SINCE 1984

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STUDY CENTRE, PALA

JEE MAIN 2025

SESSION-1

SHIFT-1 MORNING

SCAN ME

VIDEO SOLUTION

MEMORY BASED QUESTIONS

1. Which of the following react with Hinsberg's reagent

A) Aniline

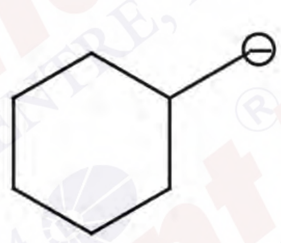
B) N, N-Dimethyl aniline

C) Methyl amine

D)$C_6H_5NHC_6H_5$

1) A, C and D 2) A and C only 3) A only 4) A and B only

2. Among the following, the most stable carbanion is

1)  2)  3)  4) 

3. Which of the following element doesn't lie on same period?

1) Iridium (Ir) 2) Platinum (Pt) 3) Osmium (Os) 4) Palladium (Pd)

4. Amount of Br_2 required for formation of 2, 4, 6-tribromophenol from 2 g phenol?

5. Statement 1 : Fructose can give tollens test even though it does not have aldehyde group.

Statement 2 : When reacted with base fructose can undergo rearrangement to produce aldehyde group

1) If both Statement 1 and Statement 2 are true and the Statement 2 is the correct explanation of the assertion

2) If both Statement 1 and Statement 2 are true but Statement 2 is not the correct explanation of the assertion

3) If Statement 1 is true but Statement 2 is false

4) If the Statement 1 and Statement 2 both are false

6. Incorrect statement among the following is:

1) NO_2 exists as dimer

2) PH_3 has lower proton affinity than NH_3

3) PF_5 exists but NF_5 does not

4) SO_2 act as oxidizing agent but not reducing agent

7. Which of the following compound can show fac-mer isomerism?

1) $[Co(NH_3)_3Cl_3]$ 2) $[Co(NH_3)_6]Cl_3$ 3) $[Co(H_2O)_6]Cl_3$ 4) $[Co(en)2(NH_3)_2]Cl_2$

8. Which of the following pair of ions are same coloured

1) Mn^{3+}, Fe^{2+} 2) Cr^{2+}, Cu^{2+} 3) Ti^{4+}, V^{3+} 4) Cr^{3+}, Ni^{2+}

9. Match the Column I with Column II and choose the correct option.

Column I		Column II	
A)	BF_3	(i)	Odd e^- species
B)	CCl_4, CO_2	(ii)	Expanded octet
C)	PCl_5, BrF_5	(iii)	Complete octet
D)	NO	(iv)	Electron deficient

10. Given below two statements:

Statement I : During Lassaigne's test, covalent compound is converted to ionic compound.

Statement II : $Na_4[Fe(CN)_6]$ gives Prussian blue colour on reaction with $Fe_2(SO_4)_3$.

1) Statement I is correct, Statement II is incorrect

2) Statement I is incorrect, Statement II is correct

3) Both Statement I and Statement II are correct

4) Both Statement I and Statement II

11. Co^{2+} is forming an octahedral complex with spin only magnetic moment 3.83 BM. Which of the following electronic configuration?

1) $t_{2g}^5 e_g^2$ 2) $t_{2g}^6 e_g^1$ 3) $t_{2g}^4 e_g^3$ 4) $e^4 t_2^3$

12. $A(g) \rightarrow 2B(g)$

For the given reaction initial pressure was 0.6 atm and rate constant is 4.606×10^{-2} sec^{-1}. Find the pressure at 100 sec

1) 0.6 atm 2) 1.194 atm 3) 0.594 atm 4) 0.006 atm

13. A particle of mass $m = 10^{-30}$ kg is moving with velocity $v = 2.21 \times 10^6$ m/s, then De-Broglie wavelength lies in range.

