

S-5-B

Roll No.

Total No. of Questions : 29]

[Total No. of Printed Pages : 7

XIAPBASZJD22

7705-B

MATHEMATICS

Time : 3 Hours]

[Maximum Marks : 100

(Objective Type Questions)

1 each

1. A function f is defined by $f(x) = 2x - 5$. The value of $f(7) = 9$.

(True/False)

2. If $G = \{7, 8\}$ and $H = \{5, 4, 2\}$, then $H \times G = \dots\dots\dots$

(Fill in the blank)

3. The derivative of $\cos x = \sin x$.

(True/False)

4. The derivative of $(ax^2 + b)^2 = \dots\dots\dots$

(Fill in the blank)

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Turn Over

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(Very Short Answer Type Questions)

2 each

5. If $U = \{a, b, c, d, e, f, g, h\}$, find the complements of the sets $A = \{a, c, e, g\}$ and $B = \{f, g, h, a\}$.
6. Find the modulus and argument of $Z = -\sqrt{3} + i$.
7. Find the limit :
- $$\lim_{x \rightarrow 0} \frac{(x+1)^5 - 1}{x}$$
8. Find the derivative of $2 \tan x - 7 \sec x$.
9. Find the slope of the line passing through the points $(3, -2)$ and $(7, -2)$.
10. Suppose 3 bulbs are selected at random from a lot. Each bulb is tested and classified as defective (D) or non-defective (N). Write the sample space of this experiment.
11. Using binomial theorem evaluate $(102)^5$.
12. If $a_n = (-1)^{n-1} 5^{n+1}$, find its first five terms.

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(Short Answer Type Questions)

4 each

13. In a group of 70 people, 37 like coffee, 52 like tea and each person likes one of the two drinks. How many like both coffee and tea ?

14. Find the domain and range of the function : $f(x) = \sqrt{9-x^2}$.

15. Prove by using the principle of mathematical induction $\forall n \in \mathbb{N}$:

$$1.2 + 2.3 + 3.4 + \dots + n.(n+1) = \left[\frac{n(n+1)(n+2)}{3} \right]$$

16. Find the coordinates of focus, axis of parabola, the equation of directrix and the length of latus rectum of $y^2 = -8x$.

17. Convert the complex number $\sqrt{3} + i$ in the polar form.

18. Find the derivative of $\cos x$ from first principle.

Or

Find the derivative of the function :

$$\frac{\sin x + \cos x}{\sin x - \cos x}$$

19. If three points $(h, 0)$, (a, b) and $(0, k)$ lie on a line, show that :

$$\frac{a}{h} + \frac{b}{k} = 1$$

20. A letter is chosen at random from the word 'ASSASSINATION'. Find the probability that letter is :

(i) a vowel

(ii) a consonant

21. The coefficients of $(r - 1)$ th, r th and $(r + 1)$ th terms in the expansion of $(x + 1)^n$ are in the ratio 1 : 3 : 5. Find n and r .

22. Using section formula, show that the points $A(2, -3, 4)$, $B(-1, 2, 1)$ and $C\left(0, \frac{1}{3}, 2\right)$ are collinear.

23. Find the negation of the statements :

(i) $\sqrt{2}$ is not a complex number.

(ii) All triangles are not equilateral triangles.

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(Long Answer Type Questions)

6 each

24. Find the general solution of the equation :

$$\sin x + \sin 3x + \sin 5x = 0$$

Or

Prove that :

$$\cot x \cot 2x - \cot 2x \cot 3x - \cot 3x \cot x = 1$$

25. Determine n if :

$$(i) \quad {}^{2n}C_3 : {}^nC_3 = 12 : 1$$

$$(ii) \quad {}^{2n}C_3 : {}^nC_2 = 11 : 1$$

Or

In how many of the distinct permutations of the letters in MISSISSIPPI do the 4 I's not come together ?

26. Prove that :

$$\frac{\cos 4x + \cos 3x + \cos 2x}{\sin 4x + \sin 3x + \sin 2x} = \cot 3x$$

27. Find the equation of ellipse that satisfies the conditions :

Major axis on x -axis and passes through the points $(4, 3)$ and $(6, 2)$.

28. Find the mean, variance and standard deviation using short-cut method :

Height (in cm)	No. of Children
70—75	3
75—80	4
80—85	7
85—90	7
90—95	15
95—100	9
100—105	6
105—110	6
110—115	3

29. Insert five numbers between 8 and 26 such that resulting sequence is an A.P.

Or

Sum of the first p , q and r terms of an A.P. are a , b and c respectively.

Prove that :

$$\frac{a}{p}(q-r) + \frac{b}{q}(r-p) + \frac{c}{r}(p-q) = 0$$

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