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Physics Model Papers

MODEL PAPER – 1

1. **Dimensional formula ML^2T^{-3} represents**
(a) Force (b) Power (c) Energy (d) Work

2. **The temperature of a given mass of a gas is raised by 20% keeping the pressure constant. The increase in volume will be**
(a) 20% (b) 10%
(c) 20 / 2.73%
(d) The information is incomplete

3. **In C.G.S. system, the Young's modulus of a steel wire is 2×10^{12}. To double the length of a wire of unit cross–section area, the force required is**
(a) 4×10^6 dynes (b) 2×10^{12} dynes
(c) 2×10^{12}newtons (d) 2×10^8 dynes

4. **When light passes from one medium into another medium, then the physical property which does not change is**
(a) Velocity (b) Wavelength
(c) Frequency (d) Refractive index

5. **The angle of projection at which the horizontal range and maximum height of projectile are equal is**
(a) 45^o (b) $\theta = \tan^{-1}(0.25)$
(c) $\theta = \tan^{-1} 4$ (d) 60^o

6. **A circular coil of radius 5 cm has 500 turns of a wire. The approximate value of the coefficient of self induction of the coil will be**
(a) 25 millihenry (b) 25×10^{-3} millihenry
(c) 50×10^{-3} millihenry (d) 50×10^{-3} henry

7. **A stone dropped from the top of the tower touches the ground in 4 sec. The height of the tower is about**
(a) 80 m (b) 40m (c) 20 m (d) 160 m

8. **The resistance of a galvanometer is 90 ohms. If only 10 percent of the main current may flow through the galvanometer, in which way and of what value, a resistor is to be used**
(a) 10 ohms in series (b) 10 ohms in parallel
(c) 810 ohms in series (d) 810 ohms in parallel

9. **The resistance of a cell does not depend on**
(a) Current drawn from the cell
(b) Temperature of electrolyte
(c) Concentration of electrolyte
(d) The emf of the cell

10. **Two Metal pieces having a potential difference of 800 V are 0.02 m apart horizontally. A particle of mass 1.96×10^{-15} kg is suspended in equilibrium between the plates. If e is the elementary charge, then charge on the particle is**
(a) e (b) 3e (c) 6e (d) 8e

11. **When a sphere of moment of inertia I about its centre of gravity and mass 'm' rolls from rest down an inclined plane without slipping, its kinetic energy is**
(a) $1/2\ I\omega^2$ (b) $1/2\ mv^2$
(c) $I\omega + mv$ (d) $1/2I\omega^2 + 1/2mv^2$

12. **Radiation emitted by a surface is directly propertional to**
(a) Third power of its temperature
(b) Fourth power of its temperature
(c) Twice power of its temperature
(d) None of the above

13. **K is the force constant of a spring. The work done in increasing its extension from l_1 to l_2 will be**
(a) $K(l_2 - l_1)$ (b) $K/2\ (l_2 + l_1)$
(c) $K(l_2^2 - l_1^2)$ (d) $K/2\ (l_2^2 - l_1^2)$

14. **A ray of light incidents on a plane mirror at an angle of 30^o. The deviation produced in the ray is**
(a) 30^o (b) 60^o (c) 90^o (d) 120^o

15. **The specific charge of an electron is**
(a) 1.6×10^{-19} coulomb
(b) 4.8×10^{-10} stat coulomb
(c) 1.76×10^{11} coulomb / kg
(d) 1.76×10^{-11} coulomb / kg.

16. **The phase difference between the current and voltage at resonance is**
(a) 0 (b) $\pi/2$ (c) π (d) $-\pi$

17. **The sensitiveness of a moving coil galvanometer can be increased by decreasing**
(a) The number of turns in the coil
(b) The area of the coil
(c) The magnetic field
(d) The couple per unit twist of the suspension

MODEL PAPER – 1 **1. (b) 2. (a) 3. (b) 4. (c) 5. (c) 6. (a) 7. (a) 8. (b) 9. (d) 10. (b) 11. (d) 12. (b) 13. (d) 14. (d) 15. (c) 16. (a) 17. (d)**

18. Two wires of same metal have the same length but their cross–sections are in the ratio 3 : 1. They are joined in series. The resistance of the thicker wire is 10Ω. The total resistance of the combination will be

(a) 40 Ω (b) 40/3 Ω (c) 5/2 Ω (d) 100 Ω

19. The radius of curvature for a lens is 40 cm. For each surface, its refractive index is 1.5. The focal length will be

(a) 40 cm (b) 20 cm (c) 80 cm (d) 30 cm

20. The force between the plates of a parallel plate capacitor of capacitance C and distance of separation of the plates d with a potential difference V between the plates, is

(a) $CV^2/2d$ (b) $C^2V^2/2d^2$

(c) C^2V^2/d^2 (d) V^2d/C

21. Which of the following is dimensionally correct

(a) Pressure = Energy per unit area

(b) Pressure = Energy per unit volume

(c) Pressure = Force per unit volume

(d) Pressure = Momentum per unit volume per unit time

22. A body radiates energy 5 W at a temperature of 127°C. If the temperature is increased to 927°C, then it radiates energy at the rate of

(a) 410 W (b) 81 W (c) 405 W (d) 200 W

23. A beam of metal supported at the two ends is loaded at the centre. The depression at the centre is proportional to

(a) Y^2 (b) Y (c) 1/Y (d) $1/Y^2$

24. A star is moving towards the earth with a speed of 4.5×10^6 m/s. If the true wavelength of a certain line in the spectrum received from the star is 5890Å, its apparent wavelength will be about [c = 3×10^8 m/s]

(a) 5890 Å (b) 5978 Å (c) 5802 Å (d) 5896 Å

25. In the motion of a projectile freely under gravity, its

(a) Total energy is conserved

(b) Momentum is conserved

(c) Energy and momentum both are conserved

(d) None is conserved.

26. In a hydrogen atom, an electron moves in a circular orbit of radius 5.2×10^{-11} m and produces a magnetic induction of 12.56 T at its nucleus. The current produced by the motion of the electron will be

(a) 6.53×10^{-3} ampere (b) 13.25×10^{-10} ampere

(c) 9.6×10^6 ampere (d) 1.04×10^{-3} ampere

(Given $\mu_o = 4\pi \times 10^{-7}$ Wb/A–m)

27. An electric lamp is marked 60W, 230V. The cost of 1 Kilowatt hour of power is Rs. 1.25. The cost of using this lamp for 8 hours is

(a) Rs. 1.20 (b) Rs. 4.00

(c) Rs. 0.25 (d) Rs. 0.60

28. Moment of inertia × angular acceleration =

(a) Torque (b) Force

(c) Angular momentum (d) Work down

29. A particle of mass 10 grams is executing simple harmonic motion with an amplitude of 0.5 m and periodic time of (π/5) seconds. The maximum value of the force acting on the particle is

(a) 25 N (b) 5 N (c) 2.5 N (d) 0.5 N

30. When a force is applied on a wire of uniform cross–sectional area 3×10^{-6} m^2 and length 4m, the increase in length is 1 mm. Energy stored in it will be (Y = 2×10^{11} N/m^2)

(a) 6250 joule (b) 0.177 joule

(c) 0.075 joule (d) 0.150 joule

31. Two coherent sources must have the same

(a) Amplitude (b) Phase difference

(c) Frequency (d) Both (b) and (c)

32. A bullet is fired with a speed of 1000 m/sec in order to hit a target 100 m away. If g = 10 m/s^2, the gun should be aimed

(a) Directly towards the target

(b) 5 cm above the target (c) 10 cm above the target

(d) 15 cm above the target

33. When 1 N force acts on 1 kg body that is able to move freely, the body receives

(a) A speed of 1 m/sec

(b) An acceleration of 1 m/sec^2

(c) An acceleration of 980 cm/sec^2

(d) An acceleration of 1 cm/sec^2

34. Band spectrum is produced by

(a) H (b) He

(c) H_2 (d) Na

35. Conduction electrons are almost uniformly distributed within a conducting plate. When placed in an electrostatic field E, the electric field within the plate

(a) Is zero (b) Depends upon E

18. (a) 19. (a) 20. (a) 21. (b) 22. (c) 23. (c) 24. (c) 25. (a) 26. (d) 27. (d) 28. (a) 29. (d) 30. (c) 31. (d) 32. (b) 33. (b) 34. (c) 35. (a)

(c) Depends upon E

(d) Depends upon the atomic number of the conducting element.

36. The mass of the earth is 6.00×10^{24} kg and that of the moon is 7.40×10^{22} kg. The constant of gravitation $G = 6.67 \times 10^{-11}$ $N\text{–}m^2 / kg^2$. The potential energy of the system is -7.79×10^{28} joules. The mean distance between the earth and moon is

(a) 3.80×10^8 metres

(b) 3.37×10^6 metres

(c) 7.60×10^4 metres

(d) 1.90×10^2 metres

37. The total momentum of the molecules of 1 gm mol of a gas in a container at rest of 300 K is

(a) $2 \times \sqrt{3R \times 300}$ gm $\times$ cm/sec

(b) $2 \times 3 \times R \times 300$ gm $\times$ cm/sec

(c) $1 \times \sqrt{3 \times R \times 300}$ gm $\times$ cm/sec

(d) Zero

38. At a certain place, the horizontal component B_o and the vertical component V_o of the earth's magnetic field are equal in magnitude. The total intensity at the place will be

(a) B_o (b) B_o^2 (c) $2 B_o$ (d) $\sqrt{2}$ B_o

39. Which one of the following statements is correct

(a) In vacuum, the speed of light depends upon frequency

(b) In vacuum, the speed of light does not depend upon frequency

(c) In vacuum, the speed of light is independent of frequency and wavelength.

(d) In vacuum, the speed of light depends upon wavelength.

40. The velocity of an electron of energy 26 eV will be

(a) 10^6 m/sec (b) 6×10^6 m/sec

(c) 3×10^6 m/sec (d) 3×10^{10} m/sec.

