UG (except BBA) CET Sample Paper

PHYSICS: (50 Questions)

1. The capacity of a vessel is $5700m^3$. The vessel is filled with water. Suppose that it takes 12 hours to drain the vessel, what is the mass flow rate (in kg/s) of water from the vessel? The density of water is $1g/cm^3$.

   A. 132 kg/s
   B. 100 kg/s
   C. 32 kg/s
   D. 152 kg/s

2. The expression for the centripetal force depends upon mass of the body, speed of the body and the radius of the circular path. Find the expression for the centripetal force.

   A. $F= mv^2/2r^3$
   B. $F= mv^2/r$
   C. $F= mv^2/r^2$
   D. $F= m^2v^2/2r$

3. A vector a makes an angle of 30 degrees and vector b makes an angle of 120 degrees with the x-axis. The magnitude of these vectors are 3 and 4 respectively. The magnitude of their resultant is

   A. 3 units
   B. 4 units
   C. 5 units
   D. 1 unit

4. The angle between the two vectors A=3i+2j+4k and B=2i+j-2k is equal to

   A. 180 degrees
   B. 90 degrees
   C. 0 degrees
   D. 240 degrees

5. Sound moves with higher velocity if
   A. Pressure of the medium is decreased
   B. Temperature of the medium is increased
   C. Humidity of the medium is increased
   D. Both B and C above

6. A particle moves along a straight line such that its position x at any time t is given by the equation $x=3t^2-t^3$, where x is in metre and t is in seconds. Then

   A. At t=0 , the acceleration is $6m/s^2$
   B. x-t curve has a maximum at 8m
   C. x-t curve has a maximum at 2s
   D. both A and C are correct

7. The motion of a body falling from rest in a resisting medium is described by the equation dv/dt = a-bv, where a and b are constants. The velocity at any time t is

   A. $a(1-b^{2t})$
   B. $[a(1-e^{-bt})]/b$
   C. abe^{-t}
   D. $ab^2(1-t)$

8. A particle is projected at an angle α with the horizontal from the foot of the inclined plane making an angle β with the horizontal. Which of the following expression holds good if the particle strikes the inclined plane normally?

   A. $\cot \beta = \tan(\alpha - \beta)$
   B. $\cot \beta = 2 \tan(\alpha - \beta)$
   C. $\cot \alpha = \tan(\alpha - \beta)$
   D. $\cot \alpha = 2 \tan(\alpha - \beta)$

9. A 0.1 kg body moves at a constant speed of 10 m/s. It is pushed by applying a constant force for 2 sec. Due to this force , it starts moving exactly in the opposite direction with a speed of 4m/s. Then ,

   A. The deceleration of the body is $7m/s^2$
   B. The magnitude of the change in momentum is 1.4 kg m/sec
   C. The impulse of the force is 1.4 Ns
   D. All the above

10. A 40N block is supported by two ropes. One rope is horizontal and the other makes an angle of 30 degrees with the ceiling. The tension in the rope attached to the ceiling is approximately equal to

    A. 80N
    B. 40N
    C. 34.6N
    D. 46.2N

11. Two buses A and B are moving around concentric circular paths of radii r_a and r_b. If the two buses complete circular paths in the same time , the ratio of the linear speeds is

    A. 1
    B. r_a/r_b
    C. r_b/r_a
    D. none of these

12. A point on the periphery of a rotating disc has its acceleration vector making an angle of 30 degrees with the velocity vector. The ratio of the centripetal acceleration to the tangential acceleration is equal to

    A. sin 30
    B. cos 30
    C. tan 30
    D. none of these

13. Which of the following is/are not conservative force?

    A. Gravitational force
    B. Electrostatic force in a columbic field
    C. Frictional force
    D. All the above

14. The potential energy of a particle of mass 5kg moving in the x-y plane is given by U= (-7x+24y) J. (x and y are in meter). If the particle starts from rest from the origin then the speed of the particle at t=2sec is

    A. 5 m/s
    B. 14 m/s
    C. 17.5 m/s
    D. 10 m/s

15. A stone is tied to a string of length L is whirled in a vertical circle with the other end of the string at the centre. At a certain instant of time, the stone is at its lowest position and has a speed U. The magnitude of the change in its velocity as it reaches a position where the string is horizontal is

