# MATHS

## BOOKS - S CHAND MATHS (ENGLISH)

## MODEL TEST PAPER-19

### Section A

**1.** Value of $\frac{\tan^2 15^\circ - 1}{\tan^2 15^\circ + 1}$

A. $\frac{1}{2}$

B. $\frac{\sqrt{3}}{2}$

C. $-\frac{\sqrt{3}}{2}$

D. $\frac{1}{\sqrt{3}}$

**Answer: C**

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**2.** In $\Delta$ ABC if $\angle C = 75^\circ$, $\angle B = 45^\circ$, $a = 2$, then b equals to

A. $\frac{4}{\sqrt{6}}$

B. $\frac{\sqrt{6}}{4}$

C. 1

D. None of these

**Answer: A**

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**3.** Let A = {p, q, r} and B = {1, 2}. Then the number of relations from A to B is :

A. 32

B. 8

C. 4

D. 64

**Answer: D**

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**4.** Which term of the A.P. 10 - 8i, 8 - 6i, 6 - 4i,....is purely real ?

A. $5^{th}$ term

B. $6^{th}$ term

C. $4^{th}$ term

D. None of these

**Answer: A**

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**5.** Solution of : $-x^2 + 6x - 5 \geq 0$ is

A. [5, 1]

B. [5, 1)

C. (1, 5)

D. [1, 5]

**Answer: D**

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**6.** The sum of the components of a and b in the expansion of $(a + b)^n$ is

A. n

B. $n^2$

C. 2n

D. n + 1

**Answer: A**

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**7.** Given that $1, \omega, \omega^2$ are the centre roots of unity, the value of

A. 2

B. 8

C. 1

D. -1

**Answer: C**

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**8.** If the line $y = \sqrt{3}x + k$ touches the circle $x^2 + y^2 = 16$, then the value of k is

A. 16

B. 8

C. $+8$

D. $+16$

**Answer: C**

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**9.** Evaluate : $\lim_{x \to 2} \frac{\sqrt{2x} - 2}{x - 2}$

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**10.** Differentiate with respect to 'x' : $x^4 + 4^x + \log x$.

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**11.** A coin is tossed. If it shows a tail, we draw a ball from a bag containing 2 Red and 3 Green balls. If it shows head, we draw a ball from a bag containing 1 Blue and 1 White ball. Write the sample space. Also find the n(S).

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**12.** How many numbers of 6 digits can be formed out of the digits of the number 567724 ?

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**13.** Find the equation of a line parallel to y-axis and at a distance of 7 units to the left of y-axis.

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**14.** Let U = {1, 2, 3, 4, 5, 6}, A = {2, 3} and B = {3, 4, 5}. Find (B - A)'.

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**15.** Find the number of term in the expansion of $(x + y + z)^n$.

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**16.** Let A = {a, e, i, o, u}, B = {a, e, i}, C = {i, o, u}. Find all sets X such that $X \subset B$ and $X \subset C$.

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**17.** Find the principal solution of the equation cot x = - 1

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**18.** If x is real, prove that $5x^2 - 8x + 6$ is always positive and find its minimum value.

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**19.** Find the domain of the function $f(x) = \frac{1}{\sqrt{[x] - x}}$. Justify.

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**20.** Given $\cos 330^\circ = \frac{\sqrt{3}}{2}$, then find the value of $\sin 165^\circ$ and $\cos 165^\circ$.

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**21.** Using definition, find the derivative of $f(x) = \tan x^2$.

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**22.** Find the set of values of x for which the inequalities $x^2 - 3x - 10 < 0$.

$10x - x^2 - 16 > 0$ hold simultaneously.

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**23.** If $\frac{2}{3} = \left(x - \frac{1}{y}\right) + \left(x^2 - \frac{1}{y^2}\right) + \ldots$ to $\infty$ and xy = 2, then find the value of x and y with the condition that $|x| < 1$.

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**24.** Find the sum of : 2 + 5 + 10 + 17 + 26 + ... to n terms.

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**25.** Find the area of the triangle formed by the lines whose equations are 2y - x = 5, y + 2x = 7 and y - x = 1.

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**26.** Circles are drawn to touch three straight lines y = 0, y = 4 and 2x + y = 2. Find the equations of the circles.

