| Roll Number | | | |

# INDIAN SCHOOL MUSCAT
# FINAL TERM EXAMINATION
## MATHEMATICS

CLASS: XI                     Sub. Code: 041                     Time Allotted: 3 Hrs

17.02.2019                                                       Max. Marks: 100

**General Instructions:**

1. All Questions are compulsory.

2. This question Paper consists of **29** questions divided into four sections A,B, C and D.

3. **Section A** comprises of **4** questions of **1** mark each;     **Section B** comprises of **8** questions of **2** marks each;  **Section C** comprises of **11** questions of **3** marks each; **Section D** comprises of **6** questions of **6** marks each

4. Use of calculator is not provided.

## SECTION: A

1. Find the equation of the parabola whose focus is the point (4,0) and directrix is   x=-4.Also find the length of the latus rectum .

2. Find the radian measure corresponding to $47°30'$.

### OR

If $\sin x = \dfrac{1}{3}$ ,find the value of $\sin 3x$.

3. If $f(x) = 3x^2 - 5$ find the number(s) which are associated with the number 43 in its range.

4. Write the negation of the statement "There exists a real number which is equal to its square."

## SECTION: B

5. $LetA = \{2x : x \in Nand1 \le x < 4\}, B = \{x + 2 : x \in Nand2 < x < 5\}.and$
$C = \{x : x \in Nand3 < x < 6\}$

Represent the given sets in Roster form and determine $(A \cup B) \cap C$ .

### OR

Two sets A and B are such that $n(A \cap B) = 7$, $n(A \cup B) = 21$, $n(A' \cap B') = 9$. Find $n(U)$ and $n(A \cap B)'$.

6. Prove that : $\cos 4x = 1 - 8\sin^2 x \cos^2 x$..

7. Solve the quadratic equation : $2x^2 - 2\sqrt{3}x + \dfrac{21}{8} = 0$

8. Find the $7^{th}$ term in the expansion of $\left(2x^3 - \dfrac{3}{2x}\right)^{10}$ .

9. For what values of a and b the intercepts cut off on the co-ordinate axes ax+by+8=0 are equal in length but opposite in signs to those cut off by the line 2x-3y+6=0 on the axes.

10. Find the coordinates of the foci and eccentricity of the hyperbola $x^2-y^2=1$.

11. Differentiate: $(x + \cos x)(x - \tan x)$ with respect to x

OR

Evaluate: $\lim\limits_{x \to 2} \dfrac{e^x - e^2}{x - 2}$

12. Write the contrapositive and converse of the following statement: If a quadrilateral is a parallelogram, then its diagonals bisect each other.

## SECTION: C

13. Find the domain and range of the following functions:

$$(i) f(x) = \sqrt{25 - x^2} \qquad (ii) g(x) = 1 - |x - 2|$$

OR

Let $A = \{1,2,3\}, B = \{,3,4\}$ and $C = \{4,5,6\}$. Verify that:

$(i) Ax(B \cap C) = (AxB) \cap (AxC)$   $(ii) Ax(B \cup C) = (AxB) \cup (AxC)$.

14. Find the general solution of cos 4x=cos 2x.

15. Use the principle of mathematical induction to prove that
$$1+4+7+\ldots\ldots\ldots+(3n-2) = \dfrac{1}{2}n(3n-1), \forall n \in N.$$

16. Find the square root of the complex number 3-4i .

OR

Find the modulus and argument of the complex number $\dfrac{1 + 3i}{1 - 2i}$.

17. In a small village, there are 87 families, of which 52 families have at most 2 children .In a rural development programme 20 families are to be chosen for assistance, of which at least 18 families must have at most 2 children. In how many ways can the choice be made?

18. Determine whether the expansion of $\left( x^2 - \dfrac{2}{x} \right)^{18}$ will contain a term containing $x^{10}$ .

19. Find the value of n so that $\dfrac{a^{n+1} + b^{n+1}}{a^n + b^n}$ may be the geometric mean between a and b.

20. Find the ratio in which YZ − plane divides the line segment formed by joining the points (−2, 4, 7) and (3,- 5, 8). .

21. Find the derivative of $\sqrt{\cos x}$ with respect to x from the first principle.

22. Two students A and B appeared in an examination. The probability that A will qualify the examination is 0.05 and that B will qualify the examination is 0.10. The probability that both will qualify the examination is 0.02. Find the probability that

i) Both A and B will not qualify the examination.

ii) Only one of them will qualify the examination.

**OR**

Two balls are drawn from a bag at random contains 3 white, 5 red and 4 green balls. Find the probability that

       i) both the balls are of different colours.

       ii) both the balls are of same colour.

