

# Model Question Paper

Class –11<sup>th</sup>  
Paper – Maths.

Time 3:00 Hrs.

Maximum Marks: – 80

General instructions:-

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

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

(1X16=16)

- 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  $\pi$  radian is equal to  
(a)  $90^\circ$  (b)  $180^\circ$  (c)  $270^\circ$  (d)  $360^\circ$
- 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  $i^{12} + i^{14} + i^{15} + i^{16}$  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 10<sup>th</sup> 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)  $-\frac{3}{2}$  (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  $y: \frac{x}{\tan x}, \frac{dy}{dx} = \text{-----}$

- (a)  $\cos^2 x$  (b)  $\sec^2 x$  (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  $5 \sin x - 6 \cos x + 7$ .

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  $x$ :

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

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  $P(A \text{ and } B) = 0.16$ . Determine (i)  $P(\text{not } A)$  (ii)  $P(\text{not } B)$  (iii)  $P(A \text{ or } B)$

**(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 Induction, 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 4<sup>th</sup> term in the expansion of  $(x-2y)^{12}$

OR

Find the middle terms in the expansion of  $(\frac{x}{3} + 9y)^{10}$

- 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

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