Code No: R10202   **R10**   **SET-1**

I B. Tech II Semester Supplementary Examinations, Nov/Dec - 2019
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 Inverse Laplace Transform of $\frac{s+4}{s(s-1)(s^2+4)}$.   (8M)

   b) Solve the equation $y'' + y' = t^2 + 2t, y(0) = 4, y'(0) = -2$ by transform method.   (7M)

2. a) Find Laplace transform of $f(t)$ where $f(t) = \begin{cases} sin2t, & 0 < t \leq \pi \\ 0, & t > \pi \end{cases}$ (8M)

   b) Find the Laplace transform of $f(t) = e^{-3t} cos5t\ sin3t$ (7M)

3. a) Find the Half range sine series of $f(x) = x(\pi - x)$, in $0 < x < \pi$ (7M)

   b) Find the Fourier series of $f(x) = x - x^2$ in $[0, 2l]$ (8M)

4. a) Find the Fourier cosine transform of e^{-ax}, $a > 0$ and hence deduce $\int\limits_{0}^{\infty} \frac{\cos px}{a^2 + p^2} dp$ (8M)

   b) Find Fourier transform of $f(x) = 1 - x^2$ for $-1 < x < 1$ (7M)

5. a) Solve the difference equations: $u_{n+2} + 4u_{n+1} + 3u_n = 3^n$ with $u_0 = 0; u_1 = 1$ (8M)

   b) Use convolution theorem for Z- transforms and evaluate $z^{-1}\left[\frac{z^2}{z^2-4z+3}\right]$ (7M)

6. a) Find partial differential equation by eliminating arbitrary functions from the equation   (8M)
   $z = f(y) + \phi(x + y + z)$

   b) Find the general solutions of the PDE $xp - yq = y^2 - x^2$ (7M)

7. a) Evaluate $\int\limits_{0}^{\infty} x^{-\frac{3}{2}}\left(1 - e^{-x}\right) dx$ (8M)

   b) Prove that $\Gamma(n)\Gamma(1-n) = \frac{\pi}{\sin n\pi}$ (7M)

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

   b) Solve the following boundary valve problem $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$ subject to   (7M)

        (i). $\frac{\partial u}{\partial x}(0,t) = 0$

        (ii) $\frac{\partial u}{\partial x}(l,t) = 0$

        (iii) $u(x,0) = x$ $0 \leq x \leq l$