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Previous Year Paper

Physics - 2009

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Multiple Choice Questions

- The number of significant figures in the numbers 4.8000×10^4 and 48000.50 are respectively
 - 5 and 6
 - 5 and 7
 - 2 and 7
 - 2 and 6

Answer

- A body of mass m moving along a straight line covers half the distance with a speed of 2 ms^{-1} . The remaining half of the distance is covered in two equal time intervals with a speed of 3 ms^{-1} and 5 ms^{-1} respectively. The average speed of the particle for the entire journey is
 - 38 ms^{-1}
 - 83 ms^{-1}
 - 43 ms^{-1}
 - 163 ms^{-1}

Answer

- The moment of inertia of a circular ring of radius r and mass M about a diameter is
 - $25 Mr^2$
 - $Mr^2/4$
 - $Mr^2/2$
 - $Mr^2/12$

Answer

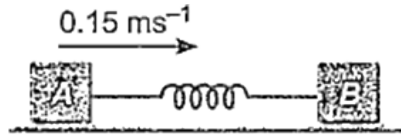
- A body of mass 0.05 kg is observed to fall with an acceleration of 9.5 ms^{-2} . The opposing force of air on the body is ($g = 9.8\text{ ms}^{-2}$)
 - 0.015 N
 - 0.15 N
 - 0.030 N
 - zero

Answer

- Three concurrent co-planar forces 1 N , 2 N and 3 N acting along different directions on a body
 - can keep the body in equilibrium if 2 N and 3 N act at right angle
 - can keep the body in equilibrium if 1 N and 2 N act at right angle
 - cannot keep the body in equilibrium
 - can keep the body in equilibrium if 1 N and 3 N act at an acute angle

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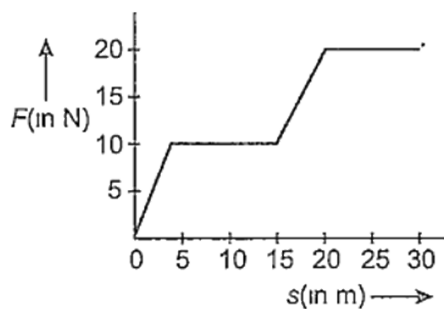
6. Two rectangular blocks A and B of masses 2 kg and 3 kg respectively are connected by a spring of spring constant 10.8 Nm^{-1} and are placed on a frictionless horizontal surface. The block A was given an initial velocity of 0.15 ms^{-1} in the direction shown in the figure. The maximum compression of the spring during the motion is



- A. 0.01 m
- B. 0.02 m
- C. 0.05 m
- D. 0.03 m

Answer

7. The work done by a force acting on a body is as shown in the graph. The total work done in covering an initial distance of 20 m is



- A. 225 J
- B. 200 J
- C. 400 J
- D. 175 J

Answer

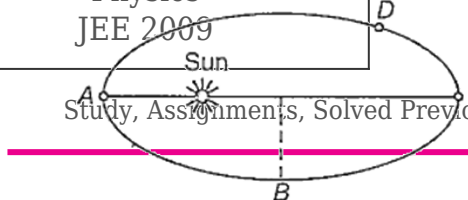
8. A door 1.6 m wide requires a force of 1 N to be applied at the free end to open or close it. The force that is required at a point 0.4 m distance from the hinges for opening or closing the door is
- A. 1.2 N
 - B. 3.6 N
 - C. 2.4 N
 - D. 4 N

Answer

9. A planet revolves around the sun in an elliptical orbit. The linear speed of the planet will be maximum at

Sun

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- A. D
- B. B
- C. A
- D. C

Answer

10. Two sources are said to be coherent if they produce waves

- A. having a constant phase difference
- B. of equal wavelength
- C. of equal speed
- D. having same shape of wavefront

Answer

11. According to Newton's corpuscular theory, the speed of light is

- A. same in all the media
- B. lesser in rarer medium
- C. lesser in denser medium
- D. independent of the medium

Answer

12. Which of the following is not a thermodynamic coordinate ?

- A. Gas constant (R)
- B. Pressure (p)
- C. Volume (V)
- D. Temperature (T)

Answer

13. Two solid pieces, one of steel and the other of aluminium when immersed completely in water have equal weights. When the solid pieces are weighed in air

- A. the weight of aluminium is half the weight of steel
- B. steel piece will weigh more
- C. they have the same weight
- D. aluminium piece will weigh more

