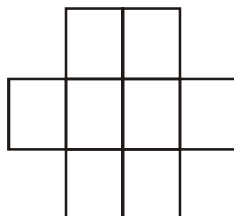# PART-I

IQ (MENTAL ABILITY)

This section contains **20 Multiple Choice Questions.** Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

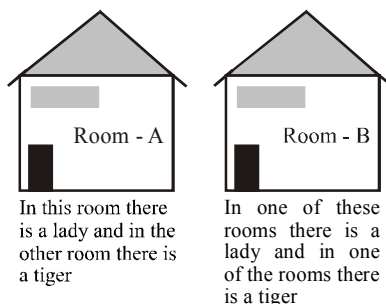**Direction (Q. 1 to Q. 3) :**

Refer to the data below and answer the questions that follow—

In a survey of 1000 households, washing machines, vacuum cleaners, and refrigerators were counted. Each house had at least one of these appliances, 400 had no refrigerator, 380 no vacuum cleaners, and 542 no washing machines. 294 had both a vacuum cleaner and a washing machine, 277 both a refrigerator and a vacuum cleaner, 120 both a refrigerator and a washing machine.

1. How many had only vacuum cleaner ?

    (1) 112   (2) 62   (3) 123   (4) 138

2. How many had at least two of the three appliance ?

    (1) 529   (2) 652

    (3) 665   (4) None of these

3. How many had exactly one appliances?

    (1) 550   (2) 500   (3) 216   (4) 335

4. Six x's have to be placed in the square of the adjacent figure such that each row contains at least one x. In how many different ways can this be done ?

    (1) 20   (2) 24   (3) 26   (4) 30

5. You are seeing two statements on the doors of two rooms. If

Room - A: In this room there is a lady and in the other room there is a tiger

Room - B: In one of these rooms there is a lady and in one of the rooms there is a tiger

only one statement is true, in which room is the lady present ?

    (1) Room A   (2) Room B

    (3) None of the rooms   (4) Can not be determined

Direction (Q. 6 & Q. 7) :

Code Relationship

P ÷ Q means 'P' is son of Q

P × Q means 'P' is sister of Q

P + Q means 'P' is brother of Q

P − Q means 'P' is mother of Q

6. How is S related to T in expression T + R − V + S

(1) Uncle   (2) Nephew   (3) Son   (4) Can't be determined

7. Which of following that S is husband of T ?

(1) T × R − V + S   (2) T − R ÷ V × S

(3) T − R + V ÷ S   (4) T ÷ R × V + S

Direction (Q. 8 & Q. 9) :

Each letter always stands for the same digit.

$$
\begin{array}{r}
N\,I\,N\,E \\
+\,T\,H\,R\,E\,E \\
+\,S\,E\,V\,E\,N \\
\hline
T\,W\,E\,L\,V\,E
\end{array}
$$

Given I = 9, R = 2, N = 6

8. For which digit W stands ?

(1) 0   (2) 4   (3) 6   (4) 3

9. For which digit L stands ?

(1) 5   (2) 6   (3) 7   (4) 8

10. P, Q, R and S are four men. P is the oldest but not the poorest. R is richest but not the oldest. Q is older than S but not than P or R. P is richer than Q but not than S. The four men can be arranged (descending) in respect of age & richness, respectively as :-

(1) PQRS, RPSQ   (2) PRQS, RSPQ   (3) PRQS, RSQP   (4) PRSQ, RSPQ

11. Six persons A, B, C, D, E and F are standing in a row. C & D are standing close to each other alongsides E. B is standing beside A only. A is fourth from F. Who are standing on the extremes ?

(1) A and F   (2) B and D   (3) B and F   (4) None

12. A man fills a basket with eggs in such a way that the number of eggs added on each successive day is the same as the number already present in the basket. This way the basket gets completely filled in 24 days. After how many days the basket was 1/4th full ?

(1) 6   (2) 12   (3) 17   (4) 22

Direction (Q. 13 to Q. 16) :

The president of a club is appointing 9 officials A, B, C, D, E, F, G, H & I to serve on 3 committes to study 3 different aspects of activities of the club. There will be a games commitee, a food service comittee & an entertainment comittee. The appointments must respect the following :

– Each comittee must have exactly 3 members
– No person can serve on more than one committee
– H must serve on entertainment committee
– C & D must serve on the same committee
– A & B cannot serve on the same committee
– E cannot serve on the same committee as I
– F must serve on the same committee as B or H or both B & H

13. If B and G serve on Games committee, which of the following must serve on the food service committee?

(1) A   (2) D   (3) E   (4) F

14. Which of the following groups could constitute the games committee ?

(1) A, B, E   (2) A, D, G   (3) C, H, E   (4) F, I, B

15. If A is assigned to the food service committee & C is appointed to entertainment committee, then which of the following must be true ?

(I) G is appointed to Food service committee
(II) E is appointed to Games committee
(III) I is appointed to Entertainment committee

(1) I only   (2) III only   (3) II & III Only   (4) I & III only

16. If F serves on the food service committee & C serves on the same committee as H, then which of the following must serve on the Games committee ?

(I) A   (II) G   (III) I

(1) I only   (2) III only   (3) I & II only   (4) II & III only

Direction (Q. 17 to Q. 19) : These questions are based on the following information for an examination :

|	
(A) Candidates appeared	10500
(B) Passed in all the five subjects	5685
(C) Passed in three subjects only	1498
(D) Passed in two subjects only	1250
(E) Passed in one subject only	835
(F) Failed in English only	78
(G) Failed in Mathematics only	275
(H) Failed in Physics only	149
(I) Failed in Chemistry only	147
(J) Failed in Biology only	221

17. How many candidates failed in all the subjects?

(1) 4815   (2) 3317   (3) 2867   (4) 362

18. How many candidates passed in at least four subjects ?

(1) 6555   (2) 5685   (3) 1705   (4) 870

19. How many candidates failed because of having failed in four or less subjects ?

(1) 4815   (2) 4453   (3) 3618   (4) 2368

20. At a farm, there are hens, cows and bullocks and keepers to look after them. There are 69 heads less than legs; the number of cows is double than that of the bullocks ; the number of cows and hens is the same and there is one keeper per ten birds and cattle. The total number of hens plus cows and bullocks and their keepers does not exceed 50. How many cows are there ?

