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5 STUDENTS IN TOP 10 IN JEE-ADVANCED 2024 OPEN CATEGORY

1 AIR	4 AIR	5 AIR	6 AIR	9 AIR	10 AIR
RAGHAV SHARMA Ht. No. 242053073*	RHYTHM KEDIA Ht. No. 247025176*	P KUSHAL KUMAR Ht. No. 246150349	RAJDEEP MISHRA Ht. No. 241016176*	DHRUVIN H DOSHI Ht. No. 241106162	A SIDHVIK SUHAS Ht. No. 246119101

HIGHLIGHTS

- BELOW 100 ALL INDIA OPEN CATEGORY RANKS: 30
- BELOW 500 ALL INDIA OPEN CATEGORY RANKS: 122
- BELOW 1000 ALL INDIA OPEN CATEGORY RANKS: 203
- BELOW 100 ALL INDIA CATEGORY RANKS COUNT: 146
- BELOW 1000 ALL INDIA CATEGORY RANKS COUNT: 721
- NUMBER OF QUALIFIED RANKS: 4187+

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JEE MAIN (JAN) 2025 - SHIFT 1

28-01-2025

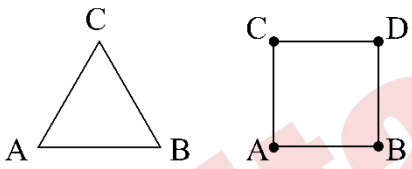
Sri Chaitanya ACADEMY

JEE Main – 28th January – 2025 (Shift-1)

[Memory Based Questions]

PHYSICS

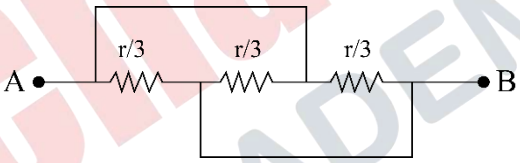
1. A wire of resistor R is bent into an equilateral triangle. An identical wire is bent into a square. What is the ratio of the resistances between any to vertices of the triangle to the any two adjacent vertices of the square.



a) 1/3 b) 27/11 c) 36/45 d) 32/27

Ans: (d)

2. Effective resistance between A and B is



a) r/11 b) r/9 c) r/13 d) r/15

Ans: (b)

3. Two solid spheres of radii R_1 and R_2 made of same material where $R_2 = 2R_1$ find Radio of Moment of Inertia I_1/I_2 = ?

a) 2/17 b) 3/25 c) 1/15 d) 1/32

Ans: (d)

4. In YDSE for $\lambda_1 = 600$ nm 10^{th} bright fringe at 10 mm from central maxima then for $\lambda_2 = 660$ nm what is the distance of 10^{th} bright fringe from central maxima

a) 7 b) 9 c) 11 d) 15

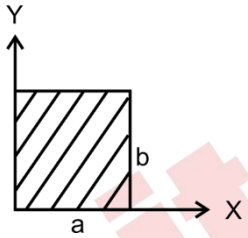
Ans: (c)

5. A proton of mass 'm_p' has same energy as that of photon of specific wavelength. If the proton is moving at non-relativistic speed, then ratio of de Broglie wavelength of the proton to the wavelength of photon is

a) $\frac{1}{c}\sqrt{\frac{2E}{m_p}}$ b) $\frac{1}{c}\sqrt{\frac{E}{2m_p}}$ c) $\frac{1}{c}\sqrt{\frac{E}{m_p}}$ d) $\frac{1}{2c}\sqrt{\frac{E}{m_p}}$

Ans: (b)

6. Find center of mass of Rectangular Plate of mass density



$\sigma = \frac{\sigma_0 x}{ab}$ is

a) $\left(\frac{2a}{3}, \frac{b}{2}\right)$ b) $\left(\frac{a}{3}, \frac{2b}{3}\right)$ c) $\left(\frac{a}{2}, \frac{b}{3}\right)$ d) $\left(\frac{a}{3}, \frac{b}{2}\right)$

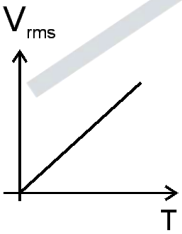
Ans: (a)

