



## MATHS

### BOOKS - S CHAND MATHS (ENGLISH)

#### MODEL TEST PAPERS 01

##### Section A

1. If  $X = \{2, 3, 5, 7, 9\}$  be the universal set,  $a = \{3, 7\}$ ,  $b = \{2, 5, 7, 9\}$ , then prove that  $(A \cup B)' = A' \cap B'$

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2. Find the radius of a circle in which a central angle of  $45^\circ$  intercepts an arc of 187 cm

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3. Evaluate :  $\sin(270^\circ - \theta) \cdot \sin(90^\circ - \theta) - \cos(270^\circ - \theta) \cdot \cos(90^\circ + \theta)$



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4. Convert the given complex number "-i" in the polar form



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5. Evaluate :  $\lim_{x \rightarrow 5^-} \frac{x + 5}{|x + 5|}$



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6. If  $f(x) = mx + c$  and  $f(0) = 1 = f'(0)$ , find  $f(-2)$



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7. In a single throws of two dice, what is the probability of getting a total of atmost 9 ?

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8. Prove that  $\frac{\cos A}{1 - \sin A} = \tan\left(\frac{\pi}{4} + \frac{A}{2}\right)$

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9. For the quadratic equation  $(k - 1)x^2 = kx - 1$ ,  $k \neq 1$  find k so that the toots are numerically equal but opposite sign

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10. How many numbers greater than 3, 00, 000 can be formed by using all the digits of the number 111223 ?

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11. Define greatest integer function . Write its domain and range. Draw the graph of it

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12. Let 'f' be a function defined by  $f: x \rightarrow 5x^2 + 2, x \in R$

Express 'f' as a set of ordered pairs using set builder notation

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13. Let 'f' be a function defined by  $f: x \rightarrow 5x^2 + 2, x \in R$

Is 'f' a one one function ?

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14. Let 'f' be a function defined by  $f: x \rightarrow 5x^2 + 2, x \in R$

Find the image of 3 under f.



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15. Let 'f' be a function defined by  $f: x \rightarrow 5x^2 + 2, x \in R$

Find x such that  $f(x) = 2$



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16. Find the total number of ways of selecting five letters of the word

'INDEPENDENT'



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17. Use the principle of mathematical induction, to prove that

$$3 \cdot 2^2 + 3^2 \cdot 2^3 + 3^3 \cdot 2^4 + \dots + 3^n \cdot 2^{n+1} = \frac{12}{5}(6^n - 1), n \in N$$

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18. Find the locus of a complex number  $z = x + iy$ ,  $x, y, \in R$  satisfying the relation  $|2z + 3i| \geq |2z + 5|$ . Illustrate the locus in Argand plane

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19. If  $\cot \alpha = \frac{1}{2}$ ,  $\alpha \in \left(\pi, \frac{3\pi}{2}\right)$  and  $\sec \beta = \frac{-5}{3}$ ,  $\beta \in \left(\frac{\pi}{2}, \pi\right)$ , find  $\tan (\alpha + \beta)$

and find the quadrant in which  $\alpha + \beta$  terminates.

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20. Prove that  $\cos \frac{\pi}{9} \cdot \cos \frac{\pi}{9} \cdot \cos \frac{3\pi}{9} \cdot \cos \frac{4\pi}{9} = \frac{1}{2^4}$

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21. Differentiate,  $f(x) = \sqrt{2x + 3}$ , by using 1<sup>st</sup> principle



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22. Evaluate :  $\lim_{x \rightarrow \pi} \frac{1 - \sin \frac{x}{2}}{(\pi - x)^2}$



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23. A variable line passes through the point (-1,2) and cuts the coordinate axes in points A and B . If the point P divides the segment AB internally in the ratio 2 : 3 show that locus of P is  $5xy = 4x - 3y$  .