41. In an A.C. circuit, a resistance of R ohm is connected in series with an inductance L. If phase angle between voltage and current be 45^o, the value of inductive reactance will be

(a) R/4 (b) R/2 (c) R

(d) Can not be found with the given data

42. A Daniel cell is balanced on 125 cm length of a potentiometer wire. Now the cell is short–circuited by a resistance 2 ohm and the balance is obtained at 100 cm. The internal resistance of the Daniel cell is

(a) 0.5 ohm (b) 1.5 ohm

(c) 1.25 ohm (d) 4/5 ohm

43. Choose the correct statement from the following : Weightlessness of an astronaut moving in a satellite is a situation of

(a) Zero g (b) No Gravity

(c) Zero mass (d) Free fall

44. For a particle executing simple harmonic motion, which of the following statements is not correct

(a) The total energy of the particle always remains the same

(b) The restoring force of always directed towards a fixed point

(c) The restoring force is maximum at the extreme positions

(d) The acceleration of the particle is maximum at the equilibrium position

45. The distance of two points on the axis of a magnet from its centre is 10 cm and 20 cm respectively. The ratio of magnetic intensity at these points is 12.5 : 1. The length of the magnet will be

(a) 5 cm (b) 25 cm

(c) 10 cm (d) 20 cm

46. Wave which cannot travel in vacuum is

(a) X–rays (b) Infrasonic

(c) Ultraviolet

(d) Radiowaves

47. Which of the following will have the least value of e/m.

(a) Electron (b) Proton

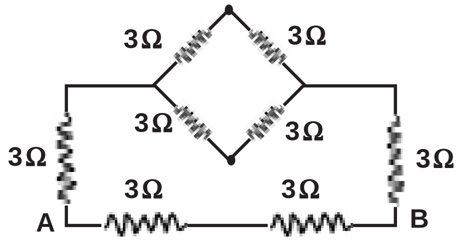
(c) α–particle (b) β–particle

48. The current flowing in a coil of self inductance 0.4 mH is increased by 250 mA in 0.1 sec. The e.m.f. induced will be

(a) + 1 volt (b) – 1 volt

(c) + 1 mV (d) – 1 mV

49. Equivalent resistance between A and B will be



36. (a) 37. (d) 38. (d) 39. (c) 40. (c) 41. (c) 42. (a) 43. (d) 44. (d) 45. (c) 46. (b) 47. (c) 48. (d) 49. (d)

(a) 2 ohm (b) 18 ohm
(c) 6 ohm (d) 3.6 ohm

50. You are given three bulbs of 25, 40 and 60 watt. Which of them has lowest resistance
(a) 25 watt bulb (b) 40 watt bulb
(c) 60 watt bulb
(d) Information is insufficient

51. Electron volt is a unit of
(a) Charge (b) Potential difference
(c) Momentum (d) Energy

52. The molar specific heat at constant pressure for a monoatomic gas is
(a) 3/2 R (b) 5/2 R (c) 7/2 R (d) 4 R

53. A magnet of magnetic moment 20 C.G.S. units is freely suspended in a uniform magnetic field of intensity 0.3 C.G.S. units. The amount of work done in deflecting it by an angle of 30^o in C.G.S. units is
(a) 6 (b) $3\sqrt{3}$ (c) $3(2-\sqrt{3})$ (d) 3

54. The focal length of a concave mirror is 12 cm. Where should an object of length 4 cm be placed so that an image of 1 cm length is formed ?
(a) 48 cm. (b) 3 cm. (c) 60 cm. (d) 15 cm.

55. In forward bias, the width of potential barrier in a p–n junction diode
(a) Increases
(b) Decreases
(c) Remains constant
(d) First increases then decreases

56. The resonant frequency of a circuit is f. If the capacitance is made 4 times the initial values, then the resonant frequency will become
(a) f/2 (b) 2f (c) f (d) f/4

57. A magnetic field
(a) Always exerts a force on a charged particle
(b) Never exerts a force on a charged particle
(c) Exerts a force, if the charged particle is moving across the magnetic field lines
(d) Exerts a force, if the charged particle is moving along the magnetic field lines.

58. In isothermic process which statement is wrong
(a) Temperature is constant
(b) Internal energy is constant
(c) No exchange of energy
(d) (a) and (b) are correct

59. X–rays of which of the following wavelengths are hardest ?
(a) 4 Å (b) 1 Å (c) 0.1 Å (d) 2 Å

60. A beam of monochromatic blue light of wave–length 4200 Å in air travels in water (μ = 4/3). Its wavelength in water will be
(a) 2800 Å (b) 5600 Å (c) 3150 Å (d) 4000 Å

61. Of two masses of 5 kg each falling from height h, by which 2 kg water is stirred. The rise in temperature of water will be
(a) 2.6^oC (b) 1.2^oC (c) 0.32^oC (d) 0.12^oC

62. Two short magnets with their axes horizontal and perpendicular to the magnetic meridian are placed with their centres 40 cm east and 50 cm west of magnetic needle. If the needle remains underflected, the ratio of their magnetic moments $M_1 : M_2$ is
(a) 4 : 5 (b) 16 : 25 (c) 64 : 125 (d) $2:\sqrt{5}$

63. The relation between the linear magni–fication m, the object distance u and the focal length f is
(a) $m=\frac{f-u}{f}$ (b) $m=\frac{f}{f-u}$
(c) $m=\frac{f+u}{f}$ (d) $m=\frac{f}{f+u}$

64. Theflow of current in N–type semiconductor is mainly due to
(a) Electrons (b) Holes
(c) Both (a) and (b) (d) None of these

65. In a LCR circuit having L = 8.0 henry, C = 0.5 μF and R = 100 ohm in series. The resonance frequency in per second is
(a) 600 radian (b) 600 hertz
(c) 500 radian (d) 500 hertz

66. A moving body of mass m and velocity 3 km/h collides with a rest body of mass 2 m and sticks to it. Now the combined mass starts to move. What will be the combined velocity
(a) 3 km/h (b) 2 km/h
(c) 1 km/h (d) 4 km/h

67. If μ_s, μ_k and μ_r are coefficients of static friction, sliding friction and rolling friction, then
(a) $\mu_s < \mu_k < \mu_r$ (b) $\mu_k < \mu_r < \mu_s$
(c) $\mu_r < \mu_k < \mu_s$ (d) $\mu_r = \mu_k = \mu_s$

68. Resolving power of a microscope depends upon
(a) The focal length and aperture of the eye lens
(b) The focal lengths of the objective and the eye lens

50. (c) 51. (d) 52. (b) 53. (c) 54. (c) 55. (b) 56. (a) 57. (c) 58. (c) 59. (c) 60. (c) 61. (d) 62. (c) 63. (d) 64. (a) 65. (c) 66. (c) 67. (c) 68. (d)

(c) The apertures of the objective and the eye lens
(d) The wavelength of light illuminating the object

69. In hydrogen atom when electron jumps from 2nd orbit to first orbit, the wavelength of light emitted is
(a) 6563 Å (b) 4102 Å
(c) 4861 Å (d) 1215 Å

70. When the N–pole of a bar magnet points towards the south and S–pole towards the north, the null points are at the
(a) Magnetic axis
(b) Magnetic centre
(c) Perpendicular divider of magnetic axis
(d) N and S poles.

71. The average binding energy per nucleon in the nucleus of an atom is approximately
(a) 8 eV (b) 8 KeV (c) 8 MeV (d) 8 joules

72. The equation of stationary wave along a stretched string is given by y = 5 sin $\pi x/3$ cos $40\pi t$, where x and y are in cm and t in second. The separation between two adjacent nodes is
(a) 1.5 cm (b) 3 cm (c) 6 cm (d) 4 cm

73. A bullet of mass 0.1 Kg is fired with a speed of 100 m/sec, the mass of gun is 50 kg. The velocity of recoil is
(a) 0.2 m/sec (b) 0.1 m/sec
(c) 0.5 m/sec (d) 0.05 m/sec.

74. A capillary tube made of glass is dipped into mercury. Then
(a) Mercury rises in the capillary tube
(b) Mercury rises and flows out of the capillary tube
(c) Mercury descends in the capillary tube
(d) Mercury neither rises nor descends in the capillary tube.

75. If the focal length for a convex lens is 10 cm, then the magnifying power of a simple microscope for a normal vision will be
(a) 2.5 (b) 3.5 (c) 10 (d) 5

MODEL PAPER – 2

1. "In a forward based P–N diode, the injected hole current in N region is proportional to the total charge Q of the injected minority carrier holes". This is statement is
(a) True (b) False
(c) True at low voltage and false at high voltage
(d) True at high voltage and false at low voltage

2. Three capacitors of capacity C_1, C_2, C_3 are connected in series. Their total capacity will be
(a) $C_1 + C_2 + C_3$ (b) $1/(C_1 + C_2 + C_3)$
(c) $(C_1^{-1} + C_2^{-1} + C_3^{-1})^{-1}$ (d) None of these

3. The excess of pressure inside a soap bubble than that of the outer pressure is
(a) 2T/r (b) 4T/r (c) T/2r (d) T/r

4. The resistance of an ideal voltmeter is
(a) Zero (b) Very low
(c) Very large (d) Infinite

5. A certain amount of current when flowing in a properly set tangent galvanometer, produces a deflection of 45^o. If the current be reduced by a factor of $\sqrt{3}$, the deflection would
(a) Decrease by 30^o (b) Decrease by 15^o
(c) Increase by 15^o (d) Increase by 30^o

6. Which duration is wrong
(a) 1 Calories = 4.18 Joules (b) 1Å = 10^{-10} m
(c) 1 MeV = 1.6 $\times$ 10^{-13} Joules
(d) 1 Newton = 10^{-5} Dynes

7. A body of mass m moving with a constant velocity v hits another body of the same mass moving with the same velocity v but in the opposite direction and sticks to it. The velocity of the compound body after collision is
(a) v (b) 2v (c) Zero (d) v/2

8. A rectangular tank of depth 8 meter is full of water (μ = 4/3), the bottom is send at the depth
(a) 6 m (b) 8/3 m (c) 8 cm (d) 10 cm

9. Two equations of two S.H.M. are x = a sin ($\omega t - \alpha$) and y = b cos ($\omega t - \alpha$). The phase difference between the two is
(a) 0^o (b) α^o (c) 90^o (d) 180^o

10. P–N junction diode works as a insulator, if connected
(a) To. A.C. (b) In forward bias
(c) In reverse bias (d) None of these

11. 64 drops each having the capacity C and potential V are combined to form a big drop. If the charge on the small drop is q, then the charge on the big drop will be
(a) 2q (b) 4q (c) 16q (d) 64q

12. In the glass capillary tube, the shape of the surface of the liquid depends upon
(a) Only on the cohesive force of liquid molecules

69. (d) 70. (a) 71. (c) 72. (b) 73. (a) 74. (c) 75. (b)
MODEL PAPER – 2 **1. (a) 2. (c) 3. (b) 4. (d) 5. (b) 6. (d) 7. (c) 8. (a) 9. (c) 10. (c) 11. (d)**

(b) Only on the adhesive force between the molecules of glass and liquid

(c) Only on relative cohesive and adhesive force between the atoms

(d) Neither on cohesive nor on adhesive force

13. At the magnetic north pole of the earth, the value of horizontal component of earth's magnetic field and angle of dip are, respectively

(a) Zero, maximum (b) Maximum, minimum

(c) Maximum, maximum (d) Minimum, Minimum

14. If x = at + bt^2, where x is the distance travelled by the body in kilometres white t the time in seconds, then the units of b are

(a) km/s (b) km-s (c) km/s^2 (d) km–s^2

15. The centre of mass of a body

(a) Lies away outside the body

(b) May lie within, outside on the surface of the body

(c) Lies away inside the body

(d) Lies away on the surface of the body.

