



PATTERN : JEE MAIN
Batch : Class XI
MINOR TEST 1 | Date : 28.04.2024

READ THE INSTRUCTIONS CAREFULLY

Time Allotted: 3 Hours Maximum Marks: 300

- Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.
- You are not allowed to leave the Examination Hall before the end of the test.

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

1. Attempt ALL the questions. Answers have to be marked on the OMR sheets.
2. This question paper contains **75 QUESTIONS**.
3. Rough spaces are provided for rough work inside the question paper. No additional sheets will be provided for rough work.
4. 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:

1. Ensure matching of OMR sheet with the Question paper before you start marking your answers on OMR sheet.
2. 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.
3. OMR sheet contains alphabets, numerals & special characters for marking answers.
4. **Do not fold or make any stray marks on the Answer Sheet.**

C. Marking Scheme for All Two Parts:

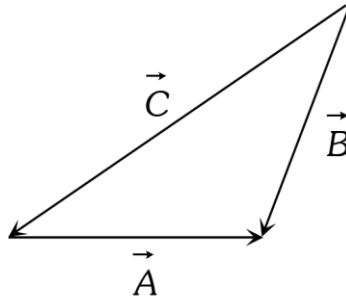
- (i) **Que No.(01-20, 26-45, 51-70)** – Contains Twenty (60) multiple choice objective questions which have four(4) options each and only one correct option. Each question carries **+4 marks** will be awarded for every correct answer and **-1 mark** will be deducted for every incorrect answer.
- (ii) **Que No.(21-25, 46-50, 71-75)** contains Fifteen (15) Numerical based questions (**NO DECIMAL VALUE**). Each question carries **+4 marks** will be awarded for every correct answer, **-1 for wrong answer** and **0 mark** for all other cases.

Name of the Candidate : _____

Batch : _____ **Date of Examination :** _____

PHYSICS
SINGLE OPTION CORRECT TYPE

1. The unit vector along $\hat{i} + \hat{j}$ is:
 (A) \hat{k} (B) $\hat{i} + \hat{j}$ (C) $\frac{\hat{i} + \hat{j}}{\sqrt{2}}$ (D) $\frac{\hat{i} + \hat{j}}{2}$
2. If a unit vector is represented by $0.5\hat{i} + 0.8\hat{j} + c\hat{k}$, then the value of 'c' is
 (A) 1 (B) $\sqrt{0.11}$ (C) $\sqrt{0.01}$ (D) $\sqrt{0.39}$
3. If $|\vec{A} + \vec{B}| = |\vec{A}| + |\vec{B}|$, then angle between \vec{A} and \vec{B} will be
 (A) 90° (B) 120° (C) 0° (D) 60°
4. If $|\vec{A} - \vec{B}| = |\vec{A}| = |\vec{B}|$, the angle between \vec{A} and \vec{B} is:
 (A) 60° (B) 0° (C) 120° (D) 90°
5. For the figure



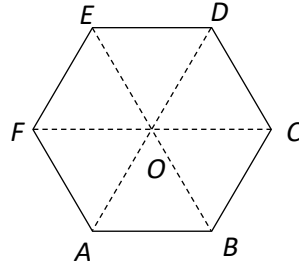
- (A) $\vec{A} + \vec{B} = \vec{C}$ (B) $\vec{B} + \vec{C} = \vec{A}$ (C) $\vec{C} + \vec{A} = \vec{B}$ (D) $\vec{A} + \vec{B} + \vec{C} = 0$
6. The expression $\left(\frac{1}{\sqrt{2}}\hat{i} + \frac{1}{\sqrt{2}}\hat{j}\right)$ is a
 (A) Unit vector (B) Null vector
 (C) Vector of magnitude $\sqrt{2}$ (D) Scalar
 7. The vector sum of two forces is perpendicular to their vector differences. In that case, the forces
 (A) Are equal to each other in magnitude
 (B) Are not equal to each other in magnitude
 (C) Cannot be predicted
 (D) Are equal to each other

