Physics

1. What happens to the gravitational potential at the centre of the uniform spherical shell which shrinks gradually?

(a) Remains constant

(b) Decreases

(c) Increases

(d) Oscillates

Answer: (b) Decreases

2. What is the relation between the escape velocity and orbital velocity of a satellite, if the satellite is close to the earth's surface?

(a) ve=2v0−−−√

(b) ve=2–√v0

(c) v0=2ve−−−√

(d) v0 = ve

Answer: (b) ve=2–√v0

3. What happens to the weight of the body if the weight becomes 116 at a certain. Also, consider the radius of the earth to be R.

(a) 4R

(b) 15R

(c) 5R

(d) 3R

Answer: (d) 3R

4. What is the maximum height attained by the rocket above the surface of the earth if the mass of the rocket is M, and the initial speed to be V. Assume that R is the radius of the earth.

(a) RgR2V2−1

(b)R2gRV2−1

(c) R(gR2V2−1)

(d) R(2gRV2−1)

Answer: (b) R2gRV2−1

5. What is the increase in the potential energy of the body with mass m if the body is taken at the height h which is equal to the radius of the earth?

(a) mgR

(b) 2mgR

(c) 12mgR

(d) 14mgR

Answer: (c) 12mgR

6. Consider a body of mass m which needs to be moved from an orbit of radius 2R to 3R. What is the energy required

(a) GMm12R2

(b) GMm6R

(c) GMm8R

(d) GMm3R2

Answer: (b) GMm6R

7. The distance between the closest planet and the sun is r1 while the distance between the farthest planet and the sun is r2. The linear velocities of these planets is v1 and v2 respectively. What is the ratio of v1v2

(a) (r1r2)2

(b) (r1r2)

(c) (r2r1)

(d) (r2r1)2

Answer: (c) (r2r1)

8. Choose the factor on which the orbital velocity does not depend when the satellite is orbiting close to the earth's surface

(a) The mass of the earth

(b) The mass of the satellite

(c) The orbital radius

(d) The radius of the earth

Answer: (b) The mass of the satellite

9. If a satellite takes time T for revolution, the the kinetic energy is proportional to

(a) 1T

(b) T−23

(c) 1T2

(d)1T3

Answer: (b) T−23

10. The atmosphere around the earth is held by

(a) Gravity

(b) Winds

(c) Clouds

(d) None of the above

Answer: (a) Gravity

11. What happens to the gravitational potential at the centre of the uniform spherical shell which shrinks gradually?

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12. What is the relation between the escape velocity and orbital velocity of a satellite, if the satellite is close to the earth's surface?

(a) ve=2v0−−−√

(b) ve=2–√v0

(c) v0=2ve−−−√

(d) v0 = ve

Answer: (b) ve=2–√v0

13. What happens to the weight of the body if the weight becomes 116 at a certain. Also, consider the radius of the earth to be R.

(a) 4R

(b) 15R

(c) 5R

(d) 3R

Answer: (d) 3R

14. What is the maximum height attained by the rocket above the surface of the earth if the mass of the rocket is M, and the initial speed to be V. Assume that R is the radius of the earth.

(a) RgR2V2−1

(b)R2gRV2−1

(c) R(gR2V2−1)

(d) R(2gRV2−1)

Answer: (b) R2gRV2−1

15. What is the increase in the potential energy of the body with mass m if the body is taken at the height h which is equal to the radius of the earth?

(a) mgR

(b) 2mgR

(c) 12mgR

(d) 14mgR

Answer: (c) 12mgR

16. By how much does kinetic energy increase if the momentum is increased by 20%

(a) 55%

(b) 66%

(c) 44%

(d) 77%

Answer: (c) 44%

17. Calculate the energy loss in a perfectly inelastic collision if the mass of the object is 40kg with velocity 4m/s hits the object of mass 60kg with velocity 2m/s.

