



RANKRIDGE IIT JEE/NEET JUNIOR COLLEGE (LONGTERM)

TELANGANA

STREAM: JR MPC
Time: 3:00 Hours

WEEKEND TEST-10

Date: 30-08-2025
Max Marks: 300

SYLLABUS

MATHEMATICS

: Basics of pair of lines

PHYSICS

: Scalar Product, Work and applications, Workdone by variable force, Energy, Work Energy theorem

CHEMISTRY

: Chemical bonding, bond parametres, resonance, dipolemoment

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. The equation $3x^2 + 10xy - 8y^2 = 0$

represents

- (A) real and distinct lines
- (B) coincident lines
- (C) imaginary lines
- (D) parallel lines

2. If the slope of one line is twice the slope of the other in the pair of straight lines

$$ax^2 + 2hxy + by^2 = 0 \text{ then } 8h^2 =$$

- (A) $7ab$
- (B) $-7ab$
- (C) $9ab$
- (D) $-9ab$

3. If $6x^2 - 5xy + y^2 = 0$ represents a pair of lines then

$$\text{I: } m_1 + m_2 = 5 \quad \text{II. } |m_1 - m_2| = 1$$

Which of the above statements are correct

- (A) only I
- (B) only II
- (C) both I and II
- (D) neither I nor II

4. If θ is the acute angle between the lines

$$6x^2 + 11xy + 3y^2 = 0, \text{ then } \tan \theta =$$

- (A) $9/7$
- (B) $7/9$
- (C) $3/7$
- (D) $7/3$

5. The equation of the pair of lines through $(1, -1)$ and perpendicular to the pair of lines $x^2 - xy - 2y^2 = 0$ is

- (A) $2x^2 - xy + y^2 + 5x + y + 2 = 0$
- (B) $2x^2 - xy - y^2 - 5x - y + 2 = 0$

(C) $x^2 - xy - 2y^2 - 5x - y - 2 = 0$

(D) $2x^2 - xy - y^2 + 5x + y - 2 = 0$

6. If the product of perpendiculars from (k, k) to the pair of lines

$$x^2 + 4xy + 3y^2 = 0 \text{ is } 4/\sqrt{5} \text{ then } k \text{ is}$$

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

7. If the area of the triangle formed by the lines $3x^2 - 2xy - 8y^2 = 0$ and the line

$$2x + y - k = 0$$
 is 5 sq. units, then $k =$

- (A) 5
- (B) 6
- (C) 7
- (D) 8

8. The area of the equilateral triangle formed by the lines passing through the origin and the line $12x - 5y + 13 = 0$, in sq. units is

