



MATHS

BOOKS - S CHAND MATHS (ENGLISH)

MODEL TEST PAPER - 18

Section A

1. If A is a set with $n(A) = m$, then $nP(A) =$

A. $(a)2^m$

B. $(b)2^{m-1}$

C. $(c)2^m - 1$

D. $(d)2^{m+1}$

Answer: A



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2. The least value of $\cos^2 x + \sec^2 x$ is :

A. 1

B. 0

C. -1

D. 2

Answer: D



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3. In a triangle ABC, if $\frac{b+c}{11} = \frac{c+a}{12} = \frac{a+b}{13}$, then $\cos A =$

A. (a) $\frac{19}{35}$

B. (b) $\frac{5}{7}$

C. (c) $\frac{1}{5}$

D. (d) $\frac{11}{12}$

Answer: C



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4.

The common ratio of a GP is $-\frac{4}{5}$ and the sum to infinity is $\frac{80}{9}$. The first term of GP is

A. 16

B. 8

C. 12

D. None of these

Answer: A



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5. In sub - parts (i) to (x) choose the correct option and in sub - parts (xi) to (xv) , answer the questions as instructed.

Given that α and β are the roots of the equation $x^2 + x + 4$, then the value of

$$\frac{\alpha}{\beta} + \frac{\beta}{\alpha} \text{ is}$$

A. $\frac{57}{4}$

B. $-\frac{57}{4}$

C. $\frac{49}{4}$

D. $\frac{75}{4}$

Answer: B



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6. In the Binomial expansion of $(\sqrt[3]{2} + \sqrt{3})^5$, which term does not contain an irrational expression

A. 2nd term

B. 3rd term

C. 4th term

D. None of these

Answer: B



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7. answer the questions as instructed.

Modulus of $\left(\cos\frac{5\pi}{3} - i\sin\frac{\pi}{6}\right)$ is

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

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

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

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

Answer: B



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8. Let $S_1: x^2 + y^2 - 2x = 0$ and $S_2: x^2 + y^2 + 6x - 6y + 2 = 0$ Do these circles

- A. touch internally
- B. S_1 lies completely inside the other circle S_2
- C. touch externally
- D. None of these

Answer: C

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9. Answer the questions as instructed.

The inclination of the line $x + \sqrt{3}y + 7 = 0$ is

- A. $\frac{2\pi}{3}$
- B. $\frac{\pi}{3}$
- C. $\frac{\pi}{6}$

D. $\frac{5\pi}{6}$

Answer: D



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10. The range of the function : $f(x) = 2 - 3x, x \in R, x > 0$ is

A. (a) $(-\infty, 2)$

B. (b) $(2, \infty)$

C. (c) $(-2, 2)$

D. (d) None of these

Answer: A



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11. Answer the questions as instructed.

Find the derivative of $(\sec x - 1)(1 + \sec x)$ w.r.t x .

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12. Evaluate : $\lim_{x \rightarrow 8} \frac{e^x - e^8}{x - 8}$

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13. In sub - parts (i) to (x) choose the correct option and in sub - parts (xi) to (xv) , answer the questions as instructed.

How many words , with or without meaning ,can be formed using the letters of the word ENGINEERING ?

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14. What is the probability of 53 Sundays and 53 Mondays in a leap year ?



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15. Find the number of terms in the expansion of $(1 - 2x + x^2)^n$.



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16. Solve $|3x-4| = 5$



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17. Taking the set of natural numbers as universal set , write down the complement of the following sets

$$\{x : 2x + 5 = 9\}$$

(b) $\{x \{x \in N \text{ and } 2x + 1 > 10\}$



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18. In any ΔABC , prove that

$$(a - b)^2 \cos^2\left(\frac{C}{2}\right) + (a + b)^2 \sin^2\left(\frac{C}{2}\right) = c^2.$$

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19. (a) In a right angled triangle, the difference between two acute angles is $\frac{\pi}{5}$ in radians Express the angles in degrees.

(b) Evaluate : $6\cos\frac{\pi}{9} - 8\cos^3\frac{\pi}{9}$

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20. Find the multiplicative inverse of $4-3i$.

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21. Given the quadratic equation $(k - 1)x^2 - kx + 1 = 0$, (where $k \neq 1$)
, find k so that product of the roots is -3 .

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22. Prove that the product of the identity function and the signum function is the modulus function.

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23. Prove that :

$$\cos x + \cos y + \cos z + \cos(x + y + z) = 4 \cos\left(\frac{x + y}{2}\right) \cos\left(\frac{y + z}{2}\right) \cos\left(\frac{x + z}{2}\right)$$

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24. Solve : $\sec x \cos 5x + 1 = 0$, where $0 < x \leq \frac{\pi}{2}$.

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25. Use principle of mathematical induction to prove that

$$\left(1 + \frac{3}{1}\right) \left(1 + \frac{5}{4}\right) \dots \left(1 + \frac{2n+1}{n^2}\right) = (n+1)^2$$

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26. If $y = (x - a)^m(x - b)^n$, prove that

$$\frac{dy}{dx} = (x - a)^{m-1}(x - b)^{n-1}[(m + n)x - (an + bm)].$$

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27. Using definition, find the derivative of $f(x) = \sin \sqrt{x}$.

