(DME 224)

B. Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the End of Second Year)

MECHANICAL ENGINEERING

Paper - IV : Computer Based Numerical Methods

Time : 3 Hours **Maximum Marks : 75**

Answer question No.1 is compulsory ***(15)***

Answer ONE question from each unit ***(4 × 15 = 60)***

1) a) Explain Regula – Falsi method.

b) Evaluate $\Delta^2 \cos 2x$

c) Evaluate $y(1)$ from

x :	0	2	3
y :	–1	3	5

d) Write down the trapezoidal rule to evaluate $\int_0^6 f(x)\,dx$ with $h = 0.5$.

e) Explain Picard's method.

f) Express $a^2 u_{xx} = u_{tt}$ in terms of difference quotients.

g) Classify the partial differential equations of second order.

UNIT - I

2) a) Find the square root of 25 given $x_0 = 2.0$ and $x_1 = 7.0$ using bisection method.

b) Find the positive root of $x^4 - x - 10 = 0$ by iteration method.

OR

c) Use Gauss Seidal method solve the following system of equations.

$x + 5y - z = 10,\ 4x + 2y + z = 14,\ x + y + 8z = 20$

d) Find a real root of the equation $xe^x - 1 = 0$ using Newton Raphson method.

UNIT - II

3) a) From the following table of values determine $f(0.23)$ as $f(0.27)$ using Newton's forward and backward formula

x	0.2	0.22	0.24	0.26	0.28	0.30
$f(x)$	1.6596	1.6698	1.6804	1.6912	1.7024	1.7139

OR

b) Using Lagranges interpolation formula find y(2) from the following data :

x :	0	1	3	4
y :	0	1	81	256

By means of Newton's divided difference formula find $f(8)$.

x :	4	5	7	10	11	13
$f(x)$:	46	100	290	900	1200	2020

UNIT - III

4) a) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using

i) Trapezoidal rule

ii) Simpson's $\frac{1}{3^{rd}}$ rule and compare the result in each case with its actual solution.

OR

b) Find the first and second derivatives of the function tabulated below at $x = 1.2$ and $x = 2.2$.

x	1.0	1.2	1.4	1.6	1.8	2.0	2.2
y	2.7183	3.3201	4.0552	4.9530	6.0496	7.3891	9.0250

UNIT - IV

5) a) Solve $y' = x + y$ given $y(1) = 0$. Find $y(1.1)$ and $y(1.2)$ by Taylor's series method and compare the result with analytical solution.

OR

b) Solve the equation $\frac{dy}{dx} = 1 - y$ given $y(0) = 0$ using modified Euler's method and tabulate the solutions at $x = 0.1$, 0.2 and 0.3. Compare your results with the exact solutions.

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