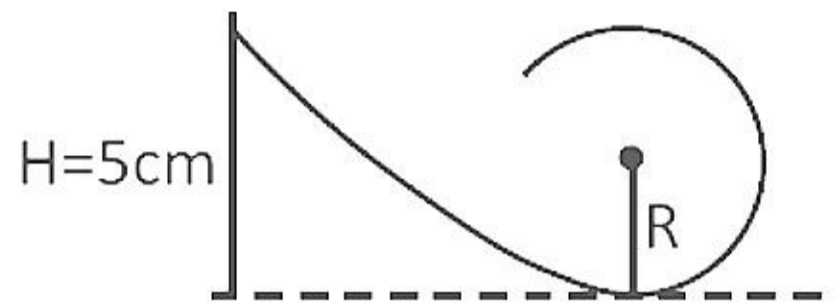# JIPMER-02-06-2019-Evening

Physics

1. Find the maximum radius of circle so that block can complete the circular motion.

   (1) 5 cm

   (2) 3 cm

   (3) 2 cm

   (4) 4 cm

2. Find the height of the liquid in the capillary tube if surface tension of liquid is S, radius of capillary tube is r and acceleration due to gravity is g :
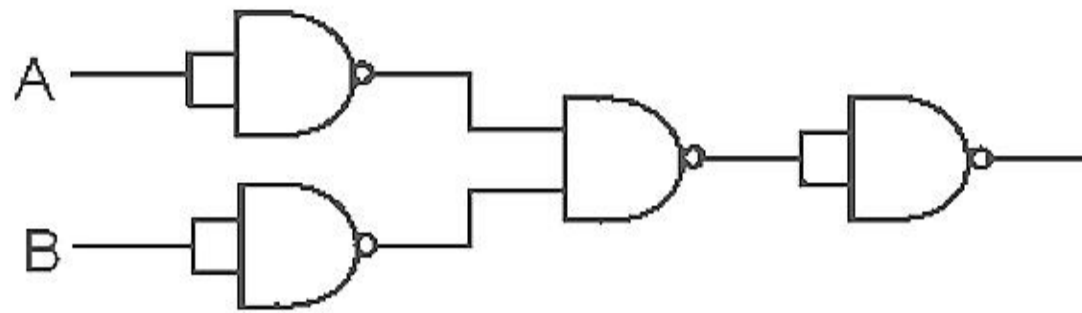
   (1) $\dfrac{2S\cos\theta}{\rho rg}$

