MODEL QUESTION PAPER 2019-2020
X STD
MATHEMATICS

Time Allowed: 15 min + 2 ½ hrs **Maximum Marks: 100**

Instructions : (1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

(2) Use Blue or Black ink to write and underline and pencil to draw diagrams.

Note: This question paper contains four parts.

PART –I

(Marks: 14)

Note : (i) Answer all the 14 questions **14 x 1=14**

(ii) Choose the most suitable answer from the given four alternatives and write the option code with the corresponding answer

1. If the ordered pairs (a+2, 4) and (5, 2a+b) are equal then (a, b) is

(1). (2, -2) (2). (5, 1) (3). (2, 3) (4). (3, -2)

2. If $f(x) = (x + 1)^3 - (x - 1)^3$ represents a function which is

(1). Linear (2). Cubic (3). Reciprocal (4). Quadratic

3. $7^{4k} \equiv$ (mod 100).

(1).1 (2). 5220 (3). 3 (4). 4

4. A = {a, b, p}, B = {2,3}, C = {p, q, r, s} then n[(A U C) X B] is

(1). 8 (2). 20 (3).12 (4). 16

5. Which of the following should be added to make $x^4 + 64$ a perfect square?

(1). $4x^2$ (2). $16x^2$ (3). $8x^2$ (4). $-8x^2$

6. For the given matrix $A = \begin{pmatrix} 1 & 3 & 5 & 7 \\ 2 & 4 & 6 & 8 \\ 9 & 11 & 13 & 15 \end{pmatrix}$ the order of the matrix A^T is

(1). 2 x 3 (2). 3 x 2 (3). 3 x 4 (4). 4 x 3

7. The solution of $(2x - 1)^2 = 9$ is equal to

(1). -1 (2). 2 (3). -1/2 (4). None of these

8. The area of triangle formed by the points (-5,0), (0,-5) and (5,0) is

(1). 0 sq. units (2). 25 sq. units (3). 5 sq. units (4). None of these

9. If A is a point on the y – axis whose ordinate is 8 and B is a point on the x – axis whose abscissa is 5 then the equation of the line AB is

(1). $8x + 5y = 40$ (2). $8x – 5y = 40$ (3). $x= 8$ (4). $y= 5$

10. If $\sin\theta = \cos\theta$, then $2\tan^2\theta + \sin^2\theta – 1$ is equal to

(1). -3/2 (2). 3/2 (3).2/3 (4). -2/3

11. The ratio of the volume of a cylinder, a cone and a sphere if each has the same diameter and same height is

(1). 1:2:3 (2). 2:1:3 (3). 1:3:2 (4). 3:1:2

12. A spherical ball of radius r_1 units is melted to make 8 new identical balls each of radius r_2 units. Then r_1 $r_2$is

(1). 2: 1 (2). 1: 2 (3). 4: 1 (4). 1: 4

13. If the standard deviation of x, y, z is p then the standard deviation of 3x + 5, 3y + 5, 3z + 5 is

(1). 3p + 5 (2). 3p (3). P + 5 (4). 9p + 15

14. Which of the following is not a measure of dispersion?

(1). Range (2). Standard deviation

(3). Arithmetic mean (4). Variance

PART –II

(Marks: 20)

II. Answer 10 questions. (Question No. 28 is compulsory) 10 x 2=20

15. Define null relation with an example.

16. Find the greatest number that will divide 445 and 572 leaving remainders 4 and 5 respectively.

17. Determine the value of d such that $15 \equiv 3 \pmod d$.

18. Multiply $\frac{x^2b^2}{x-1}$ by $\frac{x^2-1}{a^4b^3}$.

19. If α and β are the roots of the equation $x^2 + 7x + 10 = 0$ is 17. Find the value of

i. $(\alpha - \beta)$ ii. $\alpha^2 + \beta^2$

20. Find X and Y, if $X + Y = \begin{bmatrix} 7 & 0 \\ 3 & 5 \end{bmatrix}$ and $X – Y = \begin{bmatrix} 3 & 0 \\ 0 & 4 \end{bmatrix}$.

21.An insect 8 m away initially from the foot of a lamp post which is 6 m tall, crawls towards it moving through a distance. If its distance from the top of the lamp post is equal to the distance it has moved, how far is the insect away from the foot of the lamp post?

