

# FIITJEE - JEE (Main)

PHYSICS, CHEMISTRY & MATHEMATICS

BATCH: NWCMPA425A1

PHASE TEST – III

Q.P. CODE: 100876

Time Allotted: 3 Hours

Maximum Marks: 300

- Do not open this Test Booklet until you are asked to do so.
- Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.

## Important Instructions

**Caution: Question Paper CODE as given above MUST be correctly marked in the answer OMR sheet before attempting the paper. Wrong CODE or no CODE will give wrong results.**

### A. General Instructions

- Attempt ALL the questions. Answers have to be marked on the OMR sheets.
- This question paper contains **Three Sections**.
- Section-I** is Physics, **Section-II** is Chemistry and **Section-III** is Mathematics.
- Each **Section** is further divided into **Two Parts: Part-A & B** in the OMR.
- Rough spaces are provided for rough work inside the question paper. No additional sheets will be provided for rough work.
- No candidate is allowed to carry any textual material, printed or written, bits of papers, clip boards, log tables, slide rule, calculator, cellular phones, pagers and electronic devices ext. except the Admit Card inside the examination hall / room.

### B. Filling of OMR Sheet:

- Ensure matching of OMR sheet with the Question paper before you start marking your answers on OMR sheet.
- On the OMR sheet, darken the appropriate bubble with **Blue/Black Ball Point Pen** for each character of your Enrolment No. and write in ink your Name, Test Centre and other details at the designated places.
- OMR sheet contains alphabets, numerals & special characters for marking answers.
- Do not fold or make any stray marks on the Answer Sheet.**

### C. Marking Scheme for All Two Parts:

- Part-A (01-20)** – Contains Twenty (20) multiple choice objective questions which have four (4) options each and only one correct option. Each question carries **+4 marks** which will be awarded for every correct answer and **-1 mark** will be deducted for every incorrect answer.
- Part-B (01-05)** contains five (05) Numerical based questions, the answer of which maybe positive or negative numbers or decimals **Two decimal Places** (e.g. 6.25, 7.00, -0.33, -.30, 30.27, -127.30) and each question carries **+4 marks** for correct answer and **there will be no negative marking.**

Name of the Candidate : \_\_\_\_\_

Batch : \_\_\_\_\_ Date of Examination : \_\_\_\_\_

Enrolment Number : \_\_\_\_\_

# Physics

## PART – A

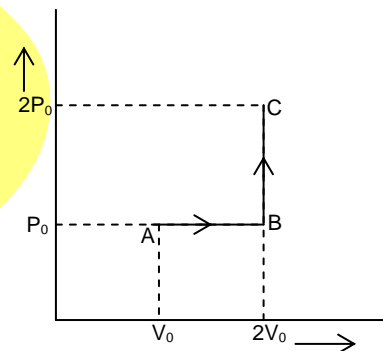
### Straight Objective Type

This part contains **20 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

- A wire of length  $\ell$  metres carrying a current  $I$  amperes is bent in the form of a circle. The magnitude of the magnetic moment is  
 (A)  $\frac{\ell I^2}{2\pi}$                       (B)  $\frac{\ell I^2}{4\pi}$                       (C)  $\frac{\ell^2 I}{2\pi}$                       (D)  $\frac{\ell^2 I}{4\pi}$
- If  $r$  is adiabatic exponent of a perfect gas. The no. of degree of freedom of a molecule of the gas is  
 (A)  $\frac{21}{2}(r-1)$                       (B)  $\frac{3r-1}{2r-1}$                       (C)  $\frac{2}{r-1}$                       (D)  $\frac{9}{2}(r-1)$
- Escape velocity of a body from earth is about 11km/sec. Assuming the mass and radius of the earth to be about 81 and 4 times the mass and radius of the moon the escape velocity in km/sec from the surface of the moon will be  
 (A) 0.54    (B) 2.44  
 (C) 11    (D) 49.5

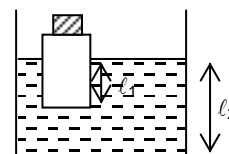
- One mole of an ideal monoatomic gas is taken from A to C along the path ABC. The temperature of the gas at A is  $T_0$ . For the process ABC (where  $R$  is gas constant)

- Heat absorbed by the gas is  $\frac{11}{12}RT_0$
- Heat absorbed by the gas is  $\frac{11}{2}RT_0$
- Work done by the gas  $> RT_0$
- Change in internal energy of gas is  $\frac{7}{2}RT_0$



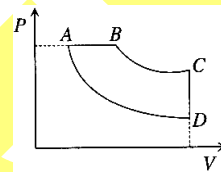
- An air cube floats in water in a vessel as shown in the figure. A metal piece is kept over it. If metal pieces drops into water then?