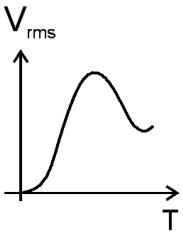
7. A thin prism P_1 with angle 4° made of glass having refractive index 1.54, is combine with another thin prism P_2 made of glass having refractive index 1.72 to get dispersion without deviation. The angle of the prism P_2 in degrees is

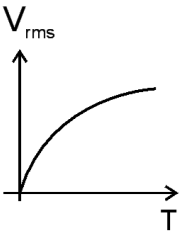
a) 4 b) 16/3 c) 3 d) 1.5

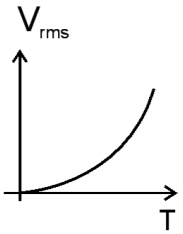
Ans: (c)

8. The variation of RMS velocity of gas molecules with temperature.

a) 

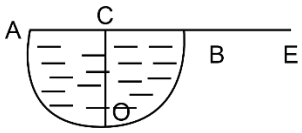
b) 

c) 

d) 

Ans: (c)

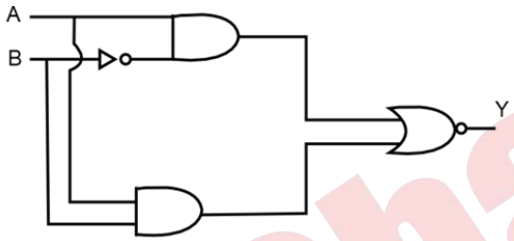
9. A hemispherical vessel is completely filled with a liquid of refractive index of μ. A small coin is kept at the lowest part of the vessel as shown in figure. The minimum value of the refractive index of the liquid so that a person can see the coin from the point E (at the level of the vessel) is



a) $\sqrt{3}$ b) $\sqrt{2}$ c) $\frac{\sqrt{3}}{2}$ d) $3/2$

Ans: (b)

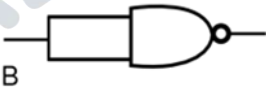
10. The given logic gate gives same output as



a) 

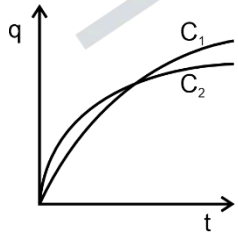
b) 

c) 

d) 

Ans: (c)

11. Two capacitors C_1C_2 are connected in parallel to a battery. Charge time graph is shown below for the two capacitors. The energy store with them in steady state are u_1 and u_2 respectively. Which of the given statement is correct



a) $C_1 > C_2, u_1 < u_2$ b) $C_1 > C_2, u_1 > u_2$ c) $C_2 > C_1, u_2 > u_1$ d) $C_2 > C_1, u_2 < u_1$

Ans: (b)

12. Which of the following is correct reaction

a) $n \to p + e^- + v$ b) $n \to p + e^+ + \bar{v}$ c) $n \to p + e^- + \bar{v}$ d) $n \to p + \bar{v}$

Ans: (c)

13. In the experiment for measurement of viscosity η of given liquid with a ball having radius R, consider the following statements.

A. Graph between terminal velocity v and R will be a Parabola.

B. Terminal velocities of different diameter balls are constant for a given liquid

C. Measurement of terminal velocity is dependent on the temperature.

D. This experiment can be utilize to assess the density of a given liquid

E. If balls are dropped with some initial speed, the value of η will change.

Choose the correct answer from the options given below.

a) B, D and E only b) A, B and E only

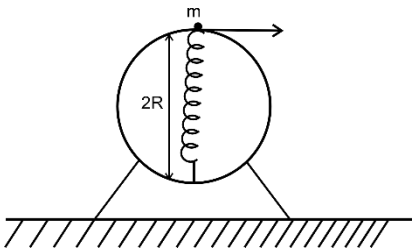
c) A, C and D only d) C, D and E only

Ans: (c)

14. If dimensions of modulus of elastically by torque = $M^a L^b T^c$ Find c.

Ans: 0

15. A bead of mass m slides without friction on the wall of a vertical circular hoop of radius R as shown in figure. The bead moves under the combined action of gravity and massless spring (k) attached to the bottom of the hoop with zero initial speed, velocity of bead when the length of spring becomes 'R', would be.



