RANKRIDGE IIT JEE/NEET JUNIOR COLLEGE (LONGTERM)

TELANGANA

STREAM: JR MPC
Time: 3:00 Hours

WEEKEND TEST-07

Date: 02-08-2025
Max Marks: 300

SYLLABUS

MATHEMATICS : Matrices
PHYSICS : Oblique projectile motion, parameters and Applications, numericals. Horizontal projectile motion, Parameters and Applications, numericals
CHEMISTRY : Electron affinity, electro negativity, valency.

MATHEMATICS

(SINGLE CORRECT ANSWER TYPE)

This section contains 20 multiple choice questions. Each question has 4 options (A), (B), (C) and (D) for its answer, out of which ONLY ONE option can be correct.
Marking scheme: +4 for correct answer, 0 if not attempted and –1 in all other cases

1. If $A=\begin{pmatrix}0 & 2\\ 3 & -4\end{pmatrix}$, $kA=\begin{pmatrix}0 & 3a\\ 2b & 24\end{pmatrix}$ then the values of k,a,b are respectively.
(A) $-6,-12,-18$ (B) $-6,4,9$
(C) $-6,-4,-9$ (D) $-6,12,18$

2. If $A=\begin{bmatrix}9 & 1\\ 4 & 3\end{bmatrix}, B=\begin{bmatrix}1 & 5\\ 6 & 11\end{bmatrix}$ and $3A+5B+2X=0$ then $X=$
(A) $\begin{bmatrix}16 & -14\\ 21 & -32\end{bmatrix}$ (B) $\begin{bmatrix}16 & 14\\ -21 & -32\end{bmatrix}$
(C) $\begin{bmatrix}-16 & -14\\ -21 & -32\end{bmatrix}$ (D) $\begin{bmatrix}-16 & 14\\ 21 & 32\end{bmatrix}$

3. If $A=\begin{bmatrix}3 & 0 & 0\\ 0 & 3 & 0\\ 0 & 0 & 3\end{bmatrix}$ then $A^5=$
(A) 243 (B) 81A
(C) 243A (D) 81I

4. If $A=\begin{bmatrix}1 & 0\\ 1 & 1\end{bmatrix}$ and $I=\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$, then which one of the following holds for all $n\geq 1$ (by the principle of mathematical induction)
(A) $A^n=nA+(n-1)I$
(B) $A^n=2^{n-1}A+(n-1)I$
(C) $A^n=nA-(n-1)I$
(D) $A^n=2^{n-1}A-(n-1)I$

5. If $3A+4B^T=\begin{pmatrix}7 & -10 & 17\\ 0 & 6 & 31\end{pmatrix}$ and $2B-3A^T=\begin{pmatrix}-1 & 18\\ 4 & -6\\ -5 & -7\end{pmatrix}$ then B=
(A) $\begin{pmatrix}1 & 3\\ -1 & 0\\ -2 & -4\end{pmatrix}$ (B) $\begin{pmatrix}1 & 3\\ 1 & 0\\ 2 & 4\end{pmatrix}$
(C) $\begin{pmatrix}1 & 3\\ -1 & 0\\ 2 & 4\end{pmatrix}$ (D) $\begin{pmatrix}1 & -3\\ 1 & 0\\ 2 & 4\end{pmatrix}$

6. $\begin{pmatrix}2 & 3 & 5\\ 4 & 1 & 2\\ 1 & 2 & 1\end{pmatrix}=P+Q$, where P is a symmetric and Q is a skew-symmetric then Q=
(A) $\begin{pmatrix}0 & \frac{-1}{2} & 2\\ \frac{1}{2} & 0 & 0\\ -2 & 0 & 0\end{pmatrix}$ (B) $\begin{pmatrix}0 & \frac{1}{2} & 2\\ \frac{-1}{2} & 0 & 0\\ -1 & 0 & 0\end{pmatrix}$

(C) $\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 1 \\ 0 & -1 & 0 \end{pmatrix}$ (D) $\begin{pmatrix} 0 & 2 & 3 \\ -2 & 0 & 4 \\ -3 & -4 & 0 \end{pmatrix}$

7. If $\begin{vmatrix} \lambda^2+3\lambda & \lambda-1 & \lambda+3 \\ \lambda+1 & 2-\lambda & \lambda-4 \\ \lambda-3 & \lambda+4 & 3\lambda \end{vmatrix}$
$= p\lambda^4+q\lambda^3+r\lambda^2+s\lambda+t$ then $t=$
(A) 16 (B) 17
(C) 18 (D) 19