Answer

14. The colloidal solution in which both the dispersed phase and dispersion medium are liquids are called

- A. emulsions
- B. gels

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D. liquid crystals

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Answer

15. Sound waves transfer

- A. only energy not momentum
- B. energy
- C. momentum
- D. Both (a) and (b)

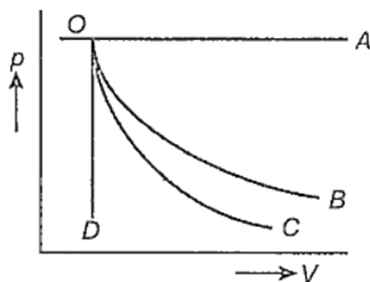
Answer

16. 0.1 m^3 of water at 80°C is mixed with 0.3 m^3 of water at 60°C . The final temperature of the mixture is

- A. 65°C
- B. 70°C
- C. 60°C
- D. 75°C

Answer

17. A graph of pressure versus volume for an ideal gas for different processes is as shown. In the graph curve OC represents



- A. isochoric process
- B. isothermal process
- C. isobaric process
- D. adiabatic process

Answer

18. Which of the following statement does not hold good for thermal radiation ?

- A. The wavelength changes when it travels from one medium to another
- B. The frequency changes when it travels from one medium to another
- C. The speed changes when it travels from one medium to another
- D. They travel in straight line in a given medium

Answer

19. The amount of heat energy radiated by a metal at temperature T is E . When the temperature is increased to $3T$, energy radiated is

- A. $81E$

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C. 3E

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Answer

20. A stationary point source of sound emits sound uniformly in all directions in a non-absorbing medium. Two points P and Q are at a distance of 4 m and 9 m respectively from the source. The ratio of amplitudes of the waves at P and Q is
- 32
 - 49
 - 23
 - 94

Answer

21. $y = 3 \sin \pi t^2 - x^4$ represents an equation of a progressive wave, where t is in second and x is in metre. The distance travelled by the wave in 5 s is
- 8 m
 - 10 m
 - 5 m
 - 32 m

Answer

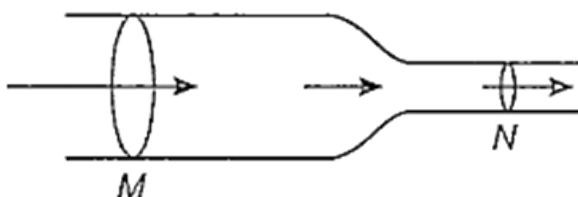
22. A cylindrical tube open at both the ends has a fundamental frequency of 390 Hz in air. If 14th of the tube is immersed vertically in water the fundamental frequency of air column is
- 260 Hz
 - 130 Hz
 - 390 Hz
 - 520 Hz

Answer

23. The surface temperature of the stars is determined using
- Planck's law
 - Wien's displacement law
 - Rayleigh-Jeans law
 - Kirchhoff's law

Answer

24. Horizontal tube of non-uniform cross-section has radii of 0.1 m and 0.05 m respectively at M and N. For a streamline flow of liquid the rate of liquid flow is



A. increasing continuously with time

B. greater at M than at N

C. greater at N than at M

D. same at M and N

Answer

25. A direct current I flows along the length of an infinitely long straight thin walled pipe, then the magnetic field is

A. uniform throughout the pipe but not zero

B. zero only along the axis of the pipe

C. zero at any point inside the pipe

D. maximum at the centre and minimum at the edge

Answer

26. Three resistors $1\ \Omega$, $2\ \Omega$ and $3\ \Omega$ are connected to form a triangle. Across $3\ \Omega$ resistor a 3 V battery is connected. The current through $3\ \Omega$ resistor is

A. 0.75 A

B. 1 A

C. 2 A

D. 1.5 A

Answer

27. Ferromagnetic materials used in a transformer must have

A. low permeability and high hysteresis loss

B. high permeability and low hysteresis loss

C. high permeability and high hysteresis loss

D. low permeability and low hysteresis loss

Answer

28. The accurate measurement of emf can be obtained using

A. multimeter

B. voltmeter

C. voltmeter

D. potentiometer

Answer

29. An electric heater rated 220 V and 550 W is connected to AC mains. The current drawn by it is

A. 0.8 A

B. 2.5 A

C. 0.4 A

D. 1.25 A

Answer

30. In fog, photographs of the objects taken with infrared radiations are more clear than those obtained during visible light because

