DIRECTORATE OF SCHOOL EDUCATION
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12JPCM01 (2023-24)	JEE PRACTICE QUESTIONS (TEST-1)	Class : XII Time : 1.15 hrs Total Marks : 180

Answer key

12TH - Physics

1. **Ans : D**

   $q_1 = +6\mu c$, $q_2 = +q\mu c$ $\quad r = d$

   $F \times q_1 q_2 \rightarrow F \times 6 \times 10^{-6} \times 9 \times 10^{-6}$

   $F^1 \times q_1^1 q_2^1 \quad \rightarrow F^1 \times 3 \times 10^{-6} \times 6 \times 10^{-6}$

   $$\frac{F^1}{F} = \frac{18 \times \cancel{10^{-12}}}{54 \times \cancel{10^{-12}}} = \frac{1}{3}$$

   $$F^1 = \frac{F}{3}$$

2. **Ans : B**

   $n = 10^{19}$

   $e = 1.6 \times 10^{-19} c$

   $q = nc = 10^9 \times 1.6 \times 10^{-19}$

   $q = +1.6\ c$

3. **Ans : D**

   $q = 10^{10}$

   $e = 1.6 \times 10^{-19}\ c$

   $q = 1c$

   $$\frac{q}{t} = 10^{10} \times 1.6 \times 10^{-19}$$

$$\frac{1}{t} = 1.6 \times 10^{-9}$$

$$t = \frac{10^9}{1.6} = \frac{10^{10}}{1.6} \text{sec}$$

$$t = \frac{10^{10}}{16 \times 3600 \times 24 \times 3652.5} \text{ years}$$

t = 20 years

4. Ans : A

Let the separation be r

$$F = \frac{k.q(Q-q)}{r^2}$$

For maximum force $\frac{dF}{dq} = 0$

$$\frac{dF}{dq} = \frac{f}{dF}\frac{(kq(Q-q)}{r^2} = \frac{k}{d^2}(Q-2q)$$

$$\frac{k}{d^2}(Q-2q) = 0$$

Q – 2q = 0

Q = 2q

$$\frac{Q}{q} = 2$$

5. Ans : (4)

For equilibrium $F_A = F_3$

$$\frac{KQ^2}{(2n)^2} + \frac{kQq}{n^2} = 0$$

$$\frac{kqQ}{n^2} = \frac{kQ^2}{4n^2}$$

$$q = \frac{Q}{4}c$$

6. Ans : C

$$E = \frac{1}{4\pi E_0}\frac{nc}{r^2}$$

$$n = \frac{Er^2 4\pi E_o}{e}$$

$$n = \frac{0.036 \times 0.1 \times 0.1}{9 \times 10^9 \times 1.6 \times 10^{-19}}$$

n = 2.5×10^5 N/c

7. Ans : A

Electric field inside the shell is Zero.

8. Ans : A

In quaitrium

QE = mg $\rightarrow$ NeE = mg

$$n = \frac{mg}{eE}$$

$$n = \frac{9.6 \times 10^{-16} \times 10}{20000 \times 16 \times 10^{-19}}$$

n = 3

Ans: 4.8×10^{-19}c, 3

9. Ans : B

$$L = h^a c^b G^c$$

$$M^2 L^1 T^0 (M^1 L^2 T^{-1})^a \quad (LT^{-1})^b \ (M^{-1}L^3T^{-2})$$

a = 1/2, b = $-3/2$, c= 1/2

$$L = \frac{\sqrt{hG}}{c^{3/2}}$$

10. Ans : C

Momentum = MLT^{-2}

Plank constant = ML^2T^{-1}

11. Ans : B

T – 2.5C $\quad \Delta T$ = 21S

$$\frac{\Delta T}{T} \times 100 = \frac{21}{2.5} \times 100 = 20\%$$

12. Ans : C

$x - at - bt^2$

$x = bt^2$

$b = x/t^2 = Km/S^2 = KmS^{-2}$

13. Ans : D

Dimensions of $\frac{e^2}{4\pi \in o} = F \times d^2 = ML^3T^{-2}$

$$l \propto \left(\frac{C^2}{4\pi Eo}\right)^a G^b C^c$$

$$L^1 = (ML^3T^{-2})^a (M^{-1}L^3T^{-2})^b (LT^{-1})^c$$

On solving $a = 1/2\ b = 1/2\ c = -2$

$$l = 1/c^2 \left[\frac{Ge^2}{4\pi Eo}\right]^{1/2}$$

14. Ans : C

$$\frac{\Delta y}{y} = \frac{2\Delta m}{m} + \frac{4\Delta r}{r} + \frac{x\Delta g}{g} + 3/2\,\frac{\Delta l}{l}$$

