RANKRIDGE IIT JEE/NEET JUNIOR COLLEGE (LONGTERM)

TELANGANA

STREAM: JR MPC
Time: 3:00 Hours

WEEKEND TEST-07

Date: 23-08-2025
Max Marks: 300

SYLLABUS

MATHEMATICS : Straight lines
PHYSICS : Friction (complete),circular motion
CHEMISTRY : Hydrogen bonding, Molecular orbital theory

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 of the straight line making an intercept of 3 units on the y-axis and inclined at 45^0 to the x-axis is**
(A) $y=x-1$ (B) $y=x+3$
(C) $y=45x+3$ (D) $y=x+45$

2. **The slope of a straight line through A(3,2) is 3/4 then the coordinates of the two points on the line that are 5 units away from A are**
(A) (-7,5) (1,-1) (B) (7,5) (-1,-1)
(C) (6,9) (-2,4) (D) (7,3) (-2,1)

3. **The distance between the parallel lines $8x+6y+5=0$ and $4x+3y-25=0$ is**
(A) $\frac{7}{2}$ (B) $\frac{9}{2}$
(C) $\frac{11}{2}$ (D) $\frac{5}{4}$

4. **If the line $3x+4y-8=0$ is denoted by L, then the points (2,-5), (-5,2)**
(A) lie on L
(B) lie on same side of L
(C) lie on opposite sides of L
(D) equidistant from L

5. **The Point P(2,1) is shifted by $3\sqrt{2}$ parallel to the line $x+y=1$, in the direction of increasing ordinate, to reach Q. The image of Q by the line $x+y=1$ is**
(A) $(5,-2)$ (B) $(-1,4)$
(C) $(3,-4)$ (D) $(-3,2)$

6. **The area of the triangle formed by the lines x = 0; y = 0 and $x\sin 18^0+y\cos 36^0+1=0$ is**
(A) 1 (B) 2
(C) 3 (D) 4

7. **If (2, -3) is the foot of the perpendicular from (-4, 5) on a line then its equation is**
(A) $3x-4y+28=0$
(B) $3x-4y-18=0$
(C) $3x-4y+18=0$
(D) $3x-4y-17=0$

8. **A line joining A(2,0) and B(3,1) is rotated about A in anticlock wise direction through angle 15^0, then the equation of AB in the new position is**
(A) $y=\sqrt{3}x-2$ (B) $y=\sqrt{3}(x-2)$
(C) $y=\sqrt{3}(x+2)$ (D) $x-2=\sqrt{3}y$

9. **The equation of the straight line whose intercepts on x-axis and y-axis are respectively twice and thrice of those by the line $3x+4y=12$, is**
(A) $9x+8y=72$ (B) $9x-8y=72$
(C) $8x+9y=72$
(D) $8x+9y+72=0$

10. **The straight line through P(1,2) is such that its intercept between the axes is bisected at P. Its equation is**
(A) $x+2y=5$ (B) $x+y-3=0$
(C) $x-y+1=0$ (D) $2x+y-4=0$

11. **A straight line is such that its distance of 5 units from the origin and its inclination is 135^0. The intercepts of the line on the co-ordinate axes are**

(A) 5,5 (B) $\sqrt{2},\sqrt{2}$

(C) $5\sqrt{2},5\sqrt{2}$ (D) $5/\sqrt{2},5/\sqrt{2}$

12. One side of an equilateral triangle is $3x+4y=7$ and its vertex is (1,2). Then the length of the side of the triangle is

(A) $\frac{4\sqrt{3}}{17}$ (B) $\frac{3\sqrt{3}}{16}$

(C) $\frac{8\sqrt{3}}{15}$ (D) $\frac{4\sqrt{3}}{15}$

13. All points lying inside the triangle formed by the points (1,3), (5,0), (-1,2) satisfy

(A) $2x+y-13=0$ (B) $3x+2y\geq 0$

(C) $3x-4y-12\leq 0$ (D) $4x+y=0$

14. The range of α for which the points $(\alpha,\alpha+2)$ and $\left(\frac{3\alpha}{2},\alpha^2\right)$ lie on opposite sides of the line $2x+3y-6=0$

(A) $(-\infty,-2)$ (B) $(0,1)$

(C) $(-\infty,,-2)\cup(0,1)$

(D) $(-\infty,1)\cup(2,\infty)$

15. Centroid of the triangle, formed by the lines $x+2y-5=0, 2x+y-7=0, x-y+1=0$ is

(A) (1,3) (B) (3,5)

(C) (2,2) (D) (1,1)

16. Reflection of $3x+4y+5=0$ w.r. to the line $2x+y+1=0$ is

(A) $2x+1=0$ (B) $2x-1=0$

(C) $5x-1=0$ (D) $5x+1=0$

17. Find the equation of the bisector of the angle between the lines $x+2y-11=0$, $3x-6y-5=0$ which contains the point $(1,-3)$.

