

Professional Course Examination, November/December 2019
(1st Semester)

BACHELOR OF COMPUTER APPLICATIONS

Course : BCA-102

[Mathematics—I (Bridge Course)]

(Pre-revised)

Full Marks : 75

Time : 3 hours

(PART : A—OBJECTIVE)

(Marks : 25)

The figures in the margin indicate full marks for the questions

SECTION—A

(Marks : 10)

Tick (✓) the correct answer in the brackets provided :

1×10=10

1. If a and b are two integers such that $a \neq b$, then

- (a) LCM of a and b = HCF of a and b ()
- (b) LCM of a and b > HCF of a and b ()
- (c) LCM of a and b < HCF of a and b ()
- (d) LCM of a and b \leq HCF of a and b ()

2. If $a : b = 1 : 2$ and $b : c = 2 : 3$, then $a : c$ will be

- (a) 1 : 3 () (b) 2 : 3 ()
- (c) 1 : 2 () (d) 2 : 1 ()

3. The n th term of the GP 2, 6, 18, 54, ... is

(a) $2 \cdot 3^{n-1}$ ()

(b) $2 \cdot 3^n$ ()

(c) $3 \cdot 2^n$ ()

(d) $3 \cdot 2^{n-1}$ ()

4. Which of the following numbers is not part of the sequence given by the rule $a_n = 2n + 1$?

(a) 5 ()

(b) 8 ()

(c) 11 ()

(d) 57 ()

5. If

$$A = \begin{bmatrix} 1 & 0 \\ 3 & 1 \end{bmatrix}$$

then $\frac{2}{3}A$ is

(a) $\begin{bmatrix} 1 & 0 \\ \frac{2}{3} & 1 \end{bmatrix}$ ()

(b) $\begin{bmatrix} 1 & 0 \\ 3 & 2 \end{bmatrix}$ ()

(c) $\begin{bmatrix} 1 & 0 \\ 1 & 3 \end{bmatrix}$ ()

(d) $\begin{bmatrix} \frac{2}{3} & 0 \\ 2 & \frac{2}{3} \end{bmatrix}$ ()

6. The value of $\begin{vmatrix} a & b \\ c & d \end{vmatrix}$ is

(a) $ad - bc$ ()

(b) $ab - cd$ ()

(c) $ac - bd$ ()

(d) $bc - ad$ ()

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

(a) $\log a$ ()

(b) xa^{x-1} ()

(c) $\log x$ ()

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

8. The value of $\frac{d}{dx}(\sin^{-1} x)$ is

(a) $\sqrt{1-x^2}$ ()

(b) $\frac{1}{\sqrt{1-x^2}}$ ()

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

(d) $\frac{1}{\sin x}$ ()

9. The value of $\int x^{-1} dx$ is

(a) Does not exist ()

(b) $-x + c$ ()

(c) $x^2 + c$ ()

(d) $\log|x| + c$ ()

10. The value of $\int \sin x dx$ is

(a) $-\cos x + c$ ()

(b) $\cos x + c$ ()

(c) $\sin x + c$ ()

(d) $\sin x + \cos x$ ()

SECTION—B

(Marks : 5)

State whether the following statements are *True* or *False* by putting a (✓) Tick mark :

1×5=5

11. $\frac{5}{4}$ is less than $\frac{4}{5}$.

(True / False)

12. The general term of a geometric progression is given by $a_n = a + (n-1)d$.

(True / False)

13. $\begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix}$ is a diagonal matrix.

