Roll Number		

SET A

INDIAN SCHOOL MUSCAT
ANNUAL EXAMINATION
MATHEMATICS

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

16.02.2020 | Max. Marks: 80

General Instructions:

(i) All questions are compulsory.

(ii) This question paper contains 36 questions divided into four sections A, B, C and D.

(iii) Questions 1-20 in Section A are MCQ/Fill in the blanks/Very short answer type questions carrying 1 mark each.

(iv) Questions 21-26 in Section B are short answer type questions carrying 2 marks each.

(v) Questions 27-32 in Section C are long-answer type-I questions carrying 4 marks each.

(vi) Questions 33-36 in Section D are long-answer type-II questions carrying 6 marks each.

(vii) Use of calculator is not provided.

SECTION: A

For questions 1 to 10, choose the correct answer from the options given. Write the answer along with the chosen option:

1. If n(A)=m and n(B)=n, then the total number of relations that can be defined from A to B is

   a) m^n b) n^m c) mn d) 2^{mn}

2. If $f(x) = ex + f$, where e and f are integers, $f(-1) = -5$ and $f(3) = 3$, then e and f are equal to

   a) e = -3 ,f = -1 b) e = 2,f = -3 c) e=0 ,f = 2 d) e = 2 ,f = 3

3. The value of $\frac{1-\tan^2 15}{1+\tan^2 15}$ is

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

4. The third term of GP is 4.The product of its first 5 terms is

   a) 4^3 b) 4^4 c) 4^5 d) None of these

5. If ${}^nC_{12} = {}^nC_8$, then n is equal to

a) 20 b) 12 c) 6 d) 30

6. Everybody in a room shakes hands with everybody else. The total number of handshakes is 66.The total number of persons in the room is

a) 11 b) 13 c) 12 d) 14

7. The distance of the point P(1 , -3) from the line 2y - 3x = 4 is

a) 13 b) $\frac{7}{13}\sqrt{13}$ c) $\sqrt{13}$ d) None of these

8. If the focus of a parabola is (0 , -3) and its directrix is y = 3, then its equation is

a) $x^2 = -12y$ b) $x^2 = 12y$ c) $y^2 = 12x$ d) $y^2 = -12x$

9. The point (-2 , -3 , -4) lies in the

a) First octant b) Seventh octant c) Second octant d) Eighth octant

10. $\lim_{x\to 1}\frac{x^m - 1}{x^n - 1}$ is

a) 1 b) $\frac{m}{n}$ c) $-\frac{m}{n}$ d) $\frac{m^2}{n^2}$

(Q.11-Q.15) Fill in the blanks.

11. If $f(x) = 1 + x + \frac{x^2}{2} + \ldots\ldots\ldots\ldots + \frac{x^{100}}{100}$, then $f'(1)$ is equal to _____.

12. The value of $\tan\frac{19\pi}{3}$ is _____.

13. If A and B are two events associated with a random experiment such that $P(A) = 0.3$, $P(B) = 0.2$ and $P(A \cap B) = 0.1$, then the value of $P(A - B)$ is _____.

14. The equation of yz-plane is_____.

15. The ratio of the coefficient of x^{15} to the term independent of x in $\left(x^2 + \frac{2}{x}\right)^{15}$ is_____.

OR

If the coefficient of x^7 and x^8 in $\left(2 + \frac{x}{3}\right)^n$ are equal, then n is _____.

(Q.16- Q.20) Answer the following

16. Three coins are tossed once. Find the probability of getting exactly 2 tails.

17. If $A = \{1,2\}$, find $P(A)$.

18. Express i^{102} in the form of $a + ib$.

OR

Find the multiplicative inverse $\sqrt{5} + 3i$.

19. Write the negation of the statement '$\sqrt{7}$ is rational'.

20. An arc of a circle of radius 35 cm subtends an angle of 18° at the centre. Find the length of the arc.

SECTION: B

21. Find the domain and range of the function, $f(x) = \sqrt{16 - x^2}$.

OR

Determine the quadratic function f defined by $f(x) = ax^2 + bx + c$,if $f(0) = 6, f(2) = 11$ and $f(-3) = 6$

22. Convert the complex number $\frac{-16}{1 + i\sqrt{3}}$ into polar form.

23. Find the equation of the set of the points P such that its distance from the points A (3 , 4 , -5) and B(-2 , 1 , 4) are equal.

24. How many terms of the G.P $3, \frac{3}{2}, \frac{3}{4}, \ldots$ are needed to give the sum $\frac{3069}{512}$?

OR

If a , b , c are in G.P. and $a^{\frac{1}{x}} = b^{\frac{1}{y}} = c^{\frac{1}{z}}$, prove that x , y , z are in A.P.

