

ALLEN SHARP

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SAMPLE TEST PAPER

CLASS XI



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SECTION-A : MENTAL ABILITY

This section contains **30 Multiple Choice Questions**. Each question has four choices (1), (2), (3) and (4) out of which **ONLY ONE** is correct

- Five friends A, B, C, D and E are standing in a row facing south but not necessarily in the same order. Only B is between A and E. C is immediate right to E and D is immediate left to A. On the basis of above information, which of the following statements is definitely true?
 (1) B is the left of A (2) B is to the right of E
 (3) A is second to the left of C (4) D is third to the left of E
- $4 : 19 :: 7 : ?$
 (1) 52 (2) 49 (3) 28 (4) 68
- Using the total number of alphabets in your solution as a parameter, find the number that represents G is:
 A – 0, B – 0, C – 2, D – 2, E, – 1, F – 2, G – ?
 (1) 2 (2) 3 (3) 4 (4) 5
- If FEED is coded as 47 and TREE is coded as 91, then MEET will be coded as :-
 (1) 110 (2) 114 (3) 118 (4) 122
- The average age of a six member family is 22 years. If the youngest member of the family is 7 years old, then one hour before the birth of this member, what was the average age of the family?
 (1) 18 years (2) 20 years (3) 16 years (4) 19 years

Directions (Questions 6 & 10)

Read carefully the information given below and answer questions :

Eight person A, B, C, D, E, F, G and H are seated in a line and all of them are facing North, not necessarily in the same order. Each one of the above person lives in different floor of a eight floor building (e.g. 1, 2, 3, 4, 5, 6, 7 and 8) not necessarily in the same order.

The person living on the 3rd floor is sitting on the second place towards right of the person living on 2nd floor. C lives on 5th floor, A is sitting on the fourth place towards left of the person living on 8th floor. D is not sitting on either side of H. Neither A nor the person living on 8th floor are sitting on the extreme ends of the line, B is sitting on the third place towards left of F. There is only one person sitting between G who lives on 1st floor and the person living on 8th floor. In between G and the person living on 7th floor there are sitting 2 persons. H is sitting just left of the person living on 7th floor. Between H and F, who lives on 6th floor there are two persons sitting.

- B lives on which floor?
 (1) 5th (2) 3rd (3) 2nd (4) 7th
- How many persons are sitting between G and B?
 (1) 1 (2) 2 (3) 3 (4) 4
- D lives on which floor?
 (1) 3rd (2) 4th (3) 2nd (4) 7th
- Who is sitting just left of the person living on 7th floor?
 (1) H (2) F (3) A (4) B

10. Who is sitting three places towards right of A?

- (1) B (2) E (3) F (4) C

Directions (Questions 11)

In the following questions complete the given number series with the most suitable alternative in place of question (?).

11. 2, 10, 30, 68, ?

- (1) 125 (2) 130 (3) 138 (4) 204

Directions (Questions 12)

Consider the following statements :

There are six villages A, B, C, D, E and F.

F is 1 km to the west of D.

B is 1 km to the east of E.

A is 2 km to the south of E.

C is 1 km to the east of A.

D is 1 km to the south of A.

12. If '-' means division '÷' means multiplication. '+' means subtraction and 'x' means addition, then which of the following equation is correct?

- (1) $20 + 8 - 7 \div 6 \times 4 = 25$ (2) $20 - 5 \div 4 + 6 \times 5 = 15$
(3) $20 \times 5 - 6 \div 7 + 4 = 28$ (4) $20 \div 4 - 8 \times 10 + 6 = 36$

Directions (Questions 13)

Complete the given analogy :

13. CE : 70 :: DE : ?

- (1) 90 (2) 60 (3) 120 (4) 210

14. P is the brother of Q and R. S is R's mother. T is P's father. Which of the following statements cannot be true?

- (1) T is Q's father (2) S is P's mother (3) P is S's son (4) Q is Ts son

Directions (Questions 15)

Find the missing number :

15.

- (1) 320 (2) 274 (3) 262 (4) 132

Directions (Questions 16)

In each of the following sets of figures. Select the one figure that is different from the other figures from the given option :

16.

- (1) 1 (2) 2 (3) 3 (4) 4

Directions (Questions 17-18)

In each of the following questions two statements and two conclusion numbered I and II are given. You have to take the given two statements to be true even if they seem to be at variance from commonly known facts. Read the conclusions and then decide which of the given conclusions logically follows from the two given statements.

