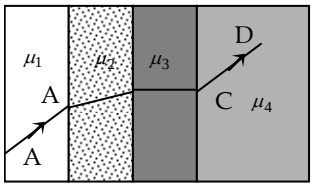
MOCK CET TEST-3

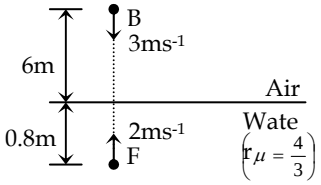
1. A ray of light passes through four transparent media with refractive indices μ_1, μ_2, μ_3 and μ_4 as shown in fig. The surfaces of all media are parallel. If the emergent ray CD is parallel to the incident ray AB, we must have



(1) $\mu_1 = \mu_2$ (2) $\mu_2 = \mu_3$

(3) $\mu_3 = \mu_4$ (4) $\mu_4 = \mu_1$

2. A fish, F in the pond is at a depth of $0.8m$ from water surface and is moving vertically upwards with velocity $2ms^{-1}$. At the same instant a bird B is at a height of $6m$ from water surface and is moving downwards with velocity $3ms^{-1}$. At this instant both are on the same vertical line as shown in Fig. Which of the following statements is/are correct?



(1) Height of B, observed by F (from itself) is equal to 5.30 m.

(2) Depth of F, observed by B (from itself) is equal to 6.60 m.

(3) Height of B, observed by F (from itself) is equal to 8.05 m.

(4) Depth of F, observed by B (from itself) is equal to 8.8 m.

3. An object is kept at a distance of 16 cm from a thin lens and the image formed is real. If the object is kept at a distance of 6 cm from the same lens the image formed is virtual. If the size of the images formed are equal, the focal length of the lens will be

(1) 15 cm (2) 17 cm (3) 21 cm (4) 11 cm

4. If the critical angle for the material of a prism is C, and the angle of the prism is A, then there will be no emergent ray when

(1) A < 2 C (2) A = 2 C (3) A > 2 C (4) A $\leq$ 2 C

5. The intensity of light coming from one of the slits in Young's double slit experiment is double the intensity from the other slit. The ratio of maximum intensity to minimum intensity in the interference pattern will be

(1) 14 (2) 34 (3) 24 (4) 44

6. In Young's experiment the wavelength of red light is 7800 and that of blue light is 5200. The value of $'n'$ for which $(n+1)^{th}$ blue band coincides with n^{th} red band is

(1) 4 (2) 3 (3) 2 (4) 1

7. The plane of polarisation is a plane

(1) parallel to the plane of vibration (2) perpendicular to the plane of vibration

(3) inclined at 45^0 to the horizontal (4) inclined at 45^0 to plane of vibration

8. When a ray of light travels from one medium to another, its velocity and wavelength undergo a change. The wave is said to experience

(1) diffraction (2) reflection (3) polarization (4) refraction

9. Two points separated by a distance of 0.1mm can just be inspected in a microscope, when light of wavelength $6000A°$ is used. If the light of wavelength $4800A°$ is used, the limit of resolution will become

(1) $0.8mm$ (2) $0.12mm$ (3) $0.1m$ (4) $0.08m$

10. When light is incident on a diffraction grating the zero order principle maxima will be

(1) spectrum of colours (2) white

(3) One of the component colours (4) absent

11. The magnitude of electric field intensity such that an electron of charge e placed in it experiences a force equal to its weight is given by

(1) $\frac{e}{mg}$ (2) $\frac{mg}{e}$ (3) $\frac{m^2g^2}{e}$ (4) mge

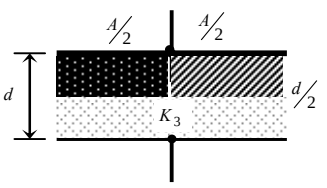
12. An electric dipole has a dipole moment p. The electric potential at a point P on the perpendicular bisector and at a distance d from the dipole is

(1) 0 (2) $\frac{P}{4\pi t_0 d^2}$ (3) $\frac{Pd}{4\pi t_0}$ (4) $\frac{3P}{4\pi t_0 d^2}$

13. n identical drops of mercury, each of radius r and carrying charge q combine to form a bigger drop of radius R. The ratio of the capacitance of the bigger drop to that of each of the smaller drop is