$18 = 2 \times 1 + 4 \times 0.5 + xp + 3/2\ (4)$

$8 = xp$

From option

$$x = 16/3\ P = \pm 3/2$$

15. Ans : C

Dimension of work and Torquc ML^2T^{-2}

12th – CHEMISTRY

16. Ans : B

$[R_n]^{86}\ 5f^{14}\ 6d^{10}\ 7s^2\ 7p^2$ belongs to carbon family

17. Ans : B

Option (i) and option (ii)

18. Ans : A

Amongst isoelectronic species, smaller the positive charge on the cation smaller is the ionic radius.

19. Ans : A

[Ne] $3s^2$ $3p^3$ 5^{th} group

Ionisation energy increases in a period and decreases in group.

20. Ans : D

CaO is basic oxide

B_2O_3 , BeO amphoteric

SiO_2 acide

21. Ans : B

$Ca^{2+} < K^+ < Ar < Cl^- < S^{2-}$

	Ca^{2+}	K^+	Ar	Cl^-	S^{2-}
Atomic number	20	19	18	17	16
Charge of nucleus	20p	19p	18p	16p	17p
Number of electrons	$18e^-$	$18e^-$	$18e^-$	$18e^-$	$18e^-$

22. Ans : A

5^{th} group

23. Ans : B

24. Ans : C

25. Ans : A

26. Ans : B

$H_2N - NH_2$, $OH^{\ominus}$

wolff kishner reduction is prepared by over clemmenson reduction to avoid reduction of phenolic OH group simultaneously.