(A) $2x-19=0$ (B) $2x+19=0$

(C) $3x-19=0$ (D) $3x+19=0$

18. Let P(1,1) and Q(3,2) be given points. The point R on the x-axis such tat PR+RQ is minimum is

(A) $\left(\frac{5}{3},0\right)$ (B) $(2,0)$

(C) $(3,0)$ (D) $\left(\frac{3}{2},0\right)$

19. The line 3x-2y=24 meets x-axis at A and y-axis at B. The perpendicular bisector of AB meets the line through (0,-1) and parallel to x-axis at C. Then C is

(A) $\left(\frac{-7}{2};-1\right)$ (B) $\left(\frac{-15}{2},-1\right)$

(C) $\left(\frac{-11}{2},-1\right)$ (D) $\left(\frac{-13}{2},-1\right)$

20. In $\Delta ABC, B=(0,0)$, $AB=2, \angle ABC=\frac{\pi}{3}$ and the middle point of BC has the co-ordinates (2,0). Then the centroid of triangle is

(A) $\left(\frac{5}{3},\frac{1}{3}\right)$ (B) $\left(\frac{5}{3},\frac{1}{\sqrt{3}}\right)$

(C) $\left(\frac{5}{\sqrt{3}},\frac{1}{3}\right)$ (D) $\left(\frac{5}{\sqrt{3}},\frac{1}{\sqrt{3}}\right)$

(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 ara (in square units) of the triangle formed by the lines $x=0, y=0$ and $3x+4y=12$ is ____.

22. If the line $2x+y=k$ passes through the point which divides the line segment joining the points (1,1) and (2,4) in the ratio 3:2, then k equals ____.

23. If the lines $x+ay+a=0, bx+y+b=0$ and $cx+cy+1=0$ (a,b,c being distinct $\neq 1$) are concurrent, then the value of $\frac{a}{a-1}+\frac{b}{b-1}+\frac{c}{c-1}$ is ____.

24. The number of lines that are parallel to $2x+6y-7=0$ and have an intercept 10 between the co-ordinate axis is ____

25. The point B is the image of A w.r.t. the line $x+y+4=0$ and C is the image of B w.r.t. the line $2x-y+2=0$. If A(1,2) then circum radius of ΔABC is ____.

PHYSICS

(SINGLE CORRECT ANSWER TYPE)

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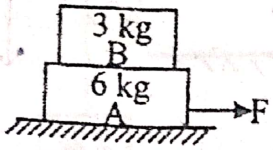
26. **Maximum value of static friction is**
(A) limiting friction (B) rolling friction
(C) static friction (D) normal reaction

27. **Two blocks A and B of masses 6 kg and 3 kg rest on a smooth horizontal surface as shown in the figure. If coefficient of friction between A and B is 0.4, the maximum horizontal force which can make them without separation is**



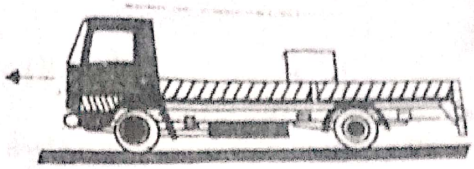
(A) 72 N (B) 40 N
(C) 36 N (D) 20 N

28. **The coefficient of friction between a hemispherical bowl and an insect is $\sqrt{0.44}$ and the radius of the bowl is 0.6m. The maximum height to which an insect can crawl in the bowl will be**
(A) 0.4m (B) 0.2m
(C) 0.3m (D) 0.1m

29. **A vehicle of mass Mis moving on a rough horizontal road with a momentum P. If the coefficient of friction between the tyres and the road is μ, then the stopping distance is**

(A) $\frac{P}{2\mu Mg}$ (B) $\frac{P^2}{2\mu Mg}$
(C) $\frac{P^2}{2\mu M^2 g}$ (D) $\frac{P}{2\mu M^2 g}$

