

Top 100+ Physics Questions for NDA 2021 Exam

1.If a current passes through a resistor then find the relation between K_1 and K_2 where K_1 and K_2 represent the average kinetic energy of the conduction electrons and the metal ions, respectively.

- A. $K_2 < K_1$
- B. $K_1 = K_2$
- C. $K_1 > K_2$
- D. Any of these three may occur

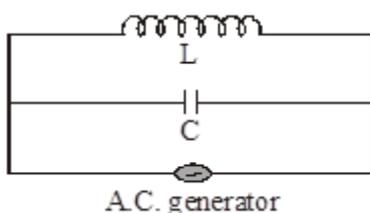
2.If a uniform wire of resistance 50Ω is cut into 5 equal parts and these parts are connected in parallel then calculate the equivalent resistance of the combination.

- A. 2Ω
- B. 10Ω
- C. 250Ω
- D. 6250Ω

3.Consider the following statements when two non-ideal batteries are connected in series.

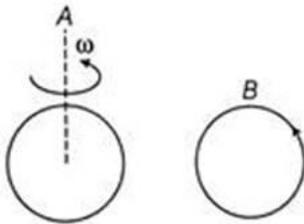
- (i) The equivalent emf is larger than either of the two EMFs.
 - (ii) The equivalent internal resistance is smaller than either of the two internal resistances.
- A. (i) and (ii) are correct.
 - B. (i) is correct but (ii) is wrong.
 - C. (ii) is correct but (i) is wrong.
 - D. (i) and (ii) are wrong.

4.How much current drawn from the alternating current shown in the figure, if the currents through inductor and capacitor are 1.2 amp and 1.0 amp respectively.



- A. 0.4 amp
- B. 0.2 amp
- C. 1.0 amp
- D. 1.2 amp

5. What is the direction of current in coil A, when the current in coil B (at $t=0$) is in a counterclockwise as shown in the figure? [Coil A is rotated about its vertical axis because no current is induced in coil B if coil A is at rest]



- A. Constant current clockwise.
- B. Varying current clockwise.
- C. Varying current counterclockwise.
- D. Constant current counterclockwise

6. An electric dipole moment \vec{P} is lying along a uniform electric field \vec{E} . Then find out the work done in rotating the dipole by 90° .

- A. $\sqrt{2} pE$
- B. $\frac{pE}{2}$
- C. $2pE$
- D. pE

7. Tick the correct options from the following statements.

- A. The total charge of the universe is constant.
- B. The total positive charge of the universe is constant.
- C. The total negative charge of the universe is constant.
- D. The total number of charged particles in the universe is constant.

8. Two spherical balls of mass 10 kg each are placed 10 cm apart. Determine the gravitational force of attraction between them.

- A. $6.67 \times 10^{-7} N$
- B. $4.67 \times 10^{-7} N$
- C. $8.67 \times 10^{-14} N$
- D. $3.67 \times 10^{-6} N$

9. Find the electrostatic energy stored in the capacitor if a 900 pF capacitor is charged by 100 v battery.

- A. $4.50 \times 10^{-6} J$
- B. $5.23 \times 10^{-6} J$
- C. $6.16 \times 10^{-6} J$
- D. $2.25 \times 10^{-4} J$

10. If a metallic particle having no net charge is placed near a finite metal plate which carries a positive charge, then electric force on the particle will be

- A. towards the plate
- B. away from the plate
- C. parallel to the plate
- D. zero

11. If a paramagnetic material is kept in a magnetic field and the field is increased until the magnetisation becomes constant. What happens to magnetisation if the temperature is decreased now?

- A. Will increase
- B. Will decrease
- C. Will remain constant
- D. May increase or decrease

12. Calculate the magnetic susceptibility of the substance if the magnetic field B and the magnetic intensity H in the material are found to be 1.6 T and $1000 Am^{-1}$, respectively.

- A. 2.6×10^3
- B. 3.23×10^3

- C. 1.26×10^3
- D. 2×10^3

13. The magnetic field in the interior of the solenoid was $B_0 = \mu_0 n I$ if the interior of the material is filled with non-zero magnetization, then what will be the field inside the solenoid?

- A. greater than B_0
- B. equal to B_0
- C. lesser than B_0
- D. zero

14. According to Gauss' law of magnetism for a magnetic dipole (m) the net magnetic flux out of any closed surface is;

- A. $\frac{\mu_0 m}{4\pi}$
- B. $\frac{\mu_0 m e}{4\pi}$
- C. Zero
- D. $\frac{\mu_0 m}{4\pi} A$

15. The vertical component of Earth's magnetic field at a place is $0.24\sqrt{3} \times 10^{-4} T$. The value of the horizontal component of earth's magnetic field, If the angle of dip at that place is 30°

- A. $0.86 \times 10^{-4} T$
- B. $0.90 \times 10^{-3} T$
- C. $0.72 \times 10^{-4} T$
- D. $0.60 \times 10^{-3} T$

16. A condenser of $250 \mu F$ is connected in parallel to a coil of the inductance of 0.16 mH, while its effective resistance is 20 Ω . Determine the resonant frequency.

- A. $9 \times 10^4 \text{ Hz}$
- B. $16 \times 10^7 \text{ Hz}$
- C. $8 \times 10^5 \text{ Hz}$
- D. $9 \times 10^3 \text{ Hz}$

17. A circular disc of radius 0.2 m is placed in a uniform magnetic field of

induction $\frac{1}{\pi} \left(\frac{\text{wb}}{\text{m}^2} \right)$ in such a way that its axis makes an angle of 60° with \vec{B} . The magnetic flux linked with the disc is

- A. 0.02 Wb
- B. 0.06 Wb
- C. 0.08 Wb
- D. 0.01 Wb

18. If a magnetic field of flux density 10 T acts normally to the coil of 50 turns to have 100 cm^2 area. Find the induced emf, if the coil is removed from the magnetic field in 0.15 sec.

- A. 40 V
- B. 23 V
- C. 27.3 V
- D. 33.33 V

19. If a 10 m wide spacecraft moves through the interstellar space at a speed and a magnetic field exists in the space in a direction perpendicular to the plane of motion. Then calculate the emf induced across its width. (Treating the spacecraft as a conductor).

- A. 0.07V
- B. 0.09 V
- C. 1.03 V
- D. 0.06 V

20. If a conducting circular loop having area 1 mm^2 is placed coplanarly with a long, straight wire at a distance of 20 cm from it and the straight wire carries an electric current which changes from 10 A to zero in 0.1 s then find the average emf induced in the loop in 0.1 s.

- A. $1 \times 10^{-9} V$
- B. $2 \times 10^{-10} V$
- C. $5 \times 10^{-9} V$
- D. $4 \times 10^{-10} V$

21. A man pushes the swing in such a way that the swing attains the condition of resonance for forced oscillation. Select the correct statements regarding the swing in this case.

- A. Amplitude is infinity.
- B. Driving frequency is equal to the natural frequency.
- C. Amplitude is zero.
- D. None of the above.

22. Electromagnetic waves travelling in a medium having relative permeability $\mu_r = 1.3$ and relative permittivity $\epsilon_r = 2.14$. Calculate the speed of electromagnetic waves in the medium.

- A. $1.8 \times 10^8 \text{ ms}^{-1}$
- B. $1.8 \times 10^4 \text{ ms}^{-1}$
- C. $1.8 \times 10^6 \text{ ms}^{-1}$
- D. $1.8 \times 10^6 \text{ ms}^{-1}$

23. Which factor does not contribute to the amount of heat lost by a body through radiation (according to Newton's law of cooling)?

- A. Nature and extent of the exposed surface
- B. Temperature of surroundings
- C. The temperature of the body
- D. The internal energy of the body

24. A refrigerator has to transfer an average of 506J of heat per second from. Temperature $-20^\circ C$ to $25^\circ C$. Calculate the average power consumed, assuming no energy losses in the process.

- A. 90 Watt
- B. 96 Watt
- C. 80 Watt
- D. 86 Watt

25. Select the correct statement when light enters from air to water?

- A. Frequency increases and speed decreases.
- B. Frequency is the same but the wavelength is smaller in water than in air.
- C. Frequency is the same but the wavelength in water is greater than in air.
- D. Frequency decreases and wavelength is smaller in water than in air.

26. If two thin converging lenses of same focal length are placed on a common axis so that the centre of one coincides with the focus of the other and an object is placed at a distance twice the focal length from the left hand lens then calculate the lateral magnification?

- A. $\frac{1}{2}$
- B. $+\frac{1}{3}$
- C. $-\frac{1}{2}$
- D. $-\frac{1}{3}$

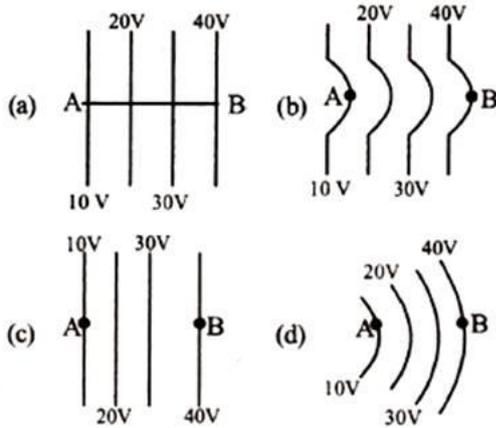
27. Find the magnetic field at a point on the axis of the magnet at a distance of 5 cm from the north pole of the magnet and has a pole strength of 10 Am.

- A. $4 \times 10^{-4} T$
- B. $6 \times 10^{-4} T$
- C. $4 \times 10^4 T$
- D. $6 \times 10^4 T$

28. If a charged particle is whirled in a horizontal circle on a frictionless table by attaching it to a string fixed at one point and a magnetic field is switched on in the vertical direction, then what would be the tension in the string.

- A. will increase
- B. will decrease
- C. will remain the same
- D. may increase or decrease

29. The diagrams given below shows the regions of equipotential.



Select the correct option when a positive charge is moved from A to B in each diagram.

- A. In all the four cases the work done is the same
- B. Minimum work is required to move q in figure (a)
- C. Maximum work is required to move q in figure (b)
- D. Maximum work is required to move q in figure (c)

30. There is a lack of 10^5 electron on each of the two small spheres. Calculate the force if the distance between them is 1 m.

- A. $9 \times 10^{-18} \text{ N Attractive}$
- B. $2.3 \times 10^{-18} \text{ N Attractive}$
- C. $9 \times 10^{-18} \text{ N repulsive}$
- D. $2.3 \times 10^{-18} \text{ N Re pulsive}$

31. Calculate the dimensional formula for electrostatic capacitance.

- A. $[M^1 L^{-3} T^4 A^2]$
- B. $[M^{-1} L^{-2} T^4 A^2]$
- C. $[M^{-1} L^{-1} T^3 A^2]$
- D. $[M^{-1} L^{-1} T^3 A^3]$

32. What is the effect on torque when angular momentum is increasing?

- A. Increasing
- B. Decreasing

- C. Constant
- D. None

33. Doppler shift in frequency does not depend upon

- A. The frequency of the wave produced
- B. The velocity of the source
- C. The velocity of the observer
- D. Distance from the source to the listener

34. A Loudness of sound is related to its

- A. frequency
- B. amplitude
- C. speed
- D. pitch

35. What are the dimensions of Co-efficient of volume expansion?

- A. $T^{-1} K^{-1}$
- B. $M^1 K^{-2}$
- C. $M^2 K^{-1}$
- D. K^{-1}

36. The three kinematics equations

a) $v = u + at$

b) $s = ut + \frac{1}{2}at^2$

c) $v^2 = u^2 + 2as$

are applicable to any system, If and only if

- A. acceleration is variable
- B. speed is constant
- C. acceleration is constant
- D. we can apply these equation in any case.

37. What is the escape velocity of a planet having mass 6 times and radius 3 times as that of earth?

- A. V_e
- B. $\sqrt{2} V_e$
- C. $\sqrt{3} V_e$
- D. None of these

38. For the measurement of potential difference, a potential-meter is preferred over voltmeter because

- A. Potential-meter is more sensitive than voltmeter.
- B. The resistance of potential-meter is less than voltmeter.
- C. Potential-meter is cheaper than voltmeter.
- D. Potential-meter does not take current from the circuit.

39. Sound travel faster in _____.

- A. Water
- B. Air
- C. Steel
- D. Wood

40. Consider a conductor in which current density is $2.5 \times 10^6 \text{ Am}^{-2}$ and electric field of 15Vm^{-1} is applied on it. The resistivity of the conductor will be

- A. $6 \times 10^{-6} \Omega m$
- B. $5 \times 10^{-6} \Omega m$
- C. $7 \times 10^{-6} \Omega m$
- D. None of these

41. Which type of semiconductor do we get when pure silicon is doped with a trivalent element?

- A. N- type semiconductor
- B. P- type semiconductor
- C. Intrinsic semiconductor
- D. None of these

42. When there is an electric current through a conducting wire along its length, then the electric field must exist

- A. outside the wire but parallel to it
- B. outside the wire but normal to it
- C. inside the wire and parallel to it
- D. inside the wire and normal to it