(1) 10   (2) 14   (3) 12   (4) 16

PART-II

SECTION-A : PHYSICS

This section contains **20 Multiple Choice Questions.** Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

21. A ball is given a velocity v and angular velocity ω such that the ball rolls purely on a plank whose upper surface is rough enough to prevent slipping but lower surface in contact with the ground is smooth. No other force is acting on system.

(1) The plank will recoil back.

(2) The plank will also move forward but with a lesser velocity than that of the ball.

(3) The plank will also move forward but with a greater velocity than that of the ball.

(4) The plank will remain at rest.

22. A hollow cylinder, a spherical shell, a solid cylinder and a solid sphere are allowed to roll on an inclined rough surface of coefficient of friction μ and inclination θ. The **INCORRECT** option is:-

(1) If all the objects are rolling and have same mass, the K.E. of all the objects will be same at the bottom of inclined plane.

(2) Work done by the frictional force will be zero, if objects are rolling.

(3) If cylindrical shell can roll on inclined plane, all other objects will also roll.

(4) Frictional force will be equal for all the rolling objects, if having same mass.

23. A uniform beam of weight W is attached to a vertical wall by a hinge H. The beam is held horizontal by a rope as shown below.
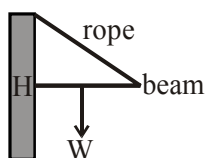
Which one of the following best shows the direction of the reaction force R at the hinge ?
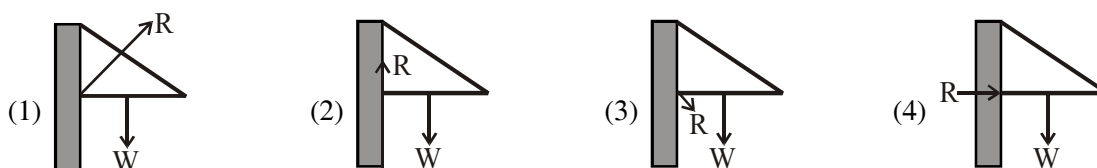
24. Two particles of mass m_1 and m_2 are moving with velocity $\vec{v}_1$ and $\vec{v}_2$ respectively. Mark the **INCORRECT** statement about a perfectly inelastic collision between m_1 and m_2.

(1) Magnitude of Impulse by m_1 to m_2 is $\dfrac{m_1 m_2}{m_1 + m_2}\left|(\vec{v}_1 - \vec{v}_2)\right|$.

(2) Kinetic energy transferred by m_2 to m_1 is $\dfrac{1}{2}\dfrac{m_1 m_2}{m_1 + m_2}(\vec{v}_2 - \vec{v}_1).(\vec{v}_2 - \vec{v}_1)$

(3) Magnitude of impulse by m_1 on m_2 in centre of mass frame is $\dfrac{m_1 m_2}{m_1 + m_2}\left|(\vec{v}_1 - \vec{v}_2)\right|$.

(4) In centre of mass frame both the particles come to rest after perfectly inelastic collision.

25. A wedge of mass m_1 and a block of mass m_2 are in equilibrium as shown. Inclined surface of the wedge has an inclination α with the horizontal. Each surface is frictionless. The normal reaction on the wedge may not be :-
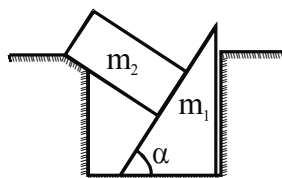
(1) $m_2 g \cos\alpha$

(2) $m_2 g \sin\alpha\cos\alpha$

(3) $m_1 g + m_2 g \cos^2\alpha$

(4) $m_1 g + m_2 g \sin\alpha\cos\alpha$

26. A helicopter is flying horizontally at 8 m/s at an altitude 180 m when a package of emergency medical supplies is ejected horizontally backward with a speed of 12 m/s relative to the helicopter. Ignoring air resistance what is horizontal distance between the package and the helicopter when the package hits the ground ?

(1) 120 m   (2) 24 m   (3) 36 m   (4) 72 m

27. To give trainee astronauts experience at feeling weightless, NASA has the insides of large planes removed. How can a plane be flown so it has an acceleration of 9.8 ms^{-2} vertically down for a while?

(1) Vertically down with decreasing speed

(2) On a parabolic path with a constant speed

(3) On a parabolic path with increasing speed while moving upwards and decreasing speed when moving downwards

(4) On a parabolic path with decreasing speed while moving upwards and increasing speed when moving downwards

28. A ball is thrown vertically upward under the influence of gravity. Suppose observer P films this motion and play the tape backwards (so the tape begins with the ball at its highest point and ends with it reaching the point from which it was released), and another observer Q observes the motion of the ball from a frame of reference moving at constant velocity which is equal to the initial velocity of the ball. The ball has a downward acceleration according to observer.
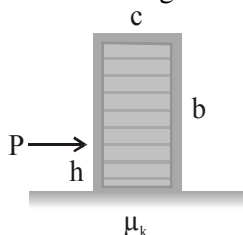
(1) P and Q   (2) only P   (3) only Q   (4) neither

29. The force P is applied to the homogeneous crate of mass m. If the coefficient of kinetic friction between the crate and the horizontal platform is μ_k, determine the minimum value of h so that the crate will slide without tipping about either the front edge or the rear edge.

