2014

(1st Semester)

BACHELOR OF COMPUTER APPLICATION

Paper No. : BCA-102

[Mathematics—I (Bridge Course)]

(Revised)

Full Marks : 75

Time : 3 hours

(PART : B—DESCRIPTIVE)

(*Marks* : 50)

The figures in the margin indicate full marks for the questions

Answer *any* **five** questions choosing **one** from each Unit

UNIT—I

1. *(a)* Find the numbers between 200 and 300 such that when they are divided by 6, 8, or 9—

(i) it leaves no remainder, i.e., exactly divisible;

(ii) it leaves in each case a remainder 5. 4

(b) A man reads $\frac{3}{8}$ of a book on a day and $\frac{4}{5}$ of the remainder on the second day. If the number of pages still unread are 40, how many pages did the book contain? 3

(c) The ratio between two numbers is 12 : 13. If each number is reduced by 20, the ratio becomes 2 : 3. Find the numbers. 3

2. (a) Find *(i)* the greatest number of 4 digits and *(ii)* the smallest number of 4 digits such that they are exactly divisible by 12, 15, 20 and 35. 4

(b) There are 50 boys in a class. Their average weight is 45 kg. When one boy leaves the class, the average reduces by 100 g. Find the weight of the boy who left the class. 3

(c) If $bc : ac : ab = 1 : 2 : 3$, find

$$\frac{a}{bc} : \frac{b}{ca}$$ 3

UNIT—II

3. (a) If a, b, c are in AP, show that

$$\frac{1}{\sqrt{b}+\sqrt{c}}, \frac{1}{\sqrt{c}+\sqrt{a}}, \frac{1}{\sqrt{a}+\sqrt{b}}$$

are in AP. 4

(b) If the 4th and 9th terms of a GP are 54 and 13122 respectively, find the GP. Also find its general term. 6

4. (a) If a, b, c are in AP, show that

$$a^2(b+c),\ b^2(c+a),\ c^2(a+b)$$

are in AP. 4

(b) Insert three numbers between 1 and 256 so that the resulting sequence is a GP. 6

UNIT—III

5. (a) Using properties of determinants, prove that

$$\begin{vmatrix} y+z & x & x \\ y & z+x & y \\ z & z & x+y \end{vmatrix} = 4xyz$$ 4

(b) If $A = \begin{bmatrix} 2 & -3 \\ 4 & 6 \end{bmatrix}$, verify that $(\text{adj}\, A)^{-1} = (\text{adj}\, A^{-1})$. 6

6. (a) Using properties of determinants, prove that

$$\begin{vmatrix} b^2+c^2 & a^2 & a^2 \\ b^2 & c^2+a^2 & b^2 \\ c^2 & c^2 & a^2+b^2 \end{vmatrix} = 4a^2b^2c^2$$ 4

(b) If $A = \begin{bmatrix} 2 & 3 \\ 1 & 5 \end{bmatrix}$, verify that $(A')^{-1} = (A^{-1})'$. 6

UNIT—IV

7. (a) If $y = \sin^{-1}(\cos x) + \cos^{-1}(\sin x)$, prove that $\frac{dy}{dx} = -2$. 4

(b) If $x^y \cdot y^x = 1$, find $\frac{dy}{dx}$. 6

8. (a) Prove that

$$\frac{d}{dx}\{2x\tan^{-1} x - \log(1+x^2)\} = 2\tan^{-1} x$$ 4

(b) If $y = x^{(x^x)}$, find $\frac{dy}{dx}$. 6

UNIT—V

9. (a) Prove that

$$\int_0^{\frac{\pi}{2}} \frac{\sqrt{\cos x}}{\sqrt{\sin x} + \sqrt{\cos x}}\, dx = \frac{\pi}{4}$$ 4

(b) Evaluate $\int x\tan^{-1} x\, dx$. 3

(c) Evaluate $\int \sec^4 x \tan x\, dx$. 3

10. *(a)* Evaluate : 4

$$\int_0^{\frac{\pi}{2}} \log(\tan x)\,dx = 0$$

(b) Evaluate $\int \log(1 + x^2)\,dx$. 3

(c) Evaluate $\int \sin^3 x \cos x\,dx$. 3

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(1st Semester)

BACHELOR OF COMPUTER APPLICATION

Paper No. : BCA-102

[Mathematics—I (Bridge Course)]

(Revised)

(PART : A—OBJECTIVE)

(*Marks* : 25)

The figures in the margin indicate full marks for the questions

SECTION—I

(*Marks* : 15)

Put a Tick (✓) mark against the correct answer in the brackets provided : $1 \times 10 = 10$

1. If * in the number 6*106 is replaced by a suitable digit, then the number formed is exactly divisible by 11. Then what is the value of *?