a) $\sqrt{2Rg + \frac{4KR^2}{m}}$ b) $\sqrt{3gR + \frac{kR^2}{m}}$ c) $\sqrt{gR + \frac{kR^2}{m}}$ d) $\sqrt{2Rg + \frac{KR^2}{m}}$

Ans: (b)

CHEMISTRY

1. The product A and B in the following reactions, respectively

$A \xleftarrow{AgNO_2} CH_3CH_2CH_2Br_2 \xrightarrow{AgCN} B$

a) $CH_3 - CH_2 - CH_2 - ONO, CH_3 - CH_2 - CH_2 - CN$

b) $CH_3 - CH_2 - CH_2 - NO_2, CH_3 - CH_2 - CH_2 - NC$

c) $CH_3 - CH_2 \rightarrow +CH_2 - NO_2, CH_3 - CH_2 - CH_2CN$

d) $CH_3 - CH_2 - CH_2 - ONO, CH_3 - CH_2 - CH_2 - NC$

Ans: (b)

2. Consider the following element in In, TI, Al, and Pb. The most stable oxidation states of elements with highest and lowest first ionization enthalpies, respectively are

a) +4 and +1 b) +2 and +3 c) +4 and +3 d) +1 and +4

Ans: (b)

3. The incorrect decreasing order of atomic radii is,

a) Si > P > Cl > F

b) Mg > Al > C > O

c) Al > B > N > F

d) Be > Mg > Al > Si

Ans: (d)

4. The molecules having square pyramidal geometry are

a) SbF_5 & PCl_5

b) BrF_5 & $XeOF_4$

c) BrF_5 & PCl_5

d) SbF_5 & XeF_4

Ans: (b)

5. A weak acid HA has degree of dissociation x. Which options gives the correct expression of $(pH - pK_a)$?

a) 0 b) $(\log(1 + 2x))$ c) $\log\left(\frac{x}{1-x}\right)$ d) $\log\left(\frac{1-x}{x}\right)$

Ans: (c)

6. Both acetaldehyde and acetone (individually) undergo which of the following reactions,

A) Iodoform Reaction B) Cannizzaro Reaction

C) Aldol condensation D) Tollen's test

E) Clemmesen Reduction

a) A, C & E only b) A, D & E only

c) A, B, C, D & E d) A & C only

Ans: (b)

7. What is the freezing point depression constant of a solvent 50g of which contain 1g of non-volatile solute (M.W:256g/mol) and depression in freezing point is 0.4K?

a) $0.372K\ Kg\ mol^{-1}$ b) $4.213K\ Kg\ mol^{-1}$

c) $4.213K\ Kg\ mol^{-1}$ d) $5.12K\ Kg\ mol^{-1}$

Ans: (d)

8. Ice and water are placed in a closed container at a pressure at 1 atm and temperature 273.15 K. If the pressure of the container increases 2 times and the temperature is kept constant, then identify the correct observation from the following

a) The amount of ice decreases

b) Volume of system increases

c) Liquid phase disappear completely

d) Solid phase (ice) disappear completely

Ans: (d)

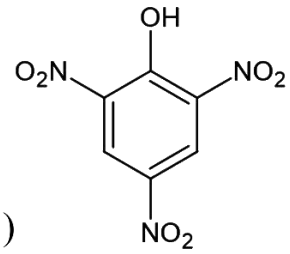
9. Which of the following set of quantum numbers have same energy?

(1) $n = 2,\ l = 2,\ m = +1$
(2) $n = 2,\ l = 1,\ m = -1$
(3) $n = 3,\ l = 2,\ m = 0$
(4) $n = 3,\ l = 2,\ m = 1$

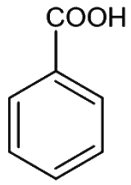
a) 1, 2 b) 2, 3 c) 3, 4 d) 1, 4

Ans: (c)

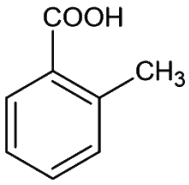
10. What is the rate of reaction for releasing $CO_2(g)$ with aq. $NaHCO_3$ among following compounds?