16. A man can see two poles separately from a distance of 10 km. The minimum distance between the poles should be

(a) 1 m (b) 2 m (c) 3 m (d) 4 m

17. Two sound waves having a phase difference of 60^o have path difference of

(a) 2λ (b) $\lambda/2$ (c) $\lambda/6$ (d) $\lambda/3$

18. The dimensions of magnetic flux are

(a) $MLT^{-2}A^{-2}$ (b) $ML^2T^{-2}A^{-2}$

(c) $ML^2T^{-1}A^{-2}$ (d) $ML^2T^{-2}A^{-1}$

19. The thermal capacity of 40 gm of aluminium (Specific heat = 0.2 cal/gm/^{o}C) is

(a) 40 cal/^{o}C (b) 160 cal/^{o}C

(c) 200 cal/^{o}C (d) 8 cal/^{o}C

20. The relation between faraday constant F, electron charge e and avogadro number N is

(a) F = N/e (b) F = Ne

(c) N = Fe^2 (d) F = N^2 e

21. For harder X–rays

(a) The wavelength is higher

(b) The intensity is higher

(c) The frequency is higher

(d) The photon energy is lower

22. A body falling for 2 seconds covers a distance S equal to that covered in next second. Taking g = 10 m/s^2, S =

(a) 30 m (b) 10 m (c) 60 m (d) 20 m

23. Two balls at same temperature collide. What is conserved ?

(a) Temperature (b) Velocity

(c) Kinetic energy (d) Momentum

24. The wavelength of light is two liquids 'x' and 'y' is 3500 Å and 7000 Å, then the critical angle of x relative to y will be

(a) 60^o (b) 45^o (c) 30^o (d) 15^o

25. The equation of a plane progressive wave is given by y = 0.025 sin (100t + 0.25x). The frequency of this wave would be

(a) 50/π Hz (b) 100 Hz

(c) 100 Hz (d) 50 Hz

26. An electron is moving along positive x–axis. To get it moving on an anticlockwise circular path in x–y plane, a magnetic filed in applied

(a) Along positive y–axis (b) Along positive z–axis

(c) Along negative y–axis (d) Along negative z–axis

27. If the rotational velocity of a dynamo armature is doubled, then the induced e.m.f. will

(a) Becomes half (b) Become double

(c) Become quadruple (d) Remain unchanged

28. When the temperature of a gas is raised from 27^{o}C to 90^{o}C, the percentage increase in the r.m.s. velocity of the molecules will be

(a) 10% (b) 15% (c) 20% (d) 17.5%

29. The SI unit of magnetic flux is Weber which is equal to

(a) Nm/A (b) N/Am

(c) A/Nm (d) None of the above

30. Velocity–time curve for a body projected vertically upwards is

(a) Parabola (b) Ellipse

(c) Hyperbola (d) Straight line

31. The mass of the earth is 81 times that of the moon and the radius of the earth is 3.5 times that of the moon. The ratio of the acceleration due to gravity at the surface of the moon to that at the surface of the moon to that at the surface of the earth is

(a) 0.15 (b) 0.04 (c) 1 (d) 6

32. A star is moving away from the earth with a velocity of 100 km/s. If the velocity of light is 3 $\times$ 10^8 m/s then the shift of its spectral line of wavelength 5700Å due to Doppler's effect will be

12. (a) 13. (a) 14. (c) 15. (b) 16. (d) 17. (c) 18. (d) 19. (d) 20. (b) 21. (c) 22. (a) 23. (d) 24. (c) 25. (a)
26. (b) 27. (b) 28. (a) 29. (a) 30. (d) 31. (a) 32. (b)

(a) 0.63 Å (b) 1.90 Å
(c) 3.80 Å (d) 5.70 Å

33. Two capacitances of capacity C_1 and C_2 are connected in series and potential difference V is applied across it. Then the potential difference across C_1 will be

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

34. If a gas is heated at constant pressure, its isothermal compressibility

(a) Remains constant
(b) Increases linearly with temperature
(c) Decreases linearly with temperature
(d) Decreases inversely with temperature

35. When connected across the terminals of a cell, a voltmeter measures 5V and a connected ammeter measures 10A of current. A resistance of 2 ohms is connected across the terminals of the cell. The current flowing through this resistance will be

(a) 2.5 A (b) 2.0 A (c) 5.0 A (d) 7.5 A

36. When cathode rays strike a metal target of high melting point with very high velocity, then

(a) X–rays are produced
(b) α–rays are produced
(c) TV waves are produced
(d) Ultrasonic waves are produced

37. In uniform circular motion

(a) Both velocity and acceleration are constant
(b) Acceleration and speed are constant but velocity changes
(c) Both acceleration and velocity changes
(d) Both acceleration and speed are constant

38. A right of radius r and mass m rotates about an axis passing through its centre and perpendicular to its plane with angular velocity ω. Its kinetic energy is

(a) $mr\omega^2$ (b) $mr\omega^2/2$
(c) $mr^2\omega^2$ (d) $mr^2\omega^2/2$

39. Expression used for the calculation of e/m for an electron in terms of electric field E and the magnetic field B is given by (J.J. Thomson's experiment)

(a) $\frac{e}{m}=\frac{EB}{2V}$ (b) $\frac{e}{m}=\frac{E^2}{2VB^2}$
(c) $\frac{e}{m}=\frac{E}{2VB}$ (d) $\frac{e}{m}=2V\frac{E^2}{B^2}$

[V = P.D. between the cathode and anode]

40. The phenomenon of interference is shown by

(a) Longitudinal mechanical waves only
(b) Transverse mechanical waves only
(c) Electromagnetic waves only
(d) All the above types of waves

41. A P–N junction diode cannot be used

(a) As a rectifier
(b) As a converter of light energy into electrical energy
(c) To get light radiations
(d) To increase the amplitude of A.C. signals

42. Magnetic field due to 0.1 A current flowing through a circular coil 0.1 m and 1000 turns at the centre of the coil is

(a) 2×10^{-1} T (b) 4.31×10^{-2} T
(c) 6.28×10^{-4} T (d) 9.81×10^{-4} T

43. The adiabatic elasticity of hydrogen gas (γ = 1.4) at NTP is

(a) 1×10^5 N/m^2 (b) 1×10^{-8} N/m^2
(c) 1.4 N/m^2 (d) 1.4×10^5 N/m^2

44. Three light bulbs of 40 W, 60 W and 100 W are connected in series with 220 V source. Which one of the bulbs will glow brightest

(a) 40 W
(b) 60 W (c) 100 W
(d) All with the same brightness

45. The angle of dip at a place on the earth gives

(a) The horizontal component of the earth's magnetic field
(b) The location of the geographic meridian
(c) The vertical component of the earth's field
(d) The direction of the earth's magnetic field

46. A body is revolving with a constant speed along a circle. If its direction of motion is reversed but the speed remains the same, then which of the following statement is true

(a) The centripetal force will not suffer any change in magnitude
(b) The centripetal force will have its direction reversed
(c) The centripetal force will not suffer any change in direction

33. (c) 34. (a) 35. (a) 36. (a) 37. (c) 38. (d) 39. (b) 40. (d) 41. (d) 42. (c) 43. (d) 44. (a) 45. (d) 46. (a,c)

(d) The centripetal force would be doubled

47. An earth satellite S has an orbit radius which is 4 times that of a communication satellite C. The period of revolution of S is

(a) 4 days (b) 8 days (c) 16 days (d) 32 days

48. For the determination of charge on an electron in Millikan's oil drop method, the radius of oil drops was about

(a) 10^{-3} mm (b) 10^{-4} mm
(c) 10^{-5} mm (d) 10^{-8} cm

49. Two coherent sources of light produce destructive interference when phase difference between them is

(a) 2π (b) π (c) $\pi/2$ (d) 0

50. The electrochemical equivalent of magnesium is 0.126 mg/C. A current of 5A is passed in a suitable solution for 1 hour. The mass of magnesium deposited will be

(a) 0.0378 gm (b) 0.227 gm
(c) 0.378 gm (d) 2.27 gm

51. Pentrating power of X–rays can be increased by

(a) Increasing the potential difference between anode and cathode
(b) Decreasing the potential difference between anode and cathode
(c) Increasing the cathode filament current
(d) Decreasing the cathode filament current

52. A man is standing on a weighting machine placed in a lift. When stationary his weight is recorded as 40 kg. If the lift is accelerated upwards with an acceleration of 2 m/s^2, then the weight recorded in the machine will be (g = 10 m/s^2)

(a) 32 kg (b) 40 kg (c) 42 kg (d) 48 kg

53. Spot the wrong statement : The acceleration due to gravity 'g' decreases if

(a) We go down from the surface of the earth towards its centre
(b) We go up from the surface of the earth
(c) We go from the equator towards the poles on the surface of the earth
(d) The rotational velocity of the earth is increased

54. The velocity of an electron in the second orbit of sodium atom (atomic number = 11) is v. the velocity of an electron in its fifth orbit will be

(a) v (b) 22/5 v (c) 5/2 v (d) 2/5 v

55. An object is placed 40 cm from a concave mirror of focal length 20 cm. The image formed is

(a) Real, inverted and same in size
(b) Real, inverted and smaller
(c) Virtual, erect and larger
(d) Virtual, erect and smaller

56. Two parallel plates have equal and opposite charge. When the space between them is evacuated, the electric field between the plates is 2×10^5 V/m. When the space is filled with dielectric, the electric field becomes 1×10^5 V/m. The dielectric constant of the dielectric material

(a) 1/2 (b) 1 (c) 2 (d) 3

57. The pole pieces of the magnet used in a pivoted coil galvanometer are

(a) Plane surfaces of a bar magnet
(b) Plane surfaces of a horse–shoe magnet
(c) Cylindrical surfaces of a bar magnet
(d) Cylindrical surfaces of a horse–shoe magnet

58. In an LR–circuit, time constant is that time in which current grows from zero to the value.

(a) 0.63 I_o (b) 0.50 I_o (c) 0.37 I_o (d) I_o

(where Io is the steady state current)

59. A black body at a temperature of 227°C radiates heat energy at the rate of 5 calories/cm^2–sec. At a temperature of 727°C, the rate of heat radiated per unit area in calories/cm^2–sec will be

(a) 80 (b) 160 (c) 250 (d) 500

60. A magnet of magnetic moment M is rotated through 360° in a magnetic field H, the work done will be

(a) MH (b) 2MH (c) 2πMH (d) Zero

61. In a rocket of mass 1000 kg fuel is consumed at a rate of 40 kg/s. The velocity of the gases ejected from the rocket is 5×10^4 m/s. The thrust on the rocket is

(a) 2×10^3 N (b) 5×10^4 N
(c) 2×10^6 N (d) 2×10^9 N

62. The relationship between Young's modulus Y, Bulk modulus K and modulus of rigidity η is

(a) $Y = \frac{9\eta k}{\eta + 3k}$ (b) $\eta = \frac{9YK}{Y + 3k}$
(c) $Y = \frac{9\eta k}{3\eta + k}$ (d) $Y = \frac{3\eta k}{9\eta + k}$

63. When light wave suffers reflection at the interface from air to glass, the change in phase of the reflected wave is equal to

(a) 0 (b) $\pi/2$ (c) π (d) 2π

47. (b) 48. (a) 49. (b) 50. (d) 51. (a) 52. (d) 53. (c) 54. (d) 55. (a) 56. (c) 57. (d) 58. (a) 59. (a) 60. (d) 61. (c) 62. (a) 63. (c)

64. Three capacitances of capacity 10μF, 5μF and 5μF are connected in parallel. The total capacity will be

(a) 10 μF (b) 5 μF (c) 20 μF (d) None

65. If black wire of platinum is heated, then its colour first appear red, then yellow and finally white. It can be understood on the basis of

(a) Wine's displacement law

(b) Prevost theory of heat exchange

(c) Newton's law of cooling

(d) None of the above

66. Two magnets are held together in a vibration magnetometer and are allowed to oscillate in the earth's magnetic field. With like poles together 12 oscillations per minute are made but for unlike poles together only 4 oscillations per minute are executed. The ratio of their magnetic moments is

(a) 3 : 1 (b) 1 : 3 (c) 3 : 5 (d) 5 : 4

67. Which of the following is correct, when a person walks on a rough surface

(a) The frictional force exerted by the surface keeps him moving

(b) The force which the man exerts on the floor keeps him moving

(c) The reaction of the force which the man exerts on floor keeps him moving

(d) None of the above.

