I B. Tech II Semester Supplementary Examinations, December - 2020
MATHEMATICS-II
(Com. to All Branches)

Time: 3 hours   Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Find the $L\left(\dfrac{1-\cos t}{t}\right)$ (8M)

   b) Find the Laplace transform Dirac delta function.   (7M)

2. a) Find $L^{-1}\left\{\dfrac{5s+3}{(s-1)(s^2+2s+5)}\right\}$ (8M)

   b) Solve the $x'' + x' = 2, x(0) = 3, x'(0) = 1, x''(0) = -2$ using Laplace transform (7M) method.

3. a) Expand e^x as a Fourier series in $(-\pi, \pi)$ (8M)

   b) Find the Half range cosine series of $f(x) = (x-1)^2$, in $0 < x < 1$ (7M)

4. a) Find the Fourier Sine transform of $\dfrac{x}{a^2+x^2}$ (8M)

   b) Find the Fourier cosine transform of $\dfrac{e^{-ax}}{x}$ (7M)

5. a) A tightly stretched string with fixed end points x = 0 , and x = p is initially in a (8M) position given by $y = y_0 Sin^3 \dfrac{\pi x}{P}$ if it is released from rest from this position, find the displacement y(x, t)

   b) Solve $4\dfrac{\partial z}{\partial x} - \dfrac{\partial z}{\partial y} = 3z$ and $z(0, y) = e^{-5y}$ (7M)

6. a) Find the Z – transforms of the following. (i) e^{-an} (ii) ne^{-an} (8M)

   b) Find the inverse Z – transform of $\left[\dfrac{z}{z^2+11z+24}\right]$ (7M)

7. a) Solve the following PDE $x^2(z-y)p + y^2(x-z)q = z^2(y-x)$ (8M)

   b) Form the differential equation by elimination arbitrary function $\phi\left(\dfrac{z}{x^3}, \dfrac{y}{x}\right) = 0$ (7M)

8. a) Prove that $\displaystyle\int_0^1 \dfrac{x^{m-1}(1-x)^{n-1}}{(a+bx)^{m+n}} dx = \dfrac{\beta(m,n)}{(a+b)^m a^n}$ (8M)

   b) Evaluate $\displaystyle\int_0^\infty x^{n-1}e^{-ax}\sin bx\, dx$ (7M)