ROUGH SPACE

8. Two forces of 12 N and 8 N act upon a body. The resultant force on the body has maximum value of
 (A) 4 N (B) 0 N (C) 20 N (D) 8 N
9. If $|\vec{v}_1 + \vec{v}_2| = |\vec{v}_1 - \vec{v}_2|$ and v_2 is finite, then
 (A) v_1 is parallel to v_2 (B) $\vec{v}_1 = \vec{v}_2$
 (C) v_1 and v_2 are mutually perpendicular (D) $|\vec{v}_1| = |\vec{v}_2|$
10. If $\mathbf{A} = \hat{i} + \hat{j}$ and $\mathbf{B} = \hat{i} - \hat{j}$, then a vector \mathbf{C} perpendicular to both \mathbf{A} and \mathbf{B} and having a magnitude equal to 3 is –
 (A) $3\hat{k}$ (B) $\sqrt{3}(\hat{i} + \hat{j})$ (C) $\sqrt{3}(\hat{i} + 2\hat{k})$ (D) $3(\hat{i} + \hat{j})$
11. The vector that must be added to the vector $\hat{i} - 3\hat{j} + 2\hat{k}$ and $3\hat{i} + 6\hat{j} - 7\hat{k}$ so that the resultant vector is a unit vector along the y -axis is
 (A) $4\hat{i} + 2\hat{j} + 5\hat{k}$ (B) $-4\hat{i} - 2\hat{j} + 5\hat{k}$ (C) $3\hat{i} + 4\hat{j} + 5\hat{k}$ (D) Null vector
12. A vector is represented by $3\hat{i} + \hat{j} + 2\hat{k}$. Its length in XY plane is
 (A) 2 (B) $\sqrt{14}$ (C) $\sqrt{10}$ (D) $\sqrt{5}$
13. If vectors $\vec{A} = \hat{i} + 2\hat{j} + 4\hat{k}$ and $\vec{B} = 5\hat{i}$ represent the two sides of a triangle then the third side of the triangle can have length equal to
 (A) 6 (B) $\sqrt{56}$
 (C) Both of the above (D) None of the above
14. Unit vector parallel to the resultant of vectors $\vec{A} = 4\hat{i} - 3\hat{j}$ and $\vec{B} = 8\hat{i} + 8\hat{j}$ will be
 (A) $\frac{24\hat{i} + 5\hat{j}}{13}$ (B) $\frac{12\hat{i} + 5\hat{j}}{13}$ (C) $\frac{6\hat{i} + 5\hat{j}}{13}$ (D) None of these
15. $\vec{C} = \vec{A} + \vec{B}$ then
 (A) $|\vec{C}|$ is always greater than $|\vec{A}|$
 (B) It is possible to have $|\vec{C}| < |\vec{A}|$ and $|\vec{C}| < |\vec{B}|$
 (C) C is always equal to $A + B$
 (D) C is never equal to $A + B$

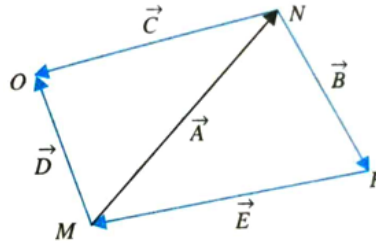
ROUGH SPACE

16. Figure shows $ABCDEF$ as a regular hexagon. What is the value of $\overrightarrow{AB} + \overrightarrow{BC} + \overrightarrow{CD} + \overrightarrow{DE} + \overrightarrow{EF}$



- (A) \overrightarrow{AO} (B) \overrightarrow{AD} (C) \overrightarrow{AE} (D) \overrightarrow{AF}