(1)



(2)

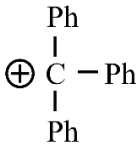


(3)

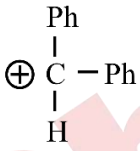
a) (1) > (2) > (3)
b) (3) > (2) > (1)
c) (1) > (3) > (2)
d) (2) > (3) > (1)

Ans: (b)

11. Correct order of stability of carbocations

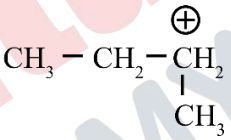


1)



2)

3)

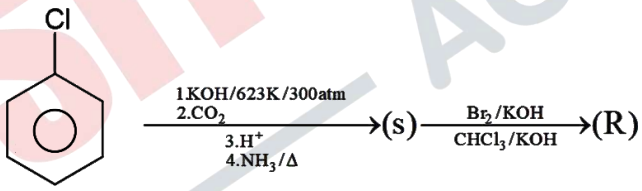


4)

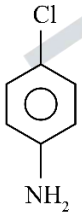
a) (3) > (1) > (2) > (4)
b) (1) > (2) > (3) > (4)
c) (3) > (4) > (2) > (1)
d)(2) > (1) > (3) > (4)

Ans: (a)

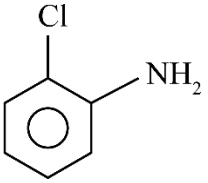
12. In the given reaction sequence:



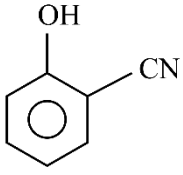
What is (R) ?



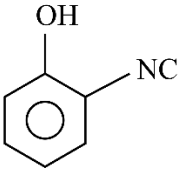
a)



b)



c)



d)

Ans: (d)

13. $H_2(g) + \frac{1}{2}O_2(g) \rightarrow H_2O_{(g)} \Delta H_f = -248$ kJ/mol. Bond energy of H_2 and O_2 are 222 & 250 kJ/mol respectively. What is bond energy of O – H bond?

a) 720 b) 645 c) 471 d) 567

Ans: (c)

14. Which gives borax bead test violet?

a) Ti^{+3} b) Ni^{+2} c) Mn^{+2} d) V^{+3}

Ans: (c)

15. 70% by mass solution of HNO_3 is taken having density 1.41gm/ml. Calculate molarity (Rounded off to nearest integer)

a) 16 b) 24 c) 12 d) 30

Ans: (a)

16. **Statement-1:** Glucose pentaacetate give 2-4DNP test

Statement-2 : Starch on heating with conc.sulphuric acid at 100°C and 2-3 atm gives glucose.

a) Both Statements are true b) Both Statements are false

c) Statement-1 is true and Statement-2 is false

d) Statement-1 is false and Statement-2 is true

Ans: (d)

17. Match the following column and choose the correct option.

	Column-I		**Column-II**
(A)	$H_2O_2 \rightarrow H_2O + O_2$	(P)	Combustion reaction
(B)	$NaH \rightarrow Na + H_2$	(Q)	Disproportionation
(C)	$CH_4 + O_2 \rightarrow CO_2 + H_2O$	(R)	Decomposition reaction
(D)	$Fe + CuSO_4 \rightarrow FeSO_4 + Cu$	(S)	Displacement reaction

a) A – (Q), B – (P), C – (R), D – (S) b) A – (R), B – (Q), C – (S), D – (P)

c) A – (Q), B – (R), C – (P), D – (S) d) A – (R), B – (Q), C – (P), D – (S)

Ans: (c)

18. The number of lone pairs in the most stable structure of ClF_3 are n, then compound that doesn't have the same number of unpaired electrons is ?

a) Ni^{+2} b) V^{+3} c) Ti^{+4} d) Ti^{+2}

Ans: (c)

19. A compound contains 14.4% of carbon, 1.8% of hydrogen and 64.46% of Chlorine by mass. The empirical formula of the compound

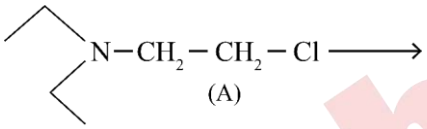
$(Cl-35.5, C-12, O-16, H-1)$

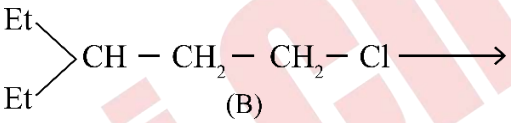
a) CH_3Cl b) C_2H_4Cl c) CH_2Cl_2 d) $CHCl_3$

Ans: (c)

20. Given below are two statements:

Statement-I





(A) give hydrolysis faster than (B).