(1) $h_{min} = \dfrac{1}{2}\left[b - \dfrac{mg}{P}(C - \mu b)\right]$

(2) $h_{min} = \dfrac{1}{2}\left[b + \dfrac{mg}{P}(C - \mu b)\right]$

(3) $h_{min} = \dfrac{1}{2}\left[b + \dfrac{mg}{P}(C + \mu b)\right]$

(4) $h_{min} = \dfrac{1}{2}\left[b - \dfrac{mg}{P}(C + \mu b)\right]$

30. As shown in the figure a person is pulling a mass 'm' from ground on a fixed rough hemispherical surface upto the top of the hemisphere with the help of a light inextensible string. Find the work done by tension in the string if radius of hemisphere is R and friction co-efficient is μ. Assume that the block is pulled with negligible velocity.

(1) mgR (2+3μ)   (2) mgR (1+2μ)   (3) mgR (1+μ)   (4) mgR (3+4μ)
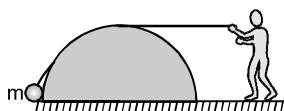
31. A small object with mass m = 1 kg is attached to the free end of an ideal spring with k = 100 Nm^{-1}. The other end of the spring is connected to a fixed frictionless pivot located at the origin O as shown in the Figure. The relaxed length of the spring is 1 m. An unspecified force F carries the object initially at rest from point A to point B in the vertical plane. At point B, the object has the speed 4 ms^{-1}. The work done by the force F is.
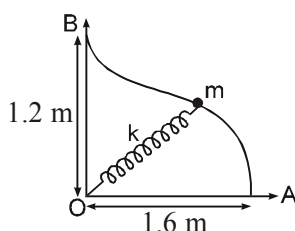
(1) 24 J   (2) −8 J   (3) 4 J   (4) 20 J

32. In the given figure a particle of mass 'M' is relased from a height h, then calculate the maximum value of height 'h', such that the particle does not leaves contact with the surface at any point during the motion and reaches point B. (Surface is smooth)
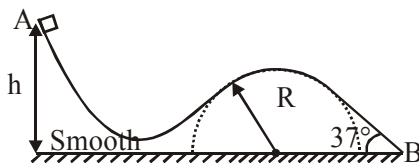
(1) $\dfrac{8R}{5}$ (2) $\dfrac{6R}{5}$ (3) $\dfrac{7R}{10}$ (4) 2R

33. Two swimmer A and B initially at the opposite banks of a 60 km wide river are located exactly opposite each other. Both the swimmers can swim in still water with speeds v_A = 10 km/h and v_B = $10\sqrt{3}$ km/h. Swimmer A swims such that his drift is $60\sqrt{3}$ km, if swimmer B start swimming $\sqrt{3}$ hours after swimmer A, then find out the angle (with the horizontal) at which swimmer B should swim with respect to swimmer A such that they meet each other before they cross the river. (Given the speed of the river is 10 km/h)

(1) $\theta = \tan^{-1}(1/\sqrt{3})$ (2) $\theta = \tan^{-1}(3/2)$ (3) $\theta = \tan^{-1}(2/3)$ (4) $\theta = \tan^{-1}(2/5)$

34. Two particles start simultaneously from the same point and move along two straight lines, one with uniform velocity v and other with a uniform acceleration a. If α is the angle between the lines of motion of two particles then the least value of relative velocity will be at time t is equal to

(1) $(v/a) \sin \alpha$ (2) $(v/a) \cos \alpha$ (3) $(v/a) \tan \alpha$ (4) $(v/a) \cot \alpha$

35. Two block A and B with masses 3 kg and 9 kg are placed over each other on a rough horizontal circular disc at a distance R = 10 m from the axis of the disc, as shown in the figure if the coeficient of friction between the two blocks is μ_1 = 1/4 and between block B and horizontal disck is μ_2 = 9/25, then calculate the maximum angular velocity with which we can rotate the disc such that there is no slipping any where
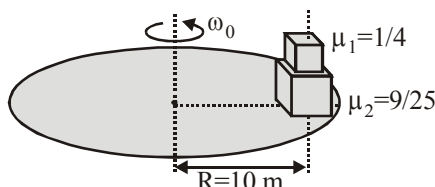

(1) 1 rad/s   (2) 0.5 rad/s   (3) 0.6 rad/s   (4) 0.3 rad/s

36. A rod of length L is hinged at and O and particle of mass 'm' is incident at its mid-point, at an angle of 37° with the vertical and the particle after elastic collision reflects at an angle of 53° with the vertical as shown in the figure. If this arrangement is on a horizontal plane, then find of the ratio of the masses of the rod and the particle (Neglect friction everywhere.)
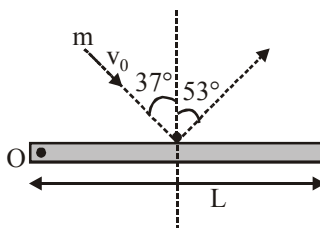
(1) $\dfrac{75}{32}$ (2) $\dfrac{75}{28}$ (3) $\dfrac{75}{16}$ (4) $\dfrac{75}{64}$

37. A plank of mass 'm' and sufficient length is moving with a constant speed v_0 on a smooth horizontal surface and a solid sphere of same mass 'm' and radius 'R' is placed over it, if μ is the co-efficient of friction between the sphere and the plank, then the velocity of the center of mass of the sphere at the instant the pure rolling starts will be:
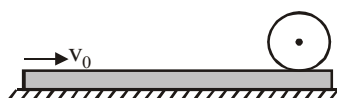
(1) $\dfrac{2}{3} v_0$ (2) $\dfrac{2}{7} v_0$ (3) $\dfrac{2}{5} v_0$ (4) $\dfrac{2}{9} v_0$

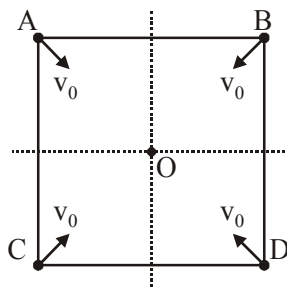**38.** A flexible chain of weight W hangs between two fixed points A and B. The angle made by the chain with the vertical at the two points A and B are θ and 2θ respectively. What is the ratio of the tensions at the end points A and B of the chain.

