NATIONAL TALENT SEARCH EXAMINATION (NTSE-2018) STAGE -1

'JHARKHAND' STATE PAPER : SAT

Date: 05/11/2017

Max. Marks: 100 **SOLUTIONS** **Time allowed: 90 mins**

1. The prefix for factor 10^{-18} is

(1) atomic (2) auto (3) atto (4) ani

Ans. (3)

Sol. Atto

2. The drift velocity of electrons in a conductor is :

(1) very small (2) very large

(3) equal to the velocity of the light (4) varies with the conductor

Ans. (1)

Sol. Very small because its magnitude lies between 10^{-4} to 10^{-6}

3. The equivalent resistance of r_1 & r_2 when connected in series in R_1 and that when they are connected in parallel is R_2.

Then the ratio $\frac{R_1}{R_2}$ is

(1) $\frac{r_1}{r_2}$ (2) $\frac{r_1+r_2}{r_1r_2}$ (3) $\frac{(r_1+r_2)^2}{r_1r_2}$ (4) $\frac{r_1r_2}{2r_1+r_2}$

Ans. (3)

Sol. For series

$R_1 = r_1 + r_2$ (equivalent resistance)

for parallel , $\frac{1}{R_2}=\frac{1}{r_1}+\frac{1}{r_2}$

$R_2 = \frac{r_1r_2}{r_1+r_2}$ (equivalent resistance)

$\therefore \frac{R_1}{R_2}=\frac{(r_1+r_2)^2}{r_1r_2}$

4. A vertical wire carries a current in upward direction. An electron beam sent horizontally towards the wire will be deflected :

(1) towards right (2) towards left (3) upwards (4) downwards

Ans. (3)

Sol. Using Right Hand thumb rule and flemming's Left Hand Rule,

current direction (i) = Left Side , Magnetic field (B) = outwards, so the direction of force is upwards.

5. Electromagnets are made of

(1) soft iron (2) steel (3) aluminium (4) titanium

Ans. (1)

Sol. Soft iron

6. X-ray beam an be deflected :

(1) by an electric field (2) by a magnetic field

(3) by electric & magnetic fields both (4) neither by an electric field nor by a magnetic field

Ans. (4)

Sol. Because X-ray consists of photons which has no net charge.

7. The dispersive power of a medium is

(1) The greatest for red light (2) the least for red light

(3) the least for yellow light (4) the same for all colours

Ans. (2)

Sol. We know $P \propto \frac{1}{f}$ focal length is maximum for red light

8. A spherical mirror and a thin spherical lens have each focal length of 15cm. The mirror and the lens are likely to be:

(1) both concave (2) both convex

(3) the mirror is concave and the lens is convex (4) the mirror is convex and the lens is concave

Ans. (1)

Sol. By using sign convention

9. The change in focal length of an eye lens is caused by the action of the

(1) Pupil (2) retina (3) ciliary muscles (4) iris

Ans. (3)

Sol. Ciliary muscles

10. An electric bulb is rated 220v and 100 w. When it is operated on 110 v, the power consumed will be:

(1) 100w (2) 75w (3) 50w (4) 25w

Ans. (4)

Sol. $P = \left(\frac{V}{V_0}\right)^2 P_0 = \left(\frac{110}{220}\right)^2 \times 100 = 25W$

11. The far point of a myopic person is 80 cm, infront of the eye. What is the power and kind of lens required to correct the problem:

(1) + 1.5 D, convex lens (2) - 1.5 D, concave lens (3) -1.25 D, concave lens (4) + 1.25 D, convex lens

Ans. (3)

Sol. $P = \frac{1}{-x} = \frac{100}{-80} = -1.25\,D$

$-ve$ sign indicates the lens is concave

12. The horizontal range of a projectile is maximum for a given velocity of projection when the angle of projection is :

(1) 30° (2) 60° (3) 45° (4) 90°

Ans. (3)

Sol. $R = \dfrac{u^2 \sin 2\theta}{g}$

$\sin\theta$ is maximum $= 90°$, $\therefore\ 2\theta = 90°$

$\theta = 45°$

13. Parsec is the unit of

(1) distance (2) time (3) velocity (4) angle

Ans. (1)

Sol. Parsec is the unit of length

14. Addition of HCl to an aqueous solution of $Pb(NO_3)_2$ gives a

(1) Yellow Precipitate (2) Brown Precipitate (3) White Precipitate (4) Black Precipitate

Ans. (3)

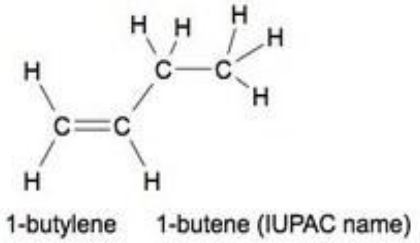
Sol. $Pb(NO_3)_2(aq) + 2HCl(aq) \longrightarrow PbCl_2(s) + 2HNO_3(aq)$ gives white precipitate

15. The total number of isomers having the molecular formula C_4H_8 is

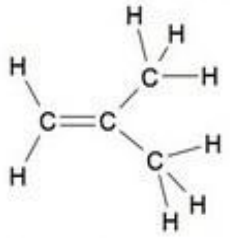
(1) 2 (2) 3 (3) 6 (4) 4

Ans. (3)

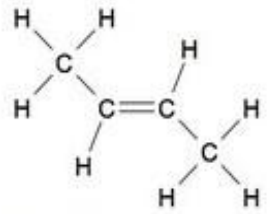
Sol.



