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# PERFECT 100 PERCENTILERS

## JEE MAIN SESSION 1 JAN 2025

**65 Students Secured 100 Percentiles***

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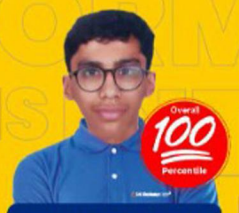

**SHIVEN TOSHNIWAL**
APP.No: 250310391420*

**BHAVESH JAYANTHI**
APP.No: 250310269939

**PRANAYA SAI MUKESH**
APP.No: 250310808114

**SAI SRI RAM SATVIK**
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**UJJWAL KESARI**
APP.No: 250310008860*

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**D NUTHAN REDDY**
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*in One or More Subjects

# JEE Main – 02nd April – 2025 (Shift-2)

## [Memory Based Questions]

## PHYSICS

1. Two water drops each of radius of $r$ coalesce to form a bigger drop. If $T$ is the surface tension, surface energy released in this process is

a) $8\Pi R^2T(1-2^{-1/3})$ b) $4\Pi R^2T(1-2^{-1/3})$

c) $2\Pi R^2T(1-2^{-1/3})$ d) $6\Pi R^2T(1-2^{-1/3})$

Ans: (a)

2. A sportsman runs around the circular track of radius $r$ such that he travels the path AB AB. The distance travelled and displacement respectively are


a) 3Πr, 1r b) 3Πr, 2r c) 1Πr, 3r d) 2Πr, 3r

Ans: (b)

3. If $\mu_0$ and $\varepsilon_0$ are permeability and permittivity of free space respectively, then the dimension of $\frac{1}{\mu_0\varepsilon_0}$ is

a) $M^2L^2T^{-2}$ b) $M^2T^{-2}$ c) $L^1T^{-2}$ d) $L^2T^{-2}$

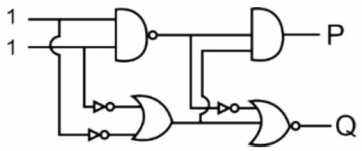
Ans: (d)

4. Moment of inertia of circular ring of mass M and diameter D about tangential axis lying in plane of the ring is

a) $\frac{2MD^2}{7}$ b) $\frac{5MD^2}{9}$ c) $\frac{3MD^2}{8}$ d) $\frac{5MD^2}{8}$

Ans: (c)

5. In the digital circuit shown in the figure, for the given inputs the $P$ and $Q$ values are.




a) P = 1, Q = 0 b) P = 1, Q = 1 c) P = 0, Q = 0 d) P = 0, Q = 1

Ans: (c)

6. A Solenoid having area $A$ and length '$T$' is filled with a material having relative permeability 2. The magnetic energy stored in the solenoid is:

a) $\frac{B^2Al}{\mu_0}$ b) $\frac{B^2Al}{4\mu_0}$ c) $B^2Al$ d) $\frac{B^2Al}{2\mu_0}$

Ans: (b)

7. Energy released when two deuterons ($_1H^2$) fuse to form a helium nucleus ($_2He^4$) is: (Given: Binding energy per nucleon of $_1H^2$ = 1.1MeV and binding energy per nucleon of $_2He^4$ = 7.0MeV)

a) 26.8 MeV b) 5.9 MeV c) 23.6 MeV d) 8.1 MeV

Ans: (c)

8. A bi-convex lens has radius of curvature of both the surfaces same as 1/6 cm. If the lens is required to be replaced by another convex lens having different radii of curvatures on both sides ($R, \neq R_2$), without any change in lens power. Then possible combination of $R_1$ and $R_2$ is

a) $\frac{1}{6}$ cm and $\frac{1}{9}$ cm b) $\frac{1}{3}$ cm and $\frac{1}{3}$ cm

c) $\frac{1}{5}$ cm and $\frac{1}{7}$ cm d) $\frac{1}{3}$ cm and $\frac{1}{7}$ cm

Ans: (c)

9. An electron with mass '$m$' with an initial velocity $(t = 0)\vec{v} = v_0\hat{\imath}(v_0 > 0)$ enters a magnetic field $\vec{B} = B_0\hat{\jmath}$. If the initial de-broglie wavelength at $t = 0$ is $\lambda_0$. Then its value after time 't' would be.

a) $\frac{\lambda_0}{\sqrt{1+\frac{e^2B_0^2t^2}{m^2}}}$ b) $\frac{\lambda_0}{\sqrt{1-\frac{e^2B_0^2t^2}{m^2}}}$ c) $\lambda_0\sqrt{1+\frac{e^2B_0^2t^2}{m^2}}$ d) $\lambda_0$

