PHYSICS SET – A

1. A body begins to slide over the surface of another when pulled with a force of 10N. If we pull with a force of 5N, the force of friction that will come into play is

   (A) Zero (B) 0.5N

   (C) 50N (D) 5 N

2. The temperature of sink and source of a Carnot engine are 300K and 400K respectively. Its efficiency is

   (A) 100% (B) 75%

   (C) 33.3% (D) 25%

3. Width of the slits in Young's double slit experiment are in the ratio 4:1. Then the ratio of the amplitude of the two waves is

   (A) 2:1 (B) 1:2

   (C) 4:1 (D) 1:4

4. Diode can be used as

   (A) Oscillator (B) Rectifier

   (C) Amplifier (D) Modulator

5. An ideal gas is one which obeys

   (A) Boyle's law only (B) Avogadro's law

   (C) Boyle's law and Charles law (D) Charles law only

6. Which of the following law is applicable for determining the apparent change in the frequency, when a source and observer are in relative motion ?

   (A) Kepler's law (B) Doppler's law

   (C) Newton's law (D) Huygen's law

7. The de-Broglie wavelength of electrons, when accelerated through a potential difference of 100 V will be

   (A) $10\,\mathring{A}$ (B) $12.27\,\mathring{A}$

   (C) $1.227\,\mathring{A}$ (D) $1\,\mathring{A}$

8. Which of the following is not a unit of time ?

   (A) Hour (B) Nanosecond

   (C) Microsecond (D) Light year

9. Two bodies of equal masses ($m_1=m_2$) moving along same straight line with velocities 3m/s and -5m/s respectively collide elastically. Their velocities after the collision will be respectively

(A) 4m/s for both
(B) -3m/s and 5m/s
(C) -4m/s and 4m/s
(D) -5m/s and 3m/s

10. Two point charges $+3\mu$ C and $+8\mu$ C repel each other with a force of 40 N. If a charge of -5μ C is added to each of them, then the force between them will become

(A) -10 N
(B) +10 N
(C) +20 N
(D) -20 N

11. The unit of magnetic pole strength is

(A) mA
(B) Am
(C) Am^2
(D) A^2m

12. Two long parallel wires carrying same current are at a distance of 2m apart. If they experience a force of 4×10^{-7} N/m, calculate the current flowing through them.

(A) 1A
(B) 2A
(C) 3A
(D) 4A

13. If $\hat{n}$ is a unit vector in the direction of vector $\vec{A}$, then

(A) $\hat{n} = \frac{\vec{A}}{|A|}$
(B) $\hat{n} = \frac{|\vec{A}|}{\vec{A}}$
(C) $\hat{n} = \vec{A}|\vec{A}|$
(D) $\hat{n} = \hat{n} \times \vec{A}$

14. If escape velocity of earth is 11.2 km/s, then escape velocity from a planet whose mass and radius are 9 times and 1/4 times respectively that of earth is

(A) 11.2 km/s
(B) 22.4 km/s
(C) 44.8 km/s
(D) 67.2 km/s

15. What force will change the velocity of a mass of 1kg from $20ms^{-1}$ to $30ms^{-1}$ in 2s ?

(A) 25N
(B) 10N
(C) 5N
(D) 2N

16. An inductor of 1H is connected to a 50 Hz AC source. Its reactance is

(A) $\frac{100}{\sqrt{2}}\Omega$ (B) $\frac{100}{\pi}\Omega$

(C) $100\pi\Omega$ (D) $\frac{100}{2\pi}\Omega$

17. The objective lens of a telescope has focal length f_o and eye-lens has focal length f_e. The magnifying power of the telescope in normal adjustment is