- 17. Statements :** (I) All dancers are singers.
(II) All singers are teachers.
- Conclusions :** (I) All dancers are teachers.
(II) Some singers are dancers.
- (1) Only conclusions I is true (2) Only conclusions II is true
(3) Both conclusions I and II are true (4) Neither conclusion I nor conclusion II is true

- 18. Statements :** (I) No Horse is Dog.
(II) All Dogs are Elephants.
- Conclusions :** (I) No Elephant is Horse.
(II) Some Elephants are Dogs.
- (1) Only conclusions I is true (2) Only conclusions II is true
(3) Both conclusions I and II are true (4) Neither conclusion I nor conclusion II is true

- 19.** Choose the alternative which is closely resembles the mirror image of the given combination :

ANS43Q12

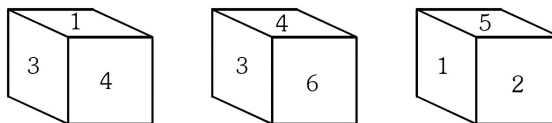
- (1) AN24E012 (2) 510E42NA (3) 2NAE4021 (4) 1504EANI2

- 20.** Graduate, Hard-working and honest rural people are indicated by :-

- (1) 1 (2) 2 (3) 3 (4) 4

Directions (Questions 21)

A dice is thrown 3 times and its 3 positions are given in the picture below. Answer the following questions :

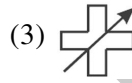
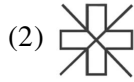
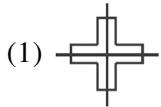
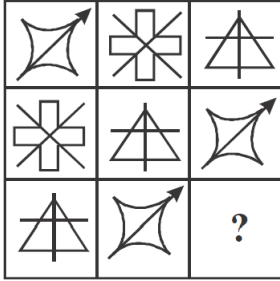


- 21.** Which number is opposite to 1?
(1) 2 (2) 3 (3) 4 (4) 6

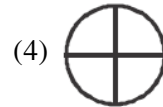
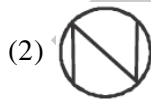
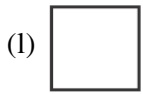
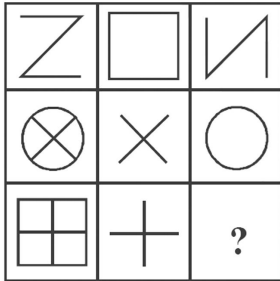
Directions (Questions 22-23)

Each of the items 56 to 59 consists of a square of 9 cells in three rows and three columns. The designs in each row or column follow the same rule. Choose the correct answer from among the given alternatives to suit the cell indicated by the question mark (?).

22.



23.



24. If Friday is the first day of a leap year, what day would be the last day of the same year?

- (1) Friday (2) Saturday (3) Thursday (4) Sunday

25. If blue means green; green means white; white means yellow; yellow means black and black means red, then what is the colour of milk?

- (1) White (2) Yellow (3) Black (4) Green

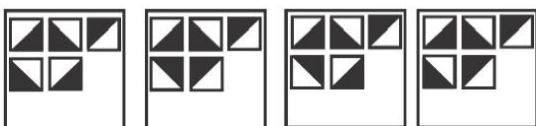
Directions (Questions 26)

In each of these questions, the four problem figures in each row make a series. Find out the one which would come next in the series from among the answer figures given.

26. Problem Figures :



Answer Figures :



(1)

(2)

(3)

(4)

(1) 1

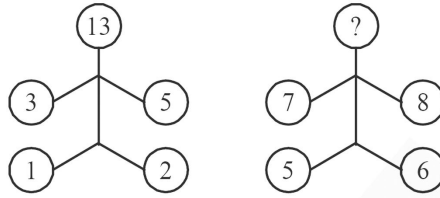
(2) 2

(3) 3

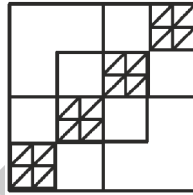
(4) 4

27. If all the letters of the word QUESTION are rearranged in alphabetical order and substituted by the letter immediately following it in the English alphabet, what will be the new arrangement of letters?
 (1) FJOPRUVT (2) FJOPRTUV (3) FJOPRUTV (4) FJOPRTVU

28. Find the missing number :



- (1) 20 (2) 22 (3) 24 (4) 26
29. If the first day of a non-leap year falls on Tuesday, then the 15th of August of the same year falls on :-
 (1) Tuesday (2) Thursday (3) Friday (4) Saturday
30. Find the number of triangle :

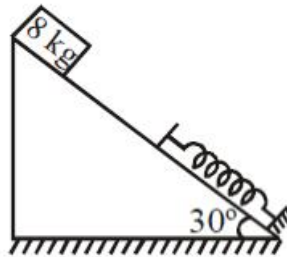


- (1) 38 (2) 48 (3) 44 (4) 40

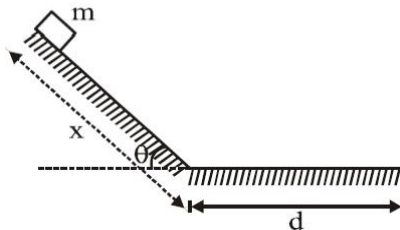
SECTION-B : PHYSICS

This section contains **30 Multiple Choice Questions**. Each question has four choices (1), (2), (3) and (4) out of which **ONLY ONE** is correct

31. A block of mass 8 kg is released from the top of an inclined smooth surface as shown in figure. If spring constant of spring is 200 N/m and block comes to rest after compressing spring by 1 m then find the distance travelled by block before it comes to rest :-