68. The ratio of the adiabatic to isothermal elasticities of a triatomic gas is

(a) 3/4 (b) 4/3 (c) 1 (d) 5/3

69. The wavelength of the first line of Balmer series is 6563 Å. The Rydberg constant for hydrogen is about.

(a) 1.09×10^7 per m (b) 1.09×10^8 per m

(c) 1.09×10^9 per m (d) 1.09×10^5 per m

70. A virtual image three times the size of the object is obtained with a concave mirror of radius of curvature 36 cm. The distance of the object from the mirror is

(a) 5 cm (b) 12 cm (c) 10 cm (d) 20 cm

71. In a series circuit R = 300Ω, L = 0.9 H, C = 2.0 μF, ω = 1000 rad/sec. The impedance of the circuit is

(a) 1300 Ω (b) 900 Ω (c) 500 Ω (d) 400 Ω

72. The wavelength of radiation emitted by a body depends upon

(a) The nature of its surface

(b) The area of its surface

(c) The temperature of its surface

(d) All the above factors

73. At a place, if the earth's horizontal and vertical components of magnetic fields are equal, then the angle of dip will be

(a) 30^o (b) 90^o (c) 45^o (d) 0^o

74. A heavy uniform chain lies on a horizontal table–top. If the coefficient of friction between the chain and table surface is 0.25, then the maximum fraction of length of the chain, that can hang over one edge of the table is

(a) 20% (b) 25% (c) 35% (d) 15%

75. According to Bohr's theory the moment of momentum of an electron revolving in second orbit of hydrogen atom will be

(a) 2πh (b) πh (c) h/π (d) 2h/π

MODEL PAPER – 3

1. When external torque on a system is zero, then there will be conservation of

(a) Linear momentum (b) Angular momentum

(c) Total energy (d) None of the above

2. If mean wavelength of light radiated by 100W lamp is 5000 Å, then number of photons radiated per seconds are

(a) 3×10^{23} (b) 2.5×10^{22}

(c) 2.5×10^{19} (d) 5×10^{17}

3. Which one of the following substances possesses the highest elasticity

(a) Rubber (b) Glass (c) Steel (d) Copper

4. 20μA current flows for 30 seconds in a wire, transfer of charge will be

(a) 2×10^{-4} C (b) 4×10^{-4} C

(c) 6×10^{-4} C (d) 8×10^{-4} C

5. The height y and the distance × along the horizontal plane of a projectile on a certain planet (with no surrounding atmosphere) are given by y = $(8t - 5t^2)$ meter and x = 6t meter, where t is in second. The velocity with which the projectile is projected is

(a) 8 m/sec

(b) 6 m/sec (c) 10 m/sec

(d) Not obtainable from the data

6. 1000 small water drops each of radius r and charge q coalesce together to form one spherical drop. The potential of the big drop is larger than that of the smaller drop by a factor of

64. (c) 65. (a) 66. (d) 67. (c) 68. (b) 69. (a) 70. (b) 71. (c) 72. (c) 73. (c) 74. (a) 75. (c)

MODEL PAPER – 3 **1. (b) 2. (c) 3. (c) 4. (c) 5. (c)**

(a) 1000 (b) 100 (c) 10 (d) 1

7. The vertical component of the earth's magnetic field is zero at a place where the angle of dip is

(a) 0^o (b) 45^o (c) 60^o (d) 90^o

8. The potential difference between the cathode and the target in the coolidge tube is 12kV. The momentum of the photon of X–rays is

(a) 6.9×10^{-22} kg $\times$ m /sec

(b) 6.96×10^{-23} kg $\times$ m/sec

(c) 6.66×10^{-20} kg $\times$ m/sec

(d) 6.4×10^{-24} kg $\times$ m/sec

9. A hollow metal sphere of radius 5 cm is charged so that the potential on its surface is 10V. The potential at the centre of the sphere is

(a) 0 V (b) 10 V

(c) Same as at point 5 cm away from the surface

(d) Same as at point 25 cm away from the surface

10. The peak value of an A.C. current is 6 amp, then r.m.s. value of current will be

(a) 3 amp (b) $3\sqrt{3}$ amp

(c) $3\sqrt{2}$ amp (d) $2\sqrt{3}$ amp

11. *n* small balls each of mass *m* impinge elastically each second on a surface with velocity *u*. The force experienced by the surface will be

(a) mnu (b) 2 mnu (c) 4 mnu (d) 1/2 mnu

12. To reduce de Broglie wavelength of an electron from 100 pm to 50 pm, the required increase in energy will be

(a) 600 eV (b) 450 eV (c) 300 eV (d) 150 eV

13. The force required to stretch a steel wire of 1 cm^2 cross–section to 1.1 times its length would be ($Y = 2 \times 10^{11}\ Nm^{-2}$)

(a) 2×10^6 N (b) 2×10^3 N

(c) 2×10^{-6} N (d) 2×10^{-7} N

14. A new flashlight cell of e.m.f. 1.5 volts gives a current of 15 amps, when connected directly to an ammter of resistance 0.04 Ω. The internal resistance of cell is

(a) 0.04 Ω (b) 0.06 Ω (c) 0.10 Ω (d) 10 Ω

15. A 60 kg man stands on a spring scale in the lift. At some instant the finds, scale reading has changed from 60 kg to 50 kg for a while and then comes back to the original mark. What should we conclude ?

(a) The lift was in constant motion upwards

(b) The lift was in constant motion downwards

(c) The lift while in constant motion upwards, is stopped suddenly

(d) The lift while in constant motion downwards in suddenly stopped.

16. The mutual inductance between two coils is 1.25 henry. If the current in the primary changes at the rate of 80 ampere/second, then the induced e.m.f. in the secondary is

(a) 12.5 V (b) 64.0 V (c) 0.016 V (d) 100.0 V

17. A short bar magnet placed with its axis at 30^o with a uniform external magnetic field of 0.16 Tesla experiences a torque of magnitude 0.032 Joule. The magnetic moment of the bar magnet will be

(a) 0.23 Joule/Tesla (b) 0.40 Joule/Tesla

(c) 0.80 Joule/Tesla (d) Zero

18. An X–ray tube operated at 30 kV emits continuous X–rays with a short wavelength limit λ = 0.414 Å. Planck's constant has the value

(a) 6.66×10^{-34} J–sec (b) 6.65×10^{-34} J–sec

(c) 6.62×10^{-34} J–sec (d) 6.60×10^{-34} J–sec

19. Two plates are 2 cm apart, a potential difference of 10 volt is applied between them, the electric field between the plates is

(a) 20 N/C (b) 500 N/C

(c) 5 N/C

(d) 250 N/C

20. A 50 volt potential difference is suddenly applied to a coil with $L = 5 \times 10^{-3}$ henry and R = 180 ohm. The rate of increase of current after 0.001 second is

(a) 27.3 amp/sec (b) 27.8 amp/sec

(c) 2.73 amp/sec (d) None of the above

21. A particle of mass m moving with velocity v strikes a stationary particle of mass 2m and sticks to it. The speed of the system will be

(a) v/2 (b) 2v (c) v/3 (d) 3v

22. The focal length of a convex lens is 5 cm. It is used as a simple microscope. the magnifying power will be

(a) 3 (b) 5.0 (c) 6.0 (d) 4.5

23. A false statement is

(a) Angle of contact $\theta < 90^o$, if cohesive force < adhesive force

(b) Angle of contact $\theta > 90^o$, if cohesive force > adhesive force

(c) Angle of contact $\theta = 90^o$, if cohesive force = adhesive force

6. (b) 7. (a) 8. (d) 9. (b) 10. (c) 11. (b) 12. (b) 13. (a) 14. (b) 15. (c) 16. (d) 17. (b) 18. (c) 19. (b) 20. (d) 21. (c)

(d) If the radius of capillary is reduced to half, the rise of liquid column becomes four times

24. A voltmeter has a resistance of G ohms and range V volts. The value of resistance used in series to convert it into a voltmeter of range nV volts is

(a) nG (b) (n – 1) G (c) G/n (d) G/(n – 1)

25. A man in a lift weight more when

(a) The lift begins to go up
(b) The lift is going up steadily
(c) The lift is slowing down
(d) The lift is descending freely

26. The capacitance of a spherical conductor of radius r is

(a) r (b) 1/r (c) r^2 (d) $1/r^3$

27. The magnetic field to a small magnetic dipole of magnetic moment M at distance r from the centre off the equatorial line is given by (in MKS system)

(a) $\frac{\mu_o}{4\pi}\times\frac{M}{r^2}$ (b) $\frac{\mu_o}{4\pi}\times\frac{M}{r^3}$

(c) $\frac{\mu_o}{4\pi}\times\frac{2M}{r^2}$ (d) $\frac{\mu_o}{4\pi}\times\frac{2M}{r^3}$

28. The number of electrons to be put on a spherical conductor of radius 0.1 m to produce an electric field of 0.036 N/c just above its surface is

(a) 2.7×10^5 (b) 2.6×10^5
(c) 2.5×10^5 (d) 2.4×10^5

29. The transformation ratio in the step–up transformer is

(a) 1
(b) Greater than one
(c) Less than one
(d) The ratio greater or less than one depends on the other factors.

30. The velocity of a body moving with a uniform acceleration of 2 m/sec^2 is 10 m/sec. Its velocity after an interval of 4 sec is

(a) 12 m/sec (b) 14 m/sec
(c) 16 m/sec (d) 18 m/sec

31. When the power of eye lens increases, the defect of vision is produced. The defect is known as

(a) Shortsightedness (b) Long sightedness
(c) Colourbilindness (d) None of the above

32. Water does not wet an oily glass because

(a) Cohesive force of oil > adhesive force between oil and glass
(b) Cohesive force of oil > cohesive force of water
(c) Oil repels water
(d) Cohesive force for water > adhesive force between water and oil molecules

33. A wire is broken in four equal parts. A packet is formed by keeping, the four wires together. The resistance of the packet in comparison to the resistance of the wire will be

(a) Equal (b) One fourth
(c) One eight (d) 1/16 th

34. Two springs of spring constants 1500 N/m and 3000 N/m respectively are stretched with the same force. They will have potential energy in the ratio

(a) 4 : 1 (b) 1 : 4 (c) 2 : 1 (d) 1 : 2

35. A Condenser having a capacity of 6 μF is charged to 100 volt and is then joined to an uncharged condenser of 14 μF and then removed. The ratio of the charges on 6 μF and 14 μF and the potential of 6 μF will be

(a) 6/14 and 50 volt
(b) 14/6 and 30 volt
(c) 6/14 and 30 volt
(d) 14/6 and 0 volt

36. If a hole is made at the centre of a bar magnet, then its magnetic moment will

(a) Increase (b) Decrease
(c) Not change
(d) None of these

37. When neutrons are bombarded on nucleus of $_{92}U^{235}$, the number of emitted neutrons will be

(a) 1 (b) 2 (c) 3 (d) 4

38. A motor car moving with a uniform speed of 20 m/sec comes to stop on the application of brakes after travelling a distance of 10 m. Its accelerations is

(a) 20 m/sec^2 (b) – 20 m/sec^2
(c) – 40 m/sec^2
(d) + 2 m/sec^2

39. A divergent lens will produce

(a) Always a virtual image (b) Always real image
(c) Sometimes real and sometimes virtual
(d) None of the above

