NATIONAL TALENT SEARCH EXAMINATION (NTSE-2021) STAGE -1

STATE : KARNATAKA PAPER : SAT

Date: 25/01/2021 ***Code : K-10***

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

1. Luggage porters place a round piece of cloth on their head when they have to carry heavy loads. By doing this, the area of contact between the load and head :

(1) Decreases and reduces the pressure. (2) Increases and reduces the pressure

(3) Decreases and increases the pressure. (4) Increases as well as increases the pressure.

Ans. ***(2)***

Sol. As pressure $= \frac{\text{Thrust}}{\text{Area}}$, Placing a round piece of cloth increases the surface area, hence, decreasing the pressure

2. A boy covers a distance of 260 m in 20 s and another distance of 300 m in 20 s. The average speed of the boy is :

(1) 14 ms^{-1} (2) 28 ms^{-1} (3) 42 ms^{-1} (4) 56 ms^{-1}

Ans. ***(1)***

Sol. Average speed $= \frac{\text{Total distance}}{\text{Total time}} = \frac{260+300}{20+20} = \frac{560}{40} = 14\text{m/s}$

3. In the following, the phenomena which were successfully explained by the law of gravitation are :

(a) Motion of moon around the earth (b) Formation of tides

(c) Motion of an aeroplane (d) Force that binds us to the earth

(e) Rotation of blades in a ceiling fan

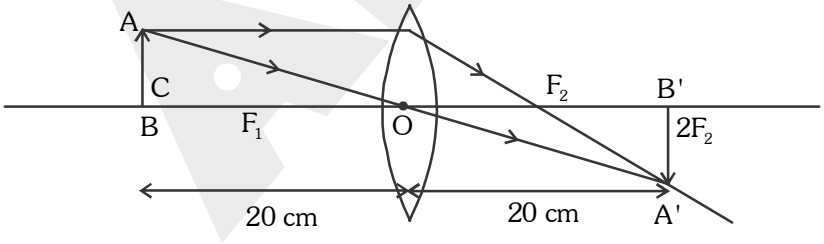
(1) b, c, d (2) d, e, a

(3) c, d, e (4) a, b, d

Ans. ***(4)***

Sol. Because of gravitational force between any two masses, the moon is binded to earth, tides are formed also because of gravitational pull of moon and also we are binded to earth for the same reason only

4. The image formation in a convex lens is shown in the following figure



AB is the object and $A'B'$ is the image. The focal length of the lens is

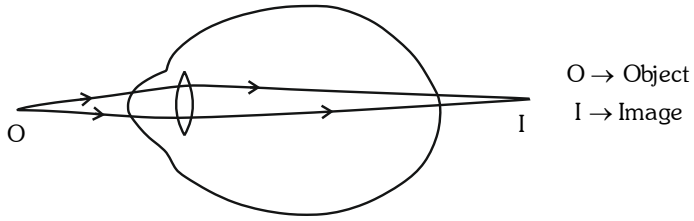
(1) 40 cm (2) 10 cm (3) 20 cm (4) 05 cm

Ans. ***(2)***

Sol. As object distance = image distance in a convex lens, the object must be placed at 2F. Given 2f = 20 cm,

$\therefore$ f = 10 cm

5. The image formation in human *eye* is shown in the given diagram.



The lens used to correct this type of *eye* defect is

(1) Plano concave lens (2) Concave lens (3) Cylindrical lens (4) Convex lens

Ans. ***(4)***

Sol. As the image is formed behind the retina a convex lens is used to correct this type of defect (Hypermetropia)

6. The lenses of power +3.5D, +2.5D and +1D are placed in contact with each other in an optical device. The *effective* power of combination of these lenses is :

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

Ans. ***(3)***

Sol. $P_{eq} = P_1 + P_2 + P_3 = +3.5 + 2.5 + 1 = +7D$

7. A force acting on a 20 kg mass changes its velocity from 6 m/s to 3 m/s. The work done by the force is

(1) + 510 J (2) – 510 J (3) – 270 J (4) + 270 J

Ans. ***(3)***

Sol. According to work energy theorm , $w = \Delta KE = \frac{1}{2}mv^2 - \frac{1}{2}mu^2$

$$= \frac{1}{2}m\left(v^2 - u^2\right) = -\frac{1}{2}m(v-u)(v+u) = \frac{1}{2}20(3-6)(3+6)$$

$$= \frac{1}{2}\times 20\times(-3)(9) = -270J$$

8. Consider the following statements and choose the correct alternative.

Statement -I: Heating capacity of bio gas is more than that of bio mass.

Statement - II: Bio gas produces lesser pollution as compared to bio mass

(1) I is false, II is true (2) I is true, II is false (3) Both I and II are false (4) Both I and II are true

Ans. ***(4)***

Sol. Bio gas has more heating capacity than bio mass and also produces lesser pollution as compared to bio mass

9. The temperature of the water at the bottom of a water fall is higher than that of the water at the top, because

(1) Falling water absorbs heat from the sun. (2) Kinetic energy of falling water is converted into heat.

(3) Water at the bottom has greater potential energy. (4) The rocks on the river bed give out heat.

Ans. ***(2)***

Sol. The kinetic energy of falling water is converted into heat because of which the temperature of the water at the bottom of a water fall is higher than that of the water at the top

10. Consider the following assertion (a) and the reason (r). Select the correct alternative

Assertion (a) : When high voltage power is supplied through a domestic wiring immediately the running television (ON condition) will burn out

Reason (r) : DP switch is fitted in domestic wiring to cut off the power supply automatically when high voltage is supplied

(1) 'a' is true and 'r' is the correct explanation to 'a'

(2) 'a' is true and 'r' is the wrong explanation to 'a'

(3) 'a' is false and 'r' is true

(4) Both 'a' and 'r' are false

Ans. ***(4)***

Sol. Both assertion and reason are false because in a domestic wiring, fuse or MCB is used as a safety device. So when high voltage power is supplied, the running television will not burn as fuse wire will melt or MCB will trip, protecting the appliances

Dp switch used in domestic wiring does not cut-off the power supply automatically when high voltage is supplied

11. A science teacher asked a student to measure potential difference across the ends of a dry cell.

The device needs to be used by the student is

(1) AC Voltmeter (2) AC Ammeter (3) DC Ammeter (4) DC Voltmeter

Ans. ***(4)***

Sol. To measure the potential difference across the ends of a dry cell a DC voltmeters needs to be used

12. Among the following, the body possessing highest momentum is

(1) Mass of 8 kg moving with velocity 6 ms^{-1}. (2) Mass of 4 kg moving with velocity 11 ms^{-1}

(3) Mass of 10 kg moving with velocity 4 ms^{-1} (4) Mass of 45 kg moving with velocity 1 ms^{-1}.

Ans. ***(1)***

Sol. Momentum = mass $\times$ velocity

So option (1) has the maximum momentum which is $P = mv = 8 \times 6 = 48kg$ m/s

13. The pole star appears to be stationary when observed from the earth. This is because pole star is

(1) Not moving.

(2) Situated in the direction of earth's axis.

(3) Moves very slowly which is not recognised by our eyes.

(4) Relative velocity of earth and pole star is zero.

Ans. ***(2)***

Sol. As the pole start is situated in the direction of earth's axis, it appers to be stationary when observed from the earth

14. Read the following and select the correct option.

Statement (a) : When we pour little petrol on our palm, it causes the palm to feel cool.

Reason (b) : Particles of petrol evaporate using the energy from our palm which causes the palm to feel cool.

(1) 'a' is correct and 'b' is not the correct reason.

(2) 'a' is correct and 'b' is the correct reason.