8. The value of a third order determinant is 11, then the value of the square of the determinant formed by the cofactors will be
(A) 11 (B) 121
(C) 1331 (D) 14641

9. $\begin{vmatrix} x+y+2z & x & y \\ z & y+z+2x & y \\ z & x & z+x+2y \end{vmatrix} =$
(A) $(x+y+z)^3$ (B) $2(x+y+z)^3$
(C) $x+y+z$ (D) $(x+y+z)^2$

10. If $A=\begin{bmatrix} 1^2 & 2^2 & 3^2 \\ 2^2 & 3^2 & 4^2 \\ 3^2 & 4^2 & 5^2 \end{bmatrix}$ then $|Adj\ A| =$
(A) 8 (B) 16
(C) 64 (D) 128

11. The rank of the matrix $\begin{bmatrix} -1 & 2 & 5 \\ 2 & -4 & a-4 \\ 1 & -2 & a+1 \end{bmatrix}$ is
(A) 3 if a = 6 (B) 1 if a = –6
(C) 3 if a = 2 (D) 2 if a = –6

12. The number of solutions of the equation $3x+3y-z=5,\ x+y+z=3,$ $2x+2y-z=3$
(A) 1 (B) 0
(C) infinite (D) two

13. If [.] denotes the greatest integer less than or equal to the real number under consideration, and $-1\le x<0;\ 0\le y<1;$ $1\le z<2$, then the value of the determinant $\begin{bmatrix} [x]+1 & [y] & [z] \\ [x] & [y]+1 & [z] \\ [x] & [y] & [z]+1 \end{bmatrix}$ is
(A) $[x]$ (B) $[y]$
(C) $[z]$ (D) $[x]+[y]+[z]$

14. If $D_k=\begin{vmatrix} 1 & n & n \\ 2k & n^2+n+2 & n^2+n \\ 2k-1 & n^2 & n^2+n+2 \end{vmatrix}$ and $\sum_{k=1}^{n} D_k = 48$, then 'n' equals
(A) 4 (B) 6
(C) 8 (D) 10

15. If $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}^x = \begin{vmatrix} 2bc-a^2 & c^2 & b^2 \\ c^2 & 2ac-b^2 & b^2 \\ b^2 & a^2 & 2ab-c^2 \end{vmatrix}$
Then $x=$
(A) 1 (B) 2
(C) 3 (D) 1/2

16. If $\begin{vmatrix} a & b & a\alpha+b \\ b & c & b\alpha+c \\ a\alpha+b & b\alpha+c & 0 \end{vmatrix}=0$ and α is not a root of $ax^2+2bx+c=0$, then
(A) a,b,c are in A.P (B) a,b,c, are in G.P
(C) a,b,c are in H.P (D) a,b,c are in A.G.P

17. Matrix A is given by $A=\begin{bmatrix} 6 & 11 \\ 2 & 4 \end{bmatrix}$ then the determinant of $A^{2015}-6A^{2014}$ is
(A) 2^{2016} (B) $(-11)2^{2015}$
(C) $-2^{2015}\times 7$ (D) $(-9)2^{2014}$

18. A, B, C are cofactors of elements, a,b,c in $\begin{bmatrix} a & b & c \\ 2 & 4 & 7 \\ -1 & 0 & 3 \end{bmatrix}$ then the value of $(2A+4B+7C)$ is equal to
(A) 0 (B) 2
(C) -1 (D) 4

19. If the product of the matrix $B=\begin{bmatrix}2&6&4\\1&0&1\\-1&1&-1\end{bmatrix}$ with a matrix A has inverse $C=\begin{bmatrix}-1&0&1\\1&1&3\\2&0&2\end{bmatrix}$ then $A^{-1}=$

(A) $\begin{bmatrix}-3&-5&5\\0&9&14\\2&2&6\end{bmatrix}$ (B) $\begin{bmatrix}-3&5&5\\0&0&9\\2&14&16\end{bmatrix}$

(C) $\begin{bmatrix}-3&-5&-5\\0&0&9\\2&14&16\end{bmatrix}$ (D) $\begin{bmatrix}-3&-5&-5\\2&14&6\\2&14&16\end{bmatrix}$

20. The system of equations $x+y+z=6$, $x+2y+3z=10$, $x+2y+\lambda z=k$ is inconsistent if $\lambda=.....,k\neq.....$

(A) 3,7 (B) 3,10
(C) 7,10 (D) 10,3

(NUMERICAL VALUE TYPE)

Section-II contains 5 **Numerical Value Type** questions.
Marking scheme: +4 for correct answer, 0 if **not attempt** and **-1** in all other cases

21. If the system of equations
$kx+y+2z=1$
$3x-y-2z=2$
$-2x-2y-4z=3$
Has infinitely many solutions, then k is equal to ____.

