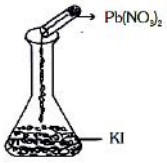
NATIONAL TALENT SEARCH EXAMINATION-2019-20, ANDRA PRADESH

SCHOLASTIC APTITUDE TEST (SAT) PAPER & HINTS & SOLUTION

CHEMISTRY

1. 

From the above experimental setup, what precipiate we obtain and what is the colour of obtained precipitate ?

(1) Lead Iodide-Yellow (B) Potassium Nitrate Yellow

(C) Lead Iodide-Red (D) Pota

Ans. (1)

$$Pb(NO_3)_2(aq) + 2KI_{(aq)} \rightarrow \underset{(\text{Yellow ppt.})}{PbI_2(s)} + 2KNO_3(aq)$$

2. Assertion (A) : Isotopes are electrically neutral.

Resason (R) : Isotopes are species with same mass number but different atomic number.

(1) Both (A) and (R) are true and (R) is the correct explanation to (A)

(2) (A) is true, but (R) is false.

(3) Both (A) and (R) are true, but (R) is not the correct explnation to (A)

(4) (A)is false but (R) is true

Ans. (2)

Sol. Factual statement

3. Find the composition of Stainless Steel.

(1) Fe, C, Ni (B) Fe, Cr, Cu (C) Fe, Cr, Ni (D) Fe, Ni, Cu

Ans. (3)

Sol. Factual statement

4. Find the correct matching

Bond		Bond Energy KJ/mol	
(A)	HH	(1)	193
(B)	Br-Br	(2)	366
(C)	H-Cl	(3)	432
(D)	H-Br	(4)	436

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

Ans. (1)

Sol.

Bond		Bond Energy KJ/mol	
(A)	HH	(1)	436
(B)	Br-Br	(2)	193
(C)	H-Cl	(3)	432
(D)	H-Br	(4)	466

5. The allowable combinations of quantum numbers for each of the electron in 4s, 3p, 5d orbitals respectively.

(1) n = 4,1 = 0, m_l = 0; n = 3,l = 2, m_l = –1; n = 5, l=3, m_l = –2

(2) n = 4,1 = 0, m_l = +1; n = 3,l = 2, m_l = –1; n = 5, l=3, m_l = 0

(3) n = 4,1 = 0, m_l = 0; n = 3,l = 1, m_l = 0; n = 5, l=2, m_l = –1

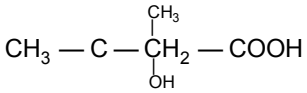
(4) n = 4,1 = 0, m_l = 0; n = 3,l = 0, m_l = 0; n = 5, l=1, m_l = 0

Ans. (3)

Sol.

	n	l	m
4s	4	0	0
3p	3	1	+1, 0, –1
5d	5	2	± 2,± 1,0

6. IUPAC Name of

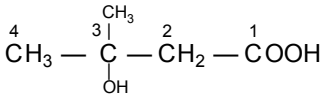


(1) 3—Hydroxy-3-methyl butanoic acid (2) 3—Hydroxy-2-methyl butane

(3) 3,3-Diethyl butane (4) 3—Ethyl-2-methyl propane

Ans. (1)

Sol.



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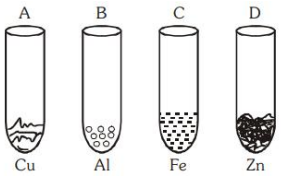


If we added $FeSO_4$ to above four test tubes, in which test tube we observe black residue ?

(1) "A" and "B" (2) "A" and "C" (3) "B" and "C" (4) "B" and "D"

Ans. (4)

8. Match the following

List-P		Bond Energy KJ/mol	
(A)	Ethane	(i)	436
(B)	Ethylene	(ii)	193
(C)	Acetylene	(iii)	432
(D)	Benzene	(iv)	2 sp^2 carbons

The correct answer is

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

Ans. (1)

Sol. In Ethane, each carbon has 4 sigma bonds = sp^3 hybridisation

In Ethane, each carbon has 3 sigma bonds = sp^2 hybridisation

In Acetylene, each carbon has 2 sigma bonds = sp^2 hybridisation

In Benzene, each carbon has 3 sigma bonds = sp^2 hybridisation

9. The elements A,B,C and D have atomic numbers 9,10,11 and 12 respectively. The correct order of ionization energy is

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

Ans. (1)

Sol. In the modern periodic table when we move from left to right in same period, ionisation energy increases . In the modern periodic table when we move from top to bottom in a same group, ionisation energy decreases.

10. An atom 'A' belongs to III A group and another atom "B" belongs to VI A group. The formula of the compound formed is

(1) A_2B (2) A_2B_3 (3) A_3B_3 (4) A_3B_6

Ans. (2)

Sol. IIIA group means the valency of element A is 3, VIA group means valency of element B is 2

11. Set of elements with the following atomic numbers belongs to the same group.

(1) 9,16,35,3 (2) 12,20,4,38 (3) 11,19,27,5 (4) 24,47,42,55

Ans. (2)

Sol. $_4Be$, $_{12}Mg$, $_{20}Ca$, $_{38}Sr$

12. Find the correct increasing order of ionic radius among

Al^{3+} , Mg^{2+}, O^{2-}, F^-

(1) $F^- < Mg^{2+} < Al^{3+} < O^{2-}$ (2) $Al^{3+} < Mg^{2+} < O^{2-} < F^-$

(3) $Al^{3+} < Mg^{2+} < F^- < O^{-2}$ (4) $Mg^{2+} < F^- < O^{-2} < Al^{3+}$

Ans. (3)

Sol.

	Al^{3+}	Mg^{2+}	F^-	O^{2-}
Z	13	12	9	8
e^-	10	10	10	10

13. Electro-negativity of the following elements increase in the order

(1) C,N,Si,P (2) P,Si,N,C (3) Si, P,C,N (4) N,Si,C,P

Ans. (3)

Sol.

