

Code No: I1801/R16

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

COMPUTATIONAL METHODS IN ENGINEERING

(Common to Thermal Sciences and Energy Systems, Machine Design, Mechanical Engg. Design, CAD/CAM, Computer Aided Design & Manufacturing and Computer Aided Analysis & Design)

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