1) x rays 2) γ rays 3) visible rays 4) infrared rays

14. $Co(NH_3)_xCl_3$ has 0.1 molal. 100% Dissociation $\Delta T_f = 0.558 \left(k_f = 1.86\right)$. Then formula of compound is:

1) $[Co(NH_3)_5Cl]Cl_2$ 2) $[Co(NH_3)_3Cl_3$ 3) $[Co(NH_3)_2Cl_4]$ 4) None

15. For a sample of Hydrogen atom, the wavelength observed is 656 nm during a transition. The transition and series of wavelength will be

1) $3 \rightarrow 2$, Balmer 2) $4 \rightarrow 1$, Lyman 3) $5 \rightarrow 2$, Balmer 4) $4 \rightarrow 3$, Paschen

16. Correct order of stability

(i) 
Anti-Aromatic

(ii) 
Aromatic

(iii) 
Non-Aromatic

1) (i) > (ii) > (iii) 2) (ii) > (iii) > (i) 3) (ii) > (i) > (iii) 4) (iii) > (i) > (ii)

17. Match the column appropriately regarding thermodynamic process.

Column I		Column II	
(P)	When volume change is zero	(i)	$\Delta W = 0$
(Q)	When volume is constant	(ii)	$\Delta Q = 0$
(R)	When no heat is exchanged	(iii)	Isochoric
(S)	Work done by the gas is equal to heat given to the gas	(iv)	Isothermal

1) P(iv), Q(iii), R(i), S(ii)

2) P(i), Q(iii), R(ii), S(iv)

3) P(ii), Q(ii), R(iv), S(i)

4) P(ii), Q(iii), R(i), S(iv)

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Name Reaction		Product	
a)	Sandmeyer's	p)	Cyano Benzene
b)	Swarts	q)	Ethyl Fluoride
c)	Wurtz-Fittig	r)	Ethyl Benzene
d)	Finkelstein	s)	Ethyl Iodide

1) a (p), b(q), c(r), d(s)

2) a(q), b(r), c(p), d(r)

3) a(q), b(p), c(s), d(r)

4) a(r), b(p), c(q), d(s)

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23-01-2025 SHIFT 1-MORNING

MEMORY BASED QUESTIONS

MATHEMATICS

1. If f(x) is continuous at $x = 0$, where

$$f(x) = \begin{cases} \frac{2}{x}\left(\sin(k_1+1)x + \sin(k_2+1)x\right) & x < 0 \\ 4 & x = 0 \\ \frac{2}{x}\log\left[\frac{k_2x+1}{k_1+1}\right] & x > 0 \end{cases}$$

Then $k_1^2 + k_2^2$ is

2. If for an arithmetic progression, if first term is 3 and sum of four terms is equal to $\frac{1}{5}$ of the sum of next four terms, then the sum of first 20 terms is

1) 1080 2) 364 3) –1080 4) 364

3. Two baised dies are tossed. Die 1 has 1 on two faces, 2 on two faces, 3 and 4 on other faces, while die 2 has 2 on 2 faces, 4 on 2 faces and 1 and 3 on other faces. Then the probability that when throwing dices we get sum 4 or 5.

4. How many words can be formed from the word DAUGHTER such that any vowels are not together

1) 34000 2) 35000 3) 36000 4) 37000

5. Value of $\cos^{-1}\left[\frac{12}{13}\cos x + \frac{5}{13}\sin x\right]$ is $\left(x \in \left[\frac{\pi}{2}, \pi\right]\right)$

1) $x + \tan^{-1}\frac{12}{13}$ 2) $x - \tan^{-1}\frac{12}{13}$ 3) $x - \tan^{-1}\frac{5}{12}$ 4) $x + \tan^{-1}\left(\frac{4}{5}\right)$

6. If for the system of linear equations having infinite solutions $(\lambda-4)x + (\lambda-2)y + \lambda z = 0$

$2x+3y+5z=0$

$x+2y+6z=0$ then $\lambda^2 + \lambda$ is

7. A relation defined on set A= {1, 2, 3, 4}, then how many ordered pairs are added to R={(1,2),(2,3),(3,3)} so that becomes equivalence relation?

1) 10 2) 9 3) 7 4) 8

8. The sum of all rational terms in the expansion of $\left(1 + 2^{\frac{1}{3}} + 3^{\frac{1}{2}}\right)^6$ is

9. If $\left|\frac{z}{z+i}\right| = 2$ represents a circle with centre P then distance of P from D is (where D:(1,5))

1) $\sqrt{\frac{\sqrt{360}}{9}}$ 2) $\sqrt{\frac{370}{9}}$ 3) $\frac{\sqrt{370}}{9}$ 4) $\frac{\sqrt{360}}{9}$

