PHYSICS

1) If wavelengths of visible rays, microwaves and X-rays are λ_v, λ_m and λ_x respectively. Then out of the following which relation is correct one?

   (A) $\lambda_m > \lambda_v > \lambda_x$ (B) $\lambda_v > \lambda_m > \lambda_x$

   (C) $\lambda_m < \lambda_v < \lambda_x$ (D) $\lambda_v = \lambda_m = \lambda_x$

   ch-8 Theory

2) An object is placed at 10 cm in front of a concave mirror of focal length 15 cm. The image formed will be _____.

   (A) virtual, erect and magnified   (B) real, inverted and diminished

   (C) virtual, erect and diminished   (D) real, inverted and magnified

   Ch-9 theory

3) If in compound microscope objective with focal length 1.0 cm, eyepiece with focal length 2.0 cm, tube length of 20 cm and near point for an observer is 25 cm. Then value of magnification of compound microscope will be _____.

   (A) 2.5   (B) 250

   (C) 25   (D) 2500

   Ch-9
   $$m = \frac{L}{f_o} \times \frac{D}{f_e}$$

(Space for Rough Work)

4) Two thin convex lenses of focal length f_1 and f_2 are placed in contact with each other. The equivalent power of the lens combination is _____.

(A) $f_1 \times f_2$

(B) $\dfrac{f_1 + f_2}{f_1 \times f_2}$
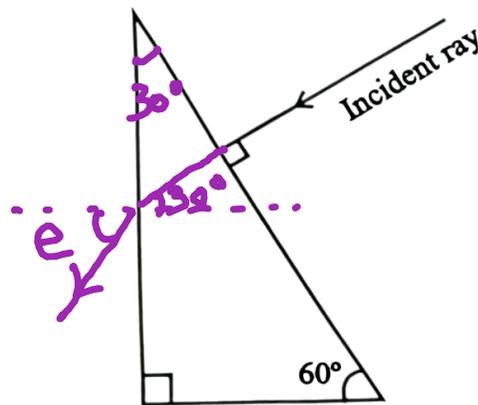
[handwritten: Ch-9 theory]

(C) $f_1 + f_2$

(D) $\dfrac{f_1 \times f_2}{f_1 + f_2}$

5) (A) **For general students :**
Find the value of angle of emergence for a emergent ray from the prism in the figure given below.

(refractive index of material of prism is $\sqrt{3}$ and refractive index of air is 1)

[handwritten: Ch·9 $\sqrt{3}\sin 30° = (1)\sin e$ ∴ $e = 60°$]

(A) 60°   (B) 45°
(C) 30°   (D) 90°

[handwritten: Ch-9 $D_m = A(n-1)$]

5) (B) **For blind students only :**
If the refractive index of a prism with small prism angle is 1.6 and angle of minimum deviation is 2.4. Then prism angle of prism is _____.

(A) 4°   (B) 3°
(C) 2°   (D) 6°

_____ (Space for Rough Work) _____

YJD72(05)   [4]

6) According to Huygens principle the phase difference between oscillations of any two particles on a same wave front is _____ rad.

(handwritten note: Ch-10 theory)

(A) $\dfrac{\pi}{2}$ (B) π

(C) 0   (D) 2π

7) In a Young's double slit experiment, the slits are separated by 0.2 mm and screen is placed 2.0 m away. The distance between the central bright fringe and the third bright fringe is measured to be 1.5 cm. Determine the wavelength of light used in the experiment.

(handwritten note: Ch-10 $x = \dfrac{n\lambda D}{d}$ (n=3 and λ=?))

(A) 4200 Å   (B) 5000 Å

(C) 4600 Å   (D) 6000 Å

8) In photoelectric effect the graph of stopping potential (V_0) versus frequency (v) is a straight line. The slope of this graph is _____.

(handwritten note: Ch-11 theory $V_0 = \dfrac{h}{e}v - \dfrac{\phi_0}{e}$ (y = mx + c))

(A) h (B) $\dfrac{e}{h}$

(C) $\dfrac{V_0}{e}$ (D) $\dfrac{h}{e}$

9) The photoelectric cut-off voltage in a certain experiment is 1.5 V. The maximum kinetic energy of photoelectrons emitted will be _____.

