DAV S.C.B APTITUDE TEST
SAMPLE PAPER – 2024

Guidelines to the Candidates:

➢ This Booklet contains printed 11pages and 1 blank page for rough work. Any defect found should be brought to the notice of the invigilator immediately.

➢ Fill in the particulars in the OMR Sheet given to you separately as per the directions given therein.

➢ This test is of three hours' duration.

➢ There are four choices in every question as (a), (b), (c) and (d). Only one is correct. Each question carries 4 marks.

➢ The test consists of 75 multiple choice questions comprising of Mathematics (30), General Science (30) and Aptitude (15) carrying maximum of 300 marks.

➢ -1 will be awarded for each wrong answer/multiple answer.

➢ No mark will be awarded for any overwriting/scratching answer.

➢ No candidate shall leave his/her seat during examination.

➢ Do not tear remove any page of the Booklet.

➢ Calculation, if any, may be done at the blank pages of this booklet provided at the end for rough work. No calculator is allowed.

➢ After finishing the test, the booklet with the OMR sheet is to be handed over to the invigilator before leaving the room.

MATHEMATICS

1. 150 litres of milk contain 20% of water. The amount of water to be added so that amount of water will be 25%, is
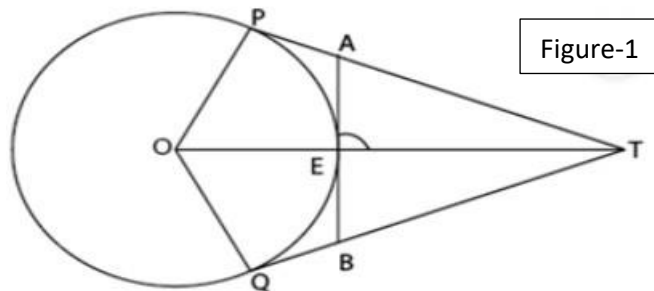   (a) 20 litres   (b) 10 litres   (c) 15 litres   (d) 30 litres

2.

Figure-1

In the above figure-1, O is the centre of a circle of radius 5 cm, T is a point such that OT = 13cm and OT intersects the circle at E, if AB is the tangent

to the circle at E, then the length of AB is

(a) $\frac{10}{3}$ cm   (b) 12cm   (c) 17cm   (d) $\frac{20}{3}$ cm

3. Three horses are tethered with 7 meter long ropes at the three corners of a triangular field having sides 20 m, 34 m and 42 m. The area of the plot which can be grazed by the horses is

(a) 80m²   (b) 100m²   (c) 77m²   (d) 30m²

4. If the point (2, 3) is equidistant from the points (a + b, b−a) and (a−b, a +b), then

(a) 2a = 3b   (b) a + b=1   (c) 3a = 2b   (d) b−a=1

5. The area of in-circle of an equilateral triangle of side 42cm is

(a) $22\sqrt{3}cm^2$ (b) $213\ cm^2$ (c) $924\ cm^2$ (d) $462\ cm^2$

6. The value of k, for which the system of equations x + (k + 1)y = 5 and (k + 1) x + 9y = 8k – 1 has infinitely many solutions, is

(a) 2   (b)3   (c) 4   (d)5

7. If among three numbers the mean of first two numbers is 2, mean of last two numbers is 3 and mean of first and last number is 4, then the mean of these three numbers is

(a) 3   (b) 3.5   (c) 9   (d) 4.5

8. The largest number which divides 31 and 99, leaving remainders 5 and 8 respectively, is

(a)13   (b)65   (c) 875   (d) 1750

9. If $\sin\gamma + \sin^2\gamma = 1$, then $\cos^2\gamma + \cos^4\gamma = ?$

(a) 0   (b) −1   (c) 1   (d) 2

10. If 3 is the least prime factor of m and 5 is the least prime factor of n, then the least prime factor of (m + n) is

(a) 11   (b) 1   (c) 15   (d) 2

11. If two dice are rolled together, then the probability that both of them shows either a prime or a composite number is

(a) $\frac{13}{18}$ (b) $\frac{25}{36}$ (c) $\frac{2}{3}$ (d) $\frac{11}{36}$

12. The number of positive real values of x such that $x^{x\sqrt{x}} = (x\sqrt{x})^x$, is

(a) 1   (b) 4   (c) 2   (d) infinite

13. The number of rows in a lecture hall equals the number of seats in a row. If the number of rows is doubled and the number of seats in every row is reduced by 10, the number of seats is increased by 300. If x denotes the number of rows in the lecture hall, then the values of x is

