MATHS

BOOKS - S CHAND MATHS (ENGLISH)

MODEL TEST PAPER-6

Section A

1. The number of subsets of a set containing n elements is :

A. n

B. $2^n - 1$

C. 2^{n-1}

D. 2^n

Answer: D

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2. If f $Q \rightarrow Q$ is defined as $f(x) = x^2$, $f^{-1}(9)$ is equal to .

A. 3

B. -3

C. $\{-3, 3\}$

D. ϕ

Answer: C

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3. $\operatorname{cosec}10° - \sqrt{3}\ \sec10° =$

A. 4

B. 2

C. 0

D. -4

Answer: A

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4. If x is a real number and $|x| < 5$, then

A. $x \leq 5$

B. $-5 < x < 5$

C. $x \leq -5$

D. $-5 \leq x \leq 5$

Answer: B

5. The number of a arrangement of the letter of the word BHARAT

taking 3 at a time is

    A. 72

    B. 120

    C. 14

    D. none of these 0

Answer: A

6. If x is real , then the minimum value of $\dfrac{x^2 - 3x + 4}{x^2 + 3x + 4}$ is :

A. 7

B. $-\dfrac{1}{7}$

C. -7

D. $\dfrac{1}{7}$

Answer: D

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7. The tw geometric means between the numbers 1 and 64 are

A. 1 and 64

B. 4 and 16

C. 2 and 16

D. 8 and 16

8. A line passes through the point (2,2) and is perpendicular to the

line $3x + y$ Its y - Intercept is

A. $\dfrac{1}{3}$

B. $\dfrac{2}{3}$

C. 1

D. $\dfrac{4}{3}$

Answer: D

9. If the circles $x^2 + y^2 = a$ and $x^2 + y^2 - 6x - 8y + 9 = 0$ touch externally then a =

A. 1

B. 2

C. 3

D. 6

Answer: A

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10. If A,B,C are three mutually exclusive and exhaustive events of an experiment such 3P(A) = 2I = P(C) , the P(A) is equal to .

A. $\dfrac{1}{11}$

B. $\dfrac{2}{11}$

C. $\dfrac{5}{11}$

D. $\dfrac{6}{11}$

Answer: B

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11. If the perimeter of a certain sector of a circle is equal to the length of the arc of the semicircle having the same radius , find the angle of the sector in degrees .

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12. There are 12 points in a plane of which 5 are collinear . Find the number of straight lines obtained by joining these points in pairs .

13. Find the least positive value of n it $\left(\dfrac{1+i}{1-i}\right)^n = 1$

14. If f(x) = αx^n prove that $\alpha = \dfrac{f'(1)}{n}$

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16. Prove that , U = $(U - A) + A$, Where U is the universal set .

17. Z is the set of integers. Describe the following relation in set builder form, given its domain and range.

$$\{(0, \ -7), (2, \ -5), (4, \ -3), (\ -13, \ -20), \ .... \ \}$$

18. The angles of a triangle ABC are in A.P and b:c = $\sqrt{3}:\sqrt{2}$ find $\angle A$

19. Find the value of

θ, if $m^2 \sin. \dfrac{\Pi}{2} - n^2 \sin. \dfrac{3\pi}{2} + 2mn \sec \theta = (m-n)^2, 0 \le \theta \le \pi$

.

20. In any $\triangle ABC$, prove that

$$a\cos(A + B + C) - b\cos(B + A) - c\cos(A + C) = 0$$

21. Find the values of λ and μ if both the roots of the equation

$(3\lambda + 1)x^2 = (2\lambda + 3\mu)x - 3$ are infinite.

22. Prove the following

$$\frac{a + b\omega + c\omega^2}{c + a\omega + b\omega^2} + \frac{a + b\omega + c\omega^2}{b + c\omega + a\omega^2} = -1$$

23. Define modulus function . Write its domain and range . Draw the graph of it .

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24. Solve $2\cos^2\theta = 3\sin\theta$

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25. $\tan 6° \tan 42° \tan 66° \tan 78° = 1$

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26. Using mathematical induction , to prove that

$7^{2n} + 2^{3n-3} \cdot 3^{n-1}$ is divisible by 25 , for al $n \in N$

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27. Differentiate w.r.t $'x'$ $f(x) = \dfrac{\sqrt{x^2+1} + \sqrt{x^2-1}}{\sqrt{x^2+1} - \sqrt{x^2-1}}$

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28. Evaluate : $\lim\limits_{x \to \infty} \sqrt{x^2 + x + 1} - \sqrt{x^2 + 1}$

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29. Find the equations of the bisectors of the angles between the lines $12x + 5y - 4 = 0$ and $3x + 4y + 7 = 0$ .Prove that bisectors are at right angles to each other .