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

(C) $\sqrt{3}$ (D) $1/\sqrt{3}$

9. If the lines $x^2 + (2+k)xy - 4y^2 = 0$ are equally inclined to the coordinate axes, then $k =$

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

10. The equation of the bisectors of the angle between the two straight lines

$$x^2 - xy - 6y^2 = 0 \text{ is}$$

(A) $x^2 + 14xy - y^2 = 0$

(B) $x^2 + 14xy + y^2 = 0$

(C) $x^2 - 14xy - y^2 = 0$

(D) $x^2 - 14xy + y^2 = 0$

11. The equation of the pair of bisectors of the angle between the pair of lines

- $x^2 + 2axy - y^2 = 0$ is $x^2 + 2bxy - y^2 = 0$. Then
 (A) $ab = 1$ (B) $ab + 1 = 0$
 (C) $ab = 2$ (D) $ab + 2 = 0$
12. Two lines $9x^2 + y^2 + 6xy - 4 = 0$ are
 (A) parallel and coincident
 (B) coincident only
 (C) parallel but not coincident
 (D) perpendicular
13. The equation to the pair of straight lines passing through (2,1) and perpendicular to the pair of lines $4xy + 2x + 6y + 3 = 0$ is
 (A) $xy + x + 2y + 2 = 0$
 (B) $xy + x + 2y - 2 = 0$
 (C) $xy + x - 2y - 2 = 0$
 (D) $xy - x - 2y + 2 = 0$
14. The equation to the pair of lines through the origin perpendicular to the pair of lines $2x^2 + 5xy + 2y^2 + 10x + 5y = 0$ is
 (A) $2x^2 + 5xy + 2y^2 = 0$
 (B) $2x^2 - 5xy + 2y^2 = 0$
 (C) $2x^2 - 5xy - 2y^2 = 0$
 (D) $x^2 - 5xy + y^2 = 0$
15. The distance between the parallel lines $9x^2 - 6xy + y^2 + 18x - 6y + 8 = 0$ is
 (A) $\frac{1}{\sqrt{10}}$ (B) $\frac{2}{\sqrt{10}}$
 (C) $\frac{4}{\sqrt{10}}$ (D) $\sqrt{10}$
16. The product of the perpendicular distance from the point (-2,3) to the lines $x^2 - y^2 + 2x + 1 = 0$ is
 (A) 3 (B) 4
 (C) 5 (D) 6
17. The point of the intersection of the pair of lines $x^2 + xy + 2y^2 - 3x + 2y + 4 = 0$ is
 (A) (1,2) (B) (-1,2)
 (C) (-2,1) (D) (2,-1)
18. The intercept made by the pair of lines $2x^2 + xy - 8y^2 - 2x + 7y + 1 = 0$ on the Y-axis is
 (A) 6 (B) 9/8
 (C) 1/5 (D) 5

19. If the equation $6x^2 + 5xy + by^2 + 9x + 20y + c = 0$ represents a pair of perpendicular lines, then $b - c =$
 (A) -6 (B) -3
 (C) -2 (D) 0

20. If $ax^2 + 6xy + by^2 - 10x + 10y - 6 = 0$ represents a pair of perpendicular straight lines, then $|a|$ is equal to
 (A) 2 (B) 4
 (C) 1 (D) 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. The difference of the slopes of the lines $x^2(\sec^2 \theta - \sin^2 \theta) - (2 \tan \theta)xy + y^2 \sin^2 \theta = 0$ is 2.
22. If the sum of the slopes of the lines given by $x^2 - 2Cxy - 7y^2 = 0$ is four times their product then C has the value 3.
23. If $\lambda x^2 + 6xy + 9y^2 + 4x + 12y + 3 = 0$ represents a pair of straight lines, then $\lambda =$ 1.
24. If (l,k) is the point of intersection of the lines given by $2x^2 + 5xy + 3y^2 + 6x + 7y + 4 = 0$, then $k =$ 0.
25. If the pair of straight lines $xy - x - y + 1 = 0$ and the line $ax + 2y - 3 = 0$ are concurrent, then $a =$ 1.

PHYSICS

(SINGLE CORRECT ANSWER TYPE)

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26. A uniform chain has mass M and length L respectively. It is lying on a smooth horizontal table with half of its length

Q hanging vertically down. The work done in pulling the chain up the table is

- (A) $MgL/2$ (B) $MgL/4$
 (C) $MgL/8$ (D) $MgL/16$

27. A particle moves along x-axis under the action of a position dependent force

$$F = (5x^2 - 2x) N.$$

Work done by forces on the particle when it moves from origin to $x = 3\text{m}$ is
 (A) 45 J (B) 36 J
 (C) 32 J (D) 42 J

28. A uniform chain of length L and mass M is lying on a smooth table and one third of its length is hanging vertically down over the edge of the table. If g is acceleration due to gravity, the minimum work required to pull the hanging part of the chain on the table is

- (A) MgL (B) $\frac{MgL}{3}$
 (C) $\frac{MgL}{9}$ (D) $\frac{MgL}{18}$

29. If a force $\vec{F} = (\vec{i} + 2\vec{j} + \vec{k}) N$ acts on a body produces a displacement of

$$\vec{s} = (4\vec{i} + \vec{j} + 7\vec{k}) \text{ m},$$

then the work done is

- (A) 9 J (B) 13 J
 (C) 5 J (D) 1 J

30. A force $F = (2 + x) \text{ N}$ acts on a particle in x-direction where 'x' is in metre. The work done by this force during a displacement from $x = 1\text{m}$ to $x = 2\text{m}$ is

- (A) 2 J (B) 3.5 J
 (C) 4.5 J (D) 5 J

31. A body of mass 3 kg is under a constant force which causes a displacement s metres in time t, given by the relation

$$s = \frac{1}{3}t^2,$$

where t is in seconds. Work done

by the force in 2 seconds is

- (A) $\frac{3}{8} \text{ J}$ (B) $\frac{8}{3} \text{ J}$
 (C) $\frac{19}{5} \text{ J}$ (D) $\frac{5}{19} \text{ J}$

