NARAYANA
IIT-JEE / NEET / FOUNDATIONS
(A Unit of NSPIRA Management Services Pvt. Ltd.)
43 YEARS OF EXCELLENCE

N-ACST-2022

CLASS – XII-PASS: - (Physics, Chemistry & Mathematics)
(Class XII Moving to XII-PASS-PCM)

(SET-1)

N-ACST (12-06-2022)

Time Duration: 1 Hour | ***Maximum marks: 140***

Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.

INSTRUCTIONS:

1. This question paper contains **35** questions: **Physics (Q. No. 1 to Q. No. 11), Chemistry (Q. No. 12 to Q. No. 22), Mathematics (Q. No. 23 to Q. No. 35)**
2. There will be individual qualifying cut-offs for all sections.
3. **For Each correct answer 4 marks will be awarded. No Negative Marking.**
4. Use OMR-Sheet for answering
5. Use HB Pencil / Pen to darken the circles.
6. If you wish to change your answer, erase the already darkened circle completely and then darken the appropriate circle.
7. Use of a calculator and mobile phone is strictly prohibited during the exam.

TO BE FILLED IN CAPITAL LETTERS

NAME OF THE STUDENT : ____

FATHER'S NAME :
____

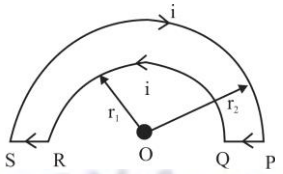
CONTACT NUMBER:____________________ SCHOOL NAME :__________________________________

ROLL NO. :__________________ TEST CENTRE :
____

I have read all the instructions and shall abide by them	I have verified all the information filled in by the Candidate
……..………………………………………………	…………………………………………………………
Signature of Candidate	**Signature of Invigilator**

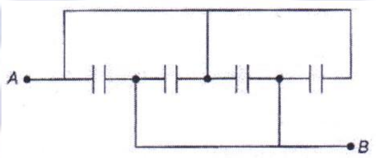
PART – A : PHYSICS

1. A wire loop PQRSP is constructed by joining two semi-circular coils of radii r_1 and r_2 respectively as shown in the figure. If the current flowing in the loop is i, then magnetic induction at the point O is



(A) $\frac{\mu_0 i}{4}\left[\frac{1}{r_1}-\frac{1}{r_2}\right]$ (B) $\frac{\mu_0 i}{4}\left[\frac{1}{r_1}+\frac{1}{r_2}\right]$ (C) $\frac{\mu_0 i}{2}\left[\frac{1}{r_1}-\frac{1}{r_2}\right]$ (D) $\frac{\mu_0 i}{2}\left[\frac{1}{r_1}+\frac{1}{r_2}\right]$

2. Four condensers are joined as shown in the adjoining figure. The capacity of each is $8\mu F$. The equivalent capacity between the points A and B will be



(A) $32\mu F$ (B) $2\mu F$ (C) $8\mu F$ (D) $16\mu F$

3. Force of attraction between two point electric charges placed at a distance d in a medium is F. What distance apart should these be kept in the same medium, so that force between becomes F/3?

(A) $2\sqrt{3}d$ (B) $3d$ (C) $9d$ (D) $\sqrt{3}d$

4. Two charges are placed at certain distance apart. A perfectly insulating sheet is placed between them. The force between them will

(A) Increases (B) Decreases
(C) Remains unchanged (D) None of these

5. An object is placed at 20 *cm* from a convex mirror of focal length 10 *cm*. The image formed by the mirror is

(A) Real and at 20 *cm* from the mirror (B) Virtual and at 20 *cm* from the mirror
(C) Virtual and at 20/3 *cm* from the mirror (D) Real and at 20/3 *cm* from the mirror

6. Radius of curvature of concave mirror is 40 *cm* and the size of image is twice as that of object for the image to real, then the object distance is

(A) 60 *cm* (B) 20 *cm* (C) 40 *cm* (D) 30 *cm*

7. Lyman series are found in ____________ region.

(A) Ultra violet (B) Infrared (C) Visible (D) None

Space for rough work

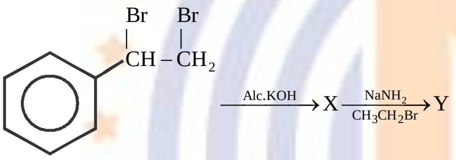
8. Domain formation is the necessary feature of
(A) Ferromagnetism (B) Paramagnetism (C) Diamagnetism (D) All of these