Statement-II: Compound (A) first combined itself to give intramolecular bond.

In the light of the above statements, choose the most appropriate answer from the options given below:

(a) Both Statement I and Statement II are incorrect
(b) Statement I is correct but Statement II is incorrect
(c) Both Statement I and Statement II are correct
(d) Statement I is incorrect but Statement II is correct

Ans: (c)

21. Which of the following Oxidation reaction reactions are carried out by both $K_2Cr_2O_7$ and $KMnO_4$ in Acidic Medium

a) $I^- \rightarrow I_2$ b) $S^{2-} \rightarrow S$ c) $I^- \rightarrow IO_3^-$ d) $S_2O_3^{2-} \rightarrow SO_4^{2-}$

Ans: (a)

MATHEMATICS

1. If $f(x)=\frac{2^x}{2^x+\sqrt{2}}, x \in R$, then $\sum_{k=1}^{81} f\left(\frac{k}{82}\right)$ is equal to

   a) $81\sqrt{2}$ b) 82 c) $\frac{81}{2}$ d) 41

   Ans: (c)

2. $z_1=\sqrt{3}+2\sqrt{2}i$ & $\sqrt{3}|Z_1|=|Z_2|$ and $\arg(z_2)=\arg(z_1)+\frac{\pi}{6}$ then area of triangle with vertices z_1, z_2 and origin.

   a) $\frac{11\sqrt{3}}{4}$ b) $\frac{3\sqrt{2}}{5}$ c) $\frac{2\sqrt{3}}{5}$ d) $\frac{2\sqrt{5}}{7}$

   Ans: (a)

3. $\cos\left(\sin^{-1}\frac{3}{5}+\sin^{-1}\frac{5}{13}+\sin^{-1}\frac{33}{65}\right)$ is equal to:

   a) 0 b) 1 c) $\frac{32}{65}$ d) $\frac{33}{65}$

   Ans: (a)

4. Area of region $\{(x,y): 0 \le y \le 2|x|+1, 0 \le y \le x^2+1, |x| \le 3\}$

   a) $\frac{17}{3}$ b) $\frac{32}{3}$ c) $\frac{64}{3}$ d) $\frac{80}{3}$

   Ans: (c)

5. The relation $R=\{(x,y) \mid x,y \in z, x+y=\text{even}\}$ then R is

   a) Equivalence

   b) Reflexive & Transitive but-not Symmetric

   c) Symmetric & Transitive but not reflexive

   d) Reflexive & symmetric but not transitive

   Ans: (a)

6. $\int_0^x tf(t)dt = x^2 f(x)$, $f(2)=3, f(6)=?$

   a) 3 b) 0 c) 2 d) 1

   Ans: (d)

7. $y = \int_{-\pi/2}^{\pi/2} \frac{96x^2\cos 2x}{1+e^x} dx = (\alpha\pi^3 + \beta)$. Then $(\alpha + \beta)$ is equal to

a) 120 b) 100 c) 115 d) 120

Ans: (b)

8. The no. of different 5 digit numbers greater than 50000 than can be formed using the digits 0, 1, 2, 3, 4, 5, 6, 7 such that the sum of their first and last digits should not be more than 8, is

a) 5720 b) 4607 c) 4608 d) 5719

Ans: (b)

9. If the image of the point (4,4,3) in the line $\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-1}{3}$ is (α, β, r), then $(\alpha + \beta + r)$ is equal to

a) 12 b) 8 c) 9 d) 7

Ans: (c)

10. The sum of all local minimum values of the function

$$\begin{cases} 1-2x & x < -1 \\ \frac{1}{3}(7+2|x|) & -1 \le x \le 2 \\ \frac{11}{18}(x-4)(x-5) & x > 2 \end{cases}$$ is

a) $\frac{131}{72}$ b) $\frac{157}{72}$ c) $\frac{171}{72}$ d) $\frac{167}{72}$

Ans: (b)