10. If the equation $a(b-c)x^2 + b(c-a)x + c(a-b) = 0$ has equal roots and if $a + c = 5$ and $b = \frac{16}{5}$, then the value of $a^2 + c^2$ is equal to

11. let $I = \int \frac{dx}{(x-1)^{\frac{11}{13}}.(x+15)^{\frac{15}{13}}}$, then l is

12. If the curve satisfying the different equation $\frac{dy}{dx} = \frac{6 - 2e^{2x}y}{1+e^{2x}}$ passes through (0, 0) and (In 2, k), then k is

1) $\frac{3}{5} l\text{n}$ 2) $\frac{6}{5} l\text{n}2$ 3) $\frac{8}{9} l\text{n}3$ 4) $\frac{7}{2} l\text{n}\,2$

13. Let A and B are non-singular commutative matrices. Then $A\left[\left(\text{adj}A^{-1}\right)\left(\text{adj}\left(B^{-1}\right)\right)\right]^{-1} B$ is equal to

1) $|A||B|\ I_n$ 2) $\frac{I_n}{|A||B|}$ 3) $\frac{I_n}{|A|}\frac{I_n}{|A|}$ 4) $\frac{I_n}{|B|}$

14. The area of larger portion enclosed by curves $y = |x-1|$ and $x^2 + y^2 = 25$ is equal $\frac{1}{4}(a\pi + \beta)$ (where α, β are natural numbers), then $\alpha + \beta$ equal to

15. Let $f(x) = \log_e x$ and $g(x) = \left(\frac{2x^4 - 2x^3 - x^2 + 2x - 1}{2x^2 - 2x + 1}\right)$, then domain of f(g(x)) for $x > 0$ is

1) $(1, \infty)$ 2) $(0, \infty)$ 3) $\left(\frac{1}{2}, \infty\right)$ 4) (0, 1)

16. Area of the triangle with the vertices P(5,4), Q(–2,4), R (a, b) is 35 square units. If orthocentre of this triangle is $\left(2, \frac{14}{5}\right)$ and centroid is C(c, d) then (c+2d) is equal to

1) 3 2) 7/3 3) 2 4) 8/3

17. Marks obtained by all the students of class 12th are in a frequency distribution with classes of equal width. Let the median of the group data be 14 with median class interval 12–18 and the median class frequency is 12. If the number of students who secures marks below 12 is 18 then the total number of students is

1) 48 2) 52 3) 44 4) 40

18. Let a curve $y = f(x)$ passes through the points (0,5) and ($\log_e 2$, k). If the curve satisfies the differential equation $2(3 + ye)\, e^{2x}\, dx - (7+e^{2x})\, dy = 0$. Then k is equal to

1) 4 2) 2 3) 5 4) 8

19. Value of $\sin 70^\circ \left(\cot 10^\circ \cot 70^\circ - 1\right)$ is

1) 3 2) 5 3) 7 4) 1

20. Consider the set S = {1, 2, 3, ..., 1000}. Then the number of arithmetic progression that can be formed using elements of set S such that first term is 1 and last term is 1000 is

1. $F = x^2yi + y^2j$, on line $x + y = 10$, work done from(0, 0) to (4, 2)

2. A positive ion A and a negative ion B have charges 6.67×10^{-9}C and $9.6 + 10^{-10}$ C and mass 19.2×10^{-1}kg and 9×10^{-27}kg respectively at an instant, the ions are separated by a certain distance r. At that instant the ratio of the magnitudes of electrostatic force to gravitational force $P \times 10^{43}$, where value of P is ----- Take $\frac{1}{4\pi\varepsilon_0} = 9\times10^9 Wm^2C^{-1}$ and universal gravitational constant as $6.67 \times 10^{-11}Nm^{-2}kg^{-2}$.

3. A solid sphere of mass m and radius r rolls down an inclined plane with an angle 30°from horizontal. The velocity with which it reaches the ground is V_1. Given that length of incline is L and its value remains same. If the angle of inclination changes to 45°, the ball reaches with velocity v_2 . Find the ratio $\left(\frac{V_2}{V_1}\right)^2$

4. Stat 1: hotter moves faster than cold water.

   Stat 2: soap water have higher surface tension than fresh water.

5. Two particles are located at equal distance from origin. The position vectors of those are represented by $\vec{A} = 2\hat{i} + 3n\hat{j} + 2\hat{k}$ and $\vec{B} = 2\hat{i} - 2\hat{j} + 4p\hat{k}$ respectively. If both the vectors are at righ angle to each other, the value of n^{-1} is.