32. A bucket of mass 'm' tied to a light rope is lowered at a constant acceleration of $g/4$. If the bucket is lowered by a distance 'd',

the work done by the rope will be (neglect the mass of the rope)

- (A) $\frac{1}{4}mgd$ (B) $\frac{3}{4}mgd$
 (C) $-\frac{3}{4}mgd$ (D) $-\frac{5}{4}mgd$

33. A block of mass 10 kg slides down a rough slope which is inclined at 45° to the horizontal. The coefficient of sliding friction is 0.30. When the block has to slide 5 m, the work done on the block by the force of friction is nearly

- (A) 115 J (B) $-75\sqrt{2} \text{ J}$
 (C) 321.4 J (D) -321.4 J

34. A force of 1200 N acting on a stone by means of a rope slides the stone through a distance of 10m in a direction inclined at 60° to the force. The work done by the force is

- (A) $6000\sqrt{3} \text{ J}$ (B) 6000 J
 (C) 12000 J (D) 8000 J

35. A particle of mass 0.5kg is displaced from position $r_1(2,3,1)$ to $r_2(4,3,2)$ by applying a force of magnitude 30N which is acting along $(\hat{i} + \hat{j} + \hat{k})$. The work done by the force is

- (A) $10\sqrt{3} \text{ J}$ (B) $30\sqrt{3} \text{ J}$
 (C) 30 J (D) 40 J

36. Two bodies of masses m_1 and m_2 have equal KE. Their momenta is in the ratio

- (A) $\sqrt{m_2} : \sqrt{m_1}$ (B) $m_1 : m_2$
 (C) $\sqrt{m_1} : \sqrt{m_2}$ (D) $m_1^2 : m_2^2$

37. A body moving with a kinetic energy of 6J comes to rest at a distance of 1m due to a retarding force of

- (A) 4 N (B) 6 N
 (C) 5 N (D) 8 N

38. A particle located in one dimensional potential field has potential energy

function $U(x) = \frac{a}{x^2} - \frac{b}{x^3}$, where a and b are positive constants. The position of equilibrium corresponds to $x =$

- (A) $\frac{3a}{2b}$ (B) $\frac{2b}{3a}$

(C) $\frac{2a}{3b}$ (D) $\frac{3b}{2a}$

39. A river of salty water is flowing with a velocity 2 m/sec. If the density of water is 1.2 gm/cc, the kinetic energy of each of cubic metre of water is
 (A) 2.4 J (B) 24 J
 (C) 4.8 KJ (D) 2.4 KJ

40. A liquid of specific gravity 0.8 is flowing in a pipe line with a speed of 2 m/s. The K.E. per cubic meter of it is
 (A) 160 J (B) 1600 J
 (C) 160.5 J (D) 1.6 J

41. A tank of size $10m \times 10m \times 10m$ is full of water and built on the ground. If $g = 10ms^{-2}$ the potential energy of the water in the tank is
 (A) 5×10^7 J (B) 1×10^8 J
 (C) 5×10^4 J (D) 5×10^5 J

42. 'n' identical cubes each of mass 'm' and edge 'L' are on a floor. If the cubes are to be arranged one over the other in a vertical stack, the work to be done is
 (A) $Lmn(n-1)/2$ (B) $Lg(n-1)/mn$
 (C) $(n-1)/Lmn$ (D) $Lmn/2(n-1)$

43. By applying the brakes without causing a skid, the driver of a car is able to stop his car with in a distance of 5 m, if it is going at 36 kmph. If the car were going at 72 kmph, using the same brakes, he can stop the car over a distance of
 (A) 10 m (B) 2.5 m
 (C) 20 m (D) 40 m

44. If p and q are two unit vectors and the angle between them is 60° then $\frac{(1 + p \cdot q)}{(1 - p \cdot q)}$

is
 (A) 2 (B) 3
 (C) 0 (D) 1/2

45. The area under a 'force - displacement' curve gives:
 (A) impulse (B) Power
 (C) work (D) time

NUMERICAL VALUE TYPE

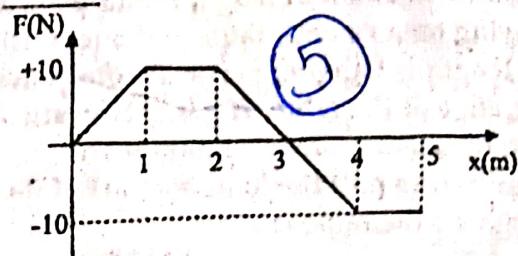
Section-II contains 5 Numerical Value Type questions.

