three hours

***The figures in the margin indicate full marks for the questions.***

*Answer **any five** questions.*

1. *(a)* Write down the effects of a force and characteristics of a force.

   *(b)* Find the magnitude of the two forces, such that if they act at right angles, their resultant is $\sqrt{10}\ N$. But if they act at 60°, their resultant is $\sqrt{13}\ N$. 10+10=20

2. *(a)* State Parallelogram Law of force

(b) The following forces act at a point

(i) 20*N* inclined at 30° towards NE

(ii) 25*N* towards North

(iii) 30*N* towards North West and

(iv) 35*N* inclined at 40° towards SW

Find the magnitude and direction of the resultant force. 10+10=20

3. (a) What do you mean by equilibrium of forces ? Write down the principles of equilibrium.

(b) An electric light fixtures weighting 15*N* hangs from a point *C*, by two strings AC and BC. The string AC is inclined at 60° to the horizontal and string BC at 45° to the horizontal. Using Lami's theorem, or otherwise, determine the forces in the strings AC and BC. 10+10=20

4. (a) State Lami's theorem.

(b) An I-section has the following dimensions in *mm* units :

Bottom flange = 300 × 100



Top flange = 150 × 50

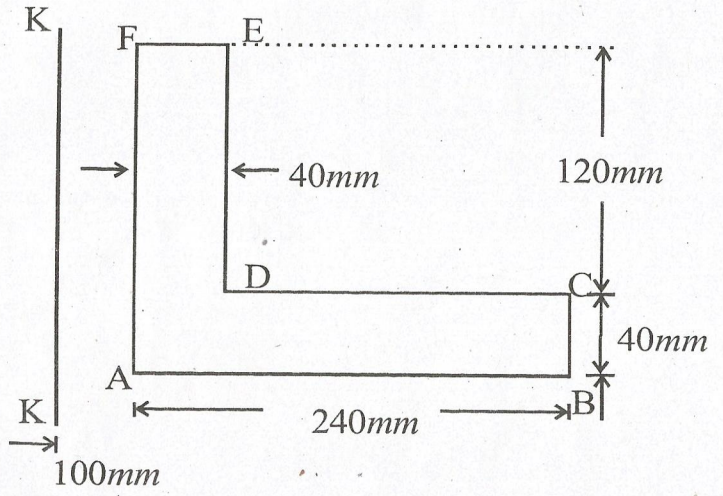
Web = 300 × 50

Determine mathematically the position of centre of gravity of the section.

5+15=20

5. (a) Define moment of force.

(b) Find the moment of Inertia of the area ABCDEF as shown below :




Compute the M. I. of the above area about pair K-K. 5+15=20

6. *(a)* Define force of friction.

*(b)* A body of weight $300N$ is lying on a rough horizontal plane having a coefficient of friction as 0.3. Find the magnitude of the force, which can move the body while acting at an angle of 25° with the horizontal. 5+15=20

7. Write short notes on : 5×4=20

*(a)* Limiting friction

*(b)* Normal Reaction

*(c)* System of force

*(d)* Parallel forces and couples.

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