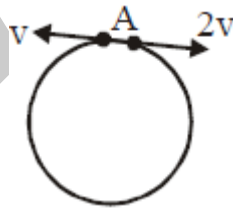


- (1) 2.5 m (2) 3.5 m (3) 2.0 m (4) None
32. A block of mass m is released on the top of a smooth inclined plane of length x and inclination θ as shown in figure. Horizontal surface is rough. If block comes to rest after moving a distance d on the horizontal surface, then coefficient of friction between block and surface is :-

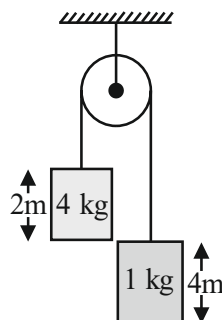


- (1) $\frac{x \sin \theta}{2d}$ (2) $\frac{x \cos \theta}{2d}$ (3) $\frac{x \sin \theta}{d}$ (4) $\frac{x \cos \theta}{d}$

33. The potential energy of a particle of mass 1 kg moving along x-axis given by $U(x) = \left[\frac{x^2}{2} - x \right]$ J. If total mechanical energy of particle is 2J then find its maximum speed (in m/s) :-
 (1) $\sqrt{5}$ (2) $\sqrt{7}$ (3) $\sqrt{3}$ (4) None
34. A cart of mass M is tied to one end of a massless rope of length 10m. The other end of the rope is in the hands of a man of mass $\frac{M}{2}$. The entire system is on a smooth horizontal surface. If the man pulls the cart by the rope then find the distance the man will slip on the horizontal surface before the man and the cart will meet each other.
 (1) $\frac{20}{3}$ m (2) $\frac{10}{3}$ m (3) 0 (4) None
35. A body of mass 2 kg moving with a velocity of 3 m/s collides head on with a body of mass 1 kg moving with a velocity of 4 m/s in opposite direction. After collision the two bodies stick together and move with a common velocity :-
 (1) (1/4) m/s (2) (1/3) m/s (3) (2/3) m/s (4) (3/4) m/s
36. A disc of radius r is cut from a larger disc of radius 4r in such a way that the edge of the hole touches the edge of the disc. The centre of mass of the residual disc will be a distance from centre of larger disc :-
 (1) $\frac{r}{5}$ (2) $\frac{r}{4}$ (3) $\frac{r}{2}$ (4) $\frac{r}{3}$
37. A mass of M kg is suspended by a weightless string, the horizontal force that is required to displace it until the string makes an angle of 45° with the initial vertical direction is :-
 (1) $Mg\sqrt{2}$ (2) $\frac{Mg}{\sqrt{2}}$ (3) $Mg(\sqrt{2}-1)$ (4) $Mg(\sqrt{2}+1)$
38. Two small particles of equal masses start moving in opposite directions from a point A in a horizontal circular orbit. Their tangential velocities are v and 2v, respectively, as shown in the figure. Between collisions, the particles move with constant speeds. After making how many elastic collisions, other than that at A, these two particles will again reach the point A :-

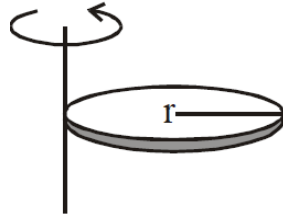


- (1) 4 (2) 3 (3) 2 (4) 1
39. In the figure both the blocks are released from rest. The time taken by both the blocks to cross each other is :-



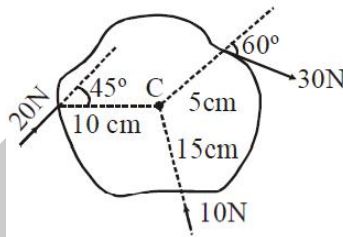
- (1) 2s (2) 3s (3) 1s (4) 4s

40. A body of mass M is placed on the top of a smooth hemisphere of radius $5m$. It is released to slide down the surface of the hemisphere. It leaves the sphere when its velocity is $5m/s$. At this instant the angle made by the radius vector of the body with the vertical is ($g = 10m/s^2$) :-
 (1) 30° (2) 45° (3) 60° (4) 90°
41. A solid sphere of radius R has moment of inertia I about its diameter. It is melted into a disc of radius r and thickness t . If its moment of inertia about the tangential axis (which is perpendicular to plane of the disc), is also equal to I . then the value of r and t are (respectively):-

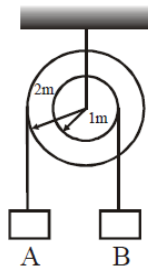


- (1) $\frac{2}{\sqrt{15}} R, 5R$ (2) $\frac{2}{\sqrt{5}} R, 2R$ (3) $\frac{3}{\sqrt{15}} R, \frac{R}{2}$ (4) $\sqrt{\frac{3}{15}} R, \frac{R}{5}$

42. Point C is the centre of the rigid body shown in Figure. Find the total torque acting on the body about point C . (CW-clockwise. ACW-anticlockwise) :-

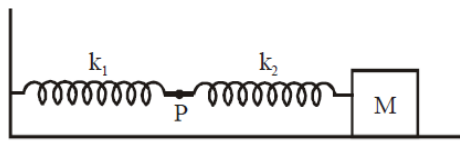


- (1) 1.71 Nm CW (2) 2.71 Nm ACW (3) 270 Nm CW (4) 2.71 Nm CW
43. In the pulley system shown, if radii of the bigger and smaller pulley are $2m$ and $1m$ respectively and the acceleration of block A is $5m/s^2$ in the downward direction, then the acceleration of block B will be :-



