



## MATHS

### BOOKS - VGS PUBLICATION-BRILLIANT

#### MODEL PAPER 9

#### Section A | Very Short Answer Type Questions

1. Find the multiplicative of  $7 + 4i$ .

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2. Write  $z = -\sqrt{7}i\sqrt{21}$  in the polar form.

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3. If  $\alpha, \beta$  are the roots of the equation  $x^2 + x + 1 = 0$  then prove that  $\alpha^4 + \beta^4 + \alpha^{-1}\beta^{-1} = 0$ .

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4. Prove that the roots of  $(x - a)(x - b) = h^2$  are always real.

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5. If 1,2,3 and 4 are the roots of  $x^4 + ax^3 + bx^2 + cx + d = 0$ , then find the values of a,b,c and d.

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6. If  ${}^{12}P_r = 1320$ , find  $r$ .



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7. Find the number of diagonals of a polygon with 12 sides.



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8. If  ${}^{22}C_r$  is the largest binomial coefficient in the expansion of  $(1 + x)^{22}$ , find the value of  ${}^{13}C_r$ .



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9. Find the mean deviation about the mean for the following data

38,70,48,40,42,55,63,46,54,44



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10. The mean and variance of a binomial distribution are 4 and 3 respectively. Fix the distribution and find  $P(X \geq 1)$ .



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## Section B li Short Answer Type Questions

1. Show that the points in the Argand digraam represented by the complex numbers  $2 + 2i$ ,  $-2 - 2i$ ,  $2\sqrt{3} + 2\sqrt{3}i$  are the vertices of an equilateral triangle.



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2. If the expressions  $\frac{x - p}{x^2 - 3x + 2}$  takes all real value for  $x \in R$ , then find the bounds for p.

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3. If the letters of the word MASTER are permuted in all possible ways and the words thus formed are arranged in the dictionary order, then find the rank of the word MASTER.

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4. 14 persons are seated at a round table. Find the number of ways of selecting two persons out of them who are not seated adjacent to each other.

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5. Find the coefficient of  $x^n$  in the power series expansion of  $\frac{x}{(x-1)^2(x-2)}$  specifying the region in which the expansion is valid.

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6. A number  $x$  is drawn arbitrality from the set  $\{1,2,3, \dots, 100\}$ . What is the probability that  $\left(x + \frac{100}{x}\right) > 29$

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7. A problem in calculus is given to two students, A and B whose chances of solving it are  $\frac{1}{3}$ ,  $\frac{1}{4}$  respectively. Find the probability of the problem being solved if both of them try independently.

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## Section C Iii Long Answer Type Questions

1. If  $n$  is a positive integer, show that

$$(P + iQ)^{1/n} + (P - iQ)^{1/n} = 2(P^2 + Q^2)^{1/2n} \cos\left(\frac{1}{n}, \tan^{-1} \frac{Q}{P}\right)$$

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2. Solve the equation  $6x^6 - 25x^5 + 31x^4 - 31x^2 + 25x - 6 = 0$

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3. Prove that : If the coefficients of  $x^{10}$  in the expansion of

$\left(ax^2 + \frac{1}{bx}\right)^{11}$  is equal to the coefficient of  $x^{-10}$  in the

expansion of  $\left(ax - \frac{1}{bx^2}\right)^{11}$ , find the relation between a and b where a and b are real numbers.

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4. If  $x = \frac{1.3}{3.6} + \frac{1.3.5}{3.6.9} + \frac{1.3.5.7}{3.6.9.12} + \dots$  then prove that  $9x^2 + 24x = 11$ .

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5. Find the mean deviation about the mean for the following data :

Marks obtained	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
No. of students	5	8	15	16	6

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6. State and prove Baye's theorem.



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7. A cubical die is thrown. Find the mean and variance of  $X$ , giving the number on the face that shows up.



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