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46. 300 J of work is done in sliding a 2 kg block up an inclined plane of height 10 m. Work done against friction is ($g = 10ms^{-2}$)

47. If $\vec{F} = 2\hat{i} + 3\hat{j} + 4\hat{k}$ acts on a body and displaces it by $\vec{S} = 3\hat{i} + 2\hat{j} + 5\hat{k}$, then the work done by the force is

48. A position dependent force F acting on a particle and its force-position curve is shown in the figure. Work done on the particle, when its displacement 0 to 5 m is Joule.



49. A bullet of mass 10 gm strikes a target at 400 m/s velocity and loses half of its initial velocity. The loss of kinetic energy in joules is

50. If $\vec{P} = 2\hat{i} + 3\hat{j} - 4\hat{k}$ and $\vec{Q} = 5\hat{i} + 2\hat{j} + 4\hat{k}$ find the angle between the two vectors. in degree.

CHEMISTRY (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.

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51. Which of the following has highest dipole moment?

(A) BF_3 (B) CO_2
 (C) CCl_4 (D) NF_3

52. The O-H bond length in H_2O is xA° . The O-H bond length in H_2O_2 is

(A) $< xA^\circ$ (B) xA°
 (C) $> xA^\circ$ (D) $2x$

53. The C-C bond distance is largest in

(A) C_2H_2 (B) C_2H_4
 (C) $C_2H_2Br_2$ (D) C_2H_6

- Bond energy is highest in the overlapping
 (A) $sp^2 - sp^2$ (B) $sp^3 - sp^2$

55. ~~(A) $sp - sp$~~ (B) $sp^3 - sp^3$
Bond energy is least in the following
(A) HF (B) HCl
(C) HBr (D) HI
56. Bond length of H_2 is 0.074nm , Bond length of Cl_2 is 1.98\AA . Bond length of HCl is
(A) 2.72\AA (B) 136pm
(C) 1.027nm (D) 0.136\AA
57. If the bond length and dipole moment of a diatomic molecule are 1.25\AA and $1.0D$ respectively, what is the percent ionic character of the bond?
(A) 10.66 (B) 12.33
~~(C) 16.66~~ (D) 19.33
58. The molecules BF_3 and NF_3 are covalent compounds. But BF_3 is non-polar and NF_3 is polar. The reason is
(A) Boron is a metal and nitrogen is a gas in uncombined state
(B) BF bonds have no dipole moment whereas NF bonds have dipole moment
(C) Atomic size of boron is smaller than that of nitrogen
(D) BF_3 is planar but NF_3 is pyramidal in shape
59. In O_2 , H_2O_2 and O_3 , the correct order of 'oxygen-oxygen' bond length is
(A) $O_2 > O_3 > H_2O_2$ (B) $O_3 > H_2O_2 > O_2$
~~(C) $H_2O_2 > O_3 > O_2$~~ (D) $O_3 > H_2O_2 > O_2$
60. Bond energy is least in the following
(A) $C - C$ (B) $N \equiv N$
(C) $O = O$ (D) $F - F$
61. The correct order of increasing C-O bond length of CO , CO_3^{2-} and CO_2
(A) $CO_3^{2-} < CO_2 < CO$
~~(B) $CO_2 < CO_3^{2-} < CO$~~
~~(C) $CO < CO_3^{2-} < CO_2$~~
(D) $CO < CO_2 < CO_3^{2-}$
- A: $CHCl_2$ is non-polar and CCl_4 is polar molecule.
R: Molecule with zero dipole moment is non-polar in nature.