Ans: (d)

10. Two identical objects are placed in front of convex mirror and concave mirror having same radii of curvature of 12 cm, at same distance of 18 cm from the respective mirrors. The ratio of sizes of the images formed by convex mirror and by concave mirror is: -

a) 1/2 b) 3 c) 2 d) 1/3

Ans: (a)

11. The length of a light string is 1.4 m when the tension on it is 5N. If the tension increases to 7N, the length of the string is 1.56 m. The original length of the string is _____ m.

a) 2 b) 4 c) 5 d) 1

Ans: (d)

12. A satellite of mass 1000 kg is launched to revolve around the earth in an orbit at a height of 270 km from the earth's surface. Kinetic energy of the satellite in this orbit is _____ $\times 10^{10}$ J. (Mass of earth $= 6 \times 10^{24}$ kg, Radius of earth $= 6400$Km, Gravitational constant $= 6.67 \times 10^{-11} \text{Nm}^2\ \text{kg}^{-2}$).

a) 4 b) 3 c) 7 d) 5

Ans: (b)

13. The internal energy of air in $4\text{ m} \times 4\text{ m} \times 3\text{ m}$ sized room at 1 atmospheric pressure will be _____ $\times 10^6$ J. (consider air as diatomic molecule).

a) 12 b) 16 c) 13 d) 18

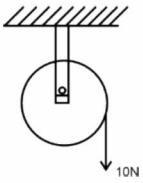
Ans: (a)

14. A ray of light suffers minimum deviation when incident on a prism having angle of the prism equal to 60°. The refractive index of the prism material is $\sqrt{2}$. The angle of incidence (in degrees) is

a) 36 b) 45 c) 55 d) 40

Ans: (b)

15. A wheel of radius 0.2 m rotates freely about its center when a string that is wrapped over its rim is pulled by force of 10 N as shown in figure. The established torque produces an angular acceleration of $2\text{rad/s}^2$. Moment of inertia of the wheel is _____ $\text{kgm}^2$. (Acceleration due to gravity $= 10\ \text{m/s}^2$).




Ans: 1

# CHEMISTRY

1. Hybridization of $[MnCl_6]^{3-}$

a) $sp^3d$ b) $dsp^2$ c) $d^2sp^3$ d) $sp^3d^2$

Ans: (c)

2. Assuming the validity of Bohr's atomic model for hydrogen like ions the radius of $Li^{2+}$ ion in its ground state is given by $\frac{1}{x}a_0$, where $x$ is equal to

a) 9 b) 3 c) 2 d) 1

Ans: (b)

3. The nature of oxide ($TeO_2$) and hydride ($TeH_2$) formed by Te, respectively are.

a) Oxidizing & Acidic b) Oxidizing & Basic

c) Reducing & Acidic d) Reducing & Basic

Ans: (a)

4. The d-orbital electronic configuration of the complex among $[Co(en)_3]^{3+}$, $[CoF_6]^{3-}$, $[Mn(H_2O)_6]^{2+}$ and $[Zn(H_2O)_6]^{2+}$ that has highest CFSE is

a) $t_2g^3eg^2$ b) $t_2g^6eg^4$ c) $t_2g^6eg^0$ d) $t_2g^4eg^2$

Ans: (c)

5. 0.2% (w/v) of NaOH solution has resistivity of 870 mho. Find the molar conductivity of the solution?

a) 0.025 S . $m^2$/mol b) 0.032 S. $m^2$/mol

c) 0.018 S . $m^2$/mol d) 0.023 S. $m^2$/mol

Ans: (d)

6. Formation of $Na_4(Fe(CN)_5NOS)$ a purple coloured compound formed by addition of sodium nitroprusside complex compound sodium fusion extract of salt indicate

a) Sodium ion b) Sulphide ion

c) Sulphite ion d) Sulphate ion

Ans: (b)

7. Correct order of electronegativity in below elements

1) $1s^2 2s^2 2p^3$ 2) $1s^2 2s^2 2p^4$

3) $1s^2 2s^2 2p^5$ 4) $1s^2 2s^2 2p^6$

a) $1 > 2 > 3 > 4$ b) $3 > 2 > 1 > 4$ c) $4 > 3 > 2 > 1$ d) $3 > 2 > 4 > 1$

Ans: (b)

8. 3,3 dimethylhex-1-en-4-yne there are sp, $sp^2$, and $sp^3$ hybridised atom

a) 2, 4, 2 b) 3, 3, 2 c) 2, 2, 4 d) 4, 4, 2

Ans: (c)

9. **Statement-I:** Melting point of Neopentane is greater than that of n-pentane.