   (2) $\dfrac{2S}{\rho rg\cos\theta}$

(3) $\dfrac{2S\sin\theta}{\rho rg}$

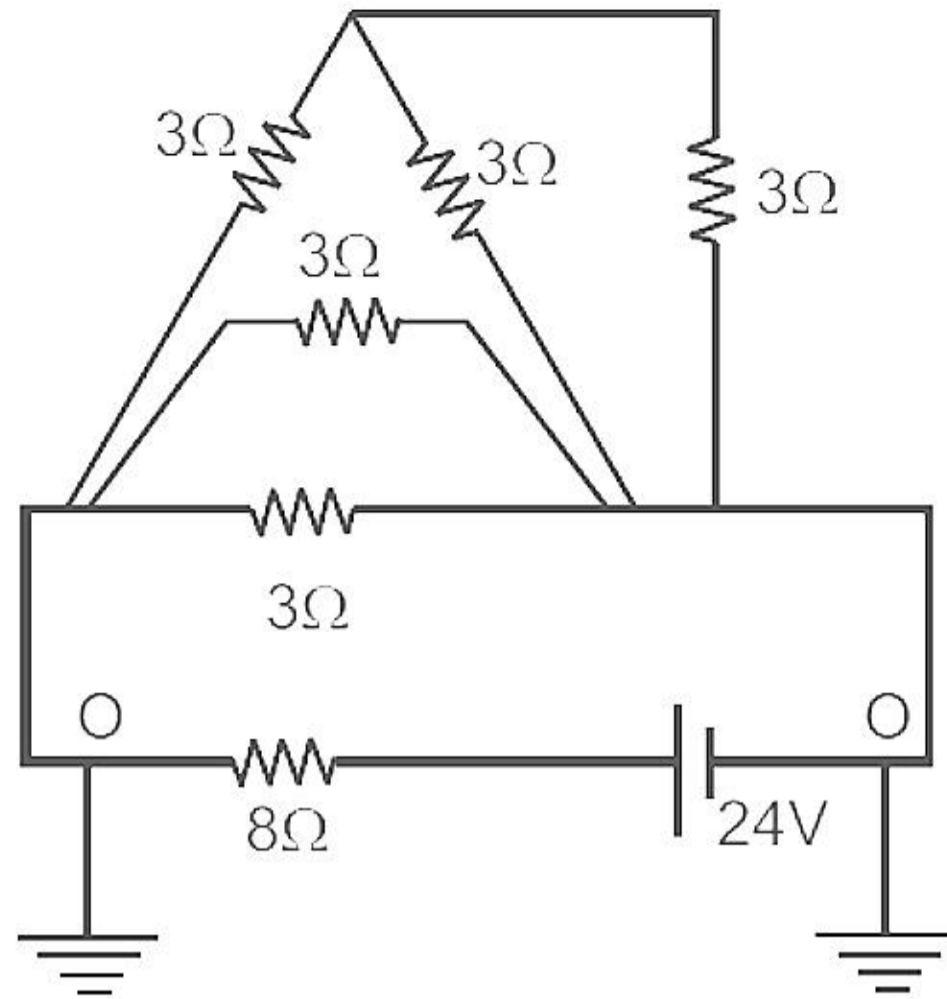(4) None of these

3. Following circuit will act as,

(1) NOR GATE

(2) NAND GATE

(3) AND GATE
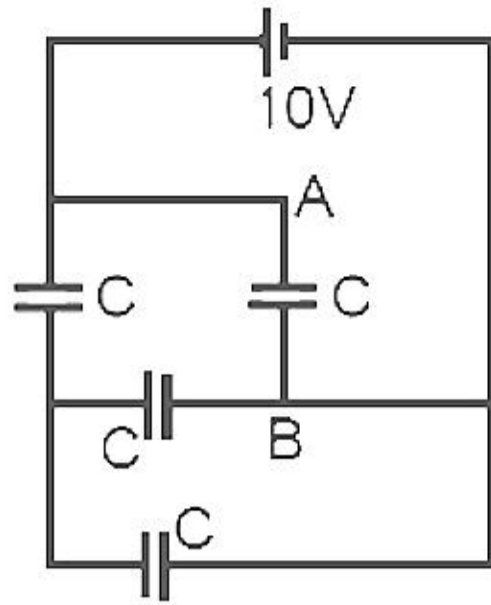
(4) OR GATE

4. Find the current in 8Ω resistance in given circuit,

(1) 2 A

(2) 3 A

(3) 4 A

(4) 5 A

5. In the given circuit find the heat produced between A & B:
    $\left(\text{given } C = 1\,\mu F \right)$

(1) 50 μJ

(2) 60 μJ

(3) 70 μJ

(4) 100 μJ

6. In the given circuit if power rating of heater is 1000 watt at 100 volt. Find the resistance R in figure so that heater produce power of 62.5 W.

(1) 5Ω

(2) 7Ω

(3) 10Ω

(4) 8Ω
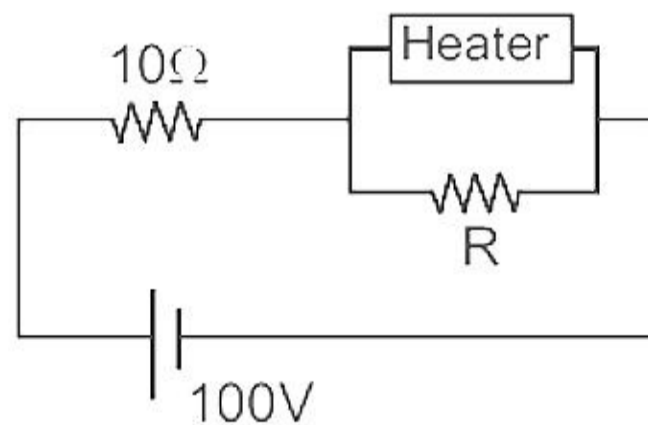
7. In β^+ emission what happens to upquarks