(a)10   (b) 15   (c) 20   (d) 30

14. A vessel is in the form of an inverted cone. Its height is 8 cm and radius of its top, which is open, is 5cm.It is filled with water up to the brim. When lead shots, each of which is a sphere of radius 0.5cm are dropped into the vessel, one fourth of the water flows out. Then the number of lead shots dropped in the vessel are

(a) 500   (b) 300   (c)200   (d)100

15. The value of $sin^2 5° + sin^2 10° + sin^2 15° + \cdots + sin^2 90°$ is equal to:

(a) 8   (b) 8.5   (c) 9.5   (d)9

16. In a ΔABC, the internal bisectors of ∠B and ∠C meet at P and the external bisectors of ∠B and ∠C meet at Q. Then ∠BPC + ∠BQC =?

(a) 60°   (b) 45°   (c) 90°   (d) 180°

17. If the difference of mode and median of a data is 24, then the difference of median and mean is

   (a) 12   (b) 24   (c) 8   (d)36

18. If r and s are roots of $x^2 + px + q = 0$, then what is the value of $\frac{1}{r^2} + \frac{1}{s^2}$?

   (a) $p^2 - 4q$ (b) $\frac{p^2-4q}{2}$ (c) $\frac{p^2-4q}{q^2}$ (d) $\frac{p^2-2q}{q^2}$

19. The sum of n terms of two A. P are in the ratio (5n+4):(9n+6), then the ratio of their 18th terms is

   (a) $\frac{47}{84}$ (b) $\frac{179}{321}$ (c) $\frac{89}{159}$ (d) $\frac{2}{3}$

20. The maximum volume of a cone that can be carved out of a solid hemisphere of radius r is

   (a) $3\pi r^2$ (b) $\frac{\pi r^3}{3}$ (c) $\frac{\pi r^2}{3}$ (d) $3\pi r^3$

21. If 1/(b + c), 1/(c + a), 1/(a + b) are in AP then

   (a) a, b, c are in AP

   (b) a², b², c² are in AP

   (c) 1/1, 1/b, 1/c are in AP

   (d) None of these

22. If a cone is cut into two parts by a horizontal plane passing through the mid-point of its axis, then the volume of the upper part and the cone is

   (a) 1:8   (b)1:5   (c)1:7   (d)1:6

23. Two numbers 'a' and 'b' are selected successively without replacement in that order from the integers 1 to 10. The probability that $\frac{a}{b}$ is an integer, is

   (a) $\frac{17}{45}$ (b) $\frac{1}{5}$ (c) $\frac{17}{90}$ (d) $\frac{8}{45}$

24. In the following figure, O is the centre of the circle. The value of the angle ∠RSQ is
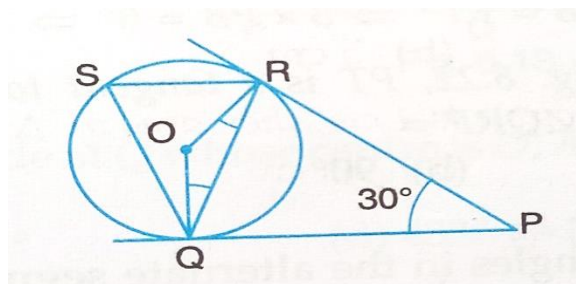
   (a) 60°   (b) 75°   (c) 150°   (d) 45

Question no **33, 34, 35 and 36** are **assertion-reason based questions** in

which a statement of Assertion (A) is followed by a statement of Reason (R).

Choose the correct answer out of the following choices.

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true and R is not the correct explanation of A

(c) A is true but R is false.

(d) A is false but R is true.

25. **Assertion (A):** If three vertices of a parallelogram taken in order are

$(-1, -6), (2, -5)$ and $(7, 2)$, then its fourth vertex is $(4,1)$.

Reason(R): Diagonals of a parallelogram bisect each other.

26. **Assertion (A):** If the total surface area and volume of a cube are numerically equal to 216, then the length of its edge is 6cm.

Reason(R): Volume and total surface area of a cube are always equal.

27. **Assertion(A):** D and E are points on the sides AB and AC respectively of a

ΔABC such that AD = $(7x - 4)$cm, AE=$(5x - 2)$cm, DB = $(3x + 4)$cm and EC=$3x$ cm. If DE ∥ BC, then the value of x is 5cm.

Reason(R): If a line divides any two sides of a triangle in the same ratio then it is parallel to the third side.

