NATIONAL TALENT SEARCH EXAMINATION (NTSE-2019) STAGE -1 [PAPER CODE : D] STATE : HIMACHAL PRADESH

Date: 04-11-2018

Max. Marks: 100 **SOLUTIONS** **Time allowed: 120 minutes**

1. Plants adapted to low light intensity have
(1) Larger photosynthetic unit size than the sun plants
(2) Higher rate of $C0_2$ fixation than the sun plants
(3) More extended root system
(4) Leaves modified into spines

Ans. ***(1)***

Sol. Plants adapted to low light intensity have larger photosynthetic unit size than sun plants.

2. Forced deep breathing for a few minutes by a person sitting at rest may be followed by a temporary cessation of breathing. This is due to
(1) Too much oxygen in blood
(2) Too much carbon dioxide in blood
(3) Both, too much oxygen and very little carbon dioxide in blood
(4) Very little carbon dioxide in blood

Ans. ***(4)***

Sol. The most powerful stimulus to take a breath is CO_2 accumulation in your blood. By breathing deeply you seriously lower your CO_2 partial pressure in your blood, thus this stimulus for some time will be lacking, until CO_2 produced by your metabolism builds up again.

3. Suggest which among the following is not a function attributed to endoplasmic reticulum
(1) Detoxification of poisons and drugs
(2) Digestion/ejection of foreign materials outside the cell
(3) Manufacture of fat and lipid molecules
(4) Biogenesis of membranes

Ans. ***(2)***

Sol. Digestion of foreign materials outside the cell is not the function of endoplasmic reticulum.

4. In a Mendelian experiment tall pea plant bearing violet flowers was crossed with short pea plants bearing white flower. All the progeny had violet flowers, but almost half of them were short in height. The genetic make-up of the tall parents can be depicted as
(1) TTWW (2)TTww (3) TtWW (4)TtWw

Ans. ***(3)***

Sol. The genotype of tall parent with violet flower will be TtWW to produce half Tall and half short plant.

5. Some organisms are sensitive to different levels of air pollution and are used as pollution indicators. Suggest which among the following fits into this category
(1) Fungi (2) Fresh water Algae (3) Bacteria (4) Lichens

Ans. ***(4)***

Sol. Lichens are sensitive to SO_2 pollution in air.

6. Which of the following statements are true about the brain
I. The main thinking part of brain is hind brain
II. Centres of hearing, smell, memory, sight etc. are located in fore brain
III. Involuntary actions like salvation, vomiting, blood pressure are controlled by the medulla in the hind brain
IV. Cerebellum does not control posture and balance of the body.
(1) I, II, III (2) I, III, IV (3) II, III 4) III, IV

Ans. ***(3)***

Sol. Centres of hearing, smell, memory, sight etc. are located in fore brain. Involuntary actions like salivation, vomiting, blood pressure are controlled by medulla in the hind brain.

7. Which one of the following statements is not correct?
(1) In the animal of phylum porifera called sponges, the reproduction is only asexual (through budding)
(2) Many forms of coelenterate possess a hard exoskeleton of lime to form corals
(3) Animals of phylum annelida occur in moist soil, fresh water and sea
(4) In cartilaginous fish, fertilization is internal

Ans. ***(1)***

Sol. In phylum *Porifera* mode of reproduction is both sexual and asexual.

8. If kidney fails to reabsorb water then the tissues would
(1) remain unaffected
(2) absorb water from the blood
(3) take more oxygen from the blood
(4) shrink to shrivel

Ans. ***(2,4)***

Sol. If kidneys fail to reabsorb water the urine will be diluted causing polyuria, then the body tissues get dehydrated and the cell will loose water content and shrink.

9. Exact location of tricuspid valve is between
(1) left auricle and left ventricle
(2) left auricle and right auricle
(3) left ventricle and right ventricle
(4) right auricle and right ventricle

Ans. ***(4)***

Sol. Tricuspid valve is present between right auricle and right ventricle.

10. Nasal tracts is lined by
(1) Simple columnar epithelium (2) stratified columnar epitheliurn
(3) pseudostratified epithelium (4) stratified cuboidal epithelum

Ans. ***(3)***

Sol. Nasal tract is lined by pseudostratified epithelium.

11. If you are asked to classify the various algae into distinct groups, which of the following characters you should choose?
(1) Nature of stored food materials in the cell (2) Type of pigments present in the cell
(3) Chemical composition of the cell wall (4) Structural organisation of thallus

Ans. ***(2)***

Sol. Algae are classified into different groups on basis of type of pigment present in the cell.

12. Flatworms have three tissue layers and an incomplete digestive system. They are called
(1) Pseudoacoelomates (2) Acoelomates (3) Pseudocoelomates (4) Coelomates

Ans. **(2)**

Sol. Flatworms do not have coelome and are thus known as acoelomates.

13. Minamata disease is due to
(1) MIC Gas (2) Methyl Mercury (3) Lead nitrate (4) Cobalt Chloride

Ans. **(2)**

Sol. Minamata disease is due to methyl mercury poisoning.

14. Leaves of healthy potted plant are coated with Vaseline. It will lead to
(1) Low respiration (2) No photosynthesis 3) No transpiration (4) All of the above

Ans. **(4)**

Sol. As the stomata will be blocked due to vaseline there will be no gaseous exchange and no transpiration.

15. The element with atomic no. 117 would be placed in
(1) Noble gas family (2) Alkali family (3) lanthanide family (4) Halogen family

Ans. **(4)**

Sol. Element with atomic number 117 would be placed in halogen family.

16. If a gas expands at constant temperature it indicates that
(1) K.E. decreases (2) Pressure increases (3) K.E. remains same (4) No. of molecules gas increase

Ans. **(3)**

Sol. When temperature is constant, kinetic energy remains same.

17. What mass of oxygen gas is required to react completely with 5g of H_2 gas to form water (H_2O)?
(1) 20 g (2) 30 g (3) 40 g (4) 50.5 g

Ans. **(3)**

Sol. $2H_2 + O_2 \longrightarrow 2H_2O$

For 4g of H_2 gas $\longrightarrow$ oxygen gas required is 32 g.

so for 1 g of H_2 gas $\longrightarrow \frac{32}{4} = 8$g is required.

