

Roll No.

Total No. of Pages : 03

Total No. of Questions : 07

B.Sc.(IT) (2015 & Onward) / BCA (2011 & Onwards) (Sem.-2)

MATHEMATICS – II

Subject Code : BSIT/BSBC-202

Paper ID : [B1114]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. **SECTION-B** contains **SIX** questions carrying **TEN** marks each and students have to attempt any **FOUR** questions.
3. **Log tables** may be asked if needed.

SECTION-A

1. Write briefly :

- a) If $A = \begin{bmatrix} b & 0 \\ 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 16 & 0 \\ 5 & 1 \end{bmatrix}$, then find the value of 'b' such that $A^2 = B$.
- b) Construct a 3×4 matrix whose elements a_{ij} are given by $\frac{(i+2j)^2}{2}$.
- c) Find the rank of the matrix $A = \begin{bmatrix} 1 & 2 & -1 \\ 3 & -1 & 2 \\ 2 & 4 & -2 \end{bmatrix}$.
- d) If the mean of a set of observations $x_1, x_2, x_3, \dots, x_{10}$ is 20, then find the mean value of $x_1 + 4, x_2 + 8, x_3 + 12, \dots, x_{10} + 40$.
- e) Evaluate $\int \frac{x^2}{(x-1)(x-2)} dx$.
- f) Evaluate $\int x^2 e^{3x} dx$.
- g) Find the median of the data : $x = 10, 11, 12, 11, 12, 10, 12, 11$.

h) Differentiate $\sqrt{\tan \sqrt{1+x^3}}$ w.r.t. x .

i) State Simpson's $\frac{1}{3}$ and $\frac{3}{8}$ rule to evaluate $\int_a^b f(x) dx$.

j) Find value of $\log_2 \sqrt{8}$.

SECTION-B

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

$$\begin{vmatrix} a & a+b & a+b+c \\ 2a & 3a+2b & 4a+3b+2c \\ 3a & 6a+3b & 10a+6b+3c \end{vmatrix} = a^3.$$

(b) Find the inverse of $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$.

3. (a) Use matrix method to solve the following system of equations

$$x + y + z = 3, 2x - y + z = 2, x - 2y + 3z = 2.$$

(b) Without using log tables, prove that $7\log_2\left(\frac{16}{15}\right) + 5\log_2\left(\frac{25}{24}\right) + 3\log_2\left(\frac{81}{80}\right) = 1$

4. (a) At what rate of interest Compounded annually, a sum of money may become double of itself in 10 years.

(b) Differentiate w.r.t. x $\sqrt{\frac{1+\tan x}{1-\tan x}}$.

5. (a) Find two positive numbers whose sum is 14 and the sum of whose squares is minimum.

(b) Evaluate the following integrals :

(i) $\int_0^{\pi/4} \tan^2 x \, dx$

(ii) $\int \frac{1}{(x-1)(x+2)} \, dx.$

6. (a) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Trapezoidal rule and compare the result with its actual value.

(b) Differentiate the following functions *w.r.t.* x .

(i) $\log_2 x + \log_x 2 + \log_x x + \log_2 2$

(ii) $\frac{e^x + \tan x}{1 + \sin x}.$

7. (a) An incomplete frequency distribution is given as under :

Variable	10–20	20–30	30–40	40–50	50–60	60–70	70–80
Frequency	12	30	?	65	?	25	18

Given that the median value is 46 and the sum of the frequencies is 229. Find the missing frequencies.

(b) Calculate the S.D. of the following distribution :

Class	0–7	7–14	14–21	21–28	28–35	35–42	42–49
Frequency	19	25	36	72	51	43	28