## IMPORTANT INSTRUCTIONS

- The maximum marks are **300.** Time allotted is **90 MINTUES.**
- There are three sections in the question paper having total **75 questions:**
  - Section – A : Maths (25 Questions)
  - Section – B : Science (25 Questions)
  - Section – C : Aptitude (25 Questions)
- Each question carries **4 marks** each
- **Negative Marking**: **1/4 (one-fourth) marks** will be deducted for every incorrect answer.
- **Use only BLUE/BLACK pen to fill the circles in bubble sheet.**
- Use of pencil is strictly **not allowed.**
- **Do not use marker or white fluid** to hide the mark.

## Section – I
## Mathematics

**1.** The LCM of two numbers is 48. The numbers are in the ratio of 2 : 3. Find the sum of the numbers.
(a) 32 (b) 64 (c) 40 (d) 28

**2.** The distance between the points (a + b, a – b) and (a – b, a + b) are.
(a) $\sqrt{8}$ b (b) $\sqrt{a+b}$ (c) a + b (d) 0

**3.** If $\alpha$ and $\beta$ are the zeroes. If the quadratic polynomials f (x) = $kx^2 + 4x + 4$ such that $\alpha^2 + \beta^2 = 24$, find the value of k.
(a) $1, \frac{2}{3}$ (b) $-1, \frac{3}{2}$ (c) $1, \frac{3}{2}$ (d) $-1, \frac{2}{3}$

**4.** Match the following:

| | Column - I | Column - II |
|---|---|---|
| (P) | Rational form of 0. $\overline{32}$ is | (i) $\frac{14}{55}$ |
| (Q) | Rational form of 0.2 $\overline{54}$ is | (ii) $\frac{11}{45}$ |
| (R) | Rational form of 0.1 $\overline{2}$ is | (iii) $\frac{32}{99}$ |
| (S) | Rational form of 0. $2\overline{4}$ is | (iv) $\frac{11}{90}$ |

(a) (P) → (iii); (Q) → (iv); (R) → (i); (S) → (ii)
(b) (P) → (iv); (Q) → (i); (R) → (ii); (S) → (iii)
(c) (P) → (iii); (Q) → (i); (R) → (iv); (S) → (ii)
(d) (P) → (i); (Q) → (iii); (R) → (iv); (S) → (ii)

**5.** Raghav had ₹ $(6x^3 + 2x^2 + 3x)$ and he bought $(4x^2 + 3)$ shirts. The price of each shirt is ₹ $(x + 5)$. How much money is left with Raghav?

(a) ₹ $(2x^3 + 18x^2 + 15)$ (b) ₹ $(4x^2 + 2x + 3)$

(c) ₹ $(x^3 - 3x)$ (d) ₹ $(2x^3 + 2x^2 - 15)$

**6.** Read the statements carefully and state 'T' for true and 'F' for false.

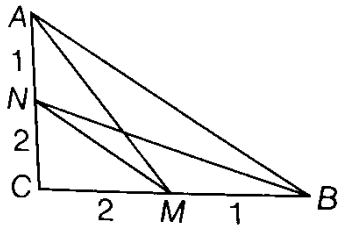
(i) The Pair of linear equations $x + 2y = 5$ and $7x + 3y = 13$ has unique solution x = 2, y = 1.

(ii) $\sqrt{2}\,x + \sqrt{3}y = 0$, $\sqrt{3}x - \sqrt{8}y = 0$ has no solution.

(iii) The values of p and q for which the following system of equations $2x - y = 5$, (p + q) x + (2p – q)y = 15 has infinite number of solutions, is p = 1 and q = 5.

| | (i) | (ii) | (iii) |
|---|---|---|---|
| (A) | T | F | T |
| (B) | T | T | F |
| (C) | F | T | T |
| (D) | F | F | T |

**7.** In $\Delta ABC$, right angled at C, N and M are the points on the sides CA and CB respectively, dividing the sides in the ratio 2 : 1, then which of the following is true



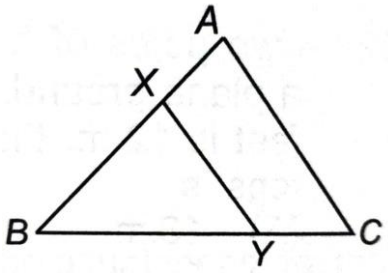

(a) $10BN^2 = 9BC^2 + 4AC^2$

(b) $10AM^2 = 9AC^2 + 4BC^2$

(c) $9(AM + BN^2) = 13AB^2$

(d) None of these

**8.** In the given figure, the line segment XY is parallel to side AC of $\Delta ABC$ and its divides the triangle into two parts of equal area. Then, find