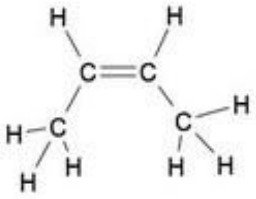
1-butylene 1-butene (IUPAC name)



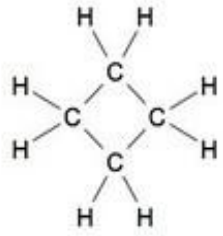
iso-butylene
2-methyl-propene (IUPAC name)



trans-2-butene

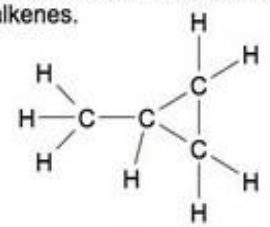


cis-2-butene



cyclo-butane

These two cycloalkanes have the same empirical formula as the butene isomers, but are not alkenes.



methyl-cyclopropane

16. The carbon-carbon bond length in ethane is

(1) $1.20\ \overset{0}{A}$ (2) $1.34\ \overset{0}{A}$ (3) $1.54\ \overset{0}{A}$ (4) $1.39\ \overset{0}{A}$

Ans. (3)

Sol.

17. Which of the following reagents may be used to distinguish between 1-butyne and 2-butyne?

(1) Br_2 in CCl_4 (2) Dilute $KMnO_4$

(3) Concentrated H_2SO_4 (4) Ammonical $CuCl$

Ans. (4)

Sol. There will be no reaction between butyne - 2 and Cu_2Cl_2 because it has no acidic hydrogen. In butyne -1 the terminal hydrogen is acidic $(CH_3CH_2-C\equiv CH)$ so it will give a real ppt with Ammonical Cu_2Cl_2 or $CuCl$

18. Which of the following reagents can convert propionic acid into 1-propanol?

(1) $NaBH_4$ (2) $LiAlH_4$ (3) Na and C_2H_5OH (4) H_2/Ni

Ans. (2)

Sol. $CH_3-CH_2-COOH \xrightarrow{LiAlH_4} CH_3-CH_2-CH_2-OH$

19. Ketones can be obtained in one step by the

(1) Oxidation of primary alcohols (2) Hydrolysis of esters

(3) Oxidation of secondary alcohols (4) Reduction of acid chlorides

Ans. (3)

Sol. Oxidation of secondary alcohol

20. Which of the following is no a Lewis acid?

(1) $SnCl_4$ (2) OR_2 (3) SO^{2+} (4) SO_3

Ans. (2)

Sol. OR_2 due to absence of vacant *D*-orbital

21. Salts on treatment with dilute H_2SO_4 gives a gas which will not turn lime water milky. The salts may be

(1) $NaHCO_3$ (2) Na_2CO_3 (3) $BaSO_4$ (4) $NaNO_2$

Ans. (4)

Sol. CO_2 & SO_2 both the gases can convert line water milky. Reaction of $NaNO_2$ and H_2SO_4 do not produce CO_2 or SO_2 gas so it will not convert lime water milky.

22. Which of the following is correctly matched?

I Gel

II Coagulation

III Micelles

IV Flocculation

(i) Colloid-size clusters of molecules (ii) Reversible aggregation of colloidal particles

(ii) A semi rigid mass of a lyophilic sol having a network (iii) Irreversible aggregation of colloidal

Ans. (2)

Sol.

23. During depression of freezing point in a solution, which of the following are in equilibrium

(1) Liquid solvent and solid solvent (2) Liquid solvent and solid solute

(3) Liquid solute and solid solute (4) Liquid solute and solid solvent

Ans. (1)

Sol.

24. Rutherford's experiments, which established the nuclear model of the atom,

(1) β particles, impinged on a metal foiled and got absorbed

(2) $\propto$ -rays, which impinged on a metal foil and ejected electrons

(3) Helium atom, impinged on a metal foiled and got scattered

(4) Helium nuclei, impinged on a metal foiled and got scattered

Ans. (4)

Sol.

25. The hottest parts of the Bunsen burner is

(1) Blue Zone (2) Zone of complete combustion

(3) Zone of partial combustion (4) All parts of the flame are equally

Ans. (2)

Sol.

26. Nitrobenzene can be prepared by heating with a mixture of concentrated HNO_3 and concentrated H_2SO_4. In this nitrating mixture, HNO_3 acts as

(1) A base (2) An acid (3) A catalys (4) A reducing agent

Ans. (1)

Sol. In preparation of nitrobenzene H_2SO_4 protanates nitric acid. So, H_2SO_4 acts as an acid while HNO_3 which accepts proton, acts as a base.

27. Plants normally growing on sand are known as

(1) Lithophytes (2) Xerophytes (3) Chasmophytes (4) Psammophytes

Ans. (4)

Sol. Psammophytes are the plants normally growing on sand.

28. Our skin becomes dark in colour when exposed to excess of sunlight. It is due to the presence of

(1) Carotene (2) Melanin (3) Flavoxanthin (4) Haemotoxylene

Ans. (2)

Sol. Melanin is a natural pigment produced in specialized group of cells known as melanocytes, which is located in the bottom layer of skin's epidermis and the middle layer of the eye.

29. Famous scientist Carolus Linnaeus is associated with one the following

(1) Plant Classification (2) Binomial Nomenclature (3) Identification of plants (4) Identification of Animals

Ans. (2)

Sol. Binomial nomenclature was proposed by carolus linnaeus, and according to him the name of any organism consists of two words called 'GENUS' and 'SPECIES'

30. Ozone hole or hole in the ozone layer in the atmosphere refers to

(1) Development of a hole in the Ozone layer (2) Decrease in the Ozone layer in troposphere

(3) Decrease in the Ozone layer in stratosphere (4) All of above

Ans. (3)

Sol. Ozone hole is the phenomenon of steady decline of amount of ozone in earth's stratosphere.

31. In living cells synthesis of ribonucleic acid (RNA) takes place in

(1) Cytoplasm (2) Nucleus (3) Golgibody (4) Nephron

Ans. (2)

Sol. Synthesis of RNA takes place within the nucleus of eukaryotic cells from a gene in DNA to a strand of RNA by the process of transcription

32. Deficiency of one of the under mentioned vitamins causes cracking of lips in human beings

(1) Vitamin A (2) Vitamin B2 (3) Vitamin K (4) Vitamin C

Ans. (2)

Sol. Deficiency of vitamin B-2 or Riboflavin can develop and result in symptoms that affect cracking of lips called cheilitis .