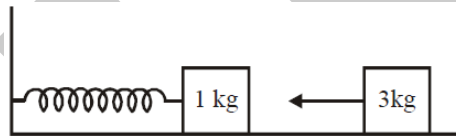
- (1) 0 m/s^2 (2) 5 m/s^2 (3) 10 m/s^2 (4) $5/2 \text{ m/s}^2$
44. A wire can be broken by applying a load of 20 kg wt . The force required to break the wire of twice the diameter is :
 (1) 20 kg wt . (2) 5 kg wt . (3) 80 kg wt . (4) 160 kg wt .
45. A block of metal (density 7 g/cc) of size $5 \text{ cm} \times 5 \text{ cm} \times 5 \text{ cm}$ is weighed completely submerged in water. What will be its apparent weight (density of water = 1 g/cc) ?
 (1) $(6 \times 5 \times 5 \times 5) \text{ g}$ (2) $(4 \times 4 \times 4 \times 7) \text{ g}$ (3) $(7 \times 5 \times 5 \times 5) \text{ g}$ (4) $(4 \times 4 \times 4 \times 6) \text{ g}$
46. A hole is in the bottom of the tank having water. If total pressure at the bottom is 3 atm ($1 \text{ atm} = 10^5 \text{ N m}^{-2}$), then velocity of water flowing from hole is :-
 (1) $\sqrt{400} \text{ ms}^{-1}$ (2) $\sqrt{600} \text{ ms}^{-1}$ (3) $\sqrt{60} \text{ ms}^{-1}$ (4) None of these

47. A cylindrical vessel filled with water upto the height H becomes empty in time t_0 due to a small hole at the bottom of the vessel. If water is filled in the same vessel to a height $4H$ it will flow out in time
 (1) $8t_0$ (2) $4t_0$ (3) $2t_0$ (4) t_0
48. A ball of mass ' m ' and radius ' r ' is released in viscous liquid. The value of its terminal velocity is proportional to :-
 (1) $(1/r)$ only (2) m/r (3) $(m/r)^{1/2}$ (4) m only
49. The amount of work done in forming a soap bubble (S.T. = $30 \times 10^{-3} \text{N/m}$) of radius 5 cm is:-
 (1) $1.88 \times 10^{-3} \text{ J}$ (2) $1.88 \times 10^1 \text{ J}$ (3) $1.88 \times 10^{-1} \text{ J}$ (4) $1.88 \times 10^3 \text{ J}$
50. Water rises in a capillary tube to a certain height such that the upward force due to surface tension is balanced by $75 \times 10^{-4} \text{N}$, force due to the weight of the liquid. If the surface tension of water is $6 \times 10^{-2} \text{ N/m}$, the inner circumference of the capillary must be:-
 (1) $1.25 \times 10^{-2} \text{ m}$ (2) $0.50 \times 10^{-2} \text{ m}$ (3) $6.5 \times 10^{-2} \text{ m}$ (4) $12.5 \times 10^{-2} \text{ m}$
51. The mass M shown in the figure oscillates in simple harmonic motion with amplitude A . The amplitude of the point P is :



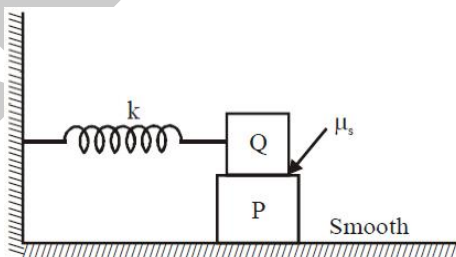
- (1) $\frac{k_1 A}{k_2}$ (2) $\frac{k_2 A}{k_1}$ (3) $\frac{k_1 A}{k_1 + k_2}$ (4) $\frac{k_2 A}{k_1 + k_2}$

52. One end of an ideal spring is fixed with a wall and the other end is fixed with a block of mass 1 kg. Force constant of spring is 100 N/m and block is performing S.H.M. with amplitude 3 cm. When the block is at left extreme position, another block of mass 3 kg moving directly towards 1 kg block with velocity 80/3 cm/s collides and gets stuck to it. The amplitude of oscillation of the combined body is :



- (1) 3 cm (2) 4 cm (3) 5 cm (4) 6 cm

53. A block P of mass m is placed on a frictionless horizontal surface. Another block Q of same mass is kept on P and connected to the wall with the help of a spring of spring constant k as shown in the figure. μ_s is the coefficient of friction between P and Q . The blocks move together performing simple harmonic motion with amplitude A . The maximum value of the friction force between P and Q is :

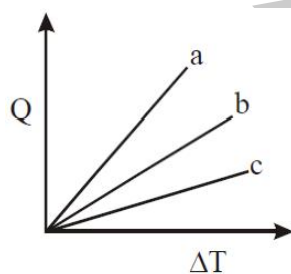


- (1) kA (2) $\frac{kA}{2}$ (3) zero (4) $\mu_s mg$

54. A body is executing simple harmonic motion. At a displacement x , its potential energy is E_1 and at a displacement y , its potential energy is E_2 . The potential energy E at a displacement $(x + y)$ is :