30. **The rear side of a truck is open and a box of 40 kg mass is placed 5 m away from the open end as shown in figure. The coefficient of friction between the box the surface below it is 0.15. On a straight road, the truck starts from rest and accelerates with $2ms^{-2}$. At what distance from the starting point does the box fall from the truck? (Ignore the size of the box.)**



(A) 20m (B) 10m
(C) $\sqrt{20m}$ (D) 5m

31. **The coefficient of friction between a car wheels and a roadway is 0.5 The least distance in which the car can accelerate from rest to a speed of 72 kmph is ($g=10\ ms^{-2}$)**
(A) 0m (B) 20m
(C) 30m (D) 40m

32. **A body of mass Mis placed on a rough inclined plane of inclination θ and coefficient of friction μ_k. A force of $(mg\sin\theta+\mu_k mg\cos\theta)$ is applied in the upward direction, the acceleration of the body is**
(A) $g\sin\theta$ (B) $g(\sin\theta+\mu_k\cos\theta)$
(C) $g(\sin\theta-\mu_k\cos\theta)$ (D) Zero

33. **The angle of inclination of an inclined plane is 60^0. Coefficient of friction between 10kg body on it and its surface is 0.2, $g = 10ms^{-2}$. The acceleration of the body down the plane in ms^{-2} is**
(A) 5.667 (B) 6.66
(C) 7.66 (D) Zero

34. **A block slides down a rough inclined plan of slope angle θ with a constant velocity. It is then projected up the same plane wit an initial velocity v. The distance travelle by the block up the plane before coming rest is**

(A) $\frac{v^2}{4g\sin\theta}$ (B) $\frac{v^2}{2g\sin\theta}$
(C) $\frac{v^2}{g\sin\theta}$ (D) $\frac{4gv^2}{\sin\theta}$

35. **A smooth block is released from rest on 45^0 inclined plane and it slides a distan 'd'. The time taken to slide is n times th on a smooth inclined plane. The coeffic of friction**

(A) $\mu_k = 1-\frac{1}{n^2}$ (B) $\mu_k = \sqrt{1-\frac{1}{n^2}}$

(C) $\mu_k = \frac{1}{1-n^2}$ (D) $\mu_k = \sqrt{\frac{1}{1-n^2}}$

36. A pulling force making an angle θ with the horizontal is applied on a block of weight W placed on a horizontal table. If the angle of friction is ϕ, the magnitude of the force required to move the body is equal to

(A) $\frac{W\cos\phi}{\cos(\theta-\phi)}$ (B) $\frac{W\sin\phi}{\cos(\theta-\phi)}$

(C) $\frac{W\tan\phi}{\sin(\theta-\phi)}$ (D) $\frac{W\sin\phi}{\tan(\theta-\phi)}$

37. The maximum speed of a car on a curved path of radius 'r' and the coefficient of friction μ_k is

(A) $v = \sqrt{\frac{\mu_k}{gr}}$ (B) $v = \sqrt{\mu_k gr}$

(C) $v = \sqrt{\frac{gr}{\mu_k}}$ (D) $v = \sqrt{\frac{1}{\mu_k gr}}$

38. A body of mass 5 kg is moving in a circle of radius 1 m with an angular velocity of 2 rad-s^{-1}. The centripetal force acting on the body is

(A) 10 N (B) 20 N
(C) 30 N (D) 40 N

39. The centripetal force required for a 1000 kg car travelling at 36 kmph to take a turn by 90° in travelling along an arc of length 628 m is

(A) 250 N (B) 500 N
(C) 1000 N (D) 125 N

40. A body is allowed to slide from the top along a smooth inclined plane of length 5m at an angle of inclination 30°. If g = 10ms^{-2} time taken by the body to reach the bottom of the plane is

(A) $\frac{\sqrt{3}}{2}s$ (B) 1.414s

(C) $\frac{1}{\sqrt{2}}s$ (D) 2s

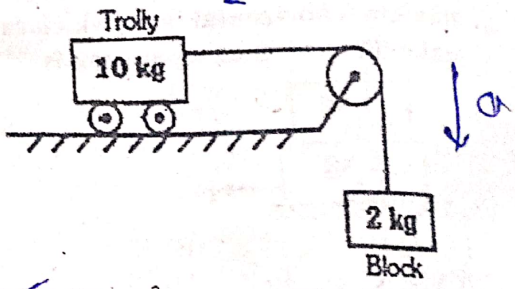
41. A body is sliding down a rough inclined plane. The coefficient of friction between the body and the plane is 0.5. The ratio of the net force required for the body to slide down and the normal reaction on the body is 1: 2. Then the angle of the inclined plane is