27. Ans : D

28. Ans : D

PCC mild oxidizing agent

29. Ans : A

30. Ans C

12th – MATHS

31. $|z_o - z_2| = \dfrac{1}{|z_o - z_1|}$

$= \dfrac{1}{\left|\dfrac{i-1}{2}\right|}$

$= \dfrac{2}{\sqrt{2}}$

$|z_o - z_2|\sqrt{2} \Rightarrow z_2$ Liss on the circle $|z_o - z_2|\sqrt{2}$

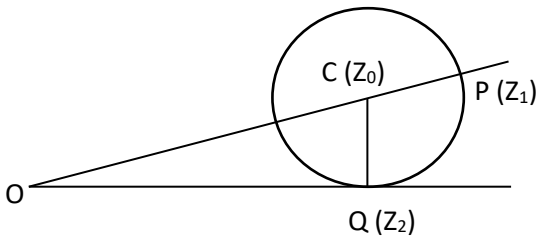
$OQ^2 = oc^2 - cp^2$

$= \dfrac{10}{4} - 2$

$z_o - z_2 = \dfrac{1+3i}{2} - 1 - i$

$= \dfrac{1+3i-2-2i}{2}$

$z_0 - z_1 = \dfrac{i-1}{2}$



$= \frac{1}{2}$

$\therefore 4|z|^2 = 4 \times \frac{1}{2} = 2$

Ans : B

32. $|z-1| = |z+i|$

$|(x-1)+iy| = |x+i(y+1)|$

$(x-1)^2 + y^2 = x^2 + (y+1)^2$

$x^2 - 2x + 1 + y^2 = x^2 + y^2 + 2y + 1$

$2x + 2y = 0$

$x+y = 0$, which is a line through the origin

Ans : C

33. $\frac{2z+zi}{2z-i} + \frac{2\bar{z}-2i}{2\bar{z}+i} = 0$

$(z+i)(2\bar{z}+i) + (\bar{z}-i)(2z-i) = 0$

$2z\bar{z} + zi + iz\bar{z} - 1 + 2z\bar{z} - i\bar{z} - i2z - 1 = 0$

$4z\bar{z} + i\bar{z} - iz - 2 = 0$

$4(x^2+y^2) + i(x-iy) - i(x+iy) - 2 = 0$

$4x^2 + 4y^2 + ix + y - ix + y - 2 = 0$

$4x^2 + 4y^2 + 2y - 2 = 0$

$2x^2 + 2y^2 + y - 1 = 0$

$-2y + 2y^2 + y - 1 = 0$ $\quad (\because x^2 = -y)$

$2y^2 - y - 1 = 0$

$\Rightarrow y = 1, -1/2$

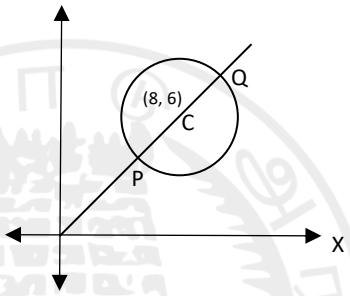
Take $y = -1/2 \quad \because y < o$

$\Rightarrow x^2 = \frac{1}{2}$

$$x^2 + y^2 + 1 = \frac{1}{2} + \frac{1}{4} + 1 = \frac{7}{4}$$

Ans : A

34. Maximum value of



$|Z| = oQ = oc + cQ = 10 + 2 = 12$

Minimum value of

$|Z| = op = oc - cp = 10 - 2 = 8$

Ans : C

35. $Let -\theta = \arg Z < 0$

$Z = r[\cos(-\theta) + iSin(-\theta)]$

$Z = r[\cos\theta - iSin\theta]$

$-Z = r[-\cos\theta - iSin\theta]$

$-Z = r[\cos(\pi - \theta) + iSin(\pi - \theta)]$

arg (-Z) = $\pi - \theta$

Ans : A

36. $\left|\frac{Z_1 - 2Z_2}{2 - Z_1\overline{Z_2}}\right|^2 = 1^2$

$(Z_1 - 2Z_2)\ (\overline{Z}_1 - 2\overline{Z}_2) = (2 - Z_1\overline{Z_2})(2 - \overline{Z_1}Z_2)$

$Z_1\overline{Z}_1 - 2Z_1\overline{Z}_2 - 2\overline{Z}_1Z_2 + 4Z_2\overline{Z_2} = 4 - 2\overline{Z_1}Z_2 - 2Z_1Z_2 + 2_1\overline{Z}_1 2_2\overline{Z_2}$

$|Z_1|^2 + 4|Z_2|^2 = 4 + |2_1|^2 |Z_2|^2$

$|Z_1|^2 + 4|Z_2|^2 - 4 - |Z_1|^2 |Z_2|^2 = 0$

$|Z_1|^2 (-1|Z_2|^2) - 4\,(1 - |Z_2|^2) = 0$

$(1 - |Z_2|^2)\,(|Z_1|^2 - 4) = 0$

$1 - |Z_2|^2 = 0 \quad (or)\ |Z_1|^2 - 4 = 0$

$|Z_2| = 1 \qquad or\ |Z_1| = 2$

$\Rightarrow |Z_1| = 2\ (\because |Z_2| \neq 1)$

Ans : B

37. $|4i - 1 - \log_2^x| \geq 5$

$\sqrt{16 + (1 + \log_2^x)^2} \geq 5$

$16 + (1 + \log_2^x)^2 \geq 25$

$(1 + \log_2^x)^2 \geq 9$

$1 + \log_2^x \geq 3 \; and \; 1 + \log_2^x \leq -3$

$\log_2^x \geq {}_2 \quad and\ \log_2^x \leq -4$

$x \geq 4 \qquad\qquad x \leq \frac{1}{16}$

$x \in (0, \frac{1}{16}) \cup (4, \infty)$

Ans : B

38. $iZ^3 + Z^2 - Z + i = 0$

$iZ^3 + Z^2 + i^2Z + i = 0$

$iZ(z2+i)\ (iZ+1) = 0$

$Z^2+i = 0$ (or) $iZ + 1 = 0$

$Z^2 = -i$ $\qquad Z = \frac{-1}{i}$

$|Z^2| = |-i|$ (or) $Z = i$

$|Z|^2 = 1$ (or) $|Z| = 1$

$|Z| = 1$ (or)

Ans : A

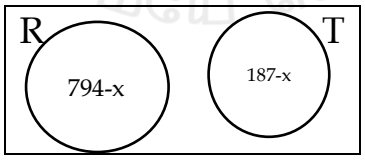
39. Let R be + be set of families having a radio and T. + be set of families having a TV.

