

STARS ACADEMY LAHORE

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Roll No. of Candidate _____

Name of Candidate _____

STARS ENTRY TEST SYSTEM-2021 (MDCAT)

Test Code: P-2 (Work & Energy + Rotational & Circular Motion)

Time Allowed: 50 min

PHYSICS

1. You lift a box from the floor and keep it on a table. The work done by you on the box does not depend on

- A) The initial and final position
- B) Time taken to lift the box
- C) The path followed by the box
- D) Both B) & C)



2. A car accelerates up a hill what happens to its K.E and its P.E respectively

	K.E	P.E
A)	Increases	Decreases
B)	Decreases	Increases
C)	Increases	Increases
D)	Remains same	Increases

3. An object is lifted 5 m above the level ground, the mass of the object is 20 kg and the gravitational pull is 10 N kg^{-2} , the P.E of the object is

- A) 1000 J
- B) 2.5 J
- C) 40 J
- D) 0 J

4. An engine pump is used to pump a liquid of density ρ continuously through a pipe of cross-sectional area A) If the speed of flow of the liquid in the pipe is v, then the rate at which kinetic energy is being imparted to the liquid is:

- A) $\frac{1}{2} A\rho v^3$
- B) $\frac{1}{2} A\rho v^2$
- C) $\frac{1}{2} A\rho v$
- D) $A\rho v$

5. Initially, four identical uniform bricks, each of mass "m" and thickness "h" are spread on a table.



How much work is done on the bricks in stacking them on top of one another?

- A) 2mgh
- B) 3mgh
- C) 4mgh
- D) 6mgh

6. An automobile travelling with speed of 60 km/h, can brake to stop within a distance of 20 cm. If the car is going twice as fast, i.e., 120 km/h, the stopping distance will be

- A) 20 m
- B) 60 m
- C) 40 m
- D) 80 m

7. A force $F = (10\hat{i} + 5\hat{j} + 2\hat{k}) \text{ N}$ is applied over a particle which displaces it from its origin to the point

$\vec{r} = (5\hat{i} - 5\hat{j}) \text{ m}$. The work done on the particle in joules is

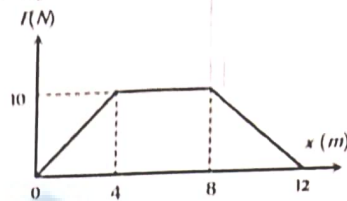
- A) 0
- B) 50
- C) +25
- D) -10

8. For freely falling body, in the presence of air friction:

- A) $mgh = \frac{1}{2} mv^2 - fh$
- B) $mgh = \frac{1}{2} mv^2 - fh^2$
- C) $mgh = \frac{1}{2} mv^2 + fh$
- D) $mgh = \frac{1}{2} mv^2$

9.

A particle of mass 0.1 kg is subjected to a force which varies with distance as shown in fig. If it starts its journey from rest at $x=0$, its velocity at $x=12$ m is:



- A) 0 m/s
 B) $20\sqrt{2}$ m/s
 C) $20\sqrt{3}$ m/s
 D) 40 m/s

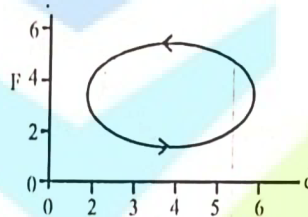
10. A ball of mass 1 kg is released from the tower of Pisa the Kinetic energy generated in it after 10m will be:

- A) 98J
 B) 10J
 C) 9.8J
 D) 8J

11. Proton, Neutron, electron and α -particle have same momentum, which particle have greater K.E.?

- A) α -particle
 B) Neutron
 C) Proton
 D) Electron

12. Total work done in figure:



- A) 24 Nm
 B) 16 Nm
 C) 8 Nm
 D) Zero Nm

13. When a body is dropped from a height 490 m, velocity just before the body strikes the ground is (Ignore air friction)

- A) 490 m/s
 B) 49 m/s
 C) 98 m/s
 D) 9.8 m/s

14. A person holds a bucket of weight 60 N. He walks 7 m along the horizontal then climbs up a vertical distance of 5m. The work done by the man is:

- A) 300 J
 B) 420 J
 C) 720 J
 D) none

15. The consumption of energy by 60-watt bulb in 2 seconds is:

- A) 20 J
 B) 120 J
 C) 30 J
 D) 0.02 J

16. Which of the following is non-conservative force?

- A) Gravitational force
 B) Frictional force
 C) Elastic spring force
 D) Electric force

17. A stone of mass 2.0 kg is dropped from a rest position 5.0 m above the ground. What is its velocity at a height of 3.0 m above the ground?