17. From figure, the correct relation is



- (A) $\vec{A} + \vec{B} + \vec{E} = \vec{0}$ (B) $\vec{C} - \vec{D} = -\vec{A}$ (C) $\vec{B} + \vec{E} - \vec{C} = -\vec{D}$ (D) All of the above
18. Given $\vec{A} = 2\hat{i} + p\hat{j} + q\hat{k}$ and $\vec{B} = 5\hat{i} + 7\hat{j} + 3\hat{k}$. If $\vec{A} \parallel \vec{B}$ then the values of p and q are respectively.
- (A) $\frac{14}{5}$ and $\frac{6}{5}$ (B) $\frac{14}{3}$ and $\frac{6}{5}$ (C) $\frac{6}{5}$ and $\frac{1}{3}$ (D) $\frac{3}{4}$ and $\frac{1}{4}$
19. Out off the following forces, the resultant of which cannot be 10N?
- (A) 15 N and 20 N (B) 10 N and 10 N (C) 5N and 12 N (D) 12 N and 1 N
20. Two forces $\vec{F}_1 = 500\text{N}$ due east and $\vec{F}_2 = 250\text{N}$ due north have their common initial point. $\vec{F}_2 - \vec{F}_1$ is
- (A) $250\sqrt{5}\text{N}, \tan^{-1}(2) \text{ W of N}$ (B) $250\text{ N}, \tan^{-1}(2) \text{ W of N}$
 (C) Zero (D) $750\text{ N}, \tan^{-1}(3/4) \text{ N of W}$

ROUGH SPACE

NUMERICAL TYPE (NO DECIMAL VALUE)

21. How many minimum number of coplanar vectors having different magnitudes can be added to give zero resultant
22. A displacement vector, at an angle of 30° with y-axis has an x-component of 10 units. Then the magnitude of the vector is -
23. The maximum and minimum magnitude of the resultant of two given vectors are 17 *units* and 7 *unit* respectively. If these two vectors are at right angles to each other, the magnitude of their resultant is
24. While travelling from one station to another, a car travels 75 km North, $5\sqrt{2}$ km North- east and 55 km East. The minimum distance between the two stations is
25. Two forces, each of magnitude F have a resultant of the same magnitude F. The angle between the two forces is _____°.

CHEMISTRY**SINGLE OPTION CORRECT TYPE**

26. The element with configuration $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^{10}$ would be
(A) Fe (B) Co (C) Cu (D) Zn
27. Among the following which subshell will undergo electron filling at the end
(A) 4p (B) 3p (C) 2p (D) 4s
28. The last member in each period of the periodic table is
(A) An inert gas element (B) A transition element
(C) A halogen (D) An alkali metal
29. For any given atom effective nuclear charge is maximum for electron of which subshell (same shell number)
(A) f (B) d (C) p (D) s
30. Which of the following quantum numbers can be a fractional number
(A) Principal (B) Spin (C) Azimuthal (D) Magnetic
31. The electronic configurations of Cr^{24} and Cu^{29} are abnormal
(A) Due to extra stability of exactly half filled and exactly fully filled sub shells
(B) Because they belong to d-block
(C) Both the above
(D) None of the above

ROUGH SPACE

32. Which of the following has smallest size
(A) Al (B) Al^+ (C) Al^{+2} (D) Al^{+3}
33. The oxidation state of each Cl in HCl is
(A) 0 (B) +1 (C) -1 (D) +1, -1
34. What is the oxidation number of Chromium in $K_2Cr_2O_7$?
(A) +6 (B) +5 (C) +7 (D) +8
35. If each orbital can hold a maximum of 3 electrons, then the maximum number of electrons in 3d subshell will be
(A) 10 (B) 9 (C) 12 (D) 15
36. For a molecule Br_2 , total distance between two nuclei is 3.2 \AA . What will be the co-valent radius of Br atom?
(A) 1.6 \AA (B) 6.4 \AA (C) 2.4 \AA (D) 4.9 \AA
37. Which of the following atoms should have lowest effective nuclear charge
(A) C (B) F (C) Li (D) N
38. Which of the following atoms should have largest size -
(A) Cs (B) He (C) Kr (D) Na
39. Calculate effective nuclear charge (Z_{eff}) of 4s electron of Ca. ($Z = 20$)
(A) 4.65 (B) 2.85 (C) 4.50 (D) None of these
40. The correct order of increasing atomic radius of the following elements is -
(A) $Te < Se < S < O$ (B) $O < S < Se < Te$ (C) $Te < S < Se < O$ (D) $S < Se < O < Te$
41. Calculate effective nuclear charge (Z_{eff}) of Na. ($Z = 11$)
(A) -1 (B) 2 (C) +2.2 (D) None of these
42. In KO_3 oxidation state of oxygen is
(A) -2 (B) $-\frac{1}{3}$ (C) -1 (D) +1
43. Which one of the following is the smallest in size
(A) N^{3-} (B) O^{2-} (C) F^- (D) Na^+
44. Which one is the correct order of the size of the iodine species
(A) $I > I^+ > I^-$ (B) $I > I^- > I^+$ (C) $I^+ > I^- > I$ (D) $I^- > I > I^+$

