Registration No : | | | | | | | | | | |

Total Number of Pages : 02

M.Sc.I
FMCE407

4th Semester Regular Examination 2017-18
MATH-IV
BRANCH : M.Sc.I(AP)
Time : 3 Hours
Max Marks : 70
Q.CODE : C788

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.
Answer all parts of a question at a place.

Q1 **Answer the following questions :** **(2 x 10)**

a) Show that in addition, an error bound for the results is given by the difference of error bounds for the terms.

b) Write about relative error and percentage error.

c) Find the interval in which the smallest positive root of $x = \pi + \tan^{-1} x$ lie.

d) Find $\nabla^2(e^{3x})$, where ∇ is the backward difference.

e) Find the forward difference of

x	0	1	2	3	4
y	1	0	1	10	13

f) What is Least square approximation method?

g) Write the formula for Newton's backward difference interpolation to find out nth degree polynomial.

h) Write the errors in Simpson's rules of integration.

i) Decompose the given matrix in LU form by Crout's method $\begin{bmatrix} 4 & 5 \\ 12 & 14 \end{bmatrix}$.

j) Use Euler's method to find $y(0.2)$ of the initial value problem $y' = x + y, \quad y(0) = 1 \; and \; h = 0.1$

Q2 a) Using fixed point iteration method finds a positive root of equation $x^2 - 3x + 1 = 0$ accurate to 3 decimal places. **(5)**

b) Find the order of convergence and error of Newton-Raphson method. **(5)**

Q3 a) Use Lagrange interpolation to find $f(4)$ from the following data **(5)**

x	0	2	3	6
f(x)	707	819	866	966

b) Find the interpolating polynomial using Newton's backward interpolation formula for the given data (1, 5), (2, 18), (3, 37), (4, 62), (5, 93). **(5)**

Q4 **a)** Evaluate $\int_0^{\pi/2} cosx\, dx$ by Simpson's 1/3rd rule with h= $\pi/8$. **(5)**

b) Evaluate $\int_0^1 e^{-x^2}\, dx$ by Gauss integration method for n=3 and n=4. **(5)**

Q5 **a)** Solve the following system of linear equations by Gauss elimination **(5)**

$$8y + 2z = -7$$
$$3x + 5y + 2z = 8$$
$$6x + 2y + 8z = 26$$

b) Find the inverse of the following matrix by Gauss-Jordan method **(5)**

$$\begin{bmatrix} 5 & 1 & 1 \\ 1 & 6 & 0 \\ 1 & 0 & 8 \end{bmatrix}$$

Q6 **a)** Fit a least square quadratic parabola to (0, 1.9), (1, 0.9), (3, 4.8), (4, 10). **(5)**

b) Compute the missing values in the following table **(5)**

x	0	5	10	15	20	25
y	6	10	--	17	---	31

Q7 **a)** Apply Gauss-Seidel iteration process to the following system **(6)**

$$x + 9y - 2z = 36$$
$$2x - y + 8z = 121$$
$$6x + y + z = 107$$

b) Write short notes about Inherent error and Truncation error. **(4)**

Q8 **a)** Apply Improved Euler's method to find $y(1)$ of the initial value problem $y' + 2xy^2 = 0$, $y(0) = 1$ and $h = 0.2$. **(5)**

b) Apply 4th order classical Runge-Kutta method to find $y(0.6)$ of the initial value problem $y' = -0.2xy$, $y(0) = 1$ and $h = 0.2$. **(5)**