$\therefore$ For 5g of H_2 gas $\longrightarrow 8 \times 5 = 40$ g

18. Correct acidic order is
(1) HI > HBr > HCl (2) HCl = HBr > HI (3) HCl > HBr > HI (4) HI > HBr = HCl

Ans. **(3)**

Sol. When we move down the group, acidic nature decreases, so order will be HCl> HBr > HI

19. The colour of NO_2 and PbO formed when lead nitrate is heated
(1) Brown and green (2) Brown and yellow (3) Brown and colourless (4) Colourless and yellow

Ans. **(2)**

Sol. Colour of NO_2 and PbO formed when read nitrate is heated is brown and yellow.

20. If copper is kept in open air it slowly loses its shining brown surface and gains a green coating. It is due to the formation of
(1) $CuSO_4$ (2) $CuCO_3$ (3) $Cu(NO_3)_2$ (4) CuO

Ans. **(2)**

Sol. $Cu + H_2O + O_2 + CO_2 \longrightarrow CuCO_3$. $Cu(OH)_2$ green coating.

21. When a mixture of iron oxide and aluminium powder is heated intense heat is generated. This fact is made use of in which of the following?

(1) Soldering (2) Welding of steel (3) Making iron (4) Cutting of metals

Ans. ***(2)***

Sol. This is thermite process and it is highly exothermic.

22. Which is the most stable?

(1) $H_3C-\overset{\oplus}{C}H_2$ (2) $CH_3-\overset{\oplus}{C}H-CH_3$ (3) $\overset{\oplus}{C}H_3$ (4) $CH_3-\overset{\oplus}{\underset{\displaystyle CH_3}{\underset{|}{C}}}-CH_3$

Ans. ***(4)***

Sol. Tertiary carbon cation is more stable.

23. IUPAC name of compound $H-\overset{H}{\underset{H}{C}}-\overset{Cl}{\underset{H}{C}}-\overset{Br}{\underset{H}{C}}-\overset{H}{\underset{H}{C}}-H$

(1) 2 - Chloro 3-bromo butane (2) 2-Bromo 3-chloro butane

(3) 3 - Chloro 2 - bromo butane (4) 3- Bromo 2- chloro butane

Ans. ***(2)***

Sol. 2-Bromo-3- chloro Butane.

24. A mixture of sulphur and carbon disulphide is :

(1) Hetrogeneous and shows Tyndall effect (2) Homogeneous and shows Tyndall effect

(3) Hetrogeneous and does not shows Tyndall effect (4) Homogeneous and does not shows Tyndall effect

Ans. ***(4)***

Sol. Homogeneous mixture and does not show tyndall effect.

25. Which of the following are exothermic processes?

(I) Reaction of water with quick lime (II) Dilution of an acid

(III) Evaporation of water (III) Sublimation of camphor

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

Ans. ***(3)***

Sol. *Evaporation of water and sublimation of camphor are endothermic process.*

26. Which of the following weight highest?

(1) 0.5 moles of sucrose $C_{12}H_{22}O_{11}$ (2) 2 moles of of CO_2

(3) 1.5 moles of $CaCO_3$ (4) 5 moles of H_2O

Ans. ***(1)***

Sol. (1) $0.5 \times 342 = 171$ g (2) $2 \times 44 = 88$ g (3) $1.5 \times 100 = 150$ g (4) $5 \times 18 = 90$ g

27. Reaction between X and Y forms compound Z. In this reaction X looses electrons and Y gains electrons ,then which of the following property is generally not shown by Z.?

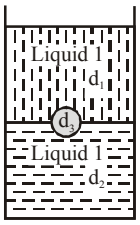
(1) Z occurs as solid (2) Z has high melting point

(3) Z has low melting point (4) Z conducts electricity in molten state

Ans. ***(3)***

Sol. *Z is ionic compound which has high melting point.*

28. A jar is filled with two non mixing liquids 1 and 2 having densities d_1 and d_2 respectively. A solid ball made of material of density d_3 is dropped in the jar. It comes to equilibrium as shown in fig. Which of the following is true for d_1, d_2 and d_3?

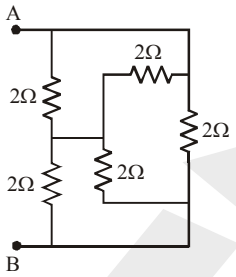


(1) $d_1 < d_2 < d_3$ (2) $d_1 < d_2 < d_3$ (3) $d_1 < d_2 > d_3$ (4) $d_1 > d_2 < d_3$

Ans. ***(2)***

Sol. The solid ball of density d_3 sinks in liquid d_1 but floats in liquid d_2. Thus, $d_1 < d_3 < d_2$.

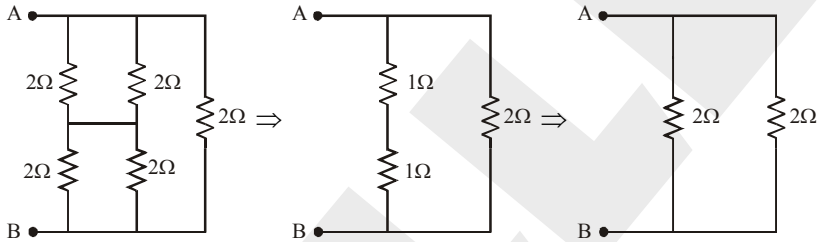
29. Equivalent resistance across A and B is



(1) 1 Ω (2) 2 Ω (3) 3 Ω (4) 4 Ω

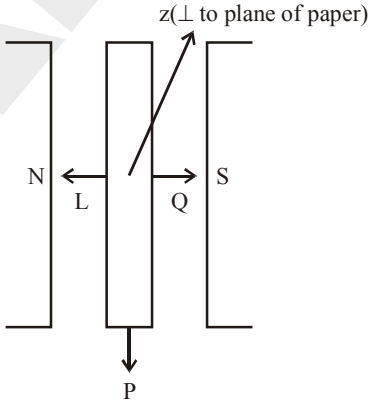
Ans. ***(1)***

Sol.



Thus equivalent resistance is 1Ω.

30. A potential difference will be induced between the ends of the conductor when conductor moves along

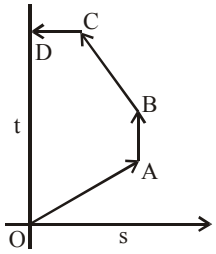


(1) along P (2) along Q (3) along Z (4) along M

Ans. ***(3)***

Sol. Along the direction of z. The motion of conductor will be perpendicular to the plane of paper to induce EMF across it.

