CAREER POINT

NEET Exam. 2018 (6th May 2018)

(Paper & Solution)

Code – PP

Q.1 An em wave is propagating in a medium with a velocity $\vec{V} = V\hat{i}$. The instantaneous oscillating electric field of this em wave is along +y axis. Then the direction of oscillating magnetic field of the em wave will be along

(1) –z direction (2) +z direction (3) – y direction (4) – x direction

Students may find similar question in CP exercise sheet :

[Chapter : EMW, Exercise # 1, Page 258, Q.1]

Ans. **[2]**

Sol. Propagation $= +\hat{i}$

$\vec{E} = +\hat{j}$

$\hat{V} = \hat{E} \times \hat{B}$

$\hat{i} = \hat{j} \times \hat{B}$

$\vec{B} = +\hat{k}$

Q.2 The refractive index of the material of a prism is $\sqrt{2}$ and the angle of the prism is 30°. One of the two refracting surfaces of the prism is made a mirror inwards, by silver coating. A beam of monochromatic light entering the prism from the other face will retrace its path (after reflection from the silvered surface) if its angle of incidence on the prism is -

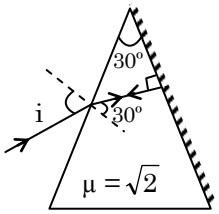
(1) 60° (2) 45° (3) 30° (4) zero

Students may find similar question in CP exercise sheet :

[Chapter : Ray Optics, Exercise # 2, Q.231]

Ans. **[2]**

Sol.



$1.\sin i = \sqrt{2}\sin 30^\circ$

$\sin i = \sqrt{2} \times \frac{1}{2}$

$\sin i = \frac{1}{\sqrt{2}} = \sin 45^\circ$

$\Rightarrow i = 45^\circ$

Q.3 The magnetic potential energy stored in a certain inductor is 25 mJ, when the current in the inductor is 60 mA. This inductor is of inductance

(1) 0.138 H (2) 138.88 H (3) 1.389 H (4) 13.89 H

Students may find similar question in CP exercise sheet :

[Module – 4(B), Page 116]

Ans. **[4]**

Sol. $\frac{1}{2}Li^2 = 25 \times 10^{-3}$

$L = \frac{2\times 25\times 10^{-3}}{(60\times 10^{-3})^2}$

$= \frac{50\times 10^{-3}}{36\times 10^{-4}} = \frac{500}{36}$

$= 13.89$ H

Q.4 An object is placed at a distance of 40 cm from a concave mirror of focal length 15 cm. If the object is displaced through of distance of 20 cm towards the mirror, the displacement of the image will be

(1) 30 cm away from the mirror (2) 36 cm away from the mirror

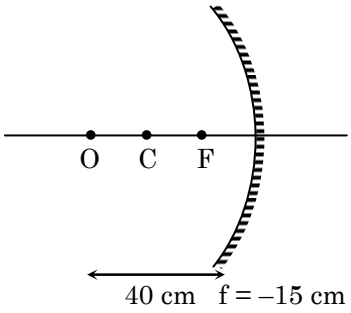
(3) 30 cm towards the mirror (4) 36 cm towards the mirror

Students may find similar question in CP exercise sheet :

[Class Notes]

Ans. **[2]**

Sol.



$$\frac{1}{v}+\frac{1}{u}=\frac{1}{f}$$

$$\frac{1}{v}+\frac{1}{-40}=\frac{1}{-15}$$

$$\frac{1}{v}=\frac{1}{40}-\frac{1}{15}$$

$$\frac{1}{v}=\frac{-25}{40\times15}$$

$$v=\frac{-120}{5}$$

$v = -24$ cm

when it is displaced by 20 cm

then $u = -20$ cm

$$\therefore \frac{1}{v}+\frac{1}{u}=\frac{1}{f}$$

$$\frac{1}{v}-\frac{1}{20}=\frac{1}{-15}$$

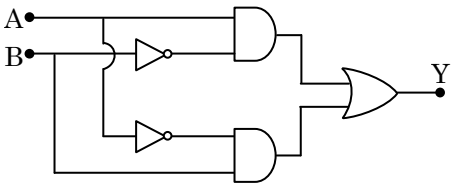
$$\frac{1}{v}=\frac{1}{20}-\frac{1}{15}$$

$$\frac{1}{v}=\frac{-5}{20\times15}$$

$v = -60$ cm

$\therefore$ displacement of image will be = 60 – 24 = 36 cm away from the mirror

Q.5 In the combination of the following gates the output Y can be written in terms of inputs A and B as

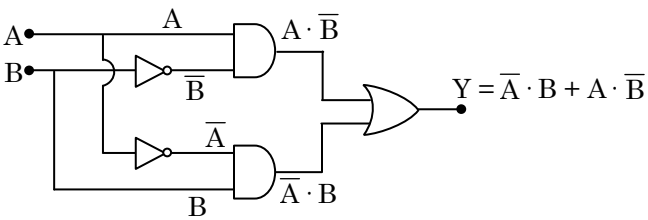


(1) $\overline{A\cdot B}$ (2) $A\cdot\overline{B}+\overline{A}\cdot B$ (3) $\overline{A\cdot B}+A\cdot B$ (4) $\overline{A+B}$

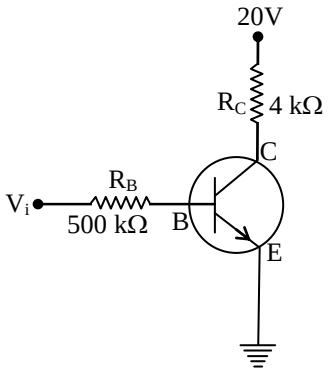
Students may find similar question in CP exercise sheet :
[Module -6, Page 197, Q.49]

Ans. **[2]**

Sol.



