Total No. of Questions – [4]

Total No. of Printed Pages 2

G.R. No.	

U218-151 (T1)

OCTOBER 2018/ IN-SEM (T1)

S. Y. B. TECH. (MECHANICAL ENGINEERING) (SEMESTER - I)

COURSE NAME: Engineering Mathematics III

COURSE CODE: MEUA21171

(PATTERN 2017)

Time: [**1 Hour**] [Max. Marks: **30**]

Instructions to candidates:

1) **Answer Q.1 OR Q.2 and Q.3 OR Q.4.**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed**
4) **Use suitable data where ever required**

Q.1 a: Solve $(D^2+4)y=\sec 2x$ by variation of parameter method. 6

Q.1 b: Solve $x^2\frac{d^2y}{dx^2}-3x\frac{dy}{dx}+5y=x^2\log x$ 6

Q.1 c: solve $\frac{dx}{x^2-yz}=\frac{dy}{y^2-zx}=\frac{dz}{z^2-xy}$ 4

OR

Q.2 a: Solve $(D^2+1)y=\operatorname{cosec} x$ by variation of parameter method. 6

Q.2 b: $x^2\frac{d^2y}{dx^2}+x\frac{dy}{dx}-y=\log x^2+x-1$ 6

Q.2 c: Solve: $\frac{dx}{dt} - wy = a\cos pt; \frac{dy}{dt} + wx = a\sin pt$ 4

Q.3 a: By considering Fourier sine and cosine integrals of e^{-mx} (m > 0)

prove that $\int_0^\infty \frac{\lambda \sin \lambda x}{\lambda^2 + m^2}\, d\lambda = \frac{\pi}{2}\, e^{-mx}$ m > 0, x > 0, 6

Q.3 b: Solve integral equation $\int_0^\infty f(x)\sin \lambda x\, dx = \begin{cases} 1-\lambda, & 0 \le \lambda \le 1 \\ 0, & \lambda \ge 1 \end{cases}$ 4

Q.3 c: Using Laplace transform evaluate following Integral: 4

$\int_0^\infty e^{-t} \frac{\cos 2t - \cos 3t}{t}\, dt$

OR

Q.4 a: Using Fourier integral representation,

show that $\int_0^\infty \frac{\lambda^3 \sin \lambda x}{\lambda^4 + 4}\, d\lambda = \frac{\pi}{2}\, e^{-x} \cos x$, where x > 0 **6**

Q.4 b: Find inverse Laplace Transform of $\frac{s}{(s+1)^2\left(s^2+1\right)}$ 4

Q.4 c: Solve differential equation using Laplace transform 4

$\frac{d^2x}{dt^2} + 9x = \cos 2t, x(0) = 1, x'(0) = -1$