CASE BASED QUESTION

(From Question No. 37 – 40 are case based questions based on the following paragraph. Choose the correct option based on this)

A group of students of class X visited India Gate on an education trip. The teacher and students had interest in history as well. The teacher narrated that India Gate, official name Delhi Memorial, originally called All-India War Memorial, monumental sandstone arch in New Delhi, dedicated to the troops of British India who died in wars fought between 1914 and 1919. The teacher also said that India Gate, which is located at the eastern end of the Rajpath (formerly called the Kingsway), is about 138 feet (42 metres) in height.

28. The angle of elevation if they are standing at a distance of 42m

away from the monument is

(a) 30°   (b) 45°   (c) 60°   (d) 0°

29. They want to see the tower at an angle of 60°. So, they want to know the distance where they should stand and hence find the distance.
(Use $\sqrt{3} = 1.732$)

(a) 25.24 m(approx.)

(b) 20.12 m(approx.)

(c) 42 m(approx.)

(d) 24.25m(approx.)

30. The ratio of the length its shadow and the tower is $1:\sqrt{3}$. The angle of elevation of the Sun is

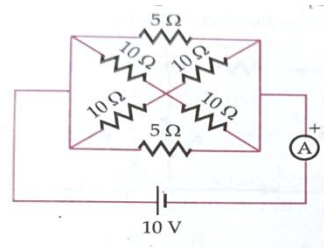(a) 30°   (b) 45°   (c) 60°   (d) 90°

GENERAL SCIENCE

31. An electric bulb is marked 100 W,230V. If the supply drops to 115 V , what is the heat energy produced by the bulb in 20 min? Calculate the current flowing through it.

(a) 50 kJ and $\frac{5}{23}$A

(b) 35 kJ and $\frac{2}{11}$A

(c) 30 kJ and $\frac{5}{23}$ A

(d) 40 kJ and $\frac{2}{11}A$

**32.** Calculate the amount of current flowing through the circuit.

(a) 5 A

(b) 4A

(c) 2.5A

(d) 8A

33. Ten one-rupee coins are put on top of each other on a table. Each coin has mass m. The reaction of the 6th coin (counted from the bottom) on the 7th coin is

(a)4mg   (b)6mg

(c)7mg   (d)3mg

34. The speed-time graph of a particle moving along a fixed direction is as shown in the figure. The distance traversed by the particle between t = 0 s to t = 10 s is
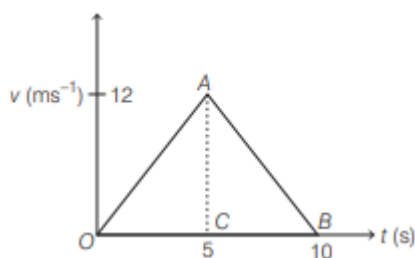
(a) 20 m   (c) 40 m

(b) 60 m   (d) 80 m

35. A glass slab is placed in the path of a beam of convergent light ,then the point of convergence of light

    (a) Moves towards the glass slab

    (b) Moves away from the glass slab

    (c) Remains at the same point

    (d) Undergoes a lateral shift

36. A virtual, erect and magnifiede image of an object is to be produced with a concave mirror of focal length 12 cm. Which of the following object distance should be chosen for this purpose?

    (a) 10 cm

    (b) 14 cm

    (c) 18 cm

    (d) 24 cm

37. A stone is projected vertically up to reach maximum height h. The ratio of its kinetic energy to its potential energy at a height 4 /5 h, will be

    (a) 5 : 4   (b) 4 : 5

    (c) 1 : 4   (d) 4 : 1

38. A hockey player is moving northward and suddenly turns westward with the same speed to avoid an opponent. The force that acts on the player is

(a) frictional force along westward

(b) muscle force along southward

 (c) frictional force along south-west

(d) muscle force along south-west

39. A metal salt MX when exposed to light splits up to form metal M and a gas X_2. Metal M is used in making ornaments whereas gas X_2 is used in making bleaching powder. What could be the metal M and the gas X_2 respectively?