(1) $n:1$ (2) $\sqrt{n}:1$ (3) $\sqrt[3]{n}:1$ (4) $\sqrt[3]{n^2}:1$

14. A parallel plate capacitor of area A plate separation d a
capacitance C is filled with three different dielectric materi
having dielectric constants k_1, k_2 and k_3 as shown in the figu



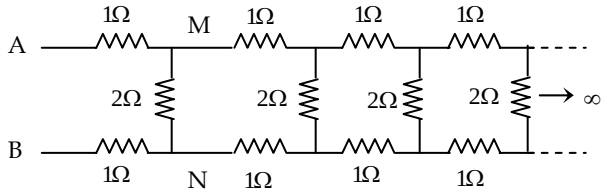
(each slab has thickness d/2). If single dielectric is used to fill in the capacitor to have the same capacitance C in this capacitor then dielectric constant k is given by

(1) $\frac{1}{k}=\frac{1}{k_1}+\frac{1}{k_2}+\frac{1}{k_3}$ (2) $\frac{1}{k}=\frac{1}{k_1+k_2}+\frac{1}{2k_3}$ (3) $k=\frac{k_1k_2}{k_1+k_2}+2k_3$ (4) $k=\frac{k_1k_3}{k_1+k_3}+\frac{k_2k_3}{k_2+k_3}$

15. The lengths and cross-sectional areas of four copper wires A,B,C and D are respectively $(l/2,2A),(2l,A/2),(2l,2A)$ and $(l/2,A/2)$. The wire which has the maximum resistance is

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

16. The effective resistance of the following infinite ladder network between the points A and B is

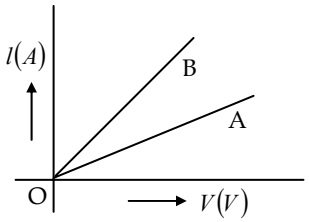


(1) 3.23Ω (2) 8.6Ω (3) 5.8Ω (4) 1.23Ω

17. The left gap of a metre bridge is open. A resistance of 5Ω is in the right gap. The balance point is obtained

(1) near the right end (2) near the left end (3) at the centre (4) no where

18. The $I-V$ graphs for two different electrical appliances A and B are as shown in the diagram. If R_A and R_B be the resistances of the devices then



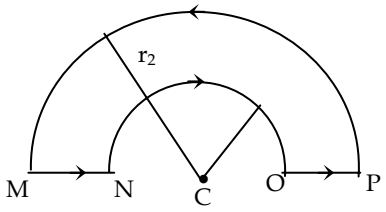
(1) $R_A=R_B$ (2) $R_A>R_B$

(3) $R_A<R_B$ (4) $R_AR_B=1$

19. A charged particle begins to move from the origin in a region which has a uniform magnetic field in the $x-$direction and a uniform electric field in the $y-$direction. Its speed is v when it reaches the point (x,y,z), v will depend

(1) only on x (2) only on y (3) on both x and y, but not z (4) on x,y and z

20. The wire loop $MNOPM$ is formed by connecting two semi-circular wires of radii r_1 and r_2 and two straight wires MN and OP as shown in the figure. The magnetic field at the centre C is (in T)



(1) $\frac{2\mu_0 I}{r_1 r_2}$ (2) $\frac{\mu_0 I}{2}\left(\frac{1}{r_1}+\frac{1}{r_2}\right)$ (3) $\frac{\mu_0 I}{4}\left(\frac{1}{r_1}+\frac{1}{r_2}\right)$ (4) $\frac{\mu_0 I}{4}\left(\frac{1}{r_1}-\frac{1}{r_2}\right)$

21. The shape of hysteresis loop does not depend on

(1) carbon content in the specimen (2) dimensions of the specimen

(3) degree of saturation (4) temperature

22. Through two parallel wire A and B, 10A and 2A of currents are passed respectively in opposite directions. If the wire A is infinitely long and the length of the wire B is 2m, the force on the conductor B, which is situated at 10cm from A, will be

(1) $8\times10^{-5}N$ (2) $4\times10^{-7}N$ (3) $4\times10^{-5}N$ (4) $4\pi\times10^{-7}N$

23. A zero to $20mA$ ammeter has a resistance of 20Ω. To convert this into a voltmeter of range of 10V, the resistance to be connected in series is

(1) $480\,\Omega$ (2) $850\,\Omega$ (3) $280\,\Omega$ (4) $380\,\Omega$

24. A rectangular coil of metallic wire is placed in a uniform field $20\,\mathrm{mT}$ with its plane perpendicular to the field. If area of loop is shrinking at a constant rate of $0.4\,\mathrm{m^2/sec}$. Find the induced e.m.f. in the coil is

