

# SUCCESS KEY TEST SERIES

Annual Examination

Std: 11th Science

Subject: Mathematics & Statistics

Time: 3 Hours

Date :

## Sample Question Paper

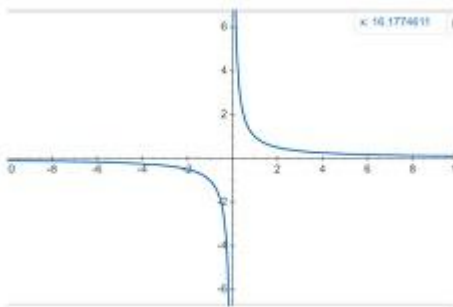
Max Marks: 80

### Section A ( MCQ & VSA 1 MARKS Questions)

#### Q.1 Select and write the correct answer:

16

- (i) The Cartesian co-ordinates of points whose polar co-ordinates are  $(4, 90^\circ)$   
(a)  $(0,4)$  (b)  $(4,0)$  (c)  $(2,0)$  (d)  $(0,2)$
- (ii) The equation  $x^2 + y^2 - 8x + 6y + 25 = 0$  is  
(a) a circle  
(b) a point in xy plane  
(c) doesn't represent any point in the xy plane.  
(d) None of these
- (iii) Equation of the parabola with vertex at the origin and diretrix  $x + 8 = 0$  is  
(a)  $y^2 = 8x$  (b)  $y^2 = 32x$  (c)  $y^2 = 16x$  (d)  $x^2 = 32y$
- (iv) The value of x such that  $8x + 4, 6x - 2, 2x + 7$  form an A.P.  
(a) 15 (b) 2 (c) 12 (d) 7.5
- (v) A coin is tossed 3 times. Find out the number of possible outcomes.  
(a) 12 (b) 10 (c) 8 (d) 11
- (vi)  $f(x) = 2k$  is a  
(a) constant function  
(b) identity function  
(c) power function  
(d) None of the above
- (vii) If  $f(x) = \frac{1 - \sqrt{2} \sin x}{\pi - 4x}$ , for  $x \neq \frac{\pi}{2}$  is continuous at  $x = \frac{\pi}{4}$ , then  $f\left(\frac{\pi}{4}\right) =$   
(a)  $\frac{1}{\sqrt{2}}$  (b)  $-\frac{1}{\sqrt{2}}$  (c)  $-\frac{1}{4}$  (d)  $\frac{1}{4}$
- (viii) From the given graph, choose the correct option.



- (a) Graph is continuous everywhere.  
(b) Graph is differentiable everywhere.  
(c) Graph is non differentiable at  $x = 0$   
(d) Graph is defined at  $x = 0$

#### Q.2 Answer the following:

4

- (i) Find the length of an arc of a circle which subtends an angle of  $108^\circ$  at the centre, if the radius of circle is 15 cm.

(ii)

Find the value of  $\sin \frac{41\pi}{4}$

(iii) Examine the collinearity of the following set of point  
A(3, -1), B(0, -3), C(12, 5)

(iv) Differentiate the following w.r.t.x  $y = x^5 \tan x$

### Section B (2 MARKS EACH)

**Attempt any Eight:**

16

**Q.3** Prove that  
 $\cos^4 \theta - \sin^4 \theta + 1 = 2\cos^2 \theta$

**Q.4** Prove that  $\frac{\sin 3x}{\cos x} + \frac{\cos 3x}{\sin x} = 2\cot 2x$

**Q.5** Find the value of determinant expanding along third column

$$\begin{vmatrix} -1 & 1 & 2 \\ -2 & 3 & -4 \\ -3 & 4 & 0 \end{vmatrix}$$

**Q.6** The vertices of a triangle are A(3, 4), B(2, 0) and C(-1, 6). Find the equations of the lines containing the mid points of sides AB and BC.

**Q.7** Find the centre and radius of  $x^2 + y^2 - 6x - 8y - 24 = 0$

**Q.8** Find the equation of the ellipse in standard form if minor axis is 16 and eccentricity is  $\frac{1}{3}$ .

**Q.9** Given below the frequency distribution of weekly wages of 400 workers. Find the range.

Weekly wages (in 00Rs)	10	15	20	25	30	35	40
No. of workers	45	63	102	55	74	36	25

**Q.10** Three cards are drawn from a pack of 52 cards. Find the chance that two are queen cards and one is an ace card

**Q.11** show that  $\left( \frac{\sqrt{7} + i\sqrt{3}}{\sqrt{7} - i\sqrt{3}} + \frac{\sqrt{7} - i\sqrt{3}}{\sqrt{7} + i\sqrt{3}} \right)$  is real.