31. Which of the following options is correct for object having a straight line motion represented by the following graph?



(1) The object moves with constantly increasing velocity from O to A. Then it moves with constant velocity.
(2) Velocity of the object increases uniformly.
(3) Average velocity is zero.
(4) The graph shown in impossible.

Ans. ***(4)***

Sol. As time cannot be negative, this graph is impossible.

32. When forces F_1, F_2, F_3 are acting on a particle of mass 'm' such that when F_2 and F_3 are mutually perpendicular then particle remains stationary. If F_1 is now removed, acceleration of the particle is

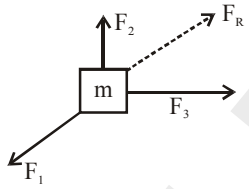
(1) F_1/m (2) F_2F_3/mF_1 (3) F_2F_3/m (4) F_2/m

Ans. ***(1)***

Sol. The resultant of forces F_2 and F_3 will be F_r as shown in figure.

$F_1 = F_r$

$\therefore a = \dfrac{F_1}{m}$

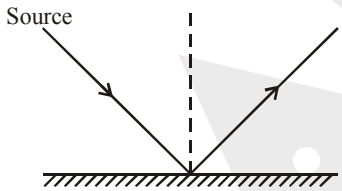


33. A ray of light travels from a light source S to an observer after reflection from a plane mirror. If source rotates in clock wise direction by 10°, by what angle and in what direction mirror must be rotated so that light still strikes the observer?

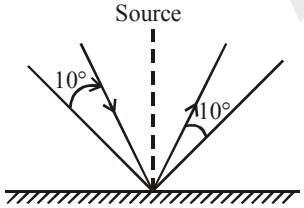
(1) 5° clock wise (2) 5 ° anti clock wise (3) 10° clock wise (4) 10° anti clock wise

Ans. ***(1)***

Sol.



Now according to question.



If the source is shifted 10° clockwise, the reflected ray shifts by 10° anti clockwise. Now to make the reflected ray be the previous, the mirror should be rotated in such a way that ray shifts by 2θ. Thus, mirror is rotated 5°C clock wise.

34. The speed of a wave in a medium is 760 m/s. If 3600 waves are passing through a point in the medium in 2 minutes then its wave length is

(1) 13.8 m (2) 41.5 m (3) 25.3 m (4) 4.2 m

Ans. ***(3)***

Sol. $\nu = \frac{\text{No. of oscillations}}{1 \text{ sec}} = \frac{3600}{120} = 30 \text{ Hz.}$

$v = \nu\lambda.$

$\lambda = \frac{v}{\nu} = \frac{760}{30} = 25.33 \text{ m}$

35. A mass of 1 kg is thrown vertically up with a velocity of 100 m/s. After 5 seconds it explodes into two parts. One part of mass 400g comes down with a velocity of 25 m/s, velocity of the other part is (Take $g = 10 \text{ m/s}^2$)

(1) 40 m/s ↑ (2) 40 m/s ↓ (3) 100 m/s ↑ (4) 60 m/s ↑

Ans. ***(3)***

Sol. $m = 1 \text{ kg}$

$u = 100 \text{ m/s}$

$t = 5 \text{ sec}$

$g = 10 \text{ m/s}^2$

$v = u + gt$

$v = 100 - (10 \times 5) = 100 - 50 = 50 \text{ m/s}$

Now According to law of conservation of momentum.

$m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2$

$1 \times 50 = \frac{400}{1000} \times (-25) + \frac{600}{1000} v_2$

$50 = -10 + 0.6\, v_2$

$v_2 = 100 \text{ m/s} \uparrow$

36. Knowing that mass of the moon is M/81, find distance of a point from moon where gravitational field due to earth and moon cancel each other. Given that distance between earth and moon = 60 R, Radius of Earth = R, Mass of Earth = M

(1) 2 R (2) 4 R (3) 6 R (4) 8 R

Ans. ***(3)***

Sol. Gravitation force due to earth on mass m

$F_1 = \frac{GMm}{(60R - x)^2}$

Gravitation force due to moon on mass m

$F_2 = \frac{GMm}{81.x^2}$

$\because F_1 = F_2$

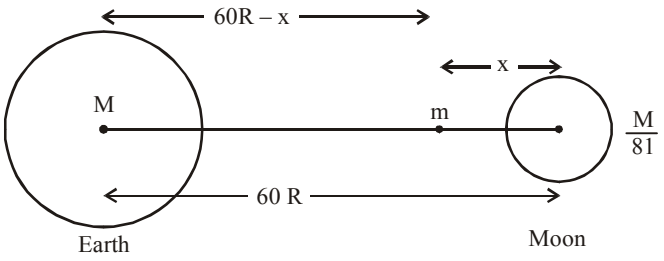
$\frac{GMm}{(60R - x)^2} = \frac{GMm}{81x^2}$

$(60R - x)^2 = 81x^2$

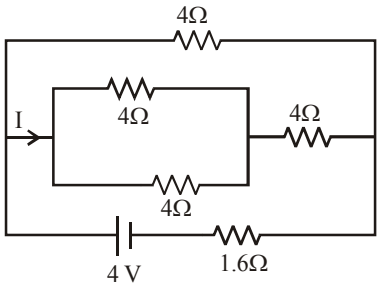
$60R - x = 9x$

$10x = 60 R$

$x = 6R$



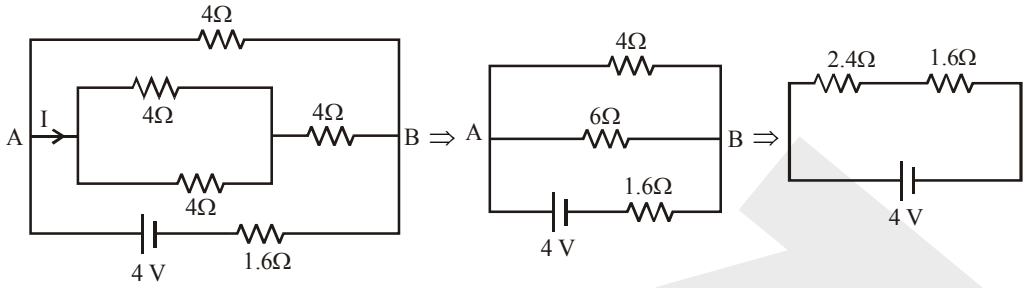
37. In the circuit shown, value of current 'I' in ampere is



(1) 1 A (2) 0.60 A (3) 0.4 A (4) 1.5 A

Ans. ***(3)***

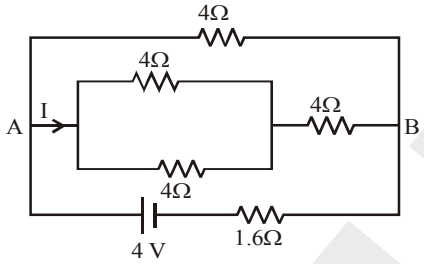
Sol.



