



# RANKRIDGE IIT JEE/NEET JUNIOR COLLEGE (LONGTERM)

TELANGANA

STREAM: JR MPC  
Time: 3:00 Hours

## WEEKEND TEST-11

Date: 08-09-2025  
Max Marks: 300

### SYLLABUS

#### MATHEMATICS

: Pair of straight lines

#### PHYSICS

: Work-Energy theorem, Law of conservation of Energy and Power.

#### CHEMISTRY

: STOICHIOMETRY: Mole concept, Equivalent weight, problems, Empirical formula, molecular formula

#### 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 lines  $3x + 4y - 5 = 0$  cuts the curve

$2x^2 + 3y^2 = 5$  at A and B. If 'O' is the origin then  $\angle AOB$

(A)  $\frac{\pi}{6}$

(B)  $\frac{\pi}{3}$

(C)  $\frac{\pi}{2}$

(D)  $\frac{\pi}{8}$

2. The equation of the diagonal passing through the origin of the parallelogram formed by the lines  $6x^2 + 7xy + 2y^2 = 0$

and  $6x^2 + 7xy + 2y^2 - 5x - 3y + 1 = 0$  is

(A)  $x + y = 0$       (B)  $3x + 5y = 0$

(C)  $5x + 3y = 0$       (D)  $x - y = 0$

3. O, A, B are vertices of triangle whose sides are given by

$(5x + 12y)^2 - 3(12x - 5y)^2 = 0$ ,

$5x + 12y - 78 = 0$  then  $AB =$

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

(C)  $3\sqrt{3}$       (D)  $4\sqrt{3}$

4. If the pairs  $x^2 - 2pxy - y^2 = 0$  and  $x^2 - 2qxy - y^2 = 0$  are such that one pair bisects the angle between the other and  $p = 3$  then  $q =$

- (A) 3      (B) -1  
(C)  $-1/3$       (D)  $-1/2$

5. The distance from the origin to the orthocentre of the triangle formed by the lines  $x + y - 1 = 0$  and

$6x^2 - 13xy + 5y^2 = 0$  is

(A)  $\frac{11\sqrt{2}}{2}$       (B) 13

(C) 11      (D)  $\frac{11\sqrt{2}}{24}$

6. The point of intersection of the perpendicular lines

$ax^2 + 3xy - 2y^2 - 5x + 5y + c = 0$  is

(A)  $\left(\frac{1}{5}, \frac{7}{5}\right)$       (B) (1, 7)

(C)  $\left(-\frac{1}{5}, -\frac{7}{5}\right)$       (D)  $\left(\frac{1}{5}, -\frac{1}{5}\right)$

7. Orthocentre of triangle of which two sides are formed by line

$6x^2 - 5xy - 6y^2 + x + 5y - 1 = 0$  is

(A)  $\left(-\frac{1}{13}, \frac{5}{13}\right)$       (B)  $\left(\frac{1}{13}, \frac{5}{13}\right)$

(C)  $\left(\frac{1}{13}, -\frac{5}{13}\right)$       (D)  $\left(-\frac{1}{13}, -\frac{5}{13}\right)$

8. The area of the triangle formed by the lines  $x^2 + 4xy + y^2 = 0$ ,  $x + y = 1$  is

(A)  $\sqrt{3}$       (B) 2

(C) 1      (D)  $\sqrt{3}/2$

9. If the equation of the pair of bisectors of the angle between the pair

$3x^2 + xy + by^2 = 0$  is  $x^2 - 14xy - y^2 = 0$   
then  $b =$

- (A) 4      (B) -4  
(C) 8      (D) -8

10. If  $2x + 3y = 7$  makes equal angles with

$$9x^2 + 12xy + ky^2 = 0 \text{ then } k =$$

(A) 3      (B) 7  
(C) 14      (D) 21

11.  $2x^2 + 5xy + 3y^2 + 6x + 7y + 4 = 0$

represents two lines  $y = m_1x + c_1$  and  
 $y = m_2x + c_2$  then  $m_1 + m_2$  and  $m_1m_2$  are