22. If A is a square matrix of order n such that $|adj(adj\,A)|=|A|^9$, then the value of n can be ____.

23. Let three matrices $A=\begin{bmatrix}2&1\\4&1\end{bmatrix}; B=\begin{bmatrix}3&4\\2&3\end{bmatrix}$ and $C=\begin{bmatrix}3&-4\\-2&3\end{bmatrix}$ then

$$t_r(A)+t_r\left(\frac{ABC}{2}\right)+t_r\left(\frac{A(BC)^2}{4}\right)+t_r\left(\frac{A(BC)^3}{8}\right)+....+\infty=$$

24. If the system of linear equations,
$x+y+z=6$
$x+2y+3z=10$
$3x+2y+\lambda z=\mu$
has more than two solutions, then $\mu-\lambda^2$ is equal to ____.

25. If $a_1,a_2,a_3.....a_n.....$ are in G.P. then the value of the determinant $\begin{vmatrix}\log a_n&\log a_{n+1}&\log a_{n+2}\\\log a_{n+3}&\log a_{n+4}&\log a_{n+5}\\\log a_{n+6}&\log a_{n+7}&\log a_{n+8}\end{vmatrix}$ is

PHYSICS

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26. The equation of projectile is $y=16x-\frac{x^2}{4}$ the horizontal range is

(A) 16 m (B) 8 m
(C) 64 m (D) 12.8 m

27. Two bodies are thrown from the same point with the same velocity of 50ms^{-1}. If their angles of projection are complimentary to each other and the difference of maximum heights is 30m, the minimum and maximum heights are ($g = 10m/s^2$)

(A) 50 m & 80 m (B) 47.5 m & 77.5 m
(C) 30 m & 60 m (D) 25 m & 55 m

28. the height y and horizontal distance x covered by a projectile in a time t seconds are given by the equations $y = 8t - 5t^2$ and $x = 6t$. If x and y are measured in metres, the velocity of projection is

(A) 8ms^{-1} (B) 6ms^{-1}

(C) $14ms^{-1}$ (D) $10ms^{-1}$

29. Two bodies are thrown from the same point with the same velocity of projection angles of pro-jection being complimentary angles. If R_1 and R_2 are the ranges and h_1 and h_2 are maximum heights respectively, then

(A) $R_1 = R_2 = \frac{u^2}{g}\sin 2\theta$

(B) $h_1 + h_2 = \frac{u^2}{2g}$

(C) both (A) and (B) (D) none

30. A ball is thrown with a velocity of u making an angle θ with the horizontal. Its velocity vector normal to initial vector (u) after a time interval of

(A) $\frac{u\sin\theta}{g}$ (B) $\frac{u}{g\cos\theta}$

(C) $\frac{u}{g\sin\theta}$ (D) $\frac{u\cos\theta}{g}$

31. A particle is projected from ground at an angle 45° with initial velocity $20\sqrt{2}ms^{-1}$. The magnitude of average velocity in a time interval from t = 0 to t = 3 in ms^{-1} is

(A) 20.62 (B) 10.31

(C) 41.14 (D) 5.15

32. A body is projected at an angle of 30° with the horizontal with momentum P. At its highest point the magnitude of the momentum is:

(A) $\frac{\sqrt{3}}{2}P$ (B) $\frac{2}{\sqrt{3}}P$

(C) P (D) $\frac{P}{2}$

33. If $\bar{u} = a\hat{i} + bj + ck$ with $\hat{i}, j, k$ are in east, north and vertical directions, the maximum height of the projectile is

(A) $\frac{a^2}{2g}$ (B) $\frac{b^2}{2g}$

(C) $\frac{c^2}{2g}$ (D) $\frac{b^2c^2}{2g}$

34. A ball is thrown from a point with a speed V_0, at an angle of projection θ. From the same point and at the same instance a person starts running with a constant speed $\frac{V_0}{\sqrt{2}}$ to catch the ball will the person be able to catch the ball ? If yes, what should be the angle of projection

(A) yes, 60^0 (B) yes, 30^0

(C) No (D) yes, 45^0

35. A boy can throw a stone up to a maximum height of 10 m. The maximum horizontal distance that the boy can throw the same stone up to will be

