DIRECTORATE OF SCHOOL EDUCATION TAMILNADU

11JPCM01 (2023-24)	JEE PRACTICE QUESTIONS (TEST-1)	Class : XI Time : 1.15 hrs Total Marks : 180

Answer key

11TH - Physics

1. **Ans : B**

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

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

   a = 1/2, b = −3/2, c= 1/2

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

2. **Ans : C**

   Momentum = MLT^{-2}

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

3. **Ans : B**

   T – 2.5C   ΔT = 21S

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

4. **Ans : C**

   x – at – bt^2

   x = bt^2

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

5. **Ans : D**

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

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

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

On solving $a = \frac{1}{2} b = \frac{1}{2} c = -2$

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

6. **Ans : C**

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

$18 = 2 \times 1 + 4 \times 0.5 + xp + \frac{3}{2}(4)$

$\qquad 8 = xp$

From option

$$x = \frac{16}{3} \; P = \pm \frac{3}{2}$$

7. **Ans : C**

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

8. **Ans : A**

$$T = 2\pi\sqrt{\frac{l}{g}} \Rightarrow T^2 = 4\pi^2 \dfrac{l}{g}$$

$$g = 4\pi^2 \dfrac{l}{T^2}$$

% Error in $l = \dfrac{1mm}{100cm} \times 100$

$\qquad = \dfrac{0.1}{100} \times 100 = 0.1\%$

% Error is T $= \dfrac{0.1}{2 \times 100} \times 100 = 0.45$

% Error in g $= \dfrac{\Delta l}{l} + \dfrac{2\Delta T}{T}$

$\qquad\qquad = 0.1\% + 2 \times 0.05\% = 0.2\%$

9. Ans : D

$$m_2 = n_1 \left(\frac{m_1}{m_2}\right)\left(\frac{L_1}{L_2}\right)^{-3}$$

$$= 4 \times \frac{1g}{100g}\left(\frac{1cm}{10cm}\right)^{-3}$$

$$= = 4 \times \frac{1}{100} \times 10^3 = 40 \, units$$

10. Ans : A

$$l = \frac{m}{v} = \frac{m}{L^3}$$

$$= \frac{\Delta p}{p} = \frac{\Delta m}{m} + 3\frac{\Delta L}{L}$$

$$= \frac{0.1}{10} + 3\left(\frac{0.01}{0.1}\right)$$

$$= 0.01 + 3 \times 0.1$$

$$= 0.31 \, Kg/m^3$$

11. Ans : C

$$x = k\eta^a (E_k)^6$$

$$L^1 = (ML^{-1}T^{-2})^a \left(ML^2T^{-2}\right)^b$$

$$= M^{a+b}L^{-a+2b}T^{-2a-2b}$$

a + b = 0   -a + 2b = 1

- 2a – 2b = 0

$$a = -\frac{1}{3} \qquad b = \frac{1}{3}$$

$$x \propto \left(\frac{Ek}{\eta}\right)^{\frac{1}{3}}$$

12. Ans : C

$$a = Pv^2 = \frac{Fv^2}{A}$$

$$= \frac{MLT^{-2}(L^3)^2}{L^2}$$

$$= \frac{MLT^{-2} L^6}{L^2}$$

$$= ML^5T^{-2}$$

13. Ans : B

$$F = A\sqrt{x} + Bt^2$$
Dimensionally
$$F = A\sqrt{x} + Bt^{2\prime}$$
$$\frac{A}{B} = \frac{t^2}{\sqrt{x}}$$
$$\frac{T^2}{L^{1/2}} = T^2L^{-1/2}$$

14. Ans : A

% Error in $V = \frac{\Delta v}{v} = \frac{5}{100} \times 100\% = 5\%$

% Error in correct $I = \frac{\Delta I}{I} = \frac{0.2}{10} \times 100\% = 2\%$

% Error in resistance Calculated is 5% + 2% = 7%

15. Ans : D

$$\mu = \frac{Velocity\ of\ light\ in\ vasuum}{Velocity\ of\ light\ in\ medium}$$

μ - Dimension less

RHS of equation shout be dimension less

$\frac{B}{\lambda^2}$ is dimensionless

B should have dimensionless of λ^2 ie m² = Area

11th – CHEMISTRY

16. Ans : B

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

17. Ans : B

18. Ans : A

19. Ans : A

[Ne] $3s^2 3p^3$ 5th 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

22. Ans : A

23. Ans : D

$IE_{Be} > IE_B$

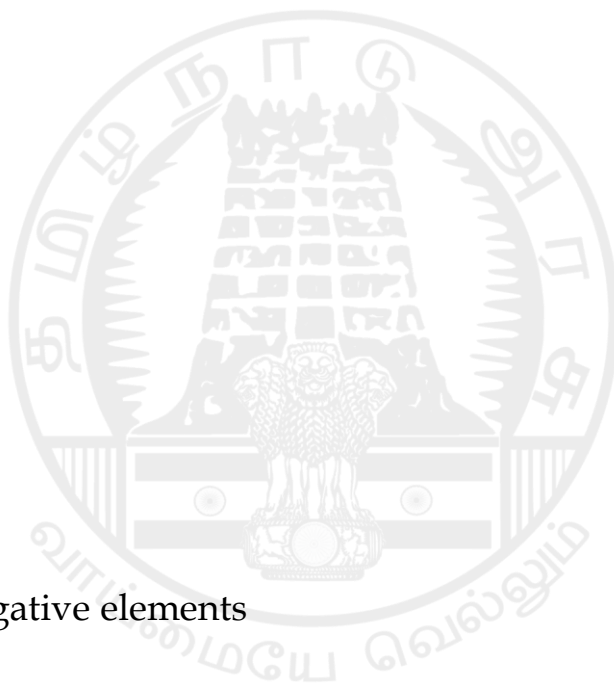**24. Ans : C**

N, O, F are electrogative elements

25. Ans : A

26. Ans : C

27. Ans : D

28. Ans : B

Outermost electronic configuration of element with atomic number 118 is $7s^2 7p^6$. So it will be a noble gas.

29. Ans : B

30. Ans : B

11th – MATHS

31. $\eta\,(A` \cap ') = \eta(A \cup B)'$
   $= \eta\,(u) - \eta\,(A \cup B)$
   $= \eta\,(u) - [n(A) + n(B) - n(A \cap B)]$
   $= 500 - [150 + 200 - 100]$
   $= 500 - 200$
   $= 250$

   Ans : B

32. $\eta(A \times B)\, \cap\, (B \times A) = \eta\,(A \cap B) \times (B \cap A)$
   $\qquad\qquad = \eta\,(A \cap B)\,(B \cap A)$
   $\qquad\qquad = (49)\,(49)$
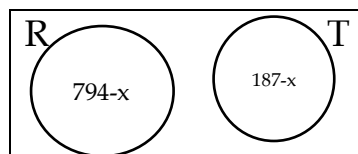 $\qquad\qquad = 49^2$

   Ans : A

33. Let R be + be set of families having a radio and T. + be set of families having a TV.
   $(R \cup T)$ = No. of families having at least one of radio and TV
   $\qquad\qquad = 1003 - 63 = 940$
   $\qquad\qquad \eta\,(R) = 794$ and $\eta\,(T) = 187$
   $\qquad\qquad$ Let + $\eta\,(R \cap T) = x$

R 794-x   T 187-x

   We have $794 + x + x + 187 - x = 940$
   $\qquad\qquad X = 981 - 940 = 41$

Ans : B

34. Since $|a - a| = 0$, a $\cancel{R}$ 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

35. $n(A) = 3, n(B) = 2$
   $\Rightarrow \eta(A \times B) = 3 \times 2 = 6$
   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

36. $(2, 3) \in R$ but $(3, 2) \in R$
   Henc eR is nto symmetric

   Ans : C

37. f(x) is is defined $\frac{|-|x||}{2-|x|} \geq 0$ and -2, (x) $\neq 0$
   $$\Rightarrow \frac{(1-|x|(2-|x|))}{(2-|x|)(2-|x|)} \geq 0 \, and \, x \neq -2,2$$
   $(|x|-1)(|x|-2) \geq 0$ and $x \neq -2, 2$
   $\Rightarrow |x| \leq 1$ (or) $|x| > 2$
   $\Rightarrow -1 \leq x \leq 1$(or) x < -2 or x > 2
   Domain of f = [-1, 1] $\cup$ (-∞, -2) $\cup$ (2, ∞)