	Si	P	C	N
Electronegativity value	1.8	2.1	2.5	3.0

14. Which of the following is the correct statement ?

I. The peninsular plateau is one of the most ancient land blocks on the earth's surface.

II. One of the remarkable features of the peninsular plateau is black soils formed due to volcanic activity.

(1) Only I is true (2) Only II is correct (3) I and II are correct (4) I and II are incorrect

Ans. (3)

Sol. Both the given statements are correct.

15. Which of the following is not true with reference to the climatic condition required for the cultivation of rice ?

(1) It requires high humidity (2) It requires high temperature i.e. above 25ºC.

(3) It requires annual rainfall above 100 cm. (4) It requires 210 frost free days.

Sol. The requirement for frost free days is for Cotton.

16. Which of the following statements is not true regarding India's climate ?

(1) India's climate has

(2) The climate has characteristics of tropical as well as subtropical climate

(3) The climate of India is described as the monsoon type.

(4) The North-East monsoons are responsibly for most of the rainfall in India.

Ans. (4)

Sol. Most of the rainfall in INdia occurs due to South West Rainfall.

17. Which of the following lake is a fresh water lake ?

(1) Sambhar (2) Chilka (3) Pulicat (4) Dal

Ans. (4)

Sol. Dal lake is a Fresh Water Lake

18. Population Change in a place is

(1) (No. of births + No. of in migrants) – (No. of deaths + No. of out migrants)

(2) (No. of births + No. of in migrants) – (No. of deaths + No. of out migrants)

(3) (No. of births + No. of in migrants) – (No. of births + No. of out migrants)

(4) (No. of births + No. of in migrants) – (No. of births + No. of out migrants)

Ans.(1)

Sol. Population Change is calculated by adding the no. of immigrants and brith rate and subtracting number of out migrants and death rate.

19. Which of the following is not correct regarding "Jet Streams" ?

(1) These are fast flowing air currents in a narrow belt inthe upper atmosphere.

(2) These causes rain from clouds.

(3) Jet Streams develops at about 35 ºN.

(4) These causes the neighbouring atmosphere cool.

Ans. (3)

Sol. Jet Streams develop at 25ºN.

20. Which is correct regardign Rural - Urban migration ?

a.Migration mainly due to insufficient employment opportunities in rural areas.

b. Migration does not necessarily.

c.They have greater exposure to new ideas in cities and try to challenge older notions in village.

(1) None of these (2) a,b (3) b,c (4) a,b,c

Ans. (4)

Sol. All the given options are correct

21. Match the following :

Column-I		**Column-II**	
(A)	Loo	(i)	Coromandal Coast
(B)	Mango showers	(ii)	Andhra Pradesh
(C)	Winter rainfall	(iii)	Dry and hot winds
(D)	Upper air currents	(iv)	Jet Streams

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

Ans. (1)

Sol. Loo-Dry and Hot Winds
Mango Showers - Andhra Pradesh
Winter Rainfall - Coromondal Coast
Upper Air Currents - Jet Streams

22. Kudremukh is an important Iron ore mine of
(1) Madhya pradesh (2) Karnataka (3) Kerala (4) Andhra Pradesh

Ans. (2)

Sol. Kudremukh mines are situated in Karnataka

23. Statement I : Density of population in North-East States is less due to heavy rainfall.
Statement II : Density of population in Kerala is high due to flat surface fertile soil and abundant rainfall.
(1) Both I, II are true (2) Both I,II are false (3) I is true, but II is fase (4) I is false, but II is true

Ans. (4)

Sol. Statement I is false and II is true

24. The ocean beds are rich in
(1) Copper (2) Manganese (3) Iron (4) Gold

Ans. (2)

Sol. The ocean beds are rich in Manganese.

25. Among the following statements, which is not true ?
(1) The portion of range found south of the Greater Himalayas is known as lesser Himalayas'.
(2) The average elevation of Himachal range is about 6,100 mts. above MSL.
(3) Himachal range is mainly composed of highly compressed rocks.
(4) The Pirpanjal and Mahabharata ranges form the important ranges of the Himachal.

Ans. (2)

Sol. The altitude varies between 3,700 and 4,500 metres and the average width is of 50 km.

PHYSICS

26. The radius of curvature of a plano-convex lens which has 2 refractive index is 20 cm. By applying Silver Bromide on its surface to change it as a concave mirror, what is the focal length of the formed mirror ?
(1) 5 cm (2) 10 cm (3) 20 cm (4) 40 cm

Ans. (1)

Sol. $P_{net} = 2 \times P_1 + P_M = 2 \times (\mu - 1)\left[\frac{1}{R_1} - \frac{1}{R_2}\right] + \left(\frac{1}{f_m}\right)$

$P_{net} = 2 \times (2-1)\left[\frac{1}{\infty} - \frac{1}{(-0.2)}\right] + \left(-\frac{1}{(-0.10)}\right)$

$P_{net} = 2 \times 5 + 10 = 20\ D$

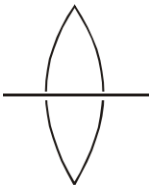
$f_{net} = \frac{1}{20} = 5\ cm$

27. Assertion (A) : The velocity of a particle may vary even when it's speed is constant.
Reason (R) : The particle is moving in circular path.
(1) (A) is true, but (R) is false.
(2) (A) is false , but (R) is true
(3) Both (A) and (R) are true and (R) is correct explanation to (A).
(4) Both (A) and (R) are true, but (R) is not correct explanation to (A).

Ans. (3)

Sol. Both (A) and (R) are true and (R) is correct explanation to (A).

28. A convex lens of focal length 20 cm is cut into two halves.Each of which is placed 0.5 mm and a point object placed at a distance of 30 cm from the lens as shown.
Then the image is at



(1) 50 cm (2) 60 cm (3) 30 cm (4) 70 cm

Ans. (2)

Sol. $\frac{1}{v}-\frac{1}{u}=\frac{1}{f}$

$\frac{1}{v}-\frac{1}{(-30)}=\frac{1}{20}$

v = 60 cm

29. A point object is placed at a distance of 10 cm and its real image is formed at a distance of 20 cm from a concave mirror. When the object is moved by 0.1 cm towards the mirror, then the image will be moved by about

(1) 0.4 cm away from the mirror (2) 0.4 cm towards the mirror

(3) 0.8 cm away from the mirror (4) 0.8 cm towards the mirror

Ans. (1)

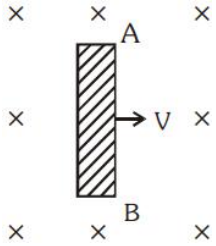
Sol. $\frac{1}{v}+\frac{1}{u}=\frac{1}{f}$

on differentiating with respect to u

$dv = (du)\left[\frac{v^2}{u^2}\right]$

$dv = (-0.1)\left[-\frac{400}{100}\right]$ = + 0.4cm (away from mirror)

30.