    (a) Gold, oxygen   (b) gold, chlorine   (c) silver, oxygen   (d) silver, chlorine

40. Among the following reactions, which is a redox reaction?

    (a) $CaCO_3$ (s) $\longrightarrow$ CaO (s) + CO_2 (g)

    (b) Mg (s) + CuO (s) $\longrightarrow$ MgO (s) + Cu(s)

    (c) NaOH (aq) + HCl (aq) $\longrightarrow$ NaCl (aq) + H_2O (l)

    (d) KBr (aq) + $AgNO_3$ (aq) $\longrightarrow$ KNO_3 (aq) + AgBr (s)

41. Match the acids given in column (I) with their correct source given in column (II) and choose the correct option.

Column (I)	Column (II)
(A) Lactic acid	(i) Lemon
(B) Citric acid	(ii) Tomato
(C) Acetic acid	(iii) Vinegar
(D) Oxalic acid	(iv) Curd

(a) A – ii, B – iii, C – iv, D – i

(b) A – iv, B – i, C – iii, D – ii

(c) A – iv, B – i, C – ii, D – iii

(d) A – ii, B – iii, C – i, D – iv

42. Which of the following should be the correct order of decreasing value of 2nd ionisation potential of $_6C$, $_7N$, $_8O$ and $_9F$?

(a) $F > O > N > C$ (b) $O > F > N > C$ (c) $O > F > C > N$ (d) $F > N > O > C$

43. Match column I with column II and select the correct answer from the codes given below the columns:

Column (I)	Column (II)
(A) Radioactive	(i) Pt
(B) Lightest metal	(ii) I_2
(C) Noble metal	(iii) Li
(D) Liquid non-metal	(iv) U
(E) Solid volatile non-metal	(v) Br_2
	(vi) H

	A	B	C	D	E
(a)	iv	iii	i	v	ii
(b)	iv	vi	i	v	ii
(c)	i	iii	iv	v	ii
(d)	i	vi	iv	v	ii

44. Riva took a thin strip of filter paper. She did an experiment by putting a small drop of green ink on the baseline drawn 3 c.m. above one of the shortest edges of filter paper and inserting the paper into a jar containing water so that the drop of ink on the paper is just above the water level. She found that the position of blue color pigment is higher than that of yellow. What type of experiment was performed by Riva and which color is more soluble in water?

(a) Paper chromatography, yellow

(b) Paper chromatography, blue

(c) Column chromatography, green

(d) Column chromatography, yellow

45. Stomata are epidermal outgrowths present on epidermal surfaces of leaf and young stem. The stomata are restricted to ----- in monocot leaves.

(a) Lower epidermis

(b) Upper epidermis

(c) Mesophyll zone

(d) Both lower and upper epidermis.

46. Enzymes enhance the rate of metabolic processes by:

(a) Lowering of the activation energy.

(b) Increasing the activation energy.

(c) With out changing the activation energy.

(d) Either lowering or increasing the activation energy.

47. Myogenic muscles are the:

(a) Specialised muscles in the mammalian gut.

(b) Specialised muscles in the mammalian heart.

(c) Specialised muscles in the mammalian pancreas.

(d) Specialised muscles in the mammalian kidney.

48. The given characteristic features represent in which phylum?

1) Their body is porous.

2) Spongocoel is lined by choanocytes or collar cells.

3) They have cellular level of organisation.

4) Water transport or water canal system is present.

Select the correct option:

(a) Echinodermata

(b) Ctenophora

(c) Porifera

(d) Platyhelminthes

49. Haemoglobin is responsible for transport of oxygen in blood. It represents which level of structure of protein arrangement?

(a) Primary structure

(b) Secondary structure

(c) Tertiary structure

(d) Quarternary structure.

50. Which of the following is incorrect with respect to significance of meiotic division?

(a) New recombination of genes.

(b) Number of chromosomes become half.

(c) Number of chromosomes remain same.

(d) Formation of spores and gametes.

51. On selfing a plant of genotype RrTt, 400 plants were raised. How many of them will be of genotype RrTt?

(a) 50

(b) 100

(c) 200

(d) 300

52. Darwin judged the fitness of individuals by:

(a) Ability to defend itself.

(b) Strategy to obtain food.

(c) Number of offsprings produced.

(d) Dominance over other individuals.

53. The organ in humans that undergo degeneration with increase in age and related to immune system is:

(a) Spleen

(b) Pancreas

(c) Liver

(d) Thymus

54. Regeneration of damaged growing grass following grazing is largely due to:

(a) Lateral meristem

(b) Intercalary meristem

(c) Apical meristem

(d) Secondary metabolites

55. Choose the wrong statements for the specialized connective tissue:

1) All of the cartilages in vertebrate embryos are replaced by bones in adults.

2) Cartilage is present in the tip of nose, outer ear joints, between adjacent bones of the vertebral column, limbs and hands in adults.

3) Osteocytes are bone cells and present in the spaces called lacunae.

4) Bone marrow is present in all bones and it is a site of production of blood cells.

