

SAMPLE PAPER

2019 AIIMS

PHYSICS

SET-1

Roll No.

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General Instructions

- (i) This test consists of 60 questions.
- (ii) Each question is allotted 1 mark for correct response.
- (iii) $-1/3$ mark will be deducted for indicating incorrect response of each question. No credit will be given for the questions not answered or marked for review .
- (iv) The duration of the examination shall be $3\frac{1}{2}$ hours.

1. What is the dimensions of impedance ?
 - (a) $ML^2T^{-3}I^{-3}$
 - (b) $M^{-1}L^{-2}T^3I^2$
 - (c) $ML^3T^{-3}I^{-3}$
 - (d) $M^{-1}L^{-3}T^3I^2$
2. A boy of mass 40kg is standing in a lift, which is moving downwards with an acceleration $9.8m/s^2$.the apparent weight of the boy is (Take $g = 9. m/s^2$):
 - (a) 40×9.8 N
 - (b) 0 N
 - (c) $(40/9.8)$ N
 - (d) 40 N.
3. A body of mass 5kg is raised vertically up a height of 10 m by a force of 170 N. The velocity of the body at this height will be :
 - (a) 15 m/s
 - (b) 37 m/s
 - (c) 9.8 m/s
 - (d) 22 m/s



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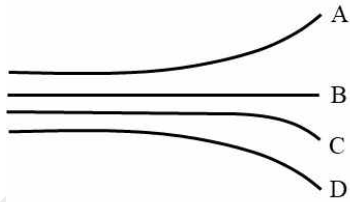
4. What is the moment of inertia for a solid sphere with respect to a tangent touching to its surface:
- (a) $\frac{2}{5}MR^2$ (c) $\frac{2}{3}MR^2$
(b) $\frac{7}{5}MR^2$ (d) $\frac{5}{3}MR^2$
5. Moment of inertia of a uniform cylindrical wire about its geometrical axis is :
- (a) MR^2 (c) $\frac{2}{5}MR^2$
(b) $\frac{1}{2}MR^2$ (d) $\frac{1}{4}MR^2$
6. If a solid sphere of mass 1kg and radius 0.1 m rolls without slipping at a uniform velocity of 1 m/s along a straight line on a horizontal floor the kinetic energy is :
- (a) 7/5J
(b) 2/5J
(c) 7/10J
(d) 1J
7. A sphere of mass M and radius R is falling in a viscous fluid the terminal velocity attained by the falling object will be proportional to :
- (a) R^2
(b) R
(c) 1/R
(d) $1/R^2$
8. What is the relative humidity on a day, when partial pressure of water vapour is 0.212×10^5 pa and temperature is 12° C? The saturated vapour pressure of water at this temperature is 0.016×10^5 pa :
- (a) 68%
(b) 52%
(c) 25%
(d) 75%
9. The volume of a gas expands by 0.25 m^3 at a constant pressure of 10^3 N/m^2 The work done is equal to :
- (a) 250Watt
(b) 2.5 erg
(c) 250 newton
(d) 250 joule



10. A certain mass of gas at 273 K is expanded to 81 times its volume under adiabatic conditions. If $\gamma = 1.25$ for the gas then its final temperature is:
- (a) -182°C
 - (b) -0°C
 - (c) -235°C
 - (d) -91°C
11. Critical temperature can be defined as the temperature
- (a) At which the volume of a gas becomes zero
 - (b) At which there is no motion between the molecules
 - (c) Above which a gas cannot be liquified, no matter however high the pressure may be.
 - (d) At which a gas is converted into its liquid state.
12. A lightly damped oscillator with a frequency (ω) is set in motion by harmonic driving force of frequency (n). When $n < \omega$, then response of the oscillator is controlled by :
- (a) Oscillator frequency
 - (b) Spring constant
 - (c) Damping coefficient
 - (d) Inertia of the mass.
13. The composition of two simple harmonic motions of equal periods at right angles to each other and with a phase difference of π results in the displacement of the particle along a :
- (a) Straight line
 - (b) Circle
 - (c) Hexagon
 - (d) Ellipse.
14. Newton's formula for the velocity of sound in gases, is :
- (a) $V = \sqrt{\frac{2p}{\rho}}$
 - (b) $V = \sqrt{\frac{p}{\rho}}$
 - (c) $V = \sqrt{\frac{\rho}{p}}$
 - (d) $V = \frac{3}{2} \sqrt{\frac{p}{\rho}}$
15. The number of waves, contained in unit length of the medium, is called :
- (a) Wave pulse
 - (b) Wave number
 - (c) Elastic wave
 - (d) Electromagnetic wave