- (A) Both A and R are true and R is the correct explanation of A
(B) Both A and R are true and R is not the correct explanation of A
(C) A is true but R is false
(D) A is false but R is true
63. Statement-1: Dipole moment of NH_3 is greater than that of NF_3 .
Statement-2: Nitrogen is more electronegative than fluorine.
(A) Statement-1 is true. Statement-2 is true and statement-2 is correct explanation for statement-1.
(B) Statement-1 is true, Statement-2 is true and statement-2 is not correct explanation for statement-1.
(C) Statement-1 is true, Statement-2 is false.
(D) Statement-1 is false, Statement-2 is true.
64. In which of the following molecule/ion all the bonds are not equal?
(A) XeF_4 (B) BF_4^-
~~(C) C_2H_4~~ (D) SiF_4
65. Increasing order of bond strength of O_2 , O_2^- , O_2^{2-} and O_2^+ is
(A) $O_2^+ < O_2 < O_2^- < O_2^{2-}$
(B) $O_2 < O_2^+ < O_2^- < O_2^{2-}$
(C) $O_2^- < O_2^{2-} < O_2^+ < O_2$
~~(D) $O_2^{2-} < O_2^- < O_2 < O_2^+$~~
66. The molecule having smallest bond angle is
(A) NCI_3 (B) $AsCl_3$
(C) $SbCl_3$ (D) PCl_3
67. Which of the following compounds has the smallest bond angle in its molecule?
(A) SO_2 (B) H_2O
(C) H_2S (D) NH_3
68. In the anion $HCOO^-$ the two $C - O$ bonds are found to be of equal length. What is the reason for it?
(A) Electronic orbits of carbon atom are hybridized
(B) The $C = O$ bond is weaker than the $C - O$ bond.
(C) The anion $HCOO^-$ has two resonating structures.
(D) The anion is obtained by removal of a proton from the acid molecule

69. What is correct order of bond order of $\text{Cl}-\text{O}$ bond?

- (A) $\text{ClO}_4^- > \text{ClO}_3^- > \text{ClO}_2^- > \text{ClO}^-$
 (B) $\text{ClO}^- < \text{ClO}_2^- > \text{ClO}_3^- < \text{ClO}_4^-$
 (C) $\text{ClO}_3^- < \text{ClO}_2^- > \text{ClO}_4^- < \text{ClO}^-$
 (D) $\text{ClO}_2^- < \text{ClO}_3^- < \text{ClO}_4^- < \text{ClO}^-$

70. Average bond order of $\text{C}-\text{C}$ bond in C_6H_6 is

- (A) 1 (B) 2
 (C) 1.5 (D) 1.33

(NUMERICAL VALUE TYPE)

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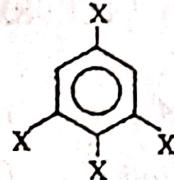
71. AX is a covalent Diatomic molecule where A and X are second row elements of periodic table. Based on Molecular orbital theory, the bond order of AX is 2.5. The total number of electrons in AX is 13. (Round off to the Nearest Integer)

72. The number of possible resonance structures for CO_3^{2-} is 3.

73. The bond order of the N - O bonds in NO_3^- ion is x. Then find to $10x$ 20.



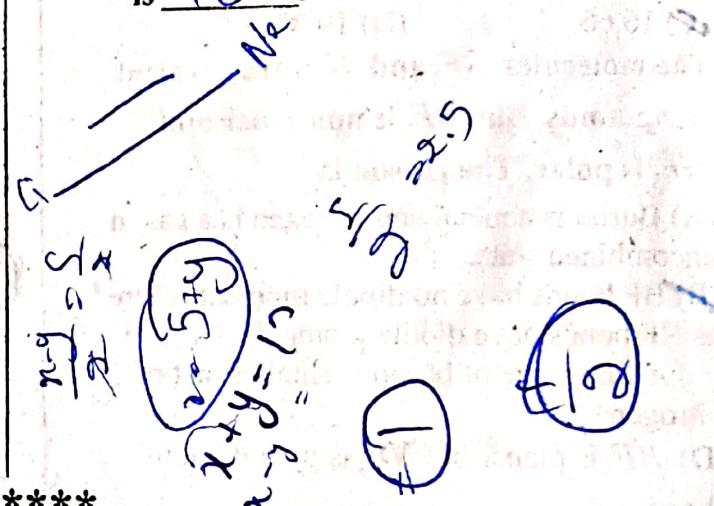
74. The dipole moment of



dipole moment of value of $2x$ is 3.

75. The dipole moment of HBr is

$1.6 \times 10^{-30} \text{ C-m}$ and interatomic spacing is 1\AA . The percent ionic character of HBr is 10.



BEST OF LUCK

