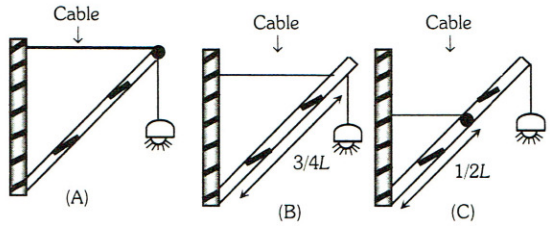
MERITSTORE

PHYSICS

1. The unit of reduction factor of tangent galvanometer is
   a) $Ampere$ b) $Gauss$
   c) $Radian$ d) None of these
2. Surface tension has the same dimensions as that of
   a) Coefficient of viscosity
   b) Impulse
   c) Momentum
   d) Spring constant
3. A particle starting from rest falls from a certain height. Assuming that the value of acceleration due to gravity remains the same throughout motion, its displacement in three successive half second intervals are S_1 , S_2, S_3.
   Then,
   a) $S_1 : S_2 : S_3 : 1 : 5 : 9$ b) $S_1 : S_2 : S_3 : 1 : 2 : 3$
   c) $S_1 : S_2 : S_3 : 1 : 1 : 1$ d) $S_1 : S_2 : S_3 : 1 : 3 : 5$
4. A particle A is projected from the ground with an initial velocity of 10 ms^{-1} at an angle 60° with horizontal. From what height should an another particle B be projected horizontally with velocity 5 ms^{-1} so that both the particles collide in ground at point C if both are projected simultaneously $g = 10ms^{-2}$
   a) 10 m b) 15 m
   c) 20 m d) 30 m
5. A body of mass 1 kg thrown with a velocity of 10 ms^{-1} at an angle of 60° with the horizontal. Its momentum at the highest point is
   a) 2 kg ms^{-1} b) 3 kg ms^{-1}
   c) 4 kg ms^{-1} d) 5 kg ms^{-1}
6. If a street light of mass M is suspended from the end of a uniform rod of length L in different possible patterns as shown in figure, then



   a) Pattern A is sturdier
   b) Pattern B is sturdier
   c) Pattern C is sturdier
   d) All will have same sturdiness
7. A ball of mass $150g$ starts moving with an acceleration of 20 m/s^2. When hit by a force, which acts on it for 0.1 sec the impulsive force is
   a) 0.5 N-s b) 0.1 N-s c) 0.3 N-s d) 1.2 N-s

8. Two springs A and B are identical but A is harder than $B(k_A > k_B)$. Let W_A and W_B represent the work done when the springs are stretched through the same distance and W'_A and W'_B are the work done when these are stretched by equal forces, then which of the following is true

a) $W_A > W_B$ and $W'_A = W'_B$
b) $W_A > W_B$ and $W'_A < W'_B$
c) $W_A > W_B$ and $W'_A > W'_B$
d) $W_A < W_B$ and $W'_A < W'_B$

9. Three identical spheres of mass M each are placed at the corners of an equilateral triangle of side 2 m. Taking one of the corners as the origin, the position vector of the centre of mass is

a) $\sqrt{3}(\hat{\mathbf{i}} - \hat{\mathbf{j}})$ b) $\frac{\hat{\mathbf{i}}}{\sqrt{3}} + \hat{\mathbf{j}}$

c) $\hat{\mathbf{i}} + \hat{\mathbf{j}}/3$ d) $\hat{\mathbf{i}} + \hat{\mathbf{j}}/\sqrt{3}$

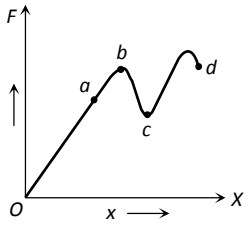
10. A wheel of moment of inertia 2.5 Kg-m^2 has an initial angular velocity of 40 rads $^{-1}$. A constant torque of 10 Nm acts on the wheel. The time during which the wheel is accelerated to 60 rads^{-1} is

a) 4 s b) 6 s c) 5 s d) 2.5 s

11. The correct option is

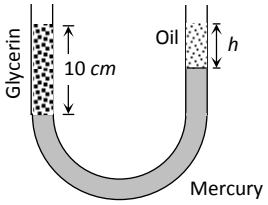
a) The time taken in travelling DAB is less than that for BCD
b) The time taken in travelling DAB is greater than that for BCD
c) The time taken in travelling $CDAD$ is less than that for ABC
d) The time taken in travelling CDA is greater than that for ABC

12. The graph is drawn between the applied force F and the strain (x) for a thin uniform wire. The wire behaves as a liquid in the part



a) ab b) bc c) cd d) oa

13. A vertical U-tube of uniform inner cross section contains mercury in both sides of its arms. A glycerin (density $= 1.3\ g/cm^3$) column of length 10 cm is introduced into one of its arms. Oil of density 0.8 gm/cm^3 is poured into the other arm until the upper surfaces of the oil and glycerin are in the same horizontal level. Find the length of the oil column. Density of mercury $= 13.6\ g/cm^3$