As per the above figure

(1) The end "Ä" of the rod becomes positively charged.

(2) Electric current flows along the rod from A to B.

(3) The rod AB is uniformly charged

(4) The end "B" of the rod becomes charged

Ans. (1)

Sol. On applying fleming's right hand rule, magnetic force on electrons is towards end B. So end A will become Positively charged.

31. Identify the following colours in the ascending orders of their frequencies.

(1) Red, blue, yellow, green (2) Blue, green, yellow, red

(3) Red, green, yellow, blue (4) Red, yellow, green, blue

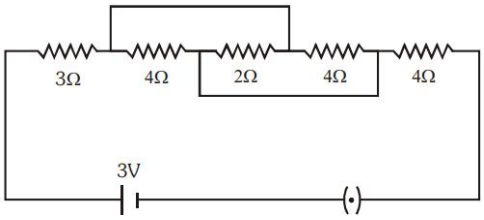
Ans. (4)

32. A person fired a gun standing at distance of 55 m from a wall. If the speed of sound is 330 m/s, the time for an echo heard is

(1) 0.5s (2) 0.3s (3) 0.6s (4) 0.4s

Ans. (2)

Sol. $t = \frac{2\times 55}{330} = \frac{110}{330} = 0.33$ sec

33. 

Find the current flowing through the above circuit.

(1) 0.375A (2) 3.75 A (3) 0.374 A (4) 3.74 A

Ans. (1)

Sol. By method of circuit reduction.

$R_{eq} = 3 + \left(\frac{1}{4}+\frac{1}{2}+\frac{1}{4}\right) + 4 = 3\Omega$

$I = \frac{3}{8} = 0.375$ A

34. Match the following :

List-I		List -II	
(A)	I Joule	1.	4.186 J
(B)	1 WH	2.	3.6×10^6J
(C)	1kWh	3.	10^7 ergs
(D)	1 calorie	4.	3.6 kJ

The correct match is

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

Ans. (1)

35. Assertion (A) : Work done by gravitational force in a moving body path is independent.

Reason (R) : Gravitational force is non-conservation force.

(1) Both (A) and (R) true and (R) is the correct explanation to (A)

(2) (A) is true, but (R) is false

(3) Both (A) and (R) are true, but (R) is not the correct explnation to (A)

(4) (A) is false but (R) is true

Ans. (2)

Sol. Gravitational force is conservative force so wok done is path independent.

Name of the Planet		Gravitation m/s^2	
(A)	Earth	1.	25.95
(B)	Jupiter	2.	3.7
(C)	Saturn	3.	9.8
(D)	Mars	4.	11.8

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

37. Bulb 'P' marked as 100 W, 220V and bulb Q marked as 60 W, 110 V. The resistance ratio of P and Q is

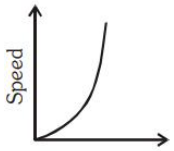
(1) 5 : 7 (2) 5 : 12 (3) 12 : 7 (4) 12 : 5

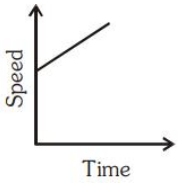
Ans. (4)

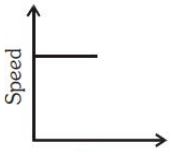
Sol. $\frac{R_p}{R_Q} = \left(\frac{V_P}{V_Q}\right)^2 \times \frac{V_Q}{P_P}$

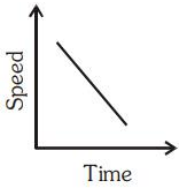
$\frac{R_P}{R_Q} = \left(\frac{220}{110}\right)^2 \times \frac{60}{100} = \frac{12}{5}$

38. Which of the following graph represents non-uniform acceleration ?

(1) 

(2) 

(3) 

(4) 

Ans. (1)

Sol. In option (1) slope of the speed time graph is not constant, which represents non uniform acceleration.

MATHEMATICS

39. Which of the following statement is not correct ?

(1) The line cosec 60ºx + cos45ºy = 4 passing through the point (tan 60º, Sec 45º)

(2) If tan θ + cot θ = 5, then tan^2 θ + cot^2 θ = 23

(3) If the pair of linear equations 4x + 5y = 9 and 8x + ky = 18 has infinitely many solutions, then k = 10.

(4) If α , β are the zeroes of the quadratic polynomial $x^2 - 2x + 1$, then $\alpha^3 + \beta^3 = 2$

Ans. (1)

Sol. (1) Cosec 60ºx + cos 45º y = 4

$\Rightarrow \frac{2}{\sqrt{3}}x + \frac{1}{\sqrt{2}}y = 4$

So, required equation is $2\sqrt{2}\ x + \sqrt{3}\ y = 4\sqrt{6}$

Now, the point (tan 60º, sec 45º) = ($\sqrt{3}$, $\sqrt{2}$)

cannot pass through line $2\sqrt{2x} + \sqrt{3y} = 4\sqrt{6}$

As, $2\sqrt{2} \times \sqrt{3} + \sqrt{3} \times \sqrt{2} \neq 4\sqrt{6}$

(2) tanθ + cot θ = 5

Now, (tanθ + cotθ)^2 = 5^2

$\Rightarrow \tan^2\theta + \cot^2\theta + 2 = 25$

so, tan^2 θ + cot$^2\theta$ = 23

(3) For equations 4x + 5y = 9 and 8x + ky = 18 having infinite solutions.