Q.6 In the circuit shown in the figure, the input voltage V_i is 20 V, V_{BE} = 0 and V_{CE} = 0. The values of I_B, I_C and β are given by



(1) I_B = 40 μA, I_C = 10 mA, β = 250 (2) I_B = 25 μA, I_C = 5 mA, β = 200

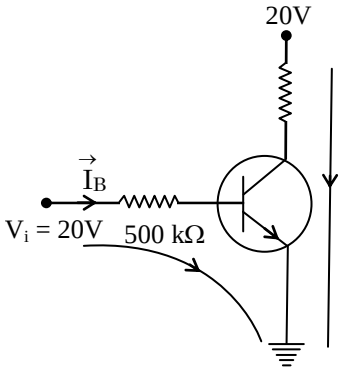
(3) I_B = 20 μA, I_C = 5 mA, β = 250 (4) I_B = 40 μA, I_C = 5 mA, β = 125

Students may find similar question in CP exercise sheet :

[Chapter : Electronics, Exercise # 3B, Page 216, Q.84]

Ans. **[4]**

Sol.



Applying KVL at input side

$20 - I_B.500 \times 10^3 - V_{BE} = 0$

$\Rightarrow I_B = \dfrac{20}{5\times10^5} = 4 \times 10^{-5}$

$\boxed{I_B = 40\mu A}$

Applying KVL at output side

$20 - 4 \times 10^3\, I_C - V_{CE} = 0$

$\Rightarrow I_C = \dfrac{20}{4\times10^3}$

$\boxed{I_C = 5mA}$

$\beta = \dfrac{I_C}{I_B} = \dfrac{5\times10^{-3}}{40\times10^{-6}} = \dfrac{5000}{40} = 125$

Q.7 In a p-n junction diode, change in temperature due to heating
(1) affects only reverse resistance
(2) affects only forward resistance
(3) does not affect resistance of p-n junction
(4) affects the overall V – I characteristics of p-n junction

Students may find similar question in CP exercise sheet :
[Module-6; Chapter : Electronics, Page 173-174]

Ans. **[4]**

Sol. Due to temperature resistance changes
$I = I_0(e^{qv/kT} - 1)$

Q.8 A small sphere of radius 'r' falls from rest in a viscous liquid. As a result, heat is produced due to viscous force. The rate of production of heat when the sphere attains its terminal velocity, is proportional to -
(1) r^3 (2) r^2 (3) r^5 (4) r^4

Students may find similar question in CP exercise sheet :
[Class Notes]

Ans. **[3]**

Sol. $\frac{d(Heat)}{dt}$ = Power by viscous force

$= -6\pi\eta rv.v$

$= -6\pi\eta r[v^2]$ $\quad (v \propto r^2)$

$\frac{d(Heat)}{dt} \propto r^5$

Q.9 A sample of 0.1 g of water at 100°C and normal pressure (1.013×10^5 Nm^{-2}) requires 54 cal of heat energy to convert to steam at 100°C. If the volume of the steam produced is 167.1 cc, the change in internal energy of the sample, is
(1) 104.3 J (2) 208.7 J (3) 42.2 J (4) 84.5 J

Students may find similar question in CP exercise sheet :
[Class Notes]

Ans. **[2]**

Sol. $m = 0.1$ gm $\qquad V_1 = \frac{m}{\rho} = \frac{0.1}{1} = 0.1$ cc

$T = 100°C$

$P = 1.013 \times 10^5$ N/m^2

Heat = 54 cal= $54 \times 4.18 = 225.72$ Joule

Work done against atmospheric pressure $W = P\Delta V$

$= 1.013 \times 10^5 (V_2 - V_1)$

$= 1.013 \times 10^5 [167.1 - 0.1]$

$= 1.013 \times 10^5 \times 167 \times 10^{-6}$

$= 169.171 \times 10^5 \times 10^{-6}$

$= 16.91$ J

$\therefore$ Change in internal energy = H – W

$= 225.72 - 16.91$

$= 208.7$ J

Q.10 Two wires are made of the same material and have the same volume. The first wire has cross-sectional area A and the second wire has cross-sectional area 3A. If the length of the first wire is increased by Δl on applying a force F, how much force is needed to stretch the second wire by the same amount ?

(1) 9 F (2) 6 F (3) 4 F (4) F

Students may find similar question in CP exercise sheet :
[Chapter : Properties of Matter, Exercise # 1B, Q.42]

Ans. **[1]**

Sol. $Y = \frac{F/A}{\Delta\ell/\ell}$

$\frac{\Delta\ell}{\ell} = \frac{F}{AY}$

$\Delta\ell = \frac{F}{AY}\ell$

$\Delta\ell_1 = \Delta\ell_2$

$\frac{F\ell_1}{AY} = \frac{F'\ell_2}{3AY}$

$V = A\ell$

$\frac{FV}{A^2Y} = \frac{F'V}{9A^2Y}$

$F' = 9\ F$

Q.11 The power radiated by a black body is P and it radiates maximum energy at wavelength, λ_0. If the temperature of the black body is now changed so that it radiates maximum energy at wavelength $\frac{3}{4}\lambda_0$, the power radiated by it becomes nP. The value of n is

(1) $\frac{3}{4}$ (2) $\frac{4}{3}$ (3) $\frac{256}{81}$ (4) $\frac{81}{256}$

Students may find similar question in CP exercise sheet :
[Class Notes]

Ans. **[3]**

Sol. $\frac{dQ}{dt} = U = e\sigma AT^4$

$\Rightarrow U \propto T^4$ ..... (1)

and from wein's displacement law

$\lambda T = b$

$T \propto \frac{1}{\lambda}$ ..... (2)

from (1) and (2)