Time : 3 Hours   **Maximum Marks : 216**

PATTERN : JEE ADVANCE
Batch : XI
Minor Test 2 | Date : 12.05.2024
READ THE INSTRUCTIONS CAREFULLY

GENERAL :

1.   This sealed booklet is your Question Paper. Do not break the seal till you are told to do so.

2.   Use the Optical Response sheet (ORS) provided separately for answering the questions.

3.   Blank spaces are provided within this booklet for rough work.

4.   Write your name, form number and sign in the space provided on the back cover of this booklet.

5.   After breaking the seal of the booklet, verify that all the **18** questions in each subject and along with the options are legible. If not, contact the invigilator for replacement of the booklet.

6.   You are allowed to take away the Question Paper at the end of the examination.

OPTICAL RESPONSE SHEET :

7.   The ORS will be collected by the invigilator at the end of the examination.

8.   Do not tamper with or mutilate the ORS. Do not use the ORS for rough work.

9.   Write your name, form number and sign with pen in the space provided for this purpose on the ORS. Do not write any of these details anywhere else on the ORS. Darken the appropriate bubble under each digit of your form number.

DARKENING THE BUBBLES ON THE ORS :

10.   Use a **BLACK BALL POINT PEN** to darken the bubbles on the ORS.

11.   Darken the bubble ◯ **COMPLETELY.**

12.   The correct way of darkening a bubble is as : ●

13.   The ORS is machine-gradable. Ensure that the bubbles are darkened in the correct way.

14.   Darken the bubbles **ONLY IF** you are sure of the answer. There is **NO WAY** to erase or "un-darken" a darkened bubble.

PHYSICS
INTEGER TYPE

This section contains **EIGHT** questions.   **[32 Marks]**

- The answer to each question is a **SINGLE DIGIT INTEGER TYPE** question.
- For each question, darken the bubble corresponding to the correct integer in the ORS.
- For each question, marks will be awarded in one of the following categories:

Full Marks   : +4 If only the bubble corresponding to the correct answer is darkened.
Zero Marks   : –1 for wrong answer.

1. A particle starts from rest and moving along a straight line travels 19m in the tenth second. The acceleration (in m/s^2) of the particle is given by -

2. A car moves with uniform acceleration along a straight line PQR. Its speeds at P and R are 5m/s and 25m/s respectively. If PQ : QR = 1 :2, the ratio of the times taken by car to travel distance PQ and QR is $\frac{x}{y}$. The value of x + y is

3. In 1.0 s, a particle goes from point A to point B, moving in a semicircle of radius 1.0 m (see fig.). The magnitude of the average velocity of the particle is –

4. A car covers AB distance with first one-third at velocity v_1 ms^{-1}, second one-third at v_2 ms^{-1} and last one-third at v_3 ms^{-1}. If $v_3 = 3v_1$, $v_2 = 2v_1$ and $v_1 = 11$ ms^{-1} then the average velocity of the car is 6x ms^{-1}. Then the value of x is
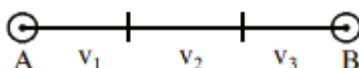
5. A particle is moving eastwards with a velocity of 5 m/s. In 10s the velocity changes to 5 m/s northwards. The average acceleration in this time is $\frac{x}{\sqrt{2}}$ the value of x is

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SPACE FOR ROUGH WORK

6. A small toy starts moving from the position of rest under a constant acceleration. If it travels a distance of 10 m in t s, the distance travelled by the toys in the next t s will be 5x. Then the value of x is

7. A car is moving with speed of 150 km/h and after applying the break it will move 27 m before it stops. If the same car is moving with a speed of one third the reported speed then it will stop after travelling _____ m distance.

8. For a train engine moving with speed of 20 ms^{-1} , the driver must apply brakes at a distance of 500 m before the station for the train to come to rest at the station. If the brakes were applied at half of this distance, the train engine would cross the station with speed $\sqrt{x}ms^{-1}$.

