

Roll No.

| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|

Total No. of Pages : 02

Total No. of Questions : 08

B.Tech. (CSE / IT) (2018 & Onwards) (Sem.-1)

MATHEMATICS-I

Subject Code : BTAM-104-18

M.Code : 75362

Time : 2 Hrs.

Max. Marks : 30

INSTRUCTIONS TO CANDIDATES :

1. Attempt any FIVE question(s), each question carries 6 marks.

- 1) a) Expand $f(x) = e^{\sin x}$ upto the term containing x^4 .
b) Show that $f(x) = \sin x (1 + \cos x)$ has a maximum at $x = \pi/3$.
- 2) a) Find the volume of the solid generated by revolving $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, a > b$ about the major axis.
b) Using Gamma function evaluate $\int_0^{\infty} \sqrt{x} \exp(-3\sqrt{x}) dx$.
- 3) a) If $A = \begin{bmatrix} 5 & 4 \\ 1 & 1 \end{bmatrix}, B = \begin{bmatrix} 1 & -2 \\ 1 & 3 \end{bmatrix}$ and $C = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}$, then show that $(AB)C = A(BC)$.
b) Solve the equations using Cramer rule $2x + 3y + 4z = 11, x + 5y + 7z = 15, 3x + 11y + 13z = 25$.
- 4) a) Find the rank of the matrix $\begin{bmatrix} -8 & 1 & 4 \\ 4 & 4 & 7 \\ 1 & -8 & 4 \end{bmatrix}$.
b) Solve using Gauss elimination method $x - y + 2z = 3, x + 2y + 3z = 5, 3x - 4y - 5z = -13$.
- 5) a) Express $v = (2, -5, 3)$ in R^3 as a linear combination of vectors $u_1 = (1, -3, 2), u_2 = (2, 4, -1), u_3 = (1, -5, 7)$.
b) Determine whether the vectors $u_1 = 2t^2 + 4t - 3$ and $u_2 = 4t^2 + 8t - 6$ are linearly dependent?

- 6) a) Suppose the mapping $F : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ is defined by $F(x, y) = (x + y, x)$.

Using the properties of matrices, show that F is a linear mapping.

- b) Find the dimension and a basis of the subspace W of $P_3(t)$ spanned by

$$u = t^3 + 2t^2 - 3t + 4, v = 2t^3 + 5t^2 - 4t + 7, w = t^3 + 4t^2 + t + 2.$$

- 7) Find the characteristic equation of the matrix $\begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ and hence compute A^{-1} .

- 8) Reduce the matrix $\begin{bmatrix} 5 & 3 & 7 \\ 3 & 26 & 2 \\ 7 & 2 & 10 \end{bmatrix}$ to the diagonal form.

Note: Any student found attempting answer sheet from any other person(s), using incriminating material or involved in any wrong activity reported by evaluator shall be treated under UMC provisions.

Student found sharing the question paper(s)/answer sheet on digital media or with any other person or any organization/institution shall also be treated under UMC.

Any student found making any change/addition/modification in contents of scanned copy of answer sheet and original answer sheet, shall be covered under UMC provisions.