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Code Number 41/2



INDIAN SCHOOL MUSCAT
SECOND TERM EXAMINATION 2017
MATHEMATICS

CLASS: XI

Sub. Code: 041

Time Allotted: 3 Hrs

12.12.2017

Max. Marks: 100

General Instructions:

- (i) All questions are compulsory.
- (ii) This question paper contains 29 questions.
- (iii) Question 1- 4 in Section A are very short-answer type questions carrying 1 mark each.
- (iv) Question 5-12 in Section B are short-answer type questions carrying 2 marks each.
- (v) Question 13-23 in Section C are long-answer-I type questions carrying 4 marks each.
- (vi) Question 24-29 in Section D are long-answer-II type questions carrying 6 marks each.

SECTION – A (4 x 1 = 4)

1. Evaluate: $\tan\left(\frac{19\pi}{3}\right)$
2. Find the angle between the X-axis and the line segment joining (3,2) and (4,3) in positive direction of X-axis.
3. Find the number of terms in the expansion of $(1 + 4x + 4x^2)^{21}$
4. Three of the six vertices of a regular hexagon are chosen at random. What is the probability that the triangle with these vertices is equilateral?

SECTION – B (8 x 2 = 16)

5. Three squares of chess board are selected at random. What is the probability of getting 2 squares of one colour and other of a different colour?
6. If $\sin \theta + \cos \theta = 1$, then find the value of $\sin 2\theta$.
7. Find the product of $3 - 2i$ and its conjugate.
8. Solve the following inequation and represent the solution on the number line.

$$\frac{4 - 3x}{5} < \frac{2x - 5}{4}$$

9. A boy has 3 library tickets and 8 books of his interest in the library. Of these 8, he does not want to borrow Mathematics Part II, unless Mathematics Part I is also borrowed. In how many ways can he choose the three books to be borrowed?

10. Find $(\sqrt{2} + \sqrt{3})^4 - (\sqrt{2} - \sqrt{3})^4$
11. Find the term independent of x in the expansion of $(x + \frac{1}{x})^6$.
12. Find the values of k, for which the numbers k+9, k-6, 4 are in G.P

SECTION – C (11 x 4 = 44)

13. If $U = \{1,2,3,4,5,6,7,8,9\}$, $A = \{2, 4, 6, 8\}$ and $B = \{2, 3, 5, 7\}$.

Verify that i) $(A \cup B)' = A' \cap B'$

ii) $(A \cap B)' = A' \cup B'$

14. Prove that $\frac{\cos 2x \sin x + \cos 6x \sin 3x}{\sin 2x \sin x + \sin 6x \sin 3x} = \cot 5x$
15. Prove by using the principle of mathematical induction for all $n \in \mathbb{N}$.

$$\frac{1}{2 \times 5} + \frac{1}{5 \times 8} + \frac{1}{8 \times 11} + \dots + \frac{1}{(3n-1)(3n+2)} = \frac{n}{6n+4}$$

16. Convert into polar form: $\frac{1+2i}{1-3i}$

(OR)

Find the square root of the complex number -15-8i

17. A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has (i) at least one boy and one girl (ii) at least three girls.
18. Find the mean deviation about the mean for the data:

xi	10	30	50	70	90
fi	4	24	28	16	8

19. Find the number of arrangements of the letters of the word INDEPENDENCE. In how many of these arrangements,

- a) do all vowels always occur together.
- b) do all vowels never occur together.

(OR)

What is the number of ways of choosing 4 cards from a pack of 52 playing cards? In how many of these

- a) 4 cards are of the same suit?
- b) Are all face cards?
- c) Three are red cards and one is a black card?

20. The sum of n terms of two Arithmetic progressions are in the ratio $(3n+8):(7n+15)$. Find the ratio of their 12^{th} terms.

(OR)

If S_1, S_2, S_3 are the sum of first n natural numbers, their squares, their cubes respectively, show that $9S_2^2 = S_3 (1 + 8S_1)$

21. A and B are two events such that $P(A) = 0.54$, $P(B) = 0.69$ & $P(A \cap B) = 0.35$

Find, a) $P(A \cup B)$ b) $P(A' \cap B')$ c) $P(A \cap B')$ d) $P(A' \cap B)$

22. Both Anil and Ashima appeared in an examination. The probability that Anil will qualify the examination is 0.05 and that Ashima will qualify the examination is 0.10. The probability that both will qualify the examination is 0.02. Find the probability that, a) both will not qualify the examination. b) at least one of them will not qualify the examination c) only one of them will qualify the examination.
23. The slope of a line is double of the slope of another line. If tangent of the angle between them is $1/3$, find the slopes of the lines.

SECTION – D (6 x 6 = 36)

24. In a town of 10,000 families, it was found that 40% families buy news paper A, 20% buy news paper B and 10% buy news paper C. 5% families buy A and B, 3% buy B and C and 4% buy A and C. If 2% families buy all the three newspapers, find the number of families which buy a) Only A b) only B c) none of A, B and C.

25. If $\tan x = -3/4$ and $\frac{3\pi}{2} < x < 2\pi$, find the values of $\sin \frac{x}{2}$, $\cos \frac{x}{2}$ and $\tan \frac{x}{2}$.

(OR)

Prove that $\cos^2 A + \cos^2(A + \frac{\pi}{3}) + \cos^2(A - \frac{\pi}{3}) = 3/2$

26. The coefficients of three consecutive terms in the expansion of $(1 + x)^n$ are in the ratio 6 : 33 : 110, find n .

(OR)

Find $a, b,$ and n in the expansion of $(a + b)^n$ if the first three terms of the expansion are 729, 7290 and 30375, respectively.

27. Show that $\frac{1 \times 2^2 + 2 \times 3^2 + \dots + n \text{ terms}}{1^2 \times 2 + 2^2 \times 3 + \dots + n \text{ terms}} = \frac{3n+5}{3n+1}$

28. Solve graphically the following system of inequations :

$$3y - 2x \leq 4, x + 3y \geq 3, x + y \leq 5, x, y > 0$$

29. Calculate mean, variance and standard deviation of the following:-

class	25-35	35-45	45-55	55-65	65-75
frequency	64	132	153	140	51

OR

The mean and standard deviation of 100 observations were calculated as 40 and 5.1, respectively by a student who took by mistake 50 instead of 40 for one observation. What are the correct means and standard deviation?

End of the Question Paper