(1) Is converted into anti-quarks

(2) Is converted into down-quarks

(3) Is converted into up-quarks

(4) None of these

8. B-122 has half life of 2 minutes experiment has to be done using Ba-122 and it take 10 minutes the setup the experiments if initially 80 gm of Ba-122 was taken how much Ba was left when experiment was started
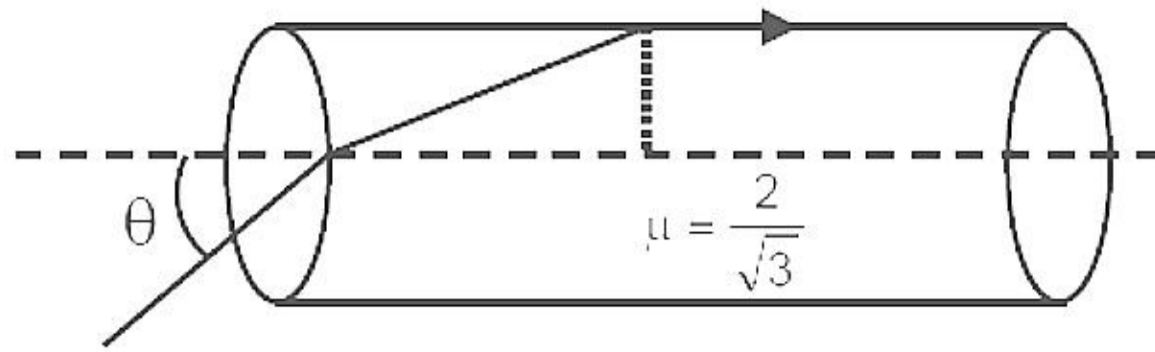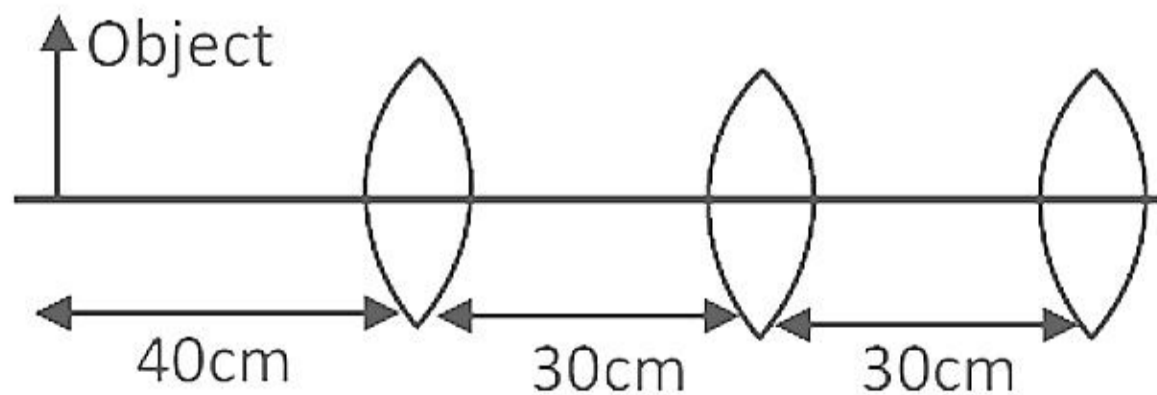
(1) 2.5 gm

(2) 5 gm

(3) 10 gm

(4) 20 gm

9. Find the value of $\theta = ?$

(1) $\sin^{-1}\left(\dfrac{2}{\sqrt{3}}\right)$

(2) $\sin^{-1}\left(\dfrac{1}{\sqrt{3}}\right)$

(3) $\sin^{-1}\left(\dfrac{1}{2}\right)$

(4) $\sin^{-1}\left(\dfrac{1}{\sqrt{2}}\right)$

10. Find the position of final image from first lens focal length of each lens is 10 cm

(1) 40 cm

(2) 50 cm

(3) 45 cm

(4) 55 cm

11. If velocity of light in the air is C then what will be the velocity of light in medium of refractive index 1.4?

   (1) 2.1×10^8 m/s

   (2) 1.4×10^8 m/s

   (3) 2.8×10^8 m/s

   (4) None of these

12. If ratio of terminal velocity of two falling drops is 3:4, then what is the ratio of their surface areas?

   (1) $\dfrac{2}{3}$

   (2) $\dfrac{3}{4}$

   (3) $\dfrac{4}{3}$

   (4) $\dfrac{3}{2}$

13. If v of light is 5×10^{16} Hz. If speed of light is air is 3×10^8 m/s, find the ration of wavelengths of light in medium of refractive index 2 to air