- (A)  $-5/3, -2/3$       (B)  $-5/3, 2/3$   
(C)  $5/3, -2/3$       (D)  $5/3, 2/3$

12. The acute angle between the lines

$$(5x - 2y)^2 - 3(2x + 5y)^2 = 0 \text{ is}$$

(A)  $\pi/6$       (B)  $\pi/4$   
(C)  $\pi/3$       (D)  $\pi/2$

13. The figure formed by the pairs of lines

$$2x^2 + 3xy - 2y^2 = 0 \text{ and}$$

$$2x^2 + 3xy - 2y^2 - 5x + 15y - 25 = 0 \text{ is a}$$

- (A) parallelogram      (B) rhombus

- (C) rectangle      (D) square

14. The length of the side of the square  
formed by the lines  $2x^2 + 3xy - 2y^2 = 0$   
and  $2x^2 + 3xy - 2y^2 + 3x + y + 1 = 0$  is

- (A)  $\frac{1}{\sqrt{3}}$       (B)  $\frac{1}{\sqrt{5}}$   
(C)  $\frac{1}{\sqrt{7}}$       (D)  $\frac{1}{\sqrt{10}}$

15. The angle between the lines joining the  
origin to the points of intersection of the  
lines  $\sqrt{3}x + y = 2$  and the curve

$$x^2 + y^2 = 4 \text{ is}$$

- (A)  $\frac{\pi}{6}$       (B)  $\frac{\pi}{4}$   
(C)  $\frac{\pi}{3}$       (D)  $\frac{\pi}{2}$

16. If  $x^2 + 4xy + y^2 = 0$  represents two sides  
of  $\triangle OAB$  and the orthocenter is  $(-1, -1)$ ,  
then the third side is

- (A)  $x + y = 2$       (B)  $x + y = 1$   
(C)  $x + y = 0$       (D)  $x + y = 3$

17. The orthocentre of the triangle formed by  
the lines  $2x + y = 2$  and

$$2x^2 + 3xy - 2y^2 = 0 \text{ is}$$

- (A)  $(4/3, -2/3)$       (B)  $(1/2, 1)$   
(C)  $(0, 0)$       (D)  $(1, 1)$

18. If  $\frac{x}{a} + \frac{y}{b} = 1$  intersects

$$5x^2 + 5y^2 + 5bx + 5ay - 9ab = 0 \text{ at P}$$

and Q,  $\angle POQ = \frac{\pi}{2}$  then the relation

between a and b is

- (A)  $a = b$       (B)  $a = 2b$  (or)  $b = 2a$   
(C)  $a = 3b$  (or)  $b = 3a$   
(D)  $a + b = 5$

19. The lines joining the origin to the points of  
intersection of  $x^2 + y^2 + 2gx + c = 0$  and

$$x^2 + y^2 + 2fy - c = 0 \text{ are at right angles}$$

is

- (A)  $g^2 + f^2 = c$       (B)  $g^2 - f^2 = 0$   
(C)  $g^2 - f^2 = 2c$       (D)  $g^2 + f^2 = 2c$

20. The angle between the pair of lines

$$2x^2 + 5xy + 2y^2 + 3x + 3y + 1 = 0 \text{ is}$$

- (A)  $\cos^{-1}\left(\frac{4}{5}\right)$       (B)  $\tan^{-1}\left(\frac{4}{5}\right)$   
(C) 0      (D)  $\pi/2$

#### (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 pair of lines  $6x^2 + 7xy + 2y^2 = 0$ ,  
 $6x^2 + 7xy + 2y^2 - 5x - 3y + 1 = 0$  form a  
parallelogram then its area 1.

22. The area of the triangle formed by the  
straight line  $x + y = 3$  and the angle  
bisectors of the pair of straight lines  
 $x^2 - y^2 + 2y = 1$  is 9.

23. If the lines  
 $x^2 + 2xy - 35y^2 - 4x + 44y - 12 = 0$  and  
 $5x + \lambda y - 8 = 0$  are concurrent then  
 $\lambda = \underline{2}$ .