(A) $20\sqrt{2}m$ (B) 10m

(C) 30m (D) 40m

36. A gardener wants to wet the garden without moving from his place with a water jet whose velocity is 20 ms^{-1} the maximum area that he can wet ($g = 10ms^{-2}$) (in $metre^2$)

(A) 1600π (B) 40π

(C) 400π (D) 200π

37. A body projected horizontally from the top of a tower follows $y = 20x^2$ parabola equation where x, y are in m $\left(g = 10ms^{-2}\right)$ Then the velocity of the projectile is (ms^{-1})

(A) 0.2 (B) 0.3

(C) 0.4 (D) 0.5

38. A stair case contains ten steps each 10 cm high and 20 cm wide. The minimum horizontal velocity with which the ball has to be rolled off the upper most step, so as to hit directly the edge of the lowest step is (approximately)

(A) 42 ms^{-1} (B) 4.2 ms^{-1}

(C) 24 ms^{-1} (D) 2.4 ms^{-1}

39. A ball is thrown horizontally from a cliff such that it strikes the ground after 5s. The line of sight makes an angle 37° with the horizontal. The initial velocity of projection in ms^{-1} is

(A) 50 (B) $\frac{100}{\sqrt{3}}$

(C) $\frac{100}{\sqrt{2}}$ (D) $\frac{100}{3}$

40. An aeroplane is flying horizontally at a height of 980 m with velocity 100 ms^{-1} drops a food packet. A person on the ground is 414 m ahead horizontally from the dropping point. At what velocity should he move so that he can catch the food packet.

(A) $50\sqrt{2}ms^{-1}$ (B) $\frac{50}{\sqrt{2}}ms^{-1}$

(C) $100ms^{-1}$ (D) $200ms^{-1}$

41. A bomb is dropped from an aeroplane flying horizontally with a velocity of 720 kmph at an altitude of 980m. Time taken by the bomb to hit the ground is
(A) 1 s (B) 7.2 s
(C) 14.14 s (D) 0.15 s

42. A stone is thrown from the top of a tower of height 50 m with a velocity of $30ms^{-1}$ at an angle of 30 deg above the horizontal. Find the time during which the stone will be in air
(A) 2 sec (B) 3 sec
(C) 4 sec (D) 5 sec

43. A body is thrown horizontally with a velocity u from the top of a tower. The displacement of the stone when the horizontal and vertical velocities are equal is
(A) $\frac{u^2}{g}$ (B) $\frac{u^2}{2g}$
(C) $\sqrt{5}\left(\frac{u^2}{2g}\right)$ (D) $\frac{2u^2}{g}$

44. A golfer standing on the ground hits a ball with a velocity of 52 m/s at an angle θ above the horizontal if $\tan\theta = \frac{5}{12}$ find the time for which the ball is at least 15m above the ground? ($g = 10m/s^2$)
(A) 2s (B) 3s
(C) 4s (D) 5s

45. A particle is projected from the ground with an initial speed of v at an angle of projection θ. The average velocity of the particle between its time of projection and time it reaches highest point of trajectory is
(A) $\frac{v}{2}\sqrt{1+2\cos^2\theta}$ (B) $\frac{v}{2}\sqrt{1+2\sin^2\theta}$
(C) $\frac{v}{2}\sqrt{1+3\cos^2\theta}$ (D) $v\cos\theta$

NUMERICAL VALUE TYPE)

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46. A particle moves in x - y plane according to equations $x = 4t^2 + 5t$ and $6y = 5t$. The acceleration of the particle must be

47. A particle is projected from ground with some initial velocity making an angle of 45° with the horizontal. It reaches a height of 7.5 m above the ground while it travels a horizontal distance of 10 m from the point of projection. The initial speed of the projection is

48. The parabolic path of a projectile is represented by $y = \frac{x}{\sqrt{3}} - \frac{x^2}{60}$ in MKS units. θ.
Its angle of projection is ($g = 10ms^{-2}$)

49. A bomber flying upward at an angle of 53° with the vertical releases a bomb at an altitude of 800 m. The bomb strikes the ground 20 s after its release. If $g = 10ms^{-2}$ the velocity at the time of release of the bomb in ms^{-1} is

50. Two cliff of heights 120 m and 100.4 m are separated by a horizontal distance of 16 m if a car has to reach from the first cliff to the second the horizontal velocity of car should be ____m/s.

