Sri Chaitanya Educational Institutions | Infinity Learn

38 Years of Excellence 1986-2023

The BEST Results in India!
Dominant! Unparalleled!

ALL INDIA RANKS IN JEE-ADV 2022

D JOHN JOSEPH | H.T.NO: 6036441*

JEE MAIN (JAN) 2023 (30-01-2023-Session-1)

Memory Based Question Paper

MATHEMATICS, PHYSICS & CHEMISTRY

Sri Chaitanya IIT Academy.,India.
A.P T.S KARNATAKA TAMILNADU MAHARASTRA DELHI RANCHI
ICON Central Office - Madhapur – Hyderabad

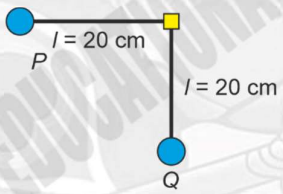
30-01-23_JEE Mains 2023_Shift-1_Questions Based on Memory

PHYSICS

1. Bullet mass 20 g hits the ball 200 g mass which is at 20 m height. let the collision be elastic Ball falls on ground at 30 m and bullet falls on ground at 120 m from the foot of Pole. Find the initial velocity of bullet.

Ans. 360 m/sec

2. Bob P is released from the position of rest at the moment shown. If it collides elastically with an identical bob Q hanging freely then velocity of Q just after collision is $(g = 10\ m/s^2)$



Ans. 2 m/s

3. Two conducting solid spheres A and B are placed at a very large distance with charge densities and radii as shown. When the key K is closed, find the ratio of final charge densities.

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

Ans. (c)

4. For a system undergoing isothermal process, heat energy is supplied to the system. Choose the option showing correct statements.

1) Internal energy will increase.
2) Internal energy will decrease.
3) Work done by system is positive.
4) Work done by system is negative.
5) Internal energy remains constant.

a) (1), (3), (5)
b) (2), (4)
c) (3), (5)
d) (1), (4), (5)

Ans. (c)

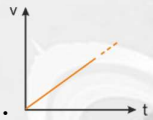
5. The heat passing through the cross-section of a conductor, varies with time 't' as Q (t)=αt – βt^2 +γt (α,β and γ are positive constants). The minimum heat current through the conductor is

1. $\alpha - \frac{\beta^2}{2\gamma}$
2. $\alpha - \frac{\beta^2}{3\gamma}$
3. $\alpha - \frac{\beta^2}{4\gamma}$
4. $\alpha - \frac{3\beta^2}{\gamma}$

Ans. (2)

6. Position-time graph for a particle is parabolic and is as shown:
Choose the corresponding $v - t$ graph.

1. 

2. 

3. 

4. 

Ans. (2)

7. A particle moving in unidirectional motion travels half of the total distance with a constant speed of 15 m/s. Now first half of the remaining journey time, it travels at 10 m/s and second half of the remaining journey time, it travels at 5 m/s. Average speed of the particle is:

Ans.10 m/s

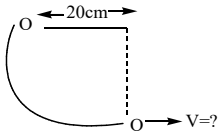
8. Electromagnetic wave beam of power 20 mW is incident on a perfectly absorbing body for 300 ns. The total momentum transferred by the beam to the body is equal to

Ans. 2×10^{-17} Ns

9. If an insulator with inductive reactance $\chi_L = R$ is connected in series with resistance R across an A. C. Voltage, power factor comes out to be P_1. Now, if a capacitor with capacitive reactance $\chi_C = R$ is also connected in series with the inductor and resistor in the same circuit, power factor becomes P_2. Find P_1/P_2.

Ans. $(1:\sqrt{2})$

10. Bob P is released from the position of rest of the moment shown. If it collides with bob Q hanging freely then velocity of Q just after collision. Balls are of equal mass.

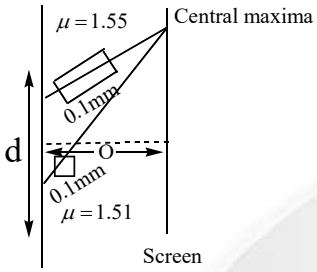


Ans. (2 m/s)

11. Poison's ratio can be expressed in terms of bulk modules (k) and modules of rigidity (η) as?

Ans: $\boldsymbol{r = \frac{3k-2\eta}{2\eta+6k}}$

12.



For the given YDSE setup, find the number of fringes by which the central maxima gets shifted from point 0 . (Given $d = 1\text{mm}, \text{D} = 1\text{ m}, \lambda = 500\bar{A}$)

Ans: 10

13. An object is placed at a distance of 40 cm, from the pole of a converging mirror. The image is formed at a distance of 120 cm from the mirror on the same side. The focal length is measured with a scale where each 1 cm has 20 equal divisions. If the fractional error in the measurement of focal length is$1/10K$, then find K.

Ans: 60

14. A bullet of mass 10g strikes a stationary ball kept at a height as shown. After collision, range of bullet is 120 m and that of ball is 30 m. Find initial speed of bullet. Collision is along horizontal direction. (Take $g = 10\text{ m/s}^2$)

a) 150 m/s
b) 90 m/s
c) 240 m/s
d) 360 m/s

Ans: d

Chemistry

1. Which of the following acts as an Inhibitor for Cancer growth

(a) Cisplatin

(b) EDTA

(c) Cobalt

(d) Ethane 1,2-Diamine

Ans (a)

2. Speed of e^- in 7^{th} orbit is 3.6×10^6 m/s then find speed in 3^{rd} orbit

a) $3.6 \times \frac{10^6\ \text{m}}{\text{s}}$

b) $8.4 \times \frac{10^6\ \text{m}}{\text{s}}$

c) $7.5 \times \frac{10^6\ \text{m}}{\text{s}}$

d) 1.8×10^6 m/s

Ans (b)