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B. scattering of I-R light is more than visible light

C. the intensity of I-R light from the object is less

D. scattering of I-R light is less than visible light

Answer

31. The resistance of a wire at 300 K is found to be 0.3Ω . If the temperature coefficient of resistance of wire is $1.5 \times 10^{-3} \text{ K}^{-1}$, the temperature at which the resistance becomes 0.6Ω is

A. 720 K

B. 345 K

C. 993 K

D. 690 K

Answer

32. A resistor and a capacitor are connected in series with an AC source. If the potential drop across the capacitor is 5 V and that across resistor is 12 V, then applied voltage is

A. 13 V

B. 17 V

C. 5 V

D. 12 V

Answer

33. A galvanometer of resistance 240Ω allows only 4% of the main current after connecting a shunt resistance. The value of the shunt resistance is

A. 10Ω

B. 20Ω

C. 8Ω

D. 5Ω

Answer

34. An α -particle of mass $6.4 \times 10^{-27} \text{ kg}$ and charge $3.2 \times 10^{-19} \text{ C}$ is situated in a uniform electric field of $1.6 \times 10^5 \text{ Vm}^{-1}$. The velocity of the particle at the end of $2 \times 10^{-2} \text{ m}$ path when it starts from rest is

A. $23 \times 10^5 \text{ ms}^{-1}$

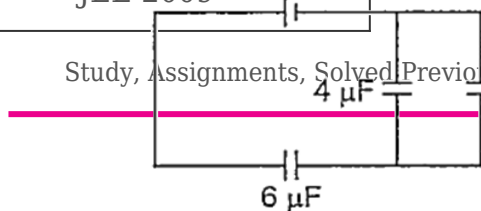
B. $8 \times 10^5 \text{ ms}^{-1}$

C. $16 \times 10^5 \text{ ms}^{-1}$

D. $42 \times 10^5 \text{ ms}^{-1}$

Answer

35. The charge deposited on $4 \mu\text{F}$ capacitor in the circuit is



- A. $6 \times 10^{-6} \text{ C}$
- B. $12 \times 10^{-6} \text{ C}$
- C. $24 \times 10^{-6} \text{ C}$
- D. $36 \times 10^{-6} \text{ C}$

Answer

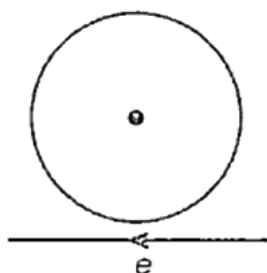
36. A coil of n number of turns is wound tightly in the form of a spiral with inner and outer radii a and b respectively. When a current of strength i is passed through the coil, the magnetic field at its centre is
- A. $\mu_0 n i b - a \log_e ab$
 - B. $\mu_0 n i 2b - a$
 - C. $2 \mu_0 n i b$
 - D. $\mu_0 n i 2b - a \log_e ba$

Answer

37. The electric potential at any point x, y, z in metres is given by $V = 3x^2$. The electric field at a point $(2, 0, 1)$ is
- A. 12 Vm^{-1}
 - B. -6 Vm^{-1}
 - C. 6 Vm^{-1}
 - D. -12 Vm^{-1}

Answer

38. Near a circular loop of conducting wire as shown in the figure an electron moves along a straight line. The direction of the induced current if any in the loop is



- A. variable
- B. clockwise

Answer

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39. The magnetic dipole moment of a current loop is independent of

- A. magnetic field in which it is lying
- B. number of turns
- C. area of the loop
- D. current in the loop

Answer

40. In ruby laser, the stimulated emission is due to transition from

- A. metastable state to any lower state
- B. any higher state to lower state
- C. metastable state to ground state
- D. any higher state to ground state

Answer

41. A convex lens made of glass has focal length 0.15 m in air. If the refractive index of glass is 3/2 and that of water is 4/3, the focal length of lens when immersed in water is

- A. 0.45 m
- B. 0.15 m
- C. 0.30 m
- D. 0.6 m

Answer

42. In a common emitter amplifier the input signal is applied across

- A. anywhere
- B. emitter-collector
- C. collector-base
- D. base-emitter

Answer

43. In a radioactive disintegration, the ratio of initial number of atoms to the number of atoms present at an instant of time equal to its mean life is