- (1) $E_1 + E_2$ (2) $\sqrt{E_1^2 + E_2^2}$
 (3) $E_1 + E_2 + 2\sqrt{E_1 E_2}$ (4) $\sqrt{E_1 E_2}$

55. For the pitch of a screw 0.1 cm and 200 divisions on the circular scale. The least count will be :-
 (1) 0.5 mm (2) 0.05 mm (3) 0.005 mm (4) 0.0005 mm
56. If P, Q, R are physical quantities, having different dimensions, which of the following combinations can never be meaningful quantity :-
 (a) $\frac{(P-Q)}{R}$ (b) PQ -R (c) $\frac{PQ}{R}$ (d) $\frac{(R+Q)}{P}$
 (1) (a) and (d) (2) (b) and (c) (3) (b) and (d) (4) (c) and (d)
57. Frequency 'f', velocity 'v' and density 'D' are considered as fundamental units the dimensional formula of momentum is :-
 (1) Dv^4t^{-3} (2) Dv^2t^{-1} (3) Dvf^2 (4) $D^2v^2f^2$
58. Figure shows the variation in temperature (ΔT) with the amount of heat supplied (Q) in an isobaric process corresponding to a monoatomic (M), diatomic (D) and a polyatomic (P) gas. The initial state of all the gases are the same and the scales for the two axes coincide. Ignoring vibrational degrees of freedom, the lines a, b and c respectively correspond to :



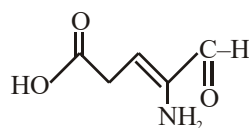
- (1) M, D and P (2) D, M and P (3) P, D and M (4) P, M and D
59. The following sets of values for C_v and C_p of a gas have been reported by different students. The units are cal/mole-K. Which of these sets is most reliable ?
 (1) $C_v = 3, C_p = 5$ (2) $C_v = 3, C_p = 6$ (3) $C_v = 3, C_p = 2$ (4) $C_v = 3, C_p = 4.2$
60. For a gas if $\gamma = 1.4$, then atomicity, C_p and C_v of the gas are respectively :-
 (1) monoatomic, $\frac{5}{2} R, \frac{3}{2} R$ (2) monoatomic, $\frac{7}{2} R, \frac{5}{2} R$
 (3) diatomic, $\frac{7}{2} R, \frac{5}{2} R$ (4) triatomic, 7 R, 5 R

SECTION-C : CHEMISTRY

This section contains **30 Multiple Choice Questions**. Each question has four choices (1), (2), (3) and (4) out of which **ONLY ONE** is correct

61. Which of the following alkaline earth metal sulphates has hydration enthalpy higher than the lattice enthalpy:
 (1) SrSO_4 (2) CaSO_4 (3) BeSO_4 (4) BaSO_4
62. The pH of 1×10^{-3} M CH_3COOH solution is
 (K_a of $\text{CH}_3\text{COOH} = 2.2 \times 10^{-4}$)
 (1) 3 (2) Slightly less than 7
 (3) Slightly greater than 7 (4) 7
63. Correct order of Ionic radii is :-
 (1) $\text{Ti}^{+4} < \text{Mn}^{+2}$ (2) $^{35}\text{Cl}^- < ^{37}\text{Cl}^-$ (3) $\text{K}^+ > \text{S}^{2-}$ (4) $\text{P}^{+3} > \text{P}^{+5}$
64. Temperature of system decreases in an
 (1) adiabatic expansion (2) isothermal compression
 (3) isothermal expansion (4) adiabatic compression

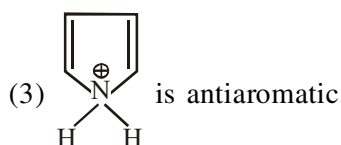
65. What is IUPAC name of following compound ?



- (1) 2-Amino-5-carboxypent-2-en-1-al (2) 4-Amino-5-oxopent-3-en-1-oic acid
(3) 2-Amino-4-carboxypent-2-en-1al (4) 4-Amino-5-oxopentenoic acid

66. Select correct statement ?

- (1) Propene in presence of HBr and peroxide obeys Markonikoff addition of HBr
(2) Benzyl cation is less stable than Tropylium ion.



- (4) Pyrrol is more basic than pyridene

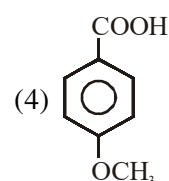
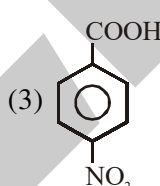
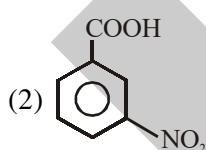
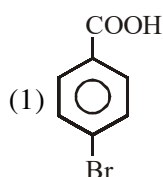
67. Which of the following overlapping doesn't produce any bond ?

