



## MATHS

### BOOKS - JEEVITH PUBLICATIONS MATHS (KANNADA ENGLISH)

### ANNUAL EXAMINATION QUESTION PAPER MARCH 2013 SOUTH

#### Part A

1. Write the power set of  $X = \{1,2\}$



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2. If  $(x+1, y-2) = (3,1)$  Find the values of  $x$  and  $y$ .



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3. Convert  $\left(\frac{7x}{6}\right)^e$  into degrees.

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4. Express the complex number  $(1 - i) - (-1 + 6i)$  in a + ib form

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5. Solve  $5x - 3 < 7$  when  $x$  is an integer

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6. Write the first five terms of the sequence defined by  $a_n = \frac{n}{n+1}$

where  $n \in \mathbb{N}$

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7. Reduce  $6x + 3y - 5 = 0$  into slope- intercept form

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8. Find the equation of the circle with centre (1,1) and radius  $\sqrt{2}$

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9. Name of the plane in which the point ( - 3, 0, 4) lies

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10. Find the derivative of  $2x - \frac{3}{4}$  w.r.t.x.

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11. Find the mean of 6, 8, 10, 12, 14, 16, 18, 20, 22





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12. Write the negation of the statement.

"intersection of two disjoint sets is not an empty set "



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## Part B

1. If  $A = \{x/x = 2^n, n \leq 5, n \in N\}$  and  $B = \{x/x = 4^n \leq 3, n \in N\}$

Find  $A - B$  and  $A \cap B$



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2. If  $A \times B = \{(a, 1)(a, 2)(a, 3)(b, 1)(b, 2)(b, 3)\}$  find the sets  $A$  and  $B$  and hence find  $B \times A$ .



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3. In a circle of diameter 40 cm, the length of a chord is 20 cm. Find the length of minor arc of the chord.

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4. Find the value of  $\sin\left(\frac{-11\pi}{3}\right)$

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5. Prove that  $\sin^2(\pi/6) + \cos^2(\pi/3) - \tan^2(\pi/4) = \frac{-1}{2}$

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6. Find the multiplication inverse of  $4 - 3i$

or

convert  $\sqrt{3} + i$  into polar form

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7. Find the roots of the equation  $2x^2 + 10x + 20 = 0$

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8. Find all pairs of consecutive odd positive integers both of which are smaller than 10 such that their sum is more than 11.

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9. How many 5 digit telephone numbers can be constructed using the digits 0 to 9. If each number starts with 67 and no digit appears more than once.

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10. The sum of some terms of a G.P. is 315. The first term and the common ratio are 5 and 2 respectively, find the number of terms.

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11. Find the middle term in the expansion of  $\left(x^2 + \frac{3}{x}\right)^{20}$

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12. Find the distance of the point (3,-5) from the line  $3x - 4y - 26 = 0$

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13. Find the equation of a line perpendicular to the line  $x - 2y + 3 = 0$  and passing through the point (1,-2)

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14. Show that  $(-2, 3, 5), (1, 2, 3), (7, 0, -1)$  are collinear



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15. Write the converse and contrapositive of the statement " If  $x$  is a prime number then  $x$  is odd "



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## Part C

1. In a class of 40 students 30 play cricket and 18 play hockey. If the students plays either cricket or hockey find the number of students who play Hockey only.



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2. Find the domain and range of the function defined by  $f(x) = \frac{x - 1}{x + 1}$

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3. If  $f(x) = \begin{cases} 3x + 1 & 0 \leq x \leq 2 \\ 1 + 9x & 2 < x < 3 \\ 30 + 2x & x \geq 3 \end{cases}$  then

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4. Prove that :  $\sin 3x = 3 \sin x - 4 \sin^3 x$

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5. If  $\tan x = \frac{3}{4}$  and  $\pi < x < \frac{3\pi}{2}$  find the values of  $\sin 2x$  and  $\cos 2x$

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6. Find the conjugate of  $\frac{(3 - 2i)(2 + 3i)}{(1 + 2i)(2 - i)}$ .

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7. Solve the system of inequalities

$$3x - 7 < x + 5$$

$$11 - 5x \leq 1$$

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8. How many words, with or without meaning can be made from the letters of the word MONDAY, assuming that no letter is repeated, if.

(i) 4 letters are used at a time,

(ii) all letters are used at a time

(iii) all letters are used but first letter is a vowel ?

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9. If A.M. and G.M. of roots of a quadratic equation are 8 and 5 respectively then obtain the quadratic equation.

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10. Find the equation of the straight line with slope  $m$  and passing through the point  $(x_1, y_1)$

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11. Find the equation of a line that cuts off equal intercepts from the coordinate axes

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12. Find the equation of the hyperbola whose foci are  $(0, \pm 12)$  and the length of the latus rectum is 36 units.

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13. Evaluate  $\lim_{x \rightarrow 3} \frac{x^4 - 81}{2x^2 - 5x - 3}$

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14. Find the coefficient of  $x^6y^3$  in the expansion of  $(x + 2y)^9$

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15. Differentiate of  $\sin x$  w.r.t.  $x$  from first principles

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16. Show that the statement

" If  $x$  is a real number such that  $x^2 + 4x = 0$  then  $x$  is 0 true by

( 1) Direct method

(2) method of contradiction

(3) Method of contrapositive

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17. A coin is tossed twice. What is the probability that at least one tail occurs?

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## Part D

$$1. 1^3 + 2^3 + 3^3 + \dots + n^3 = \frac{n^2(n+1)^2}{4} \quad \forall n \in \mathbb{N}.$$

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2. In how many ways can one select a cricket team of eleven from 17 players in which only 5 players can bowl. If each cricket team of 11 players

must include exactly 4 bowlers



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3. Prove binomial theorem for positive integers



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4. Derive the expression for the co-ordinates of a point that divides the line joining the points  $A(x_1, y_1, z_1)$  and  $B(x_2, y_2, z_2)$  internally in the ratio  $m : n$  and hence find the co-ordinates of  $A(1,2,3)$  and  $B(5,6,7)$



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5. Derive the equation of the ellipse in the form  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ .



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6. Prove that  $\lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1$ .

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## Part E

1. Prove that  $\frac{\sin 9x + \sin 7 + \sin 3x + \sin 5x}{\cos 9x + \cos 7x + \cos 3x + \cos 5x} = \tan 6x$ .

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2. Prove that  $f(x) =$

$$\begin{aligned} & ax^2 - 3x + 4 \text{ when } x < 1 \\ & = 3 \text{ when } x = 1 \\ & bx + 5 \text{ when } x > 1 \end{aligned}$$

and if  $\lim_{x \rightarrow 1} f(x) = f(1)$  then find the value of  $a$  and  $b$ .

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3. Derive a formula for the angle between two lines with slopes  $m_1$  and  $m_2$ . Hence the slopes of the lines which make an angle  $\frac{\pi}{4}$  with the line  $x - 2y + 5 = 0$



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4. Find the sum of the sequence 7,77,777,7777,.....n terms



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