Total No. of Questions – [3]

Total No. of Printed Pages: 2

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Paper code - 0118-101(T1)

OCTOBER 2018 / IN-SEM (T1)

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

COURSE NAME: Engineering Mathematics-I

COURSE CODE: ES11181

(PATTERN 2018)

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

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) Express following matrix in normal form and find the rank. [4]

$$\begin{bmatrix} 8 & 1 & 3 & 6 \\ 0 & 3 & 2 & 2 \\ -8 & 1 & -3 & 4 \end{bmatrix}$$

b) Show that the system of equations [4]
$x+2y+3z=\lambda x; 3x+y+2z=\lambda y; 2x+3y+z=\lambda z$
has non trivial solutions only if $\lambda=6$. Find the general solution for real values λ.

c) Find the Eigen values and Eigen vector corresponding to highest Eigen value of the matrix :

$$A=\begin{bmatrix} -9 & 4 & 4 \\ -8 & 3 & 4 \\ -16 & 8 & 7 \end{bmatrix}$$ [4]

Q 2) Attempt any **two**.

a) Prove that: $\left(\frac{101}{100}\right)^{100} < e < \left(\frac{100}{99}\right)^{100}$ [4]

b) Expand $3x^3 - 2x^2 + x - 4$ in powers of (x+2). [4]

c) Find values of a, b, c, if $\lim_{x \to 0} \frac{(a + b\cos x)x - c\sin x}{x^5} = 1$ [4]

Q 3) Attempt any **one**.

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

$$\sum \frac{1.2.3.....n}{4.7.....3n+1} x^n, \quad x > 0$$

b) Obtain the Fourier Series for : [4]

$f(x) = \pi^2 - x^2, \ -\pi \le x \le \pi, \ f(x + 2\pi) = f(x)$