

**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)  $u(x, 0) = u_0, 0 \leq x \leq l$



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)