(A) $-\frac{f_o}{f_e}$ (B) $f_o \times f_e$

(C) $f_o - f_e$ (D) None of the above

18. Which of the following is most elastic ?

(A) Glass (B) Steel

(C) Sponge (D) Rubber

19. What type of vibrations are produced in a sitar wire ?

(A) Progressive transverse (B) Progressive longitudinal

(C) Stationary longitudinal (D) Stationary transverse

20. To avoid any damage in Light Emitting Diode (LED), resistor must be used in

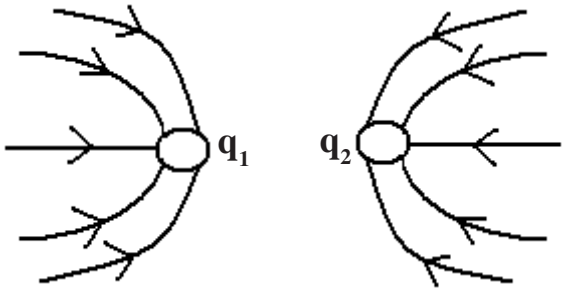
(A) Parallel with LED

(B) Series with LED

(C) Series and Parallel combination with LED

(D) None of the above

21. Figure gives the electric lines of force due to two charges q_1 and q_2. What are the signs of the two charges ?



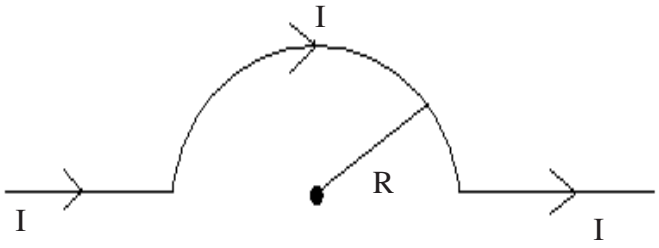
(A) Both are positive

(B) Both are negative

(C) q_1 is positive but q_2 is negative

(D) q_1 is negative but q_2 is positive

22. An infinite long straight wire is bent into a semicircle of radius R as shown in figure. A current I is sent through the conductor. The magnetic field at the centre of the semi-circle is



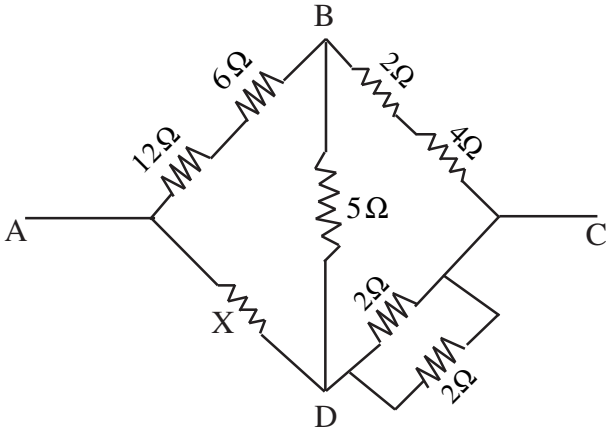
(A) Infinite

(B) Zero

(C) $\frac{\mu_0 I}{4R}$

(D) $\frac{\mu_0 I}{4\pi R}(\pi + 1)$

23. In the combination of resistances shown in the figure, the potential difference between B and D is zero, when the unknown resistance X is



(A) $12\,\Omega$

(B) $3\,\Omega$

(C) $1.5\,\Omega$

(D) $6\,\Omega$

24. The electric strength of air is 5×10^6 N/C. The largest charge that a metallic sphere of 3mm radius can hold is

(A) 5nC (B) 3nC

(C) 15nC (D) 1.6nC

25. If the distance between the earth and the sun becomes half of its present value, the number of days in a year would have been

(A) 64.5 (B) 129

(C) 182.5 (D) 730

26. The torque of a force $\vec{F} = -\hat{i} + 3\hat{j} + 5\hat{k}$ acting at the point $\vec{r} = 3\hat{i} + 4\hat{j} + \hat{k}$ is

(A) $17\hat{i} - 10\hat{j} + 13\hat{k}$ (B) $17\hat{i} - 16\hat{j} + 13\hat{k}$

(C) $13\hat{i} - 17\hat{j} + 16\hat{k}$ (D) None of these

27. Identify the pair, whose dimensions are equal

(A) Torque and work

(B) Stress and energy

(C) Force and stress

(D) Force and work

28. Displacement current I_D is a current

(A) Which flows across a resistor

(B) Which flows across an inductor

(C) Which flows across the connecting wires in a circuit

(D) Which flows between the plates of a capacitor

29. The dimensional formula of magnetic flux is

(A) $[ML^2T^{-2}A^{-1}]$

(B) $[ML^{-2}T^{-1}A^{-1}]$

(C) $[M^0L^{-1}T^2A]$

(D) $[ML^2T^2A^{-1}]$

30. When an object is placed between focus F and centre of curvature C of a concave mirror, the image formed will be

(A) Real, inverted and diminished

(B) Virtual, erect and diminished

(C) Real, inverted and enlarged

(D) Virtual, erect and enlarged

31. In a transformer, number of turns in the primary coil is 140 and that in the secondary is 280. If current in the primary is 4A, then that in secondary is

