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# CS/BBA(H),BIRM,BSCM/SEM-1/BBA-102/2009-10 2009 MATHEMATICS – I

# Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks. Candidates are required to give their answers in their own words as far as practicable.

#### **GROUP – A**

#### (Multiple Choice Type Questions)

- 1. Choose the correct alternatives for any ten of the following :  $10 \times 1 = 10$ 
  - i) The co-ordinates of the centroid of the triangle whose vertices are ( 2, 0 ), ( 1, -3 ), ( -3, 3 ) is
    - a) (2,1) b) (0,0)
    - c) (-1, 3) d) (2, 4).
  - ii) If  $ax^2 + bx + c = 0$  ( $a \neq 0$ ) then the sum of its roots will be

a) 
$$-\frac{b}{a}$$
 b)  $\frac{c}{a}$   
c)  $\frac{a}{b}$  d)  $\frac{b}{a}$ .

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CS/BBA(H),BIRM,BSCM/SEM-1/BBA-102/2009-10 The value of  $10_{C_3}$  is iii) b) 110 100 a) c) 120 d) 90. The sum of the binomial coefficients iv)  $C_0 + C_1 + C_2 + \dots + C_n$  is  $2^n$ a) 2 b)  $2^{n-1}$ c) d) none of these. Let the function  $f : R \rightarrow R$  defined by V) f(x) = 2x - 1 for x > 2 $= x^{2} - 1$  for  $-2 \le x \le 2$ = 3x + 1 for x < -2. then the value of f(-3) is a) 3 b) - 8 c) 5 d) none of these. The value of x for which the equation  $2^{x} = 3^{-x}$  is vi) satisfied is a) 1 b) 0 c) - 1 d) none of these. The sequence { 1, 3, 5, 7,  $\dots$  } forms an A.P. vii) Which of the following is true ? Common difference = 2a) b) Common difference = 3Common difference = 1c) Common difference = 4. d)

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- xiii) The co-ordinates of the middle point of the line joining the points ( 2, 3 ) and ( 3, 2 ) is
  - a) (2,2) b) (2.5,2.5)
  - c) (3,3) d) none of these.

## **GROUP – B**

### ( Short Answer Type Questions )

Answer any *three* of the following.  $3 \times 5 = 15$ 

- 2. In how many ways can 12 examination papers be arranged so that the best and the worst papers may never come together ?
- 3. Find the term independent of *x* in the expansion of  $\left(x^2 + \frac{1}{x}\right)^{12}$ .
- 4. The arithmetic mean of two numbers is 34 and their geometric mean is 16. Find the numbers.
- 5. Show that the points (3, 0), (6, 4) and (-1, 3) are the vertices of a right-angled isosceles triangle.
- 6. The straight line  $\frac{x}{a} + \frac{y}{b} = 1$  is such that a + b = 10. Find the locus of the middle point of that part of the line which is intercepted between the axes.
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- 7. a) Find the angle between the straight lines x 2y + 1 = 0and x + 3y = 2.
  - b) Find the equation of the circle concentric to  $x^2 + y^2 - 4x + 6y - 13 = 0$  and passing through the point (-4, 5).
  - c) Show that the circle  $x^2 + y^2 6x 8y + 23 = 0$ does not touch the straight line 4x - 7y + 28 = 0.

5 + 5 + 5

- 8. a) In how many ways can the letters of the word VOWEL be arranged ?
  - i) How many of these begin with V?
  - ii) How many begin with V and do not end with L?
  - b) Show that  $1/(\log_a abc) + 1/(\log_b abc) + 1/(\log_c abc) = 1$
  - c) A locomotive engine without a train can run 35 km/hour and its speed is diminished by a quantity which varies as the square root of the number of wagons attached. If with 16 wagons its speed is 15 km/hour, what is the least number of wagons that the engine will fail to move ? Find also the greatest number of wagons that the engine can move. 5 + 5 + 5

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- b) If  $\alpha$ ,  $\beta$  be the roots of  $ax^2 + bx + c = 0$ , then form an equation whose roots are  $\alpha / \beta$  and  $\beta / \alpha$ .
- c) If  $\alpha$ ,  $\beta$  be the roots of the quation  $2x^2 3x + 4 = 0$ , then find the value of  $\alpha^4 + \beta^4$ . 5 + 5 + 5
- 10. a) If  $\frac{1}{a}$ ,  $\frac{1}{b}$ ,  $\frac{1}{c}$  are in A.P. and  $(a + b + c) \neq 0$ , then show that  $\frac{b+c}{a}$ ,  $\frac{c+a}{b}$ ,  $\frac{a+b}{c}$  are also in A.P.

b) If *x* is real, find the maximum value of  $\frac{x+2}{2x^2+3x+6}$ .

- c) Solve for  $x : 4^{x} 3.2^{x+2} + 2^{5} = 0.$  5 + 5 + 5
- 11. a) Let U = { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 } be the universal set,  $A = \{ 1, 2, 3, 4, 5, 6 \}$  and  $B = \{ 5, 6, 7, \}$ . Then verify that  $(A \cup B)^{c} = A^{c} \cap B^{c}$  and  $A B = A \cap B^{c}$ .
  - b) If a/3 = b/4 = c/7, then prove that a + b = c.
  - c) The sum of *n* terms of an A.P. is  $n^2$ . Find the series. What is the common difference ? Which term is 59 ?

$$5 + 5 + 5$$

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