**Q.12** Determine whether the sum to infinity of the following G.P.s exist, if exists find them

$$\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \dots$$

**Q.13** Find the number of permutations of the letters of the word UBUNTU.

**Q.14** Evaluate  $\lim_{x \rightarrow \frac{\pi}{2}} \left[ \frac{\cos x}{x - \frac{\pi}{2}} \right]$

### Section C ( 3 MARKS EACH)

**Attempt any Eight:**

24

**Q.15** The measures of the angles of a triangle are in the ratio 3:7:8. Find their measures in degree and radian.

**Q.16** Find the trigonometric functions of:  $-90^\circ$

Q.17

$$\text{If } A = \begin{bmatrix} 1 & -2 \\ 3 & -5 \\ -6 & 0 \end{bmatrix}, B = \begin{bmatrix} -1 & -2 \\ 5 & 2 \\ 1 & 5 \end{bmatrix} \text{ and } C = \begin{bmatrix} 2 & 4 \\ -1 & -4 \\ -3 & 6 \end{bmatrix},$$

find the matrix X such that  $3A - 4B + 5X = C$ .

Q.18

Find the co-ordinates of the foot of the perpendicular drawn from the point A(-2, 3) to the line  $3x - y - 1 = 0$ .

Q.19

Calculate coefficient of variation of the following data.  
23, 27, 25, 28, 21, 14, 16, 12, 18, 16

Q.20

$$\text{Find } \sum_{r=0}^{\infty} (-8) \left( -\frac{1}{2} \right)^r$$

Q.21

Without expanding, find the value of  
 $(2x - 1)^5 + 5(2x - 1)^4(1 - x) + 10(2x - 1)^3(1 - x)^2 + 10(2x - 1)^2(1 - x)^3 + 5(2x - 1)(1 - x)^4 + (1 - x)^5$

Q.22

Solve the following inequalities and write the solution set using interval notation.

$$\frac{2x}{x - 4} \leq 5$$

Q.23

Let  $A = \{1, 2, 3, 4\}$ ,  $B = \{4, 5, 6\}$ ,  $C = \{5, 6\}$ . Verify,  
 $A \times (B \cup C) = (A \times B) \cup (A \times C)$

Q.24

Verify that f and g are inverse functions of each other, where

$$f(x) = \frac{x + 3}{x - 2}, g(x) = \frac{2x + 3}{x - 1}$$

Q.25

$$\text{If } f(x) = \frac{\cos^2 x - \sin^2 x - 1}{\sqrt{3x^2 + 1} - 1}, \text{ for } x \neq 0,$$

is continuous at  $x = 0$  then find  $f(0)$ .

Q.26

Differentiate the following w.r.t.x

$$y = e^x \sec x - x^{\frac{5}{3}} \log x$$

### Section D (4 MARKS EACH)

**Attempt any Five:**

20

Q.27

In  $\triangle ABC$  Prove that  
 $\sin^2 A + \sin^2 B - \sin^2 C = 2 \sin A \sin B \sin C$

Q.28

Prove that  $A + A^T$  is a symmetric and  $A - A^T$  is a skew symmetric matrix where

$$A = \begin{bmatrix} 5 & 2 & -4 \\ 3 & -7 & 2 \\ 4 & -5 & -3 \end{bmatrix}$$

Q.29

Find the equation of the hyperbola in the standard form if (i) Length of conjugate axis is 5 and distance between foci is 13. (ii) eccentricity is  $\frac{3}{2}$  and distance between foci is 12.  
(iii) length of the conjugate axis is 3 and distance between the foci is 5.

Q.30

The ratio of Boys to Girls in a college is 3:2 and 3 girls out of 500 and 2 boys out of 50 of that college are good singers. A good singer is chosen what is the probability that the chosen singer is a girl?

**Q.31** If  $w$  is a complex cube root of unity, then prove that

$$(1 + w + w^2)^3 = -8$$

**Q.32** A committee of 10 persons is to be formed from a group of 10 women and 8 men. How many possible committees will have at least 5 women? How many possible committees will have men in majority ?

**Q.33** Find the term independent of  $x$ , in the expansion of

$$\left( \sqrt{x} - \frac{2}{x^2} \right)^{10}$$

**Q.34** Evaluate:

$$\lim_{x \rightarrow \frac{\pi}{4}} \left[ \frac{(\sin x - \cos x)^2}{\sqrt{2} - \sin x - \cos x} \right]$$

----- All the Best -----