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**27.** Find the variance and standard deviation from the following table giving the age distribution of 540 members of a Parliament :

| Age in Years | 30 | 40 | 50 | 60 | 70 |
|---|---|---|---|---|---|
| Number of members | 64 | 132 | 153 | 140 | 51 |

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## Section B

**1.** Consider the parabola given by the equation $(x-3)^2+(y-3)^2=k(x+y-2)^2$. Then the value of k is

A. 1

B. 2

C. $\frac{1}{2}$

D. None of these

**Answer: C**

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**2.** The foci of the hyperbola $\frac{(x-1)^2}{25} - \frac{(y+1)^2}{16} = 1$ are :

A. $(1+\sqrt{41}, -1)$

B. $(-1, 1+\sqrt{41})$

C. $(-1+\sqrt{41}, -1)$

D. $(1, -1+\sqrt{41})$

**Answer: A**

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**3.** Distance between the points (7, 4, -5) and (1, 6, -2) is

A. 5 units

B. 4 units

C. 1 units

D. 7 units

**Answer: D**

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**4.** $9x^2 - 24xy + 16y^2 - 6x + 8y - 5 = 0$ represent a

A. parabola

B. circle

C. ellipse

D. hyperbola

**Answer: A**

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**5.** $q \rightarrow p$ is False when .....

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**6.** If x = 5 and y = -2 then x - 2y = 9. Write the contrapositive of this proposition.

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**7.** Write the negation of the statement $\sim p \rightarrow (q \vee r)$

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**8.** Find the area of the triangle formed by the lines joining the vertex of the parabola $x^2 = 12y$ to the ends of its latus rectum.

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**9.** Find the equation of hyperbola having foci $(+4, 0)$ and length of the latus rectum is 12.

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**10.** Find the ratio in which the zx plane divides the join of the points (2, 4, 5) and (3, -6, 8). Find also the co-ordinates of the point of intersection of join and the zx plane.

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## Section C

**1.** If u = ax + b, u = cy + d, then Cov(u, v) = k Cov(x, y). Value of k is

A. $\frac{a}{c}$

B. $\frac{c}{a}$

C. ac

D. None of these

**Answer: C**

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**2.** If $\frac{1}{4} \leq |r| < \frac{3}{4}$, then correlation is said to be

A. High degree

B. Low degree

C. Moderate degree

D. None of these

**Answer: C**

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**3.** If m items have common rank, the correction to be added is $k\left(m^3 - m\right)$. Value of k is

A. 15

B. $\frac{1}{10}$

C. 12

D. $\frac{1}{12}$

**Answer: D**

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**4.** During a certain period, the cost of living index number goes from 110 to 200 and the salary of a worker is also raised from Rs. 325 to Rs. 500. So

the worker actually.....in real term.

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**5.** Calculate the cost of living index for the following data :

| Commodity | $A$ | $B$ | $C$ | $D$ |
|---|---|---|---|---|
| PR | 248 | 133.30 | 204 | 138.50 |
| Weight | 22 | 48 | 17 | 13 |

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**6.** Calculate the coefficient of correlation between x and y series from the following data :

$$\sum_{i=1}^{12}(x_i-\bar{x})^2=360,\ \sum_{i=1}^{12}(y_i-\bar{y})^2=250 \text{ and } \sum_{i=1}^{12}(x_i-\bar{x})(y_i-\bar{y})=225$$

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**7.** Calculate Cov(x, y), given

$\sum x_i = 50, \sum y_i = -30, \sum x_i y_i = 50, n = 5.$

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**8.** Find the mode from the following frequency distribution :

| Output (in Units) | $300-309$ | $310-319$ | $320-329$ | $330-339$ | $340-$ |
|---|---|---|---|---|---|
| No. of workers | 9 | 20 | 24 | 38 | 48 |

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**9.** The scores on a reading comprehension test of 1000 students are given below :

| Score (out of 75) | $0-5$ | $5-10$ | $10-15$ | $15-20$ | $20-25$ | $25-30$ | 30 |
|---|---|---|---|---|---|---|---|
| Frequency | 6 | 12 | 50 | 120 | 225 | 250 | 18 |

Find the median score.

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**10.** Obtain the five-year moving averages for the following series of observations :

| Year | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|---|
| Annual sales (Rs. '000) | 3.6 | 4.3 | 4.3 | 3.4 | 4.4 | 5.4 | 3.4 | 2.4 |

Display these and the original figures on the same graph.

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