

Code No: R10202

R10
SET-1
I B. Tech II Semester Supplementary Examinations, Nov/Dec - 2017
MATHEMATICS-II

(Com. to All Branches)

Time: 3 hours

Max. Marks: 75

 Answer any **FIVE** Questions
 All Questions carry **Equal** Marks

1. a) Find (i) $L\{\sin^3 2t\}$ (ii) $f(t) = \begin{cases} e^t, & 0 < t < 1 \\ 3, & t > 1 \end{cases}$ (8M)
 - b) Find (i) $e^{-3t}(\cos 4t + 3\sin 4t)$ (ii) $f(t) = \begin{cases} \sin\left(t - \frac{\pi}{4}\right), & \text{if } t > \frac{\pi}{4} \\ 0, & \text{if } t < \frac{\pi}{4} \end{cases}$ (7M)
 2. a) Evaluate $L^{-1}\left\{\frac{s}{(s^2+9)(s^2+16)}\right\}$ using convolution theorem. (8M)
 - b) Show that $L^{-1}\left\{\frac{1}{(s^2+a^2)^2}\right\} = \frac{1}{2a^3}(\sin at - at \cos at)$. (7M)
 3. a) Find the Half range cosine series for $f(x) = x(\pi - x)$ in $(0, \pi)$. (8M)
 - b) Obtain the Fourier series for $f(x) = \begin{cases} 2, & -2 < x \leq 0 \\ x, & 0 \leq x < 2 \end{cases}$ (7M)
 4. a) Find the Fourier transform of $e^{-|x|}$. (8M)
 - b) Find the finite Fourier sine transform of $f(x) = x^2$ in $[0, 1]$. (7M)
 5. a) Find a differential equation by eliminating arbitrary constants a, b from the equation $z = xy + y\sqrt{x+a} + b$ (8M)
 - b) Solve the PDE $(x^2 - yz)p + (y^2 - zx)q = z^2 - xy$. (7M)
 6. a) Solve the PDE $\frac{\partial u}{\partial x} = 4 \frac{\partial u}{\partial y}$ where $u(0, x) = 8e^{-3y}$ (8M)
 - b) Solve the Heat equation $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$ (7M)
- Subject to
- (i) u is not infinite as $t \rightarrow \infty$
 - (ii) $\frac{\partial u}{\partial x}(0, t) = 0 \quad \forall t$
 - (iii) $u(l, t) = 0 \quad \forall t$
 - (iv) $u(x, 0) = u_0, 0 \leq x \leq l$

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7. a) Show that $\beta(m, n) = \int_0^1 \frac{x^{m-1} + x^{n-1}}{(1+x)^{m+n}} dx$ (8M)

b) Evaluate $\int_0^\infty 3^{-4x^2} dx$ (7M)

8. a) Find (i) $Z \left[\cos \left(\frac{n\pi}{2} + \theta \right) \right]$ (ii) coshat (8M)

b) Find $Z^{-1} \left[\frac{3z^2 + z}{(5z-1)(5z+2)} \right]$ (7M)