



## MATHS

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

### ANNUAL EXAMINATION QUESTION PAPER MARCH 2014 NORTH

#### Part A

1. Write the following set in roster form  $A = \{ x \text{ is a natural number less than } 6 \}$



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2. Convert  $\left(\frac{5\pi}{3}\right)(e)$  into degrees.

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3. Find the modulus of  $\frac{1}{1+i}$

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4. Find the value of  $6P_3 - 8P_2$

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5. Find the 10th terms of the G.P. 5,25,125.....

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6. Find the slope of the line passing through the points (3,-2) and (-1,4)

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7. Evaluate  $\lim_{x \rightarrow 4} \frac{4x + 3}{x - 2}$

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8. Write the negation of " All triangles are not equilateral triangle "

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9. If  $\frac{2}{11}$  is the probability of an event. What is the probability the event 'not A' ?

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10. A function  $f$  is defined by  $f(x) = 2x - 5$  find  $f(-3)$

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## Part B

1. If  $X$  and  $Y$  are two sets such that  $n(X) = 17$ ,  $n(Y) = 23$ , and  $n(X \cup Y) = 38$  find  $n(X \cap Y)$

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2. If  $A = \{1, 2, 3, 4\}$ ,  $B = \{3, 4, 5, 6\}$ ,  $C = \{7, 8, 9, 10\}$  find  $A \cap (B \cup C)$

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3. Let  $f, g: R \rightarrow R$  be defined respectively by  $f(x) = x + 1$ ,  $g(x) = 2x - 3$ . Find  $f+g$ ,  $f-g$  and  $\frac{f}{g}$ .

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4. Find the angle in radians through which a pendulum swings if its length is 75 cm and the tip describes an arc of length 10 cm

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5. Find the general solution of  $\sec^2 2x = 1 - \tan 2x$

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6. Evaluate  $\lim_{x \rightarrow 2} \left( \frac{3x^2 - x - 10}{x^2 - 4} \right)$

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7. Coefficient of variation of distribution are 70 and the standard deviation is 16. What is the arithmetic mean of the distribution

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8. Write the converse and contrapositive of " if a number is divisible by 9 then its is divisible by 3"

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9. In how many ways can 4 green, 3 red and 2 yellow discs be arranged in row if the discs of the same colour are indistinguishable?

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10. Find the angle between the lines

$$\sqrt{3}x + y = 1 \text{ and } x + \sqrt{3}y = 1$$

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11. Represent the complex number  $z = 1 + i$  in polar form.

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12. Find all pairs of consecutive even positive integer both of which are larger than 5 such that sum is less than 23.

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13. Find the value of  $x$  for which the points  $(x,-1)$   $(2,1)$  and  $(4,5)$  are collinear

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14. The centroid of a triangle ABC is  $(1, 2, 2)$  If the coordinates of A and B are  $(3, -5, 7)$  and  $(-1, 7, -6)$  respectively . Find the coordinates of C.



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## Part C

1. In a group of 400 people , 350 can speak Hindi and 300 can speak English . How many people can speak both Hindi and English ?



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2. Let  $R: Z \rightarrow Z$  be a relation defined by

$R = \{(a, b) : a, b, \in Z, a - b \in z\}$ . Show that

(i)  $\forall a \in Z, (a, a) \in R$

(ii)  $(a, b) \in R \Rightarrow (b, a) \in R$

(iii)  $(a, b) \in R \Rightarrow (b, c) \in R \Rightarrow (a, c) \in R$

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3. Prove that 
$$\frac{\sin x - \sin y}{\cos x + \cos y} = \tan\left(\frac{x - y}{2}\right)$$

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4.  $x^2 + x + \frac{1}{\sqrt{2}} = 0$

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5. How many 4 digits numbers can be formed by using the digits to 9 if repetition of digits is not allowed?

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6. (ii) If  $x + iy = \frac{a + ib}{a - ib}$  prove that  $x^2 + y^2 = 1$

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7. Find the middle terms in the expansion  $\left(3 - \frac{x^3}{6}\right)^6$

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8. Insert five numbers between 8 and 26 such that the resulting sequence is in AP.

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9. A committee of two persons is selected from two men and two women. What is the probability that the committee will have (i) no men (ii) two men

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

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11. Find the coordinates of the foci, the eccentricity and the length of the latus rectum of the ellipse  $14x^2 + 9y^2 = 36$

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12. The 5th, 8th, 11th, terms of a G.P. are  $p, q$  and  $s$ , respectively. Show that  $q^2 = ps$

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13. Verify by the method of contradiction that  $\sqrt{7}$  is an irrational number

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14. Two students Anil and Sunil appear in an examination. The probability that Anil will qualify in the examination is 0.05 and that Sunil Will qualify is 0.10. The probability that both will qualify in the examination is 0.02 find the probability that Anil and Sunil Will not qualify in the examination.

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## Part D

1. Draw the graph of the signum function write its domain and range.

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2. Prove that  $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$  (  $x$  being measured in radians )

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3.

$$1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6} \quad \forall n \in \mathbb{N}.$$

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4. A group consists of 7 boys and 5 girls . Find the number of ways in which a team of 5 members can be selected so as to have atleast one boy and girl.

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5. State and prove Binomial theorem for any positive integer  $n$ .

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6. Derive an expression for the co-ordinates of points that divides the linejoining points  $A(x_1, y_1, z_1)$  and  $B(x_2, y_2, z_2)$  internally in the ratio  $m:n$ . Hence find the co-ordinates of midpoint of AB where  $A=(3,2,1)$  and  $B=(7,6,5)$ .

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7. Derive the expression for the length of the perpendicular drawn from the point  $(x_1, y_1)$  to the line  $ax + by + c = 0$

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8. (a) Derive  $\cos(x + y) = \cos x \cos y - \sin x \sin y$  geometrically. Hence deduce the value of  $\cos 75^\circ$

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9. Find the sum to  $n$  terms of the series  $5 + 11 + 19 + 29 + 41 + \dots$

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10. Define hyperbola as a set of points derive its equation in

the form  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

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11. Find the derivative of  $\frac{x + \cos x}{\sin x}$  using rules of differentiation.

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