3. Caprolactum when heated at high temperature gives:

1) Nylon 6,6
2) Dacron
3) Teflon
4) Nylon 6

Ans: (4)

4. Molarity of CO_2 in soft drink is 0.01M. The volume of soft drink is 300 mL. Mass of CO_2 in soft drink is:

(a) 0.132 g

(b) 0.481 g

(c) 0.312 g

(d) 0.190 g

Ans: (a)

5. During the qualitative analysis of SO_3^{2-} using dilute H_2SO_4, SO_2 gas evolved which turns $K_2Cr_2O_7$ solution _____

(a) Green

(b) Black

(c) Blue

(d) Red

Ans:(a)

6. Which of the following is water soluble

a) $BeSO_4$ b) MgSO c) $CaSO_4$ d) $SrSO_4$ e) $RaSO_4$

1) only a and b
2) only a, b and c
3) only d and e
4) only a and e

Ans: (1)

7. Match the following no. of lone pairs of central atom

Column I		Column II	
(A)	IF_7	(p)	0
(B)	ICl^-_4	(q)	1
(C)	XeF_2	(r)	2
(D)	XeF_6	(s)	3

(a) A-p; B-q; C-r; D-s (b) A-p; B-r; C-s; D-q
(c) A-r; B-s; C-p; D-q (d) A-s; B-r; C-q; D-p

Ans: (b)

8. Shape of OF_2

A) Bent B) Linear C) Tetrahedral D) T- Shaped

Ans: (a)

9. Consider the following reactions.

$$NO_2 \xrightarrow{UV} A + B$$
$$A + O_2 \longrightarrow C$$
$$B + C \longrightarrow NO_2 + O_2$$

Find A, B and C respectively.

a) O, NO, O_3 b)NO, O_2, O_3 c)NO, O_3, O d) O_3, O, NO

Ans: (a)

10. Match the following

Atomic no.			
(A)	52	(p)	s block
(B)	37	(q)	p block
(C)	65	(r)	d block
(D)	74	(s)	f block

(a) (i)-q, (ii)-p, (iii)-r, (iv)-s (b) (i)-q, (ii)-p, (iii)-s, (iv)-r
(c) (i)-s, (ii)-r, (iii)-p, (iv)-q (d) (i)-r, (ii)-p, (iii)-q, (iv)-s

Ans: (b)

11. Which of the following is an Antacid

a. Meprobamate B. Brompheniramine

c. Terfenadine D. Rantidine

12. A solution of 2 g of a solute and 20 g water has boiling point 373.52 K. Then find the molecular mass of solute?
[given: $K_b = 0.52 Kkg/$ mole and solute is non-electrolyte]

Ans: 100g

13.Which of following ion belong to group iv of salt analysis

A) CO^{+2} B) Fe^{+3} C) Hg^{+2} D) Ca^{+2}

14. Which if the following does not belong to group IV of classification of cations in qualitative analysis?

A) Zn^{+2} B) CO^{+2} C) Fe^{+3} D) Ni^{+2}

15. How many electrons transfer in the conversation of paramagnetic ion to manganese dioxide in acidic medium?

16. How can lithium aluminum hydride be synthesized?

A) $Li + Al + H_2$ B) $LiCl + Al(OH)_3$ C) $LiH + Al_2Cl_6$ D) $LiCl + Al_2H_6$

17. If volume of ideal gas is increased isothermally than its internal energy

Ans: Remain constant

Maths

1. $\lim_{x\to 0} 48 \frac{\int_0^x \frac{t^3}{(1+t^2)}}{x^4}$

Ans.12

2. Coff of $x^{301} in (1+x)^{600} + x(1+x)^{499} + x^2(1+x)^{498} + - - - + x^{500}$

Ans. $^{501}C_{301}$

3. $\tan 15^0 + \frac{1}{6+15^0} + \frac{1}{-6+1^{\ 0}} + \tan 195^0 = 2a$ Then $a + \frac{1}{a} = ?$

Ans. a=Tan 15

4. $a_n = \frac{-2}{4n^2+16n+15}$ Find $a_1 + a_2 + - - - - - a_n$

Ans. 191

6. If $z = 1 + iz_1 = \frac{i+\bar{z}(1-i)}{\bar{z}(1+z)}$, then the value of $\frac{12}{\pi}\arg(z_1)$ is___.

Ans: 3

7. Let $P(h,k)$ be any two points on $x^2 = 4y$ which is at shortest distance from $Q(0,33)$, then difference of distances of $P(h,k)$ from directrix of $y^2 = 4(x+y)$ is:
(a) 2 (b) 4 (c) 6 (d) 8

Ans. (B)

8. $\frac{4}{x^3}\int_0^x \frac{t^3}{1+t^6}dt$

Ans.

9. $\frac{3(e-1)}{e}\int_1^2 x^2 e^{[x]+[x^3]}dx$

Ans. $e^8 - C$

10. Using the digits 1, 2, 3, 5 no. of 4 digit numbers that can be formed which are divisible by 15. (repetation allowed)

11. A die with points 2, 1, 0, -1, -2, 3 is throw 5 times. The probability that product of outcomes on all throws is positive is_____.

Ans. $\frac{521}{2592}$

12 $\tan 15^0 + \frac{1}{\tan 75^0} + \frac{1}{\tan 105^0} + \tan\left(195^0\right) = 2a$ Now $a + \frac{1}{a} = ?$

13. The larger area bounded by $y^2 = 8x, x = y$ and $x = 2$ in the first quadrant is?

14. If $y = x + 2, 3y = 4x + 1$ and $4y = 3x + 6$ are three tangent lines to the circle $(x-h)^2 + (y-k)^2 = r^2$, find h+k