43. In Bohr's model, the atomic radius of the first orbit is r_0 . Then, the radius of the third orbit will be?

- A. $3r_0$
- B. $6r_0$
- C. $9r_0$
- D. $27r_0$

44. **The displacement of a particle is represented by the equation $y = 2\sin^2 \omega t$. The motion is**

- A. **non-periodic**
- B. **periodic but not simple harmonic**
- C. **simple harmonic with period $2\pi/\omega$**
- D. **simple harmonic with period π/ω**

45. Heat energy of an object is

- A. The average energy of the molecules of the object
- B. The total energy of the molecules of the object
- C. The average velocity of the molecules of the object
- D. The average potential energy of the molecules of the object

46. A man pushes a wall but fails to displace it, he does

- A. Negative work
- B. Positive work
- C. No work at wall
- D. Maximum work

47. The ratio of change in collector-emitter voltage to the resulting change in the collector current at constant base current, when the transistor is being used in Common Emitter configuration?

- A. Input dynamic resistance
- B. Output dynamic resistance
- C. Output emitter current

D. Input emitter current

48. What happens when the monochromatic light used in Young's double slit experiment is replaced by white light?

- A. No fringes are observed.
- B. All bright fringes become white.
- C. All bright fringes have colour between violet and red.
- D. Only the central fringe is white and all other fringes are coloured

49. A Daniel cell is balanced on 125 cm length of a potentiometer wire. Now the cell is short-circuited by a resistance 4 ohm and the balance is obtained at 100 cm. Then the internal resistance of the Daniel cell is

- A. 0.5 ohm
- B. 1 ohm
- C. 1 mho
- D. 2 ohm

50. We always get real image in a convex lens, if the object is placed beyond

- A. Optical centre
- B. Focus
- C. Centre of curvature
- D. None of these

51. A conducting ring of radius 1m is placed in a uniform magnetic field B of 0.01 tesla oscillating with frequency 100 Hz with its plane at the right angle to B . What will be the induced an electric field?

- A. 2 volt/m
- B. 10 volt/m
- C. 62 volt/m
- D. π volt/m

52. Find out the velocity of the wave propagation in a conductor with the frequency of 5×10^8 rad/s and phase constant of 3×10^8 units.

- A. $\frac{3}{5}$
- B. 15

- C. 8
- D. $\frac{5}{3}$

53. Assertion: Electrical appliances with the metallic body have three-pin connections, while an electric bulb has a two-pin connection.

Reason: Three-pin connections reduces the heating of the connecting wires.

- A. If both Assertion and Reason are True and the Reason is the correct explanation of the Assertion.
- B. If both Assertion and Reason are True but the Reason is not the correct explanation of the Assertion.
- C. If Assertion is True but the Reason is False.
- D. If both Assertion and Reason are false.

54. A charged particle is accelerated by a potential of 200V. If its velocity is $8.4 \times 10^8 \text{ m/s}$, then find out the value of e/m for that particle.

- A. 17.6×10^{16}
- B. 14.5×10^{12}
- C. 1.76×10^{15}
- D. 1.45×10^{15}

55. A capacitor of capacity $5 \mu F$ is charged up to 220 Volt and is disconnected from the battery. Now this charged $5 \mu F$ capacitance is connected by another uncharged capacitor of $2.5 \mu F$ capacitor. Find the heat loss in the process.

- A. $\frac{121}{3} \times 10^{-3} \text{ J}$
- B. $\frac{1210}{5} \times 10^{-3} \text{ J}$
- C. $200 \times 10^{-3} \text{ J}$
- D. $\frac{1210}{3} \times 10^{-3} \text{ J}$

56. A park has a radius of 10 m. If a vehicle goes around it at an average speed of 18 km/hr, what should be the proper angle of banking?

A. $\tan^{-1}\left(\frac{1}{2}\right)$

B. $\tan^{-1}\left(\frac{1}{4}\right)$

C. $\left(\frac{1}{2 \tan \theta}\right)$

D. $\left(\frac{1}{4 \tan \theta}\right)$

57. A circular road of radius 50 m has the angle of banking equal to 30° . At what speed should a vehicle go on this road so that the friction is not used?