(1) cosec θ (2) 2sec θ (3) 2cos θ (4) 2sin θ
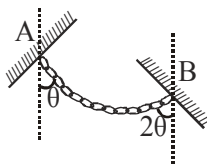
39 In the middle of a box of mass m is a weight of the same mass m. The whole structure is moving at a speed v in the horizontal plane toward the wall (see figure). Friction is absent everywhere, all the collision are absolutely elastic. Choose the correct option:
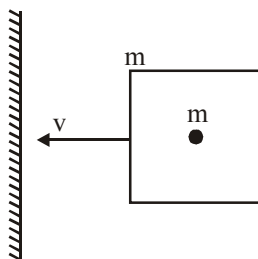
(1) There will be a total of four collisions

(2) Finally the box will be moving towards right with speed v.

(3) Finally the weight will be at the edge of the box.

(4) The weight will oscillate back and forth relative to the box after the collision with the wall is over.

40. Four identical particle each of mass 'm' are situated at the vertices of a square are moving towards the center 'O' with the constant speed v_0 on a smooth horizontal surface as shown in the figure. If after collision particles A and C retrace the are path with the same speed and particle D comes to rest then the impulse on partcile B will be:


(1) $\sqrt{7}mv_0$ (2) $\sqrt{2}mv_0$ (3) $\sqrt{3}mv_0$ (4) $\sqrt{5}mv_0$

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SECTION-B : CHEMISTRY

This section contains **20 Multiple Choice Questions.** Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

41. Equal amount (mass) of methane and ethane have their total translational kinetic energy in the ratio 3 : 1 then their temperature are in the ratio (C = 12)

(1) 4 : 5   (2) 45 : 8   (3) 15 : 8   (4) 8 : 5

42. The diagram display the plot of the compression factor Z versus P for real gases -
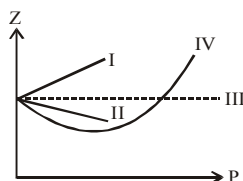
Which of the following statement is incorrect for a vander wall gas -

(1) The plot I is applicable provided the vander waal's constant 'a' is negligible

(2) The plot II is applicable provided the vander waal's constant 'b' is negligible

(3) The plot III is applicable provided that vander waal constant 'a' and 'b' are negligible.

(4) The plot IV is applicable provided the temperature in the gas is much higher than its Boyle's temperature

43. 20 ml of hydrogen gas diffuses in 4 seconds through a small cross section in a container. If the mixture of hydrogen and oxygen were taken in 2 : 1 mole ratio then find out the volume (ml) of oxygen diffused in 8 seconds. Assume all other conditions are identical.

(1) 8.3   (2) 16.3   (3) 6   (4) 7

44. Calculate the number of oxygen atoms required to combine with 7.0 g of N_2 to form N_2O_3 if 80% of N_2 is converted into products : $[N_A = 6 \times 10^{23}]$

(1) 4.5×10^{23} (2) 3.6×10^{23}

(3) 1.8×10^{23} (4) None of these

45. Atomic mass of a metal is 27. If its valency is 3, then molecular weight of its volatile chloride is :

(1) 66.75   (2) 133.5

(3) 6.675   (4) 33.75

46. 10 ml of H_2O_2 solution weighs 10 gm. The solution is diluted to 250 ml. 25ml of of this diluted solution required 40 ml of a M/50 solution of $KMnO_4$. Then volume strength of original H_2O_2 solution is-

Given : $5H_2O_2 + 2KMnO_4 + 6HCl \rightarrow 2KCl + 2MnCl_2 + 5O_2 + 8H_2O$

(1) 22.4 V   (2) 11.2 V

(3) 44.8 V   (4) 329.4

47. Moles of ABC_3 produced in the following set of reaction when 180 gm of A, 180gm of B and 200 gm of C are mixed in a container (given molar masses of A,B,C are 20, 30 & 10 respectively.

$$2A + 3B + 5C \longrightarrow A_2BC_2 + B_2C_3$$

$$B_2C_3 + 3C \longrightarrow 2BC_3$$

$$BC_3 + A \longrightarrow ABC_3$$
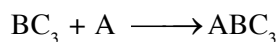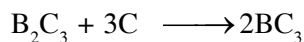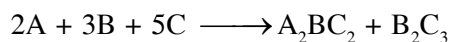
(1) 5   (2) 4   (3) 10/3   (4) 20/3

48. The energy of the second stationary state in Li^{+2} ion is -11.025×10^{-18} J. Find ionization energy

$\left(in \dfrac{Joule}{mole} \right)$ for He^+ ions.