$I_{total} = \frac{4V}{4\Omega} = 1$ Amp

Voltage drop across 1.6 Ω is 1.6 v

So voltage across terminal AB is 2.4 v



$I = \frac{V}{R} = \frac{2.4V}{6\Omega} = 0.4$ Amp

38. If an observer is moving with respect to a stationary electron then he observes

(1) Only magnetic field (2) Only electric field

(3) Both electric and magnetic field (4) None

Ans. ***(3)***

Sol. Electric field and magnetic field depends on relative motion.

39. Identify the correct statement

(1) f = R/2 for both lens and spherical mirror in general

(2) f = R/2 for only spherical mirror and not for lens in general

(3) focal length of plane mirror = 0

(4) When a convex lens of focal length 10 cm is placed in contact with concave lens of focal length 5 cm, the new focal length of combination in 5 cm

Ans. ***(2)***

Sol. $f = \frac{R}{2}$ for only spherical mirror and not for lens in general.

40. A Diwali rocket is ejecting 0.05 Kg of gases per second at a velocity of 400 m/s. What is the accelerating force on the rocket?

(1) 20 dyne (2) 20 Kg wt (3) 20 g wt (4) 20 Newton

Ans. ***(4)***

Sol. $F = \frac{\Delta P}{t} = \frac{\Delta m \times v}{t} = \frac{0.05 \times 400}{1} = 20\ N$

OR

$F = \frac{dm}{dt} \times v = 0.05 \times 400 = 20\ N$

41. $8.3\overline{1} + 0.\overline{6} + 0.00\overline{2}$ is equal to

(1) $8.9\overline{12}$ (2) $8.\overline{912}$ (3) $8.9\overline{79}$ (4) $8.97\overline{9}$

Ans. ***(4)***

Sol. $8.3\overline{1} + 0.\overline{6} + 0.00\overline{2}$

$8 + \left(\frac{28}{90} + \frac{6}{9} + \frac{2}{900}\right)$

$8 + \frac{280 + 600 + 2}{900}$

$= 8 + \left(\frac{882}{900}\right) = 8.98$

$= 8.97\overline{9}$ [$\because$ as $0.\overline{9} = 1$]

42. If p, q, r are the roots of the equation $x^3 + 5x^2 - 16x + 48 = 0$ then value of the expression $p(qr + q + r) + qr$ is

(1) 43 (2) – 32 (3) – 64 (4) 32

Ans. ***(2)***

Sol. $p + q + r = -5$

$pq + pr + rq = 16$

$pqr = -48$

Acc. to questions

$pqr + pq + pr + qr$

$(-48) + (16)$

$= -32$

43. If $f(x) = 2x + 1$ then number of real values of x for which three unequal functions f(x), f(2x), f(4x) are in G.P.

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

Ans. ***(2)***

Sol. $f(x)\, f(4x) = [f(2x)]^2$

$(2x + (1)\,(8x + (1) = (4x + (1)^2$

$\Rightarrow 16x^2 + 10x + 1 = 16x^2 + 8x + 1$

$\Rightarrow x = 0$

Only one value

44. The equation $x - \frac{2}{x-1} = 1 - \frac{2}{x-1}$ has

(1) no roots (2) one root (3) two equal roots (4) infinite roots

Ans. ***(1)***

Sol. $x - \frac{2}{x-1} = 1 - \frac{2}{x-1}$

$x = 1$

but as $x - 1$ is in denominator

$\Rightarrow x - 1 \neq 0$

$\Rightarrow x \neq 0$

No solution

45. If x is real then which equation is not possible?

(1) $\sin\theta = x + \frac{1}{x}$ (2) $\sin\theta = x^2 + \frac{1}{x^3}$ (3) $\sin\theta = x - \frac{1}{x}$ (4) $\tan\theta = x + \frac{1}{x}$

Ans. ***(1)***

Sol. $-2 \le x + \frac{1}{x} \ge 2$

but $\sin\theta \in [-1, 1]$

$\therefore$ Not possible

46. $\sec^2\theta - \tan^2\theta = 1$ is true when/for

(1) all values of θ (2) θ lies in Ist or IVth quadrant only

(3) not for all values of θ (4) always, if $\sin^2\theta + \cos^2\theta = 1$

Ans. ***(1)***

Sol. $\sec^2\theta - \tan^2\theta = 1$

applicable for all values of θ.

47. The value of $\cos 15° \cos 7\frac{1°}{2} \sin 7\frac{1°}{2}$ is

(1) $\frac{1}{2}$ (2) $\frac{1}{8}$ (3) $\frac{1}{4}$ (4) $\frac{1}{16}$

Ans. ***(2)***

Sol. $\cos15^\circ\cos7.5^\circ\sin7.5^\circ$

$\frac{1}{2}[\cos15^\circ\sin15^\circ]$ {U sing $\sin 2\theta = 2\sin\theta \times \cos\theta$}

$= \frac{1}{4}[\sin 30^\circ]$

$= \frac{1}{8}$

48. The largest common term to the sequences 1, 11, 21, 31 ..... 100 terms
31, 36, 41, 45, 46 ..... 100 terms is

(1) 381 (2) 471 (3) 281 (4) none

Ans. ***(NA)***

Sol. As second sequence give in not forming any algorithm, so we can't find largest common term.