22.Calculate the slope and *y* intercept of the straight line8x-7y+6=0.

23.A tower stands vertically on the ground. From a point on the ground, which is 48 m away from the foot of the tower, the angle of elevation of the top of the tower is 30° . Find the height of the tower.

24.The slant height of a frustum of a cone is 5 cm and the radii of its ends are 4 cm and 1 cm. Find its curved surface area.

25.Find the range and coefficient of range of the following data. 63, 89, 98, 125, 79, 108, 117, 68.

26.If n = 5, x = 6, Σx^2= 765, then calculate the coefficient of variation.

27.Two coins are tossed together. What is the probability of getting different faces on the coins?

28.Find the sum of 0.40 + 0.43 + 0.46 + ……..+1.

PART –III

(Marks: 50)

III. Answer 10 questions (Question No. 42 is compulsory) 10 x 5=50

29. If the function f: R → R defined by

$$f(x) = \begin{cases} 2x + 7, & x < -2 \\ x^2 - 2, & -2 \le x < 3 \\ 3x - 2, & x \ge 3 \end{cases}$$

i.) f (4) ii.) f (-2) iii.) f (4) + 2 f(1) iv.) $\frac{[f(1)-3f(4)]}{f(-3)}$

30. The function't' which maps temperature in Celsius (c) into temperature Fahrenheit (F) is defined by

t(c) = F where F = $\frac{9}{5}c + 32$. Find,

i. t(0)

ii. t(28)

iii. t(-10)

iv. the value of c when t(c) =212

v. Temperature when Celsius value is equal to Fahrenheit value.

31. Find the sum to n terms of the series 5 + 55 + 555 + ……

32. Find the square root of the expression $\frac{x^2}{y^2} - \frac{10x}{y} + 27 - \frac{10y}{x} + \frac{y^2}{x^2}$

33. Find the GCD of $6x^3 - 30x^2 + 60x - 48$ and $3x^3 - 12x^2 + 21x - 18$.

34. $if\ A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$, and I = $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ Show that A^2- (a+d) A = (bc-ad) I_2.
35. Find the equation of a straight line through the point of intersection of the lines 8x + 3y = 18, 4x + 5y = 9, and bisecting the line segment joining the points (5, -4) and (-7, 6).
36. A person saved money every year, half as much as he could in the previous year. If he had totally saved Rs. 7875 in years then how much did he save in the first year?
37. If l^{th} m^{th} and n^{th} term of an A.P are …… x, y, z respectively, then show that $x(m-n) + y(n-l) + z(l-m) = 0$.
38. State and prove Pythagoras Theorem.
39. A right circular cylindrical container of base radius 6 cm and height 15 cm is full of ice cream. The ice cream is to be filled in cones of height 9 cm and base radius 3 cm, having a hemispherical cap. Find the number of cones needed to empty the container.
40. The time taken (in minutes) to complete a homework by 8 students in a day are given by 38, 40, 47, 44, 46, 43, 49, 53. Find the coefficient of variation.
41. A game of chance consists of spinning an arrow which is equally likely to come to rest pointing to one of the numbers 1, 2, 3, ……12. What is the probability that it will point to
    i) 7 ii)a prime number iii) a composite number
42. If the roots of the equation $(c^2 - ab)\ x^2 - 2(a^2 - bc)\ x + b^2 - ac = 0$ are real and equal prove that either a = 0 or $a^2 + b^2 + c^2 = 3abc$.

PART – IV

(Mark – 16)

IV. Answer both the questions: **2 x 8 = 16**

43.Draw a circle of radius 8cm from a point P which is 10 cm away from its centre. Draw the two tangents PA and PB to the circle and measure their lengths.

OR

Construct a triangle similar to a given triangle ABC with it sides equal to 6/5 of the corresponding sides of the triangle ABC (scale factor 6/5).

44. Draw the graph of $y = x^2 + 3x - 4$ and hence solve $x^2 + 3x - 4 = 0$.

OR

Draw a graph of $y = x^2 - 5x - 6$ and hence solve $x^2 - 5x - 14 = 0$.