(1) -1.18×10^7 (2) 1.18×10^7

(3) 13.6   (4) None of these

49. In H-atoms electrons are present in an orbit for which the wave diagram is :
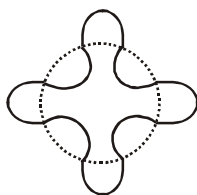
From this orbit electrons jump to ground state in all possible transitions. The transition giving maximum wavelength is

(1) $2 \rightarrow 1$ (2) $3 \rightarrow 1$ (3) $4 \rightarrow 3$ (4) $4 \rightarrow 1$

50.
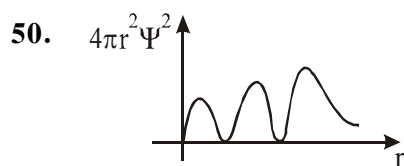
The above graph cannot be of :

(1) 3s   (2) $4p_x$ (3) $3p_x$ (4) $5d_{xy}$

51. If spin only magnetic moment of V^{x+} ion is $\sqrt{3}$ BM., then correct electronic configuration of ion is

(At. no. of V = 23)

(1) $[Ar] 3d^3 4s^1$ (2) $[Ar] 3d^2 4s^2$

(3) $[Ar] 3d^3 4s^o$ (4) $[Ar] 3d^1 4s^o$

52. Correct match of order with given property is -

Order	Property
(1) F > Cl > Br > I	Electron gain enthalpy
(2) $F_2 > Cl_2 > Br_2 > I_2$	Bond dissociation enthalpy
(3) F > Cl > Br > I	Ionisation enthalpy
(4) $F_2 > Cl_2 > Br_2 > I_2$	Bond length

53. Which of the following ion has maximum hydration enthalpy ?

(1) Li^+ (2) Be^{2+} (3) Mg^{2+} (4) Na^+

54. The ionic radii (in pm) of Au^+, Tl^{3+}, Hg^{2+} are respectively given by

(1) 151, 116, 102   (2) 116, 151, 102   (3) 102, 116, 151   (4) 151, 102, 116
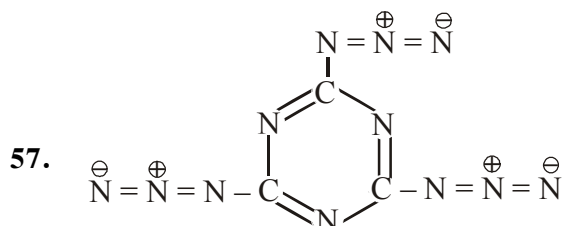
55. Which of the following contains both polor and non-polar bonds :

(1) NH_4OH (2) CO_2 (3) O_2F_2 (4) KCN

56. In CaC_2O_4 molecule which of the following statement is **CORRECT** :

(1) All elements present in CaC_2O_4 are non-metals

(2) All elements belong to p-block

(3) Oxygen has maximum $I.E_1$ compare to other type of elements present in CaC_2O_4

(4) All three elements have atomic number < 20

57.

$$\overset{\ominus}{N} = \overset{\oplus}{N} = N - C \cdots C - N = \overset{\oplus}{N} = \overset{\ominus}{N}$$

(structure of a triazine ring with three $-N=\overset{\oplus}{N}=\overset{\ominus}{N}$ groups attached to the carbon atoms)

For this molecule which option is **CORRECT**

(1) It has 15σ , 9π bonds

(2) Hybridisation of all C–atoms is sp^2 and molecule is following octet rule

(3) Total 12 lone pairs are present in this molecule

(4) All are correct

58. Which of the following orders of electron affinity of elements or ions shown below is/are correct -

(1) $O^- > S$ (2) $N^- > P$ (3) $S > O^-$ (4) $O < S^-$

59. Which of the following statements regarding peroxydisulphuric acid is not correct.

(1) It's formula is $H_2S_2O_8$ (2) It is having 11σ & 4 π bonds

(3) It is having peroxy linkage   (4) None of these

60. Find the maximum number of electron that are involved in shielding of an electron of Ni atom having

quantum numbers. n = 2, ℓ = 1 ,m = 0 , s = $+\dfrac{1}{2}$.

(1) 5   (2) 6   (3) 9   (4) 12

Attempt any one of the section C or D

SECTION-C : BIOLOGY

This section contains **20 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 options gives the correct categorisation of six animals according to the types of symmetry (A. B. C). They give out :-

	A Bilateral	B Radial	C Asymmetrical
(1)	Sea urchin, sea star, sea horse	Sea mouse, sea far	Snail
(2)	Snail, sea horse, sea-mouse	Sea urchin, sea star	Sea-far
(3)	Sea horse, sea mouse	Sea urchin, sea far, sea star	Snail
(4)	Sea horse sea mouse, snail	Sea urchin, sea star	Sea fur

62. Read features A, B, C and D for animals given below.

(A) Marine, asexual polyp present but medusa absent

(B) Fresh water, asexual polyp present but medusa-absent

(C) Marine, asexual polyp and sexual medusa present

(D) Marine, asexual polyp absent but sexual medusa present

Match the above A, B, C and D with animals and choose the correct option.

(1) A-Aurelia, B-Hydra, C-Obelia, D-Adamsia

(2) A-Adamsia, B-Hydra, C-Gorgonia, D-Aurelia

(3) A- Hydra, B-Adamsia, C-Obelia, D-Aurelia

(4) A-Adamsia, B-Hydra, C-Obelia, D - Aurelia

63. Consider the following five statements (a-e) and select the option which includes all the correct ones only :-

(a) In *Ichthyophis* gills are covered by an operculum

(b) *Vipera* and *Salamandra* shed their scales as skin cast

(c) *Camelus bactrianus* has a single hamp

(d) A tiger is slightly larger than the lion

(e) The sea horse exhibits sexual dimorphism

(1) Statement (a), (c) and (e)

(2) Statements (a), (c)

(3) Statements (d), (e)

(4) Statements (b), (c) and (d)

64. Identify the correct match from column-I, column II and column III :-

Column-I		Column-II		Column-III	
1.	Leech	(a)	Carapace	(i)	Viviparous
2.	Wuchereria	(b)	Hirudin	(ii)	Cloacal respiration
3.	Chelone	(c)	Proboscis	(iii)	Annuli
4.	Balanoglossus	(d)	Digenetic	(iv)	Acorn worm

(1) 2-d-iv, 1-b-iii, 3-a-i, 4-c-ii

(2) 1-b-ii, 2-c-i, 3-a-ii, 4-d-iv

(3) 1-b-iii, 2-d-i, 3-a-ii, 4-c-iv

(4) 2-d-iv, 1-b-iii, 3-c-i, 4-a-ii

65. If an animal is given to you is characterised by triploblastic, schizocoelomate, open type of circulatory system, segmented body with indirect development. Then identify the animal is.

