

Code No: R10202

R10
SET-1
I B. Tech II Semester Supplementary Examinations, April/May - 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 the  $L \left\{ \int_0^t e^{-2t} \sqrt{t} dt \right\}$  (8M)  
 b) Find  $L\{f'(t)\}$  of the function  $f(t) = \begin{cases} 3, & 0 \leq t < 2 \\ 0, & t \geq 2 \end{cases}$  (7M)
2. a) Find  $L^{-1} \left\{ \frac{s+2}{s^2(s+3)} \right\}$  (8M)  
 b) Find  $L^{-1} \left\{ \log \left( \frac{s+1}{s-1} \right) \right\}$  (7M)
3. a) Find the Fourier series of  $f(x) = \cos x$  in  $(-\pi, \pi)$ . (8M)  
 b) Find the Half range cosine series of  $f(x) = x^2$  in  $[0, 2]$ . (7M)
4. a) Find the Fourier cosine transform of  $\frac{1}{1+x^2}$  (8M)  
 b) Find the Fourier transform of  $f(x) = \begin{cases} x & \text{if } 0 < x < 1 \\ 1-x & \text{if } 1 < x < 2 \end{cases}$  (7M)
5. a) Prove that  $\Gamma(n)\Gamma(1-n) = \frac{\pi}{\sin n\pi}$  (8M)  
 b) Evaluate  $\int_0^1 x^4 \left( \log \frac{1}{x} \right)^4 dx$  (7M)
6. a) Form the PDE from  $z = f(2x+3y) + g(3x-y)$  by eliminating arbitrary functions. (8M)  
 b) Solve the PDE  $p \operatorname{cosec} x + q \operatorname{cosec} y = \operatorname{cosec} z$ . (7M)
7. A bar of length  $l$  with insulated sides is initially  $0^\circ\text{C}$  temperature throughout the end  $x = 0$  is kept at  $0^\circ\text{C}$  for all time and heat is suddenly applied such that  $\frac{\partial u}{\partial x} = 10$  at  $x = l$  for all time. Find the temperature function  $u(x, t)$ . (15M)
8. a) Solve the difference equations  $u_{n+1} + \frac{1}{4}u_n = \left(\frac{1}{4}\right)^n, n \geq 0, u(0) = 0, u_1 = 1$  using Z-transform method. (8M)  
 b) Find  $Z[\sin(3n + 5)]$  (7M)