   (1) $\dfrac{1}{2}$

   (2) 3

   (3) $\dfrac{3}{2}$

   (4) 2

14. For a battery the electromotive force is 1.5 V. Terminal velocity is 1.25 V. power supplied to external resistance is 2.5 W. Find the internal resistance of the battery

   (1) 0.125Ω

   (2) 0.25Ω

   (3) 0.5Ω

   (4) 0.1Ω

15. If escape velocity one earth surface is 11.1 km/hr then find the escape velocity on the moon surface if mass of moon is $\dfrac{1}{81}$

times of the mass of the earth and radius is $\dfrac{1}{4}$ times radius of earth

(1) 2.46 km/hr

(2) 3.46 km/hr

(3) 4.4 km/hr

(4) None of these

16. A projectile of mass 1 kg is projected with a speed of 10 m/s at an angle of 60° from the horizontal when projectile is at its highest point, its magnitude of angular momentum (about point of projection)

(1) $\dfrac{75}{2}$ Nm/s

(2) $\dfrac{75}{4}$ Nm/s

(3) 75 Nm/s

(4) 150 Nm/s

17. Find the distance between two consecutive nodes if for a string $T = 0.25$ N, $\mu = 1\,\text{mg/m}$, $f = 250\text{Hz}$

(1) 2 m

(2) 1 m

(3) 3 m

(4) 1.5 m

18. If three objects are thrown with velocities $\sqrt{\dfrac{2gH}{2}}, \sqrt{2gH}, \sqrt{\dfrac{gH}{3}}$, then find the ratio of maximum heights

(1) $2 : 6 : 1$

(2) $2 : 5 : 3$

(3) $2 : 4 : 7$

(4) $3 : 7 : 4$

19. One rod of length 2 m and thermal conductivity 50 unit is attached to another rod of length 1 m and thermal conductivity 100 unit. Temperature of free ends are 70°C and 50°C respectively. Then temperature of junction point will be

(1) 60°C

(2) 54°C

(3) 64°C

(4) 68°C

20. One object of mass 20 kg is moving with the speed of 10 m/s is west direct another object of mass 10 kg is moving with 15 m/s in north direction. Both collide and stick together choose the correct alternative

    (1) There kinetic energy is conserved as there is inelastic collision

    (2) There kinetic energy is conserved on it is elastic collision

    (3) There momentum is conserved as there is inelastic collision

    (4) There momentum is conserved on it is elastic collision

21. If a object starts from rest and covers angles of 60 rad in 10 sec in circular motion magnitude angular acceleration will be

    (1) $1.2 \text{ rad}/\text{sec}^2$

    (2) $1.5 \text{ rad}/\text{sec}^2$

    (3) $2 \text{ rad}/\text{sec}^2$

    (4) $2.5 \text{ rad}/\text{sec}^2$

22. Speed of particles at 3rd and 8th seconds are 20 m/s are zero respectively. Then average acceleration between 3rd and 8th second will be -

(1) $3 \, m/s^2$

(2) $4 \, m/s^2$

(3) $5 \, m/s^2$

(4) $6 \, m/s^2$

23. Find the average velocity when a particle complete the circle of radius 1m in 10 sec

(1) $2 \, m/s^2$

(2) $3.4 \, m/s^2$

(3) $6.28 \, m/s^2$

(4) Zero

24. Two wire of same material hacing radius in ratio 2:1 and lengths in ratio 1:2. If same force is applied on them, then ratio of their change in length will be
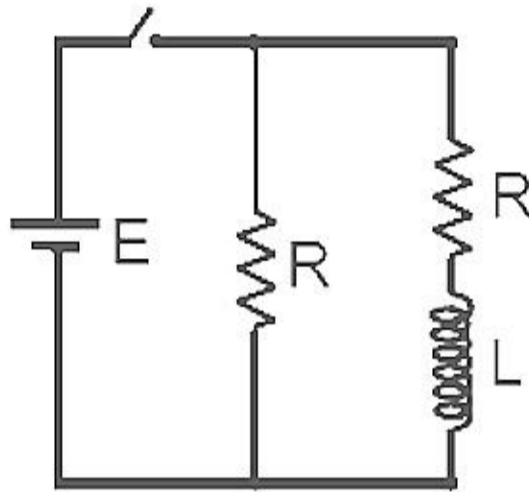
(1) 1:1