- $l_1$  decreases,  $l_2$  increases
- $l_2$  decrease  $l_1$  remain unchanged
- $l_1$  and  $l_2$  both increase
- $l_1$  and  $l_2$  both decrease



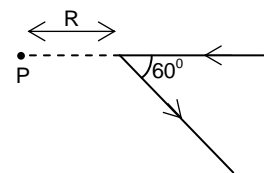
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6. If a dc of value of  $I$  amp is superimposed on an alternating current  $i = I_0 \sin \omega t$  flowing through a wire, the effective value of the resulting current in the circuit is  
 (A)  $(I^2 + I_0^2)^{1/2}$  (B)  $(I_0^2 + \frac{I^2}{2})^{1/2}$  (C)  $[I^2 + \frac{1}{2}I_0^2]^{1/2}$  (D)  $(I + \frac{I_0}{2})^{1/2}$
7. Two bodies of masses  $m_1$  and  $m_2$  are initially at rest placed infinite distance apart. They are then allowed to move towards each other under mutual gravitational attraction. Their relative velocity when they are  $r$  distance apart is  
 (A)  $\sqrt{\frac{2G(m_1 + m_2)}{r}}$  (B)  $\sqrt{\frac{2Gm_1m_2}{(m_1 + m_2)r}}$  (C)  $\sqrt{\frac{G(m_1 + m_2)}{r}}$  (D)  $\sqrt{\frac{Gm_1m_2}{(m_1 + m_2)r}}$
8. An electron enters a magnetic field acting vertically downwards with a velocity  $v$  from east. The electron is deflected along  
 (A) northwest (B) south (C) northeast (D) southeast
9. A cyclic process ABCDA, starting from A and moving clockwise is shown in the following P-V diagram. Which of the following curves represents the same process?



- (A)
- (B)
- (C)
- (D)

10. A wire of length '2R' straight wire, carrying a current  $i$  is bent at its mid point to form an angle of  $60^\circ$ . AT a point P, distance R from the point of bending the magnitude of the magnetic field is  
 (A)  $\frac{(\sqrt{2} - 1)\mu_0 i}{4\pi R}$  (B)  $\frac{(\sqrt{2} + 1)\mu_0 i}{4\pi R}$   
 (C)  $\frac{(\sqrt{3} - 1)\mu_0 i}{4\sqrt{3}\pi R}$  (D)  $\frac{(\sqrt{3} + 1)\mu_0 i}{8R}$



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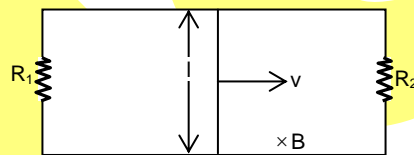
11. The workdone in slowly lifting a body from earth's surface to a height R (radius of earth) is equal to two times the workdone in lifting the same body slowly from earth's surface to a height h. Here h is equal to

- (A)  $\frac{R}{6}$                       (B)  $\frac{R}{4}$                       (C)  $\frac{R}{3}$                       (D)  $\frac{R}{2}$

12. A metallic sphere floats in immiscible mixture of water (density  $10^3 \text{ kg/m}^3$ ) and a liquid (density  $8 \times 10^3 \text{ kg/m}^3$ ) such that its (2/3) part is in water and (1/3) part in the liquid. The density of the metal is

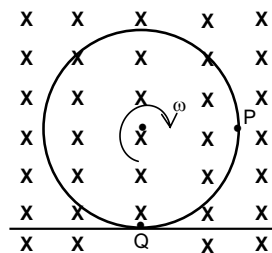
- (A)  $\frac{5000}{3} \text{ kg/m}^3$                       (B)  $\frac{10000}{3} \text{ kg/m}^3$   
 (C)  $5000 \text{ kg/m}^3$                       (D)  $2000 \text{ kg/m}^3$

13. A rectangular loop with a slide wire of length l is kept in a uniform magnetic field as shown in figure. The resistance of slider is R. neglecting self inductance of the loop find the current in the connector during its motion with a velocity v.