33. Insectivorous plants grow only one sun soils which are deficient in

(1) Calcium (2) Nitrogen (3) Magnesium (4) Phosphorus

Ans. (2)

Sol. Insectivorous or carnivorous plants consuming insects and other arthropods. These plants adapted to grow in places where the sail is thin or poor in nutrients, especially nitrogen.

34. What will happen to the body of an adult human being if his spleen is removed

(1) RBC production will be reduced (2) Antibodies production will be less

(3) WBC production will be less (4) Filtration of dead RBCs would not be possible

Ans. (4)

Sol. The spleen play a major role in filtration of old RBC platelets and WBC which are stored there.

35. DNA (De-oxyribonucleic acid) is not present in one of hte following

(1) Chloroplast (2) Nucleus (3) Mitochondria (4) TMV (Tobaco Mosaic Virus)

Ans. (4)

Sol. DNA is not present in TMV (Tobacco Mosaic virus), because TMV is a single stranded RNA virus.

36. Due to the discovery of one of the following in 1980, the evolution was termed as RNA world

(1) RNA present in some viruses as genetic material (2) RNA has enzymatic property

(3) RNA is found in all living cells (4) RNA is found to be associated with protein synthesis

Ans. (2)

Sol. RNA was the first molecule of heredity, so it evolved all the essential methods for storing and expressing genetic information before DNA come onto the scene. Ribozymes are RNA molecules that are capable of catalyzing specific biochemical reaction.

37. In plants, the developing embryo is nourished by endospermic tissues its cell consist of

(1) One genome (Haploid) (2) Two genomes (Diploid)

(3) Three genomes (Triploid) (4) Four genomes (Tetraploid)

Ans. (3)

Sol. The endospermic tissue is formed by the fusion of two polar nuclei and a sperm nucleus that occurs in double fertilization is seed plant which results in the formation of the endosperm and it mainly helps to nourishing the developing embryo

38. One of the following is not associated with gametogenesis:

(1) Formation of Ova (2) Formation of sperm

(3) Change of spermatids to spermatozoa (4) Release of ova

Ans. ***(4)***

Sol. Gametogenesis is the process in which cells undergo meiosis to form gametes i.e. sperm and ova.

39. The part of biosphere dominated by human beings is known as:

(1) Troposphere (2) Hemisphere (3) Stratosphere (4) Noosphere

Ans. (2)

Sol. The troprosphere is the lowest portion of earth's atimosphere and it is the region where all weather conditions takes place. Troposphere ranges about 11 km from the surface.

40. The excretory organs in the Earthworm is known as

(1)Malphigian cells (2) Renal cells (3) Nephridia (4) Flame cells

Ans. (3)

Sol. Nephridia is an excretary organ of many invertebrate animals like earthworm which acts as an organ of excretion or osmoregulation.

41. A positive integer n when divided by 9, gives 7 as remainder. What will be the remainder when $(3n-1)$ is divided by 9?

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

Ans. (2)

Sol. Let $n = 9q + 7 \Rightarrow 3n - 1 = 27q + 20$

$\Rightarrow \quad 279 + 18 + 2 = 9(3q + 2) + 2$

$\therefore \quad 3n - 1 = 9k + 2 \quad \therefore$ Remainder is 2 when $3n-1$ is divided by 9.

42. In the zeros of the polynomial $x^3 - 3x^2 + x + 1$ are $a-d$, a and $a+d$ then $(a+d)$ is :

(1)a natural number (2)an integer

(3)a rational number (4)an irrational number

Ans. (4)

Sol. Polynomials $p(x) = x^3 - 3x^2 + x + 1$.

Suppose roots of the equation α, β, γ, then $\alpha = a-d, \beta = a, \gamma = a+d$

Sum of roots $(\alpha + \beta + \gamma) = \dfrac{-b}{a}$, $(a-d)+(a)+(a+d) = \dfrac{-(-3)}{1}$

$a - d = a + a + d = 3 \Rightarrow 3a = 3 \Rightarrow a = 1 \quad \ldots(1)$

Product of roots $(\alpha\beta\gamma) = -\dfrac{d}{a}$, $(a-d)(a)(a+d) = \dfrac{-1}{1}$

$\left(1^2 - d^2\right)1 = -1 \Rightarrow 1 - d^2 = -1 \Rightarrow 1 - d^2 = -1$

$\therefore \quad d = \pm\sqrt{2}$, then $(a+d) = \left(1 \pm \sqrt{2}\right)$, which is irrational number.

43. For which value of K the system of equations $3x + y = 1$ and $(2k-1)x + (k-1)y = (2k+1)$ has no solution

(1)2 (2)+2 (3)–3 (4) +3

Ans. (2)

Sol. $3x + y = 1$

$(2k-1)x + (k-1)y = (2k+1)$

For no solution $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} \neq \dfrac{c_1}{c_2}$.

Then $\dfrac{3}{2k-1} = \dfrac{1}{k-1} \neq \dfrac{1}{2k+1}$

$\Rightarrow \quad 3k - 3 = 2k - 1 \Rightarrow k = 2$.

44. The ratio of the roots of the equation $ax^2 + bx + c = 0$ is same as the ratio of the roots of the equation $px^2 + qx + r = 0$.