(3) Both 'a' and 'b' are correct but 'b' is not the reason for 'a'.

(4) 'a' is not correct so 'b' is not the correct reason.

Ans. ***(2)***

Sol. Petrol is volatile liquid. So particles of petrol evaporate by using energy from palm and causes cooling effect.

15. A solution is prepared by dissolving 60 g of sugar in 480 g of water. Concentration in terms of mass by mass percentage of the solution is :

(1) 12.5 % (2) 14.2 % (3) 16.6 % (4) 17.6 %

Ans. ***(Bonus)***

Sol. Given :

Mass of sugar (solute) = 60 g

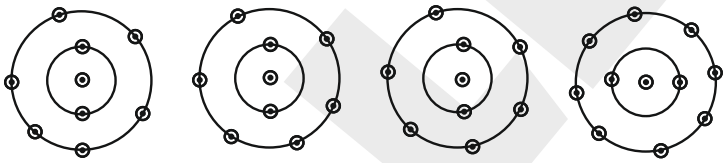
Mass of water (solvent) = 480 g

$$w/w\% = \frac{\text{mass of solute (g)}}{\text{mass of solute (g)} + \text{mass of solvent (g)}}$$

$$\Rightarrow \frac{60}{60+480} \times 100$$

$$\Rightarrow 11.11\%$$

16. Schematic atomic structure of four elements are given below. Observe and choose the right statement



(1) Atomic number of 'c' is 8. So it is inert gas.

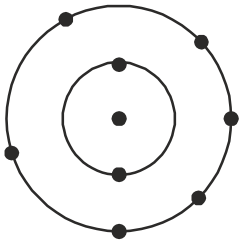
(2) 'a' is the schematic atomic structure of oxygen.

(3) 'b' has 8 electrons and it represents octet configuration.

(4) ' d' is the schematic atomic structure of sodium.

Ans. ***(2)***

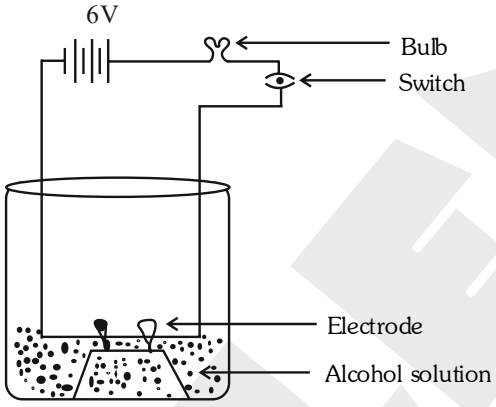
Sol.



Atomic number of oxygen = 8

Electronic configuration $\Rightarrow$ 2, 6.

17. The bulb is not glowing in this experimental setup. Because



(1) The circuit is open.
(2) The battery is not connected properly
(3) The electrodes are too short
(4) Alcohol does not conduct electricity

Ans. ***(4)***

Sol. Alcohol is organic compound which does not ionise in water. Therefore alcohol does not conduct electricity.

18. The set of products formed when electricity is passed through brine is :

(1) Cl_2, Na_2CO_3 and CO_2 (2) Cl_2, NaCl and H_2 (3) Cl_2, NaOH and H_2 (4) Cl_2, HC1 and NaOH

Ans. ***(3)***

Sol. $\underset{\text{Brine solution}}{NaCl(aq)} \longrightarrow NaOH(aq) + \underset{(\text{anode})}{Cl_2} + \underset{(\text{cathode})}{H_2}$

19. The equation of the reaction when aluminium is heated in air is given below.

$xAl + yO_2 \rightarrow zAl_2O_3$

The value of 'z' when the reaction is balanced is :

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

Ans. ***(1)***

Sol. $4Al + 3O_2 \longrightarrow 2Al_2O_3$

	Reactant	Product
Al	4×1	2×2
O	3×2	2×3

$x = 4,\ y = 3\ \&\ z = 2$

So cofficient of $Al_2O_3 = 2$.

20. Aluminium, Copper, Calcium and Lead metals when kept in decreasing order of their reactivity is :

(1) Al > Pb > Cu > Ca (2) Cu > Ca > Al > Pb (3) Ca > Al > Pb > Cu (4) Pb > Ca > Cu > Al

Ans. ***(3)***

Sol. Ca > Al > Pb > Cu

According to chemical reactivity series.

21. Dilute HCl is taken in a test tube and pieces of copper turnings were added. The change you may observe is

(1) Formation of bubbles and temperature rises. (2) Neither formation of bubbles nor rising of temperature.

(3) No formation of bubbles but temperature rises. (4) Formation of bubbles, but temperature remains same

Ans. ***(2)***

Sol. Dil. HCl does not react with copper.

Because it cannot displace hydrogen from dil. HCl.

22. Observe the following chemical equation of carbon compound.

$$CH_3Cl + Cl_2 \xrightarrow[\text{of sunlight}]{\text{In presence}} \boxed{x} + HCl$$

Name of the chemical reaction and the product 'x' respectively

(1) Oxidation reaction and CH_2Cl (2) Combustion reaction and CH_2Cl_2

(3) Substitution reaction and CH_2Cl_2 (4) Addition reaction and CH_2Cl

Ans. ***(3)***

Sol. $CH_3 - Cl + Cl_2 \xrightarrow{\text{Sunlight}} CH_2Cl_2 + HCl$

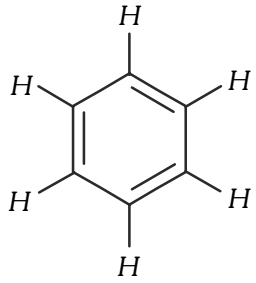
* Substitution reaction.

23. Number of covalent bonds present in benzene is

(1) 12 (2) 9 (3) 18 (4) 15

Ans. ***(4)***

Sol.



Number of covalent bonds = 15.

24. To convert the structural formula of ethane into ethanol, changes to be done with ethane are, remove:

(1) One hydrogen and add "OH" group (2) Two hydrogen and add "OH" group

(3) One hydrogen and add "CHO" group. (4) Two hydrogen and add "COOH" group.

Ans. ***(1)***

Sol. $CH_3 - CH_3 \xrightarrow[+OH]{-H} CH_3 - CH_2 - OH$

25. An element 'P' which belongs to 13^{th} group of periodic table and another element 'Q' belongs to 16^{th} group. The formula of the compound formed if they react with each other is

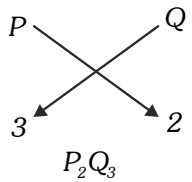
(1) P_3Q_2 (2) PQ_3 (3) P_2Q (4) P_2Q_3

Ans. ***(4)***

Sol. 'P' belongs to 13^{th} group so valency of P = 3

'Q' belongs to 16^{th} group so valency of Q = 2

Criss cross method



26. Elements with atomic numbers 7, 15, 33 and 51 belongs to same group in the periodic table. Because they have same number of:

(1) Protons (2) Valence Electrons (3) Electrons (4) Neutrons

Ans. ***(2)***

Sol. Elements in particular group have same electronic configuration of outermost orbit, so elements have same valence electrons in a group.

27. A few dried raisins are put in water for some time and then placed inside the concentrated salt solution. What we observe is, raisins :

(1) Shrink in water and swell in salt solution due to diffusion.

(2) Shrink in water and swell in salt solution due to endocytosis.

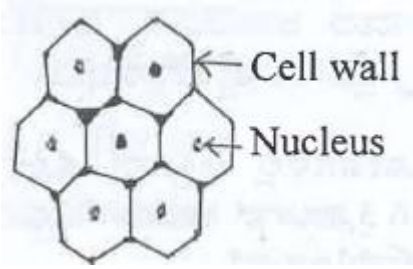
(3) Swell in water and shrink in salt solution due to osmosis.

