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Series
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CODE : 23

Write here Roll Number and Answer Sheet No.

Question Booklet Sl. No.

Roll No.

Answer Sheet No.

Duration : 1 Hour

Total Marks : 100

Declaration by Invigilator :
I Certify that I have checked that the Roll Number and the Answer Sheet Number written by the Candidate on the question paper and the OMR Sheet are correct and the Answer Sheet Number matches the Question Booklet Number exactly.

Signature of the Invigilator with Name

Declaration by Candidate :
I undertake not to employ any unfair means in this exam. I have checked the Question Booklet Number and the Answer Sheet Number and both are identical and have been correctly entered by me wherever indicated.

Signature of the Candidate with Name

Read the following instructions carefully before you begin to answer the questions.

IMPORTANT INSTRUCTIONS TO CANDIDATES

1. The Roll No. is a **7** digit No., the candidate needs to circle the Roll No. in the Answer Sheet.
2. The appropriate Circle should be shaded for Roll No. This should be done carefully because only the shaded circles are scanned.
3. Valuation of Answer Sheet will be done on the computer. Candidate should not make any stray marks on the Answer Sheet, tamper with or mutilate it. Otherwise it will not be evaluated.
4. Please check all the pages of the Booklet carefully. In case of any defect, please ask the Invigilator for replacement of the Booklet.
5. ou must not tear off or remove any sheet from this Booklet. The Answer Sheet must be handed over to the Invigilator before you leave the Examination Hall.
6. All questions are compulsory and each Question carries **2** marks.
7. **The paper carries negative marking. For each wrong answer 0.50 mark will be deducted.**
8. This Booklet contains 50 questions.
9. Use of Calculator/Palmtop/Laptop/Other Digital Instrument/Mobile/Cell Phone/Pager is **not** allowed.
10. Candidates found guilty of misconduct/using unfair means in the Examination Hall will be liable for appropriate penal/legal action.
11. **No Rough Work is to be done on the Answer Sheet and only single OMR Answer Sheet will be provided.**
12. This booklet contains **12** pages.
13. **Directions** : Each question or incomplete statement is followed by four alternative suggested answers or completions. In each case, you are required to select the one that correctly answers the question or completes the statement and blacken (●) appropriate circle a, b, c or d by Blue / Black Ball-Point Pen provided by the board against the question concerned in the Answer Sheet.
14. Mark your answer by shading the appropriate circle against each question. The circle should be shaded completely without leaving any space. The correct method of shading is given below.

Wrong Method	Wrong Method	Wrong Method	Correct Method
○ ⊗ ○ ○	○ ⊘ ○ ○	○ ◉ ○ ○	○ ● ○ ○

The Candidate must mark his/her response after careful consideration, as it is not possible to change the response once it is marked.

15. There is only one correct answer to each question. You should blacken (●) the circle of the appropriate column, viz., a, b, c or d. If you blacken (●) more than one circle against any one question, the answer will be treated as wrong.
16. Use the space for rough work given at the beginning of the Question Booklet only and not on the Answer Sheet.
17. **You are NOT required to mark your answers in this Booklet. All answers must be indicated in the Answer Sheet only.**

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DO NOT WRITE HERE

SPACE FOR ROUGH WORK

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1. The largest number among the given surds $\sqrt{62}$, $4\sqrt{5}$, $3\sqrt{9}$ and $2\sqrt{17}$ is

   (a) $3\sqrt{9}$ (b) $\sqrt{62}$

   (c) $4\sqrt{5}$ d) $2\sqrt{17}$

2. The value of $3^{30} + 9^{16} + 27^{11} + 81^{8}$ is equal to

   (a) 49×3^{30} (b) 46×3^{30}

   (c) 48×3^{30} (d) 50×3^{30}

3. If $x = \sqrt{64} + \sqrt{60}$, then $\frac{x}{2} + \frac{2}{x} =$

   (a) 4 (b) 6

   (c) 8 d) 10

4. In an election, 3 candidates A, B and C contested. Of the votes polled A got 42%, B got 28% of the votes polled and C got the rest. If A got 3096 more votes than C, then the total number of votes polled is

   (a) 25 b) 22900

   (c) 21600 (d) 20800

5. If profit as a percentage of the selling price is 25%, then what is profit as a percentage of the cost price is

   (a) 25% (b) $33\frac{1}{3}\%$

   (c) 20% (d) 15%

6. A student can solve 75 questions in 1 hour. Another student can solve 100 questions in 2 hours. In how many minutes do they together solve 250 questions ?

   (a) 120 mins (b) 90 mins

   (c) 7 mins (d) 10 mins

7. If 15 men or 24 women can do a work in 18 days, then in how many days 10 men and 32 women together complete the work ?