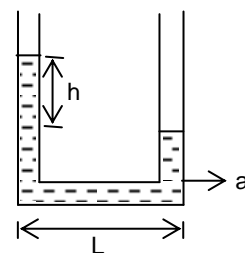
- (A)  $\frac{Blv}{R_1 + R_2 + R}$                       (B)  $\frac{Blv(R_1 + R_2)}{R + (R_1 + R_2)}$   
 (C)  $\frac{Blv(R_1 + R_2)}{RR_1 + RR_2 + R_1R_2}$                       (D)  $Blv \left( \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \right)$

14. A conducting ring of radius 'r' is rolling without slipping with a constant angular velocity  $\omega$ . If the magnetic field strength is B and is directed into the page, then emf induced across PQ is



- (A)  $\frac{B\omega r^2}{2}$                       (B)  $B\omega r^2$   
 (C)  $4B\omega r^2$                       (D)  $\frac{B\omega r^2}{4}$

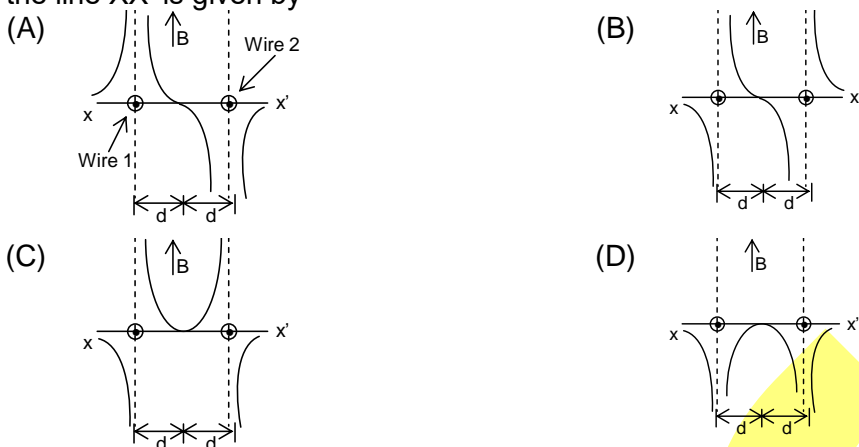
15. When at rest, a liquid stands at the same level in the tubes shown in figure. But as indicated a height difference h occurs when the system is given an acceleration a towards the right. Here h is equal to



- (A)  $\frac{aL}{2g}$                       (B)  $\frac{gL}{2a}$   
 (C)  $\frac{gL}{a}$                       (D)  $\frac{aL}{g}$

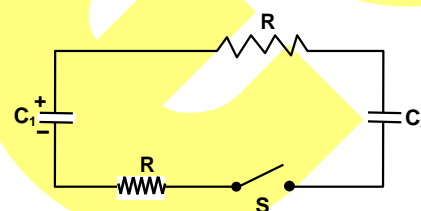
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16. Two long parallel wires are at a distance  $2d$  apart. They carry steady equal currents flowing out of the plane of the paper, as shown in figure. The variation of the magnetic field  $B$  along the line  $XX'$  is given by



17. In the circuit shown in the figure  $C_1 = 2C_2$ , capacitor  $C_1$  is initially charged to a potential of  $V$ . The current in the circuit just after the switch  $S$  is closed is

- (A) Zero (B)  $2V/R$   
 (C) Infinite (D)  $V/2R$

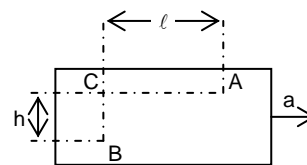


18. If there are no heat losses, the heat released by the condensation of  $x$  g of steam at  $100^\circ\text{C}$  into water at  $100^\circ\text{C}$  can be used to convert  $y$  g of ice at  $0^\circ\text{C}$  into water at  $100^\circ\text{C}$ . Then ratio  $y : x$  is nearly

- (A) 1 : 1 (B) 2 : 1 (C) 3 : 1 (D) 2.5 : 1

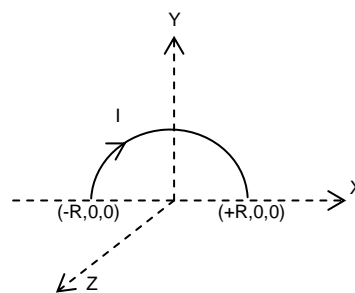
19. A sealed tank containing a liquid of density  $\rho$  moves with a horizontal acceleration  $a$ , as shown in the figure. The difference in pressure between the points A and B is

- (A)  $h\rho g$  (B)  $l\rho a$   
 (C)  $h\rho g - l\rho a$  (D)  $h\rho g + l\rho a$



