

**I B. Tech II Semester Supplementary Examinations, Nov/Dec - 2018**  
**MATHEMATICS-II**  
 (Com. to All Branches)

Time: 3 hours

Max. Marks: 75

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

1. a) Evaluate  $\int_0^{\infty} \frac{e^{-t} - e^{-3t}}{t} dt$  (8M)
- b) Find the Laplace transform of  $f(t) = \begin{cases} \cos t & 0 < t < \pi \\ \sin t & t > \pi \end{cases}$  (7M)
2. a) Find  $L^{-1} \left\{ \frac{s+2}{(s^2+4s+8)(s^2+4s+13)} \right\}$  (8M)
- b) Solve the ODE  $y''' + y = 1, y(0) = y'(0) = y''(0) = 0$  using Laplace transform method. (7M)
3. a) Find the Half range cosine series of  $f(x) = (x-1)^2$  (8M)
- b) Expand  $\sinh ax$  as a Fourier series in  $(-\pi, \pi)$  (7M)
4. a) Find finite Fourier cosine transform of  $f(x) = x + a$  for  $0 < x < \pi$  (8M)
- b) Find  $f(x)$  if  $F_c(p) = \frac{\sin ap}{p}$  (7M)
5. a) A bar of 50cm long with insulated sides kept at  $0^\circ \text{C}$  and that the other end is kept at  $100^\circ \text{C}$  until steady state conditions prevail. The two ends are suddenly insulated so that the temperature is zero at each end thereafter. Find the temperature distribution. (8M)
- b) Solve the PDE  $\frac{\partial u}{\partial y} - 2 \frac{\partial u}{\partial x} = u$  and  $u(x,0) = 3e^{-5x} + 2e^{-3x}$  (7M)
6. a) Evaluate  $Z^{-1} \left[ \frac{z^2}{(z-1)(z-3)} \right]$ , using convolution theorem. (8M)
- b) Find  $Z(2.3^n + 5.n)$  and deduce  $Z[2.3^{n+3} + 5(n+3)]$  using shifting theorem. (7M)
7. a) Solve the following PDE  $(3z - 4y)p + (4x - 2y)q = 2y - 3x$  (8M)
- b) Form the differential equation by elimination arbitrary function  $\phi(x^2 + y^2 + z^2, xyz) = 0$  (7M)
8. a) Show that  $\beta(m,n) = \int_0^{\infty} \frac{x^{m-1}}{(1+x)^{m+n}} dx = \int_0^{\infty} \frac{x^{n-1}}{(1+x)^{m+n}} dx$  (8M)
- b) Evaluate  $\int_0^{\infty} x^{n-1} e^{-ax} \cos bxdx$  (7M)