6. Electric flux ϕ is related with linear charge density λ and surface charge density σ as $\phi = \alpha\lambda + \beta\sigma$, where a and b are of appropriate dimensions (β / α) is

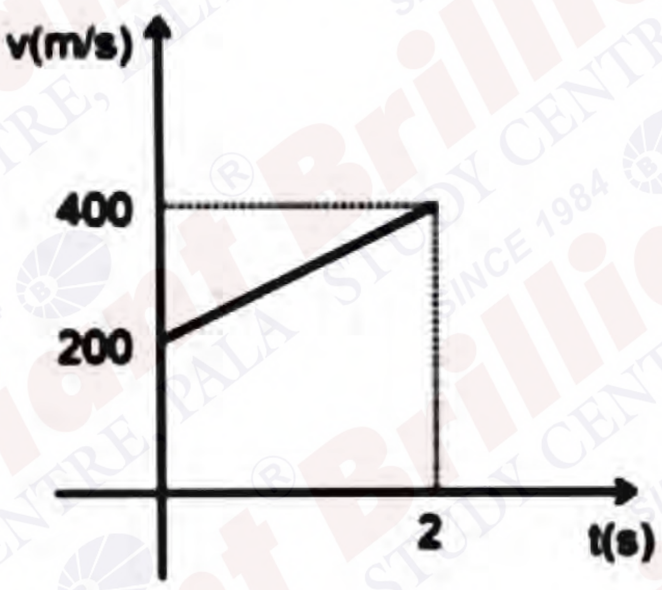
   1) Displacement 2) Area 3) Electric field 4) Velocity

7. $x(t) = A\cos t + B\cos^2 t + Ct^2 + D$ where x is displacement and t is time Find the dimension of ABC/D

   1) $L2^2$ 2) L^2T^{-2} 3) LT^{-2} 4) L^3T

8. A gas at 0°C, is reduced to 1/4 of its volume adiabatically. Change temperatue is k.(y = 3/2).

9. For given velocity-time (v – t) graph, find distance travelled at 0.5 sec



1) 125m 2) 112.5m 3) 137.5m 4) 150m

14. Self inductance depends on

1) only on geometry

2) only on medium property

3) Geometry and medium property

4) Value of current through inductor

15. Find the equation of magnetic field for the given equation of electric field (for EM wave)

$$\vec{E} = E_0(4\hat{i} - 3\hat{j})\cos(\omega t - kz)$$

1) $\vec{B} = \frac{E_0}{C}(3\hat{i} + 4\hat{j})\cos(\omega t - kz)$

2) $\vec{B} = \frac{E_0}{C}(-3\hat{i} - 4\hat{j})\cos(\omega t - kz)$

3) $\vec{B} = \frac{E_0}{C}(3\hat{i} - 4\hat{j})\sin(\omega t - kz)$

4) $\vec{B} = \frac{E_0}{C}(-3\hat{i} - 4\hat{j})\sin(\omega t - kz)$

16. For the circuit shown below

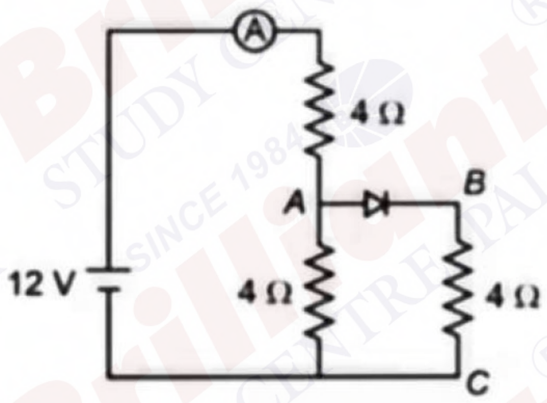
A) Current in an ammeter is 2A

B) Net resistance is 8Ω

C) Voltage across BC is 4V

D) Current through diode is 1A

Choose the correct option



1) Only A, B, C are correct

2) Only A, C, D are correct

3) Only A, B, D are correct

4) Only A, D are correct

17. Find the time period of a cube of side length 10cm and mass 10g oscillating in water. (Density of water = 10^3/kg/m^3 and g = 10m/s^2)

