



MATHS

BOOKS - S CHAND MATHS (ENGLISH)

MODEL TEST PAPER - 17

Section A

1. In sub - part (i) to (x) choose the correct option and in sub - part (xi) to (xy), answer the questions as instructed .

If A and B are two sets that $n(A-B) = 10$, $n(B-A) = 8$ and $n(A \cap B) = 3$, then $n(A \cup B)$

A. 15

B. 21

C. 13

D. 11

Answer: b



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2. The value of $(1-\omega+\omega^2)^5 + (1+\omega-\omega^2)^5$ where ω and ω^2 are the complex cube roots of unity, is

A. 32

B. 16

C. 8

D. 0

Answer: a



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3. If $ax^2 + bx + c = 0$ and $bx^2 + cx + a = 0$ have a common root then the relation between a,b,c is

A. $a^2 + b^2 + c^2 = 2abc$

B. $b^2 = ac$

C. $a^3 + b^3 + c^3 = 3abc$

D. $a = 1$

Answer: c



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4. If 17^{th} and 18^{th} terms in the expansion of $(2 + a)^{50}$ are equal, then the value of a is :

A. 0

B. -1

C. 2

D. 1

Answer: d



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

If $\lim_{x \rightarrow a} \frac{x^9 - a^9}{x - a} = \lim_{x \rightarrow 5} (4 + x)$, then a equals :

A. ± 1

B. -1

C. 1

D. 0

Answer: a



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6. In sub - part (i) to (x) choose the correct option and in sub - part (xi) to (xy), answer the questions as instructed .

Six boys and six girls sit in row rouldelary Probability that boys and girl sit alternately is :

A. $\frac{1}{462}$

B. $\frac{1}{264}$

C. $\frac{1}{426}$

D. None of these

Answer: a



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7. In sub - part (i) to (x) choose the correct option and in sub - part (xi) to (xy), answer the questions as instructed .

If A is the A.M between a and b , then $\frac{A + 2a}{A - b} + \frac{A + 2b}{A - a} =$

A. 2

B. 0

C. -4

D. 4

Answer: d



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8. In sub - part (i) to (x) choose the correct option and in sub - part (xi) to (xy), answer the questions as instructed .

The derivative of $1 + x + x^2 + x(3) + \dots + x^{50}$ at $x=1$:

A. 1275

B. 1725

C. 1257

D. 1255

Answer: a



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9. Let S and S' be two (non - concentric circles with centres A and B and radii r_1, r_2 and d be the distance between their centres , then one circle lies completely inside the other circle iff

A. $d = r_1 + r_2$

B. $d = |r_1 - r_2|$

C. $d = |r_2 - r_1|$

D. $d < |r_1 - r_2|$

Answer: d



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10. In sub - part (i) to (x) choose the correct option and in sub - part (xi) to (xy), answer the questions as instructed .

The angle between the lines

$$x - 2 = 0 \text{ and } x + \sqrt{3}y - 5 = 0:$$

- A. 90°
- B. 120°
- C. 60°
- D. 45°

Answer: c



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11. In sub - part (i) to (x) choose the correct option and in sub - part (xi) to (xy), answer the questions as instructed .

Find the value of $\cos ec(- 1410^\circ)$.

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12. In sub - part (i) to (x) choose the correct option and in sub - part (xi) to (xy), answer the questions as instructed .

In any triangle ABC,

$$\frac{b^2 - c^2}{a^2} \sin 2A + \frac{c^2 - a^2}{b^2} \sin 2B + \frac{a^2 - b^2}{c^2} \sin 2C = \text{-----}$$

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13. If $z = (3 - \sqrt{7}i)$, then find $|z^{-1}|$.

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14. Find the domain of $f(x) = \frac{1}{\sqrt{5-x}}$

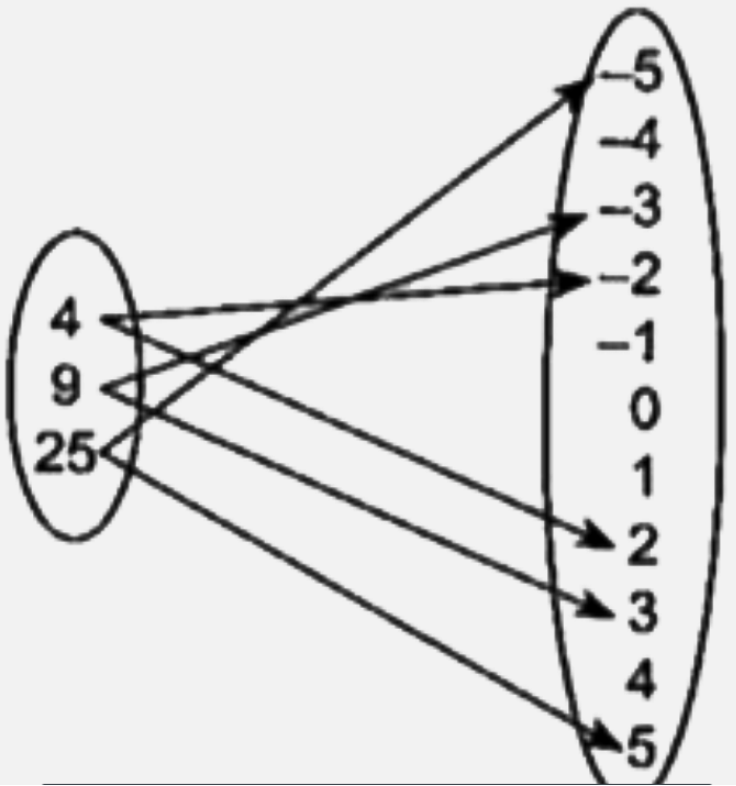
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15. In sub - part (i) to (x) choose the correct option and in sub - part (xi) to (xy), answer the questions as instructed .

Find the value (s) of k so that the term independent of x in the expansion of $\left(\sqrt{x} - \frac{k}{x^2}\right)^{10}$ is 405.

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16. The adjoining diagram shows a relation between the set A and B. Write this relation



(i) In roster form

(ii) In set builder form

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17. Find the domain and range of $f(x)=[\cos x]$.

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18. Evaluate :

$$\cos 24^\circ + \cos 55^\circ + \cos 125^\circ + \cos 204^\circ + \cos 300^\circ.$$

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19. Prove that: $\tan\left(\frac{\pi}{4} + \theta\right) + \tan\left(\frac{\pi}{4} - \theta\right) = 2 \sec 2\theta$.

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20. If n men and m women are to be seated in a row so that no two women sit together. If $n > m$, then show that number of ways in which they can be seated is $\frac{n!(n+1)!}{(n-m+1)!}$

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21. A survey shows that 63 % of the Americans like cheese whereas 76 % like apples , If x % of the Americans like both cheese and apples , then find value of x .

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22. Prove that:

$$s \in \frac{\pi}{14} s \in \frac{3\pi}{14} s \in \frac{5\pi}{14} s \in \frac{7\pi}{14} s \in \frac{9\pi}{14} s \in \frac{11\pi}{14} s \in \frac{13\pi}{14} = \frac{1}{64}$$

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23. Using principle of mathematical induction , prove that , $(x^{2n} - y^{2n})$ is divisible by $(x + y)$ fpr all $n \in N$.

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24. If $y = \frac{e^x - e^{-x}}{e^x + e^{-1}}$, prove that $\frac{dy}{dx} = 1 - y^2$



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25.

(a) If $a^2 + 2bc, b^2 + 2ac, c^2 + 2ab$ are in A.P., show that

$\frac{1}{b-c}, \frac{1}{c-a}, \frac{1}{a-b}$ are in A.P.

