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Previous Year Paper

Physics - 2007



Multiple Choice Questions

1. The dimensional formula for impulse is

- A. $[MLT^{-1}]$
- B. $[ML^{-1}T]$
- C. $[M^{-1}LT^{-1}]$
- D. $[ML^{-1}T^{-1}]$

Answer

2. The maximum height attained by a projectile when thrown at an angle θ with the horizontal is found to be half the horizontal range. Then θ is equal to

- A. $\tan^{-1}(2)$
- B. $\pi/6$
- C. $\pi/4$
- D. $\tan^{-1} 1/2$

Answer

3. A shell of mass 20 kg at rest explodes into two fragments whose masses are in the ratio 2 : 3. The smaller fragment moves with a velocity of 6 ms^{-1} . The kinetic energy of the larger fragment is

- A. 96 J
- B. 216 J
- C. 144 J
- D. 360 J

Answer

4. The acceleration due to gravity becomes $g/2$ (g = acceleration due to gravity on the surface of the earth) at a height equal to

- A. $4R$
- B. $R/4$
- C. $2R$
- D. $R/2$

Answer

5. Water rises in plant fibres due to

- A. capillarity

- B. viscosity

D. osmosis

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Answer

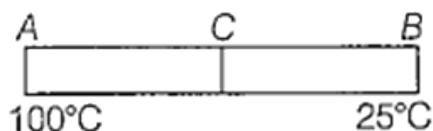
6. The cylindrical tube of a spray pump has a cross-section of 8 cm^2 , one end of which has 40 fine holes each of area 10^{-8} m^2 . If the liquid flows inside the tube with a speed of 0.15 m min^{-1} the speed with which the liquid is ejected through the holes is
- A. 50 ms^{-1}
 - B. 5 ms^{-1}
 - C. 0.05 ms^{-1}
 - D. 0.5 ms^{-1}

Answer

7. During an adiabatic process, the cube of the pressure is found to be inversely proportional to the fourth power of the volume. Then the ratio of specific heats is
- A. 1
 - B. 1.33
 - C. 1.67
 - D. 1.4

Answer

8. Two identical rods AC and CB made of two different metals having thermal conductivities in the ratio 2 : 3 are kept in contact with each other at the end C as shown in the figure. A is at 100°C and B is at 25°C . Then the junction C is at



- A. 55°C
- B. 60°C
- C. 75°C
- D. 50°C

Answer

9. 310 J of heat is required to raise the temperature of 2 moles of an ideal gas at constant pressure from 25°C to 35°C . The amount of heat required to raise the temperature of the gas through the same range at constant volume is
- A. 384 J
 - B. 144 J
 - C. 276 J
 - D. 452 J

Answer

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10. A Carnot's engine operates with source at 127°C and sink at 27°C . If the source supplies 40 kJ of heat energy, the work done by the engine is
- A. 30 kJ

- B. 10 kJ
C. 4 kJ
D. 1 kJ

Answer

11. The maximum particle velocity in a wave motion is half the wave velocity. Then the amplitude of the wave is equal to
- A. $\lambda 4\pi$
B. $2\lambda\pi$
C. $\lambda 2\pi$
D. λ

Answer

12. The ratio of the velocity of sound in hydrogen $\gamma = 75$ to that in helium $\gamma = 53$ at the same temperature is
- A. 542
B. 521
C. 425
D. 215

Answer

13. An engine moving towards a wall with a velocity 50 ms^{-1} emits a note of 1.2 kHz. Speed of sound in air is 350 ms^{-1} . The frequency of the note after reflection from the wall as heard by the driver of the engine is
- A. 2.4 kHz
B. 0.24 kHz
C. 1.6 kHz
D. 1.2 kHz

Answer

14. A glass tube is open at both the ends. A tuning fork of frequency f resonates with the air column inside the tube. Now the tube is placed vertically inside water so that half the length of the tube is filled with water. Now the air column inside the tube is in unison with another fork of frequency f' . Then
- A. $f' = f$
B. $f' = 4f$
C. $f' = 2f$
D. $f' = f/2$

Answer

15. The surface temperature of the sun which has maximum energy emission at 500 nm is 6000 K. Like. Share. Bookmark. Download. Make Notes. Print - Your Favourite Questions. Join www.zigya.com

A. 8500 K

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B. 4500 K

C. 7500 K

D. 6500 K

Answer

16. All components of the electromagnetic spectrum in vacuum have the same

A. energy

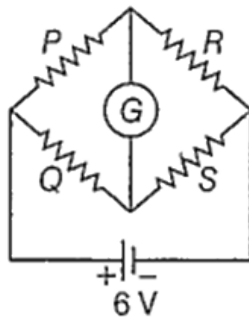
B. velocity

C. wavelength

D. frequency

Answer

17. In the Wheatstone's network given, $P = 10 \Omega$, $Q = 20 \Omega$, $R = 15 \Omega$, $S = 30 \Omega$, the current passing through the battery (of negligible internal resistance) is