If D_1 and D_2 are the discriminates of $ax^2 + bx + c = 0$ and $px^2 + qx + r = 0$ respectively, then $D_1 : D_2 =$

(1) $\dfrac{a^2}{p^2}$ (2) $\dfrac{b^2}{q^2}$ (3) $\dfrac{c^2}{r^2}$ (4)none of these

Ans. (2)

Sol. Let α_1 & β_1 be the roots of $ax^2 + bx + c = 0$

$\therefore \quad \alpha_1 + \beta_1 = \frac{-b}{a}$, $\alpha_1\beta_1 = \frac{c}{a}$, $D_1 = b^2 - 4ac$

Let α_2 & β_2 be the roots of $px^2 + qx + r = 0$

$\therefore \quad \alpha_2 + \beta_2 = \frac{-a}{p}$, $\alpha_2\beta_2 = \frac{r}{p}$, $D_2 = a^2 - 4pr$

A/q $\frac{\alpha_1}{\beta_1} = \frac{\alpha_2}{\beta_2}$

Applying componendo & dividendo, we get $\frac{\alpha_1 + \beta_1}{\alpha_1 - \beta_1} = \frac{\alpha_2 + \beta_2}{\alpha_2 - \beta_2}$

$$\Rightarrow \quad \frac{\alpha_1 + \beta_1}{\sqrt{(\alpha_1 + \beta_1)^2 - 4\alpha_1\beta_1}} = \frac{\alpha_2 + \beta_2}{\sqrt{(\alpha_2 + \beta_2)^2 - 4\alpha_2\beta_2}}$$

$$\Rightarrow \quad \frac{\frac{-b}{a}}{\sqrt{\frac{b^2}{a^2} - \frac{4c}{a}}} = \frac{\frac{-q}{p}}{\sqrt{\frac{q^2}{p^2} - \frac{4r}{p}}}$$

Squaring, we get $\frac{b^2 - 4ac}{q^2 - 4rp} = \frac{b^2}{q^2}$

$\therefore \quad D_1 : D_2 = b^2 : q^2$.

45. In a triangle PQR, $\angle R = \frac{\pi}{2}$. If $\tan\left(\frac{P}{2}\right)$ and $\tan\left(\frac{Q}{2}\right)$ are the roots of the equation $ax^2 + bx + c = 0$ $(a \neq 0)$ then

(1) $a + b = c$ (2) $b + c$ (3) $a + c = b$ (4) $b = c$

Ans. (1)

Sol. $ax^2 + bx + c = 0$, here $\tan\frac{p}{2} + \tan\frac{q}{2} = \frac{-b}{a}$ …(1)

$$\Rightarrow \quad \tan\frac{p}{2}.\tan\frac{q}{2} = \frac{c}{a} \qquad \ldots(2)$$

Now $p + q = 90° \Rightarrow \frac{p}{2} + \frac{q}{2} = 45°$

$$\Rightarrow \quad \tan\left(\frac{p}{2} + \frac{q}{2}\right) = \tan 45° \quad \Rightarrow \quad \frac{\tan\frac{p}{2} + \tan\frac{q}{2}}{1 - \tan\frac{p}{2}\tan\frac{q}{2}} = 1$$

$$\Rightarrow \quad \frac{-\frac{b}{a}}{1 - \frac{c}{a}} = 1 \quad \Rightarrow \quad \frac{-b}{a} = 1 - \frac{c}{a} \quad \Rightarrow \quad a + b = c$$

46. The sum of n terms of two series in AP are in the ratio $(3n - 13) : (5n + 21)$ then the ratio of their 24th term is :

(1) $\frac{1}{2}$ (2) $\frac{1}{4}$ (3) $\frac{2}{3}$ (4) none of these

Ans. (1)

Sol. $\frac{S_n(1)}{S_n(2)} = \frac{\frac{n}{2}\left[2a_1 + (n-1)d_1\right]}{\frac{n}{2}\left[2a_2 + (n-1)d_2\right]} = \frac{3n+13}{5n+21}$

$\therefore \quad \frac{2a_1 + (n-1)d_1}{2a_2 + (n-1)d_2} = \frac{3n-13}{5n+21} \quad \ldots(1)$

Now, we need $\frac{a_n(1)}{a_n(2)} = \frac{a_1 + 23d_1}{a_2 + 23d_2} = \frac{2a_1 + 46d_1}{2a_2 + 46d_2} \quad \ldots(2)$

Comparing (1) & (2), we get, $2a_1 + (n-1)d_1 = 2a_1 + 46d_1$

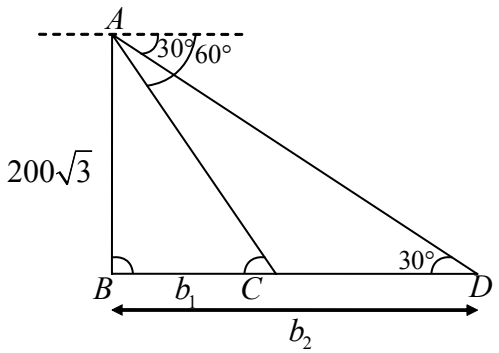
$\Rightarrow \; n = 47$, therefore, $\frac{a_n(1)}{a_n(2)} = \frac{3\times 47 - 13}{5\times 47 + 21} = \frac{128}{256} = \frac{1}{2}$

47. From the top of a hill $200\sqrt{3}$ m high, the angle of depression of a ship moving towards the hill is 30°. After 2 minutes its angle of depression becomes 60°, then the speed of the ship assuming it to be uniform is :

(1) 10 km/hr (2) 12 km/hr (3) 14 km/hr (4) 18 km/hr

Ans. (2)

Sol.



In triangle ABC , $\tan 60° = \frac{200\sqrt{3}}{b_1} \quad \Rightarrow b_1 = 200m$

$\Delta ABD, \; \tan 30° = \frac{200\sqrt{3}}{b_2} \Rightarrow b_2 = 600m$

$\therefore \quad CD = b_2 - b_1 = 400m \quad \therefore$ distance $= 400m = 0.4km$

Time $= 2\min = \frac{1}{30}$ hr

$\therefore \quad$ speed $= \frac{d}{t} = \frac{0.4}{1/30} = 12$ km/hr.

