



PHYSICS

NEET-UG - Physics

Time Allowed: 1 hour

Maximum Marks: 180

General Instructions:

- For each correct response, the candidate will get 4 marks.
- For each incorrect response, one mark will be deducted from the total scores.

PHYSICS (Section-A)

- The mass of a box measured by a grocer's balance is 2.4 kg. Two gold pieces of masses 20.16 g and 20.18 g are added to the box. What is [4]
 - the total mass of the box and
 - the difference in the masses of the pieces to correct significant figures?
 - 2.4 kg, 0.02 g
 - 2.44 kg, 0 g
 - 2.4 kg, 0 g
 - 2.4 kg, 0.02 g
- The potential energy of a particle varies with distance x as, $U = \frac{Ax^{1/2}}{x^2+B}$, where A and B are constants. The dimensional formula for $A \times B$ is [4]
 - $M^1L^{11/2}T^{-2}$
 - $M^1L^{9/2}T^{-2}$
 - $M^1L^{5/2}T^{-2}$
 - $M^1L^{7/2}T^{-2}$
- Choose the incorrect statement from the following for motion with uniform velocity. [4]
 - Magnitude of displacement < distance covered.
 - The motion is always in the same direction.
 - Average velocity is equal to the instantaneous velocity.
 - The motion is along a straight line path.
- Two projectiles are fired from the same point with the same speed at angles of projection 60° and 30° respectively. Which one of the following is true? [4]
 - Their velocity at the highest point will be the same.
 - Their range will be the same.
 - Their maximum height will be the same.
 - Their time of flight will be the same.
- A river is flowing from west to east with a speed 5 m/s. A swimmer can swim in still water at a speed of 10 m/s. [4]

If he wants to start from point A on south bank and reach opposite point B on north bank, in what direction

- a) Body C
c) does not shift
- b) Body B
d) depends on the height of the braking
11. Two point objects of masses 1.5 g and 2.5 g respectively are at a distance of 16 cm apart, the centre of gravity is at a distance x from the object of mass 1.5 g where x is: [4]
a) 13 cm
b) 10 cm
c) 6 cm
d) 3 cm
12. The elastic limit of brass is 379 MPa. What should be the minimum diameter of a brass rod, if it is to support a 400 N load without exceeding its elastic limit? [4]
a) 1.16 mm
b) 1.36 mm
c) 0.90 mm
d) 1.00 mm
13. If the temperature difference on the two sides of a wall increases from 100°C to 200°C , its thermal conductivity: [4]
a) is halved
b) is doubled
c) remains unchanged
d) becomes four times
14. Water is enclosed in the glass tube ABCD and is warmed at A with a burner as shown in the figure. Which one of the following is correct? The water: [4]
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- a) circulates in a clockwise direction.
b) circulates in both directions simultaneously.
c) does not circulate at all.
d) circulates in anticlockwise direction.
15. An electric heater supplies heat to a system at a rate of 120 W. If system performs work at a rate of 90 J s^{-1} , the rate of increase in internal energy is: [4]
a) 60 J s^{-1}
b) 30 J s^{-1}
c) 90 J s^{-1}
d) 210 J s^{-1}
16. A 15 g mass of nitrogen gas is enclosed in a vessel at a temperature 27°C . Amount of heat transferred to the gas, so that rms velocity of molecules is doubled is about (Take, $R = 8.3 \text{ J/K-mol}$) [4]
a) 6 kJ
b) 10 kJ
c) 0.9 kJ
d) 14 kJ
17. Two oscillations: [4]
 $x_1 = A \sin \omega t$
and $x_2 = A \cos \omega t$.
Superimpose at right angles in x and y-axis respectively. What will be the resultant wave form?
a) Straight line
b) Sinusoidal

c) Circle

d) Ellipse

18. The velocity of waves in a string fixed at both ends is 2 m/s. The string forms standing waves with nodes 5.0 cm apart. The frequency of vibration of the string (in Hz) is: [4]

a) 20

b) 10

c) 40

d) 30

19. Whenever stationary waves are set up, in any medium, then [4]

a) No strain is experienced at the antinodes

b) Condensations occur at nodes

c) Refractions occur at antinodes

d) Maximum strain is experienced at the antinodes

20. The electric field strength due to a ring of radius R at a distance x from its centre on the axis of the ring carrying charge Q is given by: [4]

$$E = \frac{1}{4\pi\epsilon_0} \frac{Qx}{(R^2 + x^2)^{3/2}}$$

At what distance from the centre, will the electric field be maximum?