9. A current of $\frac{25}{\pi}$ Hz frequency is passing though an AC circuit having series combination of R = 100 Ω and L = 2 H, the phase difference between voltage and current is
(A) 90^0 (B) 60^0 (C) 30^0 (D) 45^0

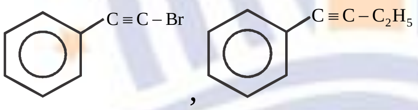
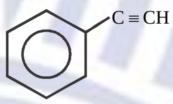
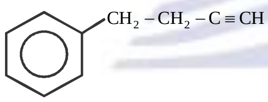
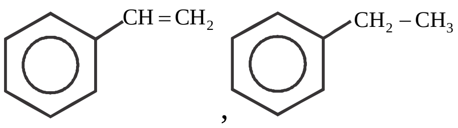
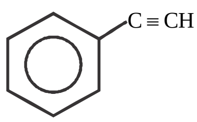
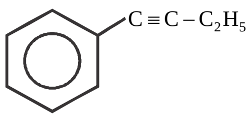
10. An atom emits a spectral line of wavelength λ when an electron makes a transition between levels of energy E_1 and E_2. Which expression correctly relates λ, E_1 and E_2?
(A) $\lambda = \frac{hc}{E_1 + E_2}$ (B) $\lambda = \frac{2hc}{E_1 + E_2}$ (C) $\lambda = \frac{2hc}{E_1 - E_2}$ (D) $\lambda = \frac{hc}{E_1 - E_2}$

11. Half life of a radioactive substance is 20 minutes. The time between 20% and 80% decay will be
(A) 20 minutes (B) 40 minutes (C) 30 minutes (D) 25 minutes

Part – B : CHEMISTRY

12. 

X and Y are respectively

(A) 
(B)  , 
(C) 
(D)  , 

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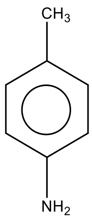
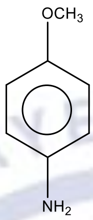
13. The order of reactivities of the following alkyl halides for a $S_N{}^2$ reaction is

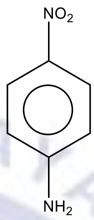
(A) RF > RCl > RBr > RI (B) RF > RBr > RCl > RI

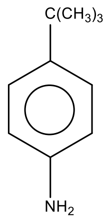
(C) RCI > RBr > RF > RI (D) RI > RBr > RCI > RF

14. $X\text{–}NH_2 \xrightarrow[OH^-,alc,\Delta]{CHCl_3} X\text{–}NC$; rate of reaction is more of $X\text{–}NH_2$ is

(A) 

(B) 

(C) 

(D) 

15. Lucas test is done for

(A) alkyl halides (B) alcohols (C) acids (D) aldehydes

16. The correct sequence of decrease in the bond angle of the following hydrides is - :

(A) $NH_3 > PH_3 > AsH_3 > SbH_3$ (B) $NH_3 > AsH_3 > PH_3 > SbH_3$

(C) $SbH_3 > AsH_3 > PH_3 > NH_3$ (D) $PH_3 > NH_3 > AsH_3 > SbH_3$

17. False statement about $[Co(NH_3)_4(NO_2)_2]^+$ is .....

(A) It is inner orbital complex with octahedral geometry

(B) It can shows linkage isomerism

(C) It shows geometrical isomerism

(D) Trans $[Co(NH_3)_4(NO_2)_2]^+$ has optical activity

18. Chemical composition of 'slag' formed during the smelting process in the extraction of copper is

(A) $Cu_2O + FeS$ (B) $FeSiO_3$ (C) $CuFeS_2$ (D) $Cu_2S + FeO$

19. $a \neq b \neq c$, $\alpha = \gamma = 90°$, $\beta \neq 90°$ represents -

(A) tetragonal system (B) orthorhombic system

(C) monoclinic system (D) triclinic system

20. Polymer used for making of computer discs is

(A) PHBV (B) Bakelite (C) Neoprene (D) Perlon-L

Space for rough work

21. Which of the following ions will exhibit colour in aqueous solutions?
(A) Sc^{3+} (Z = 21) (B) La^{3+} (Z = 57) (C) Ti^{3+} (Z = 22) (D) Lu^{3+} (Z = 71)