20. A semi circular current carrying wire having radius  $R$  is placed in  $x - y$  plane with its centre at origin 'O'. there is non uniform magnetic field  $\vec{B} = \frac{B_0 x}{2R} \hat{k}$  ( here  $B_0$  is +ve constant) is existing in the region. The magnetic force acting on semi circular wire will be along

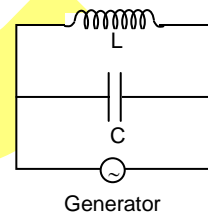
- (A)  $-x$  - axis (B)  $+y$  - axis (C)  $-y$  - axis (D)  $+x$  - axis



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**PART-B**  
**Numerical Type**

- Two soap bubbles of radii 2 mm and 4 mm are brought in contact. If the surface tension of liquid is  $7 \times 10^{-2} \text{ Nm}^{-1}$ . Then the radius of the common surface is  $r \times 10^{-2}$  (m). Find the value of 'r'.
- One mole of an ideal gas at temperature  $T_1$  expands according to the law  $\frac{P}{V^2} = a$  (constant). The work done by the gas till temperature of gas becomes  $T_2$  is  $nR[T_2 - T_1]$  then n is:
- An ornament weighing 5g in air, weighs only 4.6g in water. Assuming that some copper is mixed with gold to prepare that ornament find the amount of copper (in gm) in it. Specific gravity of gold and copper is 20 and 10 respectively
- The escape velocity for a planet is  $V_e$ . A tunnel is dug along a diameter of the planet and a small body is dropped into it at the surface. When the body reaches the centre of the planet, its speed will be  $\frac{V_e}{\sqrt{k}}$ , then find the value of 'k'.
- For the circuit shown in the figure, the current through the inductor is 0.6 A, while the current through the capacitor is 0.4 A. The current (in ampere) drawn from the generator is



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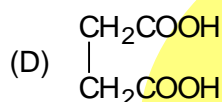
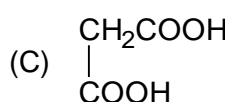
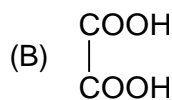
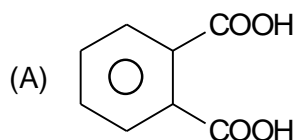
# Chemistry

## PART – A

### Straight Objective Type

This part contains **20 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

1. Which of the following substance on heating forms a monocarboxylic acid?



2.  $\text{CH}_3\text{CH}_2\text{CONH}_2 + \text{Br}_2 \xrightarrow{\text{KOH}} \text{CH}_3\text{CH}_2\text{NH}_2$

The correct statement regarding the above reaction is:

- (A) carbocation intermediate is formed in the reaction  
 (B) one mole of  $\text{OH}^-$  ions is consumed in the reaction  
 (C) addition of bromine takes place across  $\text{C}=\text{O}$  bond  
 (D) the boiling point of the organic reactant is higher than that of the organic product

3.  $\text{C}_6\text{H}_{12}\text{O}_6$  is the formula of

- (A) starch  
 (B) a monosaccharide  
 (C) sugar  
 (D) a disaccharide

4.  $\text{NH}_4\text{NO}_2 \xrightarrow{\Delta} \text{N}_2 + 2\text{H}_2\text{O}$

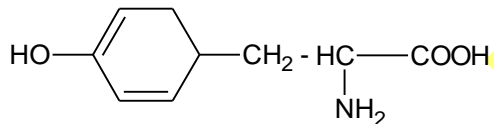
What is the n-factor of  $\text{NH}_4\text{NO}_2$  in the above reaction?

- (A) 2  
 (B) 3  
 (C) 4  
 (D) 6

5. Which of the following reaction produces urotropine?

- (A)  $\text{CH}_3\text{CHO} + \text{NaOH} \longrightarrow$   
 (B)  $\text{CH}_3\text{COCH}_3 + \text{PCl}_5 \longrightarrow$   
 (C)  $\text{HCHO} + \text{NH}_3 \longrightarrow$   
 (D)  $\text{CH}_3\text{COOH} \xrightarrow{\text{Cl}_2/\text{P}}$