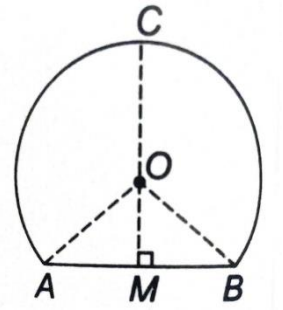

(i) AX : AB (ii) $\frac{AC}{XY}$

| | (i) | (ii) |
|---|---|---|
| (A) | $(2 + \sqrt{2}) : 2$ | $\sqrt{2}$ -2 |
| (B) | $(2 - \sqrt{2}) : 2$ | $\sqrt{2}$ -1 |
| (C) | $(2 - \sqrt{3}) : 3$ | 3 |
| (D) | $(2 + \sqrt{2}) : 3$ | $\sqrt{2}$ -3 |

**9.** If $\frac{x}{a}\cos\theta + \frac{y}{b}\sin\theta = 1$ and $\frac{x}{a}\sin\theta - \frac{y}{b}\cos\theta = 1$, then what is the value of $\frac{x^2}{a^2} + \frac{y^2}{b^2}$ ?

(a) 0 (b) 1 (c) 2 (d) None of these

**10.** The adjacent figure shows a cross-section of a railway tunnel. The radius OA of the circular part is 2 m. If $\angle AOB = 90^{\circ}$, then choose the correct match from the following.




| | List I | List II |
|---|---|---|
| A. | Height of the tunnel | i. $(2 + \sqrt{2})$ m |
| B. | Perimeter of cross-section | ii. $(3\pi + 2\sqrt{2})$m |
| C. | Area of the cross- section | Iii $(2 + 3\pi)$m |

**Codes:**

| | A | B | C | | A | B | C |
|---|---|---|---|---|---|---|---|
| (a) | iii | ii | i | (b) | ii | i | iii |
| (c) | i | iii | ii | (d) | i | ii | iii |

**11.** The given numbers are arranged in the descending order: 108, 94, 88, 82, x + 7, x – 7, 60, 58, 42, 39. If the median is 73, then the value of x is

(a) 72 (b) 73 (c) 76 (d) 75

**12.** If A + B = $90^{\circ}$, then

$$\sqrt{\frac{tanA\ tanB + tanA\ Cot\ B}{sinA\ \ secB} - \frac{sin^2B}{cos^2A}}$$

(a) tan A + tan B (b) tan A (c) tan B (d) None of the above

**13.** The point P (4, 3) is reflected in the X-axis as P'(x, y) and O' is the image of O (the origin) when reflected in the line PP'. Find the lengths of the segments PP' and OO'.

(a) 8 units, 6 units (b) 6 units, 8 units (c) 64 units, 36 units (d) 36 units, 64 units

**14.** If points A(-3, 0), B (x, - 3) and C (4, 1) are the vertices of an isosceles right angle triangle with AC as the hypotenuse, then the area of the triangle is

(a) $\frac{25}{2}\ sq\ units$ (b) $25\ sq\ units$ (c) $50\ sq\ units$ (d) $\sqrt{50}\ sq\ units$

**15.** Three cards of spades are lost from a pack of 52 playing cards. The remaining cards were well shuffled and then a card was drawn at random from them. Find the probability that the drawn card is of black colour.

(a) $\frac{26}{49}$ (b) $\frac{23}{49}$ (c) $\frac{13}{26}$ (d) $\frac{23}{52}$

**16.** A square water tank has its sides equal to 40 m. There are four semicircular grassy plots all round it. Find the cost of turfing the plots at ₹ 1.25 per sq. m. (Use $\pi = 3.14$)

(a) ₹ 2671 (b) ₹ 4401 (c) ₹ 2512 (d) ₹ 3140

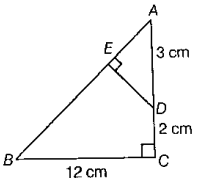
**17.** There are 45 tickets numbered as 1, 2,3,……, 45 respectively. One ticket is drawn at random. If the ticket with a number as the multiple of 3 and 5 cost ₹ 50 and other tickets as for free, then the probability that a person buying the ticket needs to pay ₹ 50 is