25. Find the sum to n terms of the A.P., whose k^{th} term is 5k+1.

26. Find the number of arrangements of the letters of the word INDEPENDENCE. In how many of these arrangements do the words begin with I and end in P?

SECTION: C

.27. Prove 1.2.3+2.3.4+.....+n.(n+1)(n+2) $= \frac{n(n+1)(n+2)(n+3)}{4}$ using the principle of mathematical induction for all $n \in N$.

28. Find the coordinate of the foci, the vertices, the length of major axis, minor axis, the eccentricity and the length of latus rectum of the ellipse $9x^2 + 16y^2 = 144$.

29. The letters of the word 'SOCIETY' are placed at random in a row. What is the probability that three vowels come together?

OR

20 cards are numbered from 1 to 20. One card is drawn at random. What is the probability that the number on the card is (i) a multiple of 4 (ii) not a multiple of 6?

30. Graph the given inequalities and shade the common solution region

$2x + y \geq 4;\ x + y \leq 3;\ 2x - 3y \leq 6;\ x \geq 0;\ y \geq 0$

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

32. Find the derivative of $\tan x$ with respect to x from first principle.

OR

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

SECTION: D

33. If p and q are the length of perpendiculars from the origin to the lines $x\cos\theta - y\sin\theta = k\cos 2\theta$ and $x\sec\theta + y\operatorname{cosec}\theta = k$ respectively, prove that $p^2 + 4q^2 = k^2$

34. In a survey of 100 students regarding watching T.V., it was found that 28 watch action movies, 30 watch comedy serials, 42 watch news channels, 8 watch action movies and comedy serials, 10 watch action movies and news channels, 5 watch comedy serials and news channels and 3 watch all the three programs. Draw a Venn diagram to illustrate this information and find

(i) how many watch news channels only?

(ii) how many watch at least one of the three channels?

(iii) how many do not watch any of the three channels?

35. Prove that $\cos 2x\cos\frac{x}{2} - \cos 3x\cos\frac{9x}{2} = \sin 5x\sin\frac{5x}{2}$

OR

Find the general solution of $\sin 2x - \sin 4x + \sin 6x = 0$.

36. The mean of 5 observations is 4.4 and their variance is 8.24. If three of the observations are 1 , 2 and 6,find the other two observations.

OR

Calculate mean , variance and standard deviation for the following distribution.

classes	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	3	7	12	15	8	3	2

End of the Question Paper

Roll Number		

SET B

INDIAN SCHOOL MUSCAT
ANNUAL EXAMINATION
MATHEMATICS

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

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(v) Questions 27-32 in Section C are long-answer type-I questions carrying 4 marks each.

(vi) Questions 33-36 in Section D are long-answer type-II questions carrying 6 marks each.

(vii) Use of calculator is not provided.

SECTION: A

For questions 1 to 10, choose the correct answer from the options given. Write the answer along with the chosen option:

1. The point (-2 , -3 , -4) lies in the

   a) First octant b) Seventh octant c) Second octant d) Eighth octant

2. The third term of GP is 4.The product of its first 5 terms is

   a) 4^3 b) 4^4 c) 4^5 d) None of these

3. $\lim\limits_{x\to 1}\dfrac{x^m-1}{x^n-1}$ is

   a) 1 b) $\dfrac{m}{n}$ c) $-\dfrac{m}{n}$ d) $\dfrac{m^2}{n^2}$

4. If $f(x) = ex + f$, where e and f are integers, $f(-1) = -5$ and $f(3) = 3$, then e and f are equal to

a) e = -3 ,f = -1 b) e = 2,f = -3 c) e=0 ,f = 2 d) e = 2 ,f = 3

5. Everybody in a room shakes hands with everybody else. The total number of handshakes is 66.The total number of persons in the room is

a) 11 b) 13 c) 12 d) 14

6. If ${}^{n}C_{12} = {}^{n}C_{8}$, then n is equal to

a) 20 b) 12 c) 6 d) 30

7. The distance of the point P(1 , -3) from the line 2y - 3x = 4 is

a) 13 b) $\frac{7}{13}\sqrt{13}$ c) $\sqrt{13}$ d) None of these

8. If the focus of a parabola is (0 , -3) and its directrix is y = 3, then its equation is

a) $x^2 = -12y$ b) $x^2 = 12y$ c) $y^2 = 12x$ d) $y^2 = -12x$

9. If n(A)=m and n(B)=n, then the total number of relations that can be defined from A to B is

a) m^n b) n^m c) mn d) 2^{mn}

10. The value of $\frac{1-\tan^2 15}{1+\tan^2 15}$ is

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

(Q.11-Q.15) Fill in the blanks.