(a) 440J

(b) 110J

(c) 392J

(d) 48J

Answer: (d) 48J

18. Calculate the final kinetic energy of a block of mass if the mass of the block is 10kg and has a constant velocity of 10m/s. The block of mass is subjected to a retarding force of F=0.1J/m

(a) 275J

(b) 250J

(c) 475J

(d) 450J

Answer: (c) 475J

19. What is the average power required to lift a mass of 100kg to a height of 50m in 50 seconds?

(a) 980

(b) 100

(c) 50

(d) 5000

Answer: (a) 980

20. What is the power of the engine when the velocity of the car is v, mass m, acceleration a, and external resistance R

(a) (R-ma)v

(b) (R+ma)v

(c) mav

(d)Rv

Answer: (b) (R+ma)v

21. Which of the following statement is true if a body moves in a semicircular track whose radius is R

(a) 2R is the displacement of the body

(b) πR is the distance travelled by the body

(c) Both (a) and (b) are correct

(d) None of the above

Answer: (c) Both (a) and (b) are correct

22. What does the area under acceleration-time graph represent for any given time interval

(a) Final velocity

(b) Distance travelled

(c) Change in the velocity in that time interval

(d) Displacement of the particle

Answer: (c) Change in the velocity in that time interval

23. When can we say that the resultant of the two vectors is maximum

(a) When the vectors are acting in the opposite direction

(b) Both the vectors are acting in the same direction

(c) When the vectors are at right angles

(d) When the vectors are parallel to each other

Answer: (b) Both the vectors are acting in the same direction

24. From the below, select the unit vector along i^+j^

(a) i^+j^2√

(b) i^+j^2

(c) i^+j^4√

(d) i^−j^2√

Answer: (a) i^+j^2√

25. A particle with radius R is moving in a circular path with constant speed. The time period of the particle is T. Calculate the time for the following after t=T6. What is the average velocity of the particle

(a) 3RT

(b) 4RT

(c) 6RT

(d) 2RT

Answer: (c)6RT

26. What will be the flux coming out of any surface a cube, if a change QμC is placed at the centre of the cube?

(a) Q6ϵ0×10−3

(b) Q24ϵ0

(c) Q8ϵ0

(d) Q6ϵ0×10−6

Answer: (d) Q6ϵ0×10−6

27. Name the law that states the force between electric charges

(a) Ohm’s law

(b) Coulomb’s law

(c) Faraday’s law

(d) Ampere’s law

Answer: (b) Coulomb’s law

28. What happens to the force acting between the charged particles, if the distance between these charged particles is halved?

(a) It increases by four times

(b) It gets doubled

(c) It becomes half

(d) It reduces by one-fourth

Answer: (a) It increases by four times

29. What is the minimum charge on a particle?

(a) 1 Coulomb

(b) 1.6 x 10-19 Coulomb

(c) 3.2 x 10-19 Coulomb

(d) 6.6 x 10-19 Coulomb

Answer: (b) 1.6 x 10-19 Coulomb

30. The capacity of parallel plate condenser is dependent on the

(a) The separation between the plates

(b) The metal used for the construction

(c) The thickness of the plate

(d) The potential applied across the plates

Answer: (a) The separation between the plates

31. The mathematical representation of the force of attraction between the plates of the parallel plate capacitor is given as

(a) q22ϵ0A2K

(b) q2ϵ0AK

(c) q22ϵ0AK

(d) q2ϵ0A

Answer: (c) q22ϵ0AK

32. What does an electric dipole experience when it is kept in the non-uniform electric field?

(a) Only a force

(b) Only torque

(c) Force and torque both

(d) Neither force nor torque

Answer: (c) Force and torque both

33. The capacitance of the capacitor is independent of

(a) The charges present on the plate

(b) The distance of separation between the plates

(c) The shape of the plates

(d) The size of the plates

Answer: (d) The size of the plates

34. Consider two capacitances of capacity C1 and C2 which are connected in series and have potential difference V. What is the potential difference across C1?