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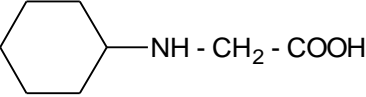
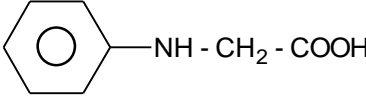
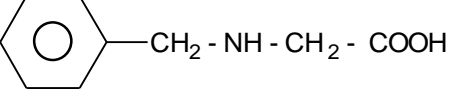
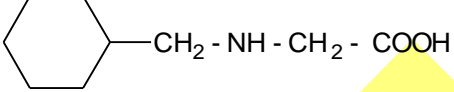
6. In order to detect the presence of nitrogen atom in organic compounds, the compound is converted to produce
- (A)  $\text{NH}_2^-$  (B)  $\text{CN}^-$   
(C)  $\text{SCN}^-$  (D)  $\text{NO}_2^-$
7. 
$$\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{Cl} \\ | \\ \text{CH}_3 \end{array} \xrightarrow{\text{NH}_3} \text{Product.}$$
- The organic product of above reaction is:
- (A) 
$$\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{CH} - \text{CH}_2\text{NH}_2 \end{array}$$
 (B) 
$$\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{NH}_2 \\ | \\ \text{CH}_3 \end{array}$$
  
(C) 
$$\begin{array}{c} \text{CH}_3 - \text{C} = \text{CH}_2 \\ | \\ \text{CH}_3 \end{array}$$
 (D) 
$$\begin{array}{c} \text{CH}_3 - \text{CH} - \text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$$
8. In what form the amino acid tyrosine exists at pH = 8? [isoelectric point = 5.63]
- 
- (A) monocationic form (B) monoanionic form  
(C) dianionic form (D) dicationic form
9. 
$$\text{As}_2\text{S}_5 + \text{HNO}_3 \longrightarrow \text{H}_2\text{SO}_4 + \text{NO}_2 + \text{H}_3\text{AsO}_4 + \text{H}_2\text{O}$$
- What is the equivalent mass of  $\text{As}_2\text{S}_5$  (Mol. mass = M) in the above reaction?
- (A)  $\frac{M}{10}$  (B)  $\frac{M}{40}$   
(C)  $\frac{M}{20}$  (D)  $\frac{M}{5}$
10. Which of the following is most reactive towards  $\text{CH}_3\text{ONa}$ ?
- (A)  $\text{CH}_3\text{COOC}_2\text{H}_5$  (B)  $\text{CH}_3\text{COCl}$   
(C)  $\text{CH}_3\text{CONH}_2$  (D)  $\text{CH}_3\text{COOCOCH}_3$
11. The product of the reaction between  $\text{CH}_3\text{NH}_2$  and  $\text{CH}_3\text{Cl}$  is:
- (A)  $\text{CH}_3\text{CH}_2\text{NH}_2$  (B)  $\text{CH}_3\text{NHCH}_3$   
(C)  $\text{CH}_3\text{CH}_2\text{Cl}$  (D)  $\text{CH}_2 = \text{CH}_2$

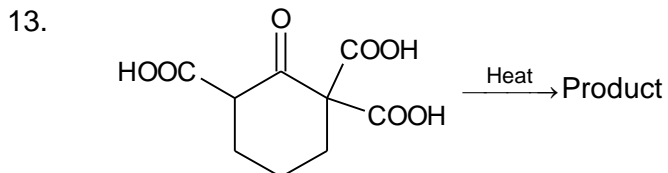
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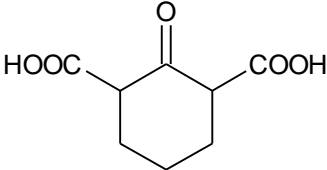
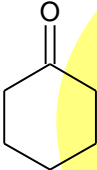
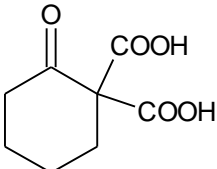
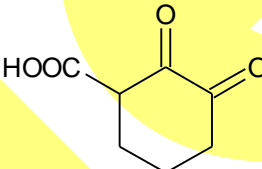


12. Which of the following amino acid cannot form Zwitter ion?

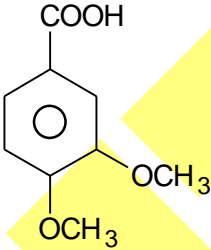
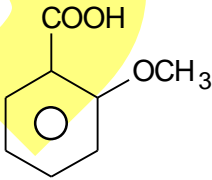
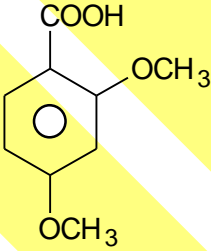
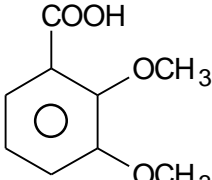
- (A)  (B) 
- (C)  (D) 



The organic product of above reaction is:

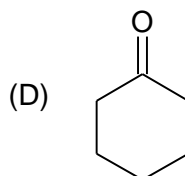
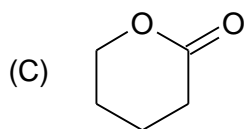
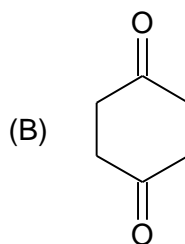
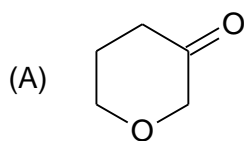
- (A)  (B) 
- (C)  (D) 

14. The most acidic compound out of the following is:

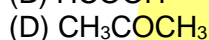
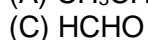
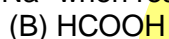
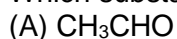
- (A)  (B) 
- (C)  (D) 

Space For Rough Work

15. Which of the following compound does not react with  $\text{NaBH}_4$ ?

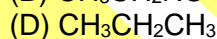
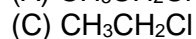
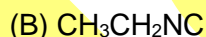
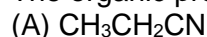


16. Which substance forms  $\text{CH}_3\text{OH}$  and  $\text{HCOO}^-\text{Na}^+$  when reacts with conc.  $\text{NaOH}$ ?



17.  $\text{CH}_3\text{CH}_2\text{NH}_2 + \text{CHCl}_3 \xrightarrow{\text{KOH}}$  Product

The organic product of above reaction is:



18. How many optical isomers are possible for fructose?

(A) 12

(B) 16

(C) 8

(D) 10

19. Reaction of acidified  $\text{KMnO}_4$  solution with  $\text{H}_2\text{C}_2\text{O}_4$  forming  $\text{Mn}^{2+}$ ,  $\text{CO}_2$  and  $\text{H}_2\text{O}$  is an example of

(A) simple titration

(B) back titration

(C) double titration

(D) acid-base titration

20. What is the n-factor of carbon in the reaction



(A) 2

(B) 4

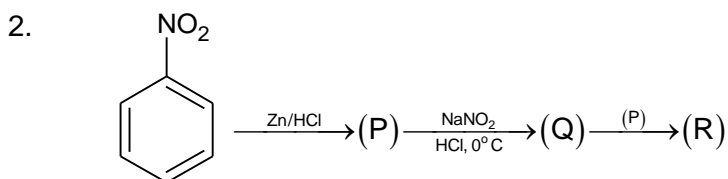
(C) 8

(D) 12

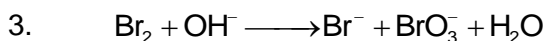
Space For Rough Work

**PART-B**  
**Numerical Type**

1. Reaction of 2-butanone with  $\text{CH}_3\text{MgBr}$  followed by acidic hydrolysis gives the organic product (P). How many hydrocarbons are formed when (P) is heated with conc.  $\text{H}_2\text{SO}_4$ ?

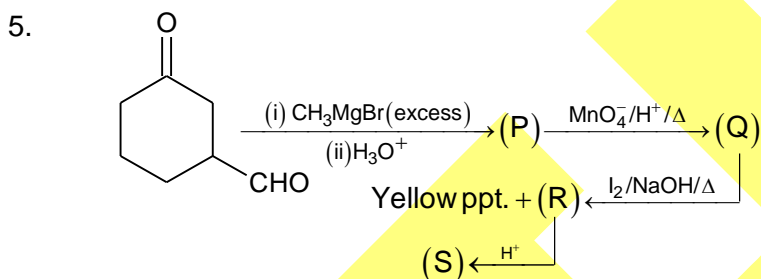


How many nitrogen atom(s) is/are present in the organic product (R)?



If the n-factor of  $\text{Br}_2$  in the above reaction is  $\frac{x}{3}$ , then x is:

4. If the oxidation number of nitrogen in  $\text{HN}_3$  is  $-\frac{x}{y}$ , what is the value of  $(x + y)$ ?



How many moles of ethane is formed by the reaction of product 'S' with excess of  $\text{C}_2\text{H}_5\text{MgBr}$ ?