   Ans : C

38. F (x) is defined if
   $1 - \sqrt{1 - \sqrt{1 - x^2}} \geq 0, 1 - \sqrt{1 - x^2} \geq 0, 1 - x^2 \geq 0$

$$(1-x^2) \geq 0 \Rightarrow (1-x)(1+x) \geq 0$$
$$\Rightarrow (x-1)(x+1) \leq 0$$
$$(1-x^2) \geq 0 \Rightarrow -1 \leq x \leq 1$$

Ans : D

39. $9 - x^2 > 0 \; x^2 - 9 < 0$ and $-1 \leq x - 3 \leq 1$
$$\Rightarrow x \in [2, 3]$$

Ans : B

40. $\dfrac{x2}{1+x^2} = 1 - \dfrac{1}{x+x^2}$

$$\Rightarrow 0 \leq \dfrac{x^2}{1+x^2} \leq 1$$

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

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

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

Range is $[0, 2\pi]$

Ans : D

41. $\dfrac{2x}{5x+3} \leq -1 \,(or) \dfrac{2x}{5x+3} \geq 1$

$$\dfrac{2x}{5x+3} + 1 \leq 0 \,(or) \dfrac{2x}{5x+3} - 1 \geq 0$$

$$\dfrac{7x+3}{5x+3} \leq 0 \,(or) \dfrac{-3x-3}{5x+3} \geq 0$$

$$\dfrac{7x+3}{5x+3} \leq 0 \,(or) \dfrac{3(x+1)}{5x+3} \leq 0$$

$(7x + 3)(5x +3) \leq 0$ (or) $(x + 1)(5x + 3) \leq 0$

x lies between $\dfrac{-3}{5}$ and $\dfrac{-3}{7}$ (or) x lies between -1 and $-\dfrac{3}{5}$

$$\Rightarrow x \in \left(-1, \dfrac{-3}{5}\right) \cup \left(\dfrac{-3}{5}, \dfrac{-3}{7}\right)$$

$$x = -1, \beta = \frac{-3}{5}, \gamma = \frac{-3}{5}, \delta = \frac{-3}{7}$$

$$|3x + 10(\beta + \gamma) + 21\delta| = |3(-1) + 10\left(\frac{-6}{5}\right) + 21\left(\frac{-3}{7}\right)|$$

$$= |-3 - 12 - 9| = 24$$

Ans : D

42. $xRx \Rightarrow x + x = 7 \Rightarrow x\cancel{A}$ R is not reflexive

$xRy \Rightarrow x + y + 7 \Rightarrow x + y = 7 \Rightarrow yRx \Rightarrow$ R is symmetric

Now 1R6 and 6R1 $1\cancel{R}1 \Rightarrow R$ but R is not transitive

Ans : B

43. $f(x) = \dfrac{x}{\sqrt{1 + x^2}}$

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

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

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

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

Ans : D

44. $F(x) + 2f\left(\dfrac{1}{x}\right) = 3x$ – (1)

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

$f\left(\dfrac{1}{x}\right) + 2f(x) = \dfrac{3}{x}$ – (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

45. $f(x) = \dfrac{x-2}{x-3}$

$$\frac{x_1 - 2}{x_1 - 3} = \frac{x_2 - 2}{x_2 - 3}$$

$$x_1 x_2 - 3x_1 = 2x_2 + 6 = x_1 x_2 - 2x_1 - 3x_2 + 6$$

$$\Rightarrow x_1 = x_2$$

So of is one – one

New $y = f(x) = \dfrac{x-2}{x-3}$

$$xy - 3y = x - 2$$
$$xy - x = 3y - 2$$
$$x = \frac{3y - 2}{y - 1}$$

x is defined if y ≠1

the range of f is R – {1}

which is domain of f

Also for no value of y, x can be 3

$$3 = x = \frac{3y - 2}{y - 1}$$

$$3y - 3 = 3y - 2$$

$$3 = 2 \text{ which in not true}$$

So f is onto

Hence f is invertible

Ans: D