(4) Shrink in water and swell in salt due to plasmolysis.

Ans. ***(3)***

Sol. Raisins when exerted in water would undergo endosmosis and hence would swell and when placed in salt solution would undergo exosmosis and hence would shrink

28. Observe the given diagram and read the following statements.



(i) These are cells of collenchyma tissue.

(ii) At maturity these cells lose their nucleus and cytoplasm.

(iii) The cells are living and thick at their corners.

(iv)This tissue gives flexibility to plant parts.

Correct statements are :

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

Ans. ***(1)***

Sol. Collenchyma is the living mechanical tissue as it provides flexibility and elasticity to the plant. The plant bends without breakage sue to collenchyma. The cells are elongated and have differential thickening at the corners of the cell wall due to the deposition of pectin.

29. The correct sequence of number of chambers of heart in crocodile, frog, man and fish is :

(1) 3, 3, 4 and 2 (2) 4, 3, 4 and 2 (3) 4, 2, 4 and 2 (4) 3, 2, 4 and 2

Ans. ***(2)***

Sol. The chambers of heart in crocodile are 4, frog is 3, man in 4 and fish is 2.

30. The function of finger like projections called "villi" in small intestine is to :

(1) Supply the digested food to each and every cell of the body.

(2) Separate the water from undigested food.

(3) Convert the glucose into carbohydrates.

(4) Increase the surface area for absorption of digested food.

Ans. ***(4)***

Sol. The villi and microvilli present in the small intestine increase the surface area for the absorption of digested food.

31. Because of lack of oxygen in muscle cells, 3 carbon molecule pyruvate is converted into :

(1) Lactic acid (2) Ethanoic acid (3) Hydrochloric acid (4) Acetic acid

Ans. (1)

Sol. During excessive and rigorous exercise the muscle cells shifts from aerobic respiration to lactic acid fermentation due to limited supply of oxygen. In lactic acid fermentation the pyruvate produced during glycolysis is converted into lactic acid with the help of the enzyme lactate dehydrogenase.

32. The correct statement which explains the structure of veins is :

(1) Thick walled and valves are absent, (2) Thin walled and valves are absent.

(3) Thin walled and valves are present. (4) Thick walled and valves are present.

Ans. (3)

Sol. The veins are thin walled and have valves to prevent the backflow of blood.

33. The correct pathway of conduction of impulses through a neuron is :

(1) Nerve ending $\rightarrow$ dendrites $\rightarrow$ axon $\rightarrow$ synapse.

(2) Dendrites $\rightarrow$ cell body $\rightarrow$ axon $\rightarrow$ nerve ending.

(3) Axon $\rightarrow$ cell body $\rightarrow$ dendrites $\rightarrow$ synapse.

(4) Synapse $\rightarrow$ axon $\rightarrow$ dendrites $\rightarrow$ cell body.

Ans. (2)

Sol. The nerve impulse is conducted from dendrite to cell body to axon and to nerve endings in a neuron.

34. Identify the relationship between the first two words and suggest the suitable word for the fourth place related to the third word.

Adrenal gland: Adrenalin :: Pancreas: ————

(1) Oestrogen (2) Thyroxin (3) Insulin (4) Testosterone

Ans. (3)

Sol. The adrenal gland produces the hormone adrenalin and similarly pancreas produces the hormone insulin.

35. Pair of an organism and its asexual method of reproduction is given below. Choose the correct pair :

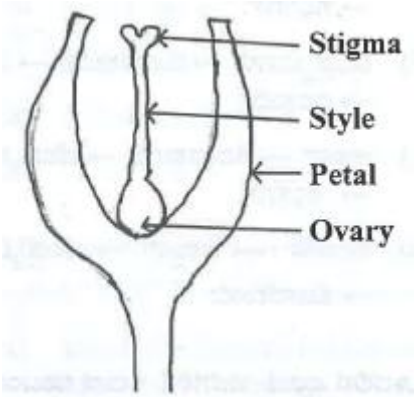
(1) Amoeba - Regeneration (2) Bryophyllum - Vegetative reproduction

(3) Yeast - Fragmentation (4) Leishmania - Budding

Ans. (2)

Sol. Amoeba undergoes binary fission, yeast undergoes budding, Leishmania undergoes longitudinal binary fission and Bryophyllum undergoes vegetative propagation by leaves.

36. Observe the diagrammatic representation of longitudinal section of the flower. Select the correct statement:



(1) Unisexual flower which has only pistil and performs cross pollination.

(2) Bisexual flower which has only stamen and performs self pollination.

(3) Unisexual flower which has only stamen and performs cross pollination.

(4) Bisexual flower which has only pistil and performs self pollination.

Ans. ***(1)***

Sol. It is a unisexual flower which contains only the female reproductive structure pistil.

37. The advantage of secretions of prostate gland and seminal vesicles to sperms is :

(1) Maintain a fixed temperature to their survival.

(2) Help them to produce certain hormones and enzymes.

(3) Provide nutrition and made transport easier.

(4) Assist them to remove wastes and provide protection.

Ans. ***(3)***

Sol. Secretions of prostate gland and seminal vesicle provides nutrition to the sperms and assist in their transport.

38. Read the following statements about the use of coal and petroleum as energy sources.

(i) These are energy sources formed from bio mass.

(ii) Inexhaustible energy sources when used continuously.

(iii) On combustion release oxides of sulphur and nitrogen.

(iv) Clean and eco-friendly sources of energy.

Correct statements are :

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

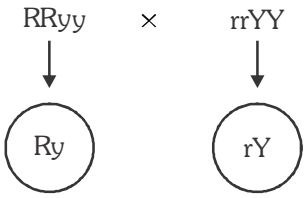
Ans. ***(1)***

Sol. The coal and petroleum is produced from biomass by decomposition. It releases oxides of sulphur and nitrogen upon combustion. These are exhaustible resources and are not clean and eco-friendly as these causes pollution.

39. If a round, green seeded pea plant (RRyy) is crossed with wrinkled, yellow seeded pea plant (rrYY) the seeds produced in F_1 generation are :

(1) Rounded green (2) Wrinkled green. (3)Wrinkled yellow. (4) Rounded yellow.

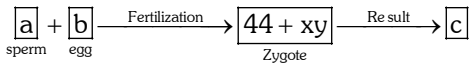
Ans. ***(4)***



Sol.

Round Yellow

40. Flow chart of sex determination in humans is given below. Information to be fiiled in the blanks a, b and c respectively are:



(1) a = 22 + y,b = 22 + x,c = Boybaby

(2) a = 22 + x, b = 22 + x, c= Girl baby

(3) a = 22 + y,b = 22 + x, c = Girl baby

(4) a = 22+x,b = 22 + y,c = Boy baby

Ans. ***(1)***

Sol. The sperms and egg cell are haploid cells. They fuses to form a diploid zygote. The male has XY chromosome and the female has XX chromosome . the zygote formed here is 44 + XY hence it would be male / boy as only males carry the Y chrosome.

41. Choose the correct statements related to Ryotwari system :

(a) The charge of collecting the revenue and paying it to the company was given to the village headman.

(b) Alexander Reed introduced it in Baramahal Region.

(c) Farmer had to pay 50% of the produce as revenue to the Government.

(1) a only (2) b and c only (3) a and b only (4) a, b and c only

Ans. ***(2)***

Sol. In Ryotwari system, there were no middle men to collect the revenue. The East India company and the farmers were directly linked.