27. ~~(C) 4N~~ (D) 4.8N  
 An aeroplane requires for take off a speed of 108 kmph the run on the ground being 100m. Mass of the plane is  $10^4$  kg and the coefficient of friction between the plane and the ground is 0.2. Assuming the plane accelerates uniformly the minimum force required is ( $g = 10\text{ms}^{-2}$ )  
 (A)  $2 \times 10^4\text{N}$  (B)  $2.43 \times 10^4\text{N}$   
 (C) ~~6.5  $\times 10^4\text{N}$~~  (D)  $8.86 \times 10^4\text{N}$
28. A body of mass 1 kg is made to travel with a uniform acceleration of  $30\text{ cm/s}^2$  over a distance of 2m, then work to be done is 2  
 (A) 6J (B) 60J  
 (C) 0.6J (D) 0.3J
29. The centripetal force required for a 1000 kg car travelling at 36 kmph to take a turn by  $90^\circ$  in travelling along an arc of length 628 m is  
 (A) 250 N (B) 500 N  
 (C) 1000 N (D) 125 N
30. A block of weight 200N is pulled along a rough horizontal surface at constant speed by a force of 100N acting at an angle  $30^\circ$  above the horizontal. The coefficient of kinetic friction between the block and the surface is  
 (A) 0.43 (B) 0.58  
 (C) 0.75 (D) 0.83
31. A block weighing 10kg is at rest on a horizontal table. The coefficient of static friction between the block and the table is 0.5. If a force acts downward at  $60^\circ$  with the horizontal, how large can it be without causing the block to move? ( $g = 10\text{ms}^{-2}$ )  
 (A) 346 N (B) 446 N  
 (C) 746 N (D) 846 N
32. The lengths of smooth & rough inclined planes of inclination  $45^\circ$  is same. 1 times of sliding of a body on two surfaces is  $t_1, t_2$  and  $\mu = 0.75$ , then  $t_1 : t_2 =$   
 (A) 2:1 (B) 2:3  
 (C) 1:2 (D) 3:2
33. The horizontal acceleration that should be given to a smooth inclined plane of angle  $\sin^{-1}\left(\frac{1}{l}\right)$  to keep an object stationary on the plane, relative to the inclined plane is  
 (A)  $\frac{g}{\sqrt{l^2 - 1}}$  (B)  $g\sqrt{l^2 - 1}$
34.  $(C) \frac{\sqrt{l^2 - 1}}{g}$  (D)  $\frac{g}{\sqrt{l^2 + 1}}$   
 A person of mass 72kg sitting on ice pushes a block of mass of 30kg on ice horizontally with a speed of  $12\text{ms}^{-1}$ . The coefficient of friction between the man and ice and between block and ice is 0.02. If  $g = 10\text{ms}^{-2}$ , the distance between man and the block, when they come to rest is  
 (A) 360m (B) 10m  
 (C) 350m (D) 422.5m
35. A body is acted upon by a force which is inversely proportional to the distance  $x$ . The work done will be proportional to  
 (A) ~~x~~ (B)  $x^2$   
 (C)  $x^{3/2}$  (D)  $\log x$
36. A ball of mass 0.5kg is attached to the end of a string having length 0.5m. The ball is rotated on a horizontal circular path about vertical axis. The maximum tension that the string can bear is 324N. The maximum possible value of angular velocity of ball in (rad/s)  
 (A) 9 (B) 18  
 (C) 27 (D) 36
37. A particle moves along X-axis from  $x = 0$  to  $x = 1$  m under the influence of a force given by  $F = 3x^2 + 2x - 10$ . Work done in the process is  
 (A) +4J (B) -4 J  
 (C) +8 J (D) 8 J
38. A particle of mass m is suspended from the ceiling through a string of length L. The particle moves in a horizontal circle of radius r. The speed of the particle is  
 (A)  $\frac{rg}{\sqrt{L^2 - r^2}}$  (B)  $\frac{r\sqrt{g}}{(L^2 - r^2)^{\frac{1}{2}}}$   
 (C)  $\frac{r\sqrt{g}}{(L^2 - r^2)^{\frac{1}{2}}}$  (D)  $\frac{mgL}{(L^2 - r^2)^{\frac{1}{2}}}$
39. A body is allowed to slide from the top along a smooth inclined plane of length 5m at an angle of inclination  $30^\circ$ . If  $g = 10\text{ms}^{-2}$  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