49. The mean of the data set comprising 16 observations is 16. If one of the observations with velue 16 is deleted and three new observations 3, 4, 5 are added, then the new mean is

(1) 17 (2) 15, 8 (3) 14 (4) 16, 8

Ans. ***(3)***

Sol. $S = a_1 + a_2 + a_3 + ... + a_{16}$

$\bar{x} = \frac{S}{n}$

$16 = \frac{S}{16}$

$S = 256$

let $a_{16} = 16$

$\therefore S - 16 = a_1 + a_2 + a_3 + ...+a_{15}$

Three new observations are added.

$S - 16 + 3 + 4 + 5 = \underbrace{a_1 + a_2 + a_3 + ... + a_{15} + 3 + 4 + 5}_{18 \text{ terms}}$

$\therefore \bar{x} = \frac{Sum}{n}$

$\bar{x} = \frac{S-4}{18} = \frac{256-4}{18} = \bar{x} = 14$

50. In a hostel 60% of students read Hindi newspapers, 40% read English and 20% read both. A student is selected at random. Find the probalility that she reads neither Hind nor English newspaper.

(1) 0 (2) $\frac{1}{5}$ (3) $\frac{1}{3}$ (4) $\frac{1}{2}$

Ans. ***(2)***

Sol. Students who read Hindi news paper $= \frac{60}{100}$

Students who read English news paper $= \frac{40}{100}$

Students who read both news paper $= \frac{20}{100}$

Students who read either Hindi or English news paper $= P(H) + P(E) - P(H \cap E) = \frac{80}{100}$

Students who read neither Hindi nor English news paper $= \frac{20}{100}$

Probability of students who read neither Hindi nor English $= \frac{1}{5}$

51. A set of farmers can completely harvest a crop in 10 days. However 12 farmers fell ill and now the remaining can do this job in 15 days. Find the original no of farmers

(1) 40 farmer (2) 36 farmer (3) 27 farmer (4) 25 farmer

Ans. ***(2)***

Sol. Let x farmers complete job in 10 days

1 farmer in 10x days.

Now, x – 12 farmers complete job in 15 days

1 farmer in 15(x – 1(2)

According to question

$10x = 15(x - 1(2)$

$5x = 15.12$

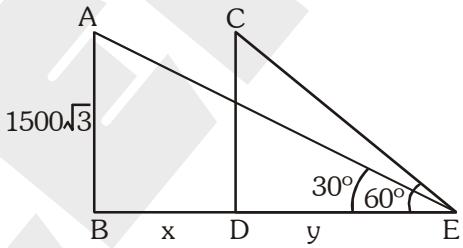
$n = 36$

52. The angle of elevation of a plane from a point on the ground is 60°. After 15 seconds flight, the elevation changes to 30°. If the plane is flying at a height of $1500\sqrt{3}$ m then speed of the plane is

(1) 200 km/h (2) 720 km/h (3) 425 km/h (4) 600 km/h

Ans. ***(2)***

Sol. In ΔABE



$$\tan 30^\circ = \frac{1500\sqrt{3}}{x+y}$$

$x + y = 4500$ ...(i)

In ΔCDE

$$\tan 60^\circ = \frac{1500\sqrt{3}}{y}$$

$y = 1500$

From (1)

$x = 3000$ m

$$\text{Speed} = \frac{3000}{15} \text{ m/s}$$

$= 200$ m/s

$$= \frac{200 \times 3600}{1000}$$

$= 720$ km/hr

53. The centroid of a triangle is (2, 4) and circumcentre is (1, 7) then find the orthocentre.

(1) 3, 1 (2) 4, – 2 (3) –2, 4 (4) –8, 4

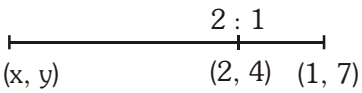
Ans. ***(2)***

Sol. Let orthocentre be (x, y)

$\frac{2+x}{3} = 2 \quad \Rightarrow 2 + x = 6 \Rightarrow x = 4$

$\frac{14+y}{3} = 4 \quad \Rightarrow 14 + y = 12 \Rightarrow y = -2$

(4, –(2)



54. Point R(h, k) divides line segment AB between axes in the ratio 1 : 2 where A lies on X-axis. Find equation of line.

(1) 2hx + ky = 3hk (2) 2hx + hy = 3hk (3) kx + hy = 2hk (4) 3Kx + hy = 2h/K

Ans. ***(2)***

Sol. $\Rightarrow R \equiv \left(\frac{2a+0}{3}, \frac{0+b}{3}\right)$

$\Rightarrow R \equiv \left(\frac{2a}{3}, \frac{b}{3}\right) = (h, k)$

$\Rightarrow a = \frac{3h}{2}, b = 3k$

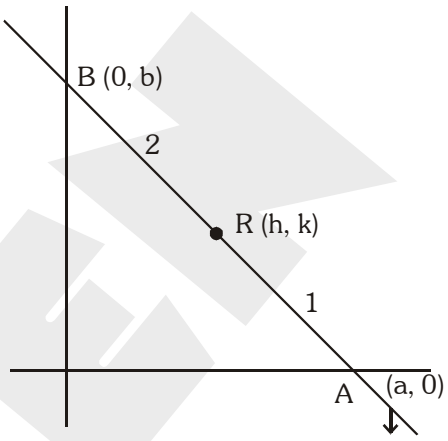
So, equation of line segment

$\Rightarrow y - 0 = \left(\frac{k-0}{h-\frac{3h}{2}}\right)\left(x - \frac{3h}{2}\right)$

$\Rightarrow y = \left(\frac{-2k}{h}\right)\left(\frac{2x-3h}{2}\right)$

$\Rightarrow hy = -2kx + 3hk$

$\Rightarrow 2kx + hy = 3hk$



55. The rartio of volume of a cube to that of a sphere which exactly fits inside the cube is

(1) π : 6 (2) π : 12 (3) 12 : π (4) 6 : π

Ans. ***(4)***

Sol. Volume of cube = a^3

Now, diameter of sphere = a

$\Rightarrow$ radius = $\frac{a}{2}$

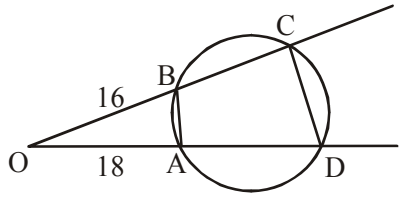
$\Rightarrow$ volume of sphere = $\frac{4}{3}\pi\left(\frac{a}{2}\right)^3$