- A) 16.0 m/s
 B) 12.5 m/s
 C) 6.3 m/s
 D) 9.3 m/s

18. 100 joules work has been done by an agency in 10 seconds. What is power of agency?

- A) 1000 watts
 B) 100 watts
 C) 10 watts
 D) 0.10 watts

19. Two bodies of masses $2m$ and m have their K.E. in the ratio 8 : 1, then their ratio of momenta is

- A) 1:1
 B) 4:1
 C) 2:1
 D) 8:1

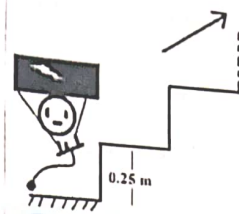
20. An electric motor creates tension of 4500N in a cable and reels at 2ms^{-1} the power of motor is

- A) 15 kW
 B) 9 kW
 C) 9000 kW
 D) 205 kW

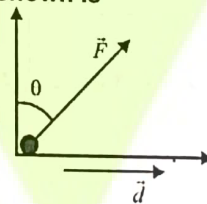
21. From an automatic gun a man fires 360 bullet per minute with a speed of 360 km/hour. If each weigh 20 g, the power of the gun is:

- A) 600 W
 B) 300 W
 C) 150 W
 D) 75 W

A man with 20kg load on his head climbs up 20 steps of 0.25m height each. The work done in climbing is: ($g = 10 \text{ m s}^{-2}$)

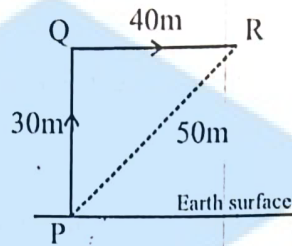


- A) 5 J
B) 100 J
C) 350 J
D) 3500 J
23. The angular velocity of a flywheel change from 6 rad s^{-1} to 18 rad s^{-1} in 6 seconds. Calculate its angular acceleration.
A) 2 rad/s^2
B) 4 rad/s^2
C) 3 rad/s^2
D) 0 rad/s^2
24. A body rotates about a fixed axis with an angular acceleration of 3 rad/s^2 . The angle rotated by it during the time when its angular velocity increases from 10 rad/s^{-1} to 20 rad/s^{-1} (in radian) is
A) 5 rad
B) 10 rad
C) 50 rad
D) 30 rad
25. A 100 kg car is moving with a maximum velocity of 9 m/s across a circular track of radius 30 m. The maximum force of friction between the road and the car is
A) 1000 N
B) 270 N
C) 706 N
D) 200 N
26. Linear velocity or tangential velocity of any particle moving in a circular path of radius 2 m with angular velocity 8 rad/s^{-1} will be:
A) 16 ms^{-1}
B) 4 ms^{-1}
C) 10 ms^{-1}
D) 6 ms^{-1}
27. A wheel of radius 1 m covers an angular displacement of 180° . Its linear distance is:
A) 3.14 m
B) $\pi \text{ rad}$
C) 6.28 m
D) 0.157 m
28. The work done by force " \vec{F} " in figure shown is



- A) $Fd \cos \theta$
B) $Fd \tan \theta$
C) $Fd \sin \theta$
D) $Fd \cot \theta$
29. An object is moving along a circular path of radius 4 m. what will be its angular displacement if it moves 14 m on this circular path?
A) 5.5 radians
B) 3.5 radians
C) 5.0 radians
D) 4.5 radians
30. If a racing bike moves with a velocity of 10 ms^{-1} on a circle of radius 20m then its angular velocity is:
A) 0.5 rads^{-1}
B) 20 ms^{-1}
C) 10 ms^{-1}
D) 200 ms^{-1}
31. A wheel rotates with a constant acceleration of 2.0 radian/sec^2 . If the wheel starts from rest, the number of revolutions it makes in the first ten seconds will be approximately
A) 16
B) 24
C) 8
D) 32
32. If a rotating fan is switched off, then angular acceleration and angular velocity are:
A) Parallel
B) Perpendicular
C) Anti - Parallel
D) Constant
33. To complete the circular path (vertical circle), the minimum velocity should be:
A) $\sqrt{5rg}$
B) 0
C) $\sqrt{3rg}$
D) $\sqrt{6rg}$

34. Two cars A and B are in moving along circular paths of radii 4 m and 8 m respectively. Their motion is such that each completes 1 rev in the same intervals of time. The ratio of their angular velocities will be?
 A) 1:1
 B) 2:3
 C) 1:2
 D) 2:1
35. A stone of weight 4 N in the Earth's gravitational field is moved from "P" to "Q" and then to "R" along the path shown.