48. If $\frac{\sin(x+y)}{\sin(x-y)} = \frac{a+b}{a-b}$, then $\frac{\tan x}{\tan y} =$

(1) $\frac{b}{a}$ (2) $\frac{a}{b}$ (3) ab (4) none of these

Ans. (2)

Sol. $\dfrac{\sin(x+y)}{\sin(x-y)} = \dfrac{a+b}{a-b}$

$\Rightarrow \quad \dfrac{\sin x.\cos y + \cos x.\sin y}{\sin x.\cos y - \cos x.\sin y} = \dfrac{a+b}{a-b}$

Using componendo and dividendo, we get

$$\frac{2\sin x.\cos y}{2\cos x.\sin y} = \frac{2a}{2b} \quad \Rightarrow \quad \frac{\tan x}{\tan y} = \frac{a}{b}$$

49. What is the probability of getting a total of at least 9 in a single throw of two dice?

(1) $\dfrac{5}{18}$ (2) $\dfrac{7}{18}$ (3) $\dfrac{11}{18}$ (4) $\dfrac{13}{18}$

Ans. (1)

Sol. $n(s) = 6^2 = 36$

Favorable event $\{(3, 6), (4, 5), (4, 6), (5, 4), (5, 5), (5, 6), (6, 3), (6, 4), (6, 5), (6, 6)\}$

$n(E) = 10$

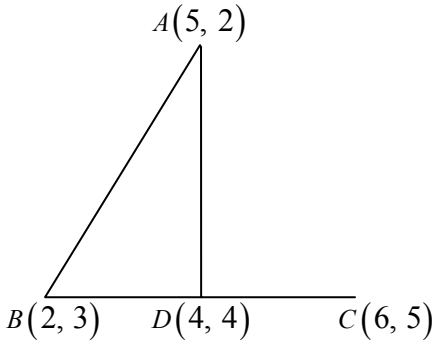
$\therefore \quad P(E) = \dfrac{n(E)}{n(S)} = \dfrac{10}{36} = \dfrac{5}{18}.$

50. Equation of the internal bisector of angle BAC of the triangle ABC whose vertices A, B and C are $(5, 2)$, $(2, 3)$ and $(6, 5)$ respectively, is :

(1) $x + 2y - 12 = 0$ (2) $2x - y + 12 = 0$ (3) $2x + y - 12 = 0$ (4) $x - 2y + 12 = 0$

Ans. ***(3)***

Sol.



Here,

$AB = \sqrt{(5-2)^2 + (2-3)^2} = \sqrt{10}$

$AC = \sqrt{(6-5)^2 + (5-2)^2} = \sqrt{10}$

$\therefore \quad ABC$ is isosceles triangle, as AD is angle bisector therefore AD is median also.

$D \equiv \left(\frac{2+6}{2}, \frac{3+5}{2}\right) = (4, 4)$, therefore equation of angle bisector is

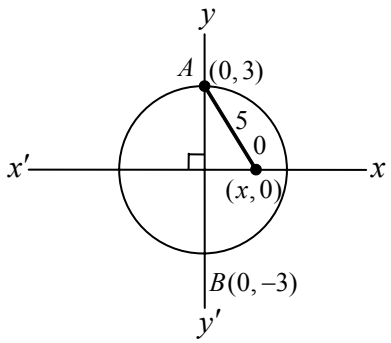
$$(y-4) = \frac{4-2}{4-5}(x-4) \quad \Rightarrow \quad 4-y = -2(x-4) \quad \Rightarrow \quad 2x+y-12 = 0 .$$

51. Equation of the circle passing through two points on y -axis at distance 3 from the origin and having radius 5, is :

(1) $x^2+y^2 \pm 16x+18=0$ (2) $x^2+y^2 \pm 12x-18=0$ (3) $x^2+y^2 \pm 4x+8=0$ (4) $x^2+y^2 \pm 8x-9=0$

Ans. ***(4)***

Sol.



$\because$ AB is chord whose perpendicular bisector is x -axis.

$\therefore$ Center lies on x -axis, let center $= (x, 0)$

Here $OA = 5 \Rightarrow \sqrt{(h-0)^2+(-3)^2} = 5^2$

$x^2+9=25 \quad \Rightarrow \quad x = \pm 4$

$\therefore$ Center $= (\pm 4, 0)$

$\therefore$ equation of circle is $(x \pm 4)^2 + (y-0)^2 = 5^2$

$\Rightarrow \quad x^2+16 \pm 8x + y^2 = 25 \quad \Rightarrow \quad x^2+y^2 \pm 8x - 9 = 0$

52. The mean of 7 numbers is 10. If the mean of first 4 numbers is 8 and that of last 4 numbers is 16 then the fourth number is :

(1) 20 (2) 26 (3) 30 (4) 36

Ans. ***(2)***

Sol. Let the numbers are $n_1, n_2, n_3 .... n_7$

$\therefore \quad n_1+n_2+n_3+n_4+n_5+n_6+n_7 = 70$ ...(1)

and $n_1+n_2+n_3+n_4 = 32$ ...(2)

also $n_4+n_5+n_6+n_7 = 64$ ....(3)

by (2)+(3), $n_1+n_2+n_3+n_4+n_4+n_5+n_6+n_7 = 32+64$

$\Rightarrow \quad (n_1+n_2+n_3+n_4+n_5+n_6+n_7)+n_4 = 96$ ....(4)

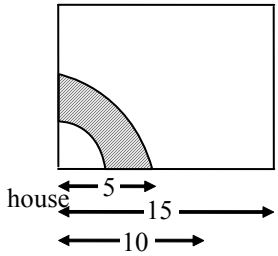
From (1) & (4), $70+n_4 = 96$, $n_4 = 26$.

53. A horse is ties to a peg at one corner of a square shaped grass field of the side 15m by means of 5m long tope. Find which one of the following is the increase in the grazing area if the rope were 10m long instead of 5m.

