2016

(1st Semester)

BACHELOR OF COMPUTER APPLICATION

Paper No. : BCA–102

[Mathematics—I (Bridge Course)]

Full Marks : 75

Time : 3 hours

(PART : B—DESCRIPTIVE)

(*Marks* : 50)

The figures in the margin indicate full marks for the questions

Answer **four** questions, choosing **one** from each Unit

UNIT—I

1. *(a)* The average age of 10 men is increased by 2 years when two of them whose ages are 21 years and 23 years are replaced by two new men. Find the average age of the two new men. 4

(b) In an examination, there were 640 boys and 360 girls; 60% of boys and 80% of girls were successful. Find the total fail percentage. 4

(c) Find the GCD and LCM of the following : 4

$$\frac{1}{3}, \frac{5}{6}, \frac{2}{9}, \frac{4}{27}$$

2. (a) In a bag, there are coins of 25 paise, 10 paise and 5 paise in the ratio of 1 : 2 : 3. If there are ₹ 30 in all, how many 5 paise coins are there? 4

(b) Divide ₹ 7,500 among A, B and C such that A's share is to B's share is 5 : 2 and B's share is to C's share is 7 : 13. How much will B receive? 4

(c) Find the coefficient of x^{10} in the binomial expression of $(x^2 - 2)^{11}$. 4

UNIT—II

3. (a) If a, b, c are in AP, show that $a^2(b+c)$, $b^2(c+a)$ and $c^2(a+b)$ are in AP. 4

(b) If 7 times the 7th term of an AP is equal to 11 times its 11th term, show that its 18th term is 0. 4

(c) Find the 7th term of GP $0 \cdot 4, 0 \cdot 8, 1 \cdot 6, \cdots$ 3

4. *(a)* For any two positive numbers a and b, show that (AM) $\geq$ (GM). 3

(b) Insert three numbers between $\frac{1}{3}$ and 432 so that the resulting sequence is a GP. 3

(c) Show that

$$\frac{1\times 2^2+2\times 3^2+\cdots+n\times(n+1)^2}{1^2\times 2+2^2\times 3+\cdots+n^2\times(n+1)}=\frac{3n+5}{3n+1}$$ 5

UNIT—III

5. *(a)* Find matrices A and B if

$$2A-B=\begin{bmatrix}6 & -6 & 0\\ -4 & 2 & 1\end{bmatrix} \text{ and } 2B+A=\begin{bmatrix}3 & 2 & 5\\ -2 & 1 & -7\end{bmatrix}$$ 4

(b) If $A=\begin{bmatrix}3 & 1\\ -1 & 2\end{bmatrix}$, show that $(A^2-5A+7I)=0$. 4

(c) Express the matrix $A=\begin{bmatrix}3 & -4\\ 1 & -1\end{bmatrix}$ as the sum of a symmetric matrix and a skew-symmetric matrix. 4

6. *(a)* Evaluate : 3

$$\begin{vmatrix}2 & -4 & 1\\ 7 & 2 & -3\\ 3 & 1 & 5\end{vmatrix}$$

(b) Find the cofactor of

$$\begin{vmatrix} 3 & -4 & 5 \\ 1 & 1 & -2 \\ 2 & 3 & 1 \end{vmatrix}$$ 4

(c) Using the properties of determinant, prove that

$$\begin{vmatrix} y+z & x & y \\ z & z+x & x \\ y & x & x+y \end{vmatrix} = 4xyz$$ 5

UNIT—IV

7. (a) Find $\frac{dy}{dx}$, when $y = x^{\sin x} + (\sin x)^{\cos x}$. 6

(b) Find $\frac{dy}{dx}$, when $x^2 + y^2 - 3xy = 1$. 4

(c) From the first principle of derivative, show that

$$\frac{d}{dx}(\cos x) = -\sin x$$ 5

8. (a) Evaluate : 3

$$\int \left(5x^2 + 2x^{-5} - x + \frac{1}{\sqrt{x}} + \frac{2}{x}\right) dx$$

(b) Solve : 3

$$\int \frac{\sin(2\tan^{-1} x)}{(1+x^2)}\, dx$$

(c) Evaluate : 4

$$\int \cos x \cos 2x \cos 3x \, dx$$

(d) Evaluate : 5

$$\int (\log x)^2 \, dx$$

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2016

(1st Semester)