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MODEL QUESTION PAPER-GIFTED STUDENTS (100 MARKS)
ANSWER KEY - QUESTION PAPER
MATHEMATICS –X STANDARD
PART –I
(Marks: 14)

Note : (i) Answer all the 14 questions **14 x 1=14**
(ii) Choose the most suitable answer from the given four alternatives and write the option code with the corresponding answer

Sl. no	Answers	Options
1	(3,-2)	(4)
2	Quadratic	(4)
3	1	(1)
4	12	(3)
5	$16x^2$	(2)
6	4x3	(4)
7	-1,2	(3)
8	25 sq.uints	(2)
9	8x+5y=40	(1)
10	3/2	(2)
11	3:1:2	(4)
12	2:1	(1)
13	3P	(2)
14	Arithmetic mean	(3)

PART –II
(Marks: 20)

II. Answer 10 questions. (Question No. 28 is compulsory) **10 x 2=20**

15. Null relation: A relation which contains no elements is called as null relation

Examples. Suppose $A = \{-3,-2,-1\}$ and $B = \{1, 2, 3,4\}$. A relation from A to B is defined as a-b=8 i.e., there is no pair (a, b) such that as a-b=8. Thus R contain no element and so $R=\varphi$.

16. The required number is **63**.
17. Possible are **4,6,12**.
18. $\frac{x^2(x+1)}{a^4b}$
19. **k= - 30**
20. $X=\begin{pmatrix} 5 & 0 \\ 3/2 & 9/2 \end{pmatrix}$, $Y=\begin{pmatrix} 2 & 0 \\ 3/2 & 1/2 \end{pmatrix}$
21. Insect is **1.75m** away from the foot of the lamp post.
22. Slope m= **8/7** & y- intercept **c = 6/7.**
23. Height **h= 16√3 m.**
24. Curved surface area of frustum of cone =**78.57 cm^2**
25. **Range = 62, Coefficient of range = 31/94**

26. **Coefficient of Variation =180.26%**
27. **P (A) = ½**
28. Number of terms **n =21.** S_{21} **=14.7.**

PART –III (Marks: 50)

III. Answer 10 questions (Question No. 42 is compulsory) 10 x 5=5

29. **i) f(4) =10 ii) f(-2) =2 iii) f(4)+2 f(1) = 8 iv)** $\frac{f(1) - 3f(4)}{f(-3)} = -31$

30. **i) f(0) = 32 ii) f(28) = 82.4°F iii) f(-10) = 14°F iv) C = 100°C, f(100°) = 40°**
31. $S_n = \frac{50(10^n-1)}{81} - \frac{5n}{9}$
32. $\pm \left(\frac{x}{y} - 5 + \frac{y}{x}\right)$
33. G.C.D = **3(x-2)**
34. Hence proved $A^2 - (a+d)A = (bc-ad)I_2$.
35. The required equation of the straight line **4x+13y-22=0**
36. The amount saved in the first year is **Rs. 4000.**
37. Hence proved **x (m-n) +y (n-l) +z (l-m) =0.**
38. Pythagoras Theorem statement with proof
39. Number of ice cream cones required to empty the container = **12.**
40. Standard deviation = **4.53**, coefficient of variation = **10.07%**
41. **i) P(A)=1/12 . i) P (B) =5/12 . i) P(C) =1/2**
42. $a^3 + b^3 + c^3 = 3abc$ Hence proved

PART – IV
(Mark – 16)

IV. Answer both the questions: 2 x 8 = 16

43. a) Length of the tangent **PA= 6 cm.**
44. a) Parabola points Table :1

x	-5	-4	-3	-2	-1	0	1	2
$y=x^2+3x-4$	6	0	-4	-6	-6	-4	0	6

Point of intersection: (-4, 0) and (1, 0) x- coordinates =-4, 1
Solution: x= -4, 1.
Scale: x –axis 1 cm = 1 unit
y –axis 1 cm = 2 units

b) Parabola points: Table: 1

x	-2	-1	0	1	2	3	4	5	6	7
$y=x^2-5x-6$	8	0	-6	-10	-12	-12	-10	-6	0	8

Table 2: (straight line)

$y=x^2-5x-6$
$0=x^2-5x-14$
$y = 8$

Point of intersection: (-2, 8) and (7, 8) x- coordinates =-2, 7
Solution: x= -2, 7.
Scale: x –axis 1 cm = 1 unit

y –axis 1 cm = 2 units.