- How much potential energy does the stone gain?
 A) 120 J
 B) 280 J
 C) 200 J
 D) 1200 J
36. A body is moving along a circular path with variable speed, it has
 A) A radial acceleration
 B) A tangential acceleration
 C) Zero acceleration
 D) Both radial and tangential acceleration
37. The ratio of distance to the angular displacement for a body moving in circle of radius 5m is:
 A) 5 m
 B) $\frac{5}{\pi}$ m
 C) 5π m
 D) $\frac{1}{5}$ m
38. A body is moving in a circular path with uniform speed. The magnitude of the tangential and centripetal acceleration is

	Tangential	Centripetal
A)	0	0
B)	$\frac{v^2}{r}$	0
C)	0	$\frac{v^2}{r}$
D)	$\frac{v^2}{r}$	$\frac{v^2}{r}$

39. If the body is moving in a circle of radius r with a constant speed v , its angular velocity is
 A) $\frac{v^2}{r}$
 B) $\frac{v}{r}$
 C) vr
 D) $\frac{r}{v}$
40. A disc is free to rotate about an axis perpendicular to the disc and passing through its centre. If the disc starts from rest and accelerates uniformly at the rate of 5 rad/s^2 for 4 sec, what is its angular displacement during this time?
 A) 20 rad
 B) 30 rad
 C) 40 rad
 D) 0 rad
41. A particle of mass m is rotating by means of a string in a vertical circle. The difference in the tensions at the bottom and the top would be:
 A) $6mg$
 B) $4mg$
 C) $2mg$
 D) zero
42. A particle moves in a circle of radius 25 cm at two revolutions per second. The acceleration of the particle in ms^{-2} is
 A) π^2
 B) $4\pi^2$
 C) $8\pi^2$
 D) $2\pi^2$

44. A 500 kg car takes a round turn of radius 50 m with a velocity of 36 km/hr. The centripetal force is
A) 250 N
B) 1000 N
C) 750 N
D) 1200 N
44. A ball of mass 0.25 kg attached to the end of a string of length 1.96m is moving in a horizontal circle. The string will break if the tension is more than 25 N. What is the maximum speed with which the ball can be moved?
A) 14 m/s
B) 3.92 m/s
C) 3 m/s
D) 5 m/s
45. In equation $\vec{a} = \vec{\alpha} \times \vec{r}$ 90° is angle between
A) \vec{a} and $\vec{\alpha}$
B) \vec{r} and $\vec{\alpha}$
C) \vec{r} and \vec{a}
D) All of these
46. The angle described in 2sec by an object rotating at a rate of 600 rpm is
A) 20π rad
B) 5π rad
C) 40π rad
D) Zero
47. Angular speed of a second's hand of a clock is
A) $\frac{\pi}{180} \text{ rads}^{-1}$
B) $\frac{\pi}{1800} \text{ rads}^{-1}$
C) $\frac{\pi}{60} \text{ rads}^{-1}$
D) $\frac{\pi}{30} \text{ rads}^{-1}$
48. A body of mass 5 kg is moving in a circle of radius 1m with an angular velocity of 2 radian/sec) The centripetal force is
A) 10 N
B) 30 N
C) 20 N
D) 40 N
49. The angular velocity of a particle rotating in a circular orbit 100 times per minute is
A) 1.66 rad/s
B) 10.47 deg/s
C) 10.47 rad/s
D) 60 deg/s
50. When a body is whirled in a horizontal circle by means of a string the centripetal force is supplied by
A) Mass of body
B) Velocity of body
C) Tension in the string
D) Centripetal acceleration

TESTS ARE THE BEST FOR YOUR TEST

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SUBJECT _____

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INSTR

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- FILL IN BUBBLE COM
- EXAMPLE (i): A
- DO NOT FOLD OR ST
- MULTIPLE RESPON
- PLEASE FILL IN THE
- THE UNIVERSITY S
- ABOVE INSTRUCTIO

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SUBJECT WITH CODE	P-2
SECTION	ME1
RIGHT ANSWERS	

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EXAMINATION
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