$\frac{4}{8} = \frac{5}{k} = \frac{9}{18}$

so, k = 10

(4) $\alpha + \beta = 2$, $\alpha\beta = 1$

$\alpha^3 + \beta^3 = (\alpha + \beta)^3 - 3\alpha\beta(\alpha + \beta)$

$(2)^3 - 3 \times (2) = 2$

40. 20 cards numbered 1,2,3.....20 are put in a box and mixed thoroughly. One person draws a card from the box, the probability that the number on the card is divisible by 2 and 3 both

(1) $\frac{1}{10}$ (2) $\frac{3}{10}$ (3) $\frac{3}{20}$ (4) $\frac{1}{5}$

Ans. (3)

Sol. Total outcomes = 20

Favorable outcomes = (6, 12, 18)

Probability = $\frac{3}{20}$.

41. If $\cos\theta = \frac{a}{b}$ then cosec θ + cot θ in terms of a and b is

(1) $\sqrt{\frac{b+a}{b-a}}$ (2) $\sqrt{\frac{b-a}{b+a}}$ (3) $\sqrt{\frac{a+b}{a-b}}$ (4) $\sqrt{\frac{a-b}{a+b}}$

Ans. (1)

Sol. If $\cos\theta = \frac{a}{b}$

then, cosec θ + cos θ = $\frac{1}{\sin\theta} + \frac{\cos\theta}{\sin\theta} = \frac{1+\cos\theta}{\sin\theta} = \frac{1+\cos\theta}{\sqrt{1-\cos^2\theta}}$

$= \frac{1+\frac{a}{b}}{\sqrt{1-\frac{a^2}{b^2}}} = \frac{\frac{b+a}{b}}{\sqrt{\frac{b^2-a^2}{b^2}}} = \frac{b+a}{\sqrt{b^2-a^2}} = \sqrt{\frac{b+a}{b-a}}$

42. The sum of a number and its reciprocal is $2\frac{1}{6}$, then the number is

(1) $\frac{5}{6}$ or $\frac{6}{5}$ (2) $\frac{4}{5}$ or $\frac{5}{4}$ (3) $\frac{3}{4}$ or $\frac{4}{3}$ (4) $\frac{2}{3}$ or $\frac{3}{2}$

Ans. (4)

Sol. Let the number of

$\Rightarrow a + \frac{1}{a} = \frac{13}{6}$

$\Rightarrow 6a^2 - 13a + 6 = 0$

$\Rightarrow 6a^2 - 9a - 4a + 6 = 0$

$\Rightarrow 3a(2a - 3) - 2(2a - 3) = 0$

$\Rightarrow (2a - 3)(3a - 2) = 0$

$\therefore a = \frac{3}{2}$ or $\frac{2}{3}$

43. If α and β are the zeroes of the quadratic polynomial $P(x) = x^2 + qx - p$, then the value of $\frac{}{\alpha} \quad -$ is

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

Ans. (2)

Sol. $\alpha + \beta = -q$

$\alpha\beta = -p$

so, $\frac{1}{\alpha} + \frac{1}{\beta} = \frac{\alpha+\beta}{\alpha\beta} = \frac{-q}{-p} = \frac{q}{p}$

44. If $\frac{x-y}{xy} = 5$ and $\frac{x+y}{xy} = 7$, then the value of 'x' is

(1) $\frac{1}{6}$ (2) $\frac{1}{2}$` (3) $\frac{1}{3}$ (D) 1

Ans. (4)

Sol. $\frac{x-y}{xy} = 5$ $\frac{x+y}{xy} = 7$

$\frac{1}{y} - \frac{1}{x} = 5$ $\frac{1}{y} + \frac{1}{x} = 7$

Let $\frac{1}{y} = a$, $\frac{1}{x} = b$

$a - b = 5$

$a + b = 7$

$2a = 12$

$a = 6$

$6 + b = 7$

$b = 1$

$\frac{1}{y} = 6 \Rightarrow y = \frac{1}{6}$

$\frac{1}{x} = 1 \Rightarrow x = 1$

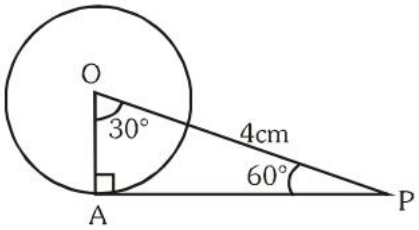
45. If AP is a tangent to the circle with centre 'O' such that OP = 4cm and $\angle$ OPA = 60º , then the radius of the circle is

(1) 2cm (2) 3cm (3) $2\sqrt{3}$ cm (4) $2\sqrt{2}$ cm

Ans. (3)

Sol. $\angle$ OPA =60º , OP = 4 cm

$\Rightarrow \sin 60º = \frac{OA}{4}$



$\Rightarrow \frac{\sqrt{3}}{2} = \frac{OA}{4} \Rightarrow OA = 2\sqrt{3}$ cm

46. If the mean of first 'n' natural numbers is $\frac{60}{11}$ then n =

(1) 9 (2) 10 (3) 11 (4) 12

Sol. Sum of 'n' natural numbers = $\frac{n(n+1)}{2}$

$\Rightarrow$ mean = $\frac{6n}{11}$

$\Rightarrow \frac{6n}{11} = \frac{n(n+1)}{2n}$

$\Rightarrow 12n = 11n + 11$

$\Rightarrow n = 11$

47. The 10^{th} term from the end of the A.P. 5, 12, 19,.....173 is

(1) 117 (2) 96 (3) 110 (4) 103

Ans. (3)

Sol. 5, 12, 29,.....173

a = 6, d = 12 – 5 = 7 , ℓ = 173

173 = 5 + (n – 1) 7

$\frac{168}{7}$ = n – 1

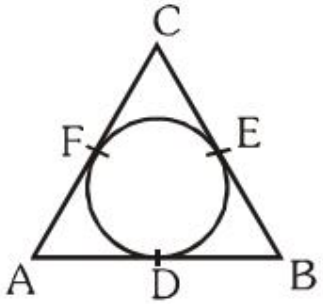
n – 1 = 24 n = 25

10^{th} term from end = 16^{th} term from starting

a_{16} = a + 15d a_{16} = 5 + 15 (7)

= 5 + 105 = 110

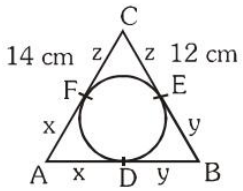
48. In the adjacent figure if AB = 10 cm, BC = 12 cm and AC = 14 cm, then AD =



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

Ans. (1)

Sol.