(1) 8 mV (2) 15 mV (3) 0.5 mV (4) 20 mV

25. When an intense beam of while light is passed through a pure liquid which is completely free from suspended particles, the scattered light will appear

(1) white (2) blue (3) red (4) green

26. The ratio of e/m of a proton to that of an $\alpha-$ particle is:

(1) $1:5$ (2) $1:2$ (3) $1:\frac{1}{4}$ (4) $1:\frac{1}{2}$

27. Silver has a work function of $4.7\ eV$. When UV light of wavelength $100\ mm$ is incident upon it. A potential of $7.7\ V$ is required to stop the photo electrons from reaching the collector plate. How much potential is required to stop photo electrons when light of wavelength $200\ mm$ is incident upon silver?

(1) $1.5V$ (2) $2.35V$ (3) $3.85V$ (4) $15.4V$

28. If the electron in a hydrogen atom jumps from an orbit with level $n_i=3$ to an orbit with level $n_f=2$ the emitted radiation has a wavelength given by

(1) $\lambda=\frac{36}{5R_H}$ (2) $\lambda=\frac{5R_H}{36}$ (3) $\lambda=\frac{6}{R_H}$ (4) $\lambda=\frac{R_H}{6}$

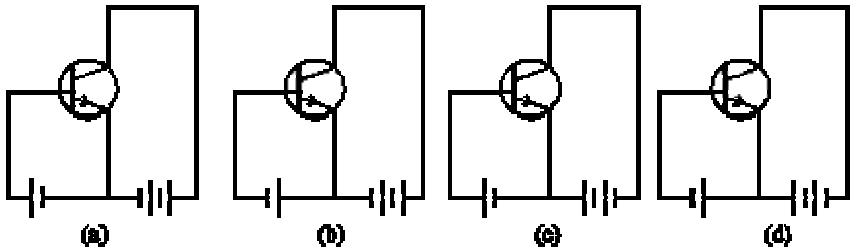
29. The binding energy per nucleon for $_1H^2$ and $_2He^4$ are $1.1\,MeV$ and $7.0\,MeV$ respectively. The energy released when two $_1H^2$ fuse to form $_2He^4$ is

(1) 5.9 (2) 11.8 (3) 2.36 (4) 23.6

30. Two radioactive substances A and B have half lives T and $2T$ respectively. Samples of A and B contain equal number of nuclei initially. After a time $4T$, the ratio of the number of undecayed nuclei of A to that of B is

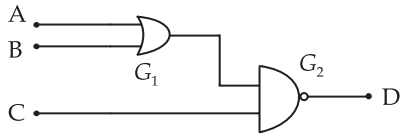
(1) $1:4$ (2) $1:2$ (3) $2:1$ (4) $4:1$

31. Which of the following circuits show the correct biasing of a npn transistor?



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

32. For the given combination of gates, if the logic states inputs A,B,C are as follows. $A=B=C=0$ and $A=B=1, C=0$ then the logic states of output D respectively are:



(1) 0,0 (2) 0,1 (3) 1,0 (4) 1,1

33. Which of the following is its own antiparticle?

(1) photon (2) electron (3) proton (4) π-meson

34. Pick out the correct statement from the following

(1) Gels are colloidal solutions in which the dispersed phase is a liquid while the dispersion medium is a solid

(2) Gels are hard transparent mass

(3) Foams are not colloidal systems (4) Syneresis is a property of foams

35. In Ramen spectrum spectral line having frequencies greater than incident frequencies are called

(1) Rayleigh lines (2) Strokes line (3) anti stokes lines (4) Compton lines

36. The following is not a characteristic of stimulated emission

(1) The induced photon propagates in the same direction as that of stimulating photon