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28. If the sum of an infinite geometric series is 15 and the sum of the squares of these terms is 45, find the G.P.

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29. Find the sum to n terms of the series :

$$1^2 + (1^2 + 2^2) + (1^2 + 2^2 + 3^2) + \dots$$

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30. Solve: $\frac{x^2 - 2x + 5}{3x^2 - 2x - 5} > \frac{1}{2}$.

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31. If the lines $2x + 3y + 1 = 0$ and $3x - y - 4 = 0$ lie along diameters of a circle of circumference 10π , then the equation of the circle is

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32. Reduce the equation in the Normal form $-x + y + 4 = 0$. Find its perpendicular distance from the origin and angle between perpendicular

and the positive x-axis .

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33. The mean and standard deviation of a group of 100 observations were found to be 20 and 3 respectively . Later , it was found that three observations were incorrect , which were recorded as 21 , 21 and 18 . Find the mean and standard deviation if the correct observations are omitted.

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Section B

1. The eccentricity of the ellipse whose foci are $(3,2)$ and $(3,-2)$ and whose length of semiminor axis $= \sqrt{5}$ is

A. $\frac{2}{3}$

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

C. $\frac{3}{5}$

D. $\frac{4}{5}$

Answer: A



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2. The vertex of the parabola : $4y^2 + 12x - 20y + 67 = 0$ is :

A. $\left(\frac{5}{2}, \frac{7}{2}\right)$

B. $\left(\frac{7}{2}, \frac{5}{2}\right)$

C. $\left(-\frac{7}{2}, \frac{5}{2}\right)$

D. $\left(-\frac{5}{2}, \frac{7}{2}\right)$

Answer: C



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3. Answer the questions as instructed.

Find the length of the axes of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, which passes through the points $(3,0)$ and $(3\sqrt{2}, 2)$.



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4. In sub -parts (i) and (ii) choose the correct option and in sub-parts (iii) to (v) answer the questions as instructed.

Rewrite in the form of conditional statement : m has no factors other than 1 and itself if it is a prime number.



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5. Find the image of the point $(2,3,-1)$ in the point $(3,0,4)$.



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6. Write the component statements of the following compound statement and check whether compound statement is true or false . Two lines intersect at a point or they are parallel"

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7. If a and b are integers then ab is a rational number Check the validity of the statement

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8. Show that the points $(0,7,10)$, $(-1,6,6)$ and $(-4,9,6)$ form a right angled isosceles triangle .

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9. Find the coordinates of the points which trisect the line segment joining the points P(4,2,-6) and Q(10,-16,6).

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10. Find the equation of tangents to the hyperbola $x^2 - 2y^2 = 8$ that make an angle of 45° with the positive direction of x-axis .

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Section C

1. The price index of rice in 2014 relative to 2010 is 110 . If the price of rice Rs. 10 per kg in 2010 , then the price in 2014 is

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2. In sub - parts (i) and (ii) choose the correct option and in sub -parts (iii) to (v) answer the questions as instructed .

Given $Q_1 = 153\text{cm}$, $Q_3 = 155\text{ cm}$, then inter - quartile range is

- A. 1 cm
- B. 2 cm
- C. 104 cm
- D. None of these

Answer: B



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3. In sub - parts (i) and (ii) choose the correct option and in sub -parts (iii) to (v) answer the questions as instructed .

In general , the k^{th} percentile is the value at or, which k percent of the values lie .



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4. Answer the questions as instructed .

Empirical formula of Mode = 3 Median -

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5. Price relative means the ratio of price of a certain item in current year to the price of that item in base year , expressed as a.....

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6. Find D_6 and D_9 following distribution

x	10	20	30	40	50
f	3	11	28	38	80

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7. A computer while calculating the correlation coefficient between the variables x and y obtained the following results :

$$n = 25, \sum x_i = 125, \sum y_i = 100, \sum x_i^2 = 650, \sum y_i^2 = 460, \sum x_i y_i =$$

It was however later discovered at the time of checking that it has copied down two pairs of observations as $(6,14)$ and $(8,6)$ where as values were $(8,12)$ and $(6,8)$.Calculate the correct correlation coefficient of x and y .

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8. In a contest the competitors are awarded marks out of 20 by two judges .The scores of the 10 competitors are given below .Calculate Spearman 's rank correlation .

Competitors	A	B	C	D	E	F	G	H	I	J
Judge X	2	11	11	18	6	5	8	16	13	15
Judge Y	6	11	16	9	14	20	4	3	13	17

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9. The average number , in thousands , of working hours lost in strikes each year of the period 2000-2009 was as under

Year	2000	01	02	03	04	05	06	07	08	09
Hours Lost	1.5	1.8	1.9	2.2	2.6	3.7	2.2	6.4	3.6	5.4

. Calculate the three - yearly moving averages .



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