- A. $1/e^2$
- B. $1/e$
- C. e
- D. e^2

Answer

44. A ray of light is incident on a surface of glass slab at an angle 45° . If the lateral shift produced per unit thickness is $1/3$ m, the angle of refraction produced is

- A. $\tan^{-1} 3/2$
- B. $\tan^{-1} 1/3$

C. $\sin^{-1} 1/3$

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Answer

45. For the constructive interference the path difference between the two interfering waves must be equal to

- A. $(2n + 1) \lambda$
- B. $2n\pi$
- C. $n\lambda$
- D. $2n + 1 \lambda^2$

Answer

46. The kinetic energy of an electron gets tripled, then the de-Broglie wavelength associated with it changes by a factor

- A. 13
- B. 3
- C. $\frac{1}{3}$
- D. $\frac{1}{13}$

Answer

47. The amount of energy released when one microgram of matter is annihilated is

- A. 25 kWh
- B. 9×10^{10} kWh
- C. 3×10^{10} kWh
- D. 0.5×10^5 kWh

Answer

48. β^- decay means emission of electron from

- A. innermost electron orbit
- B. a stable nucleus
- C. outermost electron orbit
- D. radioactive nucleus

Answer

49. G P Thomson experimentally confirmed the existence of matter waves by the phenomena

- A. diffraction
- B. refraction
- C. polarisation
- D. scattering

Answer

50. Two luminous point sources separated by a certain distance are at 10 km from an observer. If the aperture of his eye is 2.5×10^{-3} m and the wavelength of light used is 500 nm, the distance of separation between the point sources just seen to be resolved is

- A. 12.2 m
- B. 24.2 m

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D. 1.22 m

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Answer

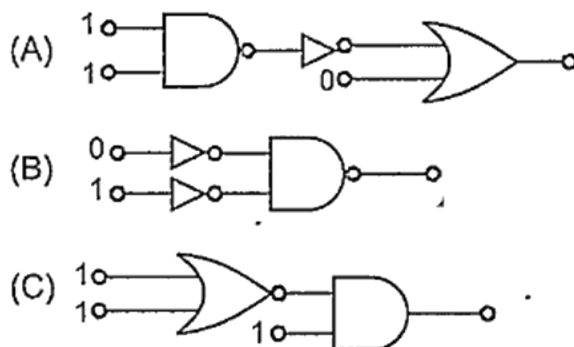
51. The spectral series of the hydrogen atom that lies in the visible region of the electromagnetic spectrum
- Paschen
 - Balmer
 - Lyman
 - Brackett

Answer

52. The angle of minimum deviation for an incident light ray on an equilateral prism is equal to its refracting angle. The refractive index of its material is
- 12
 - 3
 - 32
 - 32

Answer

53. In the following combinations of logic gates, the outputs of A, B and C are respectively



- 0, 1, 1
- 0, 1, 0
- 1, 1, 0
- 1, 0, 1

Answer

54. The phenomena in which proton flips is
- nuclear magnetic resonance
 - lasers
 - radioactivity
 - nuclear fusion

Answer

55. According to the quark model, it is possible to build all the hadrons using

- 2 quarks and 3 antiquarks

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Answer

56. A parallel beam of light is incident on a converging lens parallel to its principal axis. As one moves away from the lens on the other side of the principal axis, the intensity of light
- A. first decreases and then increases
 - B. continuously increases
 - C. continuously decreases
 - D. first increases and then decreases

Answer

57. Continuous emission spectrum is produced by
- A. incandescent electric lamp
 - B. mercury vapour lamp
 - C. sodium vapour lamp
 - D. polyatomic substances

Answer

58. A ray of light is incident on a plane mirror at an angle of 60° . The angle of deviation produced by the mirror is
- A. 120°
 - B. 30°
 - C. 60°
 - D. 90°

Answer

59. Young's double slit experiment gives interference fringes of width 0.3 mm. A thin glass plate made of material of refractive index 1.5 is kept in the path of light from one of the slits, then the fringe width becomes
- A. zero
 - B. 0.3 mm
 - C. 0.45 mm
 - D. 0.15 mm

Answer

60. Hydrogen atom from excited state comes to the ground stage by emitting a photon of wavelength λ . If R is the Rydberg constant, the principal quantum number n of the excited state
- A. $\lambda R \lambda R - 1$
 - B. $\lambda \lambda R - 1$
 - C. $\lambda R 2 \lambda R - 1$
 - D. $\lambda R \lambda - 1$

Answer