*Space For Rough Work*

# Mathematics

## PART – A

### Straight Objective Type

This part contains **20 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

- If  $\omega$  is a non-real cube root of unity then the expression  $(1 - \omega)(1 - \omega^2)(1 + \omega^4)(1 + \omega^8)$  is equal to  
(A) 0 (B) 3  
(C) 1 (D) 2
- The set of values of  $p$  for which the roots of the equation  $3x^2 + 2x + p(p - 1) = 0$  are of the opposite sign is  
(A)  $(-\infty, 0)$  (B)  $(0, 1)$   
(C)  $(1, \infty)$  (D)  $(0, \infty)$
- How many three digit numbers have at least one even digit is  
(A) 775 (B) 875  
(C) 450 (D) 750
- If  $a, b, c$  are positive real numbers, then the minimum value of  $\frac{a}{b} + \frac{b}{c} + \frac{c}{a}$  is  
(A) 2 (B) 3  
(C) 4 (D) 5
- If the 7<sup>th</sup> term of a H.P. is  $\frac{1}{10}$  and the 12<sup>th</sup> term is  $\frac{1}{25}$ , then the 20<sup>th</sup> term is  
(A)  $\frac{1}{37}$  (B)  $\frac{1}{41}$   
(C)  $\frac{1}{45}$  (D)  $\frac{1}{49}$
- A coin is tossed 4 times. The probability that at least one head turns up is  
(A)  $\frac{1}{16}$  (B)  $\frac{2}{16}$   
(C)  $\frac{14}{16}$  (D)  $\frac{15}{16}$

Space For Rough Work

7. Given the quadratic equation  $x^2 - 6x + k = 0$ , ( $k \in I$ ) has exactly one root between 1 and 2. Find number of possible integral values of  $k$ :  
(A) 1 (B) 2  
(C) 3 (D) 4
8. If  $\left| \frac{z+2i}{z-i} \right| = 2$  is a circle, then centre of circle is:  
(A) (0, 0) (B) (0, 2)  
(C) (2, 0) (D) (-2, 0)
9. The number of ways of choosing 10 objects out of 31 objects of which 10 are identical and the remaining 21 are distinct, is :  
(A)  $2^{20}$  (B)  $2^{20} + 1$   
(C)  $2^{21}$  (D)  $2^{20} - 1$
10. A test consists of 6 multiple choice questions, each having 4 alternative answers of which only one is correct. The number of ways, in which a candidate answers all six questions such that exactly four of the answers are correct, is .....  
(A) 9 (B) 15  
(C) 135 (D) 145
11. Let A and B be two independent events such that  $P(A) = \frac{1}{3}$  and  $P(B) = \frac{1}{6}$ . Then, which of the following is TRUE?  
(A)  $P\left(\frac{A}{B}\right) = \frac{2}{3}$  (B)  $P\left(\frac{A'}{B'}\right) = \frac{1}{3}$   
(C)  $P\left(\frac{A}{B'}\right) = \frac{1}{3}$  (D)  $P\left(\frac{A}{(A \cup B)}\right) = \frac{1}{4}$
12. The coefficient of  $x^{18}$  in the product  $(1+x)(1-x)^{10}(1+x+x^2)^9$  is :  
(A) 84 (B) 126  
(C) -126 (D) -84
13. If  $n$ th term of a series is  $\frac{1}{(n+1)(n+3)}$ , then sum of infinite terms of the series  
(A)  $\frac{3}{2}$  (B)  $\frac{1}{2}$   
(C)  $\frac{5}{2}$  (D)  $\frac{5}{12}$

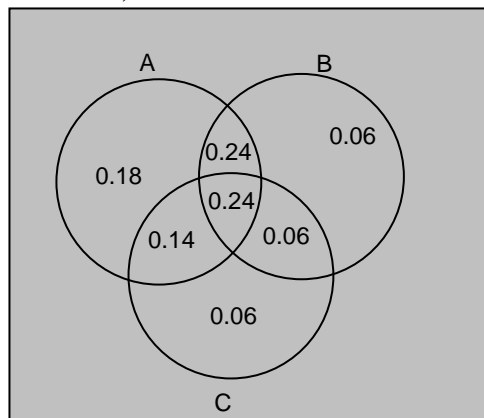
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Space For Rough Work