(A) 15° (B) 30°
(C) 45° (D) 60°

42. A car is moving on a circular level road of radius of curvature 300m. If the coefficient of friction is 0.3 and acceleration due to gravity is 10m/s^2. The maximum speed the car can have is

(A) 30km/h (B) 81km/h
(C) 108km/h (D) 162km/h

43. Calculate the acceleration of the block and trolly system shown in the figure. The coefficient of kinetic friction between the trolly and the surface is 0.05. (g = 10 m/s^2 mass of the string is negligible and no other friction exists).



(A) 1.25 m/s^2 (B) 1.50 m/s^2
(C) 1.66 m/s^2 (D) 1.00 m/s^2

44. A car of mass m moves in a horizontal circular path of radius metre. At an instant its speed is V m/s and is increasing at a rate of a m/sec^2. then the acceleration of the car is

(A) $\frac{V^2}{r}$ (B) a

(C) $\sqrt{a^2+\left(\frac{V^2}{r}\right)^2}$ (D) $\sqrt{a+\frac{V^2}{r}}$

45. The length of minute hand in a pendulum clock is 10cm the speed of tip of the hand is (in m/s)

(A) $\frac{\pi}{6000}$ (B) $\frac{\pi}{18000}$

(C) $\frac{\pi}{3600}$ (D) $\frac{\pi}{1200}$

NUMERICAL VALUE TYPE)

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46. A block of mass 20 kg is pushed with a horizontal force of 90N. If the coefficien

of static and kinetic friction are 0.4 and 0.3, the frictional force acting on the block is ($g = 10ms^{-2}$)

47. If the coefficient of friction is $\sqrt{3}$, the angle of friction is ____ degree.

48. A block of mass 4kg is placed in contact with the front vertical surface of a lorry. The co efficient of friction between the vertical surface and block is 0.8. The lorry is moving with an acceleration of $15m/s^2$. The force of friction be-tween lorry and block is ($g = 10ms^{-2}$)

49. The centripetal force required by a 1000 k g car that takes a turn of radius 50 m at a speed of 36 kmph is

50. A van is moving with a speed of 72 Kmph on a level road, where the coefficient of friction between tyres and road is 0.5. The minimum radius of curvature, the road must have, for safe driving of van is

CHEMISTRY

(SINGLE CORRECT ANSWER TYPE)

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51. According to MO Theory,
(A) O_2^+ is paramagnetic and bond order is greater than O_2
(B) O_2^+ is paramagnetic and bond order is less than O_2
(C) O_2^+ is diamagnetic and bond order is less than O_2
(D) O_2^+ is diamagnetic and bond order is more than O_2

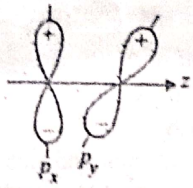
52. Which one of the following constitutes a group of the isoelectronic species?
(A) C_2^{2-}, O_2^-, CO, NO
(B) $NO^+, C_2^{2-}, CN^-, N_2$
(C) $CN^-, N_2, O_2^{2-}, C_2^{2-}$
(D) N_2, O_2^-, NO^+, CO

53. N_2 and O_2 are converted into monocations, N_2^+ and O_2^+ respectively. Which of the following is wrong?
(A) In N_2^+, $N-N$ bond weakens
(B) In O_2^+, the $O-O$ bond order increases
(C) In O_2^+, paramagnetism decreases
(D) N_2^+ becomes diamagnetic

54. The cyanide ion, CN^- and N_2 are isoelectronic, but in contrast to CN^-, N_2 is chemically inert, because of:
(A) low bond energy
(B) absence of bond polarity
(C) unsymmetrical electron distribution
(D) presence of more of electron in bonding orbitals

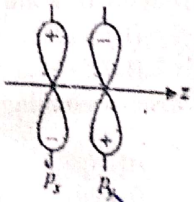
55. The number of antibonding electron pairs in O_2^{2-} molecular ion on the basis of molecular orbital theory is
(A) 4 (B) 3
(C) 2 (D) 5

56. Which of the following is a zero overlap which leads to non-bonding?



(A)

(B)



(C) (D) All

57. The correct order of bond strength is:
(A) $O_2^- < O_2 < O_2^+ < O_2^{2-}$
(B) $O_2^{2-} < O_2^- < O_2 < O_2^+$
(C) $O_2^- < O_2^{2-} < O_2 < O_2^+$
(D) $O_2^+ < O_2 < O_2^- < O_2^{2-}$

58. The bond order in NO is 2.5 while that in NO^+ is 3. Which statement is true?
(A) Bond length is unpredictable
(B) Bond length in NO is greater than in NO^+
(C) Bond length in NO^+ is equal to that in NO
(D) Bond length in NO^+ is greater than in NO

59. Which of the following species exhibits the diamagnetic behaviour?
(A) O_2^{2-} (B) O_2^+

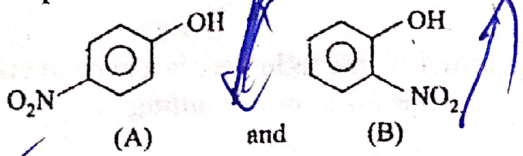
(C) O_2 (D) NO

60. **Which one of the following pairs of species have the same bond order?**
(A) CN^- and NO^+ (B) CN^- and CN^+
(C) O_2^- and CN^- (D) NO^+ and CN^+

61. **Stability of the species Li_2, Li_2^- and Li_2^+ increases in the order of**
(A) $Li_2 < Li_2^+ < Li_2^-$ (B) $Li_2^- < Li_2^+ < Li_2$
(C) $Li_2 < Li_2^- < Li_2^+$ (D) $Li_2^- < Li_2 < Li_2^+$

62. **The maximum possible number of hydrogen bonds a water molecule can form is:**
(A) 2 (B) 4
(C) 3 (D) 1

63. **Of the two compounds shown below, the vapour pressure of B at a particular temperature is**



(A) and (B)

(A) higher than that of A
(B) lower than that of A
(C) same as that of A
(D) depends on the amount and size of vessel

64. **Which contains strongest H- bond?**
(A) O - H.....S (B) S - H.....O
(C) F - H.....F (D) F - H.....O

65. **Inter molecular hydrogen bonding is absent in**
(A) H_2O (B) NH_3
(C) C_2H_5OH (D) CH_4

66. **Intramolecular hydrogen bond is present in**
(A) orthohydroxy benzaldehyde
(B) parahydroxy benzaldehyde
(C) ethyl alcohol
(D) hydrogen fluoride

67. **Water has a higher boiling point than the corresponding hydrides H_2S, H_2Se and H_2Te. This is because water has**
(A) Ionic bonds (B) Hydrogen bonds
(C) Covalent bonds
(D) Van der Waals' forces

68. **The intermolecular attractive forces vary in the order**
(A) Water < Alcohol < Ether
(B) Ether < Alcohol < Water
(C) Alcohol < Water < Ether
(D) Ether < Water < Alcohol

69. **The molecular electronic configuration of B_2 is**
(A) $KK(\sigma 2s)^2(\sigma^* 2s)^2(\pi 2p)_x^1(\pi 2p)_y^1$
(B) $KK(\sigma 2s)^2(\sigma^* 2s)^2(\pi 2p)_x^2$
(C) $KK(\sigma 2s)^2(\sigma^* 2s)^2(\pi 2p)^2$
(D) $KK(\sigma 2s)^2(\sigma^* 2s)^2(\sigma 2p)^1(\pi 2p)^1$

70. **The wave function of a molecular orbital formed by reinforce of wave functions of Ψ_A and Ψ_B of atomic orbital A and B is represented as**
(A) $\Psi_A + \Psi_B$ (B) $\Psi_A - \Psi_B$
(C) $\Psi_A \pm \Psi_B$ (D) $2\Psi_A + \Psi_B$

(NUMERICAL VALUE TYPE)
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71. **According to MO theory, number of species/ions from the following having identical bond order is ____.**
$CN^-, NO^+, O_2, O_2^+, O_2^{2+}$

72. **The number of paramagnetic species among the following is ____**
$B_2, Li_2, C_2, C_2^-, O_2^{2-}, O_2^+$ and He_2^+

73. **The number of antibonding electron pairs in O_2^{-2} molecular ion on the basis of molecular orbital theory is ____.**

74. **The mol.wt of an Oxide of Hydrogen is 34. Therefore the number of covalent bonds in its molecule are**

75. **Total number of lone pair of electrons on Xe in $XeOF_4$ is :**

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BEST OF LUCK