40. The displacement of a body of mass 2 kg varies as  $S = t^2 + 2t$ . Where S is in meters and t is in seconds. The work done by all the forces acting on the body during the time interval  $t = 0$  to  $t = 3s$  is  
 (A) 63 J      (B) 61 J  
~~(C) 62 J~~      (D) 60 J

41. A lawn roller is pulled along a horizontal surface through a distance of 20 m by a rope with a force of 200 N. If the rope makes an angle of  $60^\circ$  with the vertical while pulling, the amount of work done by pulling force is  
 (A) 4000 J      (B) 1000 J  
~~(C)  $2000\sqrt{3} J$~~       (D) 2000 J

42. A smooth block is released from rest on a  $45^\circ$  inclined plane and it slides a distance 'd'. The time taken to slide is n times that on a smooth inclined plane. The coefficient 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)  $\mu_k = \sqrt{\frac{1}{1 - n^2}}$

43. The angles between the force and the displacement for maximum and minimum work respectively be

(A)  $90^\circ$  and  $0^\circ$       ~~(B)  $0^\circ$  and  $90^\circ$~~   
~~(C)  $0^\circ$  and  $180^\circ$~~       (D)  $180^\circ$  and  $0^\circ$

44. A horizontal force is applied on a body on a rough horizontal surface produces an acceleration 'a'. If coefficient of friction between the body and surface which is  $\mu$  is reduced to  $\mu/3$ , the acceleration increases by 2 units. The value of ' $\mu$ ' is

(A)  $2/3g$       (B)  $3/2g$   
~~(C)  $3/g$~~       (D)  $1/g$

45. A body takes  $1\frac{1}{3}$  times as much time to

slide down a rough inclined plane as it takes to slide down an identical but smooth inclined plane. If the angle of inclination is  $45^\circ$  find the coefficient of friction.

(A)  $\frac{1}{16}$

(B)  $\frac{3}{16}$

(C)  $\frac{5}{16}$       (D)  $\frac{7}{16}$

### NUMERICAL VALUE TYPE

Section-II contains 5 Numerical Value Type questions.

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46. A 500 kg horse pulls a cart of mass 1500 kg along a level road with an acceleration of  $1 \text{ m/s}^2$ . If coefficient of sliding friction is 0.2, then force exerted by the earth on horse is \_\_\_\_\_ N.

47. A heavy uniform chain lies on horizontal table top. If the coefficient of friction between the chain and the table surface is 0.25, the maximum percentage of the length of the chain that can hang over one edge of the table is

48. The work done by a force  $\vec{F} = (-6x^3 \hat{i}) \text{ N}$  in displacing a particle from  $x = 4 \text{ m}$  to  $x = -2$  is 408 J. (36)

49. The work done in moving a body of mass 4kg with uniform velocity of  $5 \text{ ms}^{-1}$  for 10 seconds on a surface of  $\mu = 0.4$  is

50. 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  $10 \text{ m/s}^2$ . The maximum speed the car can have is 108 km/h.

### CHEMISTRY

#### (SINGLE CORRECT ANSWER TYPE)

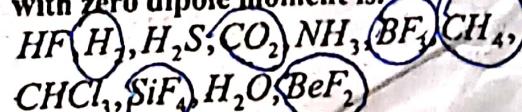
This section contains 20 multiple choice questions. Each question has 4 options (A), (B), (C) and (D) for its answer, out of which ONLY ONE option can be correct.

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51. The number of paramagnetic species among the following is.

~~(A)~~  $B_2$ ,  $Li_2$ ,  $C_2$ ,  $C_2^-$ ,  $O_2^{2-}$ ,  $O_2^+$  and  $He_2^+$   
 (A) 4      (B) 3  
~~(C) 2~~      (D) 1

52. Number of compounds from the following with zero dipole moment is.



(A) 6

(C) 7

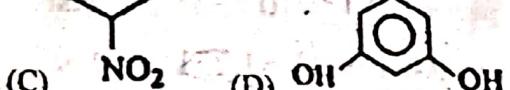
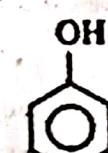
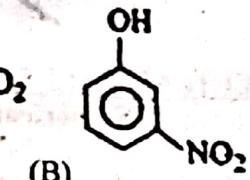
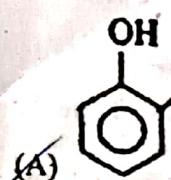
(B) 5