(2) 1:2

(3) 1:4

(4) 1:8

25. Find the current drawn from the battery just after the switch is closed

(1) $\dfrac{E}{2R}$

(2) $\dfrac{2E}{R}$

(3) $\dfrac{E}{R}$

(4) $\dfrac{2E}{3R}$

26. A circuit contains 2 resistance R_1 and R_2 in series. Find the ratio of input voltage to voltage of R_2
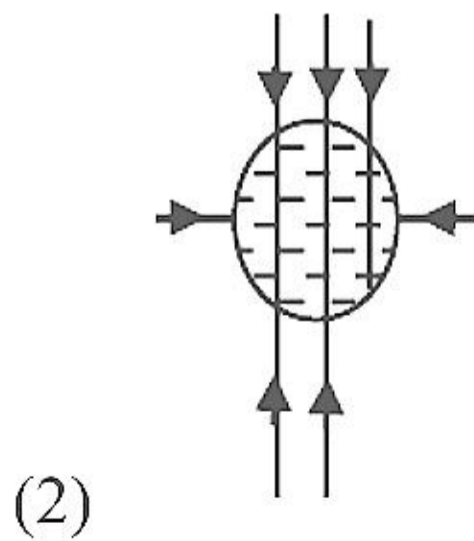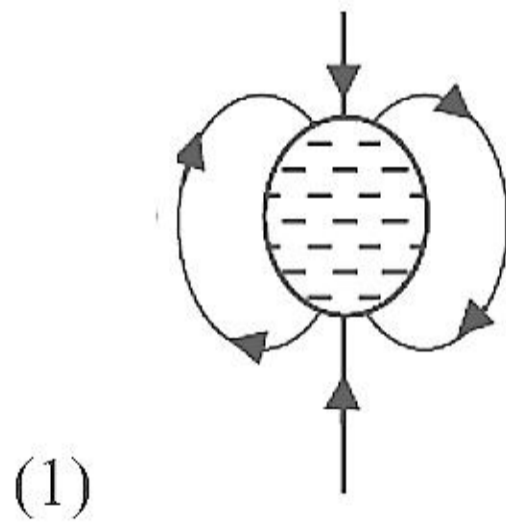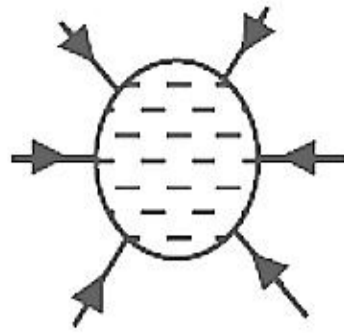
(1) $\dfrac{R_2}{R_1 + R_2}$

(2) $\dfrac{R_1 + R_2}{R_2}$

(3) $\dfrac{R_1 + R_2}{R_1}$

(4) $\dfrac{R_1}{R_1 + R_2}$

27. Find the correct diagram of electric field lines of forces for negative charges-

(1)

(2)

(3)
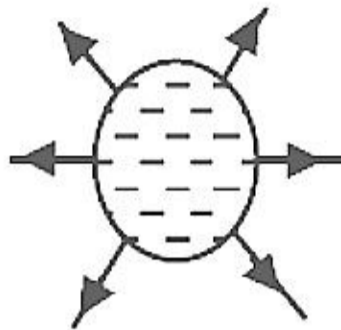
(4)

28. If mass (M), distance (L) and time (T) are the fundamental quantities then dimension of torque is

(1) $\left[ML^2T^{-2} \right]$

(2) $\left[MLT^{-2} \right]$

(3) $\left[MLT \right]$

(4) $\left[ML^2T \right]$

29. If frequencies are $(v-1)$, $(v+1)$ then find the beats

(1) 2

(2) 1

(3) 3

(4) 4

30. Maximum acceleration in SHM

(1) $\omega^2 A$

(2) $\dfrac{\omega^2 A}{2}$

(3) $\omega^2 A^2$

(4) 0

31. The rate of decrease of kinetic energy is $9.6 \, \text{j/s}$. Find the magnitude of force acting on the particle when it's speed in m m/s

(1) 3.2 N

(2) 4.8 N

(3) 2.4 N

(4) 5.6 N

32. If frequency of a photon is 6×10^{14} Hz, then find its wavelength. [Take, speed of light, $c = 3 \times 10^8 \, \text{m/s}$]

