Total No. of Questions : 6 Total No. of Printed Pages : 6

EK-318

B.E. (IInd Sem.) (CGPA) Civil Engg. Exam.-2016

ENGINEERING MECHANICS

Paper - CE-204

Time Allowed : Three Hours
Maximum Marks : 60

Note : Question No. I is compulsory. Each carry one mark. Question II to VI has internal choice.

Q.I Choose the correct answer— 2 each

(i) The frictional force is independent of —
- (a) Area of contact
- (b) Coefficient of friction
- (c) The normal reaction
- (d) The angle of friction

(ii) A rigid body is in equilibrium under the action of three forces. It implies that the forces in use—
- (a) Be concurrent
- (b) Be coplaner
- (c) Either be concurrent or coplaner
- (d) Pass through the centre of mass

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(iii) The centroid of a triangular area of base b and height h measured from left bottom corner given by—

(a) $\frac{1}{3}(a+b), \frac{h}{3}$ (b) $\frac{1}{2}(a+b), \frac{h}{4}$

(c) $\frac{1}{4}(a+b), \frac{h}{2}$ (d) None

(iv) The D' Alembert principle—
- (a) Is a hypothetical principle
- (b) Provides no special advantage over Newton's law
- (c) Is based up on the existance of inertia force
- (d) Allows a dynamical problem to be treated to a statical problem

(v) The maximum bending moment in a simply supported beam length L loaded by a concentrated load W at the mid point is given by—

(a) WL (b) WL/2
(c) WL/4 (d) WL/8

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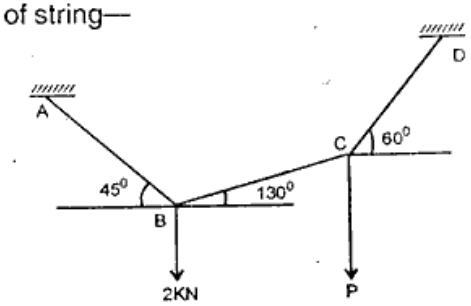
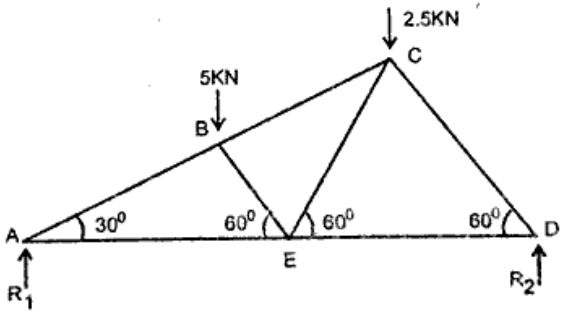
Q.II (a) State the law of moment. 2

(b) A string is subjected to the following forces 2 KN and P as shown in fig. Determine the magnitudes of P and tensions in the various portion of string—

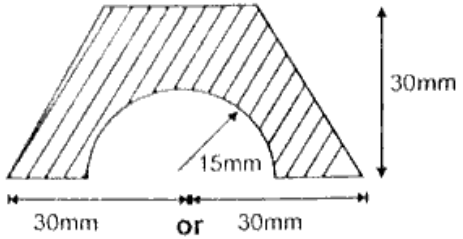


or

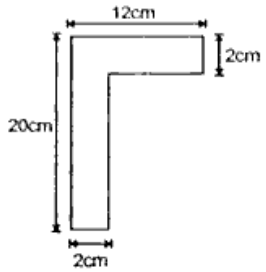
A truss of 12 m span is loaded as shown in fig. Find the forces in the members of the truss. 8



Q.III Find the moment of inertia of shaded area about centroidal x axis.



Find the principal moments of inertia and directions of principal axes for the angle section shown in fig.



Q.IV (a) State the law of dynamic friction. 2

(b) A ladder 5 m long and of 250 N weight is placed against a vertical wall in a position where its inclination to the vertical is 30°. A man weighing 800N climbs the ladder. At what position will be induce slipping ? The co-efficient of friction for both the contact surface of the ladder is 0.2. 8

or

(a) Write the advantages and disadvantages of belt drive. 2

(b) A leather belt 200 m x 10 mm has a maximum permissible tension as 2 MN/MC if the ratio of tension is 1.8, determine at what velocity should it be run so as to transmit maximum powers. Also determine the maximum value of power. Take the density of belt material = 1100 Kg/m^3.

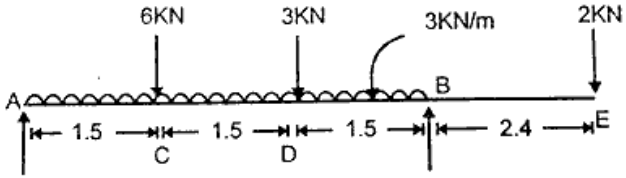
Q.V A block a weighing 3000N rests on an inclined plane of 30^0. It is connected by a pulley of weight 800 N and radius 250 mm at other end of which a 2000N weight B is attached as shown in fig. if the friction less torque of the pulley is 10 N-m, determine accelaration of the block coefficient of friction between the block A and the plane is 0.1.

or

Three perfectly elastic balls A, B and C of masses 4 Kg, 8 Kg and 10 Kg move in the same directions

with velocities of 8m/s, 2m/s and 1.5 m/s respectively. If the ball A impinges with the ball B, which in turn impinges with the ball C, prove that the balls A and B will be brought to rest by the impacts.

Q.VI Draw the shear force and bending moment diagram and calculate the maximum bending moment and the point at which it occurs.



or

(a) What is the point of contraflexture. 2

(b) Draw the shear froce and bending moment diagram for a cantilever loaded as shown in fig.