(D) 4

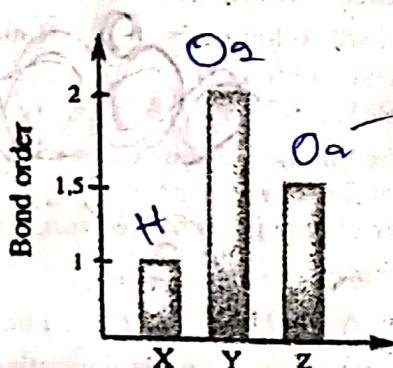
53. Which of the following MOs has more than one nodal plane?

(A)  $\pi 2p_x$ (B)  $\sigma 2s$ (C)  $\sigma^* 2p_x$ (D)  $\pi^* 2p_y$ 

54. The most volatile compound is.



55.

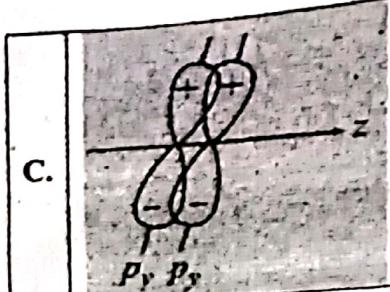


In the above graph X, Y and Z are respectively

(A)  $H_2, O_2, O_2^-$ (B)  $O_2, H_2O_2^+$ (C)  $H_2, O_2, O_2^+$ (D)  $O_2^-, O_2, H_2$ 

56. Match the following columns and choose the correct option from the codes given below

	Column-I	Column-II
A.		1. Positive overlap
B.		2. Zero overlap



3.

Negative overlap

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

57. Which of the following unit conversion of dipole moment is correct?

(A)  $1D = 3.3356 \text{ Cm}$ (B)  $1D = 3.3356 \times 10^{-30} \text{ C.m}$ (C)  $1\text{Cm} = 3.3356 \text{ D}$ (D)  $1\text{Cm} = 3.3356 \times 10^{-30} \text{ D}$ 

58. The molecule having non-zero dipole moment is

(A)  $\text{H}_2\text{O}_2$ (B)  $\text{CH}_4$ (C)  $\text{C}_2\text{H}_6$ (D)  $\text{BF}_4^-$ 

59. Ethyl alcohol is highly miscible with water because it forms the following bond with water

(A) Covalent bond (B) Ionic bond

(C) Hydrogen bond (D) Dative bond

60. In which of the following hydrides the boiling point is very low for

(A)  $\text{NH}_3$  (B)  $\text{PH}_3$ (C)  $\text{SbH}_3$  (D)  $\text{AsH}_3$ 

61. The electronegativity difference between N and F is greater than N and H, yet the dipole moment of  $\text{NH}_3$  ( $1.5\text{D}$ ) is greater than that of  $\text{NF}_3$  ( $0.2\text{D}$ ). This is because:

(A) In  $\text{NH}_3$  as well as  $\text{NF}_3$ , the atomic dipole and bond dipole are in opposite direction(B) In  $\text{NH}_3$ , the atomic dipole and bond dipole are in the opposite direction, whereas in  $\text{NF}_3$ , these are in same direction(C) In  $\text{NH}_3$ , as well as in  $\text{NF}_3$ , the atomic dipole and bond dipole are in same direction,(D) In  $\text{NH}_3$ , the atomic dipole and bond dipole are in same direction where as in  $\text{NF}_3$ , these are in opposite direction.

62. The dipole moment of hydrogen chloride with bond distance  $127 \text{ pm}$  is  $1.03 \text{ D}$ . The percentage ionic character of its bond is

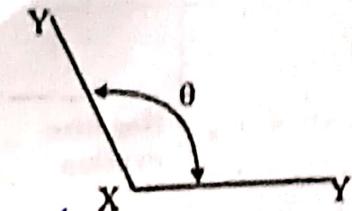
(A) 15

(B) 17

(C) 19

(D) 21

63. Which bond angle,  $\theta$  would result in the maximum dipole moment for the triatomic molecule  $\text{XY}_2$ , shown below:



63.  $\theta$  is equal to  
 (A)  $90^\circ$       (B)  $120^\circ$   
 (C)  $150^\circ$       (D)  $180^\circ$

64. The correct order of dipole moment of HF, HCl, HBr, HI and H<sub>2</sub> is

- (A) H<sub>2</sub> < HF < HCl < HBr < HI  
 (B) H<sub>2</sub> < HF < HBr < HCl < HI  
 (C) H<sub>2</sub> < HI < HBr < HCl < HF  
 (D) H<sub>2</sub> < HI < HBr < HF < HCl

65. The order of strength of hydrogen bond is:

- (A) Cl-H...Cl > N-H...N > O-H...O > F-H...F  
 (B) N-H...N > Cl-H...Cl > O-H...O > F-H...F  
 (C) O-H...O > N-H...N > Cl-H...Cl > F-H...F  
 (D) F-H...F > O-H...O > N-H...N > Cl-H...Cl

66. The observed dipole moment of HI is 0.38D. Calculate the percentage ionic character, if the H-I bond distance is 1.61 Å.

- (A) 16.4%      (B) 12%  
 (C) 5%      (D) 20%

67. Which of the following has highest bond angle?

- (A) Cl<sub>2</sub>O      (D) OF<sub>2</sub>  
 (C) H<sub>2</sub>O      (D) All have equal bond angle

68. Which of the following molecular orbital is not used in filling of N<sub>2</sub><sup>+</sup>?

- (A)  $\pi 2p_x$       (B)  $\sigma 2p_z$

69. (C)  $\pi 2p_y$       (D)  $\sigma 2s$   
 The correct order of bond length is  
 (A) F<sub>2</sub> < F<sub>2</sub><sup>+</sup> < F<sub>2</sub>  
 (B) F<sub>2</sub><sup>+</sup> < F<sub>2</sub> < F<sub>2</sub>  
 (C) F<sub>2</sub><sup>+</sup> < F<sub>2</sub> < F<sub>2</sub>  
 (D) F<sub>2</sub> < F<sub>2</sub><sup>+</sup> < F<sub>2</sub>
70. Which of the following has fractional bond  
 (A) B<sub>2</sub><sup>+</sup>      (B) H<sub>2</sub><sup>+</sup>  
 (C) Li<sub>2</sub><sup>+</sup>      (D) All of these

#### (NUMERICAL VALUE TYPE)

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71. The spin-only magnetic moment value of B<sub>2</sub><sup>+</sup> species is 1.73  $\times 10^{-2}$  BM. (Nearest integer) (Given,  $\sqrt{3} = 1.731$ )

72. The difference between bond orders of CO and NO<sup>+</sup> is  $x/2$ . Where,  $x =$  1 (Round off to the nearest integer)

73. Amongst BeF<sub>2</sub>, BF<sub>3</sub>, H<sub>2</sub>O, NH<sub>3</sub>, CHCl<sub>3</sub>, and HCl, the number of molecules with non-zero net dipole moment is 3.

74. The number of lone pairs of electrons on the central atom in I<sub>3</sub><sup>-</sup> is 3.

75. N<sub>2</sub>, N<sub>2</sub><sup>+</sup>, N<sub>2</sub><sup>-</sup>, N<sub>2</sub><sup>2-</sup>, O<sub>2</sub>, O<sub>2</sub><sup>+</sup>, O<sub>2</sub><sup>-</sup>, O<sub>2</sub><sup>2-</sup>. The number of species showing diamagnetism is 5.

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BEST OF LUCK

Y<sub>1</sub>, Y<sub>2</sub>, Y<sub>3</sub>, Y<sub>4</sub>, Y<sub>5</sub>, Y<sub>6</sub>, Y<sub>7</sub>, Y<sub>8</sub>, Y<sub>9</sub>, Y<sub>10</sub>, Y<sub>11</sub>, Y<sub>12</sub>, Y<sub>13</sub>, Y<sub>14</sub>, Y<sub>15</sub>, Y<sub>16</sub>, Y<sub>17</sub>, Y<sub>18</sub>  
 BC

10  
 3  
 5F  
 2s  
 2p