(1) 500 $\overset{\circ}{\text{A}}$

(2) 500 nm

(3) 200 $\overset{\circ}{\text{Å}}$

(4) 200 nm

33. Two disc having mass ration ½ and diameter ration 2/1 then find the ration of moment of inertia

(1) 2 : 1

(2) 1 : 1

(3) 1 : 2

(4) 2 : 3

34. In YDSE angular fringe width is 0.1 rad wavelength of light used is 6000 A°, find the distance between 2 slits

(1) 2 μm

(2) 3 μm

(3) 5 μm

(4) 6 μm

35. Find resonance frequency in the given circuit
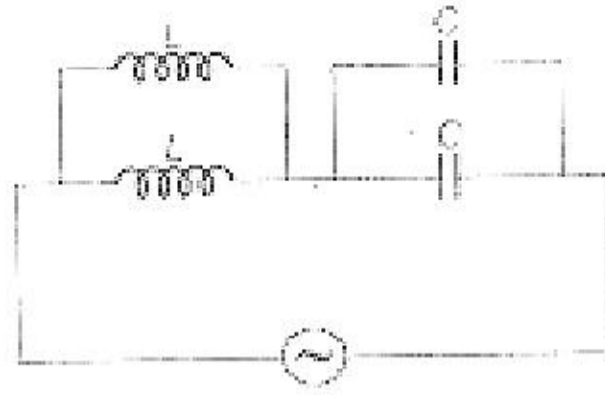
(1) $\dfrac{1}{\sqrt{LC}}$

(2) $\dfrac{2}{\sqrt{LC}}$

(3) $\dfrac{1}{2\sqrt{LC}}$

(4) $\dfrac{4}{\sqrt{LC}}$

36. In which radiation atomic number and mass number are not affected?

(1) α-radiation

(2) γ-radiation

(3) β-radiation

(4) None of these

37. If a ball of mass 0.1 kg hits the ground from the height of 20 m and bounce back to the same height, then find out the force

exerted on the ball if the time of impact is 0.04 sec. (Take, $g = 10 \text{ m/s}^2$)

(1) $100 \text{ N} \left(+\hat{j} \right)$

(2) $200 \text{ N} \left(+\hat{j} \right)$

(3) $100 \text{ N} \left(-\hat{j} \right)$

(4) $1000 \text{ N} \left(+\hat{j} \right)$

38. A galvanometer of $50 \, \Omega$ resistance has 25 divisions. A currect of 4×10^{-4} A. A gives a deflection of one division. To convert this galvanometer into a voltmeter having a range of 25V, it should be connected with a resistance of

(1) $2500 \, \Omega$ as a shunt

(2) $245 \, \Omega$ as a shunt

(3) $2500 \, \Omega$ in series

(4) $2450 \, \Omega$ in series

39. A man is applying force of 20 N on an object at an angle of 60° from the horizontal. If object moved by 20 m in horizontal direction, then work done by the force on the object is

(1) 300 J

(2) 400 J

(3) 100 J

(4) 200 J

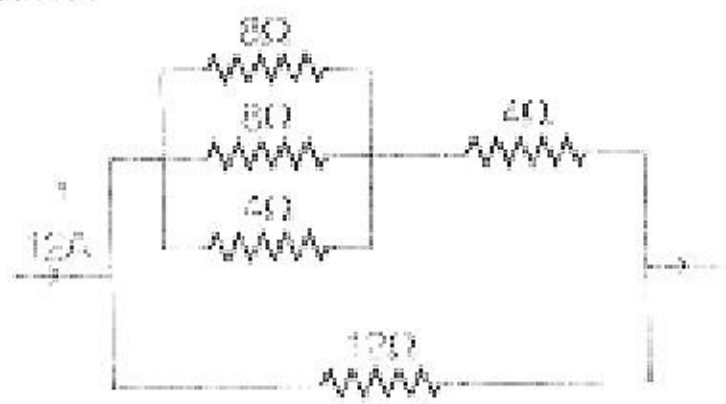40. What is the dimesion of energy in terms of linear momentum (P), area (A) and time (T).