(handwritten note: Ch-11 $K = qV$)

(A) 1.5 J   (B) 1.5 eV

(C) 2.4 eV   (D) 2.4 J

(Space for Rough Work)

10) The relation between the wavelength of electromagnetic radiation (λ) and the de Broglie wavelength of its quantum (photon) (λ') is _____.

(A) $\lambda' > \lambda$ 　　　　　　　　　(B) $\lambda' = \lambda$

(C) $\lambda' < \lambda$ 　　　　　　　　　(D) $\lambda' = \dfrac{\lambda}{2}$

[Handwritten: Ch-11 Text Ex-11]

11) Out of the following physical quantities which quantity has the same unit as that of Planck's constant?

(A) moment of force 　　　　　　(B) power

(C) angular momentum 　　　　　(D) moment of inertia

[Handwritten: Ch-11 theory]

12) The ground state energy of hydrogen atom is −13.6 eV. What is the ratio of kinetic energy and potential energy of the electron of this state?

(A) $-\dfrac{1}{2}$ 　　　　　　　　　(B) $\dfrac{1}{2}$

(C) −1 　　　　　　　　　　　　(D) −2

[Handwritten: Ch-12　$K = \dfrac{Ke^2}{2n}$　$U = -\dfrac{Ke^2}{n}$]

13) The radius of the innermost electron orbit of a hydrogen atom is $5.3 \times 10^{-11} m$. What is the radius of the $n = 3$ orbit?

(A) $1.59 \times 10^{-10}\, m$ 　　　　　(B) $1.06 \times 10^{-10}\, m$

(C) $1.43 \times 10^{-9}\, m$ 　　　　　(D) $4.77 \times 10^{-10}\, m$

[Handwritten: Ch-12　$r_n = n^2 r_1$　(n=3)]

(Space for Rough Work)

YJD72(05)

[6]

14) The energy equivalent of 1.0 kg of substance is _____.

(A) 9×10^{13} J

(B) 3×10^{13} J

(C) 9×10^{16} J

(D) 9×10^{18} J

Ch-13
E = mc²

15) The nuclear radius of hydrogen atom will be _____.

(A) 1.5 fm

(B) 1.2 fm

(C) 2.3 fm

(D) 3.2 fm

Ch-13
R = R₀A^{1/3}
(A = 1)

16) The nuclides of $^{197}_{79}$Au and $^{198}_{80}$Hg are called _____ of each other.

(A) isotopes

(B) isotones

(C) isobars

(D) isomers

Ch-13
theory

17) When a forward bias is applied to a p-n junction. It _____

(A) raises the potential barrier

(B) lowers the potential barrier

(C) reduces the majority carrier current to zero

(D) none of the above

Ch-14
theory

(Space for Rough Work)

18) If the output frequency of a full-wave rectifier is 100 Hz, then input frequency will be _____.

(A) 50 Hz

(B) 200 Hz

(C) 100 Hz

(D) 25 Hz

Chap-14 theory

19) Out of the following impurities, which impurity is not a trivalent?

(A) Aluminium (Al)

(B) Antimony (Sb)

(C) Indium (In)

(D) Boron (B)

Ch-14 theory

20) A proton and a α-particle are placed in uniform electric field. Accelerations produced in them are a_p and a_α respectively. Then $a_p : a_\alpha$ will be _____

(A) 1 : 2

(B) 4 : 1

(C) 2 : 1

(D) 1 : 4

Ch-1
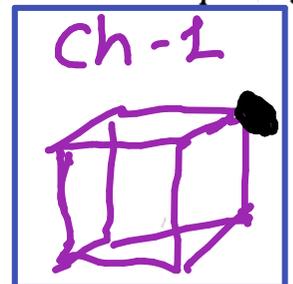$a = \dfrac{qE}{m}$
$m_\alpha = 4m_p$, $q_\alpha = 2q_p$

21) If charge q is placed on one of the vertex of a cube, then total electric flux passing through the cube is _____.