(a) $\frac{1}{15}$ (b) $\frac{2}{15}$ (c) $\frac{3}{15}$ (d) $\frac{4}{15}$

**18.** In the given figure, if $\Delta ABC$ is right angled at C and DE ⊥ AB. Then, length of AE is

(a) $\frac{15}{13}$ cm (b) $\frac{13}{15}$ cm

(c) $\frac{11}{13}$ cm (d) $\frac{11}{15}$ cm



**19.** If P = $\frac{x^2+4x+4}{x^2-5x+6}$, Q = $\frac{x^4-8x}{x^2-3x-10}$ and R = $\frac{(2x^2+4x+8)(2x+4)}{x^2-8x+15}$

Then, (P × Q) ÷ R is equal to

(a) $x^2$ (b) 2/x (c) x/4 (d) $x^2+1$

**20.** The pair of equations $4^{x+y}$ = 256 and $256^{x-y}$= 4 will be

(a) intersecting (b) parallel (c) coincident (d) Can't be determined

**21.** Let $x, y$ *and* $z$ be distinct integers, where x, y are odd and positive, z is even and positive. Then, which of the following cannot be true?

(a) $(x-z)^2$ y is odd (b) $(x-y)^2$ z is even

(c) $(x-z)^2$ y is even (d) $(x+y)^2$ z is odd

**22.** If a and b are zeroes of the polynomial $3x^2+13x+4$, then $\frac{a}{b}+\frac{b}{a}$ is equal to

(a) $\frac{169}{12}$ (b) $\frac{145}{12}$ (c) $\frac{144}{12}$ (d) $\frac{167}{12}$

**23.** A person can row 4 km upstream and 12 km downstream in 4 h. If he can row 6 km upstream and 6 km downstream in 4 h. Then, the speed of person in still water and speed of current is

(a) 4 km, 4 km (b) 2 km, 4 km (c) 4 km, 2 km (d) None of these

**24.** The sum of a two - digit number and the number formed by interchanging its digits, is 132. If 15 is subtracted from the first number, then the new number is 6 more than 3 times the sum of the digits of the first number. Then, the original number is

(a) 75 (b) 57 (c) 63 (d) 59

**25.** x % of y + y% of x is equal to

(a) 2% of $xy$ (b) y% of x (c) x% of y (d) xy% of 3

## Section – II
## SCIENCE

**26.** When hydrogen sulphide gas is passed through a blue solution of copper sulphate, a black precipitate of copper sulphide is obtained and the sulphuric acid so formed remains in the solution. The reaction is an example of:

(a) a combination reaction (b) a displacement reaction
(c) a decomposition reaction (d) a double displacement reaction

**27.** What is the physical appearance of calcium oxychloride ?

(a) Yellow oily liquid (b) Yellowish – white powder
(c) Greyish black powder (d) Colourless liquid

**28.** The composition of aqua - regia is

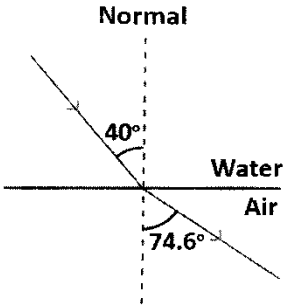
(a) dilute HCl : conc. $HNO_3$ :: 3 : 1 (b) conc. HCl : dilute $HNO_3$ :: 3 : 1
(c) conc. HCl : conc. $HNO_3$ :: 3 : 1 (d) dilute 1 : dilute $HNO_3$ :: 3 : 1

**29.** Which of the following statements are true?

(i) The principal focus of converging lens is real.
(ii) The principal focus of a diverging lens is virtual.
(iii) The principal focus of a lens always lies on the principal axis.

(a) Only (i) and (ii) (b) Only (ii) and (iii)
(c) Only (i) and (iii) (d) (i), (ii) and (iii)

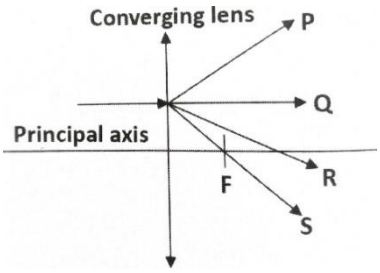
**30.** A ray of light travels from water to air as shown below.




Given that the refractive index of air is 1.0, what is the refractive index of glass?

(a) 1.2 (b) 1.3 (c) 1.4 (d) 1.5

**31.** A light ray is parallel to the principal axis of a converging lens as shown below.




Identify the correct position of the emergent ray.