(True / False)

14. The value of $\frac{d}{dx}(uv)$ is $u \frac{dv}{dx} - v \frac{du}{dx}$.

(True / False)

15. The value of the integral $\int d\theta$ is $x + c$.

(True / False)

SECTION—C

(Marks : 10)

Answer the following questions :

2×5=10

16. Convert 16% into fraction.

17. Find the geometric mean between the two numbers 5 and 125.

18. If $A = \begin{bmatrix} 2 & -5 \\ 0 & 1 \end{bmatrix}$, then find $3A$.

19. Differentiate $\sin 4x$ with respect to x .

20. Evaluate $\int \frac{1}{\sqrt[3]{x^2}} dx$.

(PART : B—DESCRIPTIVE)

(Marks : 50)

The figures in the margin indicate full marks for the questions

1. (a) Two numbers are in the ratio 8 : 3. If the sum of the numbers is 143, find the numbers. 4
- (b) What percentage is 390 g of 1 kg 500 g? 3
- (c) Find two rational numbers between 4 and 5. 3

OR

- (d) Find the cost of $3\frac{2}{5}$ metres of cloth at the rate of ₹ $36\frac{3}{4}$ per metre. 4
- (e) Find two fractions between 1 and 2. 3
- (f) Convert 0.7% into decimal. 3
2. (a) The Fibonacci sequence is defined by $a_1 = a_2 = 1$ and $a_n = a_{n-1} + a_{n-2}$. Write the first 8 terms of the Fibonacci sequence. 4
- (b) Insert four numbers between 4 and 19 such that the resulting sequence is an arithmetic progression. 3
- (c) Find the 9th term of the geometric progression 3, 6, 12, 24, ... 3

OR

- (d) How many terms are there in the arithmetic progression 7, 13, 19, ..., 205? 4
- (e) Which term of the geometric progression 5, 10, 20, 40, is 5120? 3
- (f) Find the geometric mean between the numbers 1 and $\frac{9}{16}$. 3

3. (a) If

$$A = \begin{bmatrix} 2 & 1 \\ -5 & 0 \end{bmatrix}$$

find the value of $2A^2 + 5A - I$, where I is the unit matrix. 5

(b) Evaluate $\begin{vmatrix} 1 & 2 & 12 \\ -2 & 1 & 10 \\ -9 & 3 & 5 \end{vmatrix}$. 5

OR

(c) Find a matrix X such that $A - 5B + 2X = 0$, where

$$A = \begin{bmatrix} -2 & 9 \\ 7 & -1 \end{bmatrix} \text{ and } B = \begin{bmatrix} 5 & 3 \\ 9 & -1 \end{bmatrix} \quad 5$$

(d) Show that

$$\begin{vmatrix} x & \sin \theta & \cos \theta \\ -\sin \theta & -x & 1 \\ \cos \theta & 1 & x \end{vmatrix} = -x^3 \quad 5$$

4. (a) Differentiate $\tan \sqrt{x}$ with respect to x . 4

(b) Differentiate $\cot^{-1}\left(\frac{1-x}{1+x}\right)$ with respect to x . 6

OR

(c) Differentiate e^x with respect to \sqrt{x} . 5

(d) If $y = (\tan x + \sec x)$, then prove that

$$\frac{d^2y}{dx^2} = \frac{\cos x}{(1 - \sin x)^2}$$

5. (a) Evaluate $\int \frac{\sin 2x}{(a^2 \sin^2 x + b^2 \cos^2 x)} dx$.

(b) Using integration by parts, evaluate $\int (\log x)^2 dx$.

OR

(c) Evaluate $\int \frac{x^2 \tan^{-1} x^3}{(1 + x^6)} dx$.

(d) Evaluate $\int x \tan^{-1} x dx$.

Mark***

$$\begin{bmatrix} 1 & 2 & 12 \\ -2 & 1 & 10 \\ -9 & 3 & 5 \end{bmatrix}$$

(b) Evaluate

$$\begin{bmatrix} 1 & 2 & 12 \\ -2 & 1 & 10 \\ -9 & 3 & 5 \end{bmatrix}$$

OR

(c) Find a matrix X such that $A - 5B + 2X = 0$ where

$$A = \begin{bmatrix} -2 & 9 \\ 7 & -1 \end{bmatrix} \text{ and } B = \begin{bmatrix} 5 & 3 \\ 2 & -1 \end{bmatrix}$$

(d) Show that

$$\begin{vmatrix} x & \sin \theta & \cos \theta \\ -\sin \theta & x & 1 \\ \cos \theta & 1 & x \end{vmatrix} = -x^3 - \sin^2 \theta$$

OR

(c) Differentiate e^x with respect to x .