

Roll No. ....

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4423/MH

C-2051

MATHEMATICAL METHODS-II

Option-(iii)

Semester-VI

Time allowed : 3 Hours] [Maximum Marks : 40

Note: The candidates are required to attempt two questions each from section A and section B carrying 6 marks each and the entire Section C consisting of 8 questions carrying 2 marks each is compulsory.

SECTION-A

- 1. (a) Find fourier integral of (x) where : 3
(x) = { 0 x < 1
e^-x x > 0 }
(b) State and Prove Shifting theorem. 3

- 2. Evaluate F [f(t)], where (t) = { 1 - t^2 -1 t 1
0 otherwise }

and then find integral from 0 to infinity of (t cost - sint) / t^3 \* cos t/2 dt. 6

- 3. (a) Find finite Fourier sine transform of:
f(t) = 3t, 0 < t < 9. 3
(b). State and Prove Parseval's identity for fourier transform. 3

- 4. Solve for f(t) if:
integral from 0 to infinity of (t) sin st ds = { 2 0 t < 1
3 1 t < 2
0 t 2 }

SECTION-B

- 5. Solve d^2y/dt^2 + y = e^-2t sint, given y(0) = y'(0) = 0. 6
6. Solve dx/dt - 2x + 3y = 0, dy/dt + 2x - y = 0 given x(0) = 8, y(0) = 3. 6

7. Solve  $(t D^2 + D + 9t)y = 0$  when  $y = 8$ ,  $Dy = 6$  at  $t = 0$ . 6

8. Solve  $\frac{\partial^2 y}{\partial x^2} = \frac{\partial^2 y}{\partial t^2}$ ;  $0 < x < l, t > 0$  where  $y(x, 0) = 0$

$y_t(x, 0) = \sin \frac{x}{l}$  and  $y(0, t) = 0, y(l, t) = 0$ . 6

### SECTION-C

9. (i) State Fourier Integral Formula.  
(ii) State Dirichlet's Condition.  
(iii) State Modulation Formula.  
(iv) Solve the equation  $y''(t) + k^2 y(t) = 0$  with conditions  $y(0) = A$  and  $y'(0) = B$ .  
(v) State and prove the linearity property of Fourier transforms.  
(vi) State and prove the change of scale property of Fourier transforms.  
(vii) State Convolution theorem for Fourier transforms.

(viii) If  $F(p)$  is the complex Fourier transforms of  $(x)$ , then show that

$$[ (x-a) ] = e^{ipa} F(p).$$

2×8 = 16