A. 0.36 A

B. zero

C. 0.18 A

D. 0.72 A

Answer

18. A circular coil carrying a certain current produces a magnetic field B_0 at its centre. The coil is now rewound so as to have 3 turns and the same current is passed through it. The new magnetic field at the centre is

A. $B_0/9$

B. $9B_0$

C. $B_0/3$

D. $3B_0$

Answer

19. A proton and a deuteron with the same initial kinetic energy enter a magnetic field in a direction perpendicular to the direction of the field. The ratio of the radii of the circular trajectories described by them is

A. 1 : 4

D. 1 : 2

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20. Two tangent galvanometers A and B have coils of radii 8 cm and 16 cm respectively and resistance $8\ \Omega$ each. They are connected in parallel with a cell of emf 4 V and negligible internal resistance. The deflections produced in the tangent galvanometers A and B are 30° and 60° respectively. If A has 2 turns, then B must have
- 18 turns
 - 12 turns
 - 6 turns
 - 2 turns

Answer

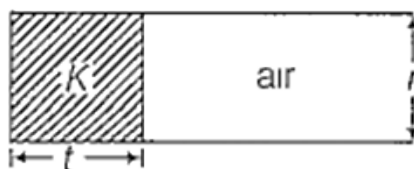
21. A charged particle is moving in a magnetic field of strength B perpendicular to the direction of the field. If q and m denote the charge and mass of the particle respectively, then the frequency of rotation of the particle is
- $f = qB2\pi m$
 - $f = qB2\pi m^2$
 - $f = 2\pi 2mqB$
 - $f = 2\pi mqB$

Answer

22. Two identical capacitors each of capacitance $5\ \mu\text{F}$ are charged to potentials 2 kV and 1 kV respectively. Their -ve ends are connected together. When the +ve ends are also connected together, the loss of energy of the system is
- 160 J
 - zero
 - 5 J
 - 1.25 J

Answer

23. A parallel plate capacitor with air as the dielectric has capacitance C. A slab of dielectric constant K and having the same thickness as the separation between the plates is introduced so as to fill one-fourth of the capacitor as shown in the figure. The new capacitance will be



- $K + 3\ C/4$
- $K + 2\ C/4$
- $K + 1\ C/4$
- $K + 3\ C/4$

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24. A current of 5 A is passing through a metallic wire of cross-sectional area $4 \times 10^{-6} \text{ m}^2$. If the density of charge carriers of the wire is $4 \times 10^{26} \text{ m}^{-3}$ the drift velocity of the electrons will be

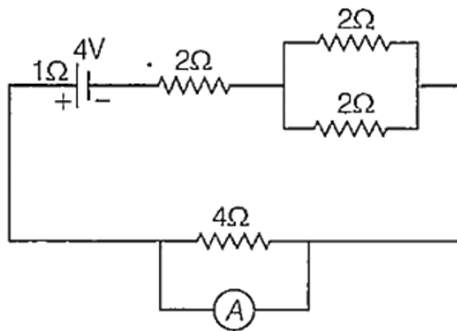
- A. $1 \times 10^2 \text{ ms}^{-1}$
- B. $1.56 \times 10^{-2} \text{ ms}^{-1}$
- C. $1.56 \times 10^{-3} \text{ ms}^{-1}$
- D. $1 \times 10^{-2} \text{ ms}^{-1}$

Answer

25. Two bulbs rated 25 W-220 V and 100 W-220 V are connected in series to a 440 V supply. Then,
- A. 100 W bulb fuses
 - B. 25 W bulb fuses
 - C. both the bulbs fuse
 - D. neither of the bulb fuses

Answer

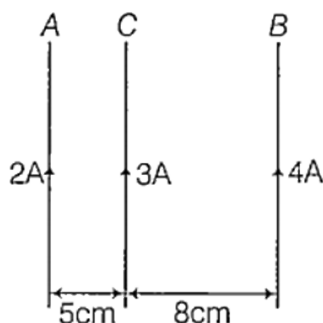
26. The current passing through the ideal ammeter in the circuit given below is



- A. 1.25 A
- B. 1 A
- C. 0.75 A
- D. 0.5 A

Answer

27. A and B are two infinitely long straight parallel conductors. C is another straight conductor of length 1 m kept parallel to A and B as shown in the figure. Then the force experienced by C is