42. In List - A Mahajanapadas and in List - B their Capitals are given. Write the correct option by matching them :

List - A	List - B
a. Anga	i. Saketha
b. Kashi	ii. Kushinagara
c. Kosala	iii. Champa
d. Malla	iv. Varanasi
	v. Kausambi

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

Ans. ***(2)***

Sol. Mahajanapadas were sixteen kingdoms that existed in northern ancient India from the sixth to fourth centuries BCE. Here we have the Mahajanapadas with their capital.

a. Angra–Champa(iii)

b. Kashi–Varanasi(iv)

c. Kosala–Saketha(i)

d. Malla–Kushinagara(ii)

43. Select the correct chronological order of wars :

(1) The first Anglo-Sikh war, The second Anglo-Marata war, The second Anglo-Mysore war, The third Carnatic war.

(2) The first Anglo-Sikh war, The second Anglo-Mysore war, The third Carnatic war, The second Anglo-Marata war.

(3) The second Anglo-Marata war, The third Carnatic war, The first Anglo-Sikh war, The second Anglo - Mysore war.

(4) The third Carnatic war, The second Anglo-Mysore war, The second Anglo-Marata war, The first Anglo Sikh war.

Ans. (4)

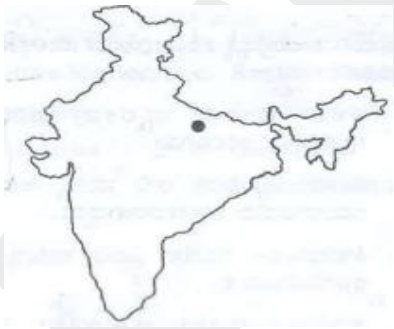
Sol. The third Carnatic war–1756

The second Anglo-Mysore war–1780

The second Anglo-Marata war–1803

The first Anglos Sikh war.–1845

44. Observe the location on the map of India and choose the correct incident related to it.



(1) The declaration of complete independence.

(2) The Chauri-Chaura incident.

(3) Champaran movement began.

(4) The first session of Indian National Congress.

Ans. (2)

Sol. Chauri-Chaura is at Gorakpur in Uttar Pradesh. The location indicates same

45. Read the following statements, choose the wrong options :

i. The facility of giant granaries was made throughout the kingdom -Aztec Civilization.

ii. The rich were electing an administrator named 'Archon' -Greek Civilization.

iii. Used their wealth and power to make their life luxurious in the capital - Inca Civilization.

iv. Fought for the control of fertile area, Sicily for 118 years - Roman Civilization.

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

Ans. (3)

Sol. The facilty of giant granaries was made throughout the Kingsom. This statement is true relation to Inca civilization, not Aztec. Option –ii and iv are wrong.

46. Identify the statement that is ***NOT*** related to Bahamani Kingdom :

(1) Asar Mahal was one of the important monuments. (2) Mir Syed Ali and Abdul Samad were the artists.

(3) Kitab-E- Navras, a literary work was written. (4) Shiabuddin Ahmed shifted his capital.

Ans. (2)

Sol. Mir Syed Ali and Abdul Samad were Persian artists. They were not related to Bahamani Kingdom

47. Read the statements and find out to who do they belong to :

i. He took Deeksha from Govindabhatta.

ii. His Tatvapadas include Kalaga pada, Alaavi pada and Sawal Jawab Pada.

(1) Chaithanya (2) Kanakadasa (3) Shishunal Shariffa (4) Guru Nanak

Ans. (3)

Sol. Shishunal Shariffa was influenced by Philosophies of varies religions. He took deeksha from Govindabhatta. He wrote several Tatvapadas meaning moral poems

48. The List - A contains the names of poets and the List - B with their works. Select the correct answer from the code given below.

List-A	List - B
a. Sree Purusha	i. GadyaChintamani
b. Vadiba Simha	ii. Raghava Pandaviya
c. Durvinita	iii. Gajashastra
d. Hemasena	iv. Gajastaka
	v. Shabdavathara

Codes:

	a	***b***	***c***	***d***
(1)	i	iii	v	iv
(2)	ii	v	iv	iii
(3)	iv	i	ii	v
(4)	iii	i	v	ii

Ans. (4)

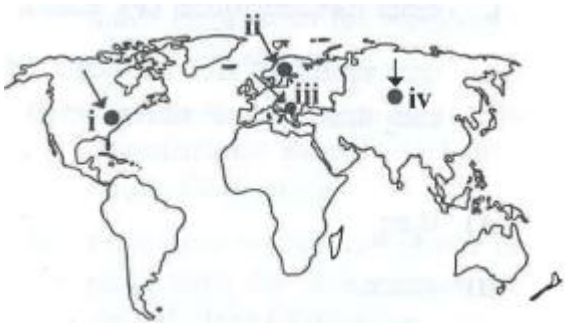
Sol. Sree Purusha wrote Gajashastra

Vadiba Simha wrote GadyaChintamani

Durvinita wrote Shabdavathara

Hemasena wrote Raghava Pandaviya

49. Select the order of events related to the world starting from West to East as shown in the world map.



a. A Newspaper by name 'Resarjimento' was published.

b. People revolted against Czar in the year 1905.

c. 'Blood' and 'Iron' policy was adopted.

d. Thirteen colonies were declared independent.

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

Ans. ***(1)***

Sol. The Newspaper by name 'Resarjimento' was published in Italy a–iii

People revolted against Czar in Russia b–iv

'Blood' and 'Iron' policy was adopted by Bismark in Germany c–ii

Thirteen American colonies were declared independence in 1776 d–i.

50. Arrange the following rivers in a correct sequence as given in the map.

(1) (a) - Chambal (b) - Yamuna (c) - Ghaghra (d) - Sone

(2) (a) - Yamuna (b) - Chambal (c) - Sone (d) - Ghaghra

(3) (a) - Ghaghra (b) - Betwa (c) - Gomati (d) - Kosi

(4) (a) - Betwa (b) - Ganga (c) - Rihand (d) - Sharda

Ans. ***(2)***

Sol. Map ans (2)

51. Match the Column-A with Column-B and choose the correct answer.

Column - A(Ports)	Column - B(States)
a. Nhava Sheva	i. West Bengal
b. Tuticorin	ii. Tamilnadu
c. Paradip	iii. Odisha
d. Haldia	iv. Andhra Pradesh
	v. Maharashtra

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

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

Ans. ***(2)***

Sol. a. Nhava Sheva - Maharashtra

b. Tuticorin - Tamil Nadu

c. Paradip - Odisha

d. Haldia - West Bengal

52. Read the statements and choose the correct option:

Assertion-(a) : During winter season, India gets oblique rays of the sun.

Reason - (r) : The rays of the sun fall vertically over the Southern hemisphere during this season.

(1) Both 'a' and 'r' is correct 'r' is the correct explanation of 'a'.

(2) Both 'a' and 'r' are correct 'r' doesn't explain 'a'.

(3) 'a' is true and 'r' is false.

(4) 'a' is false and 'r' is true.

Ans. ***(1)***

Sol. During winter season, India gets oblique rays of the sun as it falls vertically over the southern hemisphere during this season.

A and R are correct, R explains A.

53. Read the following statements and select the correct answer:

(i) It forms from the weathering of Granite and gneiss rocks.

(ii) It has more sandy and less clayey composition.

(iii) It does not retain moisture.

(iv) Total area covered in India about 5.2 lakh sq. kms.

(1) Red soil (2) Black soil (3) Laterite soil (4) Alluvial soil

Ans. ***(1)***

54. Identify the correct group related to the local names of 'Primitive Subsistence Farming' in India:

(1) Milpa, Andhis, Masole, Ray.