22. Osmotic pressure of a solution (density is 1g/ml) containing 3 g of glucose (molecular weight = 180) in 60 g of water at 15°C is -
(A) 0.34 atm (B) 0.65 atm (C) 6.25 atm (D) 5.57 atm

PART – C : MATHEMATICS

23. Evaluate $\int_0^{\pi/2} \frac{\sqrt{\sin x}}{\sqrt{\sin x}+\sqrt{\cos x}} dx$

(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{2}$
(C) zero (D) 1

24. $f(x)=\begin{cases} \frac{1}{|x|} & ,|x|\geq 1 \\ ax^2+b & ,|x|<1 \end{cases}$ if $f(x)$ is continuous and differentiable every where then

(A) $a=\frac{1}{2}, b=-\frac{3}{2}$ B) $a=1 b=-1$ C) a = b= 1 D) $a=-\frac{1}{2}, b=\frac{3}{2}$

25. The value of $\tan^{-1}\frac{1}{2}+\tan^{-1}\frac{1}{3}+\tan^{-1}\frac{7}{8}$ is

(A) $\tan^{-1}\frac{7}{8}$ (B) $\cot^{-1}15$
(C) $\tan^{-1}15$ (D) $\tan^{-1}\frac{25}{24}$

26. If $P(A)=\frac{3}{10}, P(B)=\frac{2}{5}$ and $P(A\cup B)=\frac{3}{5}$, then the value of $P(B/A)+P(A/B)$ is equal to

(A) $\frac{1}{4}$ (B) $\frac{1}{3}$ (C) $\frac{5}{12}$ (D) $\frac{7}{12}$

Space for rough work

27. If $A=\begin{bmatrix}1 & 0\\ -1 & 7\end{bmatrix}$ and $A^2=8A+KI_2$, then k is equal to

((A) -1 ((B) 1 ((C) -7 ((D) 7

28. $\int \frac{x^3}{x+1}$ is equal to

(A) $x+\frac{x^2}{2}+\frac{x^3}{3}=\log|1-x|+C$ (B) $x+\frac{x^2}{2}-\frac{x^3}{3}-\log|1-x|+C$

(C) $x-\frac{x^2}{2}-\frac{x^3}{3}-\log|1+x|+C$ (D) $x-\frac{x^2}{2}+\frac{x^3}{3}-\log|1+x|+C$

29. If the equation of the normal to the curve $y=(1+x)^y+\sin^{-1}(\sin^2 x)$ at $x=0$ is $x+y=k$, then k is

(A)1 (B)2 (C)3 (D)4

30. Distance between two parallel planes $2x+y+2z=8$ and $4x+2y+4z+5=0$ is

(A) $\frac{3}{2}$ (B) $\frac{5}{2}$

(C) $\frac{7}{2}$ (D) $\frac{9}{2}$

31. Let R be the real line. Consider the following subsets of the plane $R\times R$

S= $\{(x:y); y=x+1 \, and \; 0<x<2\}$

T = $\{(x:y); x-y \, is \; an \, integer\}$

Which of the following is true

(A)T is an equivalence relation on R but S is not

(B)Neither S nor T is an equivalence relation

(C)Both S and T are equivalence relation on R.

(D) S is an equivalence relation but T is not.

32. Minimize $Z=13x-15y$ subject to the constrains $x+y\le 7, 2x-3y+6\ge 0, x\ge 0, y\ge 0$

(A)-23 (B)-32 (C)-30 (D)-34

Space for rough work

33. Over the interval $\left(\frac{1}{2013\pi}, \frac{1}{2007\pi}\right)$, the function $\frac{\cos x}{\sin\left(\frac{1}{x}\right)}$ is discontinuous at K points then K must be equal to ___________

(A)4 (B)5 (C)6 (D)

34. The non-zero vectors $\vec{a}, \vec{b}$ and $\vec{c}$ are related by $\vec{a} = 8\vec{b}$ and $\vec{c} = -7\vec{b}$, then the angle between $\vec{a}$ and $\vec{c}$ is

(A) π (B) 0 (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{2}$

35. If $\Delta_1 = \begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix}$, $\Delta_2 = \begin{vmatrix} 1 & bc & a \\ 1 & ca & b \\ 1 & ab & c \end{vmatrix}$, then

(A) $\Delta_1 + \Delta_2 = 0$ (B) $\Delta_1 + 2\Delta_2 = 0$ (C) $\Delta_1 = \Delta_2$ (D) $\Delta_1 = 2\Delta_2$

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Space for rough work