11. The sum of squares of roots of equation $x^2 + |2x-3| - 4 = 0$

a) $6(3-\sqrt{2})$ b) $3(3-\sqrt{2})$ c) $6(2-\sqrt{2})$ d) $3(2-\sqrt{2})$

Ans: (c)

12. Let a_n be sequence, $a_0 = 0, a, = \frac{1}{2}$ and $2a_{n+2} = 5a_{n+1} - 3a_n, n = 0,1,2,\ldots$ then $\sum_{k=1}^{100} a_k$

a) $3a_{100} - 100$ b) $3a_{99} + 100$ c) $3a_{100} + 100$ d) $3a_{99} - 100$

Ans: (a)

13. Three defective oranges are accidently mixed with Seven good ones & on looking at them, it is not possible to differentiate between them. Two oranges are drawn at random from the lot. If x denote the number of defective oranges, then the variance of x is.

a) 4/75 b) 14/75 c) 28/75 d) 26/75

Ans: (c)

14. Let ${}^{n}C_{r-1} = 28$, ${}^{n}c_{r} = 56$ and ${}^{n}c_{r+1} = 70$, let A(4 cost, 4 sint), $B(2\sin t, -2\cos t)$ and $C(3r-n, r^2-n-1)$ be the vertices of a triangles ABC , where t is a parameter. If $(3x-1)^2 + (3y)^2 = \alpha$, is the locus of the centroid of triangle ABC , then α equates.

a) 20 b) 8 c) 48 d) 6

Ans: (a)

15. Let $f: R \to R$ be a function defined by $(x) = (2+3a)x^2 + \left(\frac{a+2}{a-1}\right)x + b$, $a \neq 1$, if $f(x+y) = f(x) + f(y) + 1 - \frac{2}{7}xy$, then the value of $28\sum_{i=1}^{5}|f(i)|$ is.

a) 675 b) 750 c) 545 d) 725

Ans: (a)

16. Let ABCD be a trapezium whose vertices lie on parabola $y^2 = 4x$. let the sides the AD and BC of the trapezium be Parallel to y -axis If the diagonal AC is of length $\frac{25}{4}$ and it Passes through the Point $(1,0)$ then the area of $ABCD$ is

a) $\frac{125}{8}$ b) $\frac{25}{2}$ c) $\frac{75}{8}$ d) $\frac{75}{4}$

Ans: (d)

17. Let $A(x,y,z)$ be point in xy plane, which is equidistant from three Points $(0,3,2), (2,0,3)$ and $(0,0,1)$. let $B(1,4,-1)$ and $C(2,0,-2)$. Then among the statements. S_1 =$\triangle$ ABC is an isosceles right angle triangle, and S_2 = the area of $\triangle$ ABC is $\frac{9\sqrt{2}}{2}$,

a) Only S_1 is true b) Both are false c) Only S_2 is true d) Both are true

Ans: (a)

18. Let T_r be the r^{th} term of an A.P. If for some $m, T_m = \frac{1}{25}, T_{25} = \frac{1}{20}$, and $20\sum_{r=1}^{25} T_r = 13$, Then $5m\sum_{r=m}^{2m} T_r$ is

a) 112 b) 90 c) 142 d) 126

Ans: (d)

19. Two numbers, k_1 and k_2 are randomly chosen from the set of natural numbers. Then, the probability that the value of $i^{k_1} + i^{k_2}, (i = \sqrt{-1})$ is non - zero, equal to

a) $\frac{2}{8}$ b) $\frac{1}{4}$ c) $\frac{3}{4}$ d) $\frac{1}{2}$

Ans: (c)

20. Let the equation of the circle, which touches x-axis at the point $(a, 0)$, $a > 0$ cuts off an intercept of length 'b' on y-axis be $x^2 + y^2 - \alpha x + \beta y + r = 0$. If the circle lies below x-axis, then the ordered pair $(2a, b^2)$ is equal to.

a) $(r, \beta^2 + 4\alpha)$ b) $(\alpha, \beta^2 - 4r)$ c) $(r, \beta^2 - 4\alpha)$ d) $(\alpha, \beta^2 + 4r)$

Ans: (b)

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