(a) V(C1C1+C2)

(b) V(C1+C2C1)

(c) V(C2C1)

(d) V(C2C1+C2)

Answer: (d) V(C2C1+C2)

35. The position of a particle in a rectangular coordinate system is (3,2,5). What will the position vector be?

(a)3i^+2j^+5k^

(b)3i^−2j^−5k^

(c)5i^+2j^+3k^

(d)2i^+5j^+3k^

Answer: (a) 3i^+2j^+5k^

36. What is the displacement vector of the particle that moves from point P (2,3,5) to point Q (3,4,5)?

(a)i^+j^+5k^

(b)2i^+4j^+6k^

(c)i^+j^

(d)i^+j^10k^

Answer: (c) i^+j^

37. What is the vertical component of the force 5 N acting on a particle along a direction making an angle of 600?

(a)3 N

(b)2.5 N

(c)10 N

(d)4 N

Answer: (b) 2.5 N

38. What is the direction of cosines of vector $\vec{A}$ =2i^+4j^−5k^?

(a)245√,445√,−545√

(b)445√,0,−445√

(c)345√,245√,545√

(d)145√,245√,545√

Answer: (a) 245√,445√,−545√

39. What is the minimum number of coplanar vectors with different magnitudes that can be added to get a resultant of zero?

(a)1

(b)2

(c)3

(d)4

Answer: (c) 3

39. A fly in the hall of dimensions 10 m×12 m×14 m starts to fly from one corner and ends up at the diametrically opposite corner. What is the magnitude of its flight?

(a)17 m

(b)21 m

(c)26 m

(d)36 m

Answer: (b) 21 m

40. Five equal forces of 10 N are applied at a point. If the angle between them is equal, what is the resultant force?

(a)10 N

(b)102–√N

(c)20 N

(d)0

Answer: (d) 0

41. Two bikes travelling in the same direction move at a speed of 30 km/hr. The bikes are separated by a distance of 5 km. What would the speed of the car travelling in the opposite direction be if it meets these bikes at an interval of 4 minutes?

(a)40 km/hr

(b)45 km/hr

(c)30 km/hr

(d)15 km/hr

Answer: (b) 45 km/hr

42. On a rainy day, a girl standing on the road has to hold her umbrella at an angle of 300 with respect to the vertical to avoid getting drenched in the rain. She throws the umbrella and starts running at a speed of 10 km/hr. She notices that the raindrops are falling vertically on her head. What is the speed of the raindrops with respect to the ground?

(a)20 km/hr

(b)10 km/hr

(c)30 km/hr

(d)40 km/hr

Answer: (a) 20 km/hr

43. In the above problem, the speed of raindrops w.r.t to the moving girl is

(a)102√km/hr

(b)53√km/hr

(c)103–√km/hr

(d)5km/hr

Answer: (c) 103–√km/hr

44. A 150 m long train moves towards south at a speed of 10 m/s. A sparrow flying at a speed of 5 m/s towards north crosses the train. What is the time taken by the sparrow to cross the train?

(a)30 s

(b)15 s

(c)8 s

(d)10 s

Answer: (d) 10 s

45. A river flows east to west at a speed 5 m/min. A man capable of swimming 10 m/min in still water is standing on the south bank of the river. He wants to swim across the river in the shortest time possible. Which of the following path should he choose?

(a)Due North

(b)Due North-East

(c)Due North-East with double the speed of the river

(d)None of the above

Answer: (a) Due North

46. A person who aims to reach the exact opposite point on the bank of a stream swims at a speed of 0.5 m/s at an angle of 1200 following the direction of the water flow. What is the speed of water in the stream?

(a)1 m/s

(b)0.25 m/s

(c)0.5 m/s

(d)0.433 m/s

Answer: (b) 0.25 m/s

47. X moves at a speed of 65 km/hr while Y who is behind X moves at a speed of 80 km/hr. What is the relative velocity of Y with respect to X?

(a)60 km/hr

(b)80 km/hr

(c)145 km/hr

(d)15 km/hr

Answer: (d) 15 km/hr

48. A person who aims to reach the exact opposite point on the bank of a stream swims at a speed of 0.5 m/s at an angle of 1200 following the direction of the water flow. What is the speed of water in the stream?

(a)1 m/s

(b)0.5 m/s

(c)0.25 m/s

(d)0.433 m/s

Answer: (c) 0.25 m/s