(1) $78m^2$ (2) $78.53m^2$ (3) $58m^2$ (4) 58.875m

Ans. ***(4)***

Sol. Required area = area of bigger quadrant



$$\frac{\frac{\pi(10)^2}{4}-\frac{\pi(5)^2}{4}}{\frac{22}{7\times4}\times75=58.9\,cm^2} \Rightarrow \frac{\pi}{4}\{100-25\}$$

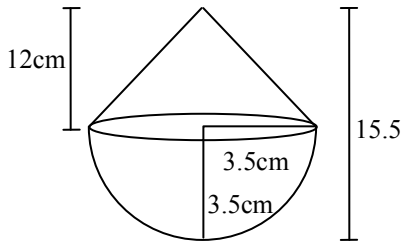
54. A toy is in the form of a cone mounted on a hemisphere of radius 3.5 cm. The total height of the toy is 15.5 cm, then the total surface area is :

(1) $220cm^2$ (2) $224cm^2$ (3) $214cm^2$ (4) $214.5cm^2$

Ans. (4)

Sol. $k =$

$$l=\sqrt{h^2+r^2}=\sqrt{12^2+3.5^2}$$



$l = 12.5\,cm$

Total square area of toy = CSA of cone + CBA of hemisphere

$$\pi rl+2\pi r^2 \quad \pi\left\{3.5\times12.5+2.(3.5)^2\right\}$$

$$\frac{22}{7}\times3.5\{12.5+2\times3.5\} \Rightarrow 11\times19.5=214.5\,cm$$

55. A hollow sphere of external and internal diameters 8 cm and 4 cm respectively is melted into a cone of base diameter 8 cm then the height of the cone is :

(1) 14cm (2) 18cm (3) 20cm (4) 28cm

Ans. (1)

Sol. Clearly, volume of hollow sphere = volume of cone

$\Rightarrow \frac{4}{3}\pi\left(R^3 - r^3\right) = \frac{1}{3}\pi \text{ (Radius)}^2 \text{ h}$

$\Rightarrow 4\left(4^3 - 2^3\right) = (4)^2 \times h \quad \Rightarrow 4 \times (64 - 8) = 16 \times h$

$\therefore \qquad h = \frac{4 \times 56}{16} = 14 \text{ cm.}$

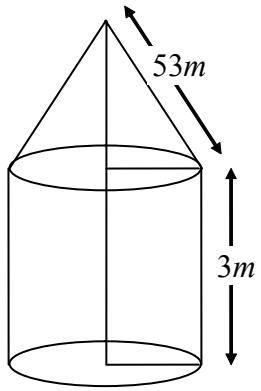
56. A circus tent is cylindrical to a height of 3m and conical above it. If its base radius is 52.5m and slant height of the conical portion is 53m then the area if the canvas required to make the ten is :

(1) 9000m^2 (2) 9700m^2 (3) 9725m^2 (4) 9735m^2

Ans. (4)

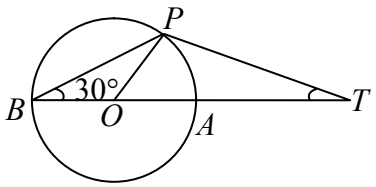
Sol. Here $r = 52.5 \text{ m}$, $h \text{ (cylinder)} = 3 \text{ m}$, $l = 53 \text{ m}$

Required area of canvas to make tent is



$= \pi r(2h + l) = \frac{22}{7} \times 52.5(2 \times 3 + 53) = 9735 \text{ m}^2.$

57. In the given fig. O is the centre of a circle, BOA is its diameter and the tangent at the point P meets Ba extended at T. If $\angle PBO = 30°$, then $\angle PTA =$



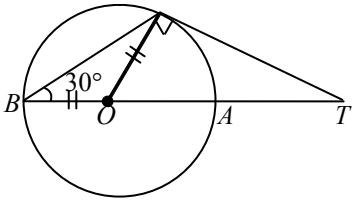
(1) 60° (2) 30° (3) 15° (4) 45°

Ans. **(2)**

Sol. $\therefore$ PT is tangent $\Rightarrow \angle OPT = 90°$

Now, ΔBPO is isosceles as $BO = PO$ (radius)

$\Rightarrow \angle BPO = 30°$



In $\Delta BPO \Rightarrow \angle BOP = 180 - 60 = 120°$

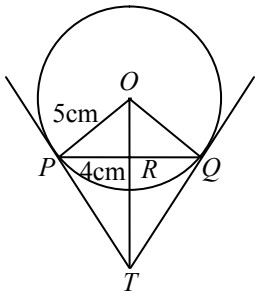
$\therefore \quad \angle POT = 180 - 120 = 60°$ (linear pair)

Now in ΔPOT, $\angle POT + \angle OPT + \angle PTO = 180°$

$\Rightarrow \quad 60° + 90° + \angle PTO = 180°$

$\therefore \quad \angle PTO = 30°$.

58. In the given fig. PQ is a chord of length 8 cm of a circle of radius 5 cm. The segment at P and Q intersect at a point T then the length of TP is :



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

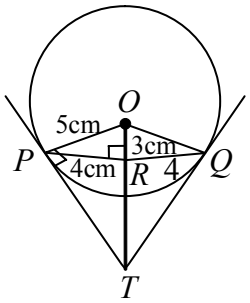
Ans. (3)

Sol. Here $PQ = 8$ cm

$\Rightarrow \quad PR = PQ = 4$ cm. Now in right ΔOPR

$OR^2 = 5^2 - 4^2 = 9$

$\therefore \quad Or = 3$. Now in ΔOPR & POT

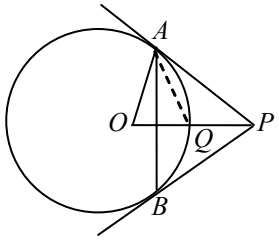


$\Rightarrow \quad \angle POR = \angle PT$ (common)

and $\angle ORP = \angle TPO(90°)$

$\therefore \quad \Delta OPR \sim \Delta OTP(AA) \quad \therefore \quad \frac{PR}{TP} = \frac{OR}{OP} \Rightarrow \frac{4}{TP} = \frac{3}{5} \Rightarrow PT = \frac{20}{3}$ cm.