(R∪ T) = No. of families having at least one of radio and TV

= 1003 – 63 = 940

η (R) = 794 and η (T) = 187

Let + η (R ∩ T) = x



We have 794 + x + x + 187 – x = 940

X = 981 – 940 = 41

Ans : B

40. Since |a – a| = 0, a $\not R$ a for any real a.

$\Rightarrow$R is not reflexive

|a - b| > 0 $\Rightarrow$ |b - a|> = 0 $\Rightarrow$ bRa is true

$\Rightarrow$ R is symmetric

|5 – 8| > 0 > |8 – 5| > 0 but |5 – 5 |= 0

|a - b| > , |b – c |> = $\Rightarrow$ |a – c| need not be greater then o

$\Rightarrow$R is not transitive

Ans : B

41. $n(A) = 3, n(B) = 2$

$\Rightarrow \eta(A \times B) = 3 \times 2 = 6$

The number of subsets of A × B having 4 or more

$= 2^6 - \left({}^6C_O + {}^6C_1 + {}^6C_2 + {}^6C_3\right)$

= 64 – 1 – 6 – 15 = 20

= 22

Ans : A

42. f(x) is is defined $\frac{|-|x|}{2-|x|} \geq 0$ and -2, (x) $\neq$ 0

$\Rightarrow \frac{(1-|x|(2-|x|)}{(2-|x|)(2-|x|)} \geq 0 \, and \, x \neq -2, 2$

(|x|-1) (|x|-2) ≥ 0 and x ≠ -2, 2

$\Rightarrow$ |x| ≤ 1 (or) |x|> 2

$\Rightarrow$-1 ≤ x ≤ 1(or) x < -2 or x > 2

Domain of f = [-1, 1] ∪ (-∞, -2) ∪ (2, ∞)

Ans : C

43. $\frac{x2}{1+x^2} = 1 - \frac{1}{x+x^2}$

$\Rightarrow 0 \le \frac{x^2}{1+x^2} \le 1$

$\Rightarrow \sin^{-1}(o) \le \sin^{-1}\left(\frac{x^2}{1+x^2}\right) \le \sin^{-1}(0)$

$0 \le \sin^{-1}\left(\frac{x^2}{1+x^2}\right) \le \frac{\pi}{2}$

$0 \le 4\sin^{-1}\left(\frac{x^2}{1+x^2}\right) \le 2\pi$

Range is $[0, 2\pi]$

Ans : D

44. $f(x) = \frac{x}{\sqrt{1+x^2}}$

(fofof) (x) = f(f(f(x))

$= f\left(f\left(\frac{x}{\sqrt{1+x^2}}\right)\right) = f\left(\frac{\frac{x}{\sqrt{1+x^2}}}{H\frac{x^2}{Hx^2}}\right)$

$= f\left(\frac{x\sqrt{1+x^2}}{\sqrt{1+x^2\sqrt{2x^2+1}}}\right) = f\left(\frac{x}{\sqrt{2x^2+1}}\right)$

$= \left(\frac{\frac{x}{\sqrt{2x^2+1}}}{\sqrt{1+\frac{x^2}{\sqrt{2x^2+1}}}}\right) = \frac{x\sqrt{2x^2+1}}{\sqrt{2x^2+1\sqrt{3x^2+1}}} = \frac{x}{\sqrt{3x^2+1}}$

Ans : D

45. F (x) + 2f($\frac{1}{x}$) = 3x – (1)

Put x = $\frac{1}{x}$

$$f(\frac{1}{x})+2f(x)=\frac{3}{x} \qquad (2)$$

Sub (2) in (1)

$$f(x)+2\left(\frac{3}{x}-2f(x)\right)=3x$$

$$f(x)+\frac{6}{x}-4f(x)=3x$$

$$3f(x)=\frac{6}{x}-3x$$

$$f(x)=\frac{2}{x}-x$$

$$f(-x)=\frac{-2}{x}+x$$

For $s, f(x) = f(-x)$

$$\frac{2}{x}-x=\frac{-2}{x}+x\Rightarrow\frac{4}{x}-2x=0\Rightarrow\frac{2}{x}-x=0$$

$$\frac{2}{x}=x\Rightarrow x^2=2\Rightarrow x=\pm\sqrt{2}$$

Ans : D