- (1) $s + p_z$ (2) $p_y + p_z$ (3) $d_{yz} + p_y$ (4) $p_z + p_z$

68. Which relation is correct :-

- (1) $\Delta x \times \Delta p = \frac{h}{2\pi}$ (2) $\lambda = \frac{h}{mv}$ (3) $E_n = \frac{13.6 \times Z^2}{n^2}$ (4) all of these

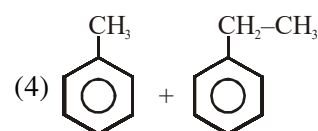
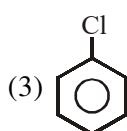
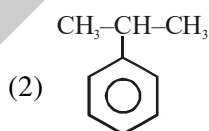
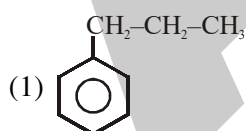
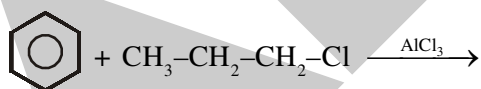
69. Which one is the strongest acid



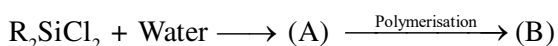
70. Which of the following hydrogen bonds is the strongest :-

- (1) F-H.....F (2) O-H.....O (3) O-H.....F (4) O-H.....N

71. Which of the following is major product of given reaction.



72. Consider the following route of reactions:



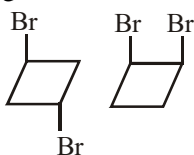
Compound (B) in above reaction is :

- (1) Dimer silicone (2) Linear/chain silicon
(3) Cross linked silicone (4) Polymerisation of (A) does not occur

73. The number of N-atoms in 1.4g nitrogen is

- (1) 6.02×10^{23} (2) 6.02×10^{22} (3) 3.01×10^{22} (4) 3.01×10^{21}

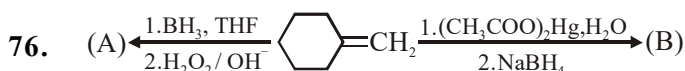
74. What is correct relation between following molecules?



- (1) Geometrical isomers (2) Positional isomers (3) Both (4) None

75. For Isothermal expansion of an ideal gas the correct relation is

- (1) $\Delta G = \Delta S$ (2) $\Delta G = \Delta H$ (3) $\Delta G = -T\Delta S$ (4) None of these



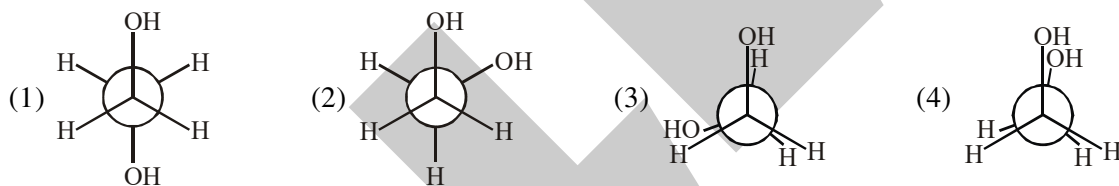
A and B are respectively :-



77. Most reactive towards EAR in the following compounds :-

- (1) $CH_3-C(=CH_2)-CH_3$ (2) $CH_3-CH=CH_2$ (3) $CCl_3-CH=CH_2$ (4) $CH_2=CH-Cl$

78. Which is most stable conformer ?



79. The reaction of $CH_3-CH=CH-$ $-CH_3$ with HBr gives .

- (1) $CH_3-CHBr-CH_2-$ $-CH_3$ (2) $CH_3-CH_2-CHBr-$ $-CH_3$
(3) $CH_3-CHBr-CH_2-$ (4) $CH_3-CH_2-CHBr-$

80. Which compound is highly covalent compound?

- (1) LiF (2) LiCl (3) LiBr (4) LiI

81. Change in entropy for an ideal gas in reversible isothermal process is given by :-

- (1) $2.303 nR \log \frac{V_2}{V_1}$ (2) $nR \log \frac{V_2}{V_1}$ (3) $nR \log \frac{P_1}{P_2}$ (4) All of these

82. Permanent Hardness of water is due to presence of:-

- (1) $CaSO_4$ (2) $CaBr_2$ (3) $MgHCO_3$ (4) $(CH_3COO)_2Ca$

83. Maximum N-O bond length is in :-

- (1) NO_2^+ (2) NO_2^-
(3) NO_3^- (4) All has equal N-O bond length

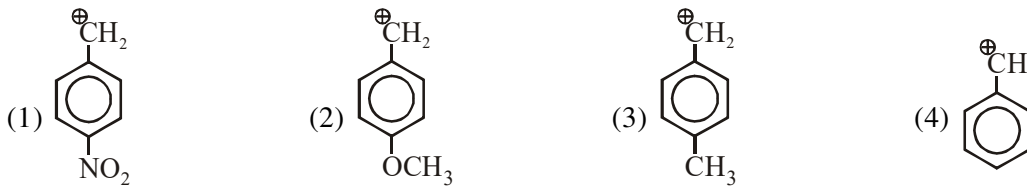
84. Which of the following is most basic compound in aqueous solution :-

- (1) CH_3-NH_2 (2) $(CH_3)_2NH$ (3) $(CH_3)_3N$ (4) NH_3

85. At $25^\circ C$, K_{sp} for $PbBr_2$ is equal to 8×10^{-5} . If the salt is 80% dissociated, what is the solubility of $PbBr_2$ in mol/litre ?

