

Model Question Paper

Class –11th
Paper – Maths.

Time 3:00 Hrs.

Maximum Marks: – 80

General instructions: -

- (i) This Question paper contains – five sections A,B,C,D and E.
- (ii) Each section is compulsory. However, there are internal choices in some questions.
- (iii) Section A has 16 MCQ's of 1 mark each.
- (iv) Section B has 5 very short Answer (VSA) – questions of 2 marks each.
- (v) Section C has 6 short Answer (SA) – questions of 3 marks each.
- (vi) Section D has 4 long – answer (LA) – question of 4 marks each.
- (vii) Section E has 4 long – answer (LA) – questions of 5 marks each.

(SECTION - A) (1X16=16)
(Multiple choice Questions)
Each question carries 1 mark

- Q.1 The set of Girls in a Boys school is
(a) a null set (b) a singleton set (c) a finite set (d) None of these
- Q.2 Two sets A, B are disjoint iff
(a) $A \cup B = \emptyset$ (b) $A \cap B \neq \emptyset$ (c) $A \cap B = \emptyset$ (d) $A - B = A$
- Q.3 If R is a relation on a finite set having n elements, then the number of relations on A is
(a) 2^n (b) 2^{n^2} (c) n^2 (d) n^n
- Q.4 The value of π radian is equal to
(a) 90° (b) 180° (c) 270° (d) 360°
- Q.5 The general solution of $\tan 3x = 1$ is
(a) $n\pi + \frac{\pi}{4}$ (b) $\frac{n\pi}{3} + \frac{\pi}{12}$ (c) $n\pi$ (d) $n\pi \pm \frac{\pi}{4}$
- Q.6 The value of $i^{13} + i^{14} + i^{15} + i^{16}$ is
(a) i (b) $-i$ (c) zero (d) -1

- Q.7 Modulus of a complex number $3 + i$ is
(a) 10 (b) $\sqrt{10}$ (c) $-\sqrt{10}$ (d) zero
- Q.8 If $n = 7$ and $r = 5$, then value of nCr is
(a) 21 (b) 42 (c) 35 (d) 75
- Q.9 If first term of G.P is 5 and its 10th term is 5^{10} then the common ratio is
(a) 1 (b) 5 (c) 9 (d) 11
- Q.10 Slope of lines passing through the points (3,-2) and (-1, 4) is
(a) $\frac{-2}{3}$ (b) $\frac{-4}{2}$ (c) $\frac{3}{2}$ (d) 0
- Q.11 $\lim_{\theta \rightarrow 0} \frac{\sin 5\theta}{\theta}$ is
(a) 5 (b) $\frac{1}{5}$ (c) 1 (d) None of these
- Q.12 Derivative of $\operatorname{Cosec} x$ is
(a) $\operatorname{Cosec} x \cot x$ (b) $-\operatorname{Cosec} x \cot x$ (c) $\tan x \cot x$ (d) None of these

(CASE STUDY - I)

Indian track and field athlete Neeraj Chopra who competes in the Javelin throw, won a gold medal at Tokyo Olympics. He is the first track and field athlete to win a gold medal for India at the Olympics.

- Q.13 Name the shape of the path followed by a Javelin
(a) Half ellipse (b) Parabola (c) Hyperbola (d) None of these
- Q.14 If equation of a such a curve is given by $x^2 = -16y$, then Co – ordinates of the foci are
(a) (4, 0) (b) (0, 4) (c) (0, -4) (d) (-4, 0)

(CASE STUDY - II)

The derivative of y with respect to x is the change in y with respect to change in x. The derivative of f(x) at x_0 is given by

$$f'(x_0) = \lim_{\Delta x \rightarrow 0} \frac{\Delta y}{\Delta x} = \frac{f(x_0 + \Delta x) - f(x_0)}{\Delta x}$$

- Q.15 If f(x) = x^{100} - x^{50}, f'(1) is
(a) 0 (b) 50 (c) 51 (d) 101

Q.16 y: $\frac{x}{\tan x} \frac{dy}{dx} = \dots\dots\dots$

- (a) cos^2x (b) sec^2x (c) $\frac{\tan x - \sec x}{\tan^2 x}$ (d) $\frac{\tan x - x \sec^2 x}{\tan^2 x}$

(SECTION-B) (2x5=10)

This section comprises of very short answer type questions (VSA) of 2- marks each.

