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Register Number:

Name of the Candidate:

M.C.A. DEGREE EXAMINATION, May 2015

(FIRST SEMESTER)

111. NUMERICAL METHODS

Time: Three hours Maximum: 100 marks

SECTION -A **(5 × 8 = 40)**

Answer any FIVE questions

1. Given the following equations $x^4-x-10=0$, determine the initial approximations to find the smallest positive root. Use these to find the roots correct to their decimal places with the regular-Falsi method.
2. Determine the roots correct to two decimals of $x^3-x-4=0$ by using bisection method.
3. Solve the equations
   $x_1+x_2+x_3=6$
   $3x_1+3x_2+4x_3=20$
   $2x_1+x_2+3x_3=13$
   by using Guass elimination method.
4. From the following data calculate the difference and obtain the forward difference polynomials. Interpolase at x=0.25

x	0.1	0.2	0.3	0.4	0.5
f(x)	1.40	1.56	1.76	2.0	2.28

5. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's three-eight rule
6. Evaluate $\int_0^1 \left(1+\frac{\sin x}{x}\right)dx$ correct to three decimal places using trapezoidal rule.
7. Solve the initial value problem $y'=(t/y)$, $y(0)=1$ by using Euler's method with $h=0.2$ to get $y(0.2)$.
8. Given the initial value problem $u'=e^t$, $u(1)=2$ estimate $u(1.4)$ with $h=0.2$ using the fourth order Runge-Kutta method.

SECTION -B **(3 × 20 = 60)**

Answer any THREE questions

9. a) Employ the Newton-Raphson method to determine a real root for $f(x) = -2.0+6x-4x^2+0.5x^3$ using initial guesses of (a) 4.2 (b) 4.43
   b) Derive Newton Raphson method.

10. Solve by using (a) Guass- Jordan and (b) Guass-Seidel method the system of equation $2x_1+x_2-x_3=1$

$5x_1+2x_2+2x_3=-4$

$3x_1+x_2+x_3=5$

11. Find the unique polynomial P(x) of degree 2 or less such that P(1)=1, P(3)=27, P(4)=64 using the following methods (a) Lagrange interpolarity formula (b) Newton divided difference formula.

12. The following data for the function $f(x)=x^4$ is given

X	0.4	0.6	0.8
f(x)	0.0256	0.1296	0.4096

Find f ′(0.8) and f ″(0.8) using quadratic interpolation. Compare with exact solution. Obtain the bound on the truncation errors.

13. Use Hues method to integrate $y'=4e^{0.8x}-0.5y$ from x=0 to x=4 with a step size of 1 the initial condition at x=0 is y=2.