    A. $\sqrt{(U^2-2gL)}$
    B. $\sqrt{(2gL)}$
    C. $\sqrt{(U^2-gL)}$
    D. $\sqrt{(2(U^2-gL))}$

16. If the momentum of a body is constant , the mass-velocity graph is

    A. Circle
    B. Straight line
    C. Rectangular hyperbola
    D. Parabola

17. A body is dropped and observed to bounce a height greater than the dropping height. Then

    A. The collision is elastic
    B. There is an additional source of energy during collision
    C. It is not possible
    D. This type of phenomenon does not occur in nature

18. The ratio of the radii of gyration of a circular disc and a circular ring of the same radii about the tangential axis in the plane is

    A. 1:2
    B. $5^{1/2}:6^{1/2}$
    C. 2:3
    D. 2:1

19. The gravitational force of attraction between two spherical bodies, each of mass 1 kg placed at 10 m apart ($G=6.67*10^{-11}$ Nm^2/kg^2) is

    A. $6.67*10^{-13}$ N
    B. $6.67*10^{-11}$ N
    C. $6.67*10^{-7}$ N
    D. None of these

20. A particle executing simple harmonic motion has an amplitude of 1m and a time period of 2 seconds. At t=0, net force on the particle is 0. The equation of displacement of the particle is

    A. $X=\sin(\pi t)$
    B. $X=\cos(\pi t)$
    C. $X=\sin(2\pi t)$
    D. $X=\cos(2\pi t)$

21. A particle executes a simple harmonic motion. The amplitude of vibration of the particle is 2cm. The displacement of the particle in one time period is

A. 1cm
B. 2cm
C. 4cm
D. Zero

22. When equal volumes of two substances are mixed, the specific gravity of the mixture is 4. When equal weights of the same substances are mixed, the specific gravity of the mixture is 3. The specific gravity of the two substances would be

A. 6 and 2
B. 3 and 4
C. 2.5 and 3.5
D. 5 and 3

23. Bernoulli's principle is applicable to points

A. In a steadily flowing liquid
B. In a streamline
C. In a straight line perpendicular to a streamline
D. In any non-viscous liquid

24. The equation of a wave travelling on a stretched string along the x-axis is $y=ae^{-(bx+ct)}$. The direction of propagation of the wave is

A. Along negative y-axis
B. Along positive y-axis
C. Along negative x-axis
D. Along positive x-axis

25. If a stone is dropped into a lake from a tower, the sound of splash heard is by a man after 11.5s, then what is the height of the tower?

A. 1000m
B. 100m
C. 500m
D. 150m

26. The equation of a sound wave in air is P=0.01 cos (1000t – 3x), where P,x,t are in SI units. The bulk modulus of elasticity is $1.4*10^5$ N/m^2. The displacement amplitude is

A. 0.24m
B. $0.24*10^{-7}$ m
C. $8*10^{-7}$m
D. 10m

27. The temperature at which phase transition occurs depends on

A. Pressure
B. Volume
C. Density
D. Mass

28. Four gas molecules of a gas have speeds 1,2,3,4 km/s. The value of the root-mean square speed of the gas molecules is

A. $0.5*\sqrt{(15)}$ km/s
B. $0.5*\sqrt{(10)}$ km/s
C. 2.5 km/s
D. $\sqrt{(15/2)}$ km/s

29. What work will be done when 3 moles of an ideal gas is compressed to half the initial volume at a constant temperature of 300K?

A. -5188J
B. 5000J
C. 5188J
D. -5000J

30. A body at temperature of 727 degrees Celsius has a surface area of $5cm^2$, and radiates 300J of energy per minute. The emissivity e =? (Boltzmann constant = $5.67*10^{-8}$ watt m^2 K^4)

A. 0.18
B. 0.02
C. 0.2
D. 0.15

31. Find the position of a 1cm tall object which is placed 8cm in front of a concave mirror of radius of curvature 24cm

A. 24cm
B. 25cm
C. 26cm
D. 27cm

32. In Young's double slit experiment , when violet light of wavelength 435.8nm is used, then 84 fringes are seen in the field of view, but when sodium light of a certain wavelength is used, 62 fringes are seen in the field of view, calculate the wavelength of sodium light :

A. 689.3nm
B. 590.4nm
C. 552.3nm
D. 642.9nm

33. A point charge is projected along the axis of a circular ring of charge Q and radius $10\sqrt{2}$ m. The distance of the point charge from the centre of the ring, where the acceleration of the charged particle is maximum will be