(A) $\dfrac{q}{\varepsilon_0}$

(B) $\dfrac{q}{8\varepsilon_0}$

(C) $\dfrac{q}{4\varepsilon_0}$

(D) $\dfrac{q}{24\varepsilon_0}$
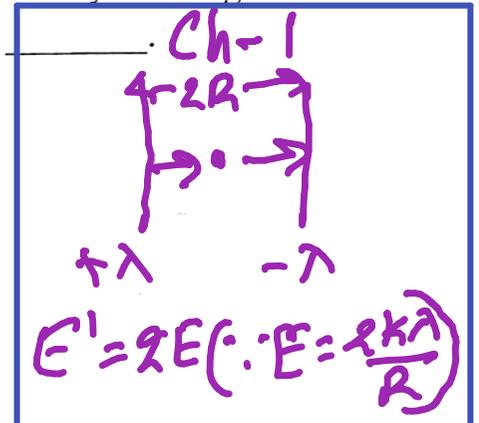
Ch-1

(Space for Rough Work)

YJD72(05)

22) Two infinitely long thin straight parallel wires are kept a perpendicular distance of 2R having uniform linear charge densities $+\lambda$ and $-\lambda$ respectively. The magnitude of electric field at a mid point between two wires will be _____.

(A) $\dfrac{\lambda}{\pi\varepsilon_0 R}$

(B) $\dfrac{\lambda}{2\pi\varepsilon_0 R}$

(C) $\dfrac{2\lambda}{\pi\varepsilon_0 R}$

(D) $\dfrac{\lambda}{4\pi\varepsilon_0 R}$

Handwritten note: Ch-1
$\leftarrow 2R \rightarrow$
$+\lambda \qquad -\lambda$
$E' = 2E \left(\because E = \dfrac{2k\lambda}{R} \right)$

23) A parallel plate capacitor with air between the plates has a capacitance of 1.0 pF. If the distance between the plates is made doubled and space between them is filled with dielectric substance, the capacitance becomes 2.0 pF. Then the value of dielectric constant of dielectric substance is _____.

(A) 1.5

(B) 3.0

(C) 2.0

(D) 4.0

Handwritten note: Ch-2
$C' = \dfrac{K\varepsilon_0 A}{2d}$
$C = \dfrac{\varepsilon_0 A}{d}$

24) The total charge on a uniformly charged spherical shell having radius R is Q. Then electric potential at a distance $r = \dfrac{R}{2}$ from the centre of the shell _____.

(A) $\dfrac{Q}{4\pi\varepsilon_0 R}$

(B) $\dfrac{Q}{\pi\varepsilon_0 R}$

(C) $\dfrac{Q}{2\pi\varepsilon_0 R}$

(D) $\dfrac{Q}{8\pi\varepsilon_0 R}$

Handwritten note: Ch-2
$V_{in} = V_{surface}$
$= \dfrac{KQ}{R}$

(Space for Rough Work)
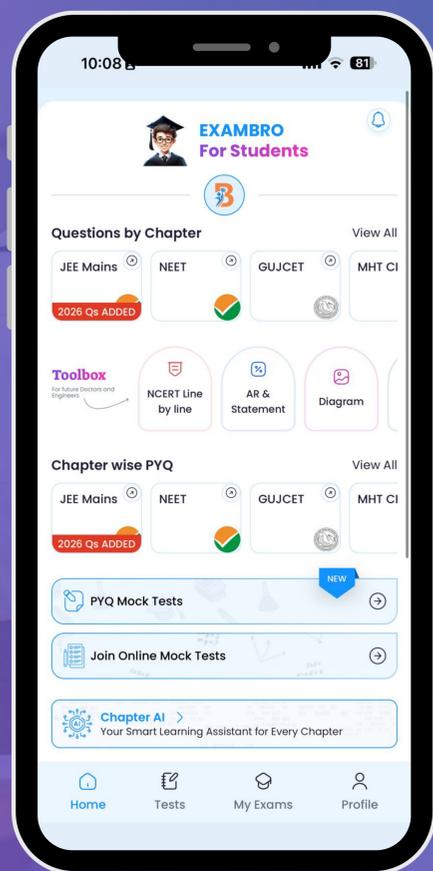
25) An electric dipole of dipole moment $\vec{P}$ is placed parallel to the uniform electric field of intensity $\vec{E}$. On rotating it through angle of 90° from this situation, the amount of work done is _____.