$= \frac{4}{3}\pi\left(\frac{a^3}{8}\right)$

$\Rightarrow \frac{\pi a^3}{6}$

$\Rightarrow \frac{\text{Volume of cube}}{\text{Volume of sphere}} = \frac{a^3}{\frac{\pi}{6}a^3} = \frac{6}{\pi}$

56. In the figure below, area of triangle ΔOAB is 72 sq. units and area of triangle ΔODC is 288 sq. units. Then length of BC and AD are



(1) BC = 15 AD = 16

(2) BC = 22 AD = 12

(3) BC = 18 AD = 16

(4) BC = 20 AD = 14

Ans. ***(4)***

Sol. $\Delta OAB \sim \Delta OCD$

Also,

$$\frac{\text{Ar } \Delta OAB}{\text{Ar } \Delta OCD} = \frac{72}{288} = \frac{1}{4}$$

$$\Rightarrow \frac{1}{4} = \left(\frac{OA}{OC}\right)^2 = \left(\frac{OB}{OD}\right)^2$$

$$\Rightarrow \frac{OA}{OC} = \frac{OB}{OD} = \frac{1}{2}$$

$$\Rightarrow \frac{18}{OC} = \frac{16}{OD} = \frac{1}{2}$$

$\Rightarrow$ OC = 36, OD = 32

$\Rightarrow$ BC = 20, AD = 14

$\Rightarrow$ 4 (Ans)

57. What is the length of the longest rod which can be placed in a cube of total surface area of 216 cm^3 ?

(1) $\sqrt{18}$ cm (2) $6\sqrt{3}$ cm (3) $6\sqrt{2}$ cm (4) $3\sqrt{6}$ cm

Ans. ***(2)***

Sol. TSA of cube = 216 cm^3

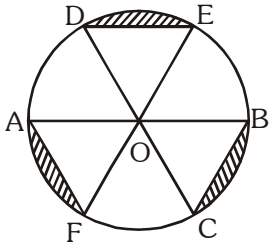
$6a^2 = 216$

$$a^2 = \frac{216}{6} = 36$$

$\therefore$ a = 6 cm

length of longest rod = $\sqrt{3}a = 6\sqrt{3}$ cm

58. In the adjoining figure O is the centre of the circle with radius r AB, CD and EF are the diameters of the circle. $\angle OAF = \angle OCB = 60°$. What is the area of the shaded region?



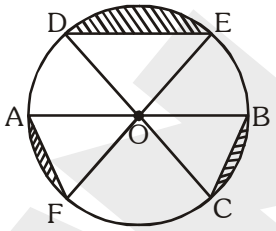
(1) $\frac{r^2}{2}\left(\pi - \frac{3\sqrt{3}}{2}\right)$ (2) $\frac{r^2}{2}\left(\pi - \frac{3\sqrt{3}}{4}\right)$ (3) $\frac{r^2}{3}\left(\pi - \frac{2\sqrt{3}}{3}\right)$ (4) data insufficient

Ans. ***(1)***

Sol. All 3Δ's AOF, BOC & DOE

for an equilateral Δ

So, area of shaded region



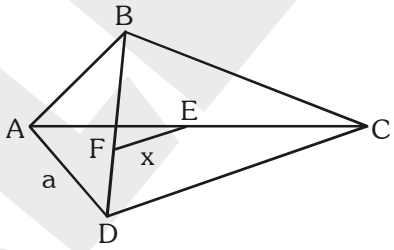
$= 3$ [area of sector – ar. of Δ]

$= 3\left[\frac{60}{360} \times \pi r^2 - \frac{1}{2} r^2 \sin 60^\circ\right]$

$= 3\left[\frac{1}{6} \times \pi r^2 - \frac{1}{2} r^2 \times \frac{\sqrt{3}}{2}\right]$

$= \frac{\pi r^2}{2} - \frac{3\sqrt{3} r^2}{4} = \frac{r^2}{2}\left[\pi - \frac{3\sqrt{3}}{2}\right]$

59. In the figure below ΔABC is a right angled triangle, ΔBDC is an equilateral triangle. E & F are the midpoints of AC and BD respectively. Then x = ?



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

Ans. ***(1)***

Sol. Let $\angle EBC = \alpha$

$\angle ECB = \alpha$ [$\because$ EB = EC = AE]

Altitudes EM & EN are drawn on BD & Cd respectively

In Δ'BMF & CNE

$\angle EMB = \angle ENC$ [Each 90°]

$\angle MBE = \angle NCE = 60 - \alpha$

BE = EC

$\Delta BME \cong \Delta CNE$ [by RHS long]

$\Rightarrow$ EM = EN [by] ....(i)

In Δ's DME & DNE

$\angle EMD = \angle END$ [Each 90°]

DE = DF [Common]

EM = EN [From (1)]

$\Delta DME \cong \Delta DNE$ [by RHS]

$\angle EDC = \angle EDB$ [by cpct] ....(ii)

In ΔBED & CED

$\angle EDC = \angle EDB$ [from (2)]

$\angle DBE = \angle DCE = 60 - \alpha$

BE = EC

$\Delta BED \cong \Delta CEF$ [AAS long]

$\Rightarrow x = a/2$

option (i) median from E on BD(x) = Median from E to DC $\left(\frac{a}{2}\right)$ [Corresponding medians of congruents ΔS]

60. PQ is a chord of length 8cm of a circle of radius 5cm. The tangent at P & Q intersect at a point T. Find the length TP.