(2) The induced photon has the same energy as that of the stimulating photon

(3) The process of stimulated emission is uncontrollable

(4) There is the multiplication of photons

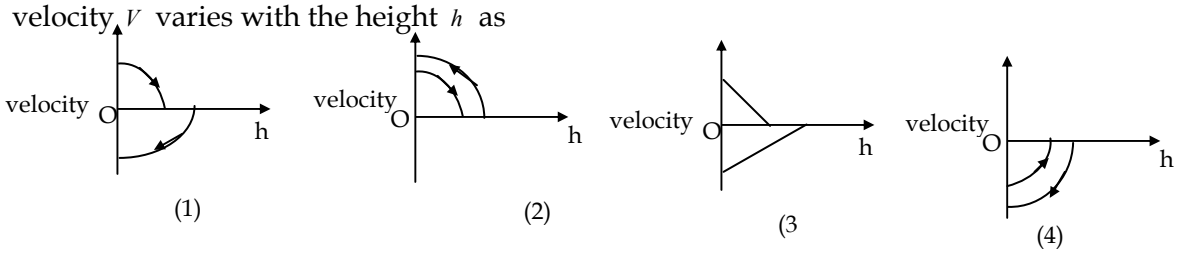
37. If the stationary proton and α - particle are accelerated through same potential difference, the ratio of de Broglie's wavelength will be

(1) 2 (2) 1 (3) $2\sqrt{2}$ (4) $\sqrt{2}$

38. The equation of state of some gases can be expressed as $\left(P+\frac{a}{V^2}\right)(V-b)=RT$, where the symbols have their usual meanings. The dimensions of a are

(1) $ML^{-1}T^{-2}$ (2) ML^5T^{-2} (3) L^6 (4) ML^6T^{-2}

39. A ball is dropped vertically from a height h above the ground. It hits the ground and bounces up vertically to a height $h/2$. Neglecting subsequent motion and air resistance, its velocity V varies with the height h as



(1) (2) (3 (4)

40. A ship is streaming towards north at a speed of 20 kmph for two hours and for next 3 hours moves towards north west with a speed 40 km/hr. The average speed of the ship is

(1) 30 km/hr (2) $20\sqrt{2}$ km/hr (3) 32 km/hr (4) $20\left(1+\sqrt{2}\right)$ km/hr

41. A ball hit with a velocity $25\,m/s$ at an angle 37° with the horizontal just clears a wall horizontally. The ratio of height of the wall to its distance from the projection point of the ball is

(1) $\frac{3}{4}$ (2) $\frac{3}{2}$ (3) $\frac{3}{8}$ (4) $\frac{3}{6}$

42. A plane is inclined at an angle θ with horizontal. A body of mass m rests on it. If the coefficient of friction is μ, then the minimum force that has to be applied parallel to the inclined plane to make the body just move up the inclined plane is

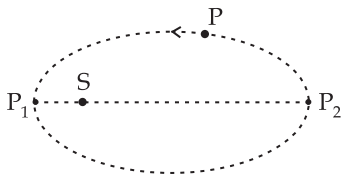
(1) $mg\sin\theta$ (2) $mg\sin\theta-\mu mg\cos\theta$

(3) $\mu mg\cos\theta-mg\sin\theta$ (4) $\mu mg\cos\theta+mg\sin\theta$

43. The percentage of kinetic energy transferred when a body of mass 'm' undergoes perfect elastic collision with another body of mass '$3m$' at rest is

(1) 25% (2) 75% (3) 70% (4) 30%

44. Elliptical orbit of a planet with the Sun at one focus is shown in the figure. Kinetic energy, potential energy, total energy and angular momentum of the planet about the sun are respectively represented by *K, W, E* and *L*. Identify the only wrong statement



(1) *L* and *E* are constants of the motion

(2) *K* is a maximum at P_1 and *W* is a maximum at P_2

(3) *K* and *W* are both a maximum at P_1 (4) *E* at any point of the orbit is negative

45. If a body moves with a constant speed in a circle

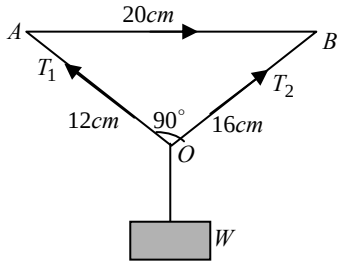
(1) no work is done on it (2) no force acts on it

(3) no acceleration is produced in it (4) its velocity remains constant

46. Liquid rises to a certain height in a capillary tube dipped in it. When a wire of radius smaller than that of the capillary tube is inserted coaxially into the tube, the height of the liquid column

(1) increases (2) decreases (3) remains the same (4) oscillates periodically

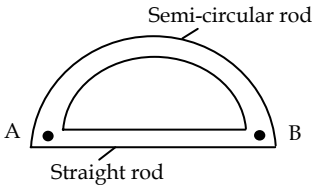
47. Three forces acting on a body and keeping it in equilibrium are as shown in the diagram. T_1 and T_2 are the tensions in the strings OA and OB and W is the weight of the body, we have