40. The angle of contact between glass and mercury is

(a) 0^o (b) 30^o (c) 90^o (d) 135^o

22. (c) 23. (d) 24. (b) 25. (a) 26. (a) 27. (b) 28. (c) 29. (b) 30. (d) 31. (a) 32. (d) 33. (d) 34. (c) 35. (c) 36. (c) 37. (c) 38. (b) 39. (a) 40. (d)

41. Which of the following statement is wrong

(a) Voltmeter should have high resistance

(b) Ammeter should have low resistance

(c) Ammeter is placed in parallel across the conductor in a circuit

(d) Voltmeter is placed in parallel across the conductor in a circuit

42. Which of the following statements is not true

(a) The coefficient of friction between two surfaces increases as the surface in contact are made rough

(b) The force of friction acts in a direction opposite to the applied force

(c) Rolling friction is greater than sliding friction

(d) The coefficient of friction between wood and wood is less than 1

43. The total energy of a particle executing S.H.M. with amplitude a is proportional to

(a) a^2 (b) $1/a^2$ (c) a (b) $\sqrt{a}$

44. The refracting angle of prism is A and refractive index of material of prism is cot A/2. The angle of minimum deviation is

(a) $180^o - 3A$ (b) $180^o + 2A$

(c) $90^o - A$ (d) $180^o - 2A$

45. When two deuterium nuclei fuse together to form a tritium nuclei, we gat a

(a) Neutron (b) Deuteron

(c) α–particle (d) Proton

46. The periodic time of a simple pendulum of length 1 m and amplitude 2 cm is 5 seconds. If the amplitude is made 4 cm, its periodic time is seconds will be

(a) 2.5 (b) 5 (c) 10 (d) $5\sqrt{2}$

47. A thin rod of 5 cm length is kept along the axis of a concave mirror of 10 cm focal length such that its image is real and magnified and one end touches the rod. Its magnification will be

(a) 1 (b) 2 (c) 3 (d) 4

48. The translatorly kinetic energy of a gas per gm is

(a) $\frac{3}{2}\frac{RT}{N}$ (b) $\frac{3}{2}\frac{RT}{M}$

(c) $\frac{3}{2}RT$ (d) $\frac{3}{2}NKT$

49. Two rods of same material and length have their electric resistance in ratio 1 : 2. When both rods are dipped in water, the correct statement will be

(a) A has more loss of weight

(b) B has more loss of weight

(c) Both have same loss of weight

(d) Loss of weight will be in the ratio 1 : 2

50. Four spheres of diameter 2a and mass M are placed with their centres on the four corners of a square of side b. Then the moment of inertia of the system about an axis along one of the sides of the square is

(a) $4/5\ Ma^2 + 2Mb^2$ (b) $8/5\ Ma^2 + 2Mb^2$

(c) $8/5\ Ma^2$

(d) $4/5\ Ma^2 + 4Mb^2$

51. A parallel plate condenser is immersed in an oil of dielectric constant 2. The field between the plates is

(a) Increased proportional to 2

(b) Decreased proportiona to 1/2

(c) Increased proportional to $\sqrt{2}$

(d) Decreased proportional to $1/\sqrt{2}$

52. A heater of 220 V heats a volume of water in 5 minute time. A heater of 110V heats the same volume of water in

(a) 5 minutes (b) 8 minutes

(c) 10 minutes (d) 20 minutes

53. In P–type semiconductor the acceptor impurity levels are a little

(a) Below the conduction band

(b) Above the conduction band

(c) Below the valence band

(d) Above the valence band

54. The radius of a circular loop is r and a current i is flowing in it. The equivalent magnetic moment will be

(a) ir (b) $2\pi ir$ (c) $i\pi r^2$ (d) $1/r^2$

55. The power factor of a good chock coil is

(a) Nearly zero (b) Exactly zero

(c) Nearly one (d) Exactly one

56. A point object is moving on the principal axis of a concave mirror of focal length 24 cm towards the mirror. When it at a distance of 60 cm from the mirror, its velocity is 9 cm/sec. What is the velocity of the image at that instant

(a) 5 cm/sec towards the mirror

(b) 4 cm/sec towards the mirror

(c) 4 cm/sec away from the mirror

(d) 9 cm/sec away from the mirror

41. (c) 42. (c) 43. (a) 44. (d) 45. (d) 46. (b) 47. (b) 48. (b) 49. (a) 50. (b) 51. (b) 52. (d) 53. (d) 54. (c) 55. (a) 56. (c)

57. A gas is enclosed in a closed pot. On keeping this pot in a train moving with high speed, the temperature of the gas

(a) Will increase (b) Will decrease

(c) Will remain the same

(d) Will change according to the nature of the gas

58. Force of gravity is least at

(a) The equator (b) The poles

(c) A point in between equator and any pole

(d) None of these

59. The magnetic moment of a current carrying loop is 2.1 $\times 10^{-25}$ amp $\times$ m^2. The magnetic field at a point on its axis at a distance of 1Å is

(a) 4.2 $\times$ 10^{-2} weber/m^2

(b) 4.2 $\times$ 10^{-3} weber/m^2

(c) 4.2 $\times$ 10^{-4} weber/m^2

(d) 4.2 $\times$ 10^{-5} weber/m^2

60. Which one of the following does not have the same dimensions

(a) Work and energy

(b) Angle and strain

(c) Relative density and refractive index

(d) Plank constant and energy

61. The spectrum from a black body radiation is a

(a) Line spectrum

(b) Band spectrum

(c) Continuous spectrum

(d) Line and band spectrum Both

62. A wave is represented by the equation y = 0.5 sin (10t + x) m. It is a travelling wave propagating along the + x direction with velocity

(a) 10 m/s (b) 20 m/s

(c) 5 m/s (d) None of these

63. An electric fan is switched on in a closed room. The air in the room is

(a) Cooled (b) Heated

(c) Maintains its temperature

(d) Heated or cooled depending on the atmospheric pressure.

64. Two light sources are said to be coherent if they are obtained from

(a) Two independent point sources emitting light of the same wavelength

(b) A single point source

(c) A wide source

(d) Two ordinary bulbs emitting light of different wavelengths

65. The gravitational force between two stones of mass 1 kg each separated by a distance of 1 metre in vacuum is

(a) Zero (b) 6.675 $\times$ 10^{-5} newton

(c) 6.675 $\times$ 10^{-11} newton (d) 6.675 $\times$ 10^{-8} newton

66. The coefficient of mutual inductance of two coils is 6 mH. If the current flowing in one coil is 2 ampere, then the induced e.m.f. in the second coil will be

(a) 12 mV (b) 3 mV (c) 3 V (d) Zero

67. The rate of radiation of a black body at 0oC is E J/sec. The rate of radiation of this black body at 273^{o}C will be

(a) 16E (b) 8E (c) 4E (d) E

68. The radius of the earth is 6.4 $\times$ 10^6 m and its magnetic moment is 6.4 $\times$ 10^{21} amp $\times$ m^2. If it is assumed that this moment is due to a current carrying loop suspended along the magnetic equatorial line, then the value of the current will be

(a) 5 $\times$ 10^6 amp (b) 5 $\times$ 10^7 amp

(c) 5 $\times$ 10^4 amp (d) 5 $\times$ 10^9 amp

69. For a perfectly black body, its absorptive power is

(a) 1 (b) 0.5 (c) 0 (d) ∞

70. When two sound waves are superimposed, beats are produced when they have

(a) Different amplitudes and phases

(b) Different velocities (c) Different phases

(d) Different frequencies

71. During the adiabatic expansion of 2 moles of a gas. The internal energy was found to have decreased by 100 J. The work done by the gas in this process is

(a) Zero (b) – 100 J

(c) 200 J (d) 100 J

72. The radius of the earth is 6400 km and g = 10 m/sec^2. In order that a body of 5 kg weighs zero at the equator, the angular speed of the earth is

(a) 1/80 radian/sec (b) 1/400 radian/sec

(c) 1/800 radian/sec (d) 1/1600 radian/sec

73. A current of 2A passing through conductor produces 80 J of heat in 10 seconds. The resistance of the conductor is

(a) 0.5 Ω (b) 2 Ω (c) 4 Ω (d) 20 Ω

57. (c) 58. (a) 59. (a) 60. (d) 61. (c) 62. (a) 63. (b) 64. (b) 65. (c) 66. (d) 67. (a) 68. (b) 69. (a) 70. (d) 71. (d) 72. (c) 73. (b)

74. A current carrying loop is placed in a uniform magnetic field. The torque acting on it does not depend upon

(a) Shape of the loop (b) Area of the loop
(c) Value of the current (d) Magnetic field

75. The unit of surface tension in SI system is

(a) Dyne/cm^2 (b) Newton/m
(c) Dyne/cm (d) Newton/m^2

MODEL PAPER – 4

1. The equation $\left(P + \frac{a}{v^2}\right)(v - b)$ = constant. The units of *a* are

(a) Dyne $\times$ cm^5 (b) Dyne $\times$ cm^4
(c) Dyne/cm^3 (d) Dyne/cm^2

2. The initial velocity of the particle is 10 m/sec and its retardation is 2 m/sec^2. The distance moved by the particle in 5th second of its motion is

(a) 1m (b) 19m (c) 50m (d) 75m

3. A body is projected horizontally with speed 20 metres/sec. What will be its speed after 5 seconds (g = 10 metres/sec^2)

(a) 54 metres/sec (b) 20 metres/sec
(c) 50 metres/sec (d) 70 metres/sec.

4. A cold soft drink is kept on the balance. When the cap is open, then the weight

(a) Increases (b) Decreases
(c) First increases then decreases
(d) Remains same

5. A block of mass 0.1 kg is held against a wall by applying a horizontal force of 5 N on the block. If the coefficient of friction between the block and the wall is 0.5, the magnitude of the frictional force acting on the block is

(a) 2.5 N (b) 0.98 N (c) 4.9 N (d) 0.49 N

6. A horizontal force of 5 N is required to maintain a velocity of 2 m/s for a block of 10 kg mass sliding over a rough surface. The work done by this force in one minute is

(a) 600 J (b) 60 J (c) 6J (d) 6000 J

7. The radius of a rotating disc is suddenly reduced to half without any change in its mass. Then its angular velocity will be

(a) Four times (b) Double
(c) Half
(d) Unchanged

8. If the earth rotates faster than its present speed, the weight of an object will

(a) Increase at the equator but remain unchanged at the poles
(b) Decrease at the equator but remain unchanged at the poles
(c) Remain unchanged at the equator but decrease at the poles
(d) Remain unchanged at the equator but increase at the poles

9. A beam of length L, area of cross–section a, Young's modulus Y and coefficient of linear expansion 'α' is fixed between two clamps. The beam is heated to a temperature of 0^{o}C. The force exerted by the beam is

(a) $Y\alpha L\theta$ (b) $Ya\alpha L\theta$ (c) $Ya\alpha\theta$ (d) $Y\alpha L\theta/a$

10. A spherical liquid drop of radius R is divide into eight equal droplets. If surface tension is T, then the work doen in this process will be

(a) $2\pi R^2T$ (b) $3\pi R^2T$ (c) $4\pi R^2T$ (d) $2\pi RT^2$

11. At what temperature is the root mean square velocity of gaseous hydrogen molecules is equal to that of oxygen molecules at 47^{o}C.