A. towards A equal to 0.6×10^{-5} N

B. towards B equal to 5.4×10^{-5} N

C. towards A equal to 5.4×10^{-5} N

D. towards B equal to 0.6×10^{-5} N

Answer

28. An electric bulb has a rated power of 50 W at 100 V. If it is used on an AC source 200 V, 50 Hz, a choke has to be used in series with it. This choke should have an inductance of

- A. 0.1 mH
- B. 1 mH
- C. 0.1 H
- D. 1.1 H

Answer

29. An inductance of 200π mH, a capacitance of $10^{-3}\pi$ F and a resistance of 10Ω are connected in series with an AC source 220 V, 50 Hz. The phase angle of the circuit is

- A. $\pi/6$
- B. $\pi/4$
- C. $\pi/2$
- D. $\pi/3$

Answer

30. A step-down transformer reduces the voltage of a transmission line from 2200 V to 220 V. The power delivered by it is 880 W and its efficiency is 88%. The input current is

- A. 4.65 mA
- B. 0.045 A
- C. 0.45 A
- D. 4.65 A

Answer

31. Current in a coil changes from 4 A to zero in 0.1 s and the emf induced is 100 V. The self inductance of the coil is

- A. 0.25 H
- B. 0.4 H
- C. 2.5 H
- D. 4 H

Answer

32. Two identical charges repel each other with a force equal to 10 mg wt when they are 0.6 m apart in air ($g = 10 \text{ ms}^{-2}$). The value of each charge is

- A. 2 mC
- B. 2×10^{-7} C

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Answer

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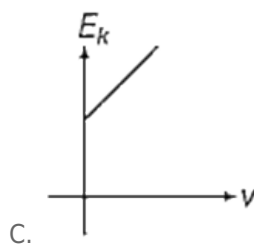
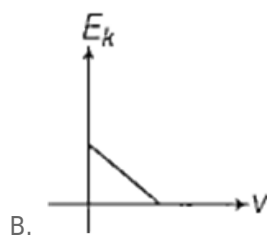
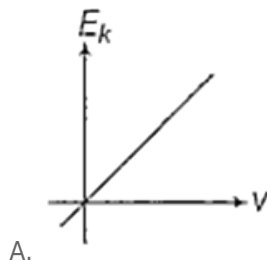
33. The potential of the electric field produced by point charge at any point (x, y, z) is given by $V = 3x^2 + 5$, where x, y are in metres and V is in volts. The intensity of the electric field at $(-2, 1, 0)$ is
- $+ 17 \text{ Vm}^{-1}$
 - $- 17 \text{ Vm}^{-1}$
 - $+ 12 \text{ Vm}^{-1}$
 - $- 12 \text{ Vm}^{-1}$

Answer

34. The potential of a large liquid drop when eight liquid drops are combined is 20 V. Then the potential of each single drop was
- 10 V
 - 7.5 V
 - 5 V
 - 2.5 V

Answer

35. Which one of the following graph represents the variation of maximum kinetic energy (E_k) of the emitted electrons with frequency ν in photoelectric effect correctly ?



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D.

Answer

36. A and B are two metals with threshold frequencies 18×10^{14} Hz and 2.2×10^{14} Hz. Two identical photons of energy 0.825 eV each are incident on them. Then photoelectrons are emitted by

(Take $h = 6.6 \times 10^{-34}$ J-s)

- A. B alone
- B. A alone
- C. neither A nor B
- D. both A and B

Answer

37. The ionisation energy of Li^{2+} is equal to

- A. $9hcR$
- B. $6hcR$
- C. $2hcR$
- D. hcR

Answer

38. Electrons in a certain energy level $n = n_1$ can emit 3 spectral lines. When they are in another energy level, $n = n_2$, they can emit 6 spectral lines. The orbital speed of the electrons in the orbits are in the ratio

- A. 4 : 3
- B. 3 : 4
- C. 2 : 1
- D. 1 : 2

Answer

39. The electromagnetic theory of light failed to explain

- A. photoelectric effect
- B. polarisation
- C. diffraction
- D. interference

Answer

40. Light from two coherent sources of the same amplitude A and wavelength λ , illuminates the screen. The intensity of the central maximum is I_0 . If the sources were incoherent, the intensity at the same point will be

A. $4I_0$

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C. I_0
D. $I_0/2$

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Answer

41. In Young's double slit experiment with sodium vapour lamp of wavelength 589 nm and the slits 0.589 mm apart, the half angular width of the central maximum is

A. $\sin^{-1} (0.01)$
B. $\sin^{-1} (0.0001)$
C. $\sin^{-1} (0.001)$
D. $\sin^{-1} (0.1)$

Answer

42. A single slit Fraunhofer diffraction pattern is formed with white light. For what wavelength of light the third secondary maximum in the diffraction pattern coincides with the second secondary maximum in the pattern for red light of wavelength 6500 Å ?