The value of $\dfrac{x}{50}$ _____ is.

(Assuming same retardation is produced by brakes)

MORE THAN ONE OPTION CORRECT

This section contains **SIX** questions.   **[24 Marks]**

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- For each question, choose the correct option(s) to answer the question.
- Answer to each question will be evaluated according to the following marking scheme:

Full Marks   : +4 If only (all) the correct option(s) is (are) chosen.
Partial Marks   : +3 If all the four options are correct but ONLY three options are chosen.
Partial Marks   : +2 If three or more options are correct but ONLY two options are chosen, both of which are correct options.
Partial Marks   : +1 If two or more options are correct but ONLY one option is chosen and it is a correct option.
Zero Marks   : 0 If none of the options is chosen (i.e. the question is unanswered).
Negative Marks   : –2 In all other cases.

9. If the velocity of a body is constant –
(A) |Velocity| = speed   (B) |Average velocity| = speed
(C) Velocity = average velocity   (D) Speed = average speed

10. The velocity of a particle is zero at t = 0, then-
(A) the acceleration at t = 0 must be zero
(B) the acceleration at t = 0 may be zero

SPACE FOR ROUGH WORK

(C) if the acceleration is zero from t = 0 to t = 10 s. the speed is also zero in this interval.
(D) if the speed is zero from t = 0 to t = 10 sec, then the acceleration is also zero in the interval

11. A train accelerates from rest for time t_1, at a constant acceleration α for distance x. Then it decelerates to rest at constant retardation β in time t_2 for distance y. Then –

(A) $\dfrac{x}{y} = \dfrac{\beta}{\alpha}$ (B) $\dfrac{\beta}{\alpha} = \dfrac{t_1}{t_2}$ (C) $\dfrac{x}{y} = \dfrac{t_1}{t_2}$ (D) x = y

12. Let $\vec{v}$ and $\vec{a}$ denote the velocity and acceleration respectively of a body in one dimensional motion
(A) $|\vec{v}|$ must decrease when $\vec{a} < 0$
(B) Speed must increase when $\vec{a} > 0$
(C) Speed will increase when $\vec{v}$ and $\vec{a}$ $are < 0$
(D) Speed will decrease when $\vec{v} < 0$ and $\vec{a} > 0$

13. A particle moving along a straight line with uniform acceleration has velocities 7m/s at A and 17 m/s at C. B is the mid point of AC. Then
(A) The velocity at B is 12 m/s.
(B) The average velocity between A and B is 10 m/s.
(C) The ratio of the time to go from A to B to that from B to C is 3: 2.
(D) The average velocity between B and C is 15 m/s.

14. The position of a particle moving along x-axis with constant acceleration at certain time is given below.
(A) Average velocity of particle in first 3 second is 6 m/s
(B) Position of particle at the end of 4th second if particle continue its motion is 30m
(C) Acceleration of particle is 4 m/s^2
(D) Position of particle at t = 2 sec is 6 m

t (s)	0	1	2	3
x (m)	−2	0	6	16

SPACE FOR ROUGH WORK

This section contains **FOUR** questions. **[16 Marks]**

- Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four options is correct.
- For each question, darken the bubble corresponding to the correct option in the ORS.
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  Zero Marks : 0 If none of the bubbles is darkened.
  Negative Marks : –1 for wrong answer.

15. Mark the wrong statement –
(A) Nothing is in the state of absolute rest or state of absolute motion
(B) Magnitude of displacement is always equal to the distance travelled
(C) Magnitude of displacement can never be greater than the distance travelled
(D) Magnitude of displacement may be equal to the distance travelled

16. A truck travelling due to North at 20m/s turns East and travels at the same speed. The change in its velocity is –
(A) 20 $\sqrt{2}$m/s North East (B) 20$\sqrt{2}$m/s South East
(C) 40 $\sqrt{2}$m/s North East (D) 20$\sqrt{2}$m/s North West