A. 13m/s

B. 15m/s

C. 17m/s

D. 14m/s

58. A stone of mass m tied to a string of length l is rotated in a circle with the other end of the string as the centre. The speed of the stone is v . If the string breaks, the stone will move

A. towards the centre

B. away from the centre

C. along a tangent

D. will stop.

59. What is the dimensional formula of thermal conductivity?

A. $M^1L^1T^{-3}\theta^{-1}$

B. $M^0L^1T^{-1}\theta^{-1}$

C. $M^1L^0T^{-1}\theta^{-1}$

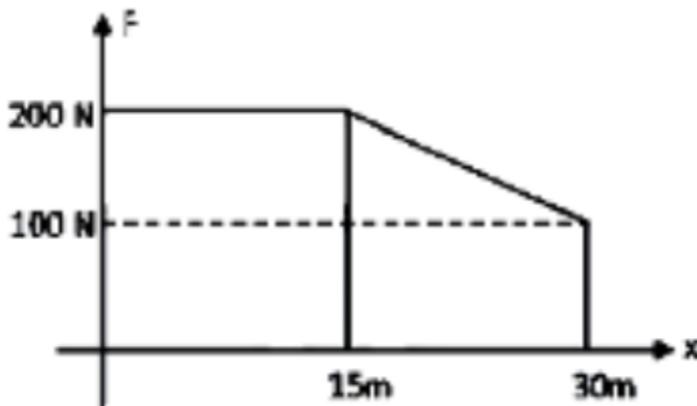
D. $M^1L^1T^0\theta^{-1}$

60. Assertion: The Airplane always flies at low altitudes.

Reason: According to Newton’s third law of motion, it states that for every action there is an equal and opposite reaction.

- A. If both Assertion and Reason are True and the Reason is the correct explanation of the Assertion.
- B. If both Assertion and Reason are True but the Reason is not the correct explanation of the Assertion.
- C. If Assertion is True but the Reason is False.
- D. If both Assertion and Reason are false.

61. Force on a particle varies with the position (x) of the particle as shown in the given figure. Calculate the work done by force from x= 0 to x= 30m



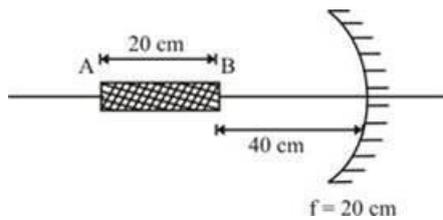
- A. 5250 J
- B. 4250 J
- C. 7500 J
- D. 3750 J

62. A helicopter is rising from the ground with an acceleration of $g \text{ m/s}^2$, starting from rest after rising a height h, it attains a velocity of v m/s. At this instant, a particle is now released from the helicopter. Take t= 0 at releasing time, calculate the time t when the particle reaches the ground.

- A. $\sqrt{\frac{2h}{g}}$
- B. $\sqrt[2]{\frac{2h}{g}}$
- C. $\left\{ 1 + \sqrt{2} \sqrt{\frac{2h}{g}} \right\}$

D. $\sqrt[4]{\frac{2h}{g}}$

63. Given figure shows a rod having length 20 cm lies along the principal axis of a concave mirror of focal length 20 cm in such a way that end closer to the pole is 40 cm away from it. What will be the length of the image?



- A. 10 cm
- B. 20 cm
- C. 40m
- D. 5cm

64. Consider the following statements:

- 1) Ohm's law holds good when the temperature is changed.
- 2) Ohm's law holds when the temperature of the conductor remains constant.
- 3) Ohm's law is an assumption that current through a conductor is always directly proportional to the potential difference applied to it.

Which of the following statements is incorrect?

- A. Only 1
- B. Only 2
- C. Only 3
- D. All of the above

65. A potentiometer wire whose length is 1200cm and it carries a current of 60mA. For a cell of emf 5V and the internal resistance of 20Ω , the null point on it is found to be at 1000cm. The resistance of the whole wire should be:

- A. 100Ω
- B. 80Ω

- C. 90Ω
- D. 60Ω

66. A 40 HP electric motor lifts an elevator which has a maximum total load capacity of 2000kg. When the frictional force on the elevator is 3000N, then the speed of the elevator at full load will be; (1 HP = 746W, $g = 10 \text{ m/s}^2$)

- A. 0.9m/s
- B. 1.2m/s
- C. 3m/s
- D. 2.1m/s

67. Electric field E in the conductor whose length is L is given by _____.

- A. $E = j\rho$
- B. $E = VL$
- C. $E = \frac{\rho l}{a}$
- D. $E = \frac{j}{a}$

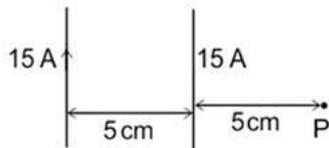
68. Which quantities do not change when a resistor connected to a battery is heated due to the current?