(a) 20 K (b) 80 K (c) – 73K (d) 3K

12. The internal energy of an ideal gas depends upon

(a) Specific volume (b) Pressure
(c) Temperature (d) Density

13. A black body at 200 K is found to exit maximum energy at a wavelength of 14 µm. When its tempe–rature is raised to 1000K, the wavelength at which maximum energy is emitted is

(a) 14 µm (b) 70 µF (c) 2.8 µm (d) 2.8 mm

14. Two mutually perpendicular simple harmonic virbations have same amplitude, frequency and phase. When they superimpose, the resultant form of vibration will be

(a) A circle (b) An ellipse
(c) A straight line (d) A parabola

15. The wavelength of ultrasonic waves in air is of the order of

(a) 10^{-10} m (b) 10^{-6} m
(c) 10^{-4} m (d) 10^{-2} m

16. The main difference between interference and diffraction is

(a) Interference is due to diffraction between the rays of two isolated light sources, while diffraction is due to diffraction of light from a single source.

74. (a) 75. (b) *MODEL PAPER – 4* 1. (b) 2. (a) 3. (b) 4. (c) 5. (b) 6. (a) 7. (a) 8. (b) 9. (c) 10. (c) 11. (a) 12. (c) 13. (c) 14. (c)

(b) Interference is due to two waves obtained from a single source, while diffraction is the interference by the light waves from the same wavefront.

(c) Interference is due to two transmitted waves

(d) None of the above

17. When a plane mirror is placed horizontally on a level ground at a distance of 60 m from the foot of a tower, the top of the tower and its image in the mirror subtend an angle of 90^o at the eye. The height of the tower will be

(a) 30 m (b) 60m (c) 90m (d) 120m

18. A thin convex lens of focal length 10cm is placed in contact with a concave lens of same material and of same focal length. The focal length of combination will be

(a) Zero (b) Infinity (c) 10 cm (d) 20 cm

19. An observer looks at a tree of height 15 m with a telescope of magnifying power 10. To him, the tree appears.

(a) 10 times taller (b) 15 times taller

(c) 10 times nearer (d) 15 times nearer

20. A body has – 80 microcoulomb of charge. Number of additional electrons on it will be

(a) 8×10^{-5} (b) $80 \times 10^{+15}$

(c) 5×10^{-14} (d) 1.28×10^{-17}

21. X–rays

(a) Are deflected in magnetic field

(b) Are deflected in electric field

(c) Remain undeflected by both the fields

(d) Deflected in both the fields

22. When a particle and a particle unite, the result is

(a) A heavier particle (b) Photons

(c) Smaller Particles (d) None of these

23. To make P–type semiconductor, the impurity to be mixed with pure germanium will be

(a) Phosphorus (b) Silver

(c) Antimony (d) Aluminium

24. A small bar magnet of moment M is placed in a uniform field H. If magnet makes an angle of 30^o with field, the torque acting on the magnet is

(a) MH (b) MH/2 (c) MH/3 (d) MH/4

25. A region surrounding a stationary electric dipoles has

(a) Magnetic field only (b) Electric field only

(c) Both electric and magnetic field

(d) No electric and magnetic field

26. Between the plates of a parallel plate condenser there is 1 mm thick paper of dielectric constant 4. It is charged at 100 volt. The electric field in volt/metre between the plates of the capacitor is

(a) 100 (b) 100000 (c) 25000 (d) 400000

27. The resistivity of a wire

(a) Increases with the length of the wire

(b) Decreases with the area of cross–section

(c) Decreases with the length and increases with the cross–section of wire

(d) None of the above statement is correct.

28. Electric power is transmitted over long distances through conducting wires at high voltage because

(a) High voltage travels faster

(b) Power loss is large (c) Power loss is less

(d) Generator produced electrical energy at a very high voltage.

29. An electron is revolving around a proton in a circular orbit of diameter 1Å. If it produces a magnetic field of 14 weber/m^2 at the proton, then its angular velocity will be about

(a) 4×10^{16} rad/sec (b) 10^{16} rad/sec

(c) 4×10^{15} rad/sec (d) 10^{15} rad/sec

30. An e.m.f. of 5 millivolt is induced in a coil in a nearby placed another coil, the current changes by 5 ampere in 0.1 sec. The coefficient of mutual induction between the two coils will be

(a) 1 henry (b) 0.1 henry

(c) 0.1 mH (d) 0.001 mH

31. In LCR circuit, the capacitance is changed from C to 4C. For the same resonant frequency, the inductance should be changed from L to

(a) 2L (b) L/2 (c) L/4 (d) 4L

32. The expression $[ML^2T^{-2}]$ represents

(a) Pressure (b) Kinetic energy

(c) Momentum (d) Power

33. The initial velocity of a particle is u (at t = 0) and the acceleration f is given by at. Which of the following relaltion is valid

(a) $v = u + at^2$ (b) $v = u + a\,t^2/2$

(c) $v = u + at$ (d) $v = u$

34. A rocket has an initial mass of 20×10^3 kg. If it is to blast off with an initial acceleration of 4 ms^{-2}, the initial thrust needed is ($g \cong 10\ ms^{-2}$)

15. (d) 16. (b) 17. (b) 18. (b) 19. (c) 20. (c) 21. (c) 22. (b) 23. (d) 24. (b) 25. (b) 26. (d) 27. (d) 28. (c) 29. (a) 30. (c) 31. (c) 32. (b) 33. (b) 34. (b)

(a) 6×10^4 N (b) 28×10^4 N
(c) 20×10^4 N (d) 12×10^4 N

35. Starting from rest, a body slides down a 45° inclined plane in twice the time it takes to slide down the same distance in the absence of friction. The coefficient of friction between the body and the inclined plane is

(a) 0.33 (b) 0.25 (c) 0.75 (d) 0.80

36. A sphere of mass m, moving with velocity V, enters a hanging bag of sand and stops. If the mass of the bag is M and it is raised by height h, then the velocity of the sphere was

(a) $\frac{M+m}{m}\sqrt{2gh}$ (b) $\frac{M}{m}\sqrt{2gh}$

(c) $\frac{m}{M+m}\sqrt{2gh}$ (d) $\frac{m}{M}\sqrt{2gh}$

37. The moment of inertia of a uniform ring of mass M and radius r about a tangent lying in its own

(a) $2\ Mr^2$ (b) $3/2\ Mr^2$ (c) Mr^2 (d) $1/2\ Mr^2$

38. A satelliste is moving around the earth with speed v in a circular orbit of radius r. If the orbit radius is decreased by 1%, its speed will

(a) Increase by 1% (b) Increase by 0.5%
(c) Decrease by 1% (d) Decrease by 0.5%

39. Which of the following relations is true ?

(a) $3Y = K(1 - \sigma)$ (b) $K = \frac{9\eta Y}{\eta + Y}$

(c) $\sigma = (6K + \eta)Y$ (d) $\sigma = \frac{0.5Y - \eta}{\eta}$

40. In the starte of weightlessness, a capillary tube is dipped in water, then water

(a) Will not rise at all
(b) Will rise to same height as at atomospheric pressure
(c) Will rise to less height than at atmospheric pressure
(d) Will rise up to the upper end of the capillary tube of any length.

41. The specific heat of an ideal gas is

(a) Proportional to T (b) Proportional to T^2
(c) Proportional to T^3 (d) Independent of T

42. In changing the state of thermodynamics from A to B state, the heat required is Q and the work done by the system is W. The change in its internal energy is

(a) Q + W (b) Q – W
(c) Q (d) (Q – W)/2

43. Energy is being emitted from the surface of a black body at 127°C temperature at the rate of 1.0×10^6 J/sec–m^2. Temperature of the black body at which the rate of energy emission is 16.0×10^6 J/sec–fm^2 will be

(a) 254°C (b) 508°C (c) 527°C (d) 727°C

44. For a simple pendulum the graph between L and T will be

(a) Hyperbola (b) Parabola
(c) A curved line (d) A straight line

45. The expression y = a sin bx sin ωt represents a stationary wave. The distance between the two consecutive nodes is

(a) π/b (b) $\pi/2b$ (c) $2\pi/b$ (d) $1/b$

46. Colour of light is known by its

(a) Velocity (b) Amplitude
(c) Frequency (d) Polarisation

47. The focal length of a plano–convex lens having the radius of curvature for convex surface 10 cm and the refractive index of the material is 1.5, will be

(a) 5 cm (b) 10 cm (c) 15 cm (d) 20 cm

48. The average distance between the earth and moon is 38.6×10^4 km. The minimum separation between the two points on the surface of the moon that can be resolved by a telescope whose objective lens has a diameter of 5 m with λ = 6000 Å is

(a) 5.65 m (b) 28.25 m
(c) 11.30 m (d) 56.51 m.

49. In Thomson's method of determining e/m of electrons

(a) Electric and magnetic fields are parallel to electrons beam
(b) Electric and magnetic fields are perpendicular to each other and perpendicular to electrons beam
(c) Magnetic field is parallel to the electrons beam
(d) Electric field is parallel to the electrons beam

50. Size of nucleus is of the order of

(a) 10^{-10} m (b) 10^{-15} m
(c) 10^{-12} m (d) 10^{-19} m

51. Which of the following statements is wrong ?

(a) Resistance of a semiconductor decreases on increasing the temperature
(b) Displacement of holes is opposite to the displace–ment of electrons in an electric field

**35. (c) 36. (c) 37. (b) 38. (b) 39. (d) 40. (d) 41. (d) 42. (b) 43. (c) 44. (b) 45. (a)
46. (c) 47. (d) 48. (d) 49. (b) 50. (b) 51. (c)**

(c) Resistance of a good conductor decreases on increasing the temperature

(d) n–type semiconductors are neutral

52. The magnetic induction in air at a distance d from an isolated point pole of strength m unit will be

(a) m/d (b) m/d^2 (c) md (d) md^2

53. Three particles, each having a charge of 10μC are placed at the corners of an equilateral triangle of side 10 cm. The electrostatic potential energy of the system is

(a) Zero (b) Infinite (c) 27 J (d) 100 J

(Given $1/4\pi\varepsilon_o = 9 \times 10^9$ N–m²/C²)

54. If B is the magnetic induction normal to a coil of cross–sectional area A, then flux φ is given by

(a) $\phi = AB$ (b) $\phi = A^2B$

(c) $\phi = B^2A$ (d) $\phi = B^2/A^2$

55. Mutual inductance of two coils can be increased by

(a) Decreasing the number of turns in the coils

(b) Increasing the number of turns in the coils

(c) Winding the coils on wooden core

(d) None of the above

56. An A.c. generator produced an output voltage E = 170 sin 377 t volts, where t is in seconds. The frequency of A.C. voltage is

(a) 50 Hz (b) 110 Hz

(c) 60 Hz (d) 230 Hz

57. One million electron volt (1 MeV) is equal to

(a) 10^5 eV (b) 10^6 eV (c) 10^4 eV (d) 10^7 eV

58. Two bodies of masses m and 2m have same momen–tum. Their respective kinetic energies k_1 and k_2 are inthe ratio

(a) 1 : 2 (b) 2 : 1 (c) 1 : $\sqrt{2}$ (d) 1 : 4.