(a) 1 ( )

(b) 2 ( )

(c) 3 ( )

(d) 4 ( )

2. The digit in the unit place in $(1038)^{67}$ is

(a) 4 ( )

(b) 2 ( )

(c) 6 ( )

(d) 8 ( )

3. The AM between $(x-y)^2$ and $(x+y)^2$ is

(a) x^2+y^2 ( )

(b) x^2-y^2 ( )

(c) $-4xy$ ( )

(d) $2xy$ ( )

4. For a standard HP, the *n*th term is given by

(a) $a_n = a + (n-1)d$ ( )

(b) $a_n = \dfrac{a}{(n-1)d}$ ( )

(c) $a_n = \dfrac{1}{a+(n-1)d}$ ( )

(d) $a_n = \dfrac{a}{(n+1)d}$ ( )

5. If $A = \begin{bmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3 \end{bmatrix}$ then A^2 is equal to

(a) A ( )

(b) 0 ( )

(c) I ( )

(d) None of the above ( )

6. If $A = \begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix}$ and $A^2 = 8A + kI$, then the value of k is

(a) 1 ( )

(b) 7 ( )

(c) -1 ( )

(d) -7 ( )

7. If $y = (ax + b)^{m-1}$, then $\frac{dy}{dx}$ is equal to

(a) $m(ax + b)^m$ ( )

(b) $b(m-1)(ax + b)^m$ ( )

(c) $am(m-1)(ax + b)^{m-2}$ ( )

(d) $a(m-1)(ax + b)^{m-2}$ ( )

8. If $y = \log_a x$, then $\frac{dy}{dx}$ is equal to

(a) $\frac{1}{x \log a}$ ( )

(b) $\frac{1}{\log_a x}$ ( )

(c) $\frac{\log a}{x}$ ( )

(d) $\frac{1}{ax}$ ( )

9. The value of $\int \frac{1}{\sqrt[4]{x^3}} dx$ is

(a) $4x^{4/3} + C$ ( )

(b) $\frac{4}{3} x^{3/4} + C$ ( )

(c) $4x^{1/4} + C$ ( )

(d) $\frac{3}{4} x^{1/4} + C$ ( )

10. The value of $\int_1^{\sqrt{2}} \frac{dx}{|x|(\sqrt{x^2 - 1})}$ is

(a) $\frac{\pi}{4}$ ( )

(b) $\frac{\pi}{2}$ ( )

(c) $\frac{\pi}{3}$ ( )

(d) $\frac{\pi}{6}$ ( )

Tick (✓) either *True* or *False* : 1×5=5

11. If the average of three numbers a, b and c is A, then the average of a, b, c and A is A.

True ( ) / *False* ( )

12. The sum of the series $1+\frac{1}{4}+\frac{1}{16}+\cdots$ is $\frac{3}{4}$.

True ( ) / *False* ( )

13. If any two rows or columns of a determinant are proportional, then its value is zero.

True ( ) / *False* ( )

14. If $y=3^{x+2}$, then the value of $\frac{dy}{dx}$ is $9\times3^{x}\log 3$.

True ( ) / *False* ( )

15. The value of $\int\frac{\log x}{x}dx$ is $\frac{1}{2}(\log x)+C$.

True ( ) / *False* ( )

SECTION—II

(*Marks* : 10)

Answer the following questions : 2×5=10

1. The sum of three numbers A, B and C is 98. If $A : B = \frac{2}{3}$ and $B : C = \frac{5}{8}$, then find the value of B.

2. The GM between two numbers is 16. If one number is 32, find the other number.

3. If $[1 \quad x \quad 1]\begin{bmatrix}1 & 2 & 3\\ 4 & 5 & 6\\ 3 & 2 & 5\end{bmatrix}\begin{bmatrix}1\\ -2\\ 3\end{bmatrix} = 0$, find x.

4. If $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$, find $\frac{dy}{dx}$.

5. Evaluate $\int \frac{e^{\tan^{-1} x}}{(1 + x^2)} dx.$

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