paper code :- V239 – 131A-CT₁

G.R. No.	

OCTOBER 2019INSEM (T1)

S. Y. B.TECH. (E&TC Engineering) (SEMESTER III)

COURSE NAME: ENGINEERING MATHEMATICS III

COURSE CODE: ES20181ET

(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) Assume suitable data where ever required.

Q 1)   Attempt any **one**

a) Solve the following differential equations

(i) $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = e^{2x}\sin2x$

[4]+[4]

(ii) $x^2\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} - 4y = x^2$

b) An inductor of 0.5 henries is connected in series with a resistor of 6 ohms, a capacitor of 0.02 farads, a generator having alternative voltage given by 24sin10t , t>0 and a switch k.

(i)Set-up a differential equation for the instantaneous charge on the condenser.

(ii) Find the charge and the current at time t if the charge on the capacitor is zero when the switch k is closed at time t = 0.

[8]

Q 2)   Attempt any **one**

a) Find the Fourier Cosine and sine Transforms of $f(x) = e^{-x}$ for x > 0 and hence using Fourier cosine integral representation show that $\int_0^\infty \frac{\cos m\tau}{1+\tau^2} d\tau = \frac{\pi}{2}e^{-m}$

[8]

b) Using Z Transform solve $f(k+2) + 3f(k+1) + 2f(k) = 0$, $k \geq 0$, f(0)=0, f(1)=1 [8]

Q 3) Attempt any **one**

a) Use Runge Kutta fourth order method to approximate y(0.2) in steps of h=0.2, given that $\frac{dy}{dx} = x + y$ and y(0)=1 [4]

b) Using Simpson's $\frac{1}{3}^{rd}$ Rule evaluate $\int_0^2 \frac{dx}{1+x^2}$ with h=0.2 [4]