**Statement-II:** Neopentane give only one mono-substituted product.

a) Both S-I and S-II are correct b) Both S-I and S-II are correct

c) Both S-I and S-II are correct d) S-I is correct but S-II is incorrect

Ans: (a)

10. Which of the following is the correct order of enthalpy of atomization of 3d-series?

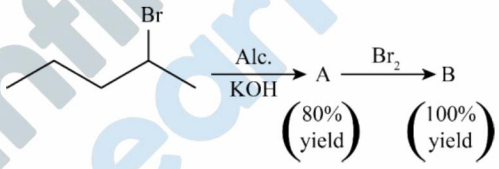
(a) Ni > Cu > Mn > Zn (b) Zn > Cu > Mn > Ni

(c) Cu > Mn > Ni > Zn (d) Mn > Ni > Cu > Zn

Ans: (a)

11. 0.5 g organic compound is heated with CuO in a $CO_2$ atmosphere at 300 K. The volume of $N_2$ gas collected over $H_2O$ is 60 mL, if aqueous tension is 15 mmHg at 300 K and pressure recorded is 715 mmHg, then calculate percentage of nitrogen in organic compound

Ans: 12.5

12. 


If 1 mole of 2-Bromopentane is used. Find the weight of B?

a) 184 g b) 174 g c) 156 g d) 230 g

Ans: (a)

13. In adiabatic process, the magnitude of work done in case of one step & infinite step follows order :-

a) $|W_{rev}|_{expansion} > |W_{Irr}|_{expansion}$ b) $|W_{reve}|_{expansion} < |W_{rrrev}|_{expansion}$

c) $|W_{rev}|_{expansion} = |W_{irrev}|_{expansion}$ d) Can't be predicted

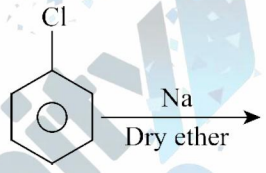
Ans: (a)

14. The four different amino acids are given A, B, C and D. Calculate the number of tetrapeptides formed including all the four amino acids.

a) 8 b) 16 c) 24 d) 32

Ans: (c)

15. Match the reactions given in List-I with the name of the reaction given in List-II and select the correct option.

| | List-I | | List-II |
|---|---|---|---|
| A | $RX + Na \xrightarrow[\text{ether}]{\text{Dry}}$ | I | Fittig reaction |
| B | $RCOOH \xrightarrow[\Delta]{NaOH + CaO}$ | II | Lucas method |
| C | $ROH \xrightarrow[H^+]{anhy.ZnCl_2}$ | III | Wurtz reaction |
| D |   | IV | Soda lime Decarboxylation reaction |

a) A-I, B-IV, C-II, D-III b) A-III, B-IV, C-II, D-I

c) A-III, B-II, C-IV, D-I d) A-I, B-II, C-III, D-IV

Ans: (b)

16. Which one of the following has at least one lone pair at the central atoms and different bond lengths?

a) $XeF_4$ b) $XeF_2$ c) $SF_4$ d) $PF_5$

Ans: (c)

# MATHEMATICS

1. If $\theta \in \left[-\frac{7\pi}{6}, \frac{4\pi}{3}\right]$, then number of solutions of $\sqrt{3}\text{cosec}^2\theta - 2\left(\sqrt{3}-1\right)\text{cosec}\theta - 4 = 0$, is ____.

   Ans: 6

2. $\lim_{x\to 0} \frac{\cos(2x)+a\cos(4x)-b}{x^4}$ is finite, then $a + b =$

   Ans: 1/2

3. The domain function $f(x) = \frac{1}{\sqrt{10+3x-x^2}} + \frac{1}{\sqrt{x+|x|}}$ is $(a,\ b)$ then $(1+a^2)+b^2$ is

   a) 26 b) 30 c) 25 d) 29

   Ans: (a)

4. The mean and variance of 6, 4, a, 8, b, 12, 10, 13 are 9 and 9.35 respectively then $a + ab + b$ is equal to

   a) 106 b) 100 c) 105 d) 103

   Ans: (d)

5. Let $f:[1,\infty) \to [2,\infty)$ be a differentiable function. If $10\int_1^x f(t)dt = 5x\,f(x) - x^5 - 9$ for all $x \geqslant 1$, then the value of $f(3)$ is:

   a) 18 b) 22 c) 32 d) 26

   Ans: (c)