59. Two rings have their moments of inertia in the ratio 2 : 1 and their diameters are in the ratio 2 : 1. The ratio of their masses will be

(a) 2 : 1 (b) 1 : 2 (c) 1 : 4 (d) 1 : 1

60. If the compressibility of water is σ per unit atmospheric pressure, then the decrease in volume V due to P atmospheric pressure will be

(a) σP/V (b) σPV (c) σ/PV (d) σV/P

61. The absolute temperature of a gas is increased 3 times. The root mean square velocity of the gas molecules will be

(a) 3 times (b) 9 times

(c) 1/3 times (d) $\sqrt{3}$ times

62. Two stars emit maximum radiation at wavelength 3600 Å and 4800Å respectively. The ratio of their temperatures is

(a) 1 : 2 (b) 3 : 4

(c) 4 : 3 (d) 2 : 1

63. A slit of width 'a' is illuminated by white light. For red light (λ = 6500 Å) the first minima is obtained at θ = 30°. Then the value of a will be

(a) 3250 Å (b) 6.5×10^{-4} mm

(c) 1.24 microns

(d) 2.6×10^{-4} cm

64. In a thin prism of glass (refractive index 1.5), which of the following relations between the angle of minimum deviations δ_m and angle of refraction r will be correct ?

(a) $\delta_m = r$ (b) $\delta_m = 1.5\ r$

(c) $\delta_m = 2r$ (d) $\delta_m = r/2$

65. The objective of a small telescope is of focal length 120 cm and diameter 5 cm. The focal length of the eye piece is 5 cm. The magnifying power of telescope for distant object is

(a) 12 (b) 24 (c) 60 (d) 300

66. When an inert gas is filled in the place vacuum in a photo cell, then

(a) Photo-electric current is decreased

(b) Photo–electric current is increased

(c) Photo–electric current remains the same

(d) Decrease or increase in photo–electric current does not depend upon the gas filled

67. In nuclear reaction

${}_2He^4 + {}_7N^{14} \longrightarrow {}_ZX^A + {}_1H^1$, X will be

(a) Nitrogen of mass 16

(b) Nitrogen of mass 17

(c) Oxygen of mass 16

(d) Oxygen of mass 17

68. The time period of a freely suspended magnet is 4 seconds. If it is broken in length into two equal parts and one part is suspended inthe same way, then its time period will be

(a) 4 seconds (b) 2 seconds

(c) 0.5 second (d) 0.25 second

69. A charged particle moving in a magnetic field experiences a resultant force

(a) In the direction of field

(b) In the direction opposite to the field

52. (b) 53. (c) 54. (a) 55. (b) 56. (c) 57. (b) 58. (a) 59. (b) 60. (b) 61. (d) 62. (c) 63. (c) 64. (a) 65. (b) 66. (b) 67. (d) 68. (b)

(c) In the direction perpendicular to both the fields and its velocity

(d) None of the above

70. According to Faraday's law of electromagnetic induction

(a) The direction of induced current is such that it opposes the cause producing it

(b) The magnitude of induced e.m.f. produced in a coil is directly proportional to the rate of change of magnetic flux.

(c) The direction of induced e.m.f. is such that it opposes the cause producing it

(d) None of the above

71. In P–type semiconductor the majority and minority charge carriers are respectively

(a) Protons and electrons

(b) Electrons and protons

(c) Electrons and holes

(d) Holes and electrons

72. Which of the following quantity is expressed as force per unit area

(a) Work (b) Pressure (c) Volume (d) Area

73. Cathode rays enter into a uniform magnetic field perpendicular to the direction of the field. In the magnetic field their path will be

(a) Straight line (b) Circle

(c) Parabolic (d) Ellipse

74. The angle of dip at the magnetic equator is

(a) 0^o (b) 45^o (c) 30^o (d) 90^o

75. A long magnetic needle of length 2L, magnetic moment M and pole strength m units is broken into two pieces at the middle. The magnetic moment and pole strength of each piece will be

(a) M/2, m/2 (b) M, m/2

(c) M/2, m (d) M, m

MODEL PAPER – 5

1. Two sources give interference pattern which is observed on a screen, D distance apart from the sources. The fringe width is 2w. If the distance D is now doubled, the fringe width will

(a) Become w/2 (b) Remain the same

(c) Become w (d) Become 4w

2. The wavelength of emission line spectrum and absorption line spectrum of a substance are related as

(a) Absorption has larger value

(b) Absorption has smaller value

(c) They are equal

(d) No relation

3. Which of the following is deflected by electric field

(a) α–particles (b) γ–rays

(c) X–rays (d) Neutrons

4. A magnet of magnetic moment M is situated with its axis along the direction of a magnetic field of strength B. The work done in rotating it by an angle 180^o will be

(a) – MB (b) + MB (c) 0 (d) + 2 MB

5. A 5 coulomb charge experiences a force of 2000 newton when moved between two points separated by a distance of 2 cm in a uniform electric field. The potential differece between the two points is

(a) 8 volt (b) 200 volt

(c) 800 volt (d) 20000 volt

6. The direction of current in an iron–copper thermo–couple is

(a) From copper to iron at the hot junction

(b) From iron to copper at the hot junction

(c) From copper to iron at cold junction

(d) No current will flow.

7. A closely wound coil of 100 turns and area of cross–section 1 cm^2 has a coefficient of self induction 1 mH. The magnetic induction in the centre of the core of the coil when a current of 2 A flows in it, will be

(a) 0.022 Wb m^{-2} (b) 0.4 Wb m^{-2}

(c) 0.8 Wb m^{-2} (d) 1 Wb m^{-2}

8. In a lossless transformer an alternating current of 2 amp is flowing in the primary coil. The number of turns in the primary and secondary coils are 100 to 20 respectively. The value of the current in the secondary coil is

(a) 0.08 amp (b) 0.4 amp

(c) 5 amp (d) 10 amp

9. Dimensional formula of heat energy is

(a) ML^2T^{-2} (b) MLT^{-1}

(c) $M^oL^oT^{-2}$ (d) None

10. A particle moves in a circle of radius 25 cm at two revolutions per second. The acceleration of the particle in m/s^2 is

(a) π^2 (b) $8\pi^2$ (c) $4\pi^2$ (d) $2\pi^2$

69. (c) 70. (b) 71. (d) 72. (b) 73. (b) 74. (a)
75. (c) *MODEL PAPER – 5* 1. (d) 2. (b) 3. (a) 4. (d) 5. (a) 6. (a) 7. (a) 8. (d) 9. (a) 10. (c)

11. A stone weighting 1 kg and sliding on ice with a velocity of 2 m/s is stopped by friction in 10 sec. The force of friction (assuming it to be constant) will be

(a) – 20 N (b) – 0.2 N
(c) 0.2 N (d) 20 N

12. Two particles A and B initially at rest move towards each other under a mutual force of attraction. At the instant when the speed of A is v and the speed of B is 2v, the speed of centre of mass of the system is

(a) Zero (b) v (c) 1.5 v (d) 3v

13. Steel and copper wires of same length are stretched by the same weight one after the other. Young's modulus of steel and copper are 2×10^{11} N/m^2 and 1.2×10^{11} N/m^2. The ratio of increase in length

(a) 2/5 (b) 3/5 (c) 5/4 (d) 5/2

14. 4 moles of an ideal gas is at 0^oC. At constant pressure it is heated to double its volume, then its final temperature will be

(a) 0^oC (c) 273^oC (c) 546^oC (d) 136.5^oC

15. When p calories of heat is given to a body, it absorbs q calories; then the absorbtion power of body will be

(a) p/q (b) q/p (c) p2/q2 (d) q2/p2

16. In stationary wave, the nodes are at the points where A is

(a) Maximum displacement and maximum change in pressure
(b) Maximum displacement and minimum change is pressure
(c) Minimum displacement and maximum pressure change
(d) Minimum displacement and minimum pressure change.

17. A convex mirror of focal length f forms an image which is 1/n times the object. The distance of the object from the mirror is

(a) (n – 1) f (b) [(n – 1)/n] f
(c) [(n+1)/n] f
(d) (n + 1) f

18. A person is suffering from the defect astigmatism. Its main reason is

(a) Distance of the eyelens from retina is increased
(b) Distance of the eyelens from retina is decreased
(c) The cornea is not spherical
(d) Power of accommodation of the eye is decreased

19. The energy of a photon of characteristic X–ray from a Coolidge tube comes from

(a) The kinetic energy of the striking electron
(b) The kinetic energy of the free electrons of the target
(c) The kinetic energy of the ions of the target
(d) An electronic transition of the target atom

20. An alpha particle is accelerated through a potential difference of 10^6 volt. Its kinetic energy will be

(a) 1 MeV (b) 2 MeV (c) 4 MeV (d) 8 MeV

21. The equivalent resistance of resistors connected in series is always

(a) Equal to the mean of component resistors
(b) Less than the lowest of component resistors
(c) In between the lowest and the highest of component resistors
(d) Equal to sum of component resistors

22. A helium nucleus makes a full rotation in a circle of radius 0.8 metre in two seconds. The value of the magnetic field B at the centre of the circle will be

(a) $\dfrac{10^{-19}}{\mu_o}$ (b) $10^{-19}\mu_o$

(c) $2\times10^{-10}\mu_o$ (d) $\dfrac{2\times10^{-10}}{\mu_o}$

23. A balloon is at a height of 81 m and is ascending upwards with a velocity of 12 m/s. A body of 2 kg weight is dropped from it. If g = 10 m/s^2, the body will reach the surface of the earth in

(a) 1.5 s (b) 4.025 s (c) 5.4 s (d) 6.75 s

24. A boy of 50 kg is in a lift moving down with an acceleration 9.8 ms^{-2}. The apparent weight of the body is (g = 9.8 ms^{-2}).

(a) 509.8 N (b) Zero (c) 50 N (d) 50/9.8 N

25. A body of mass 'M' collides against a wall with a velocity v and retraces its path with the same sped. The change in momentum is

(a) Zero (b) 2 Mv (c) mV (d) – 2Mv

26. A gas at NTP is suddenly compressed to one–fourth of its original volume. If γ is supposed to be 3/2, then the final pressure is

(a) 4 atmosphere (b) 3/2 atmosphere
(c) 8 atmosphere (d) 1/4 atmosphere

27. The length of a simple pendulum is increased by 1%, Its time period will

11. (b) 12. (a) 13. (b) 14. (b) 15. (b) 16. (c) 17. (d) 18. (c) 19. (d) 20. (b) 21. (d) 22. (b) 23. (c) 24. (b) 25. (b) 26. (c) 27. (b)

(a) Increase by 1% (b) Increase by 0.5%
(c) Decrease by 0.5% (d) Increase by 2%

28. If C and L denote capacitance and resistance respectively, then the dimensions of LC are

(a) $M^oL^oT^o$ (b) $M^oL^oT^2$ (c) $M^2L^oT^2$ (d) MLT^2

29. A block of mass m_1 rests on a horizontal table. A string tied to the block is passed on a frictionless pulley fixed at the end of the table and to the other end of string is hung another block of mass m_2. The acceleration of the system is

(a) $\frac{m_2 g}{(m_1 + m_2)}$ (b) $\frac{m_1 g}{(m_1 + m_2)}$ (c) g (d) $\frac{m_2 g}{m_1}$

30. The escape velocity of a planet having mass 6 times and radius 2 times as that of earth is

(a) $\sqrt{3}$ Ve (b) 3 Ve (c) $\sqrt{2}$ Ve (d) 2Ve

31. The pressure of air in a soap bubble of 0.7 cm diameter is 8 mm of water above the pressure outside. The surface tension of the soap solution is

(a) 100 dyne/cm (b) 68.66 dyne/cm
(c) 137 dyne/cm (d) 150 dyne/cm

32. A vessel containing 5 litres of a gas at 0.8 m pressure is connected to an evacuated vessel of volume 3 litres. The resultant pressure inside will be (assuming whole system to be isolated).

