Subject Code: R10202/R10 **Set No - 1**

I B.Tech II Semester Supplementary Examinations Dec. - 2016

MATHEMATICS-II

(Common 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 $L\left\{\int_0^t te^{-t}\sin 2t dt\right\}$.
   (b) Find the Laplace transform of Dirac-delta function.
   [7+8]
2. (a) Using the Convolution theorem, then find $L^{-1}\left\{\frac{1}{S(s+1)(s+2)}\right\}$.
   (b) Solve $(D^2+2D-3)y = cost; y(0) = y'(0) = 0$, using Laplace transforms .
   [7+8]
3. (a) Obtain the Fourier series for $f(x) = \begin{cases} 2, & -2 < x \le 0 \\ x, & 0 \le x < 2 \end{cases}$
   (b) Find the Half range cosine series of f(x) = x/2 in [0, π].
   [8+7]
4. (a) Find the Fourier sine transform of $f(x) = x^{n-1}$.
   (b) Find the Fourier transform of $f(x) = \begin{cases} 1, |x| < a \\ 0, |x| > a \end{cases}$,
   Hence Deduce that $\int_0^\infty \frac{\sin t}{t} dt = \frac{\pi}{2}$ and $\int_0^\infty \frac{\sin^2 t}{t^2} dt = \frac{\pi}{2}$
   [7+8]
5. (a) Form the P.D.E. by eliminating a, b, c from $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$
   (b) Solve $x(y^2+z)p - y(x^2+z)q = z(x^2-y^2)$
   [7+8]
6. Find the physically feasible solution of one-dimensional heat flow equation: $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$.
   [15]
7. (a) Solve $u_{n+2} - u_n = 2^n$ if $u_0 = 0$ and $u_1 = 1$
   (b) Find $Z^{-1}\left[\frac{3z^2+z}{(5z-1)(5z+2)}\right]$
   [8+7]
8. (a) Show that $\beta(m,n) = \int_0^{\pi/2} \sin^{2m-1}\theta \cos^{2n-1}\theta \, d\theta$
   (b) Evaluate $\int_0^{\pi/2} \sin^5\theta \, d\theta$ using beta gamma function [8+7]

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