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24. In the binomial expansion of  $(1 + x)^{43}$ , the coefficients of the  $(2r + 1)$ th and  $(r+2)$ th terms are equal . Find r



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25. Prove that  $\cos^3 x + \cos^3\left(\frac{2\pi}{3} + x\right) + \cos^3\left(\frac{2\pi}{3} - x\right) = \frac{3}{4}\cos 3x$

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26. Solve :  $\tan \theta + \sec \theta = \sqrt{3}$ ,  $-360^\circ \leq \theta \leq 360^\circ$

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27. If  $x$  is real, show that the value of  $\frac{x^2 + 2x - 3}{x^2 + 2x + 4}$  cannot lie between  $-\frac{4}{3}$  and 1

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28. The sum of three numbers in GP is 56. If we subtract 1, 7, 21 from these numbers in that order, we obtain an AP. Find the numbers

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29. Find the sum of the series  $1 + 5 + 14 + 30 + 55 + \dots$  upto  $n$  terms



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30. Estimate standard deviation for the following frequency distribution

Size	1 – 2	2 – 3	3 – 4	4 – 5	5 – 6	6 – 7	7 – 8	8 – 9	9 – 10
Freq	1	3	6	8	11	13	13	14	10



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## Section B

1. Construct the truth for  $[(\sim p) \wedge q] \Rightarrow (p \vee q)$



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2. Find the equation of ellipse, the distance between foci is 8 units and the distance between the direction is 18 units.

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3. Write the converse and contrapositive of the following statement :  
A positive integer is prime only if it has no divisors other than 1 and itself :

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4. The tangents from P to the hyperbola  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$  are mutually perpendicular, show that the locus of P is the circle  $x^2 + y^2 = a^2 - b^2$

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5. Find the vertex, focus and directrix of the parabola  
 $y^2 - 2y + 8x - 23 = 0$

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6. Find the ratio in which the line joining the point  $(2,5,4)$  and  $(3,5,4)$  is divided by the YZ plane. Also find the coordinates of the section

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7. Determine the point in ZX plane which is equidistant from points  $(1,-1,0), (2,1,2), (3,2,-1)$

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## Section C

1. Given  $r = 0.8$ ,  $\sum xy = 60$ ,  $\sigma_y = 2.5$  and  $\sum x^2 = 90$  find the number of items  $x$  and  $y$  are deviation from their respective means.

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2. In a class of 15 students, 4 students failed and those who passed had marks 38, 45, 63, 35 81, 99, 78, 57, 92, 39, 48 find the median marks of the class.



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3. Construct the index numbers for 2014 taking 2010 as the base year from the following data by simple average of price relative method :

Commodities	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
Price in 2010 (in ₹)	100	80	160	220	40
Price in 2014 (in ₹)	140	120	180	240	40



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4. Calculate Karl Pearson's coefficient of correlation for the following data

Marks in Mathematics	15	18	21	24	27	30	36	39	42	48
Marks in Statistics	25	25	27	27	31	33	35	41	41	45



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5. Heights (in cm) of a sample of 12 father and their oldest sons are given

below :

Heights of father	165	160	170	163	173	158	178	168	173	170	170
Heights of son	173	168	173	165	175	168	173	165	180	170	170

Find Spearman's rank correlation coefficient.



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6. Find the values of a and b from the following data :

Marks	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	Total
No. of candidates	5	$a$	15	$b$	7	47

Given that mode = 37



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7. A sample of 35 observations has mean 80 and standard 4. A second sample of 65 observations has mean 70 and standard deviation = 3 . Find the combined mean and standard deviation



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8. The following table gives the number of failures of commercial industries in a country during the year 1975 to 1990

Year	1975	1976	1977	1978	1979	1980	1981	1982
Number of failures	23	26	28	32	20	12	12	10
Year	1983	1984	1985	1986	1987	1988	1989	1990
Number of failures	9	13	11	14	12	9	3	1

Draw a graph illustrating these figures. Calculate the 4 yearly moving averages and plot them on the same graph



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