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 aganist 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 XUY 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) ϕ (d) A'

3. A function f is defined by f(x) = 2x – 5 the the value of f(–3) is   1
   (a) –5   (b) –11   (c) 11   (d) 1

4. $\sin\left(\dfrac{3\pi}{2} + \theta\right)$ is equal to   1

   (a) $\sin\theta$ (b) $-\sin\theta$ (c) $\cos\theta$ (d) $-\cos\theta$

5. 25° is equal to how many radians?   1

   (a) $\dfrac{36\pi}{5}$ (b) $\dfrac{5\pi}{36}$ (c) $\dfrac{7\pi}{36}$ (d) none of these

6. $(i)^{-35}$ in equal to   1
   (a) i   (b) –i   (c) 1   (d) –1

7. If $\dfrac{1}{\lfloor 8} + \dfrac{1}{\lfloor 9} = \dfrac{x}{\lfloor 10}$ 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. $\displaystyle \lim_{x \to '0} \dfrac{\operatorname{Sin} 3x}{\operatorname{Sin} 5x}$ equal to (1)

    (a) $\dfrac{3}{5}$ (b) $\dfrac{5}{3}$ (c) $\dfrac{-3}{5}$ (d) $\dfrac{-5}{3}$

10. Derivative of cosec x is (1)
    (a) Casec x Cot x   (b) –Cosec x Cot x
    (c) tan x Cot x   (d) none of these

11. If $\left(\dfrac{x}{3}+1, y-\dfrac{2}{3}\right)=\left(\dfrac{5}{3}, \dfrac{1}{3}\right)$, find the value of x and y. (2)

12. A wheel makes 360 revolutions in one minute through radians how many radions does it turn in one second. (2)

Or

Find the value of Cos $(-1710°)$

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 in 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.

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

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 a 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

$5 + 55 + 555 + \ldots\ldots\ldots\ldots$

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

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

3

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.   3½

23. Find the derivative of the function.   3°

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

Or

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

24. Find the range and domain of the function.   3½

$$f(x) = \sqrt{9 - x2}$$

Or

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

25. Prove that $\dfrac{\sin 5x - 2\sin 3x + \sin x}{\cos 5x - \cos x} = \tan x$ 3½

Or

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

26. Let $z_1 = 2 - i$, $z_2 = -2 + i$ Find $\text{Re}\left(\dfrac{z_1 z_2}{\bar{z_1}}\right)$ 3½

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

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

<div align="center">Or</div>

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

     $5 + 11 + 19 + 29 + 41 + \ldots\ldots\ldots$

<div align="center">Or</div>

If the pth, q^{th} and r^{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 $P(E) = \dfrac{1}{4}$, $P(F) = \dfrac{1}{2}$ and $P(E \text{ and } F)$

     $= \dfrac{1}{8}$ Find.   5

(i)   P (E or F)   (ii) P (not E and not F)

<div align="center">Or</div>

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