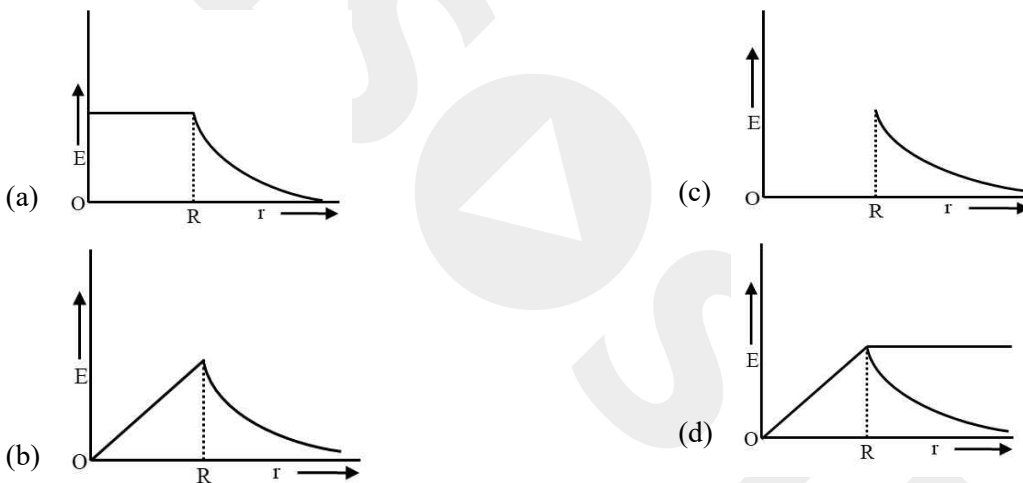


16. In the following diagram, which particle has highest e/m value?



- (a) A
- (b) B
- (c) C
- (d) D

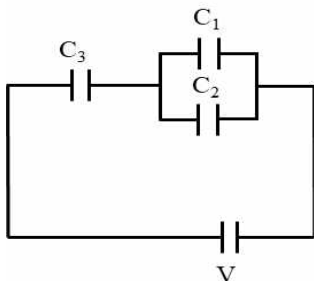
17. The electric field due to a uniformly charged sphere of radius R as function of the distance from its centre is represented graphically by



18. On moving a charge of 20 coulombs by 2cm, 2 J of work is done, then the potential difference b/w the points is :

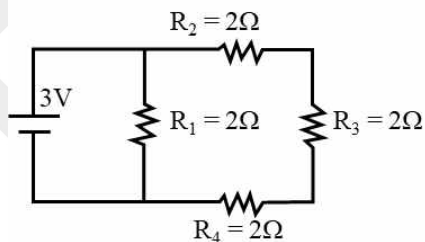
- (a) 2.1V
- (b) 8.V
- (c) 2.V
- (d) 0.V

19. Potential difference across C_2 is:



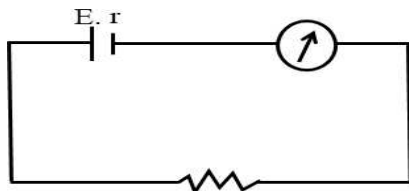
- (a) $\frac{(C_1 - C_2)V}{C_1 + C_2 + C_3}$
 (b) $\frac{(C_1 + C_2)V}{C_1 - C_2 + C_3}$
 (c) $\frac{(C_1 + 2C_2)V}{C_1 + 2C_2 + C_3}$
 (d) $\frac{(C_1 - 2C_2)V}{C_1 + C_2 + C_3}$

20. In the figure, the equivalent resistance between the points A and B is :



- (a) 8Ω
 (b) 6Ω
 (c) 2Ω
 (d) 4Ω

21. The heat produced by a 100 W heater in 2 min is equal to :



- (a) 10.5 kcal
 (b) 16.3 kcal
 (c) 2.8 kcal
 (d) 14.2 kcal

22. A toroid with mean radius R_0 , diameter $2a$ have N turns carrying current I . what is the magnetic field B outside the toroid :

- (a) $\frac{NI}{2\pi R_0}$
 (b) $\frac{NI}{2\pi(R_0 + a)}$
 (c) $\frac{NI}{\pi(R_0 + a)}$
 (d) Zero