6. $\vec{a} = 2\hat{\imath} - 3\hat{\jmath} + \hat{k}$, $\vec{b} = 3\hat{\imath} + 2\hat{\jmath} + 5\hat{k}$ and a vector $\vec{c}$ be such that $(\vec{a} - \vec{c}) \times \vec{b} = -18\hat{\imath} - 3\hat{\jmath} + 12\hat{k}$ and $\vec{a} \cdot \vec{c} = 3$. If $\vec{b} \times \vec{c} = \vec{d}$, then $|\vec{a} \cdot \vec{d}|$ is equal to:

   Ans: 15

7. If length of minor axis of an ellipse is equal to one fourth of distance between the foci, then eccentricity of ellipse is:

   a) $\frac{\sqrt{5}}{7}$ b) $\frac{4}{\sqrt{17}}$ c) $\frac{\sqrt{3}}{16}$ d) $\frac{5}{7}$

   Ans: (b)

8. If the image of the point (1,0,3) in the line joining the points $A(4,7,1)$ and $B(3,5,3)$ is $Q(\alpha,\beta,\gamma)$. then $\alpha+\beta+\gamma$ is equal to:-

a) 13 b) $\frac{47}{3}$ c) 18 d) $\frac{46}{3}$

Ans: (d)

9. If $\sum_{r=0}^{10}\left[\frac{10^{r+1}-1}{10^r}\right]\cdot {}^{11}c_{r+1}=\frac{\alpha^{11}-11^{11}}{10^{10}}$ then $\alpha$ is equal to

a) 24 b) 15 c) 11 d) 20

Ans: (d)

10. If the system of equations $2x+\lambda y+3z=5,\ 3x+2y-z=7,\ 4x+5y+\mu z=9$ has infinitely many solutions, then $(\lambda^2+\mu^2)$ is equal to

a) 22 b) 18 c) 26 d) 30

Ans: (c)

11. $4\int_0^1\left[\frac{1}{\sqrt{3+x^2}+\sqrt{1+x^2}}\right]dx-3\log_e(\sqrt{3})$ is equal to:

a) $2-\sqrt{2}-\log_e(1+\sqrt{2})$ b) $2+\sqrt{2}-\log_e(1+\sqrt{2})$

c) $2+\sqrt{2}+\log_e(1+\sqrt{2})$ d) $2-\sqrt{2}+\log_e(1+\sqrt{2})$

Ans: (a)

12. Let $(a,b)$ be the point of intersection of the curve $x^2=2y$ and the straight line $y-2x-6=0$ in the second quadrant. Then the integral $I=\int_a^b\frac{9x^2}{1+5^x}dx$ is equal to:

a) 18 b) 24 c) 21 d) 27

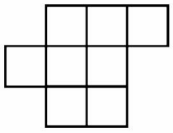
Ans: (b)

13. Let $A$ be a $3\times3$ real matrix such that $A^2(A-2I)-4(A-I)=0$, where $I$ and $O$ are the identity and null matrices, respectively. If $A^5=\alpha A^2+\beta A+\gamma I$, where $\alpha,B,\gamma$ are real constants, then $\alpha+\beta+\gamma$ is equal to:-

a) 4 b) 20 c) 76 d) 12

Ans: (d)

14. The no. of ways, in which the letters. $A, B, C, D, E$ can be placed in the 8 boxes of the figure below. So that no row remains empty and at most one letter can be placed in a box is:



a) 5760 b) 5880 c) 840 d) 960

Ans: (a)

15. Let the point P of the focal chord $PQ$ of the parabola $y^2 = 16x$ be $(1, -4)$. If the focus of the parabola divides the chord $PQ$ in the ratio m : n, gcd(m, n) = 1, then $m^2 + n^2$ is equal to:

a) 17 b) 10 c) 37 d) 26

Ans: (a)

16. The sum of the first 10 terms of the series $\frac{4\cdot1}{1+4.1^4} + \frac{4\cdot2}{1+4\cdot2^4} + \frac{4\cdot3}{1+4\cdot3^4} + \ldots\ldots$ is $\frac{m}{n}$, where $\gcd(m, n) = 1$, then $m + n$ is equal to _____

Ans: 441

17. If $\frac{dy}{dx} + 2y\sec^2 x = 2\sec^2 x + 3\tan x \cdot \sec^2 x$ and $f(0) = \frac{5}{4}$, then the value of $12\left(y\left(\frac{\pi}{4}\right) - \frac{1}{e^2}\right) =$

Ans: 21

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