5) Blood is a fluid connective tissue.

(a) 1,2 and 5

(b) 1,3 and 5

(c) 1 and 4

(d) 4 and 5

For question numbers 74,75 and 76, two statements are given – one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

(a) Both A & R are true and R is the correct explanation of A.

(b) Both A & R are true but R is NOT the correct explanation of A.

(c) A is true but R is false.

(d) A is false and R is also false.

56. Assertion: As we go up the surface of the earth, we feel light weighed than on the surface of the earth.

Reason: The acceleration due to gravity decreases on going up above the surface of the earth.

57. Assertion : Iodine is necessary for normal rete of hormone synthesis.

Reason : Deficiency of iodine cause diseases.

CASE BASED QUESTIONS:

Acid and base undergo neutralisation reaction to form salt which is an ionic compound. Salt is composed of related number of cations, those coming from base and anions, those coming from acid. Thus, salt is electrically neutral. They may be simple salts such as NaCl, KCl; acid salts like $NH_4)_2SO_4$; basic salts like CH_3COONa; double salt like $K_2SO_4.Al_2(SO_4)_3$.

58. Which one of the following salts does not contain water of crystallisation?
    (a) Green vitriol   (b) Blue vitriol   (c) gypsum   (d) baking soda

59. Potassium sulphate is a salt of
    (a) Strong acid and weak base
    (b) Strong base and weak acid
    (c) Strong acid and strong base
    (d) Weak acid and weak base

60. What happens when a solution of an acid is mixed with a solution of a base in a test tube?
    (i)   Temperature of the solution decreases
    (ii)   Temperature of the solution increases
    (iii)   Temperature of the solution remains the same
    (iv)   Salt formation takes place

    (a) (i) & (iv)   (b) (i) & (iii)   (c) (ii) only   (d) (ii) & (iv)

APTITUDE TEST

61. Solve the following analogy.
    Horse: Stable: Pig: ------
    (a) Den   (c) Sty
    (b) Byre   (d) Hive

62. Find the odd one.
    (a) 256   (c) 1331
    (b) 576   (d) 441

Direction (Q 83 -86): Here you have to assume the given statements to be true even if they differ from generally known facts. Study all the conclusions and then decide which of the conclusions logically follows.
    GIVE ANSWER AS
    a) If both I and II follow
    b) If only conclusion II follows
    c) If either I OR II follows
    d) If neither I nor II follows

63. Statements: Some rooms are stones.
                          All stones are radios.
    Conclusions: I. some rooms are radios.
                       II. some stones are rooms.

64. Statements: All roads are poles.
                    No pole is house.
    Conclusions: I. some roads are houses.
                      II. Some houses are poles.

65. Statements: All birds are trees.
Some trees are hens.
Conclusion: I. some birds are hens.
II. Some hens are trees.

66. If A is the father of B and B is the father of C, then how is C related to A?
(a) .Grandson
(b) Granddaughter
(c) C. Grandfather
(d) Can't be determined.

67. What day of the week was on 13th April,1723?
(a) MONDAY
(b) TUESDAY
(c) WEDNESDAY
(d) FRIDAY

68. Solve the following analogy.
AZCX: BYDW: HQJO: --------
(a) GREP   (c) IPKN
(b) IPKM   (d) GRJP

69. Sam ranked 9th from the top and 38th from the bottom in a class. How many students are there in the class?
(a) 46   (c) 45
(b) 47   (d).48

70. How many meaningful English word can be formed with the letter ESRO using each letter once in each word?
(a) None   (c) Two
(b) One   (d) Three

71. If you write down all the numbers from 1 to 100, then how many times do you write 3?
(a) 19   (c) 21
(b) 11   (d) 20

72. Nitin ranks 18th in the class of 49 students. What is his rank from the last?
(a) 18   (c) 19
(b) 31   (d) 32

73. The ratio of ages of two boys is 5 : 6. After two years the ratio will be 7 : 8. The ratio of their age after 12 years will be :
(a) 22 : 24   (c) 17 : 18
(b)15 : 16   (d) 11 : 12

74. In a school, the ratio of boys to girls is 4 : 3 and the ratio of girls to teachers is 8 : 1. The ratio of students to teachers is
(a) 56 : 3
(b) 55 : 1
(c) 49 : 3
(d) 56 : 1

75. There is a ratio of 5 : 4 between two numbers. If 40 per cent of the first is 12, then 50% of the second number is :
(a) 18
(b) 12
(c) 42
(d) 20