(1) *Nereis*   (2) *Neoplina*   (3) *Pila*   (4) *Hirudo*

66. Read the following terms carefully.

Cilia, Flagella, Zygote, Water bloom, Photosynthesis, Pellicle, Peptidoglycan wall, Nitrogen fixation ability, Multicellular, Heterocyst, Decomposer, Pseudopodia.

How many terms are not related with kingdom protista :-

(1) 4   (2) 5   (3) 7   (4) 6

67. (I) Fertilization

(II) Liberation of spores

(III) Prothallus formation

(IV) Embryo formation

Arrange the above events in a correct sequence in the life cycle of pteridophytes.

(1) II, III, I, IV   (2) IV, III, II, I   (3) I, II, III, IV   (4) I, IV, III, II

68. ''The sporophyte is not free living but attached to the photosynthetic gametophyte and derives nourishment form it''

This statement is related with :-

(1) Homosporous Pteridophyte   (2) Bryophytes

(3) Heterosporous Pteridophyte   (4) Gymnosperm

69. Which set of disease is caused by bacteria :-

(1) Cholera, Typhoid, Tetanus, Citrus canker

(2) Cholera, Tetanus, Influenza, Rabies

(3) Typhoid, Mumps, Kuru, Tetanus

(4) Tetanus, Kuru, Leprosy, Pertusis

70. Choose the incorrect statement from following :-

(1) Yeast are used to make bread and bear

(2) Fungi prefer to grow in warm and humid places

(3) Cell wall of fungi are composed of chitin and polysaccharides

(4) Fungi show symbiotic association with algae as mycorrhiza
   and with roots of higher plants as lichen

71. Match the column I with column II and choose correct option :

	Column I		Column II
(a)	Xylem fibres	(i)	Pitted end wall
(b)	Xylem vessels	(ii)	Store food material
(c)	Xylem tracheids	(iii)	Obliterated central lumen
(d)	Xylem parenchyma	(iv)	Perforated end wall

(1) (a)-i, (b)-ii, (c)-iii, (d)-iv

(2) (a)-iv, (b)-iii, (c)-i, (d)-ii

(3) (a)-iii, (b)-iv, (c)-i, (d)-ii

(4) (a)-iii, (b)-i, (c)-iv, (d)-ii

72. Select the false statement -

(1) All tissues except epidermis and vascular bundles constitute the ground tissue

(2) The trichomes in the shoot system are usually unicellular

(3) Epidermis is the outermost layer of the primary plant body

(4) Phloem fibres are made up of sclerenchymatous cells

73. The meristem that occurs in the mature regions of roots and shoot of many plants particularly those provide woody axis and appear later than primary meristem is called

(1) Apical meristem

(2) Intercalary meristem

(3) Secondary meristem

(4) Protoderm

74. Which one of the following is not correct ?

(1) Early wood is characterised by large number of xylary elements

(2) Early wood is characterised by vessels with wider cavities

(3) Late wood is characterised by large number of xylary elements

(4) Late wood is charactrised by fewer number of xylary elements

75. Which of the following pair of meristem is responsible for increase in girth of dicot stem ?

(1) Apical meristem and intercalary meristem

(2) Apical meristem and marginal meristem

(3) Vascular cambium and cork cambium

(4) Vascular cambium and apical meristem

76. How many glycosidic bonds and phosphodiester bonds are present respectively in a linear DNA molecule with 200 base pairs ?

(1) 200 and 200   (2) 199 and 200

(3) 400 and 398   (4) 400 and 400

77. Read the following four statements (A-D) :-

(A) Inorganic compounds like phosphate and sulphate are also seen in acid-soluble fraction

(B) Percentage of hydrogen in the human body is 3.3%

(C) Amino acid acquire net positive charge when placed in basic medium

(D) Cellulose and starch are secondary metabolites

How many of the above statements are correct ?

(1) Four   (2) Two   (3) One   (4) Three

78.
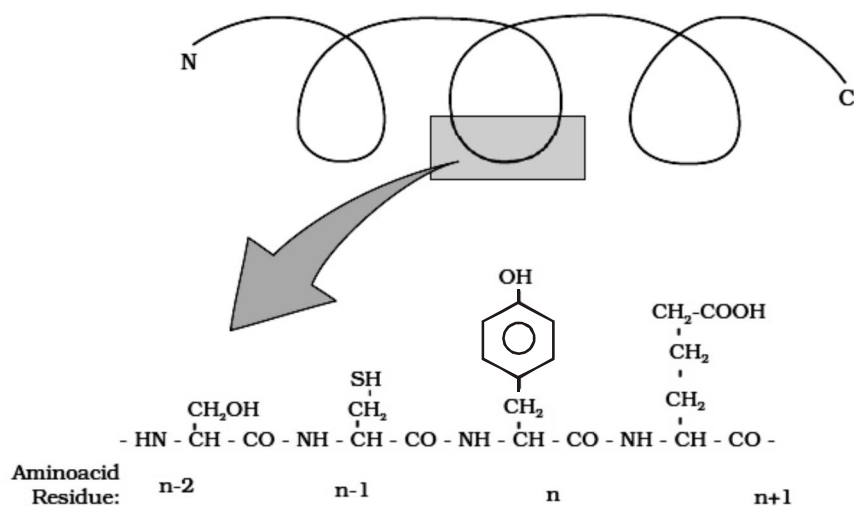
Identify the amino acid (n–1) and (n + 1) shown above and select the right option with their respective points :-

|	Amino acid	Point-I	Point-II
(1)	(n–1) Serine	Alcoholic amino acid	Optically inactive
(2)	(n+1) Glutamic acid	Acidic amino acid	Optically active
(3)	(n–1) Cystine	Thiolic amino acid	Optically active
(4)	(n+1) Aspartic acid	Acidic amino acid	Optically active

79. Read the following four statements (A – D) :-

(A) In a polysaccharide chain, the right end is called the non-reducing end and the left end is called the reducing end

(B) Together with polysaccharide and polypeptides, triglycerides form true macromolecular fraction of any living tissue or cell

(C) Living state is a non-equilibrium steady-state to be able to perform work

(D) Difference in average energy content of substrate from that of the transition state is called activation energy.