11. If $f(x) = 1 + x + \frac{x^2}{2} + \ldots\ldots\ldots\ldots + \frac{x^{100}}{100}$, then $f'(1)$ is equal to _____.

12. The value of $\sin\frac{31\pi}{3}$ is _____.

13. If A and B are two events associated with a random experiment such that $P(A) = 0.3$, $P(B) = 0.2$ and $P(A \cap B) = 0.1$, then the value of $P(A - B)$ is _____.

14. The equation of xy-plane is_____.

15. The ratio of the coefficient of x^{15} to the term independent of x in $\left(x^2 + \frac{2}{x}\right)^{15}$ is_____.

OR

If the coefficient of x^7 and x^8 in $\left(2+\frac{x}{3}\right)^n$ are equal, then n is _____.

(Q.16- Q.20) Answer the following

16. Three coins are tossed once. Find the probability of getting exactly 2 tails.

17. If $A=\{1,2\}$, find $P(A)$.

18. Express i^{102} in the form of $a+ib$.

OR

Find the multiplicative inverse $\sqrt{5}+3i$.

19. Write the negation of the statement '$\sqrt{7}$ is rational'.

20. An arc of a circle of radius 35 cm subtends an angle of 18° at the centre. Find the length of the arc.

SECTION: B

21. Find the domain and range of the function, $f(x)=3+|x+5|$.

OR

Determine the quadratic function f defined by $f(x)=ax^2+bx+c$,if $f(0)=6, f(2)=11$ and $f(-3)=6$

22. Find the sum to n terms of the A.P., whose k^{th} term is 5k+1.

23. Find the equation of the set of the points P such that its distance from the points A (3 , 4 , -5) and B(-2 , 1 , 4) are equal.

24. How many terms of the G.P $3,\frac{3}{2},\frac{3}{4},\ldots$ are needed to give the sum $\frac{3069}{512}$?

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If a , b , c are in G.P. and $a^{\frac{1}{x}}=b^{\frac{1}{y}}=c^{\frac{1}{z}}$, prove that x , y , z are in A.P.

25. Convert the complex number $\frac{-16}{1+i\sqrt{3}}$ into polar form.

26. Find the number of arrangements of the letters of the word INDEPENDENCE. In how many of these arrangements do the words begin with I and end in P?

SECTION: C

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

28. Find the coordinate of the foci, the vertices, the length of transverse axis, conjugate axis, the eccentricity and the length of latus rectum of the hyperbola $9y^2 - 4x^2 = 36$.

29. The letters of the word 'SOCIETY' are placed at random in a row. What is the probability that three vowels come together?

OR

20 cards are numbered from 1 to 20. One card is drawn at random. What is the probability that the number on the card is (i) a multiple of 4 (ii) not a multiple of 6 ?

30. Graph the given inequalities and shade the common solution region

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31. Find the derivative of $\cos x$ with respect to x from first principle.

OR

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

32. Prove 1.2.3+2.3.4+.....+n.(n+1)(n+2) $= \frac{n(n+1)(n+2)(n+3)}{4}$ using the principle of mathematical induction for all $n \in N$.

SECTION: D

33. If p and q are the length of perpendiculars from the origin to the lines $x\cos\theta - y\sin\theta = k\cos 2\theta$ and $x\sec\theta + y\,\mathrm{cosec}\,\theta = k$ respectively, prove that $p^2 + 4q^2 = k^2$

34. Prove that $\cos 2x\cos\frac{x}{2} - \cos 3x\cos\frac{9x}{2} = \sin 5x\sin\frac{5x}{2}$

OR

Find the general solution of $\sin 2x - \sin 4x + \sin 6x = 0$.

35. In a survey of 100 students regarding watching T.V., it was found that 28 watch action movies, 30 watch comedy serials, 42 watch news channels, 8 watch action movies and comedy serials, 10 watch action movies and news channels, 5 watch comedy serials and news channels and 3 watch all the three programs. Draw a Venn diagram to illustrate this information and find

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36. The mean of 5 observations is 4.4 and their variance is 8.24. If three of the observations are 1 , 2 and 6, find the other two observations.

OR

Calculate mean, variance and standard deviation for the following distribution.

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ANNUAL EXAMINATION
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SECTION: A

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SECTION - B

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SECTION: C

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SECTION: D

33. If p and q are the length of perpendiculars from the origin to the lines $x\cos\theta - y\sin\theta = k\cos 2\theta$ and $x\sec\theta + y\,\mathrm{cosec}\,\theta = k$ respectively, prove that $p^2 + 4q^2 = k^2$

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Calculate mean, variance and standard deviation for the following distribution.

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