ROUGH SPACE

45. Which one of the following indicates the correct order of atomic size
 (A) $Be > F > Ne > C$ (B) $F < C < Be < Ne$
 (C) $Be > C > Ne > F$ (D) $F < Ne < Be < C$

NUMERICAL TYPE (NO DECIMAL VALUE)

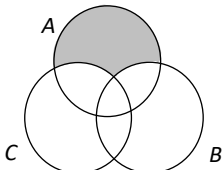
46. The number of orbitals in f subshell
47. Total number of valence electrons in element which has atomic number 16.
48. Report atomic number of the element having largest size among the following N^{3-} , O^{2-} , F^-
49. The oxidation state of manganese in K_2MnO_4 .
50. What is the possible number of subshells in the 4th orbit of an atom.

MATHEMATICS

SINGLE OPTION CORRECT TYPE

51. Greatest integral value of x satisfying the in-equation $\frac{(x+1)x(x-4)}{(x-8)(x+4)} \leq 0$
 (A) 8 (B) 7 (C) 4 (D) 5
52. If $\frac{(x-5)(x+1)^2}{(x^2+x+5)(x^2-4x-5)} > 0$, then x satisfies
 (A) $(-1, 5)$ (B) $(-1, \infty) - \{5\}$ (C) $[-1, \infty)$ (D) $(5, \infty)$
53. Solve for x , $\frac{x+1}{x-1} \geq \frac{x+5}{x+1}$
 (A) $(-\infty, -1] \cup (1, 3)$ (B) $(-\infty, -1) \cup [1, 3)$
 (C) $(-\infty, -1) \cup [1, 3]$ (D) $(-\infty, -1) \cup (1, 3]$
54. Solution of the inequality $\frac{3x^2-7x+8}{x^2+1} \leq 2$ is
 (A) $x \in [1, 6]$ (B) $x \in [1, 2]$ (C) $x \in [1, 4]$ (D) $x \in [2, 6]$
55. Solution of the system of inequalities $4x - 12 \geq 0$ and $2x - 7 \leq 5$ is
 (A) $x \in (-3, 6)$ (B) $x \in (3, 6)$ (C) $x \in [-3, 6]$ (D) $x \in [3, 6]$

ROUGH SPACE

56. Which of the following is the empty set
 (A) $\{x : x \text{ is a real number and } x^2 - 1 = 0\}$ (B) $\{x : x \text{ is a real number and } x^2 + 1 = 0\}$
 (C) $\{x : x \text{ is a real number and } x^2 - 9 = 0\}$ (D) $\{x : x \text{ is a real number and } x^2 = x + 2\}$
57. Find the integral value of x ; $(x^2 - 9) \sqrt{(x^2 - 1)} < 0$
 (A) 1 (B) 2 (C) 3 (D) None of these
58. $X = \{4^n - 3n - 1 : n \in \mathbb{N}\}$ and $Y = \{9(n-1) : n \in \mathbb{N}\}$, then $X \cup Y$ is equal to
 (A) X (B) Y (C) N (D) None of these
59. Let $n(U) = 700, n(A) = 200, n(B) = 300$ and $n(A \cap B) = 100$, then $n(A^c \cap B^c) =$
 (A) 400 (B) 600 (C) 300 (D) 200
60. If A, B and C are non-empty sets, then $(A - B) \cup (B - A)$ equals
 (A) $(A \cup B) - B$ (B) $A - (A \cap B)$
 (C) $(A \cup B) - (A \cap B)$ (D) $(A \cap B) \cup (A \cup B)$
61. $A = \{a, b\}, B = \{c, d\}, C = \{d, e\}$, then $\{a, b, c, d, e\}$ is equal to
 (A) $A \cap (B \cup C)$ (B) $A \cup (B \cap C)$ (C) $A \cup (B \cup C)$ (D) $A \cap (B \cap C)$
62. The shaded region in the given figure is

