

# Model Question Paper

Class-XI (Session : 2020-21)

Subject-Mathematics

Time Allowed : 3 hrs

Maximum Marks : 85

## Special Instructions:-

Same as that of Previous Years Annual question paper March 2020.

- (i) All questions are compulsory. Marks allotted to each question are indicated against it.
- (ii) 30% more internal choices have been provided from 70% of the syllabus, as 30% syllabus has been deleted for the session 2020-21 only. You have to attempt only one of them.
- (iii) Star (\*) marked questions are based on PISA format.
- (iv) Try to solve the questions in serial order as far as possible.

1. If  $x = \{1, 3, 5\}$ ,  $Y = \{1, 2, 3\}$  then  $X \cup Y$  is 1  
(a)  $\{1, 2, 4, 5\}$  (b)  $\{1, 2, 3, 5\}$  (c)  $\{1, 3, 5\}$  (d) none of these
2.  $(A')'$  is equal to 1  
(a) A (b) U (c)  $\phi$  (d)  $A'$
3. A function  $f$  is defined by  $f(x) = 2x - 5$  the value of  $f(-3)$  is 1  
(a) -5 (b) -11 (c) 11 (d) 1
4.  $\sin\left(\frac{3\pi}{2} + \theta\right)$  is equal to 1  
(a)  $\sin \theta$  (b)  $-\sin \theta$  (c)  $\cos \theta$  (d)  $-\cos \theta$
5.  $25^\circ$  is equal to how many radians? 1  
(a)  $\frac{36\pi}{5}$  (b)  $\frac{5\pi}{36}$  (c)  $\frac{7\pi}{36}$  (d) none of these
6.  $(i)^{-35}$  is equal to 1  
(a)  $i$  (b)  $-i$  (c) 1 (d) -1

7. If  $\frac{1}{8} + \frac{1}{9} = \frac{x}{10}$  then x is equal to (1)  
 (a) 10 (b) 20 (c) 9 (d) 100
8. The co-ordinates of foci of an ellipse  $9x^2 + 4y^2 = 36$  (1)  
 (a)  $(0, \pm\sqrt{5})$  (b)  $(\pm 5, 0)$  (c)  $(0, 0)$  (d) none of these
9.  $\lim_{x \rightarrow 0} \frac{\sin 3x}{\sin 5x}$  equal to (1)  
 (a)  $\frac{3}{5}$  (b)  $\frac{5}{3}$  (c)  $\frac{-3}{5}$  (d)  $\frac{-5}{3}$
10. Derivative of cosec x is (1)  
 (a) Cosec x Cot x (b) -Cosec x Cot x  
 (c) tan x Cot x (d) none of these
11. If  $\left(\frac{x}{3} + 1, y - \frac{2}{3}\right) = \left(\frac{5}{3}, \frac{1}{3}\right)$ , find the value of x and y. (2)
12. A wheel makes 360 revolutions in one minute through radians how many radians does it turn in one second. (2)
- Or**
- Find the value of  $\cos(-1710^\circ)$
13. Find the multiplicative inverse of a complex number  $z = \sqrt{5} + 3i$  (2)
- Or**
- For any positive integer n, prove that  
 $i^n + i^{n+1} + i^{n+2} + i^{n+3} + i^{n+4} + i^{n+5} + i^{n+6} + i^{n+7} = 0$
14. Write the converse of the statement (2)  
 (i) If a number n is even, then  $n^2$  is even.  
 (ii) If two integers a and b are such that  $a > b$  then  $a - b$  is always a positive integer.

15. In a group of 65 people, 40 like cricket, 10 like both cricket and tennis. How many like tennis only and not cricket? How many like tennis?  
3½

16. Solve the inequality.  $x + y < 5$  graphically. 3½

**Or**

Solve the following system of inequalities graphically.

$$x + y \leq 6, \quad x + y \geq 4$$

17. In how many of the distinct permutations of the letters in MISSISSIPPI do the four I's not come together. 3½

**Or**

Determine the number of 5 cards combination out of a deck of 52 cards if each selection of 5-cards has exactly one king.

18. Find the sum of series upto n terms. 3½

$$5 + 55 + 555 + \dots$$

**Or**

Find sum of all natural numbers lying between 100 and 1000 which are multiple of 5.

19. The vertices of a triangle PQR are P (2,1), Q (-2,3) R (4,5). Find equation of median through the vertex R. 3½

**Or**

Find the equation of line perpendicular to the line  $x - 2y + 3 = 0$  and passing through the point (1, -2)

20. Find the equation of hyperbola having vertices  $(0, \pm 3)$  foci  $(0, \pm 5)$ . 3½

**Or**

Find the centre and radius of the circle.

$$x^2 + y^2 - 4x - 8y - 45 = 0$$

21. Using principle of mathematical induction prove that 3½

$$\frac{1}{2.5} + \frac{1}{5.8} + \frac{1}{8.11} + \dots + \frac{1}{(3n-1)(3n-2)} = \frac{n}{6n+4}$$

22. Find the ratio in which the line segment joining the point (4,8,10) and (6,10,-8) is divided by the YZ-Plane.  $3\frac{1}{2}$

23. Find the derivative of the function.  $3^\circ$

$$f(x) = \frac{x + \cos x}{\tan x}$$

**Or**

Find the derivative of  $x \sin x$  from first Principle.

24. Find the range and domain of the function.  $3\frac{1}{2}$

$$f(x) = \sqrt{9 - x^2}$$

**Or**

If  $f(x) = x^2$  find  $\frac{f(1.1) - f(1)}{(1.1 - 1)}$

25. Prove that  $\frac{\sin 5x - 2 \sin 3x + \sin x}{\cos 5x - \cos x} = \tan x$   $3\frac{1}{2}$

**Or**

Find the general solution of the equation  $\sin 2x + \cos x = 0$

26. Let  $z_1 = 2-i$ ,  $z_2 = -2+i$  Find  $\operatorname{Re} \left( \frac{z_1 z_2}{z_1} \right)$   $3\frac{1}{2}$

27. The coefficients of three consecutive terms in the expansion of  $(1+x)^n$  are in the ratio 1:7:42 find 'n'.  $5$

**Or**

Evaluate  $(\sqrt{3} + \sqrt{2})^6 - (\sqrt{3} - \sqrt{2})^6$



28. If  $\tan x = \frac{3}{4}$ ,  $\pi < x < \frac{3\pi}{2}$  find the value of  $\sin \frac{x}{2}$ ,  $\cos \frac{x}{2}$  and  $\tan \frac{x}{2}$ . 5

**Or**

Prove that  $\cos 6x = 32 \cos^6 x - 48 \cos^4 x + 18 \cos^2 x - 1$

29. Find the sum of n-terms of the series 5  
 $5 + 11 + 19 + 29 + 41 + \dots$

**Or**

If the  $p^{\text{th}}$ ,  $q^{\text{th}}$  and  $r^{\text{th}}$  terms of a G.P. are a, b and c respectively prove that  $a^{q-r} b^{r-p} c^{p-q} = 1$

30. Calculate mean, variance and standard deviation of the data. 5

Classes	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequencies	3	7	12	15	8	3	2

31. If E and F are events such that  $P(E) = \frac{1}{4}$ ,  $P(F) = \frac{1}{2}$  and  $P(E \text{ and } F) = \frac{1}{8}$  Find. 5

- (i)  $P(E \text{ or } F)$  (ii)  $P(\text{not } E \text{ and not } F)$

**Or**

A box contains 10 red marbles, 20 blue marbles and 30 green marbles. 5 marbles are drawn from the box. Find the probability.

- (i) all will be blue (ii) atleast one will be green