59. From a point P, two tangents PA and PB are drawn to a circle $C(o, r)$. If $OP = 2r$ then ΔAPB is an



(1) Right angled triangle (2) Equilateral triangle

(3) Isosceles triangle (4) Scalene triangle

Ans. **(3)**

Sol. Here $OQ = r$ & $OP = 2r \Rightarrow QP = r$

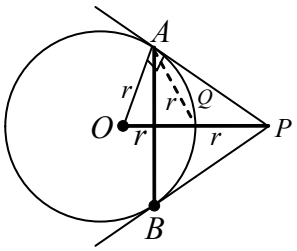
Now, $OA \perp PA$ (tangent)

$\therefore$ ΔOAP is right angled. Here Q is circumcenter of ΔOAP

Hence $AQ = OQ = QP = r$

$\Rightarrow$ ΔOAQ is equilateral $\Delta \Rightarrow \angle OAQ = 60° \Rightarrow \angle QAP = 30°$

Now by linear pair, $\angle AQP = 180 - 60 = 120°$.



$\therefore$ $\angle APQ = 30°$.

$\because$ $\Delta AOP \cong \Delta BOP$ (RHS)

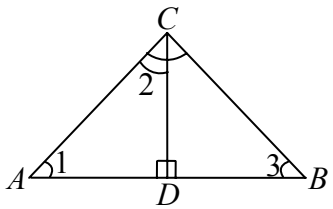
$\therefore$ $\angle APO = \angle BPO = 30° \Rightarrow \angle P = 60°$

Now ΔAPB is isosceles as $AP = PB$ (length of tangent)

& its vertical angle is 60°.

Hence ΔAPB is equilateral.

60. In a given fig. $\angle ACB = 90°$ and $CD \perp AB$ then which one of the following is true?



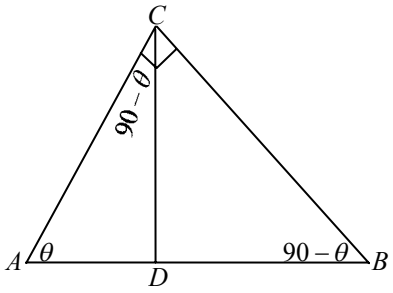
(1) $BD^2 = AD \times CD$ (2) $AD^2 = BD \times CD$ (3) $CD^2 = BD \times AD$ (4) None of these

Ans. (3)

Sol. In ΔACD, $\tan\theta = \frac{CD}{AD}$ ....(1)

In ΔCDB, $\tan(90-\theta) = \cot\theta = \frac{CD}{BD}$ ....(2)

By (1) & (2),



$\Rightarrow CD^2 = AD \times BD$.

Hence, option (3) is correct.

61. In which year Nepoleon invade Italy?

(1) 1821 (2) 1905 (3)1796 (4) 1795

Ans. (3)

Sol. *According to NCERT answers will be 1797

62. Which imperialist power dominated Vietnam?

(1) french (2) German (3) Russian (4) None of these

Ans. (1)

Sol.

63. Which of the following were precolonial parts of India?

(1) Surat and Bombay (2) Calcutta and Hooghly (3) Surat and Hooghly (4) Bombay and Calcutta

Ans. (3)

Sol.

64. Which of the following changed the formof urbanization in the modern period?

(1) capitalism (2) Socialism (3) Industrialization (4) Colonialism

Ans. (3)

Sol.

65. Mirat ul Akhbar was edited by

(1) Sir Syed Ahmed (2) Raja Ram Mohan Roy (3) Abul Kalam Azad
(4) Harish Chandra Mukherjee

Ans. (2)

Sol.

66. Who said,"Printing is the ultimate gift of God and the greatest one."?

(1) Charles Dickens (2) J. V. Scheley (3) Mahatma Gandhi (4) Charles Dickens

Ans. (4)

Sol.

67. Who authored Gitagovinda?

(1) Jayadeva (2) Mahatma Gandhi (3) Munshi Premchand (4) Chandu Menon

Ans. (1)

Sol.

68. Which of the following was the first Indian Newspaper?

(1) The Tribune (2) Times of India (3) Bengal Gazette (4) The Young India

Ans. (3)

Sol.

69. Which of the novel is not written by Rokeya Hossein?

(1)Sultana's Dream (2) Padmarag (3) Sewasadan (4) Indulekha

Ans. Select the correct answer from the following options:

(1)Only (i) and (ii) (2) Only (ii) and (iii) (3)Only (iii) and (iv) (4) All of the above

Sol. (3)

70. Who were the 'Trung Sisiters'?

(1) Writers (2) Women rebels in Vietnam (3) Actors (4) None of these

Ans. (2)

Sol.

71. Which of the following were the two most important Industrial regions of India?

(1) Punjab and United Provinces (2) Central Provinces and Bihar
(3) Bombay and Bengal (4) Bombay and Madras

Ans. (3)

Sol.

72. Who penned the following lines?

'Sarfaroshi ki tammana ab humare dil me hai,Dekhna h zor kitna baju-e-qatil me hai.

(1)Bismil (2) Raj guru (3) Bharat Singh (4) Azad

Ans. (1)

Sol.

73. The state of Awadh was annexed into British dominion in the year

(1) 1855 (2) 1854 (3) 1856 (4) 1853

Ans. (3)

Sol.

74. In which of the following countries was "Gadar party " eastablished?

(1) U.S.A (2) Germany (3) Spain (4) France

Ans. (1)

Sol.