(A) 4A

(B) 2A

(C) 6A

(D) 10A

32. A myopic person's far point is 2m. The power of the lens required for him to see distant objects clearly is

(A) -0.5 D

(B) 0.5 D

(C) 2 D

(D) -1.5 D

33. The lift in an aeroplane is based on

(A) Bernoulli's theorem

(B) Theorem of Continuity

(C) Law of gravitation

(D) Pascal's law

34. Cloudy nights are usually warmer than clear ones because clouds

(A) Do not radiate heat (B) Do not absorb heat

(C) Have low thermal conductivity (D) Have high thermal conductivity

35. The relation between pressure (P) and average kinetic energy E per unit volume of gas is

(A) $P = \frac{2}{3}E$ (B) $P = \frac{E}{3}$

(C) $P = \frac{3}{2}E$ (D) $P = 3E$

36. The unit of Plank's constant is

(A) Nm (B) eV

(C) Js^{-1} (D) Js

37. The emission of β -rays in radioactive decay results in the change of

(A) Charge but not mass (B) Mass but not charge

(C) Both mass and charge (D) Either mass or charge

38. The knee voltage in case of Ge junction diode is

(A) 0.7 V (B) 0.5 V

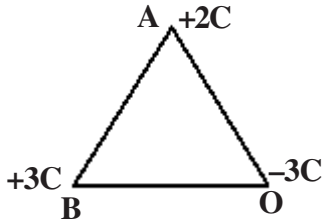
(C) 0.3 V (D) 0.1 V

39. The frequency range of cellular mobile phone from mobile to base station lies between

(A) 420 to 890 MHz (B) 540 to 1600 KHz

(C) 840 to 935 MHz (D) 896 to 901 MHz

40. Three charges are placed at the vertices of an equilateral triangle as shown in figure. The net force experienced by the charge placed at vertex A in a direction normal to BO is



(A) 2 N (B) 1/2 N

(C) Zero (D) 3/2 N

Contd.

41. The drift velocity of free electrons in a conductor is V_d, when the current I is flowing in it. If both the radius and current are doubled, the drift velocity will be

(A) $\frac{V_d}{8}$ (B) $\frac{V_d}{4}$

(C) $\frac{V_d}{2}$ (D) V_d

42. A car at rest attains a speed of 20 ms^{-1} in 4s. Its acceleration is

(A) $5cms^{-2}$ (B) $5ms^{-1}$

(C) $5ms^{-2}$ (D) $4ms^{-2}$

43. If momentum is increased by 20%, then kinetic energy increases by

(A) 48% (B) 44%

(C) 40% (D) 36%

44. A bomb of 16 kg explodes into two pieces of masses 10 kg and 6 kg. The velocity of 10 kg mass is 6m/s. The kinetic energy of the other mass is

(A) 60J (B) 100J

(C) 300J (D) 36J

45. What is the percentage change in weight of a body, when taken 32 km below the surface of the earth (radius of earth is 6400 km)?

(A) It will increase by 0.5% (B) It will decrease by 0.5%

(C) It will increase by 0.25% (D) It will decrease by 0.25%

46. The distance covered by a moving body can be found from

(A) Area under distance-time graph

(B) Area under velocity-time graph

(C) Slope of the velocity-time graph

(D) Slope of the distance-time graph

47. A rider on horseback falls forward when the horse suddenly stops. This is due to

(A) The inertia of the horse (B) The inertia of the rider

(C) Large weight of the horse (D) Losing balance

48. A body is whirled in a horizontal circle of radius 20cm. It has an angular velocity of 10 $rads^{-1}$. What is its linear velocity at any point on the circular path ?