(1) $\left[P^1 A^1 T^1 \right]$

(2) $\left[P^2 A^2 T^{-1} \right]$

(3) $\left[P^1 A^{1/2} T^{-1} \right]$

(4) $\left[P^{1/2} A^{1/2} T^{-1} \right]$

41. Ratio of charge on position is approximately

(1) $+2 \times 10^{11}$

(2) $+5 \times 10^{12}$

(3) -2×10^{11}

(4) -5×10^{12}

42. In the given circuit, find voltage across 12 Ω resistance.

(1) 12 Volt

(2) 36 Volt

(3) 72 Volt

(4) 48 Volt

43. Potential difference is given as $V(x) = -x^2 y$ Volt. Find electric field at a point (1,2)?

(1) $\hat{i} + 4\hat{j}$ V/m

(2) $-4\hat{i} - \hat{j}$ V/m

(3) $4\hat{i} + \hat{j}$ V/m

(4) $4\hat{i} - \hat{j}$ V/m

44. A planet of radius R has a time period of revolution T. Find time period of a planet of radius $9R$?

(1) $3\sqrt{3}T$

(2) $9T$

(3) $27T$

(4) $9\sqrt{3}T$

45. If resistivity of copper is 1.72×10^{-8} Ω m and number of free electrons in copper is 8.5×10^{28} $/m^3$. Find the mobility

(1) 4.25×10^{-3} $m^2 / C\Omega$

(2) 6.8×10^{-3} $m^2 / C\Omega$

(3) 8.5×10^{-3} $m^2 / C\Omega$

(4) 3.4×10^{-3} $m^2 / C\Omega$

46. Van De graff generator is used to

(1) Create a high potential of range of few million volts

(2) Create a low potential of range of few million volts

(3) To de-generate projectile, like protons deuterons etc

(4) It can not be used to study collision experiments in physics

47. Coercivity and retentivity of soft iron is

(1) High, coercivity, high retentivity

(2) low, coercivity, high retentivity

(3) low, coercivity, low retentivity

(4) High, coercivity, low retentivity

48. Lenz law is based on principle of conservation of

(1) Linear momentum

(2) Energy

(3) Charge

(4) Mass

49. Two objects of mass m each moving with speed u m/s collide at 90°, then final momentum is (assume collision is inelastic)

(1) mu

(2) $2mu$

(3) $\sqrt{2}mu$

(4) $2\sqrt{2}mu$

50. A particle is projected at an angle of 30° from the horizontal with a speed of 10 m/s on the earth. It's time of flight, range, velocity of impact are respectively T, R, V. If this projectile is projected on the moon then its time of flight, range and velocity of impact is (assume gravitational field on moon is $g / 6$ m/s^2)

(1) $6T, 6R, 6V$

(2) $6T, 6R, V$

(3) T, R, V

(4) $T, 6R, 6V$

51. A particle is moving with 10 m/s in a circle of radius 5m, find out magnitude of average velocity if particle moved by 60° in 1sec.

    (1) 5 m/s

    (2) 10 m/s

    (3) $5\sqrt{3}$ m/s

    (4) 20 m/s

52. A particle of mass 7 kg is ececuting circular motion with time period of 11 sec. Find out centripetal force, if radius of circle is 10 m.

    (1) $\dfrac{30}{7}$ N

    (2) $\dfrac{40}{7}$ N

    (3) 30 N

(4) $\dfrac{160}{7}$ N

53. A stationary wave equation is given as

$y = 20\sin(20x)\cos(1000t)$. What will be the speed of

stationary wave?

(1) 20 m/s

(2) 50 m/s

(3) 2 cm/s

(4) Not defined

54. Huygen's principle does not use

(1) Reflection

(2) Refraction

(3) Diffraction

(4) Point of spectra origin

55. When a light ray enters from oil to glass on oil glass interface,

then velocity of light changes by a factor of [given

$\mu_{oil} = 2, \mu_{glass} = 3/2$]

(1) $\dfrac{4}{3}$

(2) $\dfrac{3}{4}$

(3) 3

(4) 1

56. For CE configuration $n-p-n$ transistor. Which of the following statement is correct?

(1) $I_c = I_E + I_B$

(2) $I_B = I_E + I_C$

(3) $I_E = I_C + I_B$

(4) All of these

57. Psychrometer is used to measure

(1) Relative humidity

(2) Pressure

(3) Temperature

(4) Density

58. If same charge q is placed inside a sphere and cube hacing radius 1m and side 2m respectively. What will be the ratio of flux passing through them?

(1) 1:1

(2) 1:8

(3) 8:1

(4) 1:2

59. Induction furnace uses ……… to produce heat.

(1) Eddy current

(2) Resistance

(3) Capacitor

(4) None of these

60. In which radiation atomic number and mass number are not affected?

(1) α − radiation

(2) γ − radiation

(3) β − radiation

(4) None of these