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30. Find the equations of the tangents to the circle $x^2 + y^2 = 25$ which are parallel to the line $2x - u + 4 = 0$

31. If the coefficient of 2nd, 3rd and 4th terms in the expansion of $(1 + x)^{2n}$ are in A.P. , show that $2n^2 - 9n + 7 = 0$.

32. The sum of four numbers in G.P is 60 and the arithmetic mean of the first and the last numbers is 18 . Find the numbers .

33. An original frequency table with mean 10.5 and variance 9.9 was lost but the following table derived from it was found . Construct the original table .

u_i	-2	-1	0	1	2
f_i	1	6	7	4	2

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1. Find the equation of the dirctly of the parabola whose focus and vertex are (5,3) and (3,1) respectively .

   A. $x + y + 1 = 0$

   B. $x - y = 0$

   C. $x + y = 0$

   D. $x - y - 1 = 0$

Answer: C

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2. Find the equation of the locus of a point whose distance from the y-axis is equal to its distance from $(2, 1, -1)$.

   A. $\sqrt{2}$

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

C. $\dfrac{\sqrt{3}}{2}$

D. $\dfrac{2}{\sqrt{3}}$

Answer: B

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3. Find the equation of the locus of a point whose distance from the y-axis is equal to its distance from $(2,\ 1,\ -1)$.

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4. Find the valule (s) of k so that the line $2x + y + k = 0$ may touch the hyperbola $3x^2 - y^2 = 3$

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5. Write the inverse of the given conditiona statement :

If a number n is even , then n^2 is even .

6. Construct truth table for $(p \Rightarrow q) \wedge (q \Rightarrow p)$

7. Negation of disjunction of p and q is equivalent to the negation of both p and q . Verify

8. Find the equation of parabola with its axis parallel to x - axis and passing through the points $(-2, 1), (1, 2)$ and $(-1, 3)$.

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9. Find the centre foci and the equation of the directrices of the ellipse $8x^2 + 9y^2 - 16x + 18y - 55 = 0$

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10. Find the ratio in which the line segment , joining the points $P(2, 3, 4)$ and $Q(-3, 5, -4)$ is divided by yz plane . Also find the point of contact .

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1. Index number calculated for the year 2019 using 2015 as the base year is 114.9 .If commodity is sold for Rs 5.75 in 2015 , then the selling price in 2019 is

    A. Rs 7.57

    B. Rs 6.61

    C. Rs6.16

    D. Rs 66.1

Answer: B

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2. Q2 is always equal to

A. P_1

B. P_{10}

C. P_{25}

D. P_{50}

Answer: A::B::C::D

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3. Find the mode of the following data

17, 32,35,33,15,21,41,32,11,18,20,22,11,15,35,23,38,12

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4. Find P_{70} of the distribution x_i : 28, 17, 25, 26, 19, 13, 27, 21, 16

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5. Index number for the total cost of raw materials used for the manufacturing of te commodity in 2015, using 2001 as the base year calculated as 179.94 . If the commodity was sold for Rs 1055.75 in 2010 , calculate the selling price in 2015 on assumption that selling prices are directly proportional to the cost or raw materials .

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6. Calculate Mode for the following data

C.I.°	17–19	14–16	11–13	8–10	5–7	2–4
Frequency	4	11	16	8	4	12

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7. An analysis of daily wages of casual laboures in two firms A and B belonging to the same industry gives the following result :

	Firm A	Firm B
No. of workers	50	60
Average daily wages (in ₹)	113	120
Standard deviation	6.5	8.2

If the combined mean is Rs 116.82 find the standard deviation of wages of all casual labourers in the two firms taken in together .

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8. Calculate Karl Pearson's coefficient of correlation between the heights of husbands and wives based on the following data (given in inches) and interpret the result . Take assumed means of husbands and wives are 70 and 66 respectively .

Couple	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Height of husband	76	75	75	72	72	71	71	70	68	68	68	68	67	67	62
Height of wife	71	70	70	67	71	65	65	67	64	65	65	66	63	65	61

9.

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

Find Spearman's rank correlation coefficient .

10. The table given below shows the number of visitors (in hundreds) to a certain exhibition over a period of two weeks :

Week 1	52	48	64	68	52	70	72
Week 2	55	47	51	65	58	75	81

Calculate the 7 day moving averages and illustrate these and the original information on the same table.