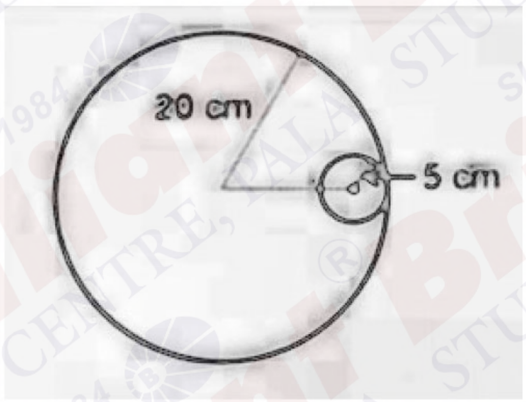
1) $\frac{\pi}{25}$ second

2) $\frac{\pi}{50}$ second

3) $\frac{\pi}{100}$ second

4) $\frac{2\pi}{25}$ second

18. From a uniform circular disc of radius 20cm a circular portion of radius 5cm is removed. The shift in the position of centre of mass (in cm).

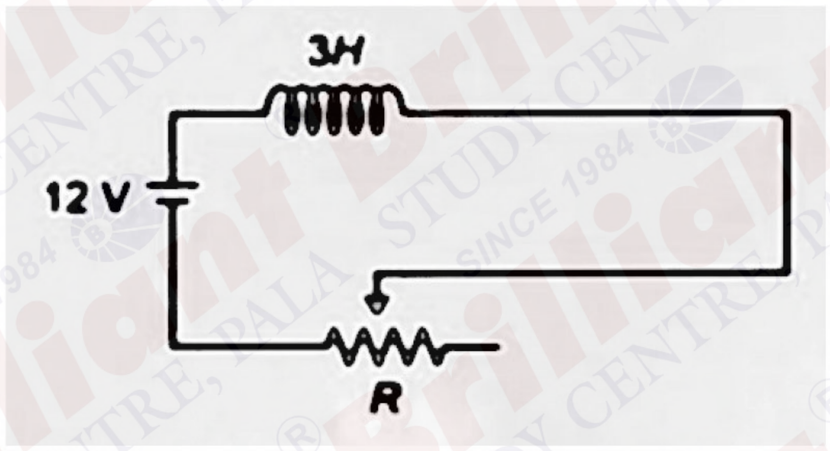


19. Adiabatic constant of a gas is $\frac{3}{2}$. If volume of gas initially at 0^oC is reduced to one fourth of the original volume then the new temperatue is

1) 0K 2) 273K 3) 546^oK 4) 546K

20. A bullet of kinetic energy of 125J strikes a lead block where temperature rises by 50^oC. If specific heat of lead is $0.1J/g\text{-}^oC$ then mass of lead block is (Assume half of kinetic energy of bullet is converted to heat) m gram then 2m is

21. In given DC circuit, find current for R = 12Ω in steady state.



1) 2A 2) 1A 3) 3A 4) 4A

22. Match the column appropriately regarding thermodynamic process.

	Column I		Column II
(P)	When volume change is zero	(i)	$\Delta W = 0$
(Q)	When volume is constant	(ii)	$\Delta Q = 0$
(R)	When no heat is exchanged	(iii)	Isobaric
(S)	Work done by the gas is equal to heat given to the gas	(iv)	Isothermal

1) P(iv), Q(iii), R(i), S(ii) 2) P(i), Q(iii), R(ii), S(iv)

3) P(ii), Q(iii), R(iv), S(i) 4) P(ii), Q(iii), R(i), S(iv)

23. Statement 1: Hot water is less viscous than of cold water

Statement 2 : Surface tension of soap bubble is more than that of a drop of water

1) Statement 1 is true and 2 is false

2) Statement 2 is true and 2 is true

3) Statement 1 is fale and 2 is true

4) State is 1 is false and 2 is false

24. A particle of mass $m = 10^{-30}kg$ moving with velocity $v = 2.21 \times 10^6$ m/s. then De-Broglie wavelength lies in range

1) x rays

2) γ rays

3) visible rays

4) infrared rays

25. Heat treatment of muscular pain involves radiation of wavelength of about 900 nm. Which spectral line of H-atom is suitable for this purpose?

1) Lyman (∞ to 1)

2) Balmer (∞ to 2)

3) Paschen (0 to 3)

3) Paschen (5 to 3)