How many of the above statements are wrong ?

(1) Four   (2) One

(3) Two   (4) Three

80. The figure given below shows three velocity-substrate concentration curves for an enzyme reaction. What do the curves x, y and z represent :-
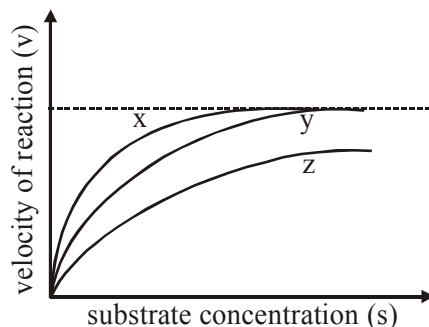
(1) x-normal enzyme reaction

   y-Enzyme reaction in presence of non-competitive inhibitor

   z-Enzyme reaction in presence of allosteric inhibitor

(2) x-Enzyme reaction in presenc of allosteric modulator

   y-Normal enzyme reaction

   z-Enzyme reaction in presence of competitive inhibitor

(3) x-Enzyme reaction in presence of allosteric activator

   y-Enzyme reaction in presence of competitive inhibitor

   z-Normal enzyme reaction

(4) x-Normal enzyme reaction

   y-Enzyme reaction in presence of competitive inhibitor

   z-Enzyme reaction in presence of non-competitive inhibitor

SECTION-D : MATHEMATICS

This section contains **20 Multiple Choice Questions.** Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

81. A, B, C, D lie on circle $x^2 + y^2 - 2x + 2y - 1 = 0$ such that chord BC subtend 110° and chord AD subtend 30° at centre O of circle, then $\angle BEC$ is -
(1) 40°   (2) 55°
(3) 80°   (4) 70°
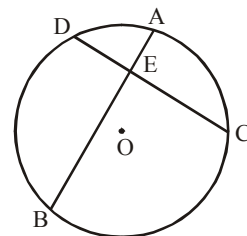
82. $A = \{(x, y) \mid x^2 + y^2 - 2|x| - 2|y| + 1 = 0\}$
$B = \{(x, y) \mid y = mx + c\}$. If $A \cap B \neq \phi \ \forall \ m \in R$, then number of integral values of C is -
(1) 5   (2) 7   (3) 11   (4) 9

83. Number of common terms in sequences 71,77,83,89,......... and 2500, 2495,2490,........, is-
(1) 80   (2) 81   (3) 82   (4) 83

84. In ΔABC, B(4,3), C(2,k) and centroid P(h,1). A variable line L = 0 passing through P intersect side AB and AC internally at M and N. If perpendicular distance of line L = 0 from A and B is 7 and 3 respectively, then distance of line L = 0 from C is-
(1) 4   (2) 2   (3) 6   (4) Data insufficient

85. Let a variable line passing through (1,2), then minimum value of $|a| + \left|\dfrac{1}{b}\right|$, is (where a & b are x intercept & slope of variable line respectively) -
(1) $\dfrac{3}{4}$ (2) $\dfrac{1}{2}$ (3) 2   (4) 1

86. There are n lines in a plane, no two of them are parallel and no three are concurrent. Due to these lines if the plane is divided into x_n parts, then value of $x_9 + x_{10}$ is equal to -
(1) 100   (2) 98   (3) 102   (4) 112

87. If larger root of the equation $(2015x)^2 - (2014)(2016)x - 1 = 0$ is α and smaller root of equation $x^2 + 2014x - 2015 = 0$ is β, then value of $\sqrt{\dfrac{\alpha - \beta}{224}}$ is -
(1) 2   (2) 0   (3) 3   (4) 4

88. As shown in adjacent figure hexagon ABCDEFA is divided into 3 squares and 4 triangles such that sum of areas of shaded region is 6 sq. units, side length AG & HD are α & β units respectively. If α & β are roots of equation $x^2 + (2k - k^2)x + (2k - 6) = 0$, where $k \in R$, then value of $(\alpha + \beta)$ is -
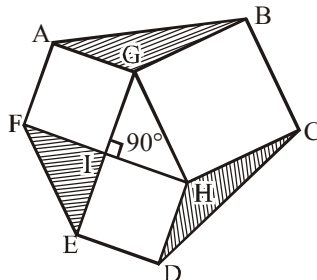
(1) 10   (2) 8   (3) 15   (4) 24

89. If γ is the unit digit of $\left(\dfrac{-2n}{4+n} - \dfrac{\sqrt{|n|-3} + \sqrt{3-|n|}}{3-n} \right)^{2014}$, (where $n \in R$), then number of integral value(s)

   of δ for which the equation $(\delta - 3)x^2 + 2(\delta - 3)x + \sqrt{\gamma - 2} = 0$, $\delta \in R$ possesses no real solution, is -