Ch-2

$$W = PE(\cos\theta_1 - \cos\theta_2)$$

(A) 2PE

(B) $\dfrac{PE}{2}$

(C) PE

(D) Zero

26) A metal rod of length 10 cm and a rectangular cross section of $1\,cm \times \dfrac{1}{2}\,cm$ is connected to a battery across opposite faces. The resistance will be _____.

Ch-3

$$R = \dfrac{\rho l}{A}$$
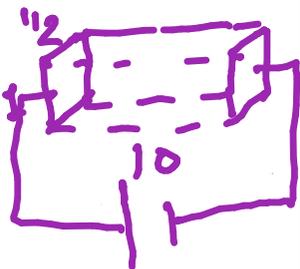
(A) Maximum when the battery is connected across $1\,cm \times \dfrac{1}{2}\,cm$ faces.

(B) Maximum when the battery is connected across $10\,cm \times \dfrac{1}{2}\,cm$ faces.

(C) Maximum when the battery is connected across 10 cm × 1 cm faces.
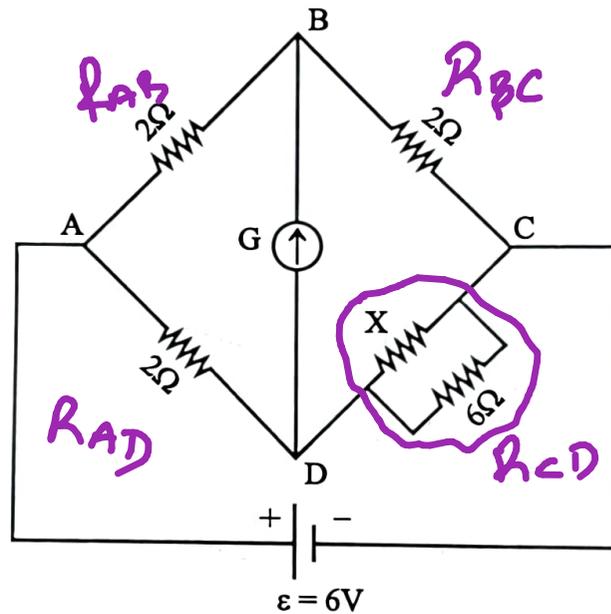
(D) Same irrespective of the three faces.

(Space for Rough Work)

YJD72(05)

[10]

27) The emf of a storage battery of a car is 6.0 V. If internal resistance of the battery is 0.2 Ω, then maximum power drawn from the battery is _____ W.

(A) 2.4   (B) 180

(C) 15   (D) Zero

(handwritten note: ch-3 $P = \dfrac{\varepsilon^2}{R}$)

28) (A) For general students :

ε = 6V

(handwritten notes: ch-3 $\dfrac{R_{AB}}{R_{AD}} = \dfrac{R_{BC}}{R_{CD}}$ $R_{CD} = \dfrac{6x}{6+x}$)

The Wheatstone bridge is in balanced condition in the given figure, then
X = _____.

(A) 12Ω   (B) 4Ω

(C) 6Ω   (D) 3Ω

28) (B) For blind students only :

On increasing the temperature of a conductor, for free electrons _____ increases.

(A) drift velocity   (B) mobility

(C) relaxation time   (D) thermal speed

(handwritten note: Ch-3 Theory)

(Space for Rough Work)

29) In the moving coil galvanometer, if number of turns in the coil is doubled, then the current sensitivity _____ and the voltage sensitivity _____.
   (A) remains unchanged, will be doubled
   (B) will be halved, will be doubled
   (C) will be doubled, remains unchanged
   (D) will be halved, remains unchanged

*[Handwritten note: ch-4
$S_I = \dfrac{NAB}{k}$
$S_V = \dfrac{NAB}{kR}$ ($\because R \propto N$)]*

30) A horizontal overhead power line carries a current of 90A in east to west direction. What is the magnitude and direction of the magnetic field due to the current 1.5m above the line?

