G.R. No.

Paper code - U119 -101 (T1)

OCTOBER 2019 / IN-SEM (T1)

F. Y. B.TECH. (COMMON) (SEMESTER - I)

COURSE NAME: ENGINEERING MATHEMATICS-I

COURSE CODE: ES11181

(PATTERN 2018)

Time: [1 Hour]
[Max. Marks: 20]

(*) Instructions to candidates:
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of scientific calculator is allowed.
4) Use suitable data where ever required.

Q 1) Attempt any **two**.

a) Find rank of matrix A by reducing it into Normal form: [4]

$$A = \begin{bmatrix} 2 & -2 & 1 & 6 \\ 4 & 2 & 4 & 2 \\ 1 & -1 & 0 & 3 \end{bmatrix}$$

b) Examine for consistency of the system and if consistent then solve it. [4]

$$3x + 4y + 5z = 1$$
$$4x + 5y + 6z = 3$$
$$5x + 6y + 7z = 5$$

c) Find Eigen values and eigenvector corresponding to largest eigenvalue of the matrix [4]

$$A = \begin{bmatrix} 1 & -2 & 0 \\ 1 & 2 & 2 \\ 1 & 2 & 3 \end{bmatrix}$$

Q 2) Attempt any **two**.

a) Using Lagrange's Mean Value Theorem prove that, [4]

$$\frac{b-a}{\sqrt{1-a^2}} < \sin^{-1} b - \sin^{-1} a < \frac{b-a}{\sqrt{1-b^2}}, where\ 0 < a < b$$

b) Find approximate value of $\cos(48^0)$ using Taylor's theorem. [4]

c) Find the values of a and b such that [4]

$$\lim_{x \to 0} \frac{x(1 - a\cos x) + b\sin x}{x^3} = \frac{1}{3}.$$

Q 3) Attempt any **one**.

a) Test for the convergence of the series: [4]

$$\frac{1}{1.2.3} + \frac{3}{2.3.4} + \frac{5}{3.4.5} + \dots\dots\dots$$

b) Find half range sine series for $f(x) = x^2$ in interval $(0, \pi)$. [4]