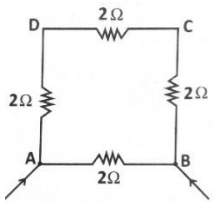
(a) Q (b) R (c) P (d) S

**32.** In an experiment to determine the focal length of a converging lens, the object distance and the image distance recorded were 20 cm and 30 cm respectively. What is the focal length of the converging lens?
(a) 10 cm (b) 12 cm (c)15 cm (d) 18 cm

**33.** If the earth had no atmosphere, how would the sky appear?
(a) Colourless (b) White (c) Blue (d) Black

**34.** On What factors does the heat generated in a conductor depend upon?
(a) Directly proportional to time
(b) Inversely proportional to time
(c) Directly proportional to density
(d) Inversely proportional to mass

**35.** Four resistors of 2 Ω each are joined end to end to form a square ABCD.




Calculate the equivalent resistance of the combination between any two adjacent corners.
(a) 1.5 Ω (b) 3.0 Ω (c) 4.5 Ω (d) 6.0 Ω

**36.** Oxygen liberated during photosynthesis comes from:
(a) Water (b) Chlorophyll (c) Carbon dioxide (d) Glucose

**37.** The blood leaving the tissues becomes richer in:
(a) Carbon dioxide (b) Water (c) Haemoglobin (d) Oxygen

**38.** When is root pressure a significant contributor to ascent of sap?
(a) At night (b) During day (c) In winter (d) At no time

**39.** In which part of the plant actual excretion of waste products can occur:
(a) Sap vacuoles (b) Roots (c) Leaves (d) Stems

**40.** For removal of chlorophyll, leaf is boiled in a breaker of alcohol, kept in water bath. Water bath is essential because:
(a) Water heats up the leaf quickly
(b) Steam from water bath dissolves chlorophyll quickly
(c) Alcohol is highly inflammable
(d) Alcohol is volatile.

**41.** Which property of a metal helps it to bear a lot of strain?
(a) Hardness (b) Tensile strength (c) Ductility (d) Malleability

**42.** Identify the formula of super phosphate of lime?
(a) $Ca_3(PO_4)_2$ (b) $CaHPO_4$ (c) $Ca(OH)_2$ (d) $Ca(H_2PO_4)_2H_2O$

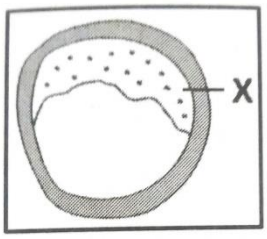
**43.** Which gas is evolved when copper is treated with dil. $HNO_3$?
(a) $H_2$ (b) NO (c) $N_2O$ (d) $N_2O_3$

**44.** Which of the following take place after we exercise?
(a) Out body needs more oxygen
(b) Our body needs to replace the energy used.
(c) Our body needs to get rid of excess carbon dioxide.
(d) All of these

**45.** Which of the following cell organelles carries out photosynthesis?
(a) Chloroplast (b) Mitochondria (c) Cytoplasm (d) Nucleus

**46.** Which of the following glands produce amylolytic enzymes?
(a) Salivary glands and liver (b) Stomach and pancreas
(c) Salivary glands and pancreas (d) Stomach and liver

**47.** Which of the following foods, when consumed in excess, cause the deposition of substance X in an artery as in the given figure?




(a) Banana (b) Strawberries (c) Citrus fruits (d) Poultry

**48.** Which of the following are found in the blood but not in the lymph?
(a) Erythrocytes (b) Platelets (c) Plasma (d) All of these

**49.** Which of the following statements is/are true based on the given reactions?

$ZnO + C \rightarrow Zn + CO$

$2Fe_2O_3 + 3C \rightarrow 4Fe + 3CO_2$

(a) Carbon is reduced (b) Metal oxide is reduced
(c) Metal oxide is oxidised (d) Both (B) and (C)

**50.** Identify 'X' and 'Y' in the given chemical equation.

$X + YSO_4 \rightarrow Y + XSO_4$

(a) Na and Mg (b) Zn and Cu (c) Ag and K (d) H and Al

## Section – III
## Mental Ability

**51.** Choose the best alternative

3 : 11 : : 7 : ?

(a) 51 (b) 22 (c) 29 (d) 18

**52.** Find the missing terms in the given series.

G 2 X , J 4 V, M 8 T, ? , S 3 2 P

(a) P 8 S (b) Q 1 6 R (c) P16 R (d) N 6 4 S

**53.** Find the number which is not like the other 3 numbers.

(a) 12336 (b) 12448 (c) 12556 (d) 12672

**54.** If '+' means '×' , '−' means '÷ ′ , '×' means '−' and '÷ ′ means '+' then

10 + 4 × 25 – 5 ÷ 8 =

(a) 48 (b) 53 (c) 35 (d) None of these

**55.** Replace the questions mark by choosing the correct answer from the given options

| | | |
|---|---|---|
| 5 | 10 | 30 |
| ? | 4 | 12 |
| 6 | 12 | 36 |

(a) 4 (b) 2 (c) 7 (d) 3

**56.** If 18th March falls on Wednesday, then 1st March was on

(a) Tuesday (b) Sunday (c) Saturday (d) Monday

**57.** If Sunita is taller than Seema and Reena. Reena is shorter than Radha and Gouri, Bina is taller than Radha and shorter than Sunita. Sunita is not the tallest and Reena not the shortest, then who is the tallest?