(2) Jhumming, Andhis, Kalabaisaki, Kuruva.

(3) Andhis, Kalabaisaki, Coffee Blossom, Mango showers.

(4) Bewar, Podu, Koman, Khil

Ans. ***(4)***

55. Match List-I with List-II. Select the correct answer from the code given below:

List I	List - II
a. Vulnerable species	i. Nicobar Pigeon
b. Rare species	ii. Blue sheep
c. Endemic species	iii.Asiatic cheetah
d. Extinct species	iv. Wild Asiatic buffalo

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

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

Ans. ***(3)***

Sol.

a.	Vulnerable species	ii) Blue Sheep
b.	Rare species	iv) Wild Asiatic buffalo
c.	Endemic species	i) Nicobar region
d.	Extinct species	iii) Asiatic cheetah

56. Read the description and choose the correct answer:

i. It is a joint venture of Punjab, Haryana and Rajasthan.

ii. It is built across River Sutlej.

iii. It is 226 mts. high and is a highest straight gravity dam in India.

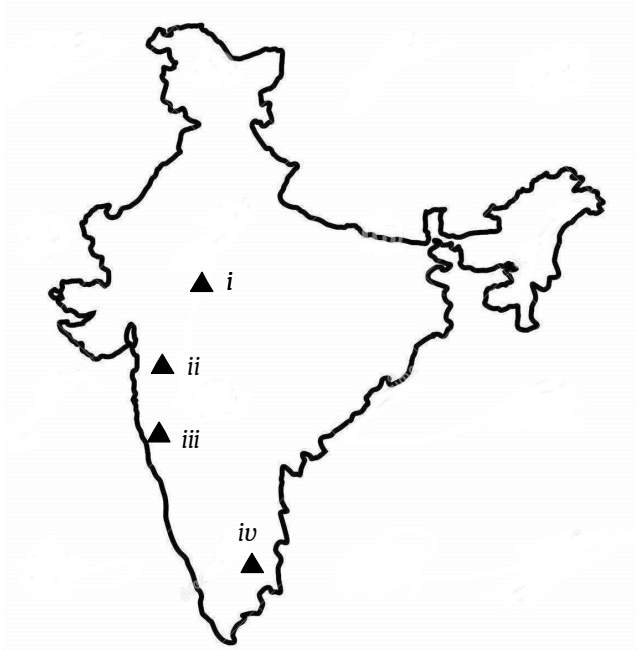
iv. It has four power projects (houses).

(1) Hirakud project (2) Bhakra Nangal project

(3) Rihand Valley project (4) Damodar Valley project

Ans. ***(2)***

57. Identify the correct sequence of nuclear power plants on the map of India.



(1) i-Tarapur, ii-Rawath Bhata, iii-Kalpakkam, iv-Kakrapara

(2) i-Kakrapara, ii-Tarapur, iii-Rawath Bhata, iv-Kalpakkam

(3) i-Rawath Bhata, ii-Kakrapara, iii-Tarapur, iv-Kalpakkam

(4) i-Kakrapara, ii-Rawath Bhata, iii-Kalpakkam, iv-Tarapur

Ans. ***(3)***

Sol. i - Rawath Bhata is in Rajasthan

ii - Kakrapara is in Gujarat

iii - Tarapur is in Maharashtra

iv - Kalpakkam is in Tamil Nadu

58. Read the following statements:

(i) Delhi, Kolkata, Chennai and Mumbai cities are linked by six lane highways.

(ii) Srinagar to Kanyakumari linking North to South.

(iii)Silchar and Porabander connects East to West.

(iv) The major objective is to reduce the time and distance between the mega cities.

The above statements refer to :

(1) National Highways

(2) Border Roads

(3) State Highways

(4) Golden Quadrilateral super highways

Ans. ***(4)***

Sol. Golden quadrilateral super highways join the major cities from North to South and from west to east of our Country.

59. Select the correct group of iron ore producing areas:

(1) Koraput, Kalahandi, Shivamogga, Palamao

(2) Singhbhum, Balghat, Chitradurga, Saraguja

(3) Sundergad, Bastar, Singhbhum, Cuttack

(4) Bastar, Gaya, Salem, Bhavanagar

Ans. ***(1)***

60. The List -A contains the laws and the List-B with their year of implementation. Choose the correct option that matches exactly.

List - A	List - B
a. Minimum wages act	i. 1956
b. Prevention of unethical activities act	ii. 1993
c. Prohibition of bonded labour act.	iii.2005
d. Human Rights protection act	iv. 1976
	v. 1948

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

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

Ans. ***(3)***

Sol. a) Minimum wages Act - 1948 (v)

b) Prevention of unethical activities Act - 1956 (i)

c) Prohibition of bonded labour Act - 1975 (iv)

d) Human rights protection Act - 1993 (ii)

61. The correct group of statements related to fundamental duties is:

a. Fundamental duties are delineated in article 51 'A'.

b. 11 fundamental duties have been delineated in the 3rd chapter of our constitution.

c. 10 fundamental duties were included as per 42nd amendment in the year 1976.

d. Through the 86^{th} amendment to the constitution in 2002, 11^{th} fundamental duty was included

(1) Only a, b and d (2) Only a, c and d

(3) Only a, b and c (4) Only c and d

Ans. ***(2)***

Sol. 11 Fundamental duties have been delineated in the 4^{th} chapter of Indian constitution.

62. Read the following statements and write the correct option with which all those links.

a. It came into existence on 1st April 1974.

b. It functions under the High court.

c. It takes up crimes like murder, robbery, dacoity etc.

d. It is also known as District Magistrate court.

(1) Civil Court (2) Commissioner's Court

(3) Tahashildar Court (4) Criminal Court

Ans. ***(4)***

Sol. Civil court deals with property, land and marriage.

Commisioner's court accepts appeals against judgements of the distinct magistrate.

Tahasildar court is the lowest court among Revenue courts, land tax and land records.

Criminal court deals with murder robbery, dacoity.

63. Choose the correct sequence to indicate the following statements as True (T) or False (F).

a. Food and Agriculture organisation was born in 1945.

b. World Health Organization's head office is in Geneva.

c. UNICEF recieved Noble Prize in the year 1965.

d. The head office of International Labour Organization in Geneva.

(1) TTTT (2) FTFT (3) TTFF (4) TFTF

Ans. (1)

Sol. All are true.

64. Identify the correct chronological sequence in which the following became the Secretary General of the UNO:

i. U.Thant ii Kurt Waldheim iii. Boutros Boutros Ghali iv. Javier Perez de Cuellar

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

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

Ans. (3)

Sol. (1) U. Thant was the Secretary General of UNO from 1961 - 1971

(2) Kurt Waldheim - 1972 - 1981

(3) Javier Perez de Cuellar - 1982 - 1991

(4) Boutras Boutros Ghali - 1992 - 1996

65. Identify the correct statements related to the current account:

(i) It is opened by businessmen who have a large number of regular transactions.

(ii) It includes deposits, withdrawals and contra transactions.

(iii) In current account, amount can be deposited only one time in a day.

(iv) Generally banks do not give any interest on these deposits.

(1) Only, i, ii and iii are correct (2) Only ii, iii and iv are correct

(3) Only i, ii and iv are correct (4) Only i and ii are correct

Ans. (3)

Sol. Current account is for businessmen, they can deposit and withdraw money any number of times in a day.

66. Read the given statements and identify the correct option related to them.

i. It came into existence on 1st January 1995.

ii. At present 164 countries of the world are its members.

iii. The members meet once in two years to take decisions.

iv. It is the only global international organization dealing with the rules of trade between nations.

(1) InternationalBankfor Reconstruction and Development.

(2) United Nations Conference on Trade and Development

(3) International Monetary Fund,

(4) World Trade Organization

Ans. ***(4)***

Sol. World Trade Organization

67. Read the given statements and select the correct answer :

Assertion (a) : Journal is called the book of original entry

Reason (r) : The full particulars of the transactions are recorded first in the Journal

(1) Both 'a' and 'r are true and 'r' is the correct explanation of 'a'

(2) Both 'a' and 'r' are true and 'r' is not the correct explanation of 'a'

(3) 'a' is true and 'r' is false

(4) 'a' is false and 'r' is true

Ans. ***(1)***

Sol. Journal is called the book of original entry and the full particulars of the transactions are recorded first in the Journal

68. In List - 'A' the areas of managerial functions and in List - 'B' their meanings are given. Choose the correct answer by matching them :

List-A	***List-B***
a. Planning	i. The process of bringing together the manpower and material resources
b. Co-ordination	ii. It involves the future course of operation for a given period
c. Organising	iii. It is the function concerned with the recuritment, selection, placement
d. Staffing	iv. It is the area of functional management where instructing, guiding supervising and leading the people
	v. It is the harmonious blending of the activities of different departments for the achievements of the desired goals

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

Ans. ***(2)***

69. Read the given statements and identify the correct option which is related to all of them :

i. It is related to financial institution which deals with short term funds in the economy.

ii. This type of market arranges funds for working capital.

iii. Here the rate of interest is high.

iv. The funds can be borrowed from this market for a short period varying from a day, a week, a month or 3 to 6 months.

(1) Capital Market (2) Stock Market (3) Money Market (4) Open Market

Ans. ***(3)***

Sol. Money Market

70. The advantages of sole trading concerns are listed. Choose the wrong statement:

i. Legal formalities are required to commence the business.

ii. It can be started by own capital.

iii. No difficulties arise in day to day running of the business.

iv. They are in a position to take quick decisions and maintain business secrets.

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

Ans. ***(1)***

71. One of the statements related to Labourers is wrong. Identify it:

(1) Organised labourers come under gratuity Act of 1971.

(2) Unorganised sector labourers are responsible for child labour.

(3) A large section of farmers are unorganised labourers.

(4) Migration is the major challenge faced by organised sector labourers

Ans. ***(4)***

Sol. Migration is the problem related to people in unorganised sector most of the people from rural areas come to urban areas in search of work

72. Read the given statements and identify the correct sociologist related to all of them :

i. He/she worked as the UGC national fellow and as Head of Department of Sociology of Bombay University.

ii. As he/she was following the Marxist ideology in his/her sociological studies, he/she was identified as Marxist Sociologist.

iii. His/her 'The Sociological Background of Indian Nationalism' is the best work.

iv. Indian Rural sociology, slums and Urbanisation are his/her major works.

(1) Iravati Karve (2) C. Parvathamma (3) M.N. Srinivas (4) A.R. Desai

Ans. ***(4)***

Sol. A.R. Desai

73. The Supreme Court declared as a fundamental right to provide free and compulsory education to all children between the age of 6 to 14 years under article 21A in :

(1) Golaknath v/s Punjab Government

(2) Keshawananda Bharathi v/s Kerala Government

(3) Unnikrishnan v/s Andrapradesh Government

(4) Minerva Mills v/s Union of India

Ans. ***(3)***

74. In Column - A the authors and in Column - B their works are given. Choose the correct matching :

Column-A	***Column-B***
a. Auguste Comte	i. Remembered Village
b. Karl Marx	ii. Positive Philosophy
c. Emile Durkheim	iii. The Holy Family
d. Max Weber	iv. The Rules of Sociological Method
	v. The Economy and the Society

	a	b	c	d
1	ii	iii	iv	v
2	v	ii	iii	iv
3	iii	iv	v	i
4	v	i	ii	iii

Ans. ***(1)***

Sol.

Column-A	***Column-B***
a. Auguste Comte	Positive Philosophy (ii)
b. Karl Marx	The Holy Family (iii)
c. Emile Durkheim	The Rules of Sociological Method (iv)
d. Max Weber	The Economy and the Society

75. Read the given statements and identify the correct option related to Caucasians Tribe.

i. The people of this tribe are white in skin colour.

ii. They are tall, have long straight sharp nose, bent head, straight cheek, elongated face, small lips as their physical characteristics.

iii. The people of these tribe are found in Europe, North and South America, Palestine, Asia, Iran, and North India

iv. The subtribes of this tribe are Nordic, alpine, mediterranean and Hindu..

(1) i, ii, iii and iv are correct
(2) Only i, ii and iii are correct
(3) Only ii, iii and iv are correct
(4) Only i, iii and iv are correct

Ans. ***(1)***

Sol. All are correct

76. Choose the correct group of Direct tax :

(1) Corporate tax, Wealth tax, Central Excise tax, Service Tax.

(2) Income Tax, Stamp Duty, Service Tax, Export Tax.

(3) Value Added Tax, Service Tax, Corporate Tax, Export Tax.

(4) Income Tax, Corporate Tax, Wealth Tax, Stamp Duty.

Ans. **(4)**

77. The List - A contains economic terms and the List - B with their correct meanings. Choose the options that matches correctly.

List - A	List - B
(a) Fiscal Deficit	(i) Fiscal deficit minus interest payment.
(b) Revenue Deficit	(ii) Total revenue minus total expenditure.
(c) Budget Deficit	(iii) Revenue receipts and non debt capital receipts minus total expenditure.
(d) Primary Deficit	(iv) Revenue receipt minus Revenue expenditure.

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

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

Ans. (2)

78. Identify the correct statements related to Antyodaya Anna Yojana.

(1) It was launched in July 2001.

(2) Under this scheme one crore of the poorest among the BPL families covered under the targeted public distribution system were identified.

(3) Poor families were identified by the respective state rural development departments through a BPL survey.

(4) Fifty kilograms of foodgrains were made available to each eligible family.

(1) Only i and ii are correct (2) Only ii and iii are correct (3) Only iii and iv are correct (4) Only i and iv are correct

Ans. (2)

79. Consider the following aspects of deficit financing :

(i) Fiscal deficit = (Revenue Receipts + Non debt capital Receipts) – Total expenditure

(ii) Revenue Deficit = Total Revenue – Total Expenditure

With reference to the above :

(1) Both i and ii are correct. - (2) Both i and ii are not correct.

(3) i is correct, ii is not correct. (4) ii is correct, i is not correct.

Ans. (3)

80. Choose the correct sequence to indicate the given statements related to Mahatma Gandhi National Rural Employment Guarantee act as TRUE (T) or FALSE (F) :

(1) It was implemented on 2-2-2006.

(2) It provides a legal guarantee for one hundred days of employment in every financial year to adult members of any rural house hold willing to do public work related to unskilled manual work.

(3) If the government fails to do so, then the person is given unemployment allowance.

(4) It was enacted on August 25,2005.