 (A) $A \cap (B \cup C)$ (B) $A \cup (B \cap C)$ (C) $A \cap (B - C)$ (D) $A - (B \cup C)$
63. If A, B and C are any three sets, then $A - (B \cap C)$ is equal to
 (A) $(A - B) \cup (A - C)$ (B) $(A - B) \cap (A - C)$ (C) $(A - B) \cup C$ (D) $(A - B) \cap C$
64. The set of intelligent students in a class is
 (A) A null set (B) A singleton set
 (C) A finite set (D) Not a well defined collection
65. If A, B, C are three sets, then $A \cap (B \cup C)$ is equal to
 (A) $(A \cap B) \cap (A \cap C)$ (B) $(A \cap B) \cup (A \cap C)$
 (C) $(A \cup B) \cup (A \cup C)$ (D) None of these

ROUGH SPACE

66. In a town of 10,000 families it was found that 40% family buy newspaper A, 20% buy newspaper B and 10% families buy newspaper C, 5% families buy A and B, 3% buy B and C and 4% buy A and C. If 2% families buy all the three newspapers, then number of families which buy A only is
 (A) 3100 (B) 3300 (C) 2900 (D) 1400
67. If A is any set, then
 (A) $A \cup A' = \phi$ (B) $A \cup A' = U$ (C) $A \cap A' = U$ (D) None of these
68. The values of x for which $\frac{(x^2 + 9)(x^2 + 4)}{(x^2 - x + 1)(x^2 - 3x + 20)} \leq 0$
 (A) ϕ (B) R (C) $[-3, 3]$ (D) None of these
69. Let A and B be two finite sets with m and n elements respectively. The total number of subsets of the set A is 56 more than the total number of subsets of B. Then the value of m, n is
 (A) 6, 3 (B) 4, 3 (C) 7, 6 (D) 5, 2
70. If $n(A) = 115$, $n(B) = 326$ and $n(A - B) = 47$, then what is $n(A \cup B)$
 (A) 372 (B) 373 (C) 300 (D) None of these

NUMERICAL TYPE (NO DECIMAL VALUE)

71. Set of values of x satisfying the inequality $\frac{(x-3)^2(2x+5)(x-7)}{(x^2+x+1)(3x+6)^2} \leq 0$ is $[a, b) \cup (b, c]$ then $2a + b + c$ is equal to
72. Number of positive integral values of x satisfying the inequality $\frac{(x-4)^{2013} \cdot (x+8)^{2014} \cdot (x+1)}{x^{2016} \cdot (x-2)^3 \cdot (x+3)^5 \cdot (x-6)(x+9)^{2012}} \leq 0$ is
73. A market research group conducted a survey of 1000 consumers and reported that 720 consumers liked product A and 450 consumers liked product B. What is the least number that must have liked both products?
74. If $A = \{x : x \text{ is a multiple of } 4\}$ and $B = \{x : x \text{ is a multiple of } 6\}$ then $A \cap B$ consists of all multiples of
75. 20 teachers of a school either teach mathematics or physics. 12 of them teach mathematics while 4 teach both the subjects. Then the number of teachers teaching physics only is

ROUGH SPACE