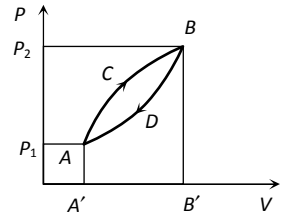
a) 10.4 cm b) 8.2 cm c) 7.2 cm d) 9.6 cm

14. Choose the correct statement(s) for a cricket ball that is spinning clockwise through air
S1 : Streamlines of air are symmetric around the ball
S2 : The velocity of air above the ball relative to it is larger than that below the ball
S3 : The velocity of air above the ball relative to it is smaller than that below the ball
S4 : There is a net upward force on the ball
a) S1, S2 and S4 b) S2 and S4
c) S4 only d) S3 only

15. Which of the prism is used to see infra-red spectrum of light
a) Rock-salt b) Nicol
c) Flint d) Crown

16. Which of the following statements is true?
a) Internal energy of a gas depends only on the state of the gas
b) In an isothermal process change in internal energy is maximum
c) Area under pressure, volume graph equals heat supplied in any process
d) Work done is state dependent but not path dependent

17. A thermodynamic system is taken from state A to B along ACB and is brought back to A along BDA as shown in the PV diagram. The net work done during the complete cycle is given by the area



a) $P_1ACBP_2P_1$ b) $ACBB'A'A$
c) $ACBDA$ d) $ADBB'A'A$

18. The latent heat of vaporization of water is 2240 J. If the work done in the process of vaporization of 1 g is 168 J, then increase in internal energy is
a) 2072 J b) 1904 J c) 2408 J d) 2240 J

19. A particle of amplitude A is executing simple harmonic motion. When the potential energy of particle is half of its maximum potential energy, then displacement from its equilibrium position is
a) $\frac{A}{4}$ b) $\frac{A}{3}$ c) $\frac{A}{2}$ d) $\frac{A}{\sqrt{2}}$

20. The motion which is not simple harmonic is
a) Vertical oscillations of a spring
b) Motion of simple pendulum
c) Motion of a planet around the sun
d) Oscillation of liquid column in a U-tube

21. Two waves are represented by $y_1 = 4\sin 404\pi t$ and $y_2 = 3\sin 400\pi t$. Then
a) Beat frequency is 4 Hz and the ratio of maximum to minimum intensity is $49:1$
b) Beat frequency is 2 Hz and the ratio of maximum to minimum intensity is $49:1$
c) Beat frequency is 2 Hz and the ratio of maximum to minimum intensity is $1:49$

d) Beat frequency is 4 Hz and the ratio of maximum to minimum intensity is $1:49$

22. Let V be the electric potential at a given point. Then the electric field E_x along x direction at that point is given by

a) $\int_0^\infty V dx$ b) $\frac{dV}{dx}$ c) $-\frac{dV}{dx}$ d) $-V\frac{dV}{dx}$

23. The number of ways one can arrange three identical capacitors to obtain distinct effective capacitances is

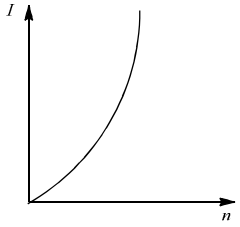
a) 8 b) 6 c) 4 d) 3

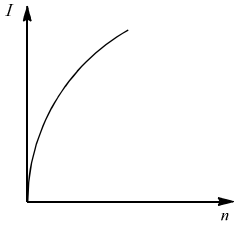
24. C, V, U and Q are capacitance, potential difference, energy stored and charge of a parallel plate capacitor respectively. The quantities that increase when a dielectric slab is introduced between the plates without disconnecting the battery are

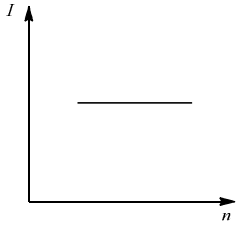
a) V and C b) V and U

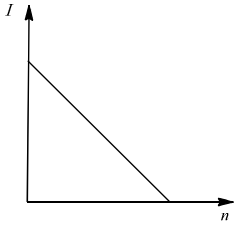
c) U and Q d) V and Q

25. A battery consists of a variable number (n) of identical cells, each having an internal resistance r connected in series. The terminal of the battery is short-circuited. A graph of current $versus$ the number of cells will be as shown in figure

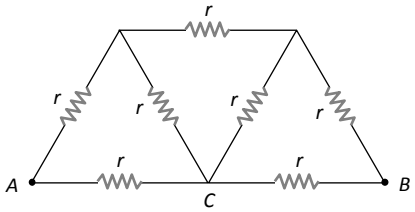
a) 

b) 

c) 

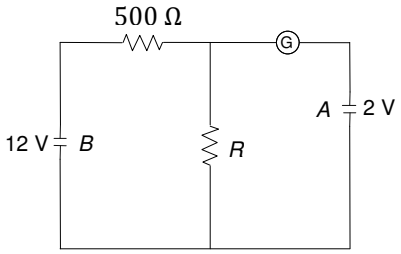
d) 