17. A body starts from rest with constant acceleration a, its velocity after n second is v. The displacement of body in last two seconds is –
(A) $\dfrac{2v(n-1)}{n}$ (B) $\dfrac{v(n-1)}{n}$ (C) $\dfrac{v(n+1)}{n}$ (D) $\dfrac{2v(n+1)}{n}$

18. A particle moves along a circular arc of radius R making an angle of θ at centre. The magnitude of displacement is –
(A) 2R sin θ/2 (B) 2R sin θ (C) R sin θ/2 (D) R sin θ

SPACE FOR ROUGH WORK

CHEMISTY
INTEGER TYPE

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19.   Identify the number of representative elements among the following
O, Li, Mn, Sc, Si, Ga, Zn

20.   The effective nuclear charge for a 4s-electron of nickel atom is (nearest integer)

21.   An element with atomic number 56 will be placed in which period of the periodic table

22.   Number of elements having electronegativity value greater than sulphur (S) in pauling scale is
F, Cl, N, C, H, O

23.   The first five ionization energies of an element are 9.1, 16.2, 24.5, 35 and 205.7 eV respectively. Then number of valence electron in the atom is

24.   The value of first ionization energy for Mg is 120 kJ/mole; the value of first ionisation energy for Mg^+ is 180 kJ/mole.

$$Mg \rightarrow Mg^{2+} + 2\ e^-$$

The energy required for the reaction is x kJ/mole. Find the value of $\dfrac{x}{100}$.

25.   How many of the following have positive electron gain enthalpy
C, N, Li, Be, B, O, F, Ne

26.   Atomic number of second most electronegative element according to pauling scale.

SPACE FOR ROUGH WORK

MORE THAN ONE OPTION CORRECT

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Negative Marks : –2 In all other cases.

27. Which of the following represent the correct order of ionization energies ?
(A) $F > O > N > C$ (B) $F > N > O > C$ (C) $F > Cl > Br > I$ (D) $I > Br > F > Cl$

28. Which of the following orders in according to acidic character is correct?
(A) $Cl_2O_3 < Cl_2O_5 < Cl_2O_7$ (B) $N_2O_3 < N_2O_5$
(C) $P_4O_{10} > P_4O_6$ (D) $SO_2 < SO_3$

29. Which of the following properties among halogens decrease(s) from fluorine to iodine?
(A) Electronegativity   (B) Electron affinity
(C) Ionisation energy   (D) None of these

30. Which of the following pairs of elements have same number of electrons in their outermost shell ?
(A) Mn^+, Fe   (B) Na, Sr   (C) As, Bi   (D) Se, Te

31. Which of the following trends of ionic radii are correct ?
(A) $F^- > Na^+ > Mg^{2+}$ (B) $Al^{3+} > O^{2-} > N^{3+}$
(C) $P^{3-} > S^{2-} > Cl^-$ (D) $H^- > H^+ > He^+$

32. The correct for electron affinity is
(A) $Ne < Be < N$ (B) $F < Cl > Br$ (C) $B < C < N$ (D) None of these

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SPACE FOR ROUGH WORK

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33. Which of the following elements has lowest value of I.P. ?
(A) Li   (B) S   (C) I   (D) Cs

34. Bond distance C–F in (CF_4) & Si–F in (SiF_4) are respective 2.66Å & 3.08 Å. C–Si bond is 3.74 Å. Calculation the covalent radius of F atom ignoring the electronegativity differences.
(A) 1.5 Å   (B) 1.0 Å   (C) 0.5 Å   (D) None of these

35. The electron affinity of the members of oxygen family of the periodic table, follows the sequence
(A) O > S > Se   (B) S > O > Se   (C) O < S > Se   (D) Se > O > S

36. Highest electron affinity is shown by
(A) F^- (B) Cl^- (C) Cl   (D) F

MATHEMATICS
INTEGER TYPE

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37. The number of integral values(s) of x satisfying the equation $\left|x^4.3^{|x-2|}.5^{x-1}\right| = -x^4.3^{|x-2|}.5^{x-1}$ is