23. If A and B are mutually exclusive events associated with a random experiment such that P(A)=0.4 and P(B)=0.5,then find:

    $(i)P(A \cup B)$     $(ii)P(A' \cap B')$     $(iii)P(A \cap B')$     $(iv)P(A' \cap B)$ .

**SECTION: D**

24. Prove that: $\dfrac{\cos x + \cos 3x + \cos 2x + \cos 4x}{\sin 4x + \sin 3x + \sin 2x + \sin x} = \cot \dfrac{5}{2} x$ .

**OR**

Find $\sin \dfrac{x}{2}$ ,$\cos \dfrac{x}{2}$ ,$\tan \dfrac{x}{2}$ when $\cos x = \dfrac{-1}{3}$ , x is in the II quadrant.

25. Each student in a class of 40 students, study at least one of the subjects English, Mathematics and Economics.16 study English, 22 Economics and 26 Mathematics, 5 study English and Economics, 14 Mathematics and Economics and 2 English, Economics and Mathematics. By

drawing a Venn diagram, find the number of students who study

(i) English and Mathematics      (ii) English, Mathematics but not Economics      (iii) Only Economics.

26. Two lines passing through the point (2,3) intersect each other at an angle of $60^{\circ}$. If slope of one line is 2, find equation of the other line.

**OR**

Show that the equation of the line passing through the origin and making an angle $\theta$ with the line y=mx + c is $\dfrac{y}{x} = \pm \dfrac{m + \tan\theta}{1 - m\tan\theta}$.

27. Find the equation of the circle passing through the centre of the circle whose equation is $x^2+y^2- 6x +4y +3 = 0$ and having its centre at the point of intersection of the lines given by the equations x – y = 1 and 2x + 3y = 7.

**OR**

Find equation of the ellipse, major axis on the y- axis and passing through

(3, 2) and (1, 6). Also find the coordinates of its foci, eccentricity and length of latus rectum.

28. Solve the following system of inequalities graphically :
$3x - y \leq 10$ , $x + y \leq 6$, $x - y \leq 2$ , $x \geq 0$ , $y \geq 0$

29. Find the mean , variance and standard deviation for the following data:

| Marks | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 |
|---|---|---|---|---|---|---|---|
| No. of Students | 3 | 51 | 122 | 141 | 130 | 51 | 2 |

**End of the Question Paper**

| Roll Number | | | SET  B |
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### SECTION: A

1.   If $f(x) = 3x^2 - 5$ find the number(s) which are associated with the number 43 in its range.

2.   Write the negation of the statement "There exists a real number which is equal to its square."

3.   Find the equation of the parabola whose focus is the point (4,0) and directrix is   x=-4.Also find the length of the latus rectum .

4.   Find the radian measure corresponding to $47°30'$.

### OR

If sin x $= \dfrac{1}{3}$ ,find the value of $\sin 3x$.

### SECTION: B

5.

$LetA = \{2x : x \in Nand 1 \le x < 4\}, B = \{x + 2 : x \in Nand 2 < x < 5\}.and$
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Represent the given sets in Roster form and determine $(A \cup B) \cap C$ .

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Two sets A and B are such that $n(A \cap B) = 7$, $n(A \cup B) = 21$, $n(A' \cap B') = 9$. Find $n(U)$ and $n(A \cap B)'$.

6. Solve the quadratic equation : $2x^2 - 2\sqrt{3}x + \dfrac{21}{8} = 0$

7. Prove that : $\cos 4x = 1 - 8\sin^2 x \cos^2 x.$

8. Find the $7^{th}$ term in the expansion of $\left(2x^3 - \dfrac{3}{2x}\right)^{10}$

9. Find the coordinates of the foci and eccentricity of the hyperbola $x^2 - y^2 = 1$.

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11. Write the contrapositive and converse of the following statement: If a quadrilateral is a parallelogram, then its diagonals bisect each other.

12. Differentiate: $(x + \cos x)(x - \tan x)$ with respect to x

**OR**

Evaluate: $\lim\limits_{x \to 2} \dfrac{e^x - e^2}{x - 2}$

**SECTION: C**

13. Find the domain and range of the following functions:

$$(i) f(x) = \sqrt{25 - x^2} \qquad (ii) g(x) = 1 - |x - 2|$$

**OR**

Let $A = \{1,2,3\}, B = \{,3,4\} and C = \{4,5,6\}$. Verify that:

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**SECTION: D**

24. Two lines passing through the point (2,3) intersect each other at an angle of $60^\circ$. If slope of one line is 2, find equation of the other line.

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Show that the equation of the line passing through the origin and making an angle $\theta$ with the line y=mx + c is $\dfrac{y}{x}=\pm\dfrac{m+\tan\theta}{1-m\tan\theta}$.

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