- A. Drift speed
- B. Resistivity
- C. Resistance
- D. Number of free electrons

69. On which of the following factors does the internal resistance of the cell not depend?

- A. Nature of the electrolyte
- B. Concentration of the electrolyte
- C. Distance between the 2 electrolyte
- D. Length of the electrolyte

70. If the distance between the two long straight wires is 5 cm, with each carrying a current of 15 A in the same direction, then find a magnetic field at P



- A. 3×10^{-7} T
- B. 5×10^{-7} T
- C. 7×10^{-7} T
- D. 12×10^{-7} T

71. An organ pipe closed at one end vibrating in its first overtone and another pipe, open at both ends vibrating in its third overtone are in resonance with a given tuning fork. The ratio of their lengths are given by.

- A. 4/5
- B. 3/8
- C. 9/7
- D. 3/4

72. The earth's magnetization is 82.5 Am^2 . Assume that the earth's magnetic field can be approximated by a giant bar magnet. Calculate the magnetic moment. The earth's radius is 6400 Km.

- A. $8.0 \times 10^{22} \text{ Am}^2$
- B. $7.5 \times 10^{22} \text{ Am}^2$
- C. $9.86 \times 10^{22} \text{ Am}^2$
- D. $9.06 \times 10^{22} \text{ Am}^2$

73. Planet A has double the radius than that of Planet B. If the mass of Planet A is 4 times heavier than the mass of Planet B, which of the following statements regarding weight of an object is correct?

- A. Heavier on Planet A than on Planet B
- B. Heavier on Planet B than on Planet A
- C. Same on both the Planets
- D. Cannot be measured on Planet B

74.If a light spring balance hangs from the hook of the other light spring balance and a block of mass M kilograms hangs from the former one. Which statements about the scale reading are true?

- A. Both the scale read $M/2$ kg each
- B. Both the scale will read M kg each
- C. The scale of the lower one read M kg and of the upper one zero.
- D. The reading of the two scales can be anything but the sum of the reading will be M kg.

75.Which of the following option is not correct with related to viscosity?

- A. S.I. Units: Pas or $N.s/m^2$
- B. One Poise= 0.1 Pas
- C. Dynamic viscosity of water at 20 °C is approximately= 1 c P
- D. 1/10 Poise is called centipoises.

76.If a cuboidal beaker is half-filled with water, then by what percent the hydrostatic force on one of the vertical sides of the beaker increase when it is completely filled?

- A. 100
- B. 200
- C. 300
- D. 400

77.A bulb B and an Ac source is connected in series with a coil having self-inductance L. The bulb decreases its brightness because of which of the following option.

- A. frequency of the ac source is decreased.
- B. number of turns present in the coil is reduced.
- C. a capacitance of reactance $X_c = X_L$ is included.
- D. inside the coil an iron rod inserted.

78.If a long barrel of radius 2cm carrying a charge of $5\mu C/m$ that is kept in a medium of dielectric constant 10? What will be the electric field intensity at a point situated at a distance of 1m from the axis of the barrel?

- A. 0.8×10^3 V/m
- B. 7×10^5 V/m

- C. 9×10^3 V/m
- D. 0.9×10^3 V/m

79. If a particle moves through a circular path with a uniform speed v . After the position vector, it has made an angle of 30° with the reference position then its speed will be

- A. $v\sqrt{2}$
- B. $\frac{v}{\sqrt{2}}$
- C. $\frac{v}{\sqrt{3}}$
- D. v

80. An equi-concave lens has power P . Find the power of a plain-concave lens, when given lens is sliced in such a way that two plain-concave lens are formed:

- A. $\frac{P}{2}$
- B. P
- C. $\frac{P}{4}$
- D. $2P$

81. Assertion: A person who touches a high power line gets to cling to the power line.

Reason: The current-carrying wires in the power line attract the man towards it.

- A. If both Assertion and Reason are True and the Reason is the correct explanation of the Assertion.
- B. If both Assertion and Reason are True but the Reason is not the correct explanation of the Assertion.
- C. If Assertion is True but the Reason is False.
- D. If both Assertion and Reason are false.

82. The component of the acceleration, parallel to the velocity of the particle, at the given instant is called

- A. radial component
- B. tangential component
- C. centripetal component
- D. none of the mentioned

83. when the circular disc rolls down an inclined plane what is the ratio of rotational kinetic energy (K.E) to total kinetic energy?