(b) Prove that the sum to n terms of the series

$$11 + 103 + 1005 + \dots = \frac{10}{9}(10^n - 1) + n^2.$$



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26. If the roots of the equation $ax^2 + bx + c = 0 (a \neq 0)$ be

α and β and those of the equation

$Ax^2 + Bx + C = 0 (A \neq 0)$ be $\alpha + k$ and $\beta + k$. Prove that

$$\frac{b^2 - 4ac}{B^2 - 4AC} = \left(\frac{a}{A}\right)^2$$

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27. One side of a rectangle lies along the line $4x + 7y + 5 = 0$. Two of its vertices are $(-3, 1)$ and $(1, 1)$. Find the equations of the other three sides.

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28. For a group of 200 candidates the mean and standard deviation were found to be 40 and 15 respectively. Later on it was found that the score 43 was misread as 34. Find the correct mean and standard deviation.

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Section B

1. The value value of λ so that the line $y = 2x + \lambda$ may touch the ellipse $3x^2 + 5y^2 = 15$

A. $k = \sqrt{23}$

B. $k = -\sqrt{23}$

C. $k = \pm \sqrt{23}$

D. None of these

Answer: c

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

The length of the perpendicular drawn from the point $P(3,4,5)$ on y- axis is

A. $\pm \sqrt{34}$

B. $\sqrt{34}$

C. $\pm \sqrt{43}$

D. $\sqrt{43}$

Answer: b



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3. Prove by using distance formula that the points $P(1, 2, 3)$, $Q(-1, -1, -1)$ and $R(3, 5, 7)$ are collinear.



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4. Find the equation of the ellipse whose axes are along the coordinate axes, foci at $(0, \pm 4)$ and eccentricity $4/5$.



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

$\sim q \rightarrow \sim p$ is equivalent to



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6. Using truth table , prove that $:(p \rightarrow q) \rightarrow [(\sim p \rightarrow q) \rightarrow q]$ is a tautology.



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7. Give the negation of each of the following statements :

(i) All circles are round.

(ii) It is not true that the set of prime numbers is finite.



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8. A man running a racecourse notes that the sum of the distances from the two flag posts from him is always 10 m and the distance between the flag posts is 8 m. Find the equation of the posts traced by the man.



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9. An equilateral triangle is inscribed in the parabola $y^2 = 4ax$ whose vertex is at the vertex of the parabola .Find the length of its side.

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10. $A(1,2,3), B(0,4,1), C(-1,-1,-3)$ are vertices of triangle ABC, find the point at which the bisector of $\angle BAC$ meets BC.

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Section C

1. If a colour TV cost Rs.12000 in and Rs. 18000 in 2003 , the price relative is

A. (a)105

B. (b)150

C. (c)250

D. (d)50

Answer: b



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2. If 95 % students pass the test , it mean 5 % students get less than minimum passing maeks . Hence the minimum passing mark is

A. D_5

B. Q_2

C. P_5

D. P_{95}

Answer: c



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3. If the median of 5 items is 3 and the median of another 5 items is 7. Find the median of all the 10 items taken together



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4. If the price index is 132, it means that price has increased by Compared to base period.



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

$$\text{Combined variance } (\sigma^2) = \frac{\sum_{i=1}^k n_i \sigma_i^2 + \sum_{i=1}^k n_i d_i^2}{\sum_{i=1}^k n_i} . \text{ where}$$

$d_i = \dots$



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6. Following are the scores of 12 students in a class test of of 30 marks : 18,20,9,15,21,26,14,13,27,22,16,28 Find D_7 and P_{33} .



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7. Given below is the distribution of marks obtained by 50 students in a class test :

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
Number of students	3	5	9	12	18	3

If 70%

students pass the test, find the minimum marks needed by a student to pass the examination.

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8. Calculate Spearman's rank correlation for the following data:

Marks in English	15	20	28	12	40	60	20	80
Marks in History	40	30	50	30	20	10	30	60

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9. Calculate Karl Pearson's coefficient of correlation between X and Y from the following data:

X	78	89	96	69	59	79	68	62
Y	125	137	156	112	107	136	123	104

Assume 80 and 130 as the mean values for X and Y respectively .



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10. Calculate 4- yearly moving averages of the following time series of steel production :

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Production (in tonnes)	506	620	1036	673	588	696	1116	738	663	773	1189

Plot these and the original figures in the same graph.



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