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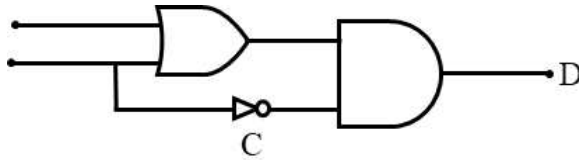
23. The magnetic needle of a tangent galvanometer is deflected at an angle 30° due to a magnet. the horizontal component of earth's magnetic field 0.34×10^{-2} T is along the plane of the coil. The magnetic intensity is :
- 1.96×10^{-7} T
 - 1.96×10^4 T
 - 1.96×10^{-3} T
 - 1.96×10^5 T
24. A small piece of metal wire is dragged across the gap between the pole pieces of a magnet in 0.4 sec. If magnetic flux between the pole pieces is known to be 8×10^{-4} Wb, then induced emf in the wire, is :
- 4×10^{-3} V
 - 8×10^{-3} V
 - 2×10^{-3} V
 - 6×10^{-3} V
25. If frequency of $R-L$ circuit is f then impedance will be :
- $R^2 + (2\pi fL)^2$
 - $R^2 + (2\pi f^2)^2$
 - $(R^2 + L\pi f^2)$
 - $R^3 + (2\pi f)^3$
26. Characteristic X-rays are produced due to :
- Transfer of momentum in collision of electrons with target atoms
 - Transition of electrons from higher to lower electronic orbits in an atom
 - Heating of the target
 - Transfer of energy in collision of electrons with atoms in the target
27. Achromatic combination of lenses comprises of the two lenses of same material placed 4 cm apart. If focal length of one lens is 25cm, the focal length of other lens is
- 2 cm
 - 4 cm
 - 6 cm
 - 3 cm
28. In a concave mirror, an object is placed at a distance d_1 from the focus and the image is formed at a distance d_2 from the focus. Then focal length of the mirror is:
- $\sqrt{d_1 d_2}$
 - $d_1 d_2$
 - $(d_1 + d_2)/2$
 - d_1/d_2
29. A glass sheet is kept in the path of one of the rays in a YDSE set-up the fringe pattern shifts downwards. Calculate the thickness of the sheet : (μ = ref. ind of glass, D = shift)
- $t = dy(\mu - 1)D$
 - $t = (\mu + 1)D/dy$
 - $t = dy(\mu + 1)D$
 - $t = (\mu + 1)D/dy$



30. In a neon discharge tube 2.9×10^{18} Ne^+ ions move to the right each second, while 1.2×10^{18} electrons move the left per second, electron charge is 1.6×10^{-19} C. the current in the discharge tube is:
- 1 A towards right
 - 0.66 A towards right
 - 0.66 A towards left
 - Zero
31. A triply ionized beryllium (Be^{3+}) has the same orbital radius as the ground state of hydrogen. then the quantum state n of Be^{3+} is :
- $n = 1$
 - $n = 2$
 - $n = 3$
 - $n = 4$
32. Consider following reaction $\text{H}^1 + \text{Li}^7 \rightarrow 2({}_2\text{He}^4)$. If Be nucleon of ${}_2\text{He}^4$ is 7.06 MeV and energy of proton is 17.28 MeV then B.E per nucleon of ${}_3\text{Li}^7$ is
- 10.96 MeV
 - 5.60 MeV
 - 5.96 MeV
 - 14.06 MeV
33. n -alpha particles per second are emitted from N atoms of a radioactive element. The half-life of the radioactive element is :
- $\frac{n}{N}$ s
 - $\frac{N}{n}$ s
 - $\frac{0.693N}{n}$ s
 - $\frac{0.693n}{N}$ s
34. A zener diode is specified as having a breakdown voltage of 9.1 V, with a maximum power dissipation of 364 mW. What is the maximum current the diode can handle?
- 40 mA
 - 60 mA
 - 50 mA
 - 45 mA
35. A transistor connected at common emitter mode contains load resistance of $5\text{k}\Omega$ if the input peak voltage is 5 mV and the current gain is 50, find the voltage gain :
- 250
 - 500
 - 125
 - 50



36. The output given circuit is:



- (a) $(A+B).\bar{B}$
- (b) $(A.B).B$
- (c) $(A+\bar{V}).B$
- (d) $(A.B)+B$

37. If modulation index is $1/2$ and power of carries wave is 2 W . Then what will be the total power in modulated wave ?