(a) 4/3 m (b) 0.5 m (c) 2.0 m (d) 3/4 m

33. Which of the property makes difference between progressive and stationary waves

(a) Amplitude (b) Frequency
(c) Propagation of energy (d) Phase of the wave

34. Which of the following is not a correct statement

(a) The wavelength of red light is greater than the wavelength of green light
(b) The wavelength of blue light is smaller than the wavelength of orange light
(c) The frequency of green light is greater than the frequency of blue light
(d) The frequency of violet light is greater than the frequency of blue light

35. The frequency of the incident light falling on a photo–sensitive metal plate is doubled, the kinetic energy of the emitted photoelectrons is

(a) Double the earlier value (b) Unchanged
(c) More than doubled (d) Less than doubled

36. Two circuits have coefficient of mutual induction of 0.09 henry. Average e.m.f. induced in the secondary by a change of current from 0 to 20 ampere in 0.006 second in the primary will be

(a) 120 V (b) 180 V (c) 200 V (d) 300 V

37. The reactance of ta coil when used in the domestic A.C. power supply (220 volt, 50 cycles) is 100 ohm. The self inductance of the coil is nearly

(a) 3.2 henry (b) 0.32 henry (c) 2.2 henry (d) 0.22 henry

38. The initial velocity of a body moving along a straight line is 7 m/s. It has a uniform acceleration of 4 m/s2. The distance covered by the body in the 5th second of its motion is

(a) 25 m (b) 35 m (c) 50 m (d) 85 m

39. The moment of inertia of a thin circular lamina of mass 1 kg and diameter 0.2 metre rotating about one of its diameter is

(a) 5×10^{-3} kg–m^2 (b) 2.5×10^{-3} kg–m^2
(c) 4×10^{-2} kg–m^2 (d) 0.2 kg–m^2

40. An area of cross–section of rubber string is 2 cm^2. Its length is doubled when stretched with a linear force of 2×10^5 dynes. The Young's modulus of the rubber in dyne/cm^2 will be

(a) 4×10^5 (b) 1×10^5 (c) 2×10^5 (d) 1×10^4

41. Every gas behaves as an ideal gas

(a) At high temperature and low pressure
(b) At low temperature and high pressure
(c) At normal temperature and pressure
(d) None of the above

42. Distribution of energy in the spectrum of a black body can be correctly represented by

(a) Wien's law (b) Stefan's law
(c) Planck's law (d) Kirchhoff's law

43. Light coming from a star is observed to have a wavelength of 3737 Å while its real wavelength is 3700 Å. The speed of the star relative to the earth is [Speed of light = 3×10^8 m/s].

(a) 3×10^5 m/s (b) 3×10^6 m/s
(c) 3.7×10^7 m/s (d) 3.7×10^6 m/s

44. A person cannot see objects clearly beyond 2.0 m. The power of lens required to correct his vision will be

(a) + 2.0 Dioptre (b) – 1.0 Dioptre
(c) + 1.0 Dioptre (d) – 0.5 Dioptre

45. Which of the following statement is true

(a) The temperature coefficient of resistance of semiconductors is positive
(b) The temperature coefficient of resistance of semiconductors is negative

28. (b) 29. (a) 30. (a) 31. (b) 32. (b) 33. (c) 34. (c) 35. (c) s36. (d) 37. (b) 38. (a) 39. (b) 40. (b) 41. (a) 42. (a) 43. (b) 44. (d)

(c) The temperature coefficient of resistance of semiconductors may be positive or negative

(d) In semiconductors there is nothing like temperature coefficient of resistance

46. A charge of 5 C is given a displacement of 0.5 m. The work done in the process is 10 J. The potential difference between the two points will be

(a) 2 V (b) 0.25 V (c) 1 V (d) 25 V

47. The resistance of 20 cm long wire is 5 ohm. The wire is stretched to a uniform wire of 40 cm length. The resistance now will be (in ohms)

(a) 5 (b) 10 (c) 20 (d) 200

48. A 2 MeV proton is moving perpendicular to a uniform magnetic field of 2.5 tesla. The force on the proton is

(a) 2.5×10^{-10} N (b) 7.6×10^{-11} N

(c) 2.5×10^{-11} N (d) 7.6×10^{-12} N

49. Which of the following quantities has the same dimensions as that of energy

(a) Power (b) Force

(c) Momentum (d) Work

50. A body of mass m moving with velocity v makes a head–on collision with another body of mass 2 m which is initially at rest. The loss of kinetic energy of the colliding body (mass m) is

(a) 1/2 of its initial kinetic energy

(b) 1/9 of its initial kinetic energy

(c) 8/9 of its initial kinetic energy

(d) 1/4 of its initial kinetic energy

51. Gravitational mass is proportional to gravitational

(a) Field (b) Force (c) Intensity (d) All of these

52. The kinetic energy of a perfect gas is 60 joules and its volume is 3 litres, then its pressure will be

(a) 2×10^4 N/m^2 (b) 4×10^4 N/m^2

(c) $4/3 \times 10^4$ N/m^2 (d) $2/3 \times 10^4$ N/m^2

53. In Young's experiment, light of wavelength 6000 Å is used to produce fringes of width 0.8 mm at a distance of 2.5 m. If the whole apparatus is dipped in a liquid of refractive index 1.6 then fringe width will be

(a) 0.5 mm (b) 0.6 mm (c) 0.4 mm (d) 0.2 mm

54. The focal length of the objective and eye lenses of a telescope are respectively 200 cm and 5 cm. The maximum magnifying power of the telescope will be

(a) – 40 (b) – 48 (c) – 60 (d) – 100

55. When light of wavelength 300 nm (nanometer) falls on a photoelectric emitter, photo–electrons are liberated, For another emitter, however light of 600 nm wavelength is sufficient for creating photoe–mission. What is the ratio of the work functions of the two emitters

(a) 1 : 2 (b) 2 : 1 (c) 4 : 1 (d) 1 : 4

56. If in a voltaic cell 5 gm of zinc is consumed, then we get how many ampere hours ? (Given that e.c.e of Zn is 3.387×10^{-7} kg/coulomb)

(a) 2.05 (b) 8.2

(c) 4.1 (d) $5 \times 3.387 \times 10^{-7}$

57. Vibration magnetometer works on the principle of

(a) Torque acting on the bar magnet

(b) Force acting on the bar magnet

(c) Both the force and the torque acting on the bar magnet

(d) None of these

58. A P–type semiconductor has acceptor levels 57 meV above the valence band. The maximum wavelength of light required to create a hole is

(a) 57 Å (b) 57×10^{-3} Å

(c) 217100 Å

(d) 11.61×10^{-33} Å

59. Two infinite plane parallel sheets separated by a distance 'd' have equal and opposite uniform charge densities σ. Electric field at a point between the sheets is

(a) Zero

(b) σ/ε_0 (c) $\sigma/2\varepsilon_0$

(d) Depends upon the location of the point

60. Wavelength of ray of light is 0.00006 m. It is equal to

(a) 6 microns (b) 60 microns

(c) 600 microns (d) 0.6 microns

61. If the K.E. of a particle is doubled, then its momentum will

(a) Remain unchanged

(b) Be doubled

(c) Be quadrupled

(d) Increase $\sqrt{2}$ times

62. If the breaking force for a given wire is F, then the breaking force of two wires of same magnitude will be

(a) F (b) 4F (c) 8F (d) 2F

45. (b) 46. (a) 47. (c) 48. (d) 49. (d) 50. (c) 51. (d) 52. (c) 53. (a) 54. (b) 55. (b) 56. (c) 57. (c) 58. (c) 59. (b) 60. (b) 61. (d) 62. (d)

63. At 100 K and 0.1 atmospheric pressure, the volume of helium gas is 10 litres. If volume and pressure are doubled, its temperature will change to

(a) 400 K (b) 127 K (c) 200 K (d) 25 K

64. In double slit experiment, the angular width of the fringes is 0.20^o for the sodium light (λ = 5890 Å). In order to increase the angular width of the fringes by 10%, the necessary change in the wavelength is

(a) Increase 589 Å

(b) Decrease of 589 Å

(c) Increase of 6479 Å

(d) Zero

65. The minimum magnifying power of a telescope is M, if the focal length of its eyelens is halved, the magnifying power will become

(a) M/2 (b) 2M

(c) 3M (d) 4M

66. A semiconductor device is connected in a series circuit with a battery and a resistance. A current is found to pass through the circuit. If the polarity of the battery is reversed, the current drops almost to zero. The device may be

(a) A P–type semiconductor

(b) An N–type semiconductor

(c) A P–N junction

(d) An intrinsic semiconductor

67. The voltage of domestic A.C. is 220 volt. What does this represent

(a) Mean voltage (b) Peak voltage

(c) Root mean voltage

(d) Root mean square voltage

68. A long magnet is cut in two parts in such a way that the ratio of their lengths is 2 : 1. The ratio of pole strengths of both the section is

(a) Equal

(b) In the ratio of 2 : 1

(c) Inthe ratio of 1 : 2

(d) In the ratio of 4 : 1

69. Three capacitors of 2.0, 3.0 and 6.0 μF are connected in series to a 10 V source. The charge on the 3.0 μF capacitor is

(a) 5μC (b) 10μC

(c) 12μC (d) 15μC

70. An electric heater kept in vacuum is heated continuously by passing electric current. Its temperature

(a) Will go on rising with time

(b) Will stop after sometime as it will loose heat to the surroundings by conduction

(c) Will rise for sometime and there after will start falling

(d) Will become constant after sometime because of loss of heat due to radiation

71. The core of a transformer is laminated to reduce energy losses due to

(a) Eddy currents

(b) Hysteresis

(c) Resistance in winding

(d) None of these

72. In the spectrum of light of a luminous heavenly body the wavelength of a spectral line is measured to be 4747 Å while actual wavelength of the line is 4700 Å. The relative velocity of the heavenly body with respect to earth with be (Velocity of light is 3×10^8 m/s)

(a) 3×10^5 m/s moving towards the earth

(b) 3×10^5 m/s moving away from the earth

(c) 3×10^6 m/s moving towards the earth

(d) 3×10^6 m/s moving away from the earth

73. Iron and silicon wires are heated from 30^oC to 50^oC. The correct statement is that

(a) Resistance of both wires increases

(b) Resistance of both wires decreases

(c) Resistance of iron wire increases and that of silicon wire decreases

(d) Resistance of iron wire decreases and that of silicon wire increases.

74. Tangent galvanometer is used to measure

(a) Steady current

(b) Current impulses

(c) Magnetic moments of bar magnets

(d) Earth's magnetic field

75. Two condensers of capacity C farad and 2C farad are connected in parallel and then connected in series with6 a third condenser of capacity 3C farad. The combination is charged with V volts. The charge on C farad condenser is (in coulomb)

(a) 1/2 VC (b) VC

(c) 2VC (d) 3/2 VC

63. (a) 64. (a) 65. (b) 66. (c) 67. (d) 68. (a) 69. (b) 70. (d) 71. (a) 72. (d) 73. (c) 74. (a) 75. (a)