(1) $\frac{10}{3}$cm (2) $\frac{20}{3}$cm (3) 10 cm (4) $\frac{40}{3}$cm

Ans. ***(2)***

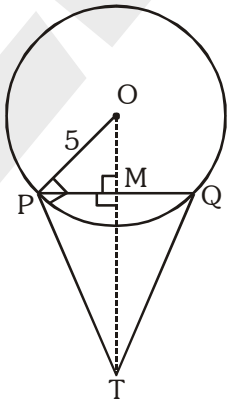
Sol. Let PT = a, MT = b

In ΔOPM

$5^2 = OM^2 + PM^2$

$\Rightarrow 25 = OM^2 + 4^2$

$\Rightarrow$ OM = 3 cm



Now, In ΔOPT

$5^2 + a^2 = (b + 3)^2$ .....(i)

Also, In ΔPMT

$a^2 = b^2 + 4^2$ .....(ii)

Putting in equation (i), we get

$25 + b^2 + 16 = b^2 + 6b + 9$

$\Rightarrow 6b = 32 \Rightarrow b = 16/3$

So, putting in equation (ii), we get

$\Rightarrow a^2 = \left(\frac{16}{3}\right)^2 + 16$

$\Rightarrow a^2 = \frac{256}{9} + 16$

$\Rightarrow a^2 = \frac{400}{9}$

$\Rightarrow a = \frac{20}{3}$ cm

61. The president of INC at the time of partition of India was

(1) C. Rajagopalachari (2) J.B. Kriplani

(3) Jawahar Lal Nehru (4) Mahatma Gandhi

Ans. ***(2)***

Sol. J.B Kriplani was the President of INC at the time of partition of India.

62. Leader of Bardoli Satyagrah 1928 was

(1) Vinobha Bhave (2) Sardar Patel (3) M.K Gandhi (4) Jawahar Lai Nehru

Ans. ***(2)***

Sol. Sardar Patel was the leader of Bardoli Satyagraha.

63. Arrange the following events of French Revolution in a chronological sequence

I) Louis XVI is guillotined

II) The Oath of the Tennis court

III) The Bastilefell

IV) French republic is declared

V) The great fear

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

Ans. ***(1)***

Sol. The oath of the Tennis Court → the Bastille Fell → The great fear → French republic is declared → Louis XVI is guillotined

64. Identify the incorrect statement

(1) Pro Tsarist were also called'greens'

(2) The secret police in Russia later on came to be known as NKVD

(3) Comintern was founded by Bolsheviks

(4) Tsar Nicholas-IInd empire included Armenia

Ans. ***(1)***

Sol. Pro Tsarists were not called Greens

65. Huyn Phu So founded

(1) Vietminh (2) Hoa Hao movement

(3) Indo Chinese Communist Party (4) NLF

Ans. ***(2)***

Sol. Huynh Phu So was the founder of Hoa Hao Movement

66. The congress held after defeat of Napolean Bonaparte headed by Duke Metternich was held at

(1) Britain (2) Russia (3) Austria (4) Germany

Ans. ***(3)***

Sol. The Congress was held at Austria

67. Give correct sequence

I) Hitler joined German worker's Party

II) Passing of the Enabling Act

III) Signing of Tripartite PACT

IV) Onset of great Economic depression

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

Ans. ***(3)***

Sol. Hitler joined the German Worker's Party → Onset of Great Economic depression → Passing of Enabling Act ' Signing of Tripartite PACT

68. 'Hind Swaraj' was written by

(1) Jawahar Lal Nehru (2) Balgangadhar Tilak (3) Sardar Patel (4) Mahatma Gandhi

Ans. ***(4)***

Sol. 'Hind Swaraj' was written by Mahatma Gandhi.

69. Which of the following decision was taken by the Indian Forest Act 1878?

(1) All forest were to be brought under the control of Forest Department

(2) Forests were to be divided into three catesories

(3) Forests were to be cleared for cultivation

(4) people's entry to all types of forest was to be restricted

Ans. ***(2)***

Sol. Forests were divided into 3 categories as per the Indian Forest Act, 1878.

70. Mugal Dynasty was to Bahadurshah Jaflfar as Lodi Dynasty was to

(1) BaliIolLodi (2) Ibrahim Lodi (3) Sikander Lodi (4) Daulat Khan Lodi

Ans. ***(2)***

Sol. Lodi Dynasty - Ibrahim Lodi

71. Identify the correct statement

I. Meyeli is a language associated with women speech in Gujrati Novels

II. Mohammad Basheer wrote mainly in Telgu

III. NavaI Kishor Press was established in Allahabad

IV. Bombay Samachar was a Gujrati News- paper

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

Ans. ***(4)***

Sol. Only Option IV is correct

72. The most effective contribution made by Dadabhai Naoroji to the cause of Indian national movment was that

I. He exposed the economic exploitation of India by the British.

II. Interpreted the ancient Indian texts and re-stored the self confidence of Indians.

III. Stressed the need for eradication of all the social evils before anything else.

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

Ans. ***(2)***

Sol. Only option 1 is correct

73. Headquarters of SAARC are situated in

(1) Kabul (2) Colombo (3) Dhaka (4) Kathmandu

Ans. ***(4)***

Sol. Headquarters of SAARC - Kathmandu

74. Who signs the one rupee note in India ?

(1) Governor of RBI (2) Finance Minister of India

(3) Finance Secretary of India (4) President of India

Ans. ***(3)***

Sol. The Finance Secretary of India signs the one rupee note in India.

75. Which of the following is an example of working capital ?

(1) Tools (2) Machines (3) Raw material (4) Building

Ans. ***(3)***

Sol. Raw material is working capital, whereas all others given here are physical capital.

76. NP-NSPE programme is basically
(1) Mission launched by Ministry of Rural Development
(2) Mid day meal scheme
(3) Unemployment based programme
(4) A Nationalised bank

Ans. ***(2)***

Sol. NP-NSPE is a mid day meal scheme

77. Underemployment occurs when
(1) People do not want to work
(2) Are not paid for their work
(3) Are not skilled
(4) Are working less than they are capable of

Ans. ***(4)***

Sol. Underemployment occurs when people are working less than they are capable of

78. A country has four groups of people. The table below shows some social indicators of their groups. Identify the group that is the most vulnerable

Group	Literacy Rate	Life Expectancy (in Years)	Unemployment rate%
A	70	80	5
B	90	82	10
E	60	75	15
D	62	76	10

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

Ans. ***(3)***

Sol. Only Option C is correct

79. In a village Bhambla, 100 families are living Forty five families work on their own piece of land, twenty families are involved in dairy farming and 35 families work in a nearby factory to earn their livelihood. What percentage of Bhambla village depends on the secondary sector?
(1) 45 (2) 55 (3) 35 (4) 20

Ans. ***(3)***

Sol. Total families - 100
Families working in dairy - 20
Families working in a factory - 35
Secondary Sector = Factory
(35/100) * 100 = 35

80. Identify incorrect stastment/stastments
I. Printing too much money leads to infaltion.
II. Before 2013 Govt, of India used to issue only two types of Ration cards, APL & BPL.
III. India has mixed economy and USA has Socialist economy.
IV. Its is worthwhile to move to Consumer Court only if the damges incurred are of highy value.
(1) I, II, III (2) II, III, IV (3) I, III, IV (4) II, IV

Ans. ***(2)***

Sol. Options II, III and IV are incorrect.