75. Chauri Chaura is sitated in the District of :

(1) Deoria (2) Gorakhpur (3) Maharajganj (4) Kushinagar

Ans. (2)

Sol.

76. Which is the first expressway of India?

(1) Delhi-Kolkata (2) Mumbai-Pune (3) Pune-Chennai (4) Delhi-Mumbai

Ans. (2)

Sol.

77. Which of the following is abiotic resource:

(1) Coal (2) Iron-Ore (3) Petroleum (4) None of the above

Ans. (2)

Sol.

78. Which are the cereal crops

I. Rice II. Groundnut III. Wheat IV. Mustard

V. Millet

Select the correct answer from the following options:

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

Ans. (3)

Sol.

79. Where rice dominant intensive subsistence agriculture is prevalent

I. West Bengal II. Western Uttar Pradesh

IIII. Peninsular Plateau IV. Eastern Madhya Pradesh

V. Bihar

Select the correct answer from the following options:

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

Ans. ***(1)***

Sol.

80. Which are leading states of cotton Textile Industry : -

Name of states

I. Maharashtra II. Gujarat IIII. Kerala IV. Haryana

V. Tamilandu

Select the correct answer from the following options:-

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

Ans. (3)

Sol.

81. What are the Human factors for establishment of an industry:-

Factors :-

I. Labour II. Raw material III. Transport IV. Banking facilities

V. Availability of water

Select the correct answer from the following options:-

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

Ans. (2)

Sol.

82. River Barkar is a tributary of the River :

(1) Subamarekha (2) Kharkai (3) Bokaro (4) Damodar

Ans. (4)

Sol.

83. Hanuman Nagar Barrage is on the River:

(1) Kosi (2) Gandak (3) Bagmati (4) Kamla

Ans. (1)

Sol.

84. Which one of the following planets belongs to the inner planet group as well as to the superior planets group of the Solar System?

(1) Jupiter (2) Earth (3) Venus (4) Mars

Ans. (4)

Sol.

85. Read the following statements

(A) Monsoon Asia is one of the most thickly populated areas of the world

(B) Monsoon Asia is an area of only subsistence farming

(1) A is true, B is false (2) B is true, B is false (3) Both A and B are true (4) Bothe A and B are false

Ans. (1)

Sol.

86. Which places are to be connected by North-South corridor and East-West corridor:-

Name of places :-

I. Ladakh II. Srinagar III. Porbandar IV. Chennai

V. Kanyakumari VI. Ahmedabad VII. Silchar VIII. Guwahati

Select the correct answer from the following options:-

(1) I-V and III-VIII (2) II-IV and VI-VII (3) I-IV and VI-VIII (4) II-V and III-VII

Ans. (4)

Sol. North -South corridor (Uri to Kanyakumari)

East-West (Silchar to Porbandar) but in question paper Srinagar is given in north south corridor, so option with Srinagar is correct

87. Gondwana rocks are found in:

(1) Narmada Valley (2) Chambal Valley (3) Krishna Valley (4) Damodar Velly

Ans. (1)

Sol.

88. Capital of Lakshdweep is

(1) Kavaratti (2) Daman (3) Silvassa (4) Port Bilair

Ans. (1)

Sol.

89. Which of the following is the largest barley producing state in India:

(1) Rajasthan (2) Bihar (3) Uttar Pradesh (4) Punjab

Ans. (3)

Sol.

90. Sandal wood tree is most typical of which of the following forest type:

(1) Monsoon forest (2) Evergreen forest (3) Mangrove forest (4) Mountainous forest

Ans. (1)

Sol. Sandal wood is commerical crop usually grows in deciduous forest.

91. In which political system the guarantee of civil rights can be maximally ascertained

(1) Totalitarian (2) Communism (3) Monarchy (4) Democratic

Ans. (4)

Sol.

92. Which Commission recommended the establishment of the Permanent Inter-State Council?

(1) Punchhi Commission (2) Sarkaria Commission

(3) Radhakrishnan Commission (4) Moily Commission

Ans. (2)

93. Which Parliamentary Committee examines the income and expenditure in Budget?

(1) Estimate Committee (2) Public Accounts Committee

(3) Privilege Committee (4) Committee on Public Undertakings

Ans. (2)

94. On the recommendation of which committee the 73rd Constitutional Amendment Bill was passed?

(1) L. M. Singhvi Committee (2) Lyngdoh Committee

(3) P . K Thungon Committee (4) G .V .K Rao Committee

Ans. (1)

Sol. L . M Singhvi recommended the 73rd constitutional amendment bill in 1986, and the bill was passed in 1992.

95. From which of the following areas the eminent and practically experienced people are nominated as the member of Rajya Sabha?

(1) Literature (2) Science (3) Arts and Social Service (4) All of the above

Ans. (4)

Sol.

96. Which of the following is correct ?

(a) Consumer Rights was accounced

(b) Consumer Awareness movement started in America

(c) Ralph Nader was the promoter of consumer movement

(d) Lack of information is the main cause of consumer exploitation

(1) All of the above (2) Only option a and option b

(c) OPtion a,b and c (4) Option c and d

Ans. (4)

Sol.

97. Which activities come under tertiary sector (service industry)?

(1) Transport, Healthy, Dairy, Bank (2) Bank, Health, Transport, Insurance

(3) Bank, Healthy, Transport, Factory (4) Factory, Fishery, Dairy, Insurance

Ans. (2)

Sol.

98. In economics, it is generally believed that the main objective of a public sector financial company like bank is to

(1) Employ more and more people (2) Maximize that total profit

(3) Maximise total production (4) Sell the goods at subsidised rates

Ans. (2)

Sol.

99. Development means economic growth with

(1) price stability (2) social change (3) inflation (4) deflation

Ans. (2)

Sol.

100. In which state in India is the infant mortality rate lowest?

(1) Kerala (2) Bihar (3) Uttar Pradesh (4) Punjab

Ans. (1)