(1) FFTT (2) TTFT (3) TFTF (4) TTTT

Ans. (4)

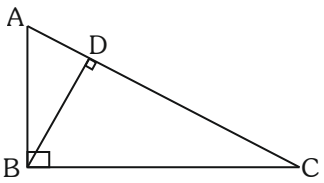
81. Two numbers are in the ratio 4 : 5. If 24 is subtracted from each of them, then the resulting numbers will be in the ratio 2 : 3. The original numbers are:

(1) 48 and 60 (2) 52 and 65 (3) 60 and 75 (4) 76 and 95

Ans. (1)

Sol. $\frac{4x-24}{5x-24}=\frac{2}{3} \Rightarrow 12x-72=10x-48 \Rightarrow x=12, 4x=48, 5x=60$

82. ABC is a right angled triangle such that $\angle ABC = 90°$, AB = 16cm and BC = 32cm. BD $\perp$ AC is :



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

Ans. (4)

Sol. $AC = 16\sqrt{5},\ BD \times AC = 16 \times 32 \Rightarrow BD = \frac{32\sqrt{5}}{5}$

$AD = \sqrt{16^2 - BD^2}$ $AD = \frac{16\sqrt{5}}{5}$ $\frac{AC}{5}$ $\therefore$ AD : AC = 1 : 5

83. If $\sin A + \sin^2 A = 1$ (A is acute angle) then the value of $\cos^2 A + \cos^4 A$ is :

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

Ans. (2)

Sol. $\sin A = 1 - \sin^2 A = \cos^2 A$

$\cos^2 A + \cos^4 A = \cos^2 A + \sin^2 A = 1$

84. X and Y walk 24km each. X walks faster than Y. Sum of their speeds is 7 km/h and the sum of the time taken by them to complete the walk is 14 hours. Speed of X is :

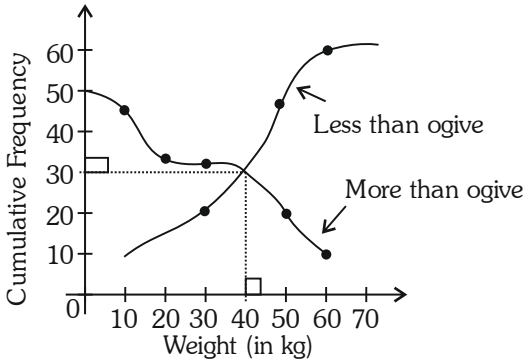
(1) 4 km/h (2) 5 km/h (3) 6 km/h (4) 7 km/h

Ans. (1)

Sol. $\frac{24}{y}+\frac{24}{x}=14$; $y + x = 7$

$\frac{1}{7-x}+\frac{1}{x}=\frac{7}{12} \Rightarrow x = 4$

85. The cumulative frequency curve for a distribution is represented in the graph. The median for the data is :

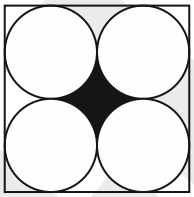


(1) 10 (2) 30 (3) 40 (4) 60

Ans. (3)

Sol. $\left(\text{Median}, \frac{N}{2}\right) = (40, 30) \Rightarrow \text{Median} = 40$

86. Four circular plates of same size having diameter 'a' units each are placed on the square mat such that each plate touches externally the other two as shown in the figure. The area of the shaded region is :

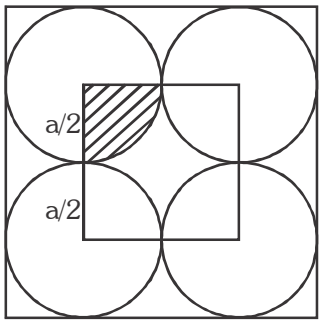


(1) $\frac{a^2}{4}(4+\pi)$ Square units (2) $\frac{a^2}{4}(4-\pi)$ Square units

(3) $4a^2(4+\pi)$ Square units (4) $4a^2(4-\pi)$ Square units

Ans. (2)

Sol.



$a^2 - 4x\frac{1}{4}x\,\pi\frac{a^2}{4},\ a^2\left(a-\frac{\pi}{4}\right) = \frac{a^2}{4}(4-\pi)$

87. The empirical relationship between the three measures of central tendency of data is :

(1) 3 median = mode + 2 mean (2) 3 mean = mode + 2 median

(3) 3 mode = mean + 2 median (4) 3 mean = median + 2 mode

Ans. (1)

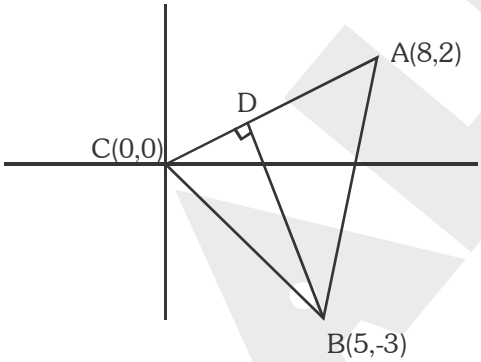
Sol. $3\ \text{median} = \text{mode} + 2\ \text{mean}$

88. ABC is a triangle whose vertices are A(8, 2), B(5, -3) and $C(0,0)$.BD $\perp$ AC . The length of the altitude BD is :

(1) 17 units (2) $\sqrt{\frac{17}{2}}$ units (3) $2\sqrt{17}$ units (4) $\sqrt{17}$

Ans. (4)

Sol.



Area of $\Delta = \frac{1}{2} \times BD \times AC = \frac{1}{2}\left|8(-3)+5(-2)+0\right|$

$BD \times 2\sqrt{17} = 34$

$BD = \sqrt{17}$

89. The value of 'p' for which the pair of linear equations $px + 3y - (p-3) = 0$ and $12x + py - p = 0$ has infinitely many solutions is :

(1) 0 (2) –6 (3) $\frac{1}{6}$ (4) 6

Ans. (4)

Sol. $\frac{P}{12} = \frac{3}{P} = \frac{-(P-3)}{-P}$

$P = 6$

90. The distance from the origin to the centroid of the triangle whose vertices are (7,1), (1, 5) and (1, 6) is :

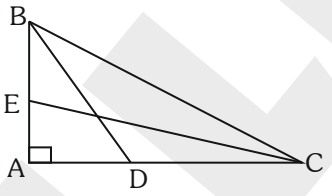
(1) 5 units (2) 6 units (3) 9 units (4) 10 units

Ans. (1)

Sol. $G \equiv \text{Centroid}\left(\frac{7+1+1}{3}, \frac{1+5+6}{3}\right) \equiv (3,4)$

$OG = \sqrt{3^2 + 4^2} = 5$

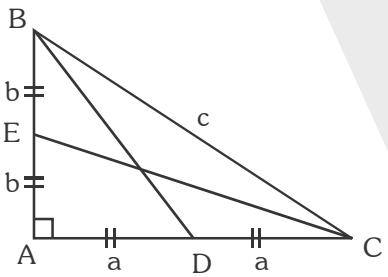
91. In ΔABC, $|\underline{BAC} = 90°$ BD and CE are the medians. BD = 6cm and CE = 8cm. The length of the hypotenuse BC is :



(1) $2\sqrt{5}$ cm (2) $3\sqrt{5}$ cm (3) $4\sqrt{5}$ cm (4) $6\sqrt{5}$ cm

Ans. (3)

Sol.



$$a^2 + 4b^2 = 36$$
$$b^2 + 4a^2 = 64$$
$$\overline{5\left(a^2 + b^2\right) = 100}$$

$$c^2 = 4\left(a^2 + b^2\right) = 4 \times 20$$

$$c = 4\sqrt{5}$$

92. In a box there are 8 red, 7 blue and 6 green balls. One ball is picked up randomly. The probability that the ball is neither blue nor green is :

(1) $\frac{13}{21}$ (2) $\frac{6}{21}$ (3) $\frac{7}{21}$ (4) $\frac{8}{21}$

Ans. (4)