38. If $|x-2|^2 + |x-2| -2 = 0$. Find sum of all the real roots of equation.

SPACE FOR ROUGH WORK

39. Find number of single digit prime numbers satisfying $\dfrac{(x-2)^{100}(2+x)^{101}(x-1)^{10}}{x^{41}(x+1)^{39}(4-x)^{11}} \le 0$

40. If $1 < |x - 1| \le 3$. Then number of integral values of x is

41. $||||||x||||||| = 4$ then sum of the roots is

42. $|e^{x^2+x+1}| = -10$, then number of solutions are

43. The number of real roots of the equations $x|x| - 5|x + 2| + 6 = 0$, is

44. Number of integral values of x which satisfies the inequality $\dfrac{(x+6)^2(x+5)(x+1)^2}{(x-3)} \le 0$, is

MORE THAN ONE OPTION CORRECT

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Negative Marks : –2 In all other cases.

45. $64 \cdot 9^x - 84 \cdot 12^x + 27 \cdot 16^x = 0$. Then the value of x is
(A) 1   (B) 2   (C) 3   (D) 4

46. $2^{x+2} - 2^{x+3} - 2^{x+4} > 5^{x+1} - 5^{x+2}$ then x can be
(A) $x \in (0, 100)$ (B) $x \in (100, 1000)$ (C) $x \in (-100, 0)$ (D) $x \in (0, \infty)$

47. $\sqrt{x^2 - 4} + |x - 2| + (x - 2)^{2024} = 0$ then x can be
(A) $\{2\}$ (B) $\{-2, +2\}$ (C) ϕ (D) None of these

SPACE FOR ROUGH WORK

48. $x + \sqrt{x} \geq \sqrt{x} - 3$ then x can be

(A) $[-3, \infty)$ (B) $[0, \infty)$ (C) $[-3, 0]$ (D) $[3, \infty)$

49. $|||x - 2|| + 4| \geq 6$ then x can be

(A) $(-\infty, 0]$ (B) $[4, \infty)$ (C) $(-\infty, 0] \cup [4, \infty)$ (D) None of these

50. The set of all real numbers x for which $x^2 - |x + 2| + x > 0$, is

(A) $(-\infty, -\sqrt{2})$ (B) $(\sqrt{2}, \infty)$ (C) $(-\infty, \sqrt{2})$ (D) $(-\sqrt{2}, \infty)$

SINGLE OPTION CORRECT TYPE

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  Negative Marks   : –1 for wrong answer.

51. If $\dfrac{8x^2 + 16x - 51}{(2x - 3)(x + 4)} > 3$ if x is such that–

(A) $x < -4$ (B) $-3 < x < \dfrac{3}{2}$ (C) $x > \dfrac{5}{2}$ (D) All three correct

52. If $\dfrac{|x| - 1}{|x| - 2} \geq 0, x \in R$ then x does not belong to

(A) $(-\infty, -2)$ (B) $[-1, 1]$ (C) $(2, \infty)$ (D) $(1, 2)$

53. If the solution of the inequality $1 < \dfrac{3x^2 - 7x + 8}{x^2 + 1} \leq 2$, is $[\alpha, \beta]$ then mark **incorrect** option

(A) α is least natural number   (B) $\beta - \alpha$ is a prime number
(C) $\beta + \alpha$ is a prime number   (D) $\beta + 3\alpha$ is a prime number

54. Values of x satisfying the equality $|x^2 + 8x + 7| = |x^2 + 4x + 4| + |4x + 3|$ for $x \in R$ are

(A) $(-2, \infty)$ (B) $\left(-\infty, \dfrac{-3}{4}\right]$ (C) $\left[\dfrac{-3}{4}, \infty\right) \cup \{-2\}$ (D) None of these

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SPACE FOR ROUGH WORK