

Total No. of Questions – [06]

Total No. of Printed Pages: 01

G.R. No.

**MARCH 2020 INSEM (T1)**  
**S. Y. B.TECH. (E&TC) (SEMESTER -IV)**  
**COURSE NAME: Engineering Mathematics III**  
**COURSE CODE: ES20181ET**  
**(PATTERN 2018)**

Time: [1 Hour]

[Max. Marks: 20]

(\*) Instructions to candidates:

1. Attempt Q.1 **OR** Q.2, Q.3 **OR** Q.4, Q.5 **OR** Q.6
2. Figures to the right indicate full marks.
3. Use of scientific calculator is allowed.
4. Assume suitable data wherever required

Q.1) Solve the following differential equations;

[4]+[4]

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

ii)  $\frac{d^2y}{dx^2} + \frac{1}{x} \frac{dy}{dx} = x$

**OR**

Q.2) Solve the following differential equations;

[4]+[4]

i)  $\frac{d^2y}{dx^2} - 7\frac{dy}{dx} - 6y = e^{2x}(1+x)$

ii)  $(2x+1)^2 \frac{d^2y}{dx^2} - 6(2x+1) \frac{dy}{dx} + 16y = 8(2x+1)^2$

Q.3) Attempt the following

[4]+[4]

i) Find Fourier sine transform of  $f(x) = e^{-x}$ ,  $x \geq 0$

ii) Find Z Transform of  $2^k \cos(3k+2)$ ,  $k \geq 0$

**OR**

Q.4) Attempt the following

[4]+[4]

i) Using Fourier integral representation show that

$$\int_0^\infty \frac{1-\cos \pi \tau}{\tau} \sin \tau x \, d\tau = \begin{cases} \frac{\pi}{2} & 0 < x < \pi \\ 0 & x > \pi \end{cases}$$

ii) Using Z Transform solve the following difference equation

$$f(k+2)+3f(k+1)+2f(k)=0, f(0)=0, f(1)=1$$

Q.5) Using Simson's  $\left(\frac{1}{3}\right)^{rd}$  Rule with  $h=0.5$  Evaluate  $\int_0^4 \frac{1}{1+x} dx$

[4]

**OR**

Q.6) Using Runge Kutta fourth order method find value of  $y(0.1)$ , given [4]

that  $\frac{dy}{dx} = 1 - xy$ ,  $y(0)=0$  &  $h=0.1$

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