a) $x = \sqrt{2}R$

b) $x = \frac{R}{\sqrt{2}}$

c) $x = \frac{R}{2}$

d) $x = R$

21. An electron microscope is used to probe the atomic arrangements to a resolution of 5Å . What should be the electric potential to which the electrons need to be accelerated? [4]

a) 2.5 kV

b) 5 kV

c) 2.5 V

d) 5.76 V

22. The charge flowing through a resistance R varies with time according to $Q = at - bt^2$. Then the current: [4]

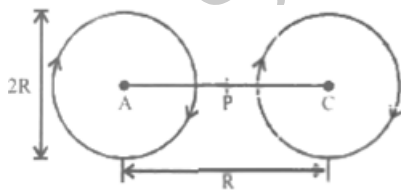
a) reaches a maximum and then becomes zero

b) changes at the rate $\frac{b}{a}$

c) falls to zero after time $t = \frac{2b}{a}$

d) decreases linearly with time

23. A Helmholtz coil has pair of loops, each with N turns and radius R. They are placed coaxially at distance R and the same current I flows through the loops in the same direction. The magnitude of magnetic field at P, midway between the centres A and C, is given by (Refer to figure): [4]



a) $\frac{4N\mu_0 I}{5^{3/2}R}$

b) $\frac{4N\mu_0 I}{5^{1/2}R}$

c) $\frac{8N\mu_0 I}{5^{1/2}R}$

d) $\frac{8N\mu_0 I}{5^{3/2}R}$

24. The magnetic susceptibility is negative for: [4]

a) paramagnetic and ferromagnetic materials

b) ferromagnetic material only

c) paramagnetic material only

d) diamagnetic material only

25. The ratio of voltage sensitivity (V_s) and current sensitivity (I_s) of a moving coil galvanometer is: [4]

a) $\frac{1}{G}$

b) G^2

- c) $\frac{1}{G^2}$ d) G
26. What is the charge induced in coil of 100 turns of resistance 100Ω , if magnetic flux changes from 2 Tm^2 to -2 Tm^2 ? [4]
- a) 0.4 C b) 2 C
c) 2.8 C d) 4 C
27. A 100 turns coil of area of cross-section 200 cm^2 having 2Ω resistance is held perpendicular to a magnetic field of 0.1 T. If it is removed from the magnetic field in one second, the induced charge produced in it is: [4]
- a) 2 C b) 1 C
c) 0.2 C d) 0.1 C
28. An alternating voltage is given by:
 $e = e_1 \sin \omega t + e_2 \cos \omega t$ Then the root mean square value of voltage is given by: [4]
- a) $\frac{\sqrt{e_1^2 + e_2^2}}{2}$ b) $\sqrt{e_1 e_2}$
c) $\sqrt{e_1^2 + e_2^2}$ d) $\sqrt{\frac{e_1 e_2}{2}}$
29. The sun delivers 10^4 W/m^2 of electromagnetic flux to the earth's surface. The total power that is incident on a roof of dimensions $(10 \times 10) \text{ m}^2$ will be: [4]
- a) 10^7 W b) 10^4 W
c) 10^6 W d) 10^5 W
30. A diver in a swimming pool wants to signal his distress to a person lying on the edge of the pool by flashing his waterproof flashlight: [4]
- a) he must direct the beam vertically upwards b) he has to direct the beam horizontally
c) he has to direct the beam at an angle to the vertical which is slightly more than the critical angle of incidence for total internal reflection d) he has to direct the beam at an angle to the vertical which is slightly less than the critical angle of incidence for total internal reflection
31. Four light sources produce the following four waves: [4]
- i. $y_1 = a \sin(\omega t + \phi_1)$
ii. $y_2 = a \sin 2\omega t$
iii. $y_3 = a' \sin(\omega t + \phi_2)$
iv. $y_4 = a' \sin(3\omega t + \phi)$
- Superposition of which two waves give rise to interference?
- a) (i) and (ii) b) (iii) and (iv)
c) (i) and (iii) d) (ii) and (iii)
32. A particle is moving 5 times as fast as an electron. The ratio of the de-Broglie wavelength of the particle to that of the electron is 1.878×10^{-4} . The mass of the particle is close to: [4]
- a) $1.2 \times 10^{-28} \text{ kg}$ b) $9.7 \times 10^{-28} \text{ kg}$

following, the incorrect statement is:

- i. The energy released per fission as well as the energy released per unit mass of the fuel in nuclear fission, both greater than the corresponding quantities for nuclear fusion.
- ii. The control rods in a nuclear reactor must be made of a material that absorbs neutrons effectively.
- iii. It is the surface to volume ratio of the sample of nuclear fuel used which determines whether or not the reaction would sustain itself as a chain reaction.
- iv. The fission energy released per reaction is much more than conventional nuclear reaction and one of the products of the reaction is the very particle that initiates the reaction.

a) Option (iii)

b) Option (i)

c) Option (iv)

d) Option (ii)

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