14. Sum of  $n \cdot n + (n-1) \cdot (n+1) + (n-2) \cdot (n+2) + \dots + 1 \cdot (2n-1)$  is  
 (A)  $n^3 - \frac{1}{2}n(n-1)$  (B)  $n^3 + \frac{1}{6}n(n-1)(2n-1)$   
 (C)  $n^3 - \frac{1}{6}n(n-1)(2n+1)$  (D)  $\frac{1}{6}n(n+1)(4n-1)$
15. If the  $p$ th,  $q$ th, and  $r$ th terms of an A.P. are in G.P. then the common ratio of the G.P. is:  
 (A)  $\frac{p+q}{r+q}$  (B)  $\frac{r-q}{q-p}$   
 (C)  $\frac{p-r}{p-q}$  (D) None
16. Let  $a, b, c$  be in arithmetic progression. Let the centroid of the triangle with vertices  $(a, c)$ ,  $(2, b)$  and  $(a, b)$  be  $(\frac{10}{3}, \frac{7}{3})$ . If  $\alpha, \beta$  are the roots of the equation  $ax^2 + bx + 1 = 0$ , then the value of  $\alpha^2 + \beta^2 - \alpha\beta$  is:  
 (A)  $-\frac{69}{256}$  (B)  $\frac{69}{256}$   
 (C)  $\frac{27}{256}$  (D)  $-\frac{71}{256}$
17. Let  $p$  and  $q$  be two positive numbers such that  $p + q = 2$  and  $p^4 + q^4 = 272$ . Then  $p$  and  $q$  are roots of the equation:  
 (A)  $x^2 - 2x + 8 = 0$  (B)  $x^2 - 2x + 136 = 0$   
 (C)  $x^2 - 2x + 16 = 0$  (D)  $x^2 - 2x + 2 = 0$
18. The minimum value of  $f(x) = a^{a^x} + a^{1-a^x}$ , where  $a, x \in \mathbb{R}$  and  $a > 0$ , is equal to :  
 (A)  $2a$  (B)  $a + 1$   
 (C)  $2\sqrt{a}$  (D)  $a + \frac{1}{a}$
19. Let  $\alpha$  and  $\beta$  be two real numbers such that  $\alpha + \beta = 1$  and  $\alpha\beta = -1$ . Let  $P_n = (\alpha)^n + (\beta)^n$ ,  $P_{n-1} = 11$  and  $P_{n+1} = 29$  for some integer  $n \geq 1$ . Then, the value of  $p_n^2$  is....  
 (A) 324 (B) 326  
 (C) 328 (D) 330

Space For Rough Work

20. The figure shows three events A, B and C. Probabilities of different events are shown in the figure. For instance,  $P(A \cap B \cap C) = 0.18$ ,  $P(A' \cap B \cap C') = 0.06$  etc.



Which of the following is not true?

- (A) A and B are independent  
 (B) B and C are independent  
 (C) A and C are independent  
 (D) A and  $B \cap C$  are independent

**PART-B**  
**Numerical Type**

- If different words are formed from letters of the word "UNIVERSITY", then the probability that two I's do not come together
- If  $3 + \frac{3+d}{4} + \frac{3+2d}{4^2} + \dots + \infty = 8$  then  $d =$
- Let A be the set of 4-digit numbers  $a_1a_2a_3a_4$  where  $a_1 > a_2 > a_3 > a_4$ , then  $n(A)$  is equal to
- Let  $(a + bx + cx^2)^{10} = \sum_{i=0}^{20} p_i x^i$ ,  $a, b, c \in \mathbb{N}$ . If  $p_1 = 20$  and  $p_2 = 210$ , then  $2(a + b + c)$  is equal to
- If the roots of the equation  $10x^3 - cx^2 - 54x - 27 = 0$  are in H.P., then  $c =$

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Space For Rough Work

**FIITJEE INTERNAL TEST****BATCH: NWCMPA425A1\_PT-3****PHYSICS, CHEMISTRY & MATHEMATICS****JEE MAIN-PHASE****Paper Code  
100876****ANSWER KEY****SECTION – I****(PHYSICS)****PART – A**

1. D	2. C	3. B	4. B
5. D	6. C	7. A	8. A
9. A	10. C	11. C	12. B
13. C	14. B	15. D	16. B
17. D	18. C	19. D	20. A

**PART – B**

1. 0.40	2. 0.33	3. 3	4. 2
5. 0.20			

**SECTION – II****(CHEMISTRY)****PART – A**

1. C	2. D	3. B	4. B
5. C	6. B	7. C	8. C
9. B	10. B	11. B	12. B
13. B	14. D	15. C	16. C
17. B	18. C	19. A	20. B

**PART – B**

1. 2	2. 3	3. 5	4. 4
5. 2			

**SECTION – III  
(MATHEMATICS)****PART – A**

1. B	2. B	3. A	4. B
5. D	6. D	7. B	8. B
9. A	10. C	11. C	12. A
13. B	14. D	15. B	16. D
17. C	18. C	19. A	20. C

**PART – B**

1. 0.8	2. 9	3. 210	4. 12
5. 9			