(1) $W = T_1 + T_2$ (2) $W = \sqrt{T_1^2 + T_2^2}$

(3) $W = \frac{T_1 T_2}{T_1 + T_2}$ (4) $W = \sqrt{T_1 T_2}$

48. Two rods (one semi-circular and other straight) of same material and of same cross-sectional area are joined as shown in Fig. The points A and B are maintained at different temperatures. The ratio of the heat transferred through a cross section of a semicircular rod to the heat transferred through a cross-section of the straight rod in a given time is



(1) 2 : 1 (2) $2 : \pi$ (3) $\pi : 2$ (4) 3 : 2

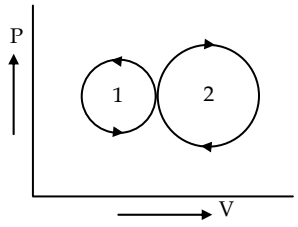
49. At $30^\circ C$, a lead bullet of $50g$, is fired vertically upwards with a speed of $840\ \text{m/s}$. The specific heat of lead is $0.02\ \text{cal/g}^\circ C$. On returning to the starting level, it strikes a cake of ice at $0^\circ C$.

The amount of ice melted is (Assume all the energy is spent in melting only & latent heat of fusion of ice is 80 cal/g)

(1) 62.7 g (2) 55 g (3) 52.675 g (4) 52.875 g

50. The internal energy of perfect gas is
(1) partly kinetic and partly potential (2) wholly potential
(3) wholly kinetic (4) depends on the ratio of two specific heats

51. In the indicator diagram, Fig. net amount of work done will be



(1) positive (2) zero
(3) infinity (4) negative

52. A particle in S.H.M. has a period of 4 s. It takes time t_1 to start from mean position and reach half the amplitude. In another case it takes a time t_2 to start from extreme position and reach half the amplitude.

(1) $\frac{t_1}{t_2}=1$ (2) $\frac{t_1}{t_2}=\frac{1}{2}$ (3) $\frac{t_1}{t_2}=2$ (4) $\frac{t_1}{t_2}=\frac{3}{2}$

53. A stretched wire is vibrating in the second overtone. In the wire there are
(1) two nodes and two antinodes (2) one node and two antinodes
(3) four nodes and three antinodes (4) three nodes and three antinodes

54. A source and listener are both moving towards each other with speed $\frac{V}{10}$ when V is the speed of sound. If the frequency of the note emitted by the source is f, the frequency heard by the listener would be nearly

(1) $1.11f$ (2) $1.22f$ (3) f (4) $1.27f$

55. In a progressive wave, which of the following physical quantity is transmitted?
(1) amplitude (2) velocity (3) frequency (4) energy

56. What magnitude was assigned by Hipparchus to the faintest star?
(1) 1 (2) 4 (3) 6 (4) 8

57. A point charge q with mass m is placed in between two fixed charges each of charge $2q$. The distance between the charges is $2d$. If the mass is displaced by a small distance along the line joining the two charges, it executes SHM with a time period of

(1) $2\pi\sqrt{\frac{\mathrm{md}^3}{8\,\mathrm{kq}^2}}$ (2) $2\pi\sqrt{\frac{8kq^2}{md^3}}$ (3) $2\pi\sqrt{\frac{3\,\mathrm{kq}^2}{md^3}}$ (4) $2\pi\sqrt{\frac{4kq^2}{md^3}}$

58. The dielectric strength of air is $3x10^6$ Vm^{-1}. A parallel plate capacitor has area 20 cm^2 and plate separation 0.1 mm. Find the maximum rms voltage of an AC source which can be connected ?

1) 210 V 2) 300 V 3) 435 V 4) 280 V

59. There is a stream of neutrons with a kinetic energy of 0.0327 eV. If the half life of neutron is 700 second, what fraction of neutrons will decay before they travel a distance of 10 m? Given mass of neutron = 1.675×10^{-27} kg.

(1) 3.96×10^{-2} (2) 3.96×10^{-3} (3) 3.96×10^{-6} (4) 3.96×10^{-8}

60. A student measured the diameter of a wire using a screw gauge with least count 0.001 cm and listed the measurements. The correct measurement is:

(1) 5.320 cm (2) 5.3 cm (3) 5.32 cm (4) 5.3200 cm