26. In the circuit shown, the value of each resistance is r, then equivalent resistance of circuit between points A and B will be



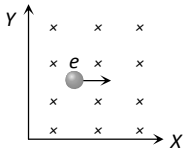
a) $(4/3)r$ b) $3r/2$ c) $r/3$ d) $8r/7$

27. In the circuit, the galvanometer G shows zero deflection. If the batteries A and B have negligible internal resistance, the value of the resistor R will be



a) 200Ω b) 100 Ω c) 500 Ω d) 1000 Ω

28. In the given figure, the electron enters into the magnetic field. It deflects in .... direction



a) $+veX$ direction b) $-veX$ direction
c) $+veY$ direction d) $-veY$ direction

29. A current carrying small loop behaves like a small magnet. If A be its area and M its magnetic moment, the current in the loop will be

a) M/A b) A/M c) MA d) AM^2

30. The earth's magnetic induction at a certain point is $7 \times 10^{-5}\text{Wbm}^{-2}$. This is to be annulled by the magnetic induction at the center of a circular conducting loop of radius 15 cm. The required current in the loop is

a) 0.56 A b) 5.6 A c) 0.28 A d) 2.8 A

31. A current $I = 10\sin(100\,\pi t)\,A$ is passed in first coil, which induces a maximum emf of $5\,\pi V$ in second coil. The mutual inductance between the coils is

a) $5\,mH$ b) $10\,mH$ c) $15\,mH$ d) $20\,mH$

32. A pure inductor of $25\,mH$ is connected to a source of $220\,V$. Given the frequency of the source as $50\,Hz$, the rms current in the circuit is

a) $7\,A$ b) $14\,A$ c) $28\,A$ d) $42\,A$

33. A series R-C circuit is connected to AC Voltage source. Consider two cases: (A) when C is without a dielectric medium and (B) when C is filled with dielectric of constant 4. The current I_R through the resistor and voltage V_c across the capacitor are compared in the two cases. Which of the following is/are true?

a) $I_R^A > I_R^B$ b) $I_R^A < I_R^B$ c) $V_C^A > V_C^B$ d) $V_C^A < V_C^B$

34. A charged particles oscillates about its mean equilibrium position with a frequency of 10^9 Hz. Frequency of the Electromagnetic Waves produced by the oscillator is

a) 10 Hz b) 10^5 Hz c) 10^9 Hz d) 10^{10} Hz

35. A person can see objects clearly only upto a maximum distance of 50 cm. His eye defect, nature of the corrective lens and its focal length are respectively

a) Myopia, concave, 50 cm
b) Myopia, convex, 50 cm
c) Hypermetropia, concave, 50 cm
d) Catract, convex, 50 cm

36. If the red light is replaced by blue light illuminating object in a microscope the resolving power of the microscope

a) Decreases b) Increases
c) Gets halved d) Remains unchanged

37. In Young's double slit experiment, distance between two slits is 0.28 mm and distance between slits and screen is 1.4 m. Distance between central bright fringe and third bright fringe is 0.9 cm, what is the wavelength of light used?
a) 4000 Å b) 6000 Å
c) 3000 Å d) 5000 Å

38. An electron in the hydrogen atom jumps excited state n to the ground state. The wavelength so emitted illuminates a photosensitive material having work function 2.75 eV. If the stopping potential of the photoelectron is 10 eV, then the value of n is
a) 5 b) 2 c) 3 d) 4

39. When a proton is accelerated with 1 $volt$ potential difference, then its kinetic energy is
a) $\frac{1}{1840} eV$ b) 1840 eV
c) 1 eV d) 1840 $c^2 eV$

40. The largest wavelength in the ultraviolet region of the hydrogen spectrum is 122 nm. The smallest wavelength in the infrared region of the hydrogen spectrum (to the nearest integer) is
a) 802 nm b) 823 nm c) 1882 nm d) 1648 nm

41. Hydrogen atom emits blue light when it changes from $n = 4$ energy level to the $n = 2$ level. Which colour of light would the atom emit when it changes from the $n = 5$ level to the $n = 2$ level
a) Red b) Yellow c) Green d) Violet

42. A radioactive decay chain starts from ${}_{92}Np^{237}$ produces ${}_{90}Th^{229}$ by successive emissions. The emitted particles can be
a) Two α-particles and one β-particle
b) Three β^+ particles
c) One α-particle and two β^+ particles
d) One α-particle and two β^- particles

43. Platinum and silicon are heated upto 250°C and after that cooled. In the process of cooling
a) Resistance of platinum will increase and that of silicon will decrease
b) Resistance of silicon will increase and that of platinum will decrease
c) Resistance of both will increase
d) Resistance of both will decrease

44. Through which mode of propagation, the radio waves can be sent from one place to another
a) Ground wave propagation
b) Sky wave propagation
c) Space wave propagation
d) All of the above

45. The velocity of all radio waves in free space is $3 \times 10^8 m/s$. The frequency of a radio waves of wavelength 150 m is