Let AD = AF = x BD = BE = y CE = CF = z

x + y = 10 .....(1)

y + z = 12 .....(2)

z + x = 14 .....(3)

$\Rightarrow$ 2 (x + y + z) = 36

x + y + z = 18.....(4)

equation (4) – equation (2)

x = 18 – 12 x = 6

49. If two positive integers 'a' and 'b' are expressible in the from of $a = p^3q^2$ and $b = p^2q^4$, p and q being prime number, then LCM (a, b) is

(1) p^3q^1 (2) p^2q^4 (3) p^3q^4 (4) p^3q^5

Ans. (3)

Sol. $a = p^3q^2$

$b = p^2q^4$

LCM (a,b) = p^3q^4

50. The solution of the line equation cos 30º x + sin 30º y = 3 is

A. (2,3) B.(0,6) C.$(2\sqrt{3}, 0)$ D.$(0, 2\sqrt{3})$

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

Ans. cos 30º x + sin 30º y = 3

$\Rightarrow \frac{\sqrt{3}x}{2} + \frac{1}{2} y = 3$

$\Rightarrow \sqrt{3}\ x + y = 6$ .....(1)

As points B(0,6) & C$(2\sqrt{3}, 0)$ satisfying the equation

51. A copper sphere of radius 3 cm is melted and recast into a right circular cone of height 3 cm. Then the radius of the base of the cone is

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

Ans. (4)

Sol. Volume of sphere = Volume of cone

$\Rightarrow \frac{4}{3}\pi r_1^3 = \frac{1}{3}\pi r_2^2 h$

$\Rightarrow 4r_1^3 = r_2^2 h$

$\Rightarrow 4 \times 3^3 = r_2^2 \times 3$

$\Rightarrow 4 \times 9 = r_2^2$

$\Rightarrow r_2^2 = 36 = 6^2$

$\Rightarrow r_2 = 6$ cm

52. If the points (a, 2a), (3a, 3a) and (3,1) are collinear then the value of 'a' is

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

Ans. (4)

Sol. Points are collinear

$\Rightarrow$ area of triangle formed by given 3 points is zero

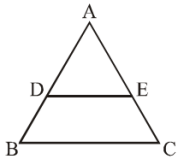
$\Rightarrow \frac{1}{2} |a(3a-1) + 3a(1-2a) + 3(2a-3a)| = 0$

$\Rightarrow -3a^2 - a = 0$

$\Rightarrow a(3a+1) = 0$

$\Rightarrow a = 0$ or $a = -\frac{1}{3}$

53. From the adjacent figure Δ ABC, DE || BC and AD = $\frac{1}{2}$ BD. If BC = 6 cm then DE is



(1) 4cm (2) 1.5cm (3) 3 cm (4) 2 cm

Sol. $\Delta ADE \sim \Delta ABC$

$\frac{AD}{AB} = \frac{DE}{BC}$

$\frac{1}{3} = \frac{DE}{6}$

DE = 2 cm.

54. Match the item in Column-I with Column-II.

Column-I		Column-II	
(A)	Slope of x -axis	1.	sec0°
(B)	Slope of y-axis	2.	sin0°
(C)	distance between the points (sin 55°, 0) and (0, sin 35°)	3.	cot0°

(1) A$\rightarrow$2,B$\rightarrow$1,C$\rightarrow$3 (2) A$\rightarrow$3,B$\rightarrow$1,C$\rightarrow$2 (3) A$\rightarrow$2,B$\rightarrow$3,C$\rightarrow$1 (4) A$\rightarrow$1,B$\rightarrow$2,C$\rightarrow$3

Ans. (3)

Sol. (A) Slope of x-axis (y = 0) m = 0 = sin 0°

(B) Slope of x-axis (x = 0) m = $\frac{y}{x} = \infty$ = cot 0°

(C)distance between the points (sin 55°, 0) and (0,sin 35°) = $\sqrt{(\sin 55°-0)^2 + (0-\sin 35°)^2}$

= $\sqrt{\sin^2 55° + \sin^2 35°}$ .....(1)

as sin 35° = sin (90°–55°) = cos 55° .....(2)

from (1) and (2)

$\sqrt{\sin^2 55^\circ + \cos^2 55^\circ} = 1 = \sec 0^\circ$

$A \to 2, B \to 3, C \to 1$

55. Metallic spheres of radii 15cm, 20 cm and 25 cm respectively are melted to form a single solid sphere. Then the radius of the resulting sphere is

(1) 35 cm (2) 25 cm (3) 20 cm (4) 30 cm

Ans. (4)

$\Rightarrow \frac{4}{3}\pi R^3 = \frac{4}{3}\pi r_1^3 + \frac{4}{3}\pi r_2^3 + \frac{4}{3}\pi r_3^3$

$\Rightarrow \frac{4}{3}\pi R^3 = \frac{4\pi}{3}[15^3+20^3+25^3]$

$\Rightarrow R^3 = 27000$

$\Rightarrow R = \sqrt[3]{27000} = 30$ cm

56. If α and β are the zeroes of the polynomial $P(x) = x^2 + 3x + k$ such that $\alpha - \beta = 5$, then the value of k is

(1) –4 (2) –3 (3) 5 (4) 2

Ans. (1)

Sol. If α and β are the zeroes of the polynomial P(x) then

Sum of zeroes $\alpha + \beta = \frac{-b}{a} = -3$ .....(1)

Product of zeroes $\alpha\beta = \frac{c}{a} = k$ .....(2)