   (1) 0   (2) 1   (3) 2   (4) infinite

90. If m, n are two real numbers satisfying the relation $2m^2 - 3m - 1 = 0$ and $n^2 + 3n - 2 = 0$ respectively

   and $mn \neq 1$, then value of $\sqrt{\dfrac{mn + m + 1}{n}}$ is -

   (1) $\sqrt{\dfrac{3}{2}}$ (2) $\dfrac{1}{2}$ (3) 1   (4) $\dfrac{5}{2}$

91. If $i = \sqrt{-1}$, $\alpha, \beta \in R$ and $\alpha + i\beta = \dfrac{(2 - 3i)(5(1 + i) + \sqrt{3}(1 - i))(3 - i)(21 + 4i)(5 - 7i)}{(4 - 21i)(8 + 26i)(2 + 3i)}$, then value of

   $\alpha^2 + \beta^2$ is -

   (1) 28   (2) 56   (3) 44   (4) 36

92. Let $Z(\alpha, \beta) = \cos\alpha + e^{i\beta}\sin\alpha$ be a complex number, $(i = \sqrt{-1})$ then the maximum value of the square

   of modulus of $Z(\theta, 2\theta)$, is

   (1) $\dfrac{1}{2}$ (2) 1   (3) $\dfrac{3}{2}$ (4) 2

93. Let $a_1 = 0$, $b_1 = 8$, $a_{i+1} = a_i + \dfrac{3}{2}b_i$ and $b_{i+1} = \dfrac{1}{2}b_i$ $\forall$ i = 1, 2, 3, ... Let R_i be the region bounded on

   the X-Y plane formed by the circle $(x - a_i)^2 + y^2 = b_i^2$. Then the area (in sq. units) of the region

   $\bigcup_{i \geq 1} R_i$, is

   (1) $\dfrac{256\pi}{3}$ (2) $\dfrac{512\pi}{3}$ (3) $\dfrac{1024\pi}{3}$ (4) $\dfrac{2048\pi}{3}$

94. If the roots of the equation $ax^2 - 8x + b - 1 = 0$, $(a, b \in N)$ are equal, the value of $a + b$, $(b \neq \text{prime})$, is

(1) 18 (2) 11 (3) 9 (4) none of these

95. Image of $x(2 + \lambda) + y(1 + \lambda) - 2\lambda - 3 = 0$ with respect to line mirror $x + y + 2 = 0$ passing through (a,b) $\forall \lambda \in R$, then value of '$2a + 3b$' is-

(1) -9 (2) 6 (3) 12 (4) -15

96. Let a_k be the complex number such that $\left|a_k\right| = 1$ $\forall$ k = 1, 2, 3, 4 and $\arg\left(\dfrac{a_1 - a_2}{a_3 - a_4}\right) = \dfrac{\pi}{2}$ then$(a_1 a_2 + a_3 a_4)$

equals

(1) 0 (2) $a_1 a_3 + a_2 a_4$ (3) -1 (4) $a_1 a_2 a_3 a_4$

97. Let a line (not passing through the origin O) cuts the co-ordinate axes at points A and B. If the slopes of the medians drawn through the vertices A and B of the ΔOAB are the roots of the equation $ax^2 + bx + c = 0$ then the value of $\left(\dfrac{b^2}{ac}\right)$ is

(1) $\dfrac{9}{2}$ (2) $\dfrac{16}{3}$ (3) $\dfrac{25}{4}$ (4) $\dfrac{49}{6}$

98. If cos 3A + cos 3B + cos 3C = 1 then one of the angles of the triangle ABC is

(1) 60° (2) 90° (3) 120° (4) 135°

99. On the X-Y plane ; at $x = \dfrac{\pi}{4}$ the curve $y = 8 \cos (\tan x)$

(1) crosses the line y = 5x (2) lies below the line y = 5x

(3) lies above the line y = 5x (4) touches the line y = 5x

100. For i = 1, 2, 3, ..., n, let (t_i , t_{i+1}) represent n different points on the X-Y plane lying on the fixed line y = mx in the first quadrant. If A, G and H represent respectively the arithmatic geometric and harmonic means of the abscissae of these points then A, G, H are in

(1) A.P. (2) G.P. (3) H.P. (4) none of these

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK
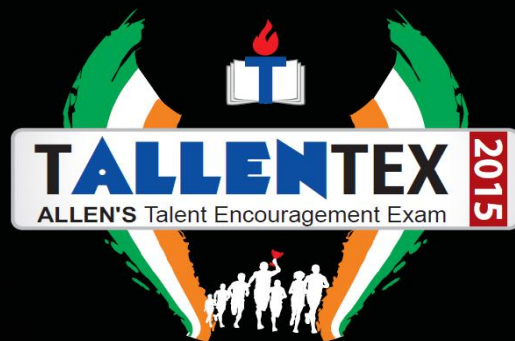
REVISED ANSWER KEY : CLASS - 11th (XI)
(Held on : 16-11-2014)

Q. No.	Ans.	Q. No.	Ans.	Q. No.	Ans.	Q. No.	Ans.
1	2	26	4	51	4	76	3
2	3	27	4	52	3	77	3
3	4	28	1	53	2	78	2
4	3	29	4	54	4	79	3
5	2	30	3	55	3	80	4
6	4	31	3	56	3	81	4
7	3	32	2	57	4	82	1
8	1	33	1	58	3	83	2
9	3	34	2	59	4	84	1
10	2	35	2	60	3	85	2
11	3	36	2	61	3	86	3
12	4	37	4	62	4	87	3
13	2	38	3	63	3	88	3
14	4	39	2	64	3	89	2
15	1	40	4	65	2	90	3
16	3	41	4	66	1	91	2
17	4	42	4	67	1	92	3
18	1	43	Bonus	68	2	93	1
19	2	44	2	69	1	94	2
20	3	45	2	70	4	95	4
21	4	46	1	71	3	96	1
22	4	47	2	72	2	97	3
23	1	48	2	73	3	98	3
24	2	49	3	74	3	99	3
25	4	50	3	75	3	100	2

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