(a) Gouri (b) Bina (c) Seema (d) Data inadequate

**58.** Laxmi went 10 km to the west from my house then turned left and walked 20 kms. She then turned east and walked 25 kms and finally turning left covered 20 kms. How far was she from my house?

(a) 5 km (b) 10 km (c) 40 km (d) 15 km

**59.** $(54.4 \times 5 \times 8) \div 16 + 8 = (?)^2$

(a) 12 (b) $(12)^2$ (c) $\sqrt{12}$ (d) $2\sqrt{12}$

**60.** Out of the fraction $\frac{3}{7}$ , $\frac{11}{13}$ , $\frac{6}{11}$ , $\frac{7}{8}$ and $\frac{5}{9}$ what is the sum of the largest and smallest fraction

(a) $1\frac{13}{77}$ (b) $1\frac{5}{63}$ (c) $1\frac{17}{56}$ (d) $1\frac{19}{99}$

**61.** In a certain code 'PAGE' is written as '3%7@', 'SORE' is written as '8©9@'. How is 'PEAS' written in that code?

(a) 3@ © 8 (b) 3 @ % 8 (c) 3 @ % 7 (d) 3 % @ 8

**62.** Paw : Cat :: Hoof : ?

(a) Lamb (b) Horse (c) Elephant (d) Tiger

**63.** In a row of persons, the position of Sakshi from the left side of the row is 26th and position of skashi from the right side of the row is 35th. Find the total number of students in the row.

(a) 60 (b) 32 (c) 67 (d) 72

**64.** A is B's sister. C is B's mother. D is c's father. E is D's mother, then how is A related to D?

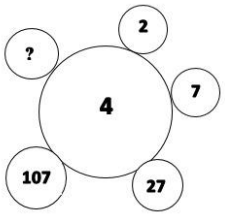
(a) Daughter (b) Grandmother (c) Grand daughter (d) Grand father

**65.** If x > 8 and y > - 4, then which one of the following is always true?
(a) xy < 0 (b) y > x (c) – x < 2y (d) x > y

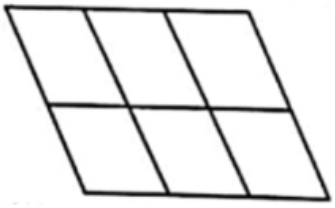
**66.** Rearrange the jumbled letters to make a meaningful word and then select the one which is different.
(a) THEA (b) DNHA (c) EDAH (d) IRHA

**67.** Find the next term in the following term.
40320, 5760, 960, 192, 48, ….?
(a) 14 (b) 18 (c) 16 (d) 22

**68.** Find the missing number in each of the following figures
(a) 407 (b) 427
(c) 417 (d) 327




**69.** Number of parallelogram in the given figure is



(a) 16 (b) 20 (c) 19 (d) 18

**70.** Looking at a portrait of a man, Harsh said, "His mother is the wife of my father's son. Brother and sister I have none." At whose portrait was Harsh looking?
(a) His son (b) His cousin (c) His Uncle (d) none of these

**Directions (Q. Nos 71 to 75) Study the following information carefully and answer the given questions.**
A, B, C, D, F, G, H and J are sitting around a circular table facing the centre.
(i) D sits exactly between J and F
(ii) J sits second to the left of F and second to the right of B.
(iii) H sits third to the left of G.
(iv) A is not an immediate neighbour of B.

**71.** How many people sit between G and H when counted in an anti-clockwise direction from G?
(a) One (b) Two (c) Three (d) Four

**72.** If H : F and then J : ?
(a) B (b) F (c) H (d) None of these

**73.** If all the persons are made to sit in alphabetical order in anti-clockwise direction, starting from A, the positions of how many (excluding A) will remain unchanged as compared to their original seating positions?
(a) None (b) One (c) Two (d) Three

**74.** In which of the following pairs, is the second sitting to the immediate left to the first person?
(a) GJ (b) FA (c) CH (d) AH

**75.** Who sits third to the left of J?
(a) B (b) A (c) C (d) H