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Total Number of Pages : 02

M.Sc.I  
FMCC7047<sup>th</sup> Semester Regular Examination 2017-18

Advanced Numerical Method

BRANCH : M.Sc.I(MC)

Time : 3 Hours

Max Marks : 70

Q.CODE : B628

Answer Question No.1 which is compulsory and any five from the rest.  
The figures in the right hand margin indicate marks.

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

- What is the meaning of round-off error and its effect?
- What is the difference between interpolation and extrapolation?
- What is the meaning of Quadrature ?
- Write the pade approximation of  $e^{-x}$ .
- What is the meaning of convergence analysis of Eigen values and Eigen vectors?
- Write Poisson's Equation in 2<sup>nd</sup> order LPDE.
- What do you mean by similarity of matrices.
- IF  $U_{xx} + 4U_{yy} = 0$  find  $V$  and  $Z$ .
- What do you mean by Rate of convergence.
- Write conditions for 2<sup>nd</sup> order LPDE of 2<sup>ND</sup> order in two variables

Q2 a) Using Runge-Kutta method find an approximate value of  $y$  when  $\frac{dy}{dx} = x + y$  and  $y = 1$  when  $x = 0$  at  $h=0.2$ . (5)b) Prove that determinant of orthogonal matrix is  $\pm 1$ . (5)Q3 a) Solve by bisection method correct up to three decimal places.  $f(x) = x^3 - 4x - 9$ . (5)

b) Prove that Eigen values of a Hermitian Matrix is real (5)

Q4 a) Solve by Euler's method and the approximate value of  $y$  at  $x=0.1$  in 5 steps given that  $\frac{dy}{dx} = \frac{y-x}{y+x}$ ,  $y(0) = 1$  (5)b) Find the Cubic splines & evaluate  $y(1.5)$  and  $y'(3)$  (5)

$x$	1	2	3	4
$y$	1	2	5	11

Q5 a) Evaluate  $\int_0^6 \frac{dx}{1+x^2}$  using Simpson's 1/3 rule taking  $n=6$ . Then find exact value and error. (5)b) Solve by Lagrange interpolation and find  $f(0.35)$  using the following table (5)

$x$	0.3	0.5	0.6
$f(x)$	0.6179	0.6915	0.7257

**Q6 a)** Transform to principal Axes  $17 X_1^2 - 30 X_1 X_2 + 17 X_2^2 = 128$  **(5)**

**b)** Diagonalise the matrix **(5)**

5	4
1	2

**Q7 a)** Find inverse of A such that  $AX=B$  , by inverse factorization method **(5)**  
 $X+Y+2Z=4, 3X+2Y+5Z=10, 4X+5Y+Z=10$

**b)** Find the missing values in the following table. **(5)**

<i>x</i>	45	50	55	60	65
<i>y</i>	3.0		2.0		-2.4

**Q8 Write short notes on :**

**a)** