class 10

SAT
Scholastic Aptitude Test

TARGET
NTSE
National Talent Search Examination

Solved Paper
2017
Stage 2

Time : 90 Minutes **Max. Marks : 100**

Instructions for Candidates

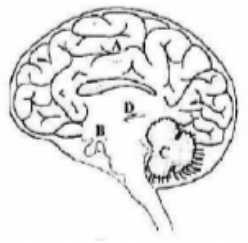
Read the following instructions carefully before you answer the questions :

1. Answers are to be given on a separate answer-sheet.
2. Write your eight-digit Roll Number very clearly on the test-booklet and answer-sheet as given in your letter/ admission card.
3. Write down the Booklet Number in the appropriate box on the answer sheet.
4. There are 100 questions in this test. All are compulsory.
5. Please follow the instructions for marking the answers given on the answer sheet.
6. For questions 1 – 100, put a cross mark (X) on the number of the correct alternative on the answer-sheet against the corresponding question number.
7. If you do not know the answer to any question, do not spend much time on it and pass on to the next one. Time permitting, you can come back to the questions, which you have left in the first instance and try them again.
8. Since the time allotted for this question paper is very limited you should make the best use of it by not spending too much time on any one question.
9. Rough work can be done anywhere in the booklet but not on the answer sheet/loose paper.
10. Every correct answer will be awarded one mark.
11. Please return the Test-booklet and answer-sheet to the invigilator after the test.

1. Small cut pieces of soft stems are placed in growth medium with following plant hormones. Which combination of plant hormones will show slowest growth?
(1) Auxin + Cytokinin (2) Gibberellins + Auxin
(3) Gibberellins + Cytokinin (4) Abscisic Acid + Auxin

2. Which one of the following demonstrates the characteristics of cardiac muscle cells ?
(1) Involuntary and multinucleated
(2) Unbranched and uninucleated
(3) Cylindrical and uninucleated
(4) Unbranched and involuntary

3. From the given figure identify the part of human brain controlling most of the involuntary actions:



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

4. An animal kept in a jar has the following features.
(I) It is bilaterally symmetrical.
(II) It has coelomic cavity
(III) The body is segmented
(IV) It has jointed appendages.
To which phylum does the animal belong to ?
(1) Arthropoda (2) Annelida
(3) Platyhelminthes (4) Mollusca

5. Read the following statements and select the correct option.
Statement - I : Nostoc and Bacteria are prokaryotes.
Statement - II : Penicillium and Spirogyra are fungi.
(1) Only statement I is true
(2) Only statement II is true
(3) Both statements I and II are true
(4) Both statements I and II are false

6. You find a herbaceous flowering plant growing in your school garden having leaves with parallel venation. Choose the correct additional features the given plant would be possessing.
(I) It has no secondary vascular tissues.
(II) Its flower possesses three sepals.
(III) It possesses tap root.
(IV) Its embryo has 2 cotyledons.
(1) (I) and (II) (2) (I) and (III)
(3) (II) and (IV) (4) (III) and (IV)

7. Varieties of vegetables such as cabbage, broccoli and cauliflower have been produced from a wild cabbage species. Such process of producing new varieties of living organisms is called
(1) Natural selection (2) Artificial selection
(3) Speciation (4) Genetic drift

8. Which of the following are pairs of analogous organs?
(I) Forelimbs of horse – Wings of bat
(II) Wings of bat –Wings of butterfly
(III) Forelimbs of horse – Wings of butterfly
(IV) Wings of bird – Wings of bat
(1) (I) and (II) (2) (II) and (IV)
(3) (III) and (IV) (4) (II) and (III)

9. Which of the following organisms is used as a biopesticide ?
(1) Azolla (2) Anabaena
(3) Rhizobium (4) Trichoderma

10. A tall plant (TT) is crossed with a dwarf plant (tt). All F1 plants showed tall phenotype.Which of the following correctly defines a test cross ?
(1) TT (F_1) Tt (P) (2) Tt (F_1) Tt (P)
(3) tt (F_1) Tt (P) (4) Tt (F_1) tt (P)

11. Which one of the following pairs of causative agent and type of disease are correct ?
(I) Leishmania — Sleeping sickness
(II) Nematode — Elephantiasis
(III) Trypanosoma — Kala azar
(IV) Staphylococcus — Acne
(1) (I) and (II) (2) (II) and (III)
(3) (II) and (IV) (4) (III) and (IV)

12. Pancreatic juice contains more than one enzyme. Which among the following combination is correct ?
(1) Pepsin and Lipase (2) Amylase and Pepsin
(3) Pepsin and Trypsin (4) Trypsin and Lipase

13. You discover a new species of a plant. You also discover that it produces motile sperms and dominant generation has diploid cells. It belongs to
(1) Bryophyte (2) Angiosperm
(3) Gymnosperm (4) Pteridophyte

14. At every 20 mintues, one bacterium divides into two. How many bacteria will be produced after two hours, if one starts with 10 bacteria?
(1) $2^5 \times 10$ (2) $2^5 \times 10^5$
(3) $2^6 \times 10$ (4) $2^6 \times 10^6$

15. The metal (M) forms an oxide, M_2O_3. The formula of its nitride will be
(1) M_2N_3 (2) MN
(3) M_2N (4) M_3N_2

16. A solution is a homogeneous mixture of two or more substances. Which of the following is a solution?
(1) Milk (2) Smoke
(3) Brass (4) Face Cream

17. 1.80 g of glucose is dissolved in 36.00 g of water in a beaker. The total number of oxygen atoms in the solution is
(1) 12.405×10^{23} (2) 12.405×10^{22}
(3) 6.022×10^{23} (4) 6.022×10^{22}

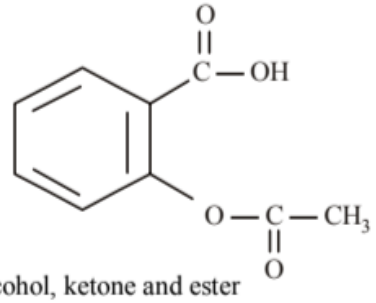
18. ^{35}Cl and ^{37}Cl are the two isotopes of chlorine, in the ratio 3 : 1 respectively. If the isotope ratio is reversed, the average atomic mass of chlorine will be –
(1) 35.0 u (2) 35.5 u
(3) 36.0 u (4) 36.5 u

19. The turmeric solution will turn red by an aqueous solution of -
(1) potassium acetate (2) copper sulphate
(3) sodium sulphate (4) ferric chloride

20. A metal 'M' of moderate reactivity is present as its sulphide 'X'. On heating in air, 'X' converts into its oxide 'Y' and a gas evolves. On heating 'Y' and 'X' together, the metal 'M' is produced. 'X' and 'Y' respectively are
(1) 'X' cuprous sulphide, 'Y' cuprous oxide
(2) 'X' cupric sulphide, 'Y' cupric oxide
(3) 'X' sodium sulphide, 'Y' sodium oxide
(4) 'X' calcium sulphide, 'Y' calcium oxide

21. Which one of the following statement is incorrect about graphite and diamond ?
(1) Graphite is smooth and slippery.
(2) Diamond is good conductor of heat.
(3) Graphite is a good conductor of electricity.
(4) Physical and chemical properties of graphite and diamond are different.

22. The functional groups present in the following compound are –



(1) alcohol, ketone and ester
(2) ester and carboxylic acid
(3) carboxylic acid and ketone
(4) ester and alcohol

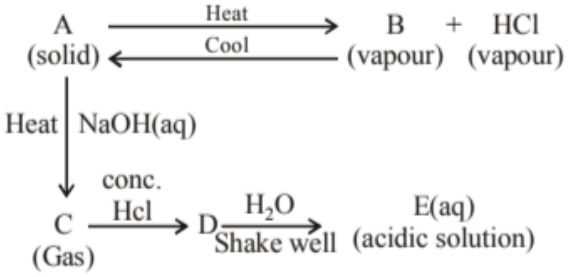
23. A part of the modern periodic table is presented below in which the alphabets represent the symbols of elements.

Group → / Period ↓	1	12	14	15	16	17
2				M	Q	
3	A	J			R	
4	E		L			T
5	G					X

Consult the above part of the periodic table to predict which of the following is a covalent compound-
(1) RQ_2 (2) AT (3) JQ (4) JX_2

24. A compound 'X' reacts with a compound 'Y' , to produce a colourless and odourless gas. The gas turns lime water milky. When 'X' reacts with methanol in the presences of concentrated H_2So_4, a sweet smelling sub-stance is produced. The molecular formula of the compound 'X' is–
(1) C_2H_4O (2) $C_2H_4O_2$
(3) C_2H_6O (4) $C_2H_6O_2$

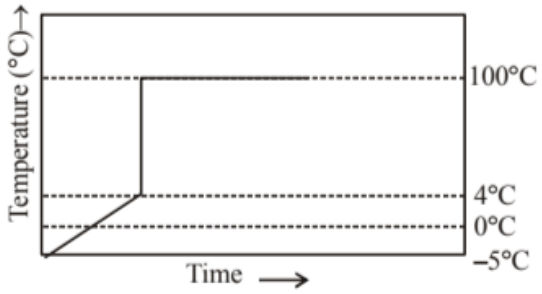
25. The schematic diagram is given below.

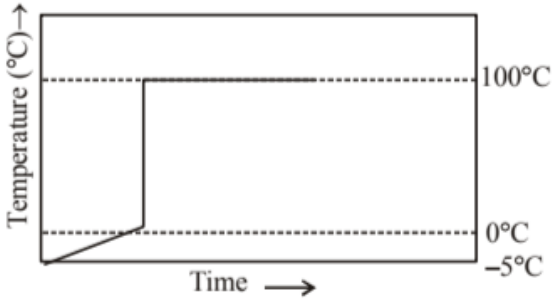


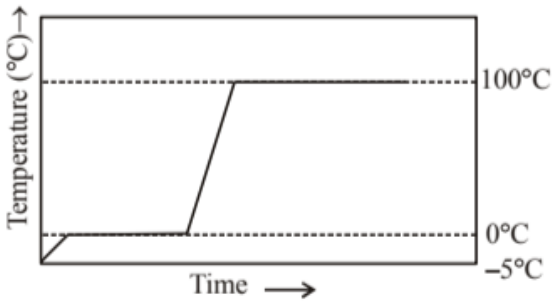
Which of the following is an incorrect statement ?
(1) A and E are chemically same.
(2) A and D are chemically same.
(3) D and E are chemically same.
(4) C and E are chemically same.

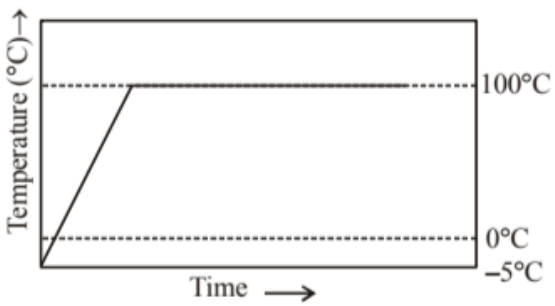
26. Which of the following is a feasible reaction ?
(1) $Ba(s) + K_2SO_4(aq) \rightarrow BaSO_4(aq) + 2K(s)$
(2) $Zn(s) + 2AgNO_3(aq) \rightarrow Zn(NO_3)_2(aq) + 2Ag(s)$
(3) $Mg(s) + Na_2SO_4(aq) \rightarrow MgSO_4(aq) + 2Na(s)$
(4) $Cu(s) + MgSO_4(aq) \rightarrow CuSO_4(aq) + Mg(s)$

27. Some ice pieces kept at a temperature –5° C are heated gradually to 100° C in a beaker. The temperatures of the contents are plotted against time. The correct plot is-

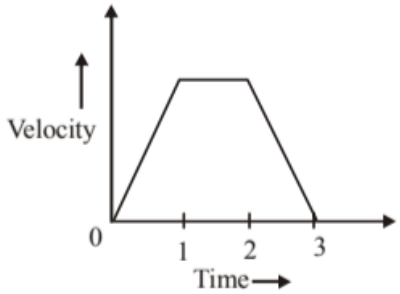
(1)


(2)


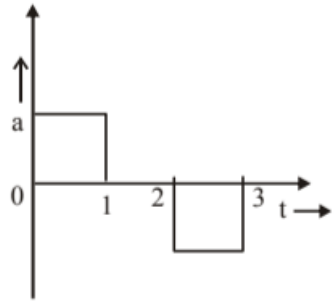
(3)


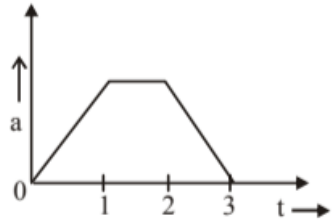
(4)


28. The velocity-time graph of an object moving along a straight line is shown below :



Which one of the following graphs represents the acceleration (a) - time (t) graph for the above motion?

(1)


(2)


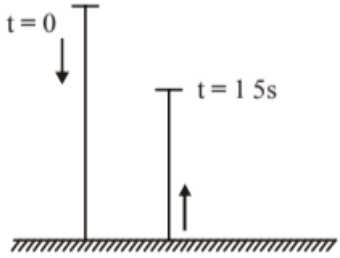
(3)


(4)


29. To read a poster on a wall, a person with defective vision needs to stand at a distance of 0.4m from the poster. A person with normal vision can read the poster from a distance of 2.0 m. Which one of the following lens may be used to correct the defective vision?

(1) A concave lens of 0.5 D
(2) A concave lens of 1.0 D
(3) A concave lens of 2.0 D
(4) A convex lens of 2.0 D

30. A ball released from rest at time t = 0 hits the ground. It rebounds inelastically with a velocity 5 m s^{-1} and reaches the top at t = 1.5 s, What is the net displacement of the ball from its initial position after 1.5s ? ($g = 10 m/s^{-2}$)



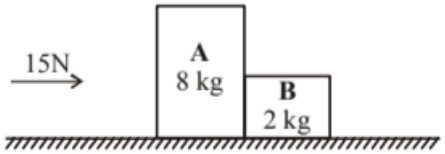
(1) 1.25 m (2) 3.75 m
(3) 5.00 m (4) 6.25 m

31. A horizontal jet of water is made to hit a vertical wall with a negligible rebound. If the speed of water from the jet is 'v' , the diameter of the jet is 'd' and the density of water is 'ρ', then the force exerted on the wall by the jet of water is-

(1) $\frac{\pi}{4}d^2\rho\upsilon$ (2) $\frac{\pi}{4}d^2\rho\upsilon^2$

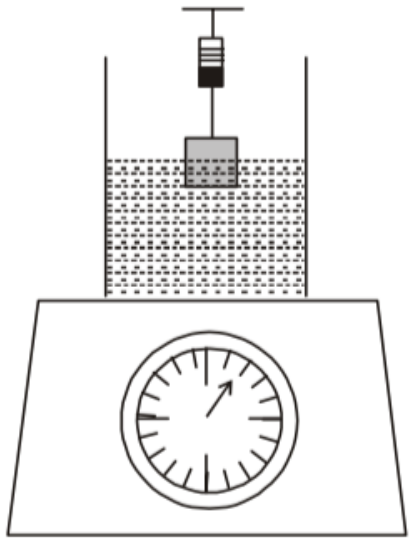
(3) $\frac{\pi}{8}d^2\rho\upsilon^2$ (4) $\frac{\pi}{2}d^2\rho\upsilon^2$

32. Two blocks A and B of masses 8 kg and 2 kg respectively, lie on a horizontal frictionless surface as shown in the figure. They are pushed by a horizontally applied force of 15 N. The force exeerted by B on A is



(1) 1.5 N (2) 3.0 N
(3) 4.5 N (4) 6.0 N

33. A beaker half-filled with water is put on a platform balance which is then set to zero. A 800 g mass is immersed partially in water using a spring balance as shown in the figure. If the spring balance reads 300 g, what will be the reading on the platform balance ?



(1) 200 g (2) 300 g
(3) 500 g (4) 800 g

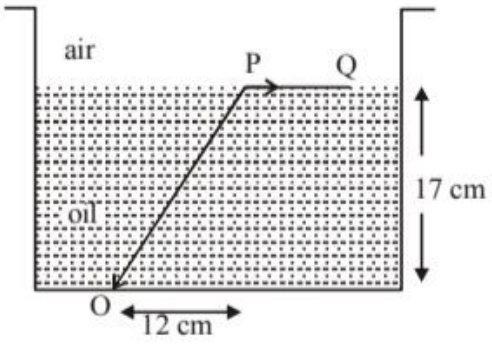
34. An object falls a distance H in 50 s when dropped on the surface of the earth. How long would it take for the same object to fall through the same distance on the surface of a planet whose mass and radius are twice that of the earth? (Neglect air resistance.)
(1) 35.4 g (2) 50.0 s
(3) 70.7 s (4) 100.0 s

35. A source produces sound waves under water. Waves travel through water and then into air. Which of the following statements about the frequency (*f*)and the wavelength (λ) is correct ans sound passes from water to air?
(1) *f* remains unchanged but λ decreases.
(2) *f* remains unchanged but λ increases.
(3) λ remains unchanged but *f* decreases.
(4) λ remains unchanged but *f* increases.

36. The diameter of a wire is reduced to one-fifth of its original value by stretching it. If its initial resistance is R, what would be its resistance after reduction of the diameter?
(1) $\frac{R}{625}$ (2) $\frac{R}{25}$
(3) 25 R (4) 625 R

37. An object of mass '*m*' moving along a straight line with a velocity '*u*' collides with a heavier mass 'M' and get embedded into it. If the compound system of mass (m + M) keeps moving in the same direction then which of the given options is true?
(1) The kinetic energies before and after collision are same.
(2) The kinetic energy after collision is $\frac{1}{2}(M+m)u^2$
(3) There will be a loss of kinetic energy equal to $\frac{1}{2}\frac{m^2u^2}{(M+m)}$
(4) There will be a loss of kinetic energy equal to $\frac{1}{2}\frac{Mm}{(M+m)}u^2$

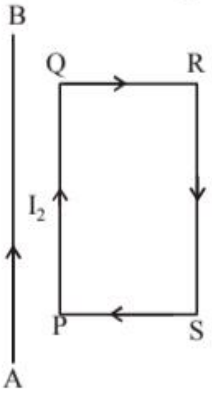
38. A vessel is filled with oil as shown in the diagram. A ray of light from point O at the bottom of vessel is incident on the oil-air intergace at point P and grazes the surface along PQ. The refractive index of the oil is close to _____



(1) 1.41 (2) 1.50
(3) 1.63 (4) 1.73

39. A charged particle placed in an electric field falls from rest through a distance *d* in time *t*. If the charge on the particle is doubled, the time of fall through the same distance will be
(1) 2t (2) t
(3) $\frac{t}{\sqrt{2}}$ (4) $\frac{t}{2}$

40. AB is a long wire carrying a current I_1, and PQRS is rectangular loop carrying current I_2 (as shown in the figure).



Which among the following statements are correct ?
(a) Arm PQ will get attracted to wire AB, and the arm RS will get repelled from wire AB.
(b) Arm PQ will get repelled from wire AB and arm RS attracted to weir AB.
(c) Forces on the arms PQ and RS wil be unequal and opposite.
(d) Forces on the arms QR and SP will be zero.
(1) only (a) (2) (b) and (c)
(3) (a) and (c) (4) (b) and (d)

41. The sum of all the possible remainders, which can be obtained when the cube of a natural number is divided by 9, is
(1) 5 (2) 6
(3) 8 (4) 9

42. When a polynomial p(x) is divided by x – 1, the remainder is 3. When p(x) is divided by x – 3, the remainder is 5. If r(x) is the remainder when p(x) is divided by (x – 1)(x – 3), then the value of r(– 2) is
(1) –2 (2) –1
(3) 0 (4) 4

43. For what value of p, the following pair of linear equations in two variables will have infinitely many solutions ?
px + 3y – (p – 3) = 012x + py – p = 0
(1) 6 (2) – 6
(3) 0 (4) 2

44. Two quadratic equations $x^2 - bx + 6 = 0$ and $x^2 - 6x + c - 0$ have a common root. If the remaining roots of the first and second equations are positive integers and are in the ration 3 : 4 respectively, then the common root is
(1) 1 (2) 2
(3) 3 (4) 4

45. First term of an arithmetic progression is 2. If the sum of its first five terms is equal to one-fourth of the sum of the next five terms, then the sum of its first 30 terms is
(1) 2670 (2) 2610
(3) –2520 (4) –2550

46. A circle C is drawn inside a squar S so that the four sides of S are tangents to C. An equilateral triangle T is drawn indide C with its vertices on C. If the area of S is k times the are of T, then the value of k is

(1) $\frac{16}{3\sqrt{3}}$ (2) $\frac{16}{\sqrt{3}}$

(3) $\frac{32}{3\sqrt{3}}$ (4) $\frac{32}{\sqrt{3}}$

47. Let AP be a diameter of a circle of radius r and PT be the tangent to the circle at the point P such that the line AT intersects the circle at B. If PT = 8 units and BT = 4 units, then r is equal to

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

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

48. If the quadratic equation $x^2 + bx + 72 = 0$ has wo distinct integer roots, then the number of all possible value for b is_____

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

49. If the area of a square inscribed in a semicircle is $2cm^2$, then the area of the square inscribed in a full circle of the same radius is _____

(1) $5\,cm^2$ (2) $10\,cm^2$

(3) $5\sqrt{2}\ cm^2$ (4) $25\,cm^2$

50. If the discriminants of two quadratic equations are equal and the equations have a common root 1, then the other roots –

(1) are either equal or their sum is 2
(2) have to be always equal
(3) are either equal or their sum is 1
(4) have their sum equal to 1

51. Three circular wires are attached in series such that, if one wire is rotated, other two also get rotated. If the diameter of a wire is 4/5 times that of immediate left wire and the left most wire rotates at the speed of 32 revolutions per minute, then the number of revolutions made by right most wire per minute will be –

(1) 40 (2) 49
(3) 50 (4) 60

52. Let ABC be an equilateral triangle. If the co-ordinates of A are (1, 2) and co-ordinates of B are (2, –1), then _____

(1) C cannot lie in the first quadrant
(2) C cannot lie in the second quadrant
(3) C is the origin
(4) C cannot lie in the third quadrant

53. Shyam wants to make a solid brick shape structure from 400 wooden cubes of unit volume each. If the sides of the solid brick have the ratio 1 : 2 : 3, then the maximum number of cubes, which can be used, will be _____

(1) 400 (2) 288
(3) 300 (4) 384

54. Positive integers from 1 to 21 are arranged in 3 groups of 7 integers each, in some particular order. Then the highest possible mean of the medians of these 3 groups is _____

(1) 16 (2) 12.5
(3) 11 (4) 14

55. On dividing 2272 as well as 875 by a 3-digit number N, we get the same remainder in each case. The sum of the digits of N is –

(1) 10 (2) 11 (3) 12 (4) 13

56. A line *l* passing through the origin makes an angle θ with positive direction of x-axis such that $\sin\theta = \frac{3}{5}$. The co-ordinates of the point, which lies in the fourth quadrant at a unit distance from the origin and on perpendicular to *l*, are

(1) $\left(\frac{3}{5}, -\frac{4}{5}\right)$ (2) $\left(\frac{4}{5}, -\frac{3}{5}\right)$

(3) (3, –4) (4) (4, –3)

57. The value(s) of k for which $x^2 + 5kx + k^2 + 5$ is exactly divisible by x + 2 but not by x + 3 is (are)

(1) 1 (2) 5
(3) 1, 9 (4) 9

58. If $\cos^4\theta + \sin^2\theta = m$, then _____

(1) $1 \le m \le 2$ (2) $\frac{1}{2} \le m \le 1$

(3) $\frac{3}{4} \le m \le 1$ (4) $\frac{3}{4} \le m \le \frac{13}{16}$

59. Cost of 2 apples, 3 bananas and one coconut is ` 26. Also the cost of 3 apples, 2 bananas and two coconuts is ` 35. Then the cost of 12 apples, 13 bananas and 7 coconuts is

(1) ` 172 (2) ` 148
(3) ` 143 (4) ` 126

60. ABC is a field in the form of an equilateral triangle. Two vertical poles of heights 45m and 20m are erected at A and B respectively. The angles of elevation of the tops of the two poles from C are complementary to each other. There is a point D on AB such that from it, the angles of elevation of the tops of the two poles are equal.Then AD is equal to –

(1) $17\frac{5}{12}$m (2) $20\frac{10}{13}$m

(3) $20\frac{5}{13}$m (4) $17\frac{10}{12}$m

61. Arrange the developments related to European history in a chronological sequence.

I. Napoleon invaded Italy.
II. Unification of Italy.
III. Unification of Germany.
IV. Vienna Settlement.

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

62. Which of the following statements about Liberals in 19th century Europe are correct?

I. They favoured the Catholic Church.
II. They opposed dynastic rule with unlimited power.
III. They were democrats.
IV. They did not want any voting rights for women.

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

63. Which of the following statements are correct?
I. In the beginning Bombay was under the Portuguese control.
II. Control of Bombay passed onto the French in the 17th century.
III. The Marathas replaced the French in Bombay.
IV. Bombay became the capital of the Presidency in early 19th century.
(1) I, II and IV (2) I and IV
(3) I, II and III (4) II, III and IV

64. Which of the following statements are correct?
I. The Chinese introduced printing.
II. The Buddhist missionaries introduced printing in Japan.
III. The Chinese developed printing to facilitate their expanding trade.
IV. Printing reached Europe through Italy.
(1) I, II and III (2) I, II and IV
(3) II, III and IV (4) I and IV

DIRECTIONS (Qs. 65 - 72): Read the statements are select the correct answer from the options given below.

1. Statement I is true, Statement II is false.
2. Statement I is false, Statement II is true.
3. Both Statements are true, and Statement II provides explanation to Statement I.
4. Both Statements are true, but Statement II does not provide explanation of Statement I.

65. **Statement I:** During the years of the Great Depression the economic crisis was worse in Germany.
Statement II: The President of the Weimar Republic had the power to impose emergency.

66. **Statement I:** The Forest Act of 1878 categorized some forests as 'reserved forests'.
Statement II: They were considered the best forests for people's use.

67. **Statement I:** Shifting cultivation was widely prevalent in different parts of India in the 19th century.
Statement II: More and more people took to shifting cultivation when forest laws were enacted.

68. **Statement I:** Cricket emerged as a colonial game.
Statement II: Cricket was started in England.

69. **Statement I :** Mahatma Gandhi wished everyone had clothes to wear.
Statement II : He wanted everyone to wear the single loin cloth as he did.

70. **Statement I :** The Spanish conquest of America was not a conventional military conquest.
Statement II : One of the most powerful weapon was the spread of smallpox.

71. **Statement I :** The silk routes led to trade and cultural links between distant parts of the world.
Statement II : Early Christian missionaries travelled to Asia through this route.

72. **Statement I :** The French used forced labour in Indo-China for building canals.
Statement II : Vietnam became a major exporter of rice in the world.

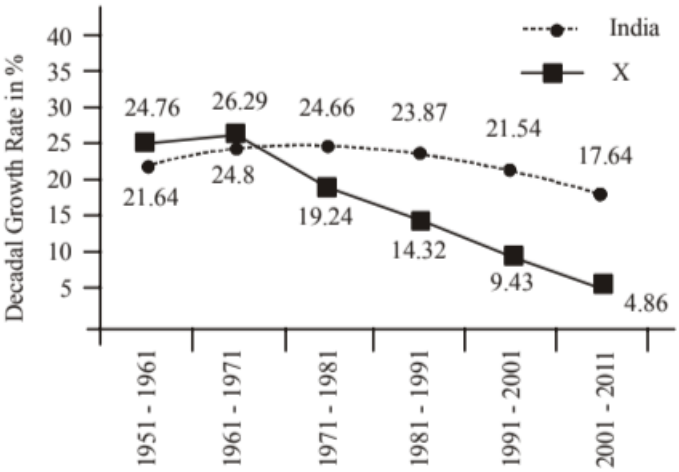
73. Match List I (Layers of Atmosphere and List II (Characteristics) and select the correct answer using the code given below.

List I (Layer of Atmosphere)	**List II (Characteristics)**
(A) Ionosphere	(I) Contains Ozone
(B) Stratosphere	(II) Reflects radio Waves
(C) Exosphere	(III) Fall in Temperature
(D) Troposphere	(IV) Extremely low air density

(1) A-II, B-III, C-IV, D-I (2) A-II, B-I, C-IV, D-III
(3) A-II, B-III, C-I, D-IV (4) A-III, B-I, C-IV, D-II

74. Which of the following statements are correct?
I. Rann of Kachchh is formed by the recession of the sea.
II. Kuchaman, Sambhar and Didwana are salt water lakes.
III. The land to the east of Aravallis is known as Bagar.
IV. the fertile flood plains formed by small streams in Rajasthan are known as Rohi.
(1) I, II and IV (2) I, III and IV
(3) II, III and IV (4) I, II, III and IV

75. Observe the graph given below :



Identify the state with population growth rate marked by 'X' in the given graph.
(1) Goa (2) Kerala
(3) Sikkim (4) Nagaland

76. River Alaknanda forms confluences (Prayags) in Uttrakhand. Match the codes given in Figure with Table (Prayags)and select the correct answer using the code given below.

Figure

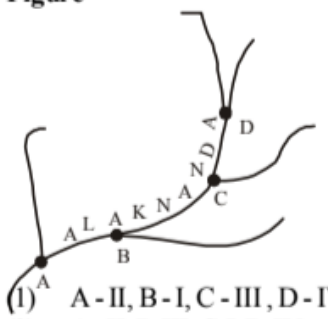


Table (Prayags)
(I) Karn Prayag
(II) Rudra Prayag
(III) Nand Prayag
(IV) Vishnu Prayag

(1) A - II, B - I, C - III , D - IV
(2) A - II, B-III, C-I, D-IV
(3) A-III, B-II, C-I, D-IV
(4) A - III, B-I, C-II, D-IV

77. Match List I (Original Rock) with List II (Metamorphic Rock) and select the correct answer using the code given below:

List I (Original Rock)	**List II (Metamorphic Rock)**
(A) Granite	(I) Diamond
(B) Coal	(II) Marble
(C) Limestone	(III) Slate
(D) Shale	(IV) Gneiss

(1) A-III, B-IV, C-II, D-I
(2) A- III, B-II, C-IV, D-I
(3) A- IV, B-II, C-I, D-III
(4) A- IV, B-I, C-II, D-III

78. Observe the given map.

Which one of the following statement is NOT true about the shaded state indicated on the map?

(1) Society predominantly follows right of female ultimogeniture
(2) The state is an example of areas with karst topography
(3) the state is a major producer of potatoes in India
(4) Some parts of the state receive extremely high rainfall

79. Match List I (Mineral Oil Refineries) with List II (States) and select the correct answer using the code given below:

List I (Mineral Oil Refineries)	**List II (States)**
(A) Numaligarh	(I) Punjab
(B) Bathinda	(II) Andhra Pradesh
(C) Tatipaka	(III) Madhya Pradesh
(D) Bina	(IV) Assam

(1) A-IV, B-II, C-III, D-I
(2) A-IV, B-I, C-II, D-III
(3) A-II, B-I, C-IV, D-III
(4) A-IV, B-III, C-II, D-I

80. 'Slash and Burn Agriculture' is known by specific name in different states of India. Match the shaded states marked in the given map with codes given in the table (Different names of Slash an Burn Agriculture) and select the correct answer using the code given below.

Table (Different Names of Slash and Burn Agriculture)

(I) Bringa
(II) Waltre
(III) Dahiya

(1) A-III, B-IV, C-II, D-I
(2) A-III, B-II, C-IV, D-I
(3) A-I, B-IV, C-II, D-III
(4) A-I, B-II, C-IV, D- III

81. Match List I (Industries) with List II (Important Centers) and select the correct answer using the code given below:

List I (Industries)	**List II (Important Centers)**
(A) Cotton textile	(I) Ludhiana
(B) Hosiery	(II) Rishra
(C) Jute	(III) Coimbatore
(D) Silk textile	(IV) Mysuru

(1) A-I, B-III, C-IV, D-II
(2) A-IV, B-I, C-II, D-III
(2) A-III, B-II, C-I, D-IV
(4) A-III, B-I, C-II, D-IV

82. Which one of the following island is closest to the equator?

(1) Minicoy (2) Car Nicobar
(3) Little Nicobar (4) Great Nicobar

83. Which of the following characteristics are true about plantation agriculture?

I. Generally plantation agriculture is considered as an example of subsistence farming.
II. Generally single crop is grown on a large area in plantation agriculture.
III. It has an interface of agriculture and industry.
IV. It uses capital intensive inputs.

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

84. Match List I (Vegetation zones) with List II (Mean Annual Temperature Range) and select the correct answer using the code given below :

List I (Vegetation Zones)	**List II (Mean Annual Temperature Range)**
(A) Alpine	(I) Above 24°C
(B) Temperate	(II) 17° to 24° C
(C) Tropical	(III) Below 7°C
(D) Sub-tropical	(IV) 7°C to 17°C

(1) A-III, B-I, C-II, D-IV
(2) A-III, B-I, C-IV, D-II
(3) A-III, B-IV, C-I, D-II
(4) A-I, B-II, C-III, D-IV

85. In a democracy, the will of the people is supreme. Which of the following statement concerning democracy in India best reflects this?

(1) The President appoints the Prime Minister who is the leader of the political party possessing a majority in the Lok Sabha.
(2) An assembly of elected representatives excercises political authority on behalf of the people.
(3) In case of a difference between the two Houses of Parliament, the final decision is taken in a joint session of the two Houses.
(4) The permanent executive has more powers than the political executive.

86. Which of the following statements about the Panchayati Raj Institutions after the Constitutional Amendment in 1992 are false?
I. Seats are reserved for the Scheduled Castes, Scheduled Tribes, and Other Backward Classes in the elected bodies of the Panchayati Raj Institutions.
II. Elections to the Panchayati Raj Institutions are supervised by the Election Commission of India.
III. Elections to the Panchayati Raj Institutions are held regularly after every five years.
IV. Half of the seats in all the States are reserved for women.
(1) I and III (2) I and II
(3) III and IV (4) II and IV

87. Match List I (Political Systems) with List II (Nations) and select the correct answer using the code given below :

List I (Political Systems)	List II (Nations)
(A) Federal, Presidential, Republic	(I) India
(B) Federal, Parliamentary, Republic	(II) United Kingdom
(C) Unitary, Parliamentary, Monarchy	(III) Germany
(D) Presidential cum Parliamentary, Republic	(IV) United States of America
	(V) France

(1) A-IV, B-I, C-II, D-V (2) A-IV, B-I, C-II, D-III
(3) A-V, B-IV, C-II, D-III (4) A-V, B-II, C-III, D-IV

88. Which of the following statements about the federal system in India are true?
I. The Constitution of India provides for a three-fold distribution of legislative powers between the Union and the State Government.
II. Both the Union and the State Governments can legislate on residuary subjects.
III. The Parliament cannot on its own change the power-sharing arrangement between the Union and the State Governments.
IV. the High Courts have no role in resolving disputes about the division of powers between the Union and the State Governments.
(1) I and III (2) II, III and IV
(3) I, III and IV (4) I, II and IV

89. Which of the following group of States/Union Territories have only one Lok Sabha constituency?
(1) Arunachal Pradesh, Sikkim, Lakshadweep
(2) Goa, Meghalaya, Andaman and Nicobar Islands
(3) Chandigarh, Sikkim, Mizoram
(4) Manipur, Dadra and Nagar Haveli, Puducherry

90. Which of the following statements best reflects the 'socialist' feature of the Preamble to the Constitution of India?
(1) There are no unreasonable restrictions on how the citizens express their thoughts
(2) The traditional social inequalities have to be abolished
(3) Government should regulate the ownership of land and industry to reduce socio-economic inequalities
(4) No one should treat a fellow citizen as inferior

91. Which of the following statements about the Indian judiciary is true?
(1) India has an integrated judiciary
(2) The Judiciary in India is subordinate to the Executive
(3) The Supreme Court is more powerful than Parliament
(4) The Chief Justice of India appointed by the Prime Minister

92. Which of the following Fundamental Rights includes the Right to Education?
(1) Right to Equality
(2) Right to Freedom
(3) Cultural and Educational Rights
(4) Right to Constitutional Remedies

93. Which of the following is NOT an indicator of economic development?
(1) Increased per capita income
(2) Decreased infant mortality
(3) Increased life expectancy at birth
(4) Decreased women participation in job market

94. The poverty line in Dinanagar is set at ` 100 per capita per day. Five Hundred people live in Dinanagar ofwhom 50 earn ` 30 per capita per day and another 25 earn ` 80 per capita per day each. Everybody elseearn more than ` 100 per day per capita. What is the minimum amount that the government of Dinanagarwill have to spend to completely eradicate poverty?
(1) ` 3000 (2) ` 3500
(3) ` 4000 (4) ` 4500

95. The local telephone company sells me a landline connection only if I purchase a handset from them as well.Which of the following rights does this practice violate under the Consumer Protection Act 1986?
(1) Right to represent (2) Right to information
(3) Right to choose (4) Right to seek redressal

96. Match List-I (Type of Unemployment) with List-II (Characteristics) and select the correct answer using the codes given below:

List I (Type of Unemployment)	List II (Characteristics)
A Seasonal	I Occurs during boom or recession in the economy
B Frictional	II An absence of demand for a certain type of workers
C Disguised	III Occurs when moving from one job to another
D Structural	IV Actual contribution by the additional labour is nil
E Cyclical	V Job opportunities during certain months in the year

(1) A-V, B-III, C-IV, D-II, E-I
(2) A-IV, B-V, C-III, D-I, E-II
(3) A-I, B-II, C-III, D-IV, E-V
(4) A-V, B-IV, C-III, D-II, E-I

97. Suppose Indian Farmers sell wheat at ` 50 per kg and the international price of wheat is ` 40 per kg. Whatis the minimum rate of import duty Government of India must impose on imported wheat so that it does not adversely affect Indian farmers in the domestic market?
(1) 10% (2) 20% (3) 25% (4) 30%

98. The wage rate of a worker in a country is ` 300 per day. Which of these person(s) would you consider unemployed?
(1) Ramu is willing to work at ` 300 a day, but cannot find work.
(2) Suresh is willing to work only at ` 400 a day or more, and cannot find work.
(3) Shanti stays at home because she has young children to look after.
(1) Ramu (2) Suresh
(3) Ramu and Suresh (4) Ramu and Shanti

99. Which of the following can be used as collateral in Indian banks to borrow money?
(1) Bank Passbook (2) Credit Card
(3) Own House (4) Passport

100. The total agricultural land in a village is 1200 hectares. This is distributed among 320 families who form four groups in the following pattern. It is assumed that the land is distributed equally within each group. Identify the group of small farmers.

Group	Number of Families	Total amount of land owned and operated by each group (in hectares)
A	100	300
B	180	300
C	30	300
D	10	300

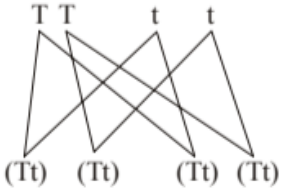
(1) A (2) B
(3) C (4) D

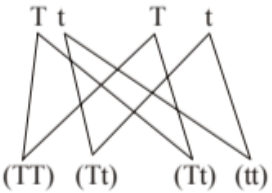
ANSWER KEY

1	(4)	**11**	(3)	**21**	(4)	**31**	(2)	**41**	(4)	**51**	(3)	**61**	(3)	**71**	(3)	**81**	(4)	**91**	(1)
2	(3)	**12**	(4)	**22**	(2)	**32**	(2)	**42**	(3)	**52**	(2)	**62**	(4)	**72**	(3)	**82**	(4)	**92**	(2)
3	(3)	**13**	(4)	**23**	(1)	**33**	(3)	**43**	(1)	**53**	(2)	**63**	(2)	**73**	(2)	**83**	(4)	**93**	(4)
4	(1)	**14**	(3)	**24**	(2)	**34**	(3)	**44**	(2)	**54**	(4)	**64**	(3)	**74**	(1)	**84**	(3)	**94**	(3)
5	(1)	**15**	(2)	**25**	(2)	**35**	(1)	**45**	(4)	**55**	(1)	**65**	(4)	**75**	(2)	**85**	(2)	**95**	(3)
6	(1)	**16**	(3)	**26**	(2)	**36**	(4)	**46**	(1)	**56**	(1)	**66**	(1)	**76**	(1)	**86**	(4)	**96**	(1)
7	(2)	**17**	(1)	**27**	(3)	**37**	(4)	**47**	(1)	**57**	(4)	**67**	(1)	**77**	(4)	**87**	(1)	**97**	(3)
8	(2)	**18**	(4)	**28**	(1)	**38**	(4)	**48**	(1)	**58**	(3)	**68**	(3)	**78**	(3)	**88**	(3)	**98**	(1)
9	(4)	**19**	(1)	**29**	(3)	**39**	(3)	**49**	(1)	**59**	(2)	**69**	(1)	**79**	(3)	**89**	(3)	**99**	(3)
10	(4)	**20**	(1)	**30**	(2)	**40**	(3)	**50**	(1)	**60**	(2)	**70**	(3)	**80**	(4)	**90**	(3)	**100**	(2)

Hints & Explanations

1. (4) Abscisic acid inhibits the cell growth and promotes dormancy in seeds. Auxin initiates division of the vascular cambium.
2. (3) Cardiac muscles are found only in heart. These are involuntary, branched, cylindrical and uninucleated.
3. (3) Involuntary activities such as brcathing blinking, yawning, heart beat, digestion etc are controlled by mid brain and hind brain. (3) is hind brain and (4) is mid brain.
4. (1) Phylum Arthropoda includes such animals that show bilateral symmetry, coelomic cavity, segmented body and jointed appendages, example – scorpions, spiders, centepedes etc.
5. (1) Penicillium is a genus of ascomycetous fungi used as medicinal product and spirogyra is a green alga showing sprial arrangement.
6. (1) Monocot plants do not show secondary vascular tissues and flower has three sepals. Example - banana and bamboo.
7. (2) Artificial selection is characterized by intentional reproduction of an organism having desirable traits. It is also called as selective breeding.
8. (2) Analogous organs are such organs which show anatomically different structures but doing similar functions. Example : wings of a bat and wings of a pigeon.
9. (4) Trichoderm is used as a biopesticide whereas *Azolla*, *Anabaena* and *Rhizobium* are *biofertilizers*, Trichoderma is the most important biological agent controlling plant pathogens.
10. (4)





Test cross = $Tt(F_1) \times tt$ (P)
Test cross is performed between hybrid of first generation with recessive parent.

11. (3) A nematode, Wuchereria bancrofti causes Elephantiasis. Staphylococcus is a genus of Gram-positive bacteria cansing infection in skin. Leishmania causes kala azar and sleeping sickness is caused by Trypanosoma.
12. (4) Trypsin and Lipase are pancreatic juice. Lipase is needed to break down fats. Trypsin is essential for protein digestion.
13. (4) Pteridophytes inchlude the ferns, horsetails and spike musses etc. These have motile sperms and dominant generations has diploid cells.
14. (3) Time = 120 minutes = (20×6)
Number of bacteria = 10
after 6 division, the no. of bacteria = 640

$$10 \xrightarrow[(i)]{20} \xrightarrow[(ii)]{40} \xrightarrow[(iii)]{80} \xrightarrow[(iv)]{160} \xrightarrow[(v)]{320} \xrightarrow[(vi)]{640}$$

$= 640 = 64 \times 10$
$= (2)^6 \times 10 = 2^6 \times 10$

15. (2) The formula of metal (m) for its nitride (3) $M_{(3)} N_{(3)}$ = MN
16. (3) All the alloys are homogenous mixture of two or three metals or non-metals. Since brass is an alloy. so it is a solution. Milk is emulsion. Smoke is aerosol and face cream is liquid foam.
17. (1) The number of Oxygen atoms in 180 gm of glucose = 6 NA

$\therefore$ The number of Oxygen atoms in 1.8 gm of glucose

$= \frac{6\ NA}{180_{30}} \times 1.8 = 0.06\ NA$

The number of oxygen atoms in 18 gm of water = NA

$\therefore$ The number of Oxygen atoms in 36 gm of water

$= \frac{NA}{18} \times 36^{2} = 2\ NA$

Total number of oxygen atoms in the solution
$= (0.06 + 2)\ NA = 2.06\ NA\ (1\ mole = 6.022 \times 10^{23})$
$= 2.06 \times 6.022 \times 10^{23} = 12.405 \times 10^{23}$

18. (4) The ratio of isotopes ^{35}Cl and $^{37}Cl = 1 : 3$

Average atomic mass $= \frac{35 \times 1 + 37 \times 3}{4} = \frac{35 + 111}{4}$

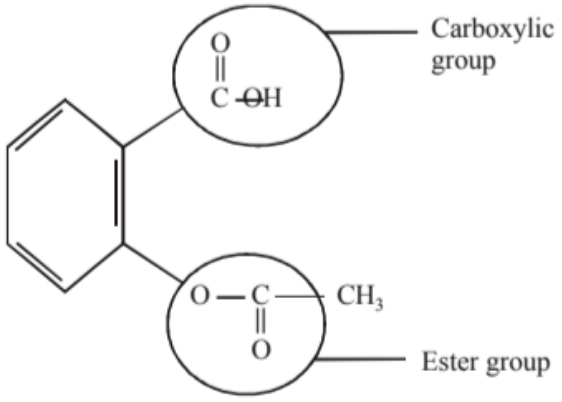
$= \frac{146}{4} = 36.5u$

19. (1) Turmeric solution + CH_3 COOK = red solution.
(liquid) (Potassium acetate)

20. (1) $Cu_2S + 3\ O_2 = 2\ Cu_2O + 2SO_2$
$2\ Cu_2O + Cu_2S = 6\ Cu + SO_2$
X = Cuprous sulphide, y = Cuprous oxide.

21. (4) Graphite and diamond show different physical and chemical properties. Diamond is colour less transparent substance. It does not conduct electricity. Graphite is greyish black. It is good conductor of electricity.

22. (2)



23. (1) R and Q are members of Group 16th which is non metallic having O, S, Se, Te etc. These are characterised by showing the formation of covalent bond.

24. (2) x + y $\rightarrow$ gas (Colourless, odourless)

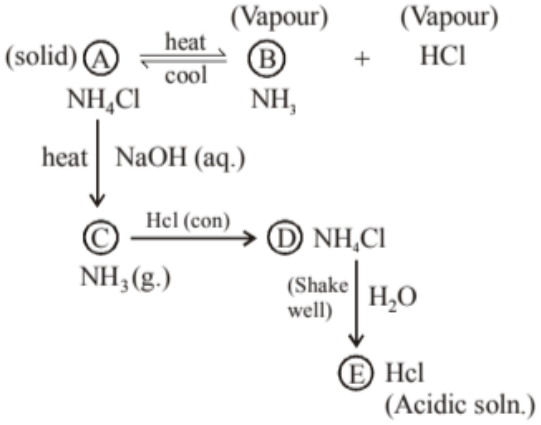
$CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + CO_2\uparrow + H_2O$
(Acetic acid)

$CO_2\uparrow + Ca(OH)_2 \rightarrow CaCO_3 + H_2O$
(lime water) (Milky water)

$CH_3COOH + CH_3OH \xrightarrow[H_2SO_4]{} CH_3COOCH_3 + H_2O$
(x)

Here compound (x) is acetic acid.

25. (1)



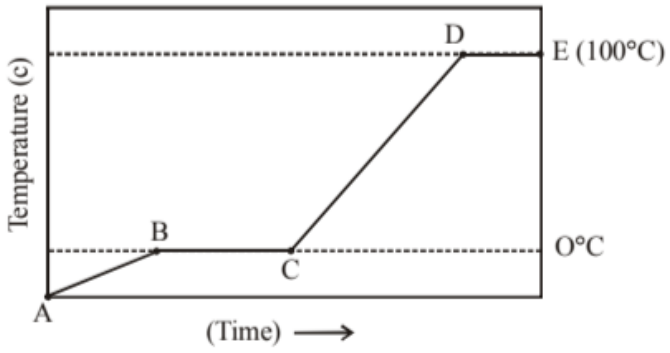
A = NH_4Cl
D = NH_4Cl
Hence correct statement A and D are chemically same.

26. (2) Zn (s) + 2Ag NO_3 (aq.) $\rightarrow$ Zn $(NO_3)_2$ (aq) + 2 Ag(s).
It is a feasible reaction because zinc is more reactive than silver.

Reactivity order

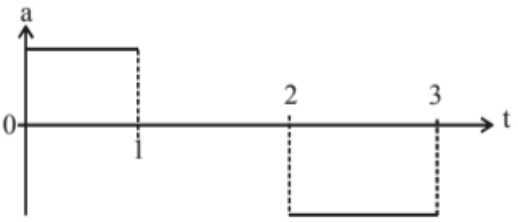
Zinc > Iron > Tin > Lead > hydrogen > copper > Silver > Gold.

27. (3)



B C = Latent heat of fusion
CD = 100 cal/gm to heat water O °C to 100°C.
DE = Latent heat of vaporization

28. (1)



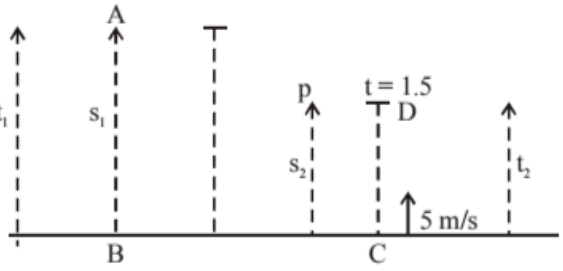
from o to 1 second, acceleration will be constant. a = o from time 1 to 2 second.
There is negative acceleration from 2 sec. to 3 sec.

29. (3) $u = 2$ meter, $v = 0.4$ meter, $f = ?$

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{4} = \frac{-5+1}{2} = \frac{-4}{2}$$

$$\frac{1}{f} = \frac{-4}{2} = -2\,; \qquad P = \frac{1}{f} = 2\ D \text{ (concave lens)}$$

30. (2)



Displacement from C to D

$u = 5$ m/s, $a = 10$ m/s^2, $V = 0$

$V^2 = u^2 - 2as$

$0 = (5)^2 - 2 \times 10 \times S_2$

$$S_2 = \frac{5}{4} = 1.25 \text{ mt} \quad -(1)$$

$v = u - at$

$0 = 5 - 10 \times t_2$

$t_2 = 0.5$ sec

So, $t_1 + t_2 = 1.5$

$t_1 = 1.5 - 0.5 = 1.0$ second

Displacement from A to B

$u = o$, $g = 10$ m/s^2

s_1, $t = 1$ second

$$S_1 = ut + \frac{1}{2}at^2$$

$$= \frac{1}{2} \times 10 \times (1)^2 = 5 \times 1 = 5 \text{ meter}$$

Displacement from A to D

$= S_1 - S_2 = 5 - 1.25 = 3.75$ meter

31. (2) $u = v$, $v = 0$, $m = ?$

$$\rho = \frac{m(\text{mass})}{v(\text{vol.})}$$

$$m = \rho \times v = \rho \times \pi r^2 \times \ell \quad (v = \pi r^2 \ell)$$

$$= \rho \times \pi \times \left(\frac{d}{2}\right)^2 \times \ell \quad (\ell = v \times t)$$

$$= \rho \times \pi \times \frac{d^2}{4} \times v \times t \quad \text{.....(1)}$$

Change in momentum, $\Delta P = m \Delta v$

$$\Delta P = \frac{\pi}{4} \cdot \rho\, d^2 vt\,(v - o)$$

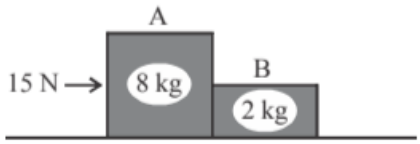
$$\Delta P = \frac{\pi}{4} \cdot \rho\, d^2 v^2 t$$

from Newton's second law

$$F = \frac{\Delta P}{\Delta t} = \frac{\pi}{4} \cdot \frac{\rho d^2 v^2 t}{t}$$

$$= \frac{\pi}{4}\rho d^2 v^2 = \frac{\pi}{4} d^2 \rho v^2$$

32. (2)



$F = m_1 a$

$15 - f = 8 \times a$ ...(i)

$F = m_2 a = 2 \times a$ ...(ii)

eq (i) + (ii)

$(15 - f = 8a) + 2a$

$2a = 15 - 8a$

$8a + 2a = 10a$

$10a = 15$

$$a = \frac{15}{10} = \frac{3}{2} \text{ m/s}^2$$

from equation (ii),

$$F = 2 \times \frac{3}{2} = 3\text{N}$$

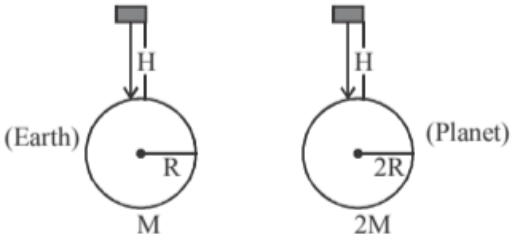
33. (3) Reading $= mg - F_b$

300 gm $= mg - F_b$

$F_b = 800$ gm $- 300$ gm

$= 500$ gm (It will be equal to buoyant force)

34. (3)



Earth mass = M	Planet mass = 2M
Earth radius = R	Planet radius = 2R
Earth Gravity = g	Planet gravity = $\frac{g}{2}$

$$g = \frac{GM}{R^2} = \frac{G \times 2M}{4R^2} = \frac{g}{2}$$

On earth –

$u = 0$, $t = 50$ second, $d = H$

gravity $= g$

$$S = ut + \frac{1}{2}at^2$$

$$H = 0 + \frac{1}{2} \times g \times (50)^2$$

$$= \frac{1}{2} \times g \times 2500 \quad \text{...(i)}$$

On Planet –

$u = 0,\ t,\ d = H,\ \frac{g}{2}$

$S = ut + \frac{1}{2}at^2$

$H = 0 + \frac{1}{2} \times \frac{g}{2} \times t^2$

from eq (i)

$\frac{1}{2} \times g \times 2500 = \frac{1}{2} \times \frac{g}{2} \times t^2$

$5000 = t^2$

$t = \sqrt{5000} = 50\sqrt{2} = 70.7$ second

35. (1) Refractive index decreases, when sound travels from water to air. Frequency remains unchanged but wavelength decreases.

36. (4) Let the Diameter of wire $= \frac{d}{5}$

radius will be $= \frac{r}{5}$

changed Area (1) will be =

$A = \pi r^2$

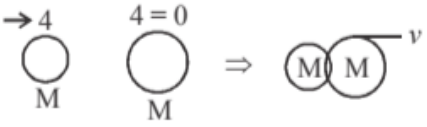
$= \pi\left(\frac{r}{5}\right)^2 = \frac{\pi r^2}{25}$

$A = \frac{\pi r^2}{25} \qquad 25A = \pi r^2$

Hence streched length will be $= 25\ l$

Change resistance (R) $= \frac{\rho \ell}{A} = \frac{\rho(25\ell)}{A/25}$

$= 625\frac{\rho\ell}{A} = 625\ R$

37. (4) 

By the law of conservation of momentum

$mu = (M + m)\ v$

$v = \frac{mu}{(M+m)} \qquad ...(i)$

$KE_{(initial)} = \frac{1}{2}mu^2 + \frac{1}{2}M(0)^2$

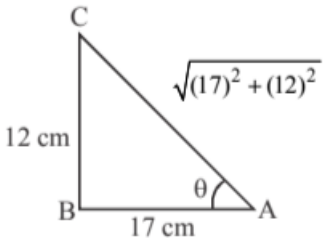
$KE_{(final)} = \frac{1}{2}(M+m)^{v^2} = \frac{1}{2}\frac{m^2u^2}{M+m}$

$\Delta KE = \frac{1}{2}\frac{Mm}{M+m}u^2$

38. (4) According to Snell's law

$\eta_l \sin\theta_1 = \eta_2 \sin\theta_2$

$\eta_{oil} \sin\theta = \eta_{air} \sin 90°$



$\eta_{oil} = \frac{1}{\sin\theta} (\eta_{air} = 1)$

$\eta_{oil} = \frac{1}{12} \times \sqrt{17^2 + 12^2}$

$= \frac{1}{12} \times \sqrt{289} + 144$

$= \frac{1}{12} \times \sqrt{433}$

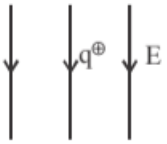
≈ 1.73

39. (3) $F = ma$ (second law of Newton)

In a electric field (F) = charge (q) × Electric field (5)

$F = q \times E$

$qE = ma$



$a = \frac{qE}{m}$

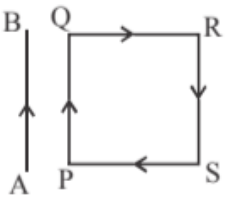
$s = \frac{1}{2}\left(\frac{qE}{m}\right)t^2$

$t = \sqrt{\frac{25m}{qE}}$

after doubling the charge

the time will be $= \frac{t}{\sqrt{2}}$

40. (3) According to Lorentz law current in AB and PQ are in same direction. They will repel each other.
Similarly RS will be attracted by AB.
force between the wires



$F = \frac{\mu_0}{2\pi d} i_1 . i_2$

$F \propto \frac{1}{d}$

It will be unequal and opposite for PQ and RS.

41. (4) Let any no. P be divided by 3 possible result is 3q; 3q + 1 and 3q + 2 when p = 3q than $P^3 = 27q^3 = 9(3q^3)$ no remainder when P = 3q +1;
$P^3 = (3q+1)^3 = (27q3) + 9q(3q+1) + 1 = 9(3q^3 + 3q^2 + q) + 1$ remainder = 1
When P = (3q + 2)
$P^3 = (3q+2)^3 = 27q^3 + 18q(3q+2) + 8 = 9(3q^3 + 2q(3q + 2)] + 8$ Remainder = 8
Sum of Remainder = 1 + 8 = 9

42. (3) $p(x) = q(x)(x-1) + 3$ (given)
$p(x) = q(x)(x-3) + 5$ (given)
Also, $p(x) = (x-1)(x-3) + r(x)$
for x = 1,
$p(1) = r(3)$

$\boxed{3 = r(1)}$

for x = 3,
$p(3) = r(3)$

$\boxed{5 = r(3)}$

Suppose $r(x) = Ax + B$
$r(1) = A + B = 3$
$r(3) = 3A + B = 5$

$\therefore$ $\boxed{A = 1}$ and $\boxed{B = 2}$
$r(x) = Ax + B$
$r(-2) = 2A + B$
$r(-2) = 2(1) + 2$
$r(-2) = 2 + 2$

$\boxed{r(-2) = 0}$

43. (1) Condition for infinite many solutions.

$\frac{p}{12} = \frac{3}{p} = \frac{p-3}{p}$ $\left\{\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}\right\}$

$P^2 = 36$; $P = \pm 6$ {From 1 and 2}
$P^2 - 3p = 3p$ {From 2 and 3}
$P = 6$
$\therefore$ $P = 6$

44. (2) Let α, β be the roots of $x^2 - bx + 6 = 0$ and α, γ be the roots of $x^2 - 6x + c = 0$
$x^2 - bx + 6 = 0$ $\alpha + \beta = b, \alpha + \gamma = 6$
$x^2 - 6x + c = 0$ $\alpha\beta = 6, \alpha\gamma = c$

Given, $\frac{\beta}{\gamma} = \frac{3}{4}$

$\frac{\alpha\beta}{\alpha\gamma} = \frac{6}{c}$

$\frac{\beta}{\gamma} = \frac{6}{c} \Rightarrow \frac{3}{4} = \frac{6}{c}$ $\therefore \boxed{c = 8}$

$\alpha\beta = 6$ $\alpha\gamma = 8$

HCF $(\alpha\beta, \alpha\gamma) = \alpha$
HCF $(6, 8) = 2$
$\alpha = 2$

45. (4) a = 2, d = d,
According to question,

$S_5 = \frac{1}{4}(S_{10} - S_5)$
$4S_5 = S_{10} - S_5$
$5S_5 = S_{10}$

$5\left[\frac{5}{2}\{2\times 2 + (5-1)d\}\right] = \frac{10}{2}[2\times 2 + (10-1)d]$

$\left\{S_n = \frac{n}{2}(2a + (n-1)d\right\}$

$\Rightarrow 5\times\frac{5}{2}(4 + 4d) = \frac{10}{2}[4 + 9d]$
$\Rightarrow 20 + 20d = 8 + 18d$
$\Rightarrow d = -6$

$S_{30} = \frac{30}{2}[2\times 2 + (30-1)(-6)]$

$= \frac{30}{2}[4 + 29\times(-6)]$

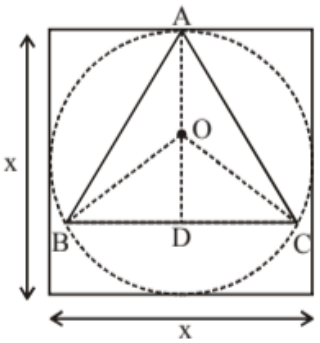
$= \frac{30}{2}\times(-170)$

$= \frac{-5100}{2} = -2550$

46. (1) Let the side of square be x units
Then, Diameter of a circle = x units

So, radius of O circle = $\frac{x}{2}$

$\Rightarrow$ $OA = OB = OC = \frac{x}{2}$



in Δ OBD

$\frac{BD}{OB} = \cos 30°$

$\frac{-2BD}{x} = \frac{\sqrt{3}}{2}$

$2BD = \frac{\sqrt{3}x}{2} = BC$

$\because$ Area of equilateral triangle = $\frac{\sqrt{3}}{4}a^2$

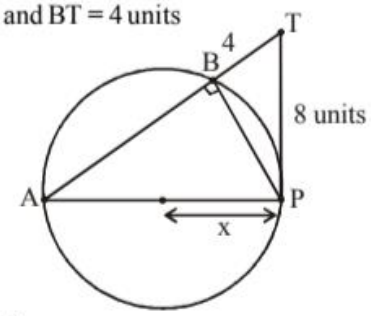
$\therefore$ Area of equilateral Δ ABC = $\frac{\sqrt{3}}{4}\left(\frac{\sqrt{3}x}{2}\right)^2$

$\because = \frac{3\sqrt{3}}{16}x^2$

$\frac{ar.S}{ar.T} = \frac{x^2\ 16}{3\sqrt{3}\ x^2} = \frac{16}{3\sqrt{3}}$

Option 1 is correct.

47. (1) Here, PT = 8 units and BT = 4 units



Then,

$TB \times TA = TP^2$

$\Rightarrow 4 \times TA = (8)^2$

$\Rightarrow TA = 16$

$\therefore \boxed{BA = 12}$

Also, In ΔBTP,

$TP^2 = TB^2 + BP^2$

$\Rightarrow 8^2 = 4^2 + BP^2$

$\Rightarrow BP^2 = 64 - 16 = 48$

$\Rightarrow BP = 4\sqrt{3}$

Also In ΔABP

$AB^2 + BP^2 = AP^2$

$\Rightarrow (12)^2 + \left(4\sqrt{3}\right)^2 = (2x)^2$

$\Rightarrow \boxed{r = 4\sqrt{3} \text{ units}}$ So, option (1) is correct.

48. (1) $x^2 + bx + 72 = 0$ (given)

$\therefore \alpha\beta = 72$

Possible roots for $\alpha, \beta \in$ +ive

(1, 72) (2, 36) (3, 24) (4, 18) (6, 12) (8, 9)

or

(–1, –72) (–2, –36) (–3, –24) (–4, –18) (–6, –12) (–8, –9)

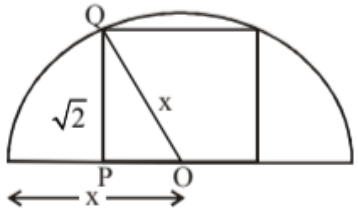
total value of $\alpha + \beta$ can be written in 12 ways.

$\therefore$ Total possible value of b will be 12.

49. (1) Area of square = 2 cm^2

Side of square = $\sqrt{2}$ cm

$OP = \frac{\sqrt{2}}{2}$ cm, OQ = x cm

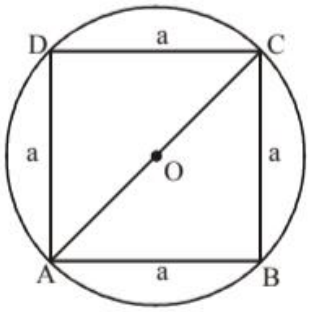


$x^2 = \left(\sqrt{2}\right)^2 + \left(\frac{\sqrt{2}}{2}\right)^2$

$x^2 = 2 + \frac{2}{4}$

$x^2 = \frac{5}{2} \Rightarrow x = \sqrt{\frac{5}{2}}$ cm.

$AC = 2\sqrt{\frac{5}{2}}$ cm (AC = Diameter)



$\left\{\frac{1}{2} \times d_1 \times d_2\right\}$

of ar Square = $\frac{1}{2}$ AC × BD

$= \frac{1}{2} \times 2\sqrt{\frac{5}{2}} \times 2\sqrt{\frac{5}{2}}$

$= 5 \text{ cm}^2$

50. (1) Let the quadratic equations be $a_1x^2 + b_1x + c_1 = 0$ and $a_2x^2 + b_2x + c_2 = 0$

Putting x = 1

Then,

$\Rightarrow a_1 + b_1 + c_1 = a_2 + b_2 + c_2 = 0$

$\Rightarrow b_1 = -(a_1 + c_1)$ and $b_2 = -(a_2 + c_2)$

Also, the discriminants of two quadratic equations are equal.

Then

$\Rightarrow b_1^2 - 4a_1c_1 = b_2^2 - 4a_2c_2$

$\Rightarrow (a_1 + c_1)^2 - 4a_1c_1 = (a_2 + c_2)^2 - 4a_2c_2$

$\Rightarrow (a_1 - c_1)^2 = (a_2 - c_2)^2$

$\Rightarrow a_1 - c_1 = \pm (a_2 - c_2)$

$\Rightarrow \boxed{a_1 - a_2 = c_1 - c_2}$ or $\boxed{a_1 + a_2 = c_1 + c_2}$

Now, the roots of equation, $x = -\frac{b_1 \pm \sqrt{D_1}}{2}$

$= \frac{(a_1 + c_1) \pm \sqrt{(a_1 - c_1)^2}}{2} = \frac{a_1 + c_1 \pm (a_1 - c_1)}{2}$

ie a_1 and c_1

and the roots of equation 2, $x = \frac{-b_2 \pm \sqrt{D_2}}{2} = a_1$ and c_2

$= \frac{(a_2 + c_2) \pm \sqrt{(a_2 - c_2)^2}}{2} = \frac{a_2 + c_2 \pm (a_2 - c_2)}{2}$

ie a_2 and c_2

If $a_1 = a_2 = 1$ be the common roots

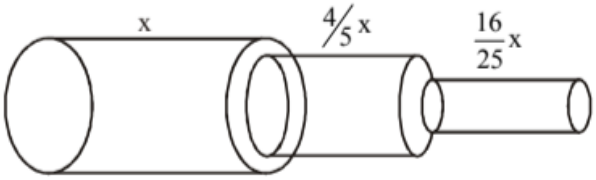
Then, other roots are c_1 and c_2

$\Rightarrow c_1 - c_2 = a_1 - a_2 = 0$ or $c_1 + c_2 = a_1 + a_2$

$\Rightarrow \boxed{c_1 = c_2}$ $\boxed{c_1 + c_2 = 2}$

Hence, roots are either equal or their sum is 2.

51. (3)



{where D is diameter and N be the Rotation}

$D_1 N_1 = D_2 N_2$

$$x \times 32 = \frac{4}{5} x \times N_2$$

$$\boxed{N_2 = 40}$$

Now, $N_2 D_2 = N_3 D_3$

$$40 \times \frac{4x}{5} = \frac{16x}{25} \times N_3$$

$$\boxed{N_3 - 50}$$

52. (2) Let the third point be C(x, y)

Then,

$\Rightarrow$ $CA = CB = AB$

$\Rightarrow$ $CA^2 = CB^2 = AB^2$

$\Rightarrow$ $(x-1)^2 + (y-2)^2 = (x-2)^2 + (y+1)^2 = (1-2)^2 + (2+1)^2$

$\Rightarrow$ $x^2 + 1 - 2x + y^2 + 4 - 4y = x^2 + 4 - 4x + y^2 + 1 + 2y$

$\Rightarrow$ $2x - 6y = 0$

$\Rightarrow$ $x = 3y$ .....(1)

$\therefore$ $(x-1)^2 + (y-2)^2 = 10$

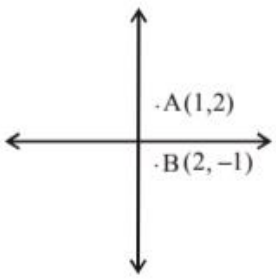
$\Rightarrow$ $(3y-1)^2 + (y-2)^2 = 10$ ($\because x = 3y$)

$\Rightarrow$ $2y^2 - 2y - 1 = 0$

On solving we get.

$\Rightarrow$ $y = 1 \pm \sqrt{3}$

$\therefore$ $x = 3\left(1 \pm \sqrt{3}\right)$



Hence C(x, y) lies in either 1st quadrant or 3rd quadrant.

So, C cannot lies in the second quadrant.

53. (4) Let sides of the solid brick be x, 2x and 3x.

Volume = Number of bricks = $6x_3$

$6x^3 < 400$

$$x^3 < \frac{400}{6}$$

$$x^3 < 66\frac{2}{3}$$

number less than 66 which is perfect cube is 64 than volume = $6 \times 64 = 384$

i e no of cube

54. (4) We need to maximize the median in each group to maximize the average of all median.

Highest possible median is 18 at there should be 3 numbers higher than it in a group of 7.

Se we have

1 2 3 (18) 19 20 21

Similarly, 4 5 6 (14) 15 16 17

7 8 9 (10) 11 12 13

Medians are, 18, 14 and 10.

$$\text{Mean} = \frac{18+14+10}{3} = \frac{42}{3} = 14$$

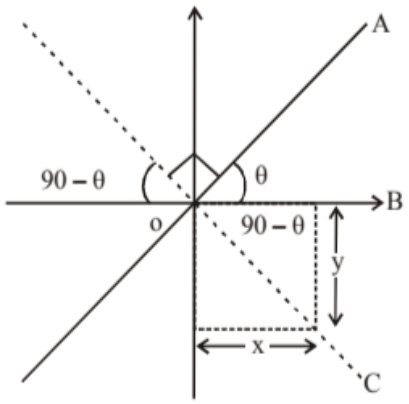
55. (1) Clearly $2272 - 875 = 1397$, will be divisible by N.

$1397 = 11 \times 127$, (Prime factorization).

$\therefore$ The required 3 – digit number is 127,

$\therefore$ Required sum of the digit = $1 + 2 + 7 = 10$

56. (1)



$< AOB = \theta$

$\because$ $CO \perp OA$

$\therefore$ $\angle BOC = (90 - \theta)$

$$\sin\theta = \frac{3}{5}$$

$$\cos\theta = \frac{4}{5}$$

Now, $\sin(90 - \theta) = \frac{-y}{1}$

$\Rightarrow$ $y = \cos\theta$

$\Rightarrow$ $\boxed{y = \frac{-4}{5}}$

$$\cos(90-\theta)=\frac{x}{1}$$

$$\Rightarrow \quad x=\sin\theta \boxed{x=\frac{3}{5}}$$

57. (4) Here $P(x)=x^2+5Kx+K^2+5$

When $x=-2 \quad P(-2)=O$

$\therefore \quad 4-10K+K^2+5=0$

$\Rightarrow \quad K^2-10K+9=0$

$\Rightarrow \quad (K-9)(K-1)=0$

$\Rightarrow \quad K=1,9 \qquad .....(1)$

When, $\quad x=-3 \quad P(-3)\neq O$

$\Rightarrow \quad 9-15K+K^2+5\neq 0$

$\Rightarrow \quad K^2-15K+14\neq 0$

$\Rightarrow \quad (K-14)(K-1)\neq 0$

$\Rightarrow \quad K\neq 14,1 \qquad .....(2)$

From (1) and (2)

$K=9$ Option (4) is correct.

58. (3) $\cos^4\theta+\sin^2\theta=m,$

$$\Rightarrow \quad \cos^4\theta+1-\cos^2\theta=m$$

let $\cos^2\theta=x$

$$m=\cos^4\theta-\cos^2\theta+1$$

$$=\left[\cos^2\theta-\frac{1}{2}\right]^2+\frac{3}{4}$$

Now, $\quad O\le\left(\cos^2\theta-\frac{1}{2}\right)^2\le\frac{1}{4}$

$$\frac{3}{4}\le\left(\cos^2\theta-\frac{1}{2}\right)^2+\frac{3}{4}\le\frac{1}{4}+\frac{3}{4}$$

$$\frac{3}{4}\le m\le 1$$

Option (3) is correct.

59. (2) Let number of apples, bananas and cocounut be x, y and z respectively.

$2x+3y+z=26 \qquad .....(1)$

$3x+2y+2z=35 \qquad .....(2)$

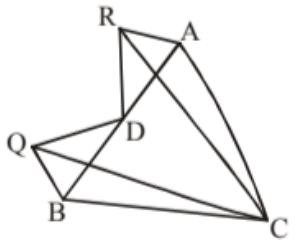
Multiplying Eq(1) with 3 and eq (ii) with 2 and adding

$6x+9y+3z=78$

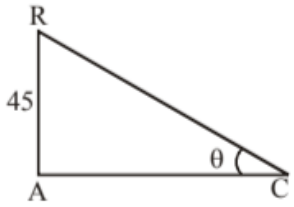
$$\frac{6x+4y+4z=70}{12x+13y+7z=148}$$

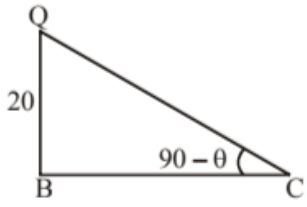
So, Cost of 12 apples, 13 bananas and 7 cocounts is ` 148.

60. (2)



taking ΔARC and ΔBQC





$\tan(90-\theta)=\cot\theta$

$$\frac{20}{BC}=\frac{AC}{45} \text{ (let } AC=BC=x)$$

$x^2=900$

$x=30$

Now, in Δ ARD and BQD

$$\frac{45}{AD}=\frac{20}{BD}=\tan\theta$$

$$\frac{AD}{BD}=\frac{9}{4}$$

$$AD=\frac{9}{13}\times 30=20\left(\frac{10}{13}\right)m$$

61. (3) The correct sequence is I, IV, II and III because :

I. Napolean invaded Italy in 1796.

IV. Vienna settlement took place from November 1814 to June 1815.

II. Unification of Italy held in 1848.

III. Unification of Germany started from 1864 to 1817.

Hence the chronological sequence will be I, IV, II and III.

62. (4) III They were democrats.

IV They did not want any voting right for women.

The liberals were democrats, they believed that each individual has inherent rights. Each citizen should be able to work independently. They also favoured all the religions but they did not believe in giving power to women. They were against the voting rights for women.

63. (2) I and IV

In the beginning Bombay was under the control of Portuguese from 23 December 1534 but in the middle of 7th century Dutch Empire compelled the Britishers to gain the possession over western India. On 21st May 1662 Bombay come into the possession of British

Empire but some of the villages remained in Portuguese possession. And later on Bombay became the capital of presidency in early 19th century. It happened after the Anglo-Maratha war. Bombay became the base camp for the East India company's trade and till 19th century it became the important industrial centre.

64. (3) I, II and IV. (Bonus) correct answer I and II

I. The prior form of printing was known as woodblock printing. It was first started by 'Bi sheng' in China around 1040 AD. Later Gutenberg developed mechanical movrable type printing to Europe in 15th century.

II. The Buddhist missionaries introduced printing in Japan around AD- 768-770. The popular Japanese book, the Buddhist Diamondsutra was printed in AD 808. Images and pictures were printed or published on textiles.

65. (4) Both statements are true, but statement II does not provide explanation of statement I.

Statement I: During the year of the Great Depression the economic crisis was worse in Germany. Great Depression affected many developed nations. It was caused by the stock market crash in 1929 and soon it spread over the U.S. It severly affected the Germany and hit millions of Germans by unemployment many companies shut down or diminish. Great Depression was "an economic bubble" in Germany.

Statement II: The president of the Weimar Republic had the power to impose emergency under the certain circumstances. According to the Constitution of Weimar Republic of Germany under Article 48.

66. (1) Statement I is true and Statement II is false.

Statement I: The Forest Act of 1878 divided forests into three main categories (1) Reserved (2) Protected (3) Village forests. The Best forests were known as "Reserved forests." People's from villages could not take anything from these forests for their personal use. They fulfilled their needs from protected or village forests.

Statement II: Reserved forests were considered the best forests for people's use but it's not true. Villagers were not allowed to fulfil their needs by these forests. They were depended on Protected or village forests to obtained their livelihood.