$\alpha - \beta = 5$

Solving equation (1) and (3), we have

$\alpha = 1, \beta = -4$

Put value of α and β in equation (2), we have

(1) $(-4) = k \Rightarrow k = -4$

57. If –2 is a root of the quadratic equation $x^2 - px + 6 = 0$ and $x^2 + px - k = 0$ has equal roots, then the value of k is

(1) 14 (2) 18 (3) 6 (4) 10

Ans. **(Correct option is not available)**

Sol. $P(x) = x^2 - px + 6 = 0$ and $Q(x) = x^2 + px - k = 0$

If –2 is a root of P(x) then $P(-2) = 0 \Rightarrow (-2)^2 - p(-2) + 6 = 0$

$\Rightarrow 4 + 2p + 6 = 0$

$\Rightarrow p = -5$ .....(1)

Also, Q (x) has equal roots then D = 0

$\Rightarrow p^2 - 4(-k) = 0$

$\Rightarrow p^2 = -4k$ .....(2)

From equation (1) and (2)

$\Rightarrow (-5)^2 = -4k$

$\Rightarrow \kappa = \frac{-25}{4}$

58. If Δ ABC is an equilateral triangle such that AD $\perp$ BC, then AD^2 =

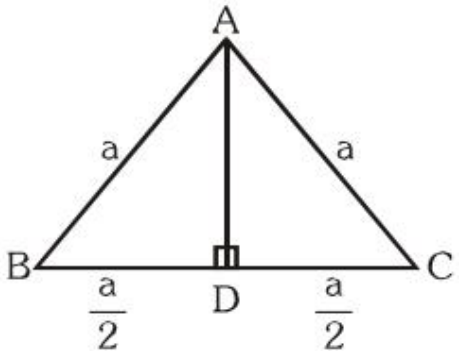
A. $\frac{3a^2}{4}$ B. $\frac{3a^2}{2}$ C. $\frac{3}{4}BC^2$ D. $\frac{\sqrt{3}}{2}a$

Ans. (2)

Sol. Let AB = BC = AC = a

$AD^2 = AB^2 - BD^2$

$AD^2 = a^2 - \frac{a^2}{4}$



$AD^2 = \frac{3a^2}{4}$

or $AD^2 = \frac{3}{4}BC^2$

So A and C are right options.

59. Match Column -I with Column-II and select the correct answer using the codes given below the columns.

Column-I **Political Party**	**Column-II** **State**
(A) SAD	(1) Uttar Pradesh
(B) DMK	(2) Assam
(C) AGP	(3) Tamil Nadu
(D) BLD	(4) Punjab

` (1) A-I, B-3, C-2,D-4 (2) A-4, B-2, C-3,D-1 (3) A-4, B-3, C-2,D-1 (4) A-1, B-2, C-3,D-4

Ans. (3)

Sol. SAD - Punjab
DMK – Tamil Nadu
AGP - Assam
BLD - U.P

60. Which of the following is incorrect regarding with first general electrions of India ?
(1) Separate ballot boxes for each candidate.
(2) Massive campaign to encourage the voters.
(3) Symbols were introduced.
(4) Only 10% of the population

Ans. (4)

Sol. More than 10% of the population voted in the first election.

61. With reference to democracy, consider the following statements:
(A) In a democracy, only leaders elected by people should rule the country
(B) People have the freedom to express views, freedom to organise and freedom to protests.
Which of the statement(s) given above is/are correct ?
(1) (A) only (2) Niether (A) or (B) (3) (B) only (4) Both (A) and (B)

Ans. (4)

Sol. Both the given statements are correct.

62. Which of the following is correct regarding with "Coliation Government" ?
(1) Power shared by different groups
(2) Power shared among Governments at different levels.
(3) Power shared by two or more political parties
(4) Power shared among different organisations of Government

Ans. (3)

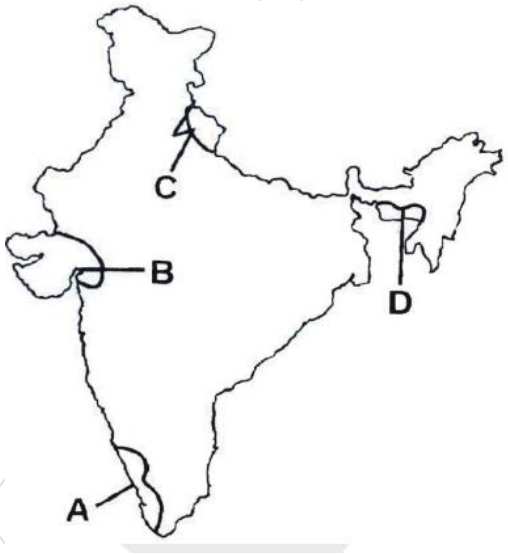
Sol. When power is shared between two or more political parties it is called Coalition Government.

63. What type of information is not accessible to the citizen as per RTI ?
(1) The manner of executions of subsidy programmes, including amounts allocated.
(2) Endanger the life or physical safety of a person.
(3) The particulars of its organization, functions and duties.
(4) The powers and duties of its officers and employees.

Ans. (2)

Sol. The threat to safety is not accessible to the people.

64. Identify the pointed states with their corresponding Social and Environment movements and select the correct option using the codes given below.



(1) A-Silent Valley Movement, B-Chipko movement, C-Narmada Bachao Andolan, D-Meira Paibi Mvoement
(2) A - Narmada Bachao Andolan, B-Silent Valley Movement, C-Chipko Movement , D-Meira Paibi Movement
(3) A-Silent Valley Movement, B-Narmada Bachao Andolan, C-Chipko Movement, D-Meira Paibi Movement
(4) A-chipko movement, B-Narmada Bachao Andolan, C-Silent Valley Movement , D-Meira Paibi Movement

Ans. (3)

Sol. Silent Valley Movement- Kerala, Western Ghats
Narmada Bachao Aandolan - Gujrat
Chipko Movement - Uttarakhand

65. With reference to the Fundamental Rights, Consider the following statements :
(A) Indian constitution gurantees Fundamental Rights to its citizen
(B) Fundamental Rights are absolute and never suspended.
Which of the statement/s given above is/are correct ?
(1) Both (A) & (B) (2) (A) only (3) Neither (A) Nor (B) (4) (B) only

Ans. (2)

Sol. Fundamental Rights are Relative and Not Absolute

66. Observe the given 'Logo' and answer the question.
This 'Logo' represents to :

(1) United Nation Education, Scientific and Cultural Organisation
(2) United Nations Organisation
(3) United Nations Children's Fund
(4) United Nations Human Rights Commision

Ans. (4)

BIOLOGY

67. The Enzyme thrombokinase released by
(1) White blood cells (2) Plasma (3) Red blood cells (4) Platelets

Ans. (4)

Sol. During the time of injury platelets will release thrombokinase enzyme that helps in activating blood clotting factor

68. Find out the renewable resource
(1) Petrol (2) Natural gas (3) Coal (4) Water

Ans. (4)

Sol. Petrol, Natural gas and coal are fossil fuels so they are non renewable while water is a renewable resource.

69. In animal kingdom, the first organism possessing back bones
(1) Reptiles (2) Aves (3) Fishes (4) Amphibians

Ans. (3)

Sol. From the given organisms, fishes belongs to the first class of vertebrates that is Pisces.

70. Match the item in column-I with Column-II

Column-I	Column-II
A.Plants Excrete material	1. Tears
B. Animals Excrete material	2. Saliva
C. Plants secretion	3. Falling of leaves
D. Animals secretion	4. Gums

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

Ans. (3)

Sol. Plants store excretory material in their leaves so they shed their leaves to excrete waste
Animals excrete waste product like urea, salts etc. through tears
Gums are the secretion of plants while animals secrete saliva

71. Nodes of Ranvier absent in

(1) Myelinated neurons (2) Sensory neurons
(3) Motor neurons (4) Non-myelinated neurons

Ans. (4)

Sol. Nodes of ranvier are the gap between myelin sheath so they are absent in non-myelinated neurons

72. Parthenogenesis is

(1) Asexual reproduction (2) Sexual reproduction
(3) Artificial propagation (4) Natural propagation

Ans. (1)

Sol. Parthenogenesis is a type of asexual reproduction in which a a female gamete or egg cell develops into an individual without fertilization.

73. One of the following is not related to Pea plant

(1) It is a biennial plant (2) It prefers self fertilization
(3) It ahs well defined characters (4) Presence of bisexual flowers.

Ans. (1)

Sol. Pea plant is an annual plant

74. One of the following digestive juices which contains no enzymes

(1) Lipase (2) Trypsin (3) Amylase (4) Bile

Ans. (4)

Sol. Bile juice does not contain any digestive enzyme while lipase, trypsin and amylase are digestive enzymes.

75. If you think chest cavity is a room int his the diaphragm may be

(1) Windows (2) Walls (3) Roof (4) Floor

Ans. (4)

Sol. Diaphragm forms the floor of chest cavity as it is present at posterior part of chest cavity.

76. In a living cell the fluid present inside the nucleus called as

(1) Nucleoplasm (2) Cytoplasm (3) Protoplasm (4) Endoplasm

Ans. (1)

Sol. Nucleoplasm is the fluid present inside nucleus.

77. The scientific name of human is "Homo sapiens". In this the word "Sapiens" represents

(A) Family (B) Species (C) Genera (4) Class

Ans. (2)

Sol. As per the binomial nomenclature Homo is the name of Genus while sapiens is the name of species.

78. In human eye, the cornea formed from
(A) Iris (B) Choroid (C) Retina (D) Sclera
Ans. (4)
Sol. The external layer of eye ball is composed of sclera.The anterior portion of this layer is called the cornea
79. The hormone "Ghrelin" is secreted by
(1) Wall of the stomach (2) Wall of the intestine (3) Wall of the Esophagus (4) Salivary glands
Ans. (1)
Sol. Gherelin is often termed as the hunger hormone produced by specialized cells that lines the stomach.
80. Ecological pyramids was first introduced by
(1) Darwin (2) Willian Elton (3) Charles Elton (4) Mendel
Ans. (3)
Sol. Ecological pyramids was first introduced by Charles Elton.
81. Which of the following are correct regarding WTO ?
(i) It's main aim is to liberalise international trade.
(ii) It was starteda t the initiative of the developed countries.
(iii) The rules of WTO are framed to favour the developing countries.
(iv) It establishes rules regarding international trade.
(1) Only (ii) and (iii) (2) Only (iii) and (iv) (3) All of these (4) Only (i),(ii) and (iv)
Ans. (4)
Sol. World Trade Organisation (WTO) is one such organisation whose aim is to liberalise international trade.Started at the initiative of the developed countries, WTO establishes ruels regarding itnernational trade, and sees that these rules are obeyed.

82. Which of the following is not a feature of the liberalisation ?
a. Businesses are allowed to make decisions freely about what they wish to import or export.
b.Government removes restrictions from foreign trade.
c. MNCs are allowed to work in the country.
d. It establishes rules regarding international trade.
(1) Only a,b,c (2) Only b,c (3) All of these (4) Only c,d
Ans. (2)
Sol. With liberalisation of trade, businesses are allowed to make decisions freely about what they wish to import or export. The government imposes much less restrictions than before and is therefore said to be more liberal.
83. Choose the wrong pair given below.
(1) per capita income US $ 1,035 and above low countries
(2) Per capita income- World Bank
(3) Per capita income US $ 12,600 and above-rich countries.
(4) Human Development Index- UNDP
Ans. (1)
Sol. Countries with per capita income of US $ 12,600 and above per annum in 2012 are called high income countries of rich countries .Those with per capita income of US $ 1,035 or less per annum in 2012 are called low income countries.

84. For calculating Body Mass Index (BMI), weight of the person is divided by the

(1) Square of the sum of height and weight

(2) Square of the weight

(3) Square of the height

(4) Square root of the height

Ans. (3)

Sol. BMI = (weight in kgs/height in metres squared)

85. In the rural areas, the unorganised sector mostly comprise of

(i) Landless agricultural labourer

(ii) Garment makers

(iii) Street Vendors.

(iv) Sharecroppers and artisans.