   (a) 9 days (b) 3 days

   (c) 6 days (d) 12 days

8. If $\cos x + \sec x = 2$, then $\cos^{100} x + \sec^{100} x =$

   (a) 50 (b) 1

   (c) 2^{50} (d) 2

9. The value of $\tan 1° \tan 2° \tan 3° ... \tan 89°$ =
   (a) 0 (b) 1
   (c) $\frac{1}{2}$ (d) not defined

10. The minimum value of $3\cos x + 4\sin x + 8$ is equal to
   (a) 5 (b) 9
   (c) 7 (d) 3

11. If A lies in II quadrant, $3\tan A + 4 = 0$, then the value of $2\cot A - 5\cos A + \sin A$ is equal to
   (a) $\frac{23}{10}$ (b) $\frac{-53}{10}$
   (c) $\frac{-23}{10}$ (d) $\frac{7}{10}$

12. For real values of x, $\cos\theta = \frac{1}{x} + x$, then
   (a) θ is an acute angle
   (b) θ is a right angle
   (c) θ is an obtuse angle
   (d) no value of θ is possible

13. If $\tan\theta = \frac{a}{b}$, then the value of $b\cos 2\theta + a\sin 2\theta$ is
   (a) a (b) b
   (c) $\frac{a}{b}$ (d) $\frac{b}{a}$

14. If $\frac{\sin(x+y)}{\sin(x-y)} = \frac{a+b}{a-b}$, then $\frac{\tan x}{\tan y}$ =
   (a) $\frac{a}{b}$ (b) $\frac{b}{a}$
   (c) a^2 (d) b^2

15. In an Arithmetic Progression (A.P.), the pth term is q and $(p + q)^{th}$ term is zero, then q^{th} term of the A.P. is
   (a) $-p$ (b) p
   (c) $p + q$ (d) $p - q$

16. The minimum value of the expression $3^{1-x} + 3^x$, $x \in R$ is

(a) 0 (b) $\frac{1}{3}$

(c) 3 (d) $2\sqrt{3}$

17. A man saved Rs. 66,000 in 20 years. In each succeeding year after the first year, he saved Rs. 200 more than what he saved in the previous year. How much did he save in the first year ?

(a) Rs. 1,400 (b) Rs. 1,250

(c) Rs. 1,600 (d) none of these

18. If a, b, c are 3 consecutive terms of an A.P. and x, y, z are 3 consecutive terms of a G.P., then $x^{b-c}\, y^{c-a}\, z^{a-b} =$

(a) xyz (b) 1

(c) – 1 (d) 0

19. $\lim\limits_{x \to \frac{\pi}{6}} \frac{\cot^2 x - 3}{\text{cosec } x - 2} =$

(a) 4 (b) – 4

(c) 2 d) –

20. $\lim\limits_{x \to 0} \frac{2 \sin x - \sin 2x}{x^3} =$

(a) – 1 (b) $\frac{1}{2}$

(c) 1 d) $\frac{-1}{2}$

21. If $f(x) = 1 - x + x^2 - x^3 ... - x^{99} + x^{100}$, then $f'(1) =$

(a) 150 b) –

(c) – 150 (d) 50

22. If $f(x) = x^3 - \frac{1}{x^3}$, then $f(x) + f\left(\frac{1}{x}\right) =$

(a) $2x^3$ (b) $\frac{2}{x^3}$

(c) 0 (d) 1

23. The number of terms in the expansion of $(x + 3)^5 - (x - 3)^5$ after simplification is

(a) 6 (b) 3

(c) 5 (d) none of these

24. The number of terms in the expansion of $(x + y + z)^3$ is

(a) 10 (b) 2

(c) 9 (d) 12

25. If $f(x) = \frac{1}{4x^2 + 2x + 1}$, then its maximum value is

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

26. $\int e^x \left(\frac{1-x}{1+x^2}\right)^2 dx =$

(a) $\frac{-e^x}{1+x^2} + c$ (b) $\frac{e^x}{1+x^2} + c$

(c) $\frac{e^x}{\left(1+x^2\right)^2} + c$ (d) $\frac{-e^x}{\left(1+x^2\right)^2} + c$

27. If definite integral $\int_0^a \frac{dx}{1+4x^2} = \frac{\pi}{8}$, then the value of a is

(a) 0 (b) $\frac{1}{2}$

(c) 1 d) $\frac{3}{2}$

28. $\int_{-\pi/2}^{\pi/2} \sin^5 x dx =$

(a) $\frac{5\pi}{2}$ (b) 5π (c) 0 (d) 1

29. $\int \frac{e^{6\log x} - e^{5\log x}}{e^{4\log x} - e^{3\log x}} dx =$

(a) $\frac{x^2}{2} + c$ (b) $\frac{x^3}{3} + c$

(c) $x^3 + c$ (d) none of these

30. If $f(x) = \begin{cases} \frac{2x^2 - 3x - 2}{x - 2} & , \text{ if } x \neq 2 \\ k & , \text{ if } x = 2 \end{cases}$ is continuous at x = 2, find k.

