MATHS

BOOKS - ML KHANNA

SELF ASSESSMENT TEST

Objective Mathematics

1. A uniform one metre long rod AB of 17 kg weight I suspended horizontally from fixed supports by two vertical strings attached to

points C and D on the rod at distances of 12 cm and 16 cm from A and B respectively .The strings at C and D can support weights of 10 kg and 9 kg respectively without breaking .Find where a weight of 2 kg can be attached to the rod without breaking either of the string .

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2. A ship is approaching a cliff of height 105 m above sea level . A gun fitted on the ship can fire shots with a speed of $110ms^{-1}$. Find the

maximum distance from the foot of the cliff from where the gun can hit an object on the top of the cliff.

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3. Let N denote the set of all natural numbers and R be the relation on NxN defined by $(a, b)R(c, d)ad(b + c) = bc(a + d)$. Check whether R is an equivalence relation on NxN.

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4. Two uniform rods AB and BC of weight w per unit length hinged smoothly at B . They are kept in horizontal position with end A hinged smoothly at a fixed point and the rod BC resting on a peg D . If BD = k .BC , find the value of k in terms of AB and BC. Also find the reactions at A and D .

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5. A light triangular frame ABC is placed with its plane vertical and the base .BC horizontal

on two pegs situated just below the vertices B and C . A weight of 289 kg is suspended from the vertex A . If AB = 15 m , BC = 17 m and Ca = 8 m ,find the tensions (thrusts) in the arms of the frame .Also find the reactions on the pegs .

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6. Let A and B be two non-empty subsets of a set X such that A is not a subset of B then

A. A is subset of the complement of B

B. B is a subset of A

C. A and B are disjoint

D. A and the complement of B are non - disjoint .

Answer: D

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7. The resultant of two forces sec B and C along sides AB , AC of triangle ABC is a force acting along AD when D is

A. middle point of BC

B. foot of perpendicular from A on BC

C. D divides Bc in the ratio $\cos B : \cos C$

D. D divides BC in the ratio $\cos C : \cos B$

Answer:

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8. If a system of coplanar force acting on a rigid body is represented in magnitude , direction and sence by the sides of a polygon

taken in order , then the system is equivalent to

A. a single non - zero force

B. a zero force

C. a couple whose moment is equal to the area of the polygon

D. a couple whose moment is twice the area of the polygon

Answer: D

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9. A body is in equilibrium a rough in clined plane of which the coefficient of friction is $1/\sqrt{3}$. The angle of inclination of the plane is gradually increased .The body will be on the point sliding downwards when the inclination of the plane reaches

A. 15°

B. 30°

C. 45°

D. 60°

Answer: B

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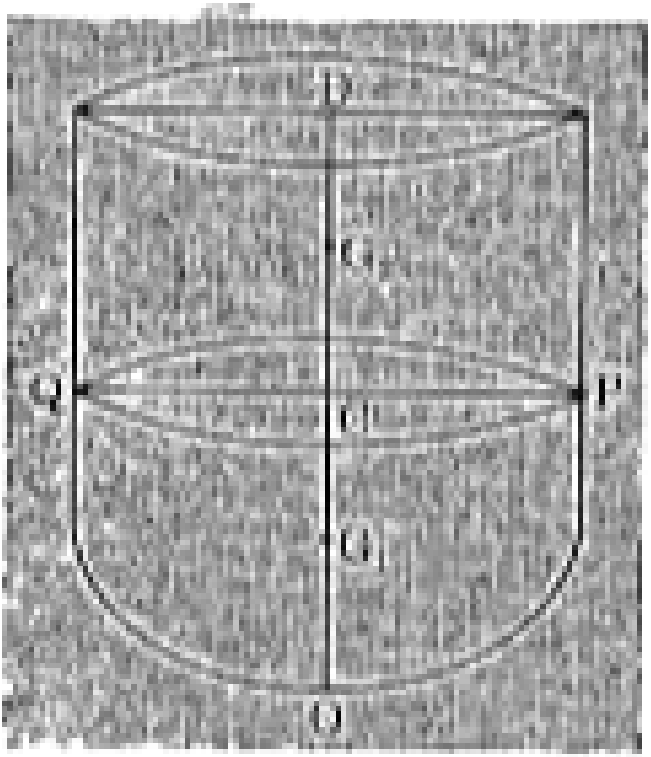
10. A body consists of a solid cylinder with radius a and height a together with a solid hemisphere of radius a placed on the base of the cylinder .The centre of gravity of the

complete body is



A. Inside the cylinder

B. inside the hemisphere

C. On the interface between the two

D. Outside both

Answer: A

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11. A body start from rest and moves in a straight line with uniform acceleration F , the distances covered by in it second , fourth and eights seconds are

A. in arthmetic progression

B. in geometrical progression

C. in the ratio $1:3:7$

D. in the ratio $3:7:15$

Answer: D

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12. An elastic ball with coefficient of elasticity 1/2 is dropped from rest at a height h on a smooth floor . The total distance covered by the ball is

A. more than 2h

B. less than 2h but more than $\frac{3}{2}$ h

C. less than $\frac{3}{2}$ h but more than $\frac{4}{3}$ h

D. less than $\frac{4}{3}$h

Answer: B

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13. A sphere of weight w is in equilibrium on a smooth plane of inclination α to the horizontal , being supported by a string which

is in length equal to the radius and is fastened to two points , one on the sphere and the other on the plane . Show that the tension of the string is $\frac{2}{3}.\sqrt{3}w\sin\alpha$

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14. A ladder whose centre of gravity divides its length in the ratio a : b is in limting equilibrium with its one end on a rough floor (coefficient of friction μ) and the other end against a rough vertical wall (coefficient of

friction μ) .Determine the angle of inclination of the ladder in terms of two angles of friction .

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15. A gun has to be fired from the bottom of a hill on the target which is at a distance R up the hill along the line of greatest slope , whose inclination to the gun should be fired so that it may hit the target .What is the greatest range you can get on the line of

greatest slope if the velocity of projection V is fixed ?

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16. A particle moves in a straight line with a velocity which varies as the square of distance from a fixed point .Its acceleration varies as the cube of the distance .

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