Sol. $P(\text{red}) = \frac{8}{8+7+6} = \frac{8}{21}$

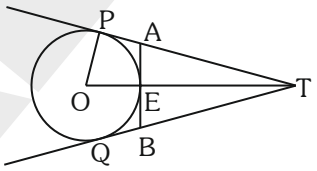
93. 10^{th} term of an AP is 16 and 16^{th} term of it is 10. The common difference and the 26^{th} term of the AP are respectively:

(1) 1 and 0 (2) –1 and 0 (3) 0 and 1 (4) 0 and –1

Ans. (2)

Sol. $\begin{matrix} a + 9d = 16 \\ a + 15d = 10 \end{matrix} \Rightarrow 6d = -6 \quad \Rightarrow d = -1 \qquad \Rightarrow a = 25$

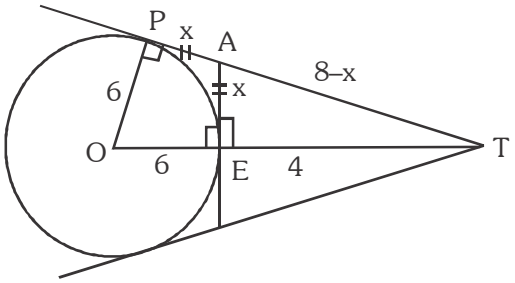
94. From an external point T, two tangents TP and TQ are drawn to a circle with centre 'O' and radius 6cm as shown in the figure. OT intersects the circle at E. A tangent drawn at E meets TP and TQ at A and B respectively. If OT =10cm then length of AB is :



(1) 12 cm (2) 10 cm (3) 8 cm (4) 6 cm

Ans. (4)

Sol.

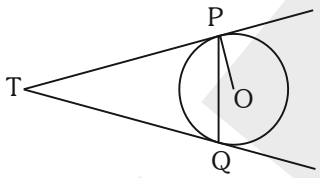


$OT = 10, OP = 6 \Rightarrow TP = 8$

$(8 - x)^2 = x^2 + 4^2 \Rightarrow x = 3$

$\therefore AB = 6$

95. Two tangents TP and TQ are drawn to a circle with centre 'O' from an external point T as shown in the figure. If $\angle PTQ = 32°$ then $\angle OPQ$ is :



(1) 8° (2) 16° (3) 20° (4) 24°

Ans. (2)

Sol. $\angle TPQ = \frac{180° - 32°}{2} = 74°$

$\angle OPQ = 90° - 74° = 16°$

96. List - A contains trigonometric expressions and List - B is their values on simplification. Choose the correct option by matching them :

List - A	***List - B***
(i) $\tan 1° \tan 2° \tan 3° ..... \tan 89°$	(a) 0
(ii) $\text{cosec } 31° - \sec 59°$	(b) $\frac{\sqrt{3}}{2}$
(iii) $\sin^2 45° + \cos^2 60°$	(c) $\frac{3}{4}$

(iv) $\frac{2\tan 30°}{1+\tan^2 30°}$ (d) 1

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

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

Ans. (3)

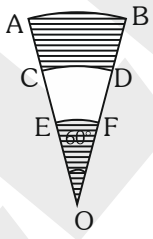
Sol. (i) $\tan 1°.\tan 2°.\tan 3°.....\tan 89° = 1$

(ii) $\text{cosec}31° - \text{cosec}31° = 0$

(iii) $\sin^2 45° + \cos^2 60° = \frac{1}{2} + \frac{1}{4} = \frac{3}{4}$

(iv) $\frac{2\times 1/\sqrt{3}}{1+\left(1/\sqrt{3}\right)^2} = \frac{\sqrt{3}}{2}$

97. AB, CD and EF are arcs of three concentric circles with radius 21 cm, 14 cm and 7 cm respectively with centre 'O' as shown in the figure. If $\angle AOB = 60°$ then the sum of the areas of two shaded regions are : (consider the approximate value for π as $\frac{22}{7}$)



(1) 154 cm^2 (2) $\frac{1078}{3} cm^2$ (3) $\frac{770}{3} cm^2$ (4) 231 cm^2

Ans. (1)

Sol. $Ar(EOF) = \frac{60°}{360°} \times \pi \times 7^2 = \frac{\pi \times 7^2}{6}$

$Ar(ABDC) = Ar(OAB) - AR(COD)$

$$= \frac{60^\circ}{360^\circ} \times \pi \times 21^2 - \frac{60^\circ}{360^\circ} \times \pi \times 14^2$$

$$= \frac{\pi \times 7^2}{6}\left(3^2 - 2^2\right)$$

$$\text{Reqd Area} = \frac{\pi \times 7^2}{6}(1+5) = 49\pi = 49 \times \frac{22}{7} = 154\text{cm}^2$$

98. The condition that one of the roots of $ax^2 + bx + c = 0 (a \neq 0)$ is twice the other is :

(1) $2b^2 = -4ac$ (2) $2b^2 = 9(c - a)$ (3) $2b^2 = 9ac$ (4) $3b^2 = 16ac$

Ans. (3)

Sol. $\alpha + 2\alpha = \frac{-b}{a}; \alpha.2\alpha = \frac{c}{aa}$

$$\alpha = \frac{-b}{3a}; 2\alpha^2 = \frac{c}{a} \Rightarrow 2\left(\frac{b^2}{9a^2}\right) = \frac{c}{a}$$

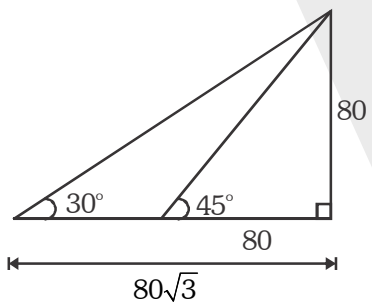
$$\Rightarrow 2b^2 = 9ac$$

99. The angles of depression of two ships as observed from the top of a 80m high light house from the sea-level are 30° and 45°°. If two ships are on the same side of the light house and all the three are along a straight line, then distance between the two ships is :

(1) 80 m (2) $80(\sqrt{3} - 1)$m (3) $80(\sqrt{3} + 1)$m (4) $80\sqrt{3}$ m

Ans. (2)

Sol.

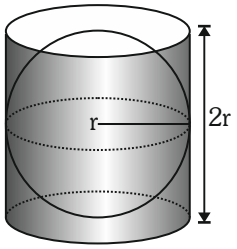


$80\sqrt{3} - 80$

100. A sphere is inscribed in a right cylinder such that the height of the cylinder is equal to the diameter of the sphere. Also the diameter of the base of the right cylinder is equal to the diameter of the sphere as shown in the figure. Read the following statements and choose the correct option :

Statement (a) : Ratio of the total surface area of the right cylinder to that of total surface area of the sphere is 3 : 2

Statement (b) : Ratio of the volume of the right cylinder to that of the volume of the sphere is 3 : 2



(1) Only statement (a) is true.

(2) Only statement (b) is true.

(3) Both the statements (a) and (b) are true.

(4) Both the statements (a) and (b) are false.

Ans. (1)

Sol. (a) $R_S = R_C ; 2R_S = H_C \quad \Rightarrow R_C = x = R_S \Rightarrow H_C = 2x$

$$TSA_c = 2\pi R_c H_c + 2\pi R_c^2 = 6\pi x^2$$
$$TSA_s = 4\pi R_s^2 = 4\pi R_c^2 = 4\pi x^2 \quad \Rightarrow \text{Ratio} = 3:2$$

(b) $V_c = \pi R_c^2 H_c = \pi x^2 (2x) = 2\pi x^3$

$$V_s = \frac{4}{3}\pi R_s^3 = \frac{4}{3}\pi x^2 \quad \Rightarrow \text{Ratio} = 3:2$$