CHEMISTRY

(SINGLE CORRECT ANSWER TYPE)

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51. Which of the following processes is accompanied by absorption of energy?
(1) $F_{(g)} + e \longrightarrow F^-_{(g)}$
(2) $Cl_{(g)} + e \longrightarrow Cl^-_{(g)}$
(3) $O_{(g)} + e \longrightarrow O^-_{(g)}$
(4) $O^-_{(g)} + e \longrightarrow O^{2-}_{(g)}$

52. Arrange N, S, O and F in order of decreasing electron gain enthalpy:
(1) F>S>O>N (2) NO>S>F
(3) O>S>F>N (4) S>O>N>F

53. In a period of normal elements the most electronegative element belongs to :
(1) first group (2) 17th group

(3) second group (4) 16th group

54. The values of electronegativities of atoms A and B are 1.0 and 4.0, respectively. The % of ionic character of A-B is:
(1) 50.0% (2) 79.5%
(3) 55.0% (4) 43.0%

55. Which of the following is an endothermic process?
(1) First electron affinity of chlorine
(2) Second electron affinity of oxygen
(3) Formation of NaCl from gaseous ions
(4) Hydration of $MgCl_2$

56. Configuration that shows the highest energy released when an electron is added to the atom is
(1) $1s^2\ 2s^2\ 2p^3$ (2) $1s^2\ 2s^2\ 2p^4$
(3) $1s^2\ 2s^2\ 2p^5$ (4) $1s^2\ 2s^2\ 2p^6$

57. Correct relation among X_A, X_B and Δ, where X_A and X_B are the electronegativities of elements A and B.
(1) $X_A + X_B = 0.208\sqrt{\Delta}$
(2) $\sqrt{X_A - X_B} = 0.208\Delta$
(3) $X_A - X_B = 0.208\sqrt{\Delta}$
(4) $X_A - X_B = \sqrt{0.208 x \Delta}$

58. The electronegativity values according to Mulliken scale are ..... times to those in Pauling scale
(1) 0.208 (2) 2
(3) 2.8 (4) 544

59. The stable oxidation state of Thallium, a IIIA group element is
(1) +1 (2) +3
(3) -3 (4) +5

60. An element with electronic arrangement as 2, 8, 18, 1 will exhibit the following stable oxidation states
(1) + 2 & + 4 (2) +1 & +2
(3) + 2 only (4) + 1 only

61. Basic nature of the oxides of a period from left to right
(1) Increases (2) Decreases
(3) Remains constant
(4) First increases and then decreases

62. Chemical similarity between B and Al is due to
(1) Diagonal relationship
(2) Both belong to same period
(3) Similar outer electronic configuration
(4) Inert pair effect

63. Pair of ions with similar ionic radii
(1) Li^+, Mg^{2+} (2) Li^+, Na^+
(3) Mg^{2+}, Ca^{2+} (4) Mg^{2+}, K^+

64. Among the following pairs of elements, the pair that is different from others is
(1) Lithium and Magnesium
(2) Nitrogen and Phosphorus
(3) Beryllium and Aluminium
(4) Boron and Silicon

65. Which of the following is the correct order of electron affinity
(1) I > Br > F > Cl (2) F < Cl < Br < I
(3) F > Cl > Br > I (4) I < Br < F < Cl

66. Two elements A and B have the following electronic configurations. The formula of the compound formed between them can be
A = $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^1$, B = $1s^2\ 2s^2\ 2p^4$
(1) AB (2) AB_2
(3) A_2B_3 (4) A_3B_2

67. Among the following elements most acidic oxide is given by
(1) Al (2) P
(3) N (4) Sb

68. If the ionisation energy and electron affinity of an element are 275 and 86 Kcals mol^{-1} respectively, the electronegativity of that element on Mulliken scale is
(1) 2.8 (2) 0.0
(3) 4.0 (4) 1.9

69. The bond energies of H – H, X – X and H – X are 104 K.Cal, 38K.Cal and 138 K.Cal respectively the electronegativity of 'X' is
[$\sqrt{67}$ =8.18]
(1) 3.0 (2) 3.5
(3) 3.8 (4) 1.7

70. Some oxides are shown in List-I and their nature is shown in List II

	List-I		List-II
A.	MgO	1.	Amphoteric
B.	BeO	2.	Acidic
C.	P_2O_5	3.	Neutral
D.	CO	4.	Basic

The correct match is

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

(NUMERICAL VALUE TYPE)

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71. **Maximum number of elements present in 7^{th} period is** 32.

72. **Atomic number of newly discovered inert gas is** 118.

73. **The period number with only gaseous elements is** 1.

74. **Calculate the value of Zeff in 3^{rd} electrons of Sc? (Nearest integer)**

75. **How many elements from the following are not transition element? (Zr, Co, Cd, Hg, Au, Cu)**

0

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