- (a) 0.05 w
- (b) 1 w
- (c) 0.25 w
- (d) 2.25 w

38. Find the area covered by a transmitting antenna of height 50m :

- (a) $320\pi\text{ km}^2$
- (b) 1440 km^2
- (c) $640\pi\text{ km}^2$
- (d) $120\pi\text{ km}^2$

39. A long straight wire carries 10A d.c current an electron travels perpendicular to the plane of this wire at a distance 0.1 m with velocity $5.0 \times 10^6\text{ ms}^{-1}$ Force acting on the electron due to current in wire is:

- (a) Zero N
- (b) $2.3 \times 10^{-17}\text{ N}$
- (c) $2.4 \times 10^{-17}\text{ N}$
- (d) $2.2 \times 10^{-17}\text{ N}$

40. A particle of charge q and mass m starts moving from the origin under the action of electric field $\vec{E} = E_0.\hat{i}$ and $\vec{B} = B_0.\hat{i}$ with a velocity $\vec{V} = \hat{j}_0$. The speed of the particle will become $\sqrt{5/2}v_0$ after a time :

- (a) $\frac{mV_0}{qE_0}$
- (b) $\frac{mv_0}{2qE_0}$
- (c) $\frac{\sqrt{3mv_0}}{2qE_0}$
- (d) $\frac{\sqrt{5mv_0}}{2qE_0}$



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Direction : From Q no. 41 to Q no. 60 has a statements of assertion (A) is given followed by a corresponding statement of reason (R). Mark the correct answer.

- (a) If both Assertion & reason are True & the reason is a correct explanation of the assertion.
- (b) If both assertion & reason are true but reason is not a correct explanation of the Assertion.
- (c) If Assertion is True but the reason is false.
- (d) If both Assertion & Reason are False.

41. **Assertion** : KE is conserved at every instant of (elastic) collision.

Reason : No deformation of the matter occurs in elastic collision

42. **Assertion** : centre of mass of a system does not move under the action of internal forces.

Reason : Internal forces are non conservative forces.

43. **Assertion** : if polar ice melts, days will be longer.

Reason : Moment of inertia increases and thus angular velocity decreases

44. **Assertion** :The earth without its atmosphere would be inhospitably cold.

Reason : All heat would escape in the absence of atmosphere

45. **Assertion** : A hydrogen filled balloon stops rising after is has attained a certain height in the sky.

Reason : The atmospheric pressure decreases with height and becomes zero when maximum height is attained.

46. **Assertion** : It is not possible for a system, unaided by an external agency to transfer heat from a body at lower

Reason : It is not possible to violate the second law of thermodynamics

47. **Assertion** : Magnetic lines forms closed loops in nature.

Reason : Mono-magnetic pole does not exist in nature.

48. **Assertion** : The mutual inductance of two coils is doubled if the self inductance of the primary or secondary coil is doubled.

Reason : Mutual inductance is proportional to the self inductance of primary and secondary coils.

49. **Assertion** : Microscope magnifies the image.

Reason : Angular magnification for image is more than object in microscope.

50. **Assertion** : the focal length of objective lens in telescope is much more than that of eye piece.

Reason : Telescope has high resolving power due to large focal length.

51. **Assertion** : An electron microscope is based on de Broglie hypothesis.

Reason : A beam of electrons behaves as wave which can be converged by electric and magnetic lenses.

52. **Assertion** : Wavelength Balmer series belongs to visible spectrum.

Reason : In H-spectrum Balmer series belongs to visible.



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53. **Assertion** : In a communication system based on amplitude modulation index is kept
Reason : It ensures minimum distortion of signal
54. **Assertion** : In the transmission of long distance radio signals, short wave band is used.
Reason : In the shorter wavelength attenuation is very less.
55. **Assertion** : During reverse biasing a diode does not conduct current
Reason : It narrows the depletion layer
56. **Assertion** : When the temperature of a semiconductor is increased, then its resistance decreases
Reason : The energy gap between conduction band and valence band is very small
57. **Assertion** : γ -Radiation emission may occur after α and β decay.
Reason : Energy levels occur in nucleus.
58. **Assertion** : Size of nucleus is constant in electron scattering or gamma scattering.
Reason : Electron scattering or gamma scattering is controlled by distribution of charge in nucleus.
59. **Assertion** : A damped spring-mass system is the simplest free vibration system.
Reason : It has three degrees of freedom.
60. **Assertion** : Vibrational energy of a particle at temperature T is kT .
Reason : For every particle, vibrational degree of freedom is 2.