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

84. Which of the following is true for a reversible heat transfer and for the adiabatic process?

- A. $dQ = 0$
- B. $dS = 0$
- C. $S = \text{CONSTANT}$
- D. all of the mentioned

85. An astronaut has just finished fixing a space telescope using a big instrument whose mass is $\left(\frac{1}{10}\right)^{th}$ as big as his mass. You realize that you have no way to get back to your spaceship which is 10 meters away from you, so you throw the instrument as hard as you can in a direction away from the spaceship which causes you to move in the opposite direction, toward the spaceship. When you finally reach the space ship, how much distance away are you from the instrument?

- A. 110m
- B. 100m
- C. 80m
- D. 90m

86. Step-up transformers are used for –

- A. increasing Electrical Power
- B. decreasing Electrical Power
- C. decreasing Voltage
- D. increasing Voltage

87. Which is not true regarding SHM?

- A. A glass ball rolling freely in a shallow hemispherical bowl is an example of SHM.
- B. The phase angle of a particle executing SHM is when it has a maximum displacement
- C. The total energy of the particle always remains the same.
- D. The velocity of the particle is minimum at the centre of motion of the particle.

88. **Statement I:** An induced e.m.f. can be produced by Magnetic flux

Statement II: Induced e.m.f. was established by Faraday.

- A. Statement-I is True, Statement-II is True, and Statement-II is a correct explanation for Statement-I
- B. Statement-I is True, Statement-II is True, and Statement-II is not a correct explanation for Statement-I
- C. Statement-I is True, and Statement-II is False
- D. Statement-I is False, Statement-II is True

89. Calculate the coefficient of coupling for two coils having self-inductance of 80 mH and 65 mH. The mutual inductance between them is 50 mH.

- A. 0.75
- B. 0.8
- C. 0.693
- D. 0.789

90. A 4m long ladder weighing 25 kg rests with its upper end against a smooth wall and lower end on rough ground. What should be the minimum coefficient of friction between the ground and the ladder for it to be inclined at 60° with the horizontal without slipping? (Take $g=10\text{m/s}^2$)

- A. 0.3
- B. 0.247
- C. 0.2
- D. 0.288

91. A car of mass 1500 kg is moving with some speed on a circular path of radius 16 m on a level road. The coefficient of friction is 0.8 (between car

and the road). Find the maximum speed of the car such that it does not slip. ($g = 9.8 \text{ ms}^{-2}$)

- A. 15.4 m/s
- B. 10.9 m/s
- C. 11.2 m/s
- D. 9.7 m/s

92. Two particles of masses a_1 and a_2 ($a_1 > a_2$) captivate each other with a force which is inversely proportional to the square of the distance between them. The particles are initially held at rest and then released. Which one is correct?

- A. The CM moves towards to a_2
- B. The CM moves towards to a_1
- C. The CM remains at rest
- D. The CM moves at the right angles to the line joining a_1 and a_2

93. A bullet hits a block kept at rest on a smooth horizontal surface and gets embedded into it. Which of the following does not change?

- A. linear momentum of the block
- B. kinetic energy of the block
- C. gravitational potential energy of the block
- D. temperature of the block.

94. A turn of radius 20 m is banked for the vehicle of mass 200 kg going at a speed of 10 m/s. Find the direction and magnitude of frictional force acting on a vehicle if it moves with a speed of 5 m/s. Assume that friction is sufficient to prevent slipping. ($g = 10 \text{ m/s}^2$)

- A. $200\sqrt{5}$ N (downwards)
- B. $100\sqrt{5}$ N (onwards)
- C. $300\sqrt{5}$ N (downwards)
- D. $300\sqrt{5}$ N (outwards)

95. A particle moves in a circle of radius 25 cm at 2 rev/ sec. The acceleration of the particle is:

- A. $2\pi^2 \text{ m/s}^2$
- B. $4\pi^2 \text{ m/s}^2$
- C. $8\pi^2 \text{ m/s}^2$
- D. $\pi^2 \text{ m/s}^2$

96.If K is the bulk modulus for material and ρ is its density, then which of the following is the correct formula concerning these 2 quantities for the speed of sound through this material?

- A. $v = \sqrt{K\rho}$
- B. $v = K\sqrt{\frac{1}{\rho}}$
- C. $v = \sqrt{\frac{K}{\rho}}$
- D. $v = \frac{K}{\rho}$

97.If mass-energy equivalence is taken into account when water is cooled to form ice, the mass of water should

- A. Increase
- B. Decrease
- C. Remain unchanged
- D. First increase then decrease

98.Which of the given statements cannot affect the loudness of a sound?