BACHELOR OF COMPUTER APPLICATION

Paper No. : BCA-102

[Mathematics—I (Bridge Course)]

(PART : A—OBJECTIVE)

(*Marks* : 25)

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SECTION—I

(*Marks* : 15)

1. Put a Tick (✓) mark against the correct answer in the brackets provided : 1×10=10

(a) The digit in the unit place in $(379)^{246}$ is

(i) 9 ( )

(ii) 1 ( )

(iii) 6 ( )

(iv) 2 ( )

(b) The number which is divisible by one and itself is called

(i) composite number ( )

(ii) even number ( )

(iii) prime number ( )

(iv) odd number ( )

(c) The arithmetic mean (AM) between $(a - b)$ and $(a + b)$ is

(i) a ( )

(ii) 1 ( )

(iii) b ( )

(iv) $2a$ ( )

(d) The sum of $(1 + 2 + 3 + \cdots + n)$ is equal to

(i) $\frac{1}{6}n(n+1)(2n+1)$ ( )

(ii) $\frac{1}{2}n(n+1)$ ( )

(iii) $\left\{\frac{1}{2}n(n+1)\right\}^2$ ( )

(iv) $n^2(2n^2 - 1)$ ( )

(e) A square matrix in which every non-diagonal element is 0 and every diagonal element is 1 is called

(i) diagonal matrix ( )

(ii) scalar matrix ( )

(iii) unit matrix ( )

(iv) null matrix ( )

(f) The value of $\begin{vmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{vmatrix}$ is

(i) 1 ( )

(ii) 0 ( )

(iii) 2 ( )

(iv) −2 ( )

(g) The value of $\frac{d}{dx}(\log_a x)$ is

(i) $a^x(\log a)$ ( )

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

(iii) $\frac{1}{x}$ ( )

(iv) $\frac{1}{a}$ ( )

(h) The value of $\int x^{-1}\,dx$ is

(i) 0 ( )

(ii) $\frac{1}{x^2} + c$ ( )

(iii) $\frac{1}{x} + c$ ( )

(iv) $\log x + c$ ( )

(i) $\int e^x (\tan x + \log \sec x)\,dx$ is equal to

(i) $e^x \log (\sec x) + c$ ( )

(ii) $e^x \tan x + c$ ( )

(iii) $e^x + c$ ( )

(iv) $e^x \sec^2 x + c$ ( )

(j) The value of $\frac{d}{dx}(\cos 5x)$ is

(i) $-5 \sin 5x$ ( )

(ii) $5 \cos 5x$ ( )

(iii) $5 \sin 5x$ ( )

(iv) $-5 \cos 5x$ ( )

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

(a) Mean proportional to 8 and 32 is 16.

True ( ) / *False* ( )

(b) The series 2, 6, 18, 54, ... is called HP.

True ( ) / *False* ( )

(c) The value of $\int \frac{1}{\sqrt{1-x^2}}\,dx$ is $\cos^{-1} x$.

True ( ) / *False* ( )

(d) The value of $\frac{d}{dx}(e^{2x})$ is $2e^{2x}$.

True ( ) / *False* ( )

(e) A square matrix A is invertible if and only if A is singular.

True ( ) / *False* ( )

SECTION—II

(*Marks* : 10)

Answer the following questions : 2×5=10

1. If

$$\frac{2x}{1+\dfrac{1}{1+\dfrac{x}{1-x}}} = 1$$

then find the value of x.

2. Find the sum of all odd integers from 1 to 1001.

3. Is matrix multiplication commutative? Justify your answer.

4. Evaluate :

$$\frac{d}{dx}(\sec^{-1}\sqrt{x})$$

5. Evaluate :

$$\int \frac{1}{(1-\cos x)}\, dx$$

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