(A) $10ms^{-1}$ (B) $2cms^{-1}$

(C) $2ms^{-1}$ (D) $20cms^{-1}$

49. Infra-red spectrum lies between

(A) Radiowaves and Microwaves (B) Microwaves and Visible region

(C) Visible and Ultraviolet region (D) Ultraviolet and X-rays

50. The magnetic flux threading a coil changes from 12×10^{-3}Wb to 6×10^{-3}Wb in 0.01 second. The induced e.m.f is

(A) 6V (B) 0.6 H

(C) 0.6V (D) 0.6 F

51. Mirage is an optical illusion formed due to the phenomenon of

(A) Dispersion (B) Interference

(C) Polarisation (D) Total internal reflection

52. Light of wavelength 500nm is used to illuminate two slits 1mm apart and are 1m away from a screen. The width of the fringes will be

(A) 5×10^{-3}m (B) 5×10^{3}m

(C) 0.5×10^{-3}m (D) 0.5×10^{3}m

53. Which one of the following statements is not true for diffraction fringes ?

(A) The intensity of secondary maxima goes on decreasing

(B) All the secondary maxima and minima are of the same width

(C) The central fringe is twice as wide as secondary maxima and minima

(D) It has a central minimum

54. The radius of ball A is twice that of ball B. The ratio of their terminal velocities in a liquid will be in the ratio

(A) 2 : 1 (B) 1 : 2

(C) 1 : 4 (D) 4 : 1

55. The ratio of two specific heats of gas (γ) for diatomic gas is equal to

(A) 1.67 (B) 1.4

(C) 1.28 (D) 1.98

56. The range of frequency of audible sound to which human ear responds varies between

(A) 20 to 2,000 Hz (B) 20 to 20,000 Hz

(C) 20 to 200 Hz (D) 20 to 2,00,000 Hz

57. At normal pressure in air, the range of α-particle varies from

(A) 3 to 8 m (B) 3 to 8 cm

(C) 2 to 3 m (D) 2 to 3 cm

58. The electromagnetic wave used in the telecommunication is

(A) Ultraviolet (B) Infra-red

(C) Visible (D) Microwave

59. The output of solar cell is

(A) Direct current (B) Alternating current

(C) Either direct or alternating current (D) None of these

60. Two point charges $24\,\mu$C and $16\,\mu$C are placed 10 cm apart. The work done to bring them closer by 6 cm will be approximately

(A) 52 J (B) 5.1 J

(C) 25 J (D) 57 J

61. Cyclotron is used to accelerate

(A) Electrons (B) Neutrons

(C) Positive ions (D) Negative ions

62. The ratio of the horizontal component to the resultant magnetic field of earth at a given place is $\frac{1}{\sqrt{2}}$. The angle of dip at that place is

(A) 30° (B) 45°

(C) 0° (D) 90°

63. The moment of momentum is called

(A) Couple (B) Torque

(C) Impulse (D) Angular momentum

64. The position-time graph of uniform motion is a

(A) Straight line inclined to the time axis

(B) Straight line parallel to the time axis

(C) Hyperbola

(D) Parabola

65. Which of the following is not a projectile ?

(A) A bullet fired from a gun

(B) A stone thrown horizontally from the top of a tower

(C) Throwing a cricket ball from one player to another

(D) Flight of an aeroplane

66. In a AC circuit containing only a capacitor, the current

(A) Leads voltage by 180^o (B) Is in phase with voltage

(C) Leads voltage by 90^o (D) Lags behind voltage by 90^o

67. The maximum velocity of a vehicle taking a turn on a level road is given by

(A) $v^2 = \mu rg$ (B) $v = \mu rg$

(C) $v = \frac{\mu}{rg}$ (D) $v = \frac{\mu}{r^2 g}$

68. Heat energy from the sun reaches the earth by

(A) Conduction (B) Scattering

(C) Convection (D) Radiation

69. A convex lens is dipped in a liquid whose refractive index is equal to the refractive index of the lens. Then its focal length will

(A) Become zero (B) Become infinite

(C) Remain unchanged (D) Becomes small but non-zero