- A. The motion of air particles
- B. Distance between source and listener
- C. Intensity of sound
- D. The temperature of the medium

99.Compared to audible sound waves, ultrasound waves have

- A. higher speed.
- B. higher frequency.
- C. longer wavelength.
- D. both higher speed and frequency.

100.If v_m is the speed of sound in moist air and v_d is the speed of sound in dry air under identical conditions of pressure and temperature, then

- A. $V_m > v_d$
- B. $V_m < v_d$
- C. $V_m = v_d$
- D. $V_m \cdot v_d = 1$

101.What is the magnitude of magnetic force per unit length on an electric wire if it carries a current of 12A and makes an angle of 30° with the direction of a uniform magnetic field of 2.5 T?

- A. 2.5 N/m
- B. 15 N/m
- C. 11 N/m
- D. 20 N/m

102.At a particular point, the density of energy in a medium of dielectric constant ϵ is $26.55 \times 10^6 J/m^2$. What should be the electric field intensity at that point?

- A. $7.45 \times 10^{-5} N/C$
- B. $9.37 \times 10^{-5} N/C$
- C. $8.66 \times 10^8 N/C$
- D. $9.65 \times 10^6 N/C$

103.An object is having weight of 100N on the surface of the earth. How much will it weigh midway down to the center of the earth's surface?

- A. 10 N
- B. 50 N
- C. 80 N
- D. 100 N

104.S.I. unit of thermal conductivity is

- A. $Jm^{-1}K^{-1}$
- B. $Wm^{-1}K^{-1}$
- C. WmK^{-1}

D. JmK^{-1}

105. A wire carrying a current of 10A makes an angle of 30° with the direction of a uniform magnetic field of 0.10T. The magnitude of magnetic force per unit length will be-

- A. 0.5 Nm^{-1}
- B. 0.6 Nm^{-1}
- C. 0.8 Nm^{-1}
- D. 5 Nm^{-1}

106. Match the thermometer with the corresponding thermometric property.

Thermometer	Property
i – Pyrometer	a – Electrical resistance of a metal wire
ii – Mercury thermometer	b – Radiated power
iii – Platinum resistance thermometer	c – Thermoelectrical emf
iv – Thermocouple	d – Length of liquid column in a capillary

- A. (i-c) , (ii-d) , (iii-b) , (iv-a)
- B. (i-b) , (ii-a) , (iii-d) , (iv-c)
- C. (i-d) , (ii-b) , (iii-b) , (iv-c)
- D. (i-b) , (ii-d) , (iii-a) , (iv-c)

107. The angle of minimum deviation for a glass prism with $\mu = \sqrt{3}$ equals the refracting angle of the prism. What is the angle of the prism?

- A. 75°
- B. 60°
- C. 65°
- D. 80°

108. Which of the following relation among the coefficient of linear expansion (α), superficial expansion (β) and cubical expansion (γ) is correct?

- A. $\frac{\alpha}{1} = \frac{\beta}{3} = \frac{\gamma}{2}$
B. $\frac{\alpha}{1} = \frac{\beta}{2} = \frac{\gamma}{3}$
C. $\frac{\alpha}{2} = \frac{\beta}{1} = \frac{\gamma}{3}$
D. $\frac{\alpha}{3} = \frac{\beta}{1} = \frac{\gamma}{2}$

109. A ball of mass 100 g falls from a height of 1 m and rebounds to a height of 50 cm. Find the force between the ground and the ball if the time of contact was 0.1 s. ($g = 10 \text{ ms}^{-2}$)

- A. 5.76 N
B. 7.63 N
C. 8 N
D. 6.5 N

110. In the lab, during an experiment to resolve the focal length of a convex lens, Mukesh observed a sharp inverted image of a distant tree on the screen behind the lens. He then removed the screen and looked through the lens in the direction of that object. What will he observe?

- A. An inverted image of the tree at the focus of the convex lens.
B. No image formation as the screen has been removed.
C. A blurred image on the wall of lab.
D. An erect image of a tree on the screen.

111. Radha tries to trace the path of light with a glass slab whose two opposite faces are not parallel with each other. She observes

- A. Incident ray will not parallel to the emergent ray.
B. Emergent ray is parallel to the incident ray.
C. Emergent angle depends upon the refractive index of the medium.
D. Both (A) and (C) options.