

MATHS By Er. AJEET Sir

CODE:F1702

XI-MATHS

TIME 3:00 HRS

MM: 100

Date: 17.02.17

Note: Q. No. 1 to 4 carry 1 marks each, Q. No. 5 to 12 carry 2 marks each, Q. No. 13 to 23 carry 4 marks each, Q. No. 24 to 29 carry 6 marks each.

Section-A

- Q1. Write $[-3, 6)$ in the set builder form.
- Q2. If $f(x) = \sqrt{x^2 - 1}$, find the value of $f(\sqrt{x})$.
- Q3. Find n^{th} term of the sequence whose sum of first n is given by $S_n = 3n^2 - 1$.
- Q4. Evaluate $\lim_{x \rightarrow \pi} \frac{\sin x}{x}$.

Section-B

- Q5. If $\sec \theta = \sqrt{2}$, θ lies in fourth quadrant, find the value of $\frac{1 + \tan \theta + \operatorname{cosec} \theta}{1 + \cot \theta - \operatorname{cosec} \theta}$.
- Q6. Find the range of $f(x) = 2 - 3 \sin x$.
- Q7. If ${}^{18}C_n = {}^{18}C_{n+2}$, then find the value of n .
- Q8. U is a universal set containing 70 elements. If A, B are its such subsets that $n(A) = 20$, $n(B) = 30$ and $n(A \cap B) = 10$, then find $n(A' \cap B')$.
- Q9. Find the value of $i^{91} + i^{92} + i^{93} + i^{94}$.
- Q10. Solve the following system of linear inequalities $-5 < x \leq 4$, $-2 \leq x < 7$, $-4 < x < 1$.
- Q11. Find $\frac{dy}{dx}$ if $y = \frac{x^2}{\cos x}$.
- Q12. Find the value of c for which the equation $x^2 + y^2 + 4x + 6y + c = 0$ represents a circle.

Section-C

- Q13. If $\tan \frac{\theta}{2} = \sqrt{\frac{1-e}{1+e}} \tan \frac{\phi}{2}$, prove that $\cos \phi = \frac{\cos \theta - e}{1 - e \cos \theta}$.
- Q14. If one vertex of a square is $(-4, 5)$ and equation of its one diagonal is $7x - y + 8 = 0$, then find the equation of the other diagonal.
- Q15. Evaluate $\lim_{x \rightarrow 0} \frac{\sin(\pi \cos^2 x)}{x^2}$.
- Q16. If $y = \sqrt{\frac{x}{a}} + \sqrt{\frac{a}{x}}$, prove that $2xy \frac{dy}{dx} = \left(\frac{x}{a} - \frac{a}{x} \right)$.
- Q17. If standard deviation of the numbers 2, 3, a and 11 is 3.5, then prove that $3a^2 - 32a + 84 = 0$.
- Q18. Find the square root of $-8 - 6i$.

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- Q19. If the sum of 1st n terms of an AP is cn^2 , then prove that the sum of square of these n terms is $\frac{nc^2(4n^2-1)}{3}$.
- Q20. All the letters of the word *STREAM* are taken and permuted. The words thus obtained are arranged in an alphabetical order as in a dictionary. What is the rank of the word *MASTER*?
- Q21. Find the value of p and q for the function given below if $\lim_{x \rightarrow 0} f(x) = f(0)$.

$$f(x) = \begin{cases} \frac{\sin(p+1)x + \sin x}{x}, & x < 0 \\ q, & x = 0 \\ \frac{\sqrt{x+x^2} - \sqrt{x}}{x^{3/2}}, & x > 0 \end{cases}$$

- Q22. If $r > 1, n > 2$ and coefficients of $(3r)^{\text{th}}$ and $(r+2)^{\text{th}}$ terms in the expansion of $(1+x)^{2n}$ are equal, then prove that $n = 2r$.
- Q23. If two vertices of an equilateral triangle are $(-1,0)$ & $(1,0)$ and its third vertex lies above the x -axis, then find the equation of the circumcircle of the triangle.

Section-D

- Q24. The mean and standard deviation of 200 observations were 40 and 15. Later on it was found that the observation 43 was misread as 34. Find the correct mean and correct standard deviation.
- Q25. In a lottery of 50 tickets numbered 1 to 50, two tickets are drawn simultaneously. Find the probability that:
- both the tickets drawn have prime numbers
 - none of the tickets drawn has prime number
 - one ticket has prime number
- Q26. Letters of the word *GARDEN* are arranged. Find the probability of the words in which the vowels are in alphabetical order.
- Q27. Find the differentiation of $\sqrt{\tan x}$ from the first principle.
- Q28. Find the mean and variance of first n natural numbers.
- Q29. The cable of a uniformly loaded suspension bridge hangs in the form of a parabola. The roadway which is horizontal and 100 meter long is supported by vertical wires attached to the cable, the longest wire being 30 m and the shortest being 6m. Find the length of a supporting wire attached to the roadway 18m from the middle.

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ANSWERS:

Q1. $\{x : x \in R, -3 \leq x < 6\}$

Q2. $\sqrt{x-1}$

Q3. $6n-3$

Q4. 0

Q5. -1

Q6. $[-1,5]$

Q7. 8

Q8. 30

Q9. 0

Q10. $-2 \leq x < 1$

Q11. $\frac{2x \cos x + x^2 \sin x}{\cos^2 x}$

Q12. $c < 12$

Q14. $x+7y=31$

Q15. π

Q18. $\pm(1-3i)$

Q20. 257

Q21. $p = -\frac{3}{2}, q = \frac{1}{2}$

Q23. $x^2 + y^2 - \frac{2}{\sqrt{3}}y - 1 = 0$

Q24. 40.045, 14.995

Q25. (i) $21/245$, (ii) $17/35$, (iii) $3/7$

Q26. $\frac{1}{2}$

Q27. $\frac{\sec^2 x}{\sqrt{\tan x}}$

Q28. $\frac{n+1}{2}, \frac{n^2-1}{12}$

Q29. 9.11 m(Approx.)