67. (1) Statement I is true and Statement II is false.

Statement I: Shifting cultivation was widely prevalent in different parts of India in the 19th century. It was the traditional cultivation method of the forest habitant. It affected the development of Indian forestry in 19th century. It increased the pressure on exploitation of natural resources. In India shifting cultivation was extensively practiced in forest regions in the British period. Shifting cultivation was the part of mixed use "agroforestry land" which included farms, grasslands and domesticaled forests.

Excessive shifting cultivation destroys the forests and leads to ecological degradation.

Statement II: More and more people took shifting cultivation when forests laws were enacted is not true. After the implentation of forests laws people adopted the alternative methods of cultivation or profession. People used tawagya system for cultivation for the regeneration of disrobed or degraded forests.

68. (3) Both statements are true and statement II provides explanation to statement I.

Statement I: Cricket emerged as colonial game and limited to British colonies. Here cricket was populaised by settlers, white or by localites. The first cricket club was formed in Hambeldon in 1760s.

Statement II: Cricket was started in south-east England. It spread over the world in 19th and 20th centuries.

69. (1) Statement I is true, statement II is false.

Statement I: Mahatma Gandhi wished everyone had clothes to wear. In 1905, Lord curzon decided the partition of Bengal to stop the opposition against British Rule. The Swadeshi Movement developed in reaction to this meassur. People boycott the foreign goods. Khadi became the ptriatic symbol. Gandhi ji dream was to cloth the whole nation in khadi because he thought khadi would be a great method of wipe out the difference between religious, classes etc. He demanded clothe for everyone in India. Gandhi ji wants to remove the difference of upper and lower class. So, he tried to change the dress code in Indian subcontinents.

Statement II: He wanted everyone to wear the single loin cloth as he did. He wanted everyone to have clothes but never forced anyone to wear the single loin cloth as he did.

70. (3) Both Statement are true and statement II provides explanation to statement I.

Statement I and II: The spanish conquest of America was not a coventional military conquest. It was the most painful weapon of spanish conquerors was not a conventional military weapon. It was the germs of smallpox that they carried on their person. American's habitants had no immunity against those diseases. Smallpox proved deadly killer when introduced once it spread deep into the continents and decimated whole communities.

71. (3) Both statements are true, statement II provides explanation to statement I.

Statement I: The silk routes led to trade and cultural links between distant parts of the world. It is the route taken by Western China silk cargoes. China is famous for the silk export through these routes. There are

many silk routes which connects Asia with Europe and Northern Africa.

Statement II: Early Christian missonaries travelled to Asia through these silk routes. Historians have identified several silk routes which connects Asia with various regions. Trade and culture went hand in hand because of these routes. Many christian missionaries and later the muslim preachers travelled through these routes. Many Boddhist missonaries went from India to China and Chinese Boddhist travellers come to India by using these routes.

72. (4) Both the statements are true, but statement II does not provide explanation of statement I.

Statement I: The French used forced labour in India-China for building canals and draining lands in the Mekong Delta to expand or increase cultivation because they wanted to export rice and earn profit.

Statement II: Vietnam became a major exporter of rice in the world. The Mekong Delta in Vietnam is the heart of rice producing region. Vietnam's total land area of 33 million used for rice cultivation. The Mekong Delta. Known as the "Rice Bowl" of Vietnam where 80% of people involved in rice cultivation.

Both the statements are true but the II statement is not related to the I statement.

73. (2) A - II, B - I, C - IV, D - III

(1) Ionosphere : It is the region of Earth's upper atmosphere which reflects radio waves.

(2) Stratosphere : Stratosphere is the second major layer of Earth's atmosphere. It also contains the Ozone shield or Ozone layer in it which absorb the Sun's ultraviolet (UV) radiation.

(3) Exosphere : The exosphere is the outermost layer of our atmosphere. Air in this layer is extremely thin in different ways. Air is almost same as airlers void of outer space.

(4) Troposphere : Troposphere is the lowest layer of Earth's atmosphere. Most of the mass of atmosphere lies in the troposphere. Weather happens in this layer. As one rises through troposphere the temperature decreases automatically.

74. (1) I, II, and IV

(I) The Rann of Kachch was a gulf of the sea surrounding coastal touns. According to Lyell 1855. The Rann of Kachch is a singularly flat region which is neither a land nor sea which dries up during some part of a year and again inundated by saline water from the sea side and fresh water from the adjoining land area during monsoon. The Rann is a tectonic basic which is now elevated by several small rivers which are pouring water from north-east, east and south.

(II) Kuchaman, Sambhar and Didwana are salt water Lakes: Rajasthan is the arid state of India with the average rainfall less then 100 cm yearly. Rajasthan has a large number of lakes some are artifical and some are historical. The Lakes of Rajasthan divided into two parts.

(1) Saline Water Lakes:- These are considered as remains of Tethys sea like, Didwana Sambhar and Kuchaman.

(2) Fresh Water Lakes:- They are developed naturally or artifically and get replenished by rainwater like, Pichchola, Jaisam and, Rajsamand, Ana sagar etc.

(IV) The fertile flood plains formed by small streams in Rajasthan are known as Rohi. These are originated from western slope of Aravalli and located to the east of Bagar.

75. (2) Kerala

The decadal growth of population in kerala from 2001 to 2011 has been worked out as 4.91 percent almost the half of growth of 9.43% during previous years.

76. (1) A - (II) Rudra Prayag
B - (I) Karn Prayag
C - (III) Nand Prayag
D - (IV) Vishnu Prayag

77. (4) A – (IV) Gneiss
B – (I) Diamond
C – (II) Marble
D – (III) Slate

78. (3) The shaded state indicated in map is not the major producer of potatoes in India. Only U.P. is the largest producer of potatoes in India.

79. (2) A = (IV) Assam
B = (I) Punjab
C = (II) Andhra Pradesh
D = (III) Madhya Pradesh

80. (4) A = (I) Bringa
B = (II) Waltre
C = (IV) Kuruwa
D = (III) Dahiya

81. (4) A = (III) Coimbatore
B = (I) Ludhiana
C = (II) Rishra
D = (IV) Mysuru

82. (4) The Great Nicobar Island is the Indian Island which lies closest to the equator and The Indira point is the southern most point that lies closest to equator.

83. (4) II, III, and IV

II. Generally single crop is grown on a large area in plantation agriculture: It means growing a single crop on the same land repeatedly. It also known as Monoculture.

III. It has an interface of agriculture and industry: Plantation has an interface of agriculture and

industry and their interdependence. Agriculture and industries compliments each other in many ways. Plantation is also known as commercial farming which practised in Assam and Bangal. Under this farming single crop cultivated in large areas of land.

IV. It uses capital intensive inputs. This system of cultivation uses large amount of labour and capital related to land area. These are necessary for the application of fertilizers insecticides to growing crops.

84. (3) A = (III) Below 7°C
B = (IV) 7°C to 17°C
C = (I) Above 24°C
D = (II) 17°C to 24°C

85. (2) In all democracies an assembly of elected representatives exercises political authority on behalf of the people. Parliament has the authority to make new laws for the country and abolish existing laws. Parliament control all the money related issues of government. All the bills have to be presented to Lok Sabha before they become laws. Since Lok Sabha consists of elected representative of the people, it exercises authority over the government.

86. (4) II. Election of the Panchayati Raj Institution are supervised by the Election Commission of India it is not true. Election of the Panchayati Raj Institutions are supervised by State Election Commission.

IV. Half of the seats in all the states are reserved for women. This statement is not true. The Women's Reservation Bill or The constitution (108th Amendment) Bill 2008 was lapsed as Rajya sabha passed the bill on 9th March 2016 but Lok sabha never voted against the bill so, there is no laws or regulation over the reservation seats for women in elections.

87. (1) A = (IV) United States of America
B = (I) India
C = (II) United Kingdom
D = (V) France

88. (3) I, III and IV

I. The constitution of India provides for a three-fold distribution of legislative powers between the union and the state Government. These governments act within a well defined sphere, co-ordinate and at the same time act independently.

II. The Parliament cannot on its can change the power sharing arrangement between the union and the state government. All the states in the Indian union do not have the identical powers. The parliament cannot change the fundamental structure of constitution. Any change in it has to first passed by the houses of Parliament with two-third majority and then by the legislatures by half of the total states.

IV. The high-courts have no role in resolving disputes about the division of powers between the Union and the State Governments. Both Union as well as state government can make laws on the different subjects. If their laws conflicts with each other then the law made by the Union government will be applied or prevailed.

89. (3) Chandigarh – 1 Lok Sabha Constituency
Sikkim – 1 Lok Sabha Constituency
Mizoram – 1 Lok Sabha Constituency

90. (3) Only option 3 reflects socialist feature.
Government should regulate the ownership of land and industry to reduce socio-economic inequalities. According to the Preamble of Indian constitution the rules and regulations has been made to lake the land and industries under the government authorities to remove the socio-economic difference or inequalities. Provision has been made to fulfill the basic necessities of all and equal pay provision for equal work.

91. (1) India has an integrated judiciary is true.
At the summit or top of country's judicial system the supreme court look after the law's of land, comprises Chief Justice and other 25 judges.

- There are high courts at the state level which have juridiction over a state.
- There are District courts which are established by state governments.
- There are subordinate Courts in districts which are civil and criminal in nature.
- Gram Nayayalyas have also been established at panchayat levels from 2008.

In India, Supreme Court is the highest court of appeal which hear cases that comes as an appeal from high courts. Supreme Court decisions are binding on all other courts of the country.

92. (2) Right to education is a part of Right to freedom (Article 21A). Right to education inserted in constitution through 86th amendment act. According to this fundamental right for children in the age group of 6-14 years "The state shall provide free and compulsory education to all children of the age of six to fourteen years in such manner as the state may, by law determine."

93. (4) Women Participation in job market is not the correct criteria or parameter to indicate the growth of economic development.

94. (3) 50 people are earning ` 30 per capita per day. In which government has to add ` 70 to reach the set per capita Larget of ` 100. Whereas 25 people need ` 20 more to reach the target, hence the total money to be spent by state government will be ` 4000

95. (3) Right to choose. According to Article 21 of the constitution people of India, have a right to choose or opt the things without any compulsion and pressure. People can make one's own choices.

96. (1) A = (V) Job opportunities during certain months in the year.
B = (III) Occurs when moving from one job to another.
C = (IV) Actual contribution by the additional Labour is nil.
D = (II) An absence of demand for a certain type of workers.
E = (I) Occurs during boom or recession in the economy.

97. (3) 25%
Indian farmer sell wheat at ` 50 per kg and International price of wheat is ` 40 per kg. ` 10 per kg is to be increased so as to compete with International market ` 10 as percentage leads to 25%.

98. (1) Ramu.
The basic wage rate of a worker in a country is ` 300 per day. Ramu is willing to work at the basic rate of ` 300 a day but still he is not getting work so Ramu is considered as unemployed.

99. (3) Own House can be used as a collateral in India. Although high interest rates and credit costs can make it more expensive to borrow money. But still people use their houses who has low income or those who have credit problems.

100. (2) B is the group of small farmers as Total amount of land owned and operated by this group is 300 and number of families depended on it are 180 (300/180) so, it would be minimum land available to each farmer.