A. 10cm
B. 20 cm
C. ∞
D. None of these

34. What should be the flux linked with the cube if a point charge q is placed at one corner of the cube?

A. q/ε_0
B. $q/2\varepsilon_0$
C. $q/3\varepsilon_0$
D. $q/8\varepsilon_0$

35. Over a thin ring of radius R a charge Q is distributed non-uniformly. Calculate the work done of the force field in displacing a point charge q_1 from centre of the ring to infinity :

A. $Qq_1/4\pi\varepsilon_0 R$
B. $Qq_1/2\pi\varepsilon_0 R$
C. $Qq_1/\pi\varepsilon_0 R$
D. None of these

36. The angle between the electric lines of force and an equipotential surface is

A. 45 degrees
B. 90 degrees
C. 0 degrees
D. 180 degrees

37. Two capacitors having capacitances 8μF and 16 μF having breaking voltages of 20V and 80V respectively. They are combined in series. The maximum charge they can store individually in the combination is

A. 1280 μC
B. 200 μC
C. 160 μC
D. None of these

38. Calculate the work done against the electric force if the separation of the capacitor of area S is increased from x_1 to x_2. Assume charge q on the capacitor is constant.

A. $W= q^2(x_2-x_1)/ \varepsilon_0 S$
B. $W= q(x_2-x_1)/ \varepsilon_0 S$
C. $W= q^2(x_2-x_1)/2\varepsilon_0 S$
D. $W= q^2(x_2-x_1)/4\varepsilon_0 S$

39. Two resistors of 6Ω and 9Ω are connected in series to a 120 V source. The power consumed by the 6 Ω resistor is:

A. 384 W
B. 576 W
C. 1500 W
D. 1800 W

40. The resistance of a 50cm long wire is 10 Ω. The wire is stretched to a uniform wire of length 100cm. The resistance will now be :

A. 15 Ω
B. 30 Ω
C. 20 Ω
D. 40 Ω

41. The earth's magnetic field at a certain point is 0.70 Gauss. This field is to be annulled by the magnetic field at the centre of a circular conducting loop 5 cm in radius. The requires current is about

A. 0.66A
B. 5.6A
C. 0.28A
D. 2.8A

42. The dimension of $1/\sqrt{(\mu_0\varepsilon_0)}$ is the same as

A. E/B
B. B/E
C. E^2/B^2
D. $\sqrt{(E/B)}$

43. Calculate the force acting between two magnets, placed in end on position 0.1 m apart from their centres. Given that the magnetic moment of each magnet is $5Am^2$

A. 0.6N
B. 0.8N
C. 0.15N
D. 0.2N

44. A bar magnet of magnetic moment 2.5 J/T is placed in a magnetic field of 0.2T. What amount of work is done in turning the magnet from parallel to antiparallel position relative to the field direction?

A. 1 J
B. 2 J
C. 3 J
D. 4 J

45. The magnetic flux φ (in weber) in a closed circuit of resistance 10Ω varies with time t (in seconds) according to the equation $\varphi=6t^2-5t+1$. The magnitude of induced current at t=0.25s is equal to

A. 1.2 A
B. 0.8 A
C. 0.6 A
D. 0.2 A

46. When the current changes from +2A to -2A in 0.05s, an emf of 8V is induced in a coil. The coefficient of self-induction of the coil is

A. 0.1 H
B. 0.2 H
C. 0.4 H
D. 0.8 H

47. An A.C source of voltage V=100 sin πt is connected to a resistor of resistance 20 Ω. The rms value of the current through the resistor is

A. 10 A
B. $10/\sqrt{2}$ A
C. $5/\sqrt{2}$ A
D. None of these

48. A radiation is incident on the metal surface of work function 2.3 eV. The wavelength of incident radiation is 600nm. If the total energy of the incident radiation is 23 J, then the number of photoelectrons is

A. Zero
B. $> 10^4$
C. $= 10^4$
D. None of these

49. If the radius of the first Bohr's orbit is x, then the de Broglie wavelength of electron in the 3rd orbit is nearly

A. 2πx
B. 6πx
C. 9x
D. x/3

50. In case of Compton effect, which of the following is applicable :

A. Energy conservation
B. Momentum conservation
C. Charge conservation
D. All the above