- (1) $\left[\frac{10^{-4}}{1.6 \times 1.6} \right]^{1/3}$ (2) $\left[\frac{10^{-5}}{1.6 \times 1.6} \right]^{1/3}$ (3) $\left[\frac{10^{-4}}{0.8 \times 0.8} \right]^{1/3}$ (4) $\left[\frac{10^{-5}}{1.6 \times 1.6} \right]^{1/2}$

86. Least stable carbocation is :-



87. A(g) is 90% converted into B according to the reaction $A(g) \rightleftharpoons 3B(g)$, then the value of $\left(\frac{D}{d}\right)$ at this point is :-

- (1) 1 (2) 2 (3) 2.8 (4) 2.5

88. Ratio of velocities of e^- of hydrogen atom in 1st, 2nd, 3rd orbit is :-

- (1) 1 : 2 : 3 (2) 1 : 1 : 1
(3) 1 : 1/2 : 1/3 (4) 3 : 2 : 1

89. Which of the following is not correct for inorganic benzene :-

- (1) It is a planar molecule. (2) It has $p\pi-d\pi$ back bonding
(3) It has $p\pi-p\pi$ back bonding (4) All of the above

90. The compound $(SiH_3)_3\ddot{N}$ is

- (1) Pyramidal & more Basic than $(CH_3)_3\ddot{N}$ (2) Planar & less Basic than $(CH_3)_3\ddot{N}$
(3) Pyramidal & less Basic than $(CH_3)_3\ddot{N}$ (4) Planar & more basic than $(CH_3)_3\ddot{N}$

SECTION-D : MATHEMATICS

This section contains **30 Multiple Choice Questions**. Each question has four choices (1), (2), (3) and (4) out of which **ONLY ONE** is correct

91. If one of the lines given by equation $ax^2 + 6xy + by^2 = 0$ bisects the angle between the coordinate axes then product of all the possible values of $a + b$ is

- (1) -36 (2) 5 (3) -12 (4) -5

92. Consider a triangle with vertices A(1,2), B(3,1) and C(-3,0) then point of intersection of altitude through vertex A and median through vertex B is

- (1) (0,0) (2) (3,4) (3) (1,2) (4) $\left(\frac{7}{6}, 1\right)$

93. A vertex of an equilateral triangle is (2,3) and the equation of opposite side is $x + y = 2$ then area of triangle is

- (1) $2\sqrt{3}$ (2) $\frac{9}{2\sqrt{3}}$ (3) $\frac{\sqrt{3}}{4}$ (4) $\sqrt{3}$

94. The orthocentre of the triangle with vertices (5,0), (0,0) and $\left(\frac{5}{2}, \frac{5\sqrt{3}}{2}\right)$ is

- (1) (3,2) (2) $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$ (3) $\left(\frac{5}{2}, \frac{5}{2\sqrt{3}}\right)$ (4) $\left(\frac{5}{2}, \frac{5}{\sqrt{3}}\right)$

95. If $\log_{10}\left(\sin\left(x + \frac{\pi}{4}\right)\right) = \frac{\log_{10} 6 - 1}{2}$, then the value of $\log_{10}(\sin x) + \log_{10}(\cos x)$ is