81. Prime Minister of India has to be a member of
(1) Lok Sabha
(2) RajyaSabha
(3) Either Lok Sabha or Rajya Sabha
(4) Can be a mcmberof Rajya Sabha but he/she has to get elected to Lok Sabha within six months

Ans. ***(3)***

Sol. Prime Minister can be a member of either Lok Sabha or Rajya Sabha.

82. What colours are present in the state flag of J & K?

(1) Green and White (2) Red and White. (3) Only Red (4) Green and Red

Ans. ***(2)***

Sol. Red and White are the colours in the flag of J & K.

83. Which of the following high court is recently formed ?

(1) Ultrakhand High Court (2) Chhattisgarh High court

(3) Tripura High Court (4) Sikkim High court

Ans. ***(3)***

Sol. Tripura High Court is recently formed.

84. There is no provision in the constitution for the impeachment of

(1) Chief Justice of India/Supreme Court (2) Chief Justice of High Court

(3) Governor of State (4) Vice-President of India

Ans. ***(3)***

Sol. Governor of state cannot be impeached.

85. A Panchayat Samiti at the block level is

(1) An Advisory body (2) An Administrative authority

(3) A Consultant committee (4) A Supervisory authority

Ans. ***(2)***

Sol. Panchayat Samiti at Block level is an administrative body.

86. Which of the following statements is/are correct?

I. There are eleven fundamental duties laid down in the constitution of India for even'citizen of India

II. There is no provision in the constitution of India for direct enforcement of the fundamental duties

III. No negative amendment can be done in the fundamental rights.

IV. One of the fundamental duties of every citizen of India is to cast his/her vote in general or slate election so as to maintain vibrant democracy in India.

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

Ans. ***(3)***

Sol. Option IV is incorrect.

87. Minimum number of members required to hold a meeting of Lok Sabha is

(1) At least 100 members

(2) At least one fourth of total members

(3) At least 1/10 of total members

(4) Any no. of members provided the prime minister is present

Ans. ***(3)***

Sol. Atleast 1/10th of members are required to hold a meeting of Lok Sabha.

88. What is the criterion for a political party to be recognized as National Party?

(1) In a general election of Lok Sabha or Legislative Assembly the party polls 6% of votes in four states and in addition, it wins four Lok Sabha seats.

(2) The party wins at least six Lok Sabha seals

(3) The party polls 12% votes in a general Election to loksabha

(4) The party wins at least 12 Lok Sabha seals.

Ans. ***(1)***

Sol. Only option 1 fulfills the criteria for a national party.

89. Indian state and country with largest coast line respectively

(1) Andhra Pradesh, Canada (2) Gujrat,U.S,A

(3) Gujrat, Canada (4) Andhra Pradesh, Australia

Ans. ***(2)***

Sol. Gujarat and USA have largest coastline

90. Bamboo and Teak trees are generally found in which type of forest?

(1) Alpine (2) Meditenian (3) Tropical (4) Mountain Forest

Ans. ***(3)***

Sol. Bamboo and teak are generally found in tropical forests

91. Which of the following oilseeds in India grown in both Rabi and Kharif season ?

(1) Ground Nut (2) Coconut (3) Caster seed (4) Mustard seed

Ans. ***(3)***

Sol. Castor Seed is an oil seed grown in both rabi and kharif season in India.

92. Assertion (A): Laterite the typical soil of tropical region is rich in oxides of iron and aluminium compounds

Reason (R): Heavy rainfall promotes leaching of lime and Silica content.

(1) Both A & R are correct & R is explanation of A

(2) Both A & R are correct but R is not explanation of A

(3) Only R is correct but A is incorrect

(4) Only A is correct but R is incorrect

Ans. ***(3)***

Sol. Only reason is correct

93. Minerals that lie near the surface ares simply dug out by the process known as

(1) Mining (2) Shafts (3) Drilling (4) Quarrying

Ans. ***(4)***

Sol. The process by which the minerals are dug out is called quarrying.

94. Which is the largest inhabited riverine island of the world ?

(1) Dihang (2) Majuli island (3) Moore island (4) Teesta

Ans. ***(2)***

Sol. The largest inhabited riverine island of the world is Majuli Island.

95. Which is the Shortest national highway among the following ?

(1) NH 55— Siliguri — Darjeeling (2) NH 35— Barasat — Bangaon

(3) NH41— Kolaghat-Haldia (4) NH 31 A — Sivok — Gangtok

Ans. ***(3)***

Sol. NH 41 is the shortest national highway.

96. According to census 2011, most spoken language after Hindi in India is.

(1) Marathi (2) Gujrati (3) Punjabi (4) Bengali

Ans. ***(4)***

Sol. According to census 2011, Bengali is the most spoken language after hindi in India.

97. During October, November i.e. the retreat time of monsoon the apparent movement of sun takes place towards:

(1) North (2) South (3) East (4) West

Ans. ***(2)***

Sol. During October-November the apparent movement of sun is towards south.

98. A river joined by its tributaries at approximately right angles develops the pattern

(1) Dendritic (2) Trellis (3) Rectangular (4) Radial

Ans. (3)

Sol. When the tributaries of river join the main river, at approx. right angles then it forms trellis pattern

99. The standard meridian of India does not pass through

I. U.P

II. Andhra Pradesh

III. Tamil Nadu

IV. Uttrakhand

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

Ans. (3)

Sol. Tropic of Cancer passes through UP and Andhra Pradesh among the given options.

100. Which one of the following statements is NOT correct about the shaded part on given outline of India?

(1) It is a mineral rich state.

(2) The famous gem Koh-i-noor was produced in the mines of this state

(3) The famousTirumalaTemple is situated in this state

(4) Two important rivers, the Godavari and Krishna flow through the state

Ans. (3)

Sol. The famous Tirumala temple is not situated in the shaded state.