- Q.17 How many times will be a wheel of a car rotate in a Journey of 1320m, if the radius of the wheel is 35cm?

- Q.18 Find the multiplicative inverse of 2 + \sqrt{3} i.
OR

For any positive integer n, prove that i^{2n} + i^{4n+1} + i^{4n+2} + i^{4n+3} = 0

- Q.19 If $\frac{1}{8!} + \frac{1}{9!} = \frac{x}{10!}$, find x.

OR

In how many ways can 4 red, 3 yellow and 2 green discs be arranged in a row if the discs of the same colour are indistinguishable?

- Q.20 Find the derivative of 5 sinx - 6 cosx + 7.

- Q.21 Write the contrapositive of the statement, if a number is divisible by 9, then it is divisible by 3.

(SECTION-C) (3x6=18)

This section comprises of short answer type questions (SA) of 3 marks each.

- Q.22 Prove that $\frac{\sin x + \sin 3x}{\cos x + \cos 3x} = \tan 2x$

- Q.23 Solve the equality for real x:

$$\frac{3(x-2)}{5} \leq \frac{3(2-x)}{3}$$

OR

Solve the system of inequalities graphically

$$2x + y - 3 \geq 0 \text{ and } x - 2y + 1 \leq 0$$

- Q.24 Find the equation of the line passing through (-3,5) and perpendicular to the line through the points (2,5) and (3,-6).

OR

Find the angle between the lines y - \sqrt{3}x - 5 = 0 and \sqrt{3}y - x + 6 = 0

- Q.25 Find the equation of the circle passing through the points (2,3) and (-1,1) and whose centre is on the line x - 3y - 11 = 0

OR

Find the coordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and the length of the latus rectum of the ellipse

$$\frac{x^2}{36} + \frac{y^2}{16} = 1$$

- Q.26 Find the ratio in which the YZ-plane divides the line segment formed by joining the points (-2,4,7) and (3,-5,8).

- Q.27 A and B are events such that P(A)=0.42, P(B)=0.48 and P(A and B)=0.16. Determine (i) P(not A) (ii) P(not B) (iii) P(A or B)

(SECTION-D) (4x4=16)

This section comprises long answer (LA) questions of 4 marks each.

- Q.28 In a group of 65 people, 40 like cricket, 10 like both cricket and tennis. How many like tennis only not cricket? How many like tennis?

- Q.29 A function f is defined by $f(x)=2x-5$. Write down the values of
 (i) $f(0)$ (ii) $f(7)$ (iii) $f(-3)$

OR

Find the domain of the function $f(x)=\frac{x^2+2x+1}{x^2-8x+12}$

- Q.30 Using principle of mathematical Induciton, prove that
 $1^2+2^2+3^2+4^2+\dots+n^2=\frac{n(n+1)(2n+1)}{6}$

- Q.31 Three coins are tossed once. Find the probability of getting (i) 3 heads (ii) no tail (iii) atmost 2 heads (iv) exactly two tails.

OR

A and B are two events such that $P(A)=0.54$, $P(B)=0.69$ and $P(A \cap B)=0.35$

Find:

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

SECTION-E (5x4=20)

This section comprises long answer (LA) - questions of 5 marks each.

- Q.32 Find the general solution of
 $\sin x + \sin 3x + \sin 5x = 0$

OR

If $\tan x = -\frac{4}{3}$, x in quadrant II, find the value of $\sin \frac{x}{2}$, $\cos \frac{x}{2}$ and $\tan \frac{x}{2}$

- Q.33 Find the 4th term in the expansion of $(x-2y)^{12}$

OR

Find the middle terms in the expansion of $(\frac{x}{2} + 9y)^{10}$

- Q.34 Find the sum to n terms of the series
 $1 \times 2 + 2 \times 3 + 3 \times 4 + 4 \times 5 + \dots$

- Q.35 Find the mean and variance for the following distribution

| Classes | Frequencies |
|---------|-------------|
| 0-30 | 2 |
| 30-60 | 3 |
| 60-90 | 5 |
| 90-120 | 10 |
| 120-150 | 3 |
| 150-180 | 5 |
| 180-210 | 2 |