(1) (i) and (iii (2) (iii) and (iv) (3) (ii) and (iii) (4) (i) and (iv)

Ans. (4)

Sol. Garment makers and street vendors work inthe urban areas not in rural areas.

86. Which of the following is not correct relating to service sector ?

(1) 25% of people are engaged in service sector

(2) All the people who employed in service sector are earning high income

(3) Service sector in India employs many different kinds of people

(4)All service sector a activities are not growing equally well

Ans. (2)

Sol. All the people employed in service sector do not earn high incomes.

87. Which of the following methods can be used by the government for a fair globlisation ?

(i) impose trade barriers.

(ii) negotiate at the WTO for fairer rules.

(iii) align with other developing countries.

(iv) close its marked for foreign trade.

(1) Only (i) , (ii) and (iii) (2) Only (i) and (ii) (3) All of these (4) Only (ii) and (iv)

Ans. (1)

Sol. If necessary, the government can use trade and investment barriers. It can negotiate at the WTO for 'fairer rules'.It can also align with other developing countries with similar interests to fight against the domination of developed countries in the WTO.

88. Terms of credit does not include

(1) Interest rate (2) Collateral (3) Cheque (4) Mode of repayment

Ans. (3)

Sol. Cheque is not included in Terms of Credit.

89. Which is not the main principle of United Nations Organisation ?

(1) Promote social progress (2) Uphold human rights

(3) Achieve equality among different countries (4) Preserve peace

Ans. (3)

Sol. The UN Charter sets out four main purpose :

(a) Maintaining worldwide peace and security

(b) Developing relations among nations

(c) Fostering cooperation between nations in order to solve economic, social, cultural, or humanitarian international problems.

(d) Providing a forum for bringing countries together to meet the UN's purposes and goals

90. Consider the following statements :

(A) In 1937 the Muslim League got only 4.4 percent of the total Muslim votes.

(B) In 1946 when elections were held again for the provincial and central assemblies, the Muslim league succeeded in winning the Muslim seats decisively.

(C) It was occurred by sensitive response of Congress Party with Muslims.

Which of the statements given above are correct ?

(1) A,B & C (2) A & C only (3) B & C only (D) A & B only

Ans. (4)

Sol. (a) In 1937 the Muslim League got only 4.4 percent of the total Muslim vote cast in the elections.

(b) In 1946, when elections were held against for the provincial and central assemblies, the League succeeded in winning that Muslim seats decisively.

(c) The League Pointed out many issues and blamed Congress of Insensitivity

91. The following regional military and strategic alliances given below, is not related to U.S.A.

(1) WARSAW (2) CENTO (3) SEATO (4) NATO

Ans. (1)

Sol. WARSAW is related to USSR

92. Match Column-I with Column-II and select the correct answer using the codes given below the columns.

Column - I	**Column-II**
(A) Bolsheviks	(1) Mussolini
(B) Mensheviks	(2) Hitler
(C) Nazism	(3) Lenin
(D) Fascism	(4) Kerensky

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

Ans. (2)

Sol. Bolsheviks - Lenin

Mensheviks - Kerensky

Nazism - Hitler

Fascism - Mussolini

93. Which statement is incorrect with regard to "Tebhaga" Movement ?

(1) This movement about to tenancy reforms

(2) This movement was led by Provincial Kissan Sabha

(3) Bigger Landlords participated in this movement

(4) This agitation was started in Bengal.

Ans. (3)

Sol. Bigger landlords did not participate inthe movement.

94. The "Zollverein" is known as

(1) Tax (2) Customs Union (3) Administrative Union (4) Religious Union

Ans. (2)

Sol. Zolleverein is a Customs Union

95. Arrange the following eveents in correct chronological order with regard to Indian National Movement :

(A) Quit India Movement (B) Three member Cabinet Mission came to India

(C) Direct Action Day (D) Cripps Mission came to India

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

Ans. (4)

Sol. Quit India Movement-August 1942
Three Members Cabinet Mission - March 1946
Direct Action Day - 16th August 1946
Cripps Mission - April 1942

96. In March 1945, the US President, Harry Truman, Said' 'we have emerged from this war as the most powerful nation inthe world-the most powerful nation, perhaps, perhaps, in all history".
This is not reason for this statement.
(1) Infact the Second World War helped USA grow out of its economic misery caused by the Great Depression.
(2) Far from the theatres of war, the industries and agriculture of USA prospered.
(3) This ensured full employment and high productivity in US during the Second World War.
(4) Only villages of USA had been completely destroyed.

Ans. (4)

Sol. There is no reference of the village being destroyed by the USA.

97. The French were keen to develop Vietnam as an exporter of Rice. For this purpose they did not adopt this strategy.
(1) Encouraging landlords.
(2) Improving irrigation network
(3) Taken up of land reforms.
(4) Facilitating marketing of agricultural produce like rice & rubber

Ans. (3)

Sol. The French did not adopt the strategy to take up land reform measures.

98. Match column-I with column-II and select the correct answer using the codes given below the columns.

Column-I	Column-II
(A) Spain	(1) Mexico
(B) Belgium	(2) Congo
(C) Portugal	(3) Brazil
(D) Britain	(4) Nigeria

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

Ans. (4)

Sol. Sapain- Mexico
Belgium - Congo
Portugal - Brazil

99. Eric Hobsbawm, a historian, called the 20th century "the age of extremes". This is not the reason for that statement.
(1) Great Depression (2) Occurred two world wars
(3) Women got their right to vote (4) Established colonies

Ans. (4)

Sol. The colonies were not established

Ans.4

Sol. The colonies were not established

100. Arrange the following events in chronological order regard to Germany.

(i) Proclamation of the Weimar Republic (ii) Hitler becomes Chancellor of Germany

(iii) Germany invades Poland (iv) Germany invades the USSR

(1) ii, i, iii,iv (2) i,iii,ii,iv (3) iv,iii,ii,i (4) i,ii,iii,iv

Ans. (4)

Sol. Proclamation of Weimer - 1918

Hitler became Chancellor -1933

Germany invaded poland - 1939

Germany invaded USSR - 1941