A. 4400 Å
B. 4100 Å
C. 4642.8 Å
D. 9100 Å

Answer

43. The head lights of a jeep are 1.2 m apart. If the pupil of the eye of an observer has a diameter of 2 mm and light of wavelength 5896 Å is used, what should be the maximum distance of the jeep from the observer if the two head lights are just separated ?

A. 33.9 km
B. 33.9 m
C. 3.34 km
D. 3.39 m

Answer

44. The de-Broglie wavelength of a proton (charge = 1.6×10^{-19} C, mass = 1.6×10^{-27} kg) accelerated through a potential difference of 1 kV is

A. 600 Å
B. 0.9×10^{-12} m
C. 7 Å
D. 0.9 nm

Answer

45. A radioactive element forms its own isotope after 3 consecutive disintegrations. The particles emitted are

A. 3β-particles

B. 2β-particles and 1α-particle

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D. 2α -particles and 1β -particle

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Answer

46. A radioactive substance contains 10000 nuclei and its half-life period is 20 days. The number of nuclei present at the end of 10 days is

- A. 7070
- B. 9000
- C. 8000
- D. 7500

Answer

47. In Raman effect, Stokes' lines are spectral lines having

- A. frequency greater than that of the original line
- B. wavelength equal to that of the original line
- C. wavelength less than that of the original line
- D. wavelength greater than that of the original line

Answer

48. The principle of LASER action involves

- A. amplification of particular frequency emitted by the system
- B. population inversion
- C. stimulated emission
- D. All of the above

Answer

49. A ray of light is travelling from glass to air. (refractive index of glass = 1.5). The angle of incidence is 50° . The deviation of the ray is

- A. 0°
- B. 80°
- C. $50^\circ - \sin^{-1} \sin 50^\circ / 1.5$
- D. $\sin^{-1} \sin 50^\circ / 1.5 - 50^\circ$

Answer

50. A vessel of height $2d$ is half-filled with a liquid of refractive index 2 and the other half with a liquid of refractive index n (the given liquids are immiscible). Then the apparent depth of the inner surface of the bottom of the vessel (neglecting the thickness of the bottom of the vessel) will be

- A. $nd / n + 2$
- B. $d / n + 2n^2$
- C. $2nd / n + 2$
- D. $nd / d + 2n$

Answer

51. A ray of light is incident normally on one face of a right angled isosceles prism. It then grazes the hypotenuse. The refractive index of the material of the prism is

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B. 1.414

C. 1.5 Study Assignments, Solved Previous Year Papers . Questions and Answers. Free Forever.

D. 1.732

Answer

52. Two thin equiconvex lenses each of focal length 0.2 m are placed coaxially with their optic centres 0.5 m apart. Then the focal length of the combination is

A. -0.4 m

B. 0.4 m

C. -0.1 m

D. 0.1 m

Answer

53. A prism of a certain angle deviates the red and blue rays by 8° and 12° respectively. Another prism of the same angle deviates the red and blue rays by 10° and 14° respectively. The prisms are small angled and made of different materials. The dispersive powers of the materials of the prisms are in the ratio

A. 5 : 6

B. 9 : 11

C. 6 : 5

D. 11 : 9

Answer

54. When the angle of incidence is 60° on the surface of a glass slab, it is found that the reflected ray is completely polarised. The velocity of light in glass is

A. 2×10^8 ms⁻¹

B. 3×10^8 ms⁻¹

C. 2×10^8 ms⁻¹

D. 3×10^8 ms⁻¹

Answer

55. A 20 cm length of a certain solution causes right handed rotation of 38° . A 30 cm length of another solution causes left handed rotation of 24° . The optical rotation caused by 30 cm length of a mixture of the above solutions in the volume ratio 1 : 2 is

A. left handed rotation of 14°

B. right handed rotation of 14°

C. left handed rotation of 3°

D. right handed rotation of 3°

Answer

56. The volume of a nucleus is directly proportional to

A. A

D. $A^{1/3}$

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Answer

57. An electron is

- A. a hadron
- B. a baryon
- C. a nucleon
- D. a lepton

Answer

58. Minority carriers in a p-type semiconductor are

- A. free electrons
- B. holes
- C. neither holes nor free electrons
- D. both holes and free electrons

Answer

59. In a reverse biased diode when the applied voltage changes by 1 V, the current is found to change by $0.5 \mu\text{A}$. The reverse bias resistance of the diode is

- A. $2 \times 10^5 \Omega$
- B. $2 \times 10^6 \Omega$
- C. 200Ω
- D. 2Ω

Answer

60. The truth table given below is for (A and B are the inputs, Y is the output)

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

- A. NOR
- B. AND
- C. XOR
- D. NAND

Answer