- (1) -1 (2) $-\frac{1}{2}$ (3) $-\frac{1}{3}$ (4) 3

96. If $\log_a(10) + \log_a(10^2) + \dots + \log_a(10^8) = 72$ then a equals to
 (1) $\sqrt{10}$ (2) 10 (3) 20 (4) $10^{1+\frac{1}{2}+\frac{1}{3}+\dots+\frac{1}{10}}$
97. In a ΔABC , area of triangle is equal to its perimeter, then value of $\frac{1}{r_1} + \frac{1}{r_2} + \frac{1}{r_3} + \frac{1}{r}$ is
 (where symbols used have usual meaning)
 (1) $\frac{1}{3}$ (2) 3 (3) 1 (4) $\frac{1}{2}$
98. The value of expression $\tan A + \tan B + \tan A \tan B$ when $\angle A = 20^\circ$ and $\angle B = 25^\circ$ reduces to
 (1) prime number (2) irrational number (3) odd number (4) even number
99. Let $ab = 1$ then minimum value of $\left(\frac{1}{a^4} + \frac{4}{b^4}\right)$ is not greater than
 (1) 1 (2) 2 (3) 3 (4) 5
100. If roots of the quadratic equation $x^2 + 6x + b = 0$ are real and distinct and they differ by at most 4 then number of possible integral values of b is
 (1) 10 (2) 3 (3) 4 (4) 5
101. The roots of quadratic equation $x^2 - 12x + t = 0$ are positive and one of them is square of the other, if roots are α and β with $\alpha > \beta$ then
 (1) $3\alpha + \beta - t = 5$ (2) $2\alpha + 3\beta - t = 0$ (3) $\alpha + \beta - t = 4$ (4) $\alpha + 2\beta - t = 0$
102. Let S_k be sum of the first k terms of the arithmetic sequence with first term 1 and common difference 1 then $\sum_{k=1}^{100} \frac{1}{S_k}$ equals
 (1) $\frac{1}{100}$ (2) $\frac{101}{100}$ (3) $\frac{100}{101}$ (4) $\frac{200}{101}$
103. If the line $y - x - 1 + \lambda = 0$ is equidistant from the points $(1, -2)$ and $(3, 4)$ then λ is
 (1) 2 (2) $\frac{1}{2}$ (3) 3 (4) 4
104. In the interval $[0, 5\pi]$ the equation $\log_{\sin\theta} \cos 2\theta = 2$ has
 (1) no solution (2) six solutions (3) two solutions (4) five solutions
105. In a ΔABC with usual notation, if $3 \log \left(\frac{a+b+c}{3}\right) = \log a + \log b + \log c$ then ΔABC is
 (1) right angle triangle (2) equilateral triangle (3) obtuse angle triangle (4) can not say
106. If $2\cos^2(\pi + x) + 3\sin(3\pi + x) = 0$, then the value of x lying in the interval $[0, 2\pi]$ can be
 (1) $\frac{5\pi}{6}$ (2) $\frac{\pi}{4}$ (3) $\frac{\pi}{2}$ (4) $\frac{\pi}{3}$
107. The number of values of $x \in [0, 2\pi]$ satisfying equation
 $\cos^6 x - \sin^6 x + \frac{\sin^2 2x \cos 2x}{4} = 0$ is
 (1) 6 (2) 3 (3) 5 (4) 4
108. If the letters of the word "MASTER" are written in all possible ways and then arranged as in a dictionary, then the rank of the word "MASTER" is $2^n + 1$, the value of n is
 (1) 4 (2) 6 (3) 0 (4) 8

109. The line $x - y + 1 = 0$ is tangent to circle at the point $(-2, -1)$ and centre of circle lies on $y = 2x$ then radius of circle is
- (1) $\frac{1}{\sqrt{2}}$ (2) $\sqrt{2}$ (3) 2 (4) $2\sqrt{2}$
110. Let r be the radius of circle passing through points $(1,0)$ and $(-2,-3)$ then minimum value of r is equal to
- (1) $\frac{3}{\sqrt{2}}$ (2) 3 (3) 2 (4) $\frac{1}{2}$
111. Two vertices of an equilateral triangle are $(-2,0)$ and $(4,0)$ and its third vertex lies above x -axis, then the centre of its circumcircle is
- (1) $\left(1, \frac{1}{2}\right)$ (2) $(1,2)$ (3) $(1, \sqrt{3})$ (4) $(\sqrt{3}, 1)$
112. Which of the following point lies outside the circle passing through points $(2,3)$, $(2,-3)$ and $(5, -3)$
- (1) $\left(\frac{7}{2}, 0\right)$ (2) $(5,0)$ (3) $\left(3, \frac{1}{2}\right)$ (4) $(-3,-2)$
113. Radius of a circle which passes through the points $(0,7)$ and $(0,6)$ and touches the x -axis is
- (1) 5 (2) $\frac{13}{2}$ (3) 2 (4) $\frac{7}{2}$
114. The lines of family $cx - y = 3 + 2c$ (where c is a parameter) are concurrent at a point P whose distance from the line $3x + 4y - 9 = 0$ is equal to
- (1) 5 (2) 3 (3) 4 (4) $\frac{1}{2}$
115. Sum of all the values of t for which the lines $2x + 3y = 5$, $t^2x + ty - 6 = 0$, and $3x - 2y - 1 = 0$ are concurrent
- (1) $\frac{1}{4}$ (2) 3 (3) -1 (4) 2
116. If $P(\alpha + 1, \alpha - 3)$ be any point in x - y plane, then the number of integral values of α for which the point P lies between the lines $x + 2y - 1 = 0$ and $2x + 4y - 14 = 0$
- (1) 0 (2) 1 (3) 2 (4) 3
117. Coefficient of x^{12} in $\left(\frac{x^2}{2} - \frac{3}{x^2}\right)^{10}$ is -
- (1) $\frac{405}{256}$ (2) $\frac{504}{256}$ (3) $\frac{450}{64}$ (4) none of these
118. The sum of all 4 digit numbers that can be formed by using the digits 2, 4, 6, 8. (repetition of digits not being allowed) is -
- (1) 133320 (2) 123330 (3) 113230 (4) 323430
119. ${}^{25}C_0 + {}^{25}C_1 + {}^{25}C_2 + \dots + {}^{25}C_{11}$ is equal to -
- (1) 2^{24} (2) $2^{24} - {}^{25}C_{12}$ (3) $\frac{2^{25} - {}^{25}C_{13}}{2}$ (4) $2^{25} - {}^{25}C_{13}$
120. If $\cos 27^\circ + \sin 27^\circ = p$ then $\cos 54^\circ$ is
- (1) $-\sqrt{2-p^2}$ (2) $p\sqrt{2-p^2}$ (3) $-p\sqrt{2-p^2}$ (4) $\sqrt{2-p^2}$