

Code No: G1501/R13

M.Tech. I Semester Supplementary Examinations, January-2017

COMPUTATIONAL METHODS IN ENGINEERING

(Common to MD, MED, CAD/CAM and TS&ES)

Time: 3 hours

Max. Marks: 60

*Answer any FIVE Questions  
All Questions Carry Equal Marks*

1. Solve using gauss – Jordan elimination 12  
 $x - y + 2z = -8$   
 $x + y + z = -2$   
 $2x - 2y + 3z = -20$
2. Fit a curve of the form  $y = ax^b$  for the following data: 12  

X	1	2	3	4	5
y	0.5	2	4.5	8	12.5
3. Using Shooting method, solve the BVP  $y'' + y + x = 0$ ,  $0 < x < 1$ ,  $y(0) = 0$  and  $y(1) = e - 1$ . 12
4. Solve the heat conduction equation,  $u_{xx} - u_t = 0$ , subject to boundary conditions  $u(0,t) = u(1,t) = 0$  and  $u(x,0) = x - x^2$ . Take  $h = 0.25$  and  $k = 0.025$ . 12
5. Explain FFT by taking a suitable example. 12
6. Solve  $4u_{xx} = u_{tt}$   $u(0,t) = 0$   $y(4,t) = 0$  12  
 $u_t(x,0) = 0$  and  $u(x,0) = x(4-x)$ .
7. Solve the Poisson equation  $\Delta^2 = -15(x^2 + y^2 + 15)$  subject to the condition  $u = 0$  at  $x = 0$  and  $x = 3$   $u = 3$   $u = 0$  at  $y = 0$  and  $u = 1$  at  $y = 3$  for  $0 < x < 3$ . Find the solution taking  $h = 1$  with a square. 12
8. Solve  $u_{xx} + u_{yy} = 0$ ,  $0 \leq x, y \leq 1$ , with  $u(0,y) = 10 = u(1,y)$  and  $u(x,0) = 20 = u(x,1)$ . Take  $h = 0.25$  and apply Liebmann method to 3 decimal accuracy. 12

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