   (A) 1.2×10^{-5} T, towards north   (B) $1.2\pi \times 10^{-5}$ T, towards north

   (C) 1.2×10^{-5} T, towards south   (D) $1.2\pi \times 10^{-5}$ T, towards south

*[Handwritten note: Ch-4
$B = \dfrac{\mu_0 I}{2\pi R}$
and Right hand Rule]*

31) A charged particle having charge q is moving perpendicularly to the uniform magnetic field with linear speed v on a circular path of radius R. The periodic time of revolution of a particle _____.

   (A) depends on v but does not depend on R.

   (B) do not depend on v and R both.

   (C) depends on R but does not depend on v.

   (D) depend on v and R both.

*[Handwritten note: Ch-4
$T = \dfrac{2\pi m}{qB}$]*

(Space for Rough Work)

YJD72(05)   [12]

32) A closely wound solenoid of 800 turns and area of cross section $2.5 \times 10^{-4}\,\text{m}^2$ carries a current of 3.0A. The magnetic moment associated with it is _____.

(A) 60 JT^{-1}

(B) 0.60 JT^{-1}

(C) 6 JT^{-1}

(D) 0.06 JT^{-1}

[Handwritten note: Ch-5 m = NIA]

33) The magnetic susceptibility χ for superconductors is _____.

(A) Zero

(B) 1

(C) 0.1

(D) −1

[Handwritten note: Ch-5 theory]

34) Two concentric circular coils, one of small radius r_1 and the other of large radius r_2, such that $r_1 \ll r_2$ are placed co-axially with centres coinciding. The mutual inductance M of the arrangement is proportional to _____.

(A) $\dfrac{r_1}{r_2^2}$

(B) $\dfrac{r_2}{r_1^2}$

(C) $\dfrac{r_1^2}{r_2}$

(D) $\dfrac{r_2^2}{r_1}$

[Handwritten note: Ch-6 $M = \dfrac{\mu_0 \pi r_1^2}{2 r_2}$]

(Space for Rough Work)

YJD72(05) [13] (P.T.O.)

35) The dimensional formula of $\dfrac{B^2}{2\mu_0}$ is _____.

(A) $M^1 L^{-1} T^{-2}$

(B) $M^0 L^{-1} T^{-2}$

(C) $M^1 L^2 T^{-2}$

(D) $M^1 L^1 T^{-2}$

[Handwritten note: Ch-6 theory]

36) A coil has N turns and current passes through it is I ampere then we obtain L Henry of self inductance. Now if current is made doubled then new self inductance will be _____ H.

(A) $\dfrac{L}{2}$

(B) 2L

(C) L

(D) 4L

[Handwritten note: Ch-6 $L = \dfrac{\mu_0 N^2 A}{\ell}$ doesn't depend on current]

37) A 15.0 μF capacitor is connected to a 220 V, 50 Hz source. Then capacitive reactance of the circuit is _____ Ω.

(A) 2.12

(B) 212

(C) 21.2

(D) 2120

[Handwritten note: Ch-7 $X_c = \dfrac{1}{\omega C}$]

(Space for Rough Work)

YJD72(05)   [14]

38) A charged 30 µF capacitor is connected to a 27 mH inductor. What is the angular frequency of free oscillations of the circuit?

(A) $11\dfrac{rad}{s}$

(B) $1100\dfrac{rad}{s}$

(C) $110\dfrac{rad}{s}$

(D) $11000\dfrac{rad}{s}$

Ch-7

$\omega = \dfrac{1}{\sqrt{LC}}$

39) In an ideal step up transformer, the number of turns in primary coil and secondary coil are 100 and 200 respectively. If output current is found to be 5A, then input current will be _____.

(A) 2.5 A

(B) 100 A

(C) 5.0 A

(D) 10 A

Ch-7

$\dfrac{N_s}{N_p} = \dfrac{i_p}{i_s}$

$\therefore i_p = 10A$

40) A charged particle oscillates about its mean equilibrium position with a frequency of 8×10^9 Hz. What is the frequency of the electromagnetic waves produced by the oscillator?

(A) 4×10^9 Hz

(B) 1.6×10^{10} Hz

(C) 8×10^9 Hz

(D) 2×10^9 Hz

Ch-8 Theory

(Space for Rough Work)

(P.T.O.)