(a) -5 (b) -3 (c) 5 (d) 3

31. A unit vector in the direction of sum of vectors $\vec{a} = 2\hat{i} - \hat{j} + \hat{k}$ and $\vec{b} = 2\hat{j} + \hat{k}$ is

(a) $\frac{2\hat{i} + 2\hat{j} + \hat{k}}{3}$ (b) $\frac{2\hat{i} + \hat{j} + 2\hat{k}}{3}$

(c) $\frac{2\hat{i} + \hat{j} + 2\hat{k}}{5}$ (d) none of these

32. The area enclosed by the curve x = 3 cost and y = 2 sint is

(a) 6π sq. units (b) $\frac{\pi}{6}$ sq. units

(c) 12π sq. units (d) π sq. units

33. The area of the region included between the curve $y^2 = 9x$ and the line y = x is

(a) 27 sq. units (b) $\frac{27}{2}$ sq. units

(c) 13 sq. units (d) 100 sq. units

34. A boat goes 30 km upstream and 44 km downstream in 10 hours. In 13 hours, it goes 40 km upstream and 55 km downstream. Find the speed of boat in still water.

(a) 8 km/hr (b) 5 km/hr

(c) 10 km/hr (d) none of these

35. The present age of a father is 3 years less than 4 times the present age of his son. After 4 years, the age of father will be 1 year more than thrice the age of his son. What is the present age of the son ?

(a) 10 yrs (b) 12 yrs

(c) 8 yrs (d) none of these

36. There is a circular path around a sports field. Mr. X takes 18 minutes to cover one round of the field while Mr. Y takes 12 minutes for the same. Suppose they both start at the same point and at the same time and go in the same direction, then after how many minutes will they meet again at the starting point ?

(a) 60 minutes (b) 24 minutes (c) 36 minutes (d) 40 minutes

37. The HCF of $\frac{2}{3}, \frac{4}{9}$ and $\frac{7}{20}$ is

(a) $\frac{1}{90}$ (b) $\frac{56}{180}$

(c) $\frac{1}{180}$ (d) none of these

38. The side of a square is four-fifth of the radius of a circle of circumference 220 cm., then the area of the square is

(a) 78 sq. cm.
(b) 900 sq. cm.
(c) 640 sq. cm.
(d) none of these

39. The mean of a group of 100 observations was found to be 20. Later on it was found that 3 observations were incorrect, which were recorded as 21, 21 and 18. The mean if the incorrect observations were omitted is

(a) 18 (b) 20
(c) 21 d) none of these

40. The smallest number that should be multiplied to 1680 to make it a perfect square is

(a) 75 (b) 1
(c) 135 (d) 1

41. If the six digit number 47x2y8 is divided by 9, then the lowest value of x + y is

(a) 0 (b) 2
(c) 4 d) 6

42. The greatest number which divides 89, 127 and 163 leaving the same remainder in each case is

(a) 2 (b) 4
(c) 6 d) 8

43. The average marks of 4 students is 78. If 3 of them scored 82, 80 and 72, then marks scored by the 4th student is

(a) 75 b) 80

(c) 78 (d) none of these

44. If $y = \frac{1+\frac{1}{x^2}}{1-\frac{1}{x^2}}$, then $\frac{dy}{dx} =$

(a) $\frac{-4x}{(x^2-1)^2}$ (b) $\frac{-4x}{x^2-1}$

(c) $\frac{1-x^2}{4x}$ (d) $\frac{4x}{x^2-1}$

45. The number of solutions for the equation $\tan x + \sqrt{3} = 0$ in $[0, 2\pi]$ is

(a) 1 (b) 2

(c) 3 (d) 4

46. In a given G.P. if first term is 729 and 7th term is 64, then $S_7 =$

(a) 2059 b) 576

(c) 0 (d) none of these

47. The probability that a number selected from the first fifty natural numbers is divisible by 3 is

(a) $\frac{2}{25}$ (b) $\frac{8}{25}$

(c) $\frac{4}{25}$ (d) $\frac{16}{25}$

48. The roots of the quadratic equation $2x^2 - 5x + 3 = 0$ are

(a) $\frac{2}{3}, 1$ (b) $\frac{3}{2}, 1$ (c) $\frac{-3}{2}, 1$ (d) $\frac{3}{2}, -1$

49. The runs scored by a cricket player in 10 matches are 80, 100, 60, 30, 10, 30, 40, 60, 30 and 40. The mode of the data is

(a) 30 (b) 40 c) 100 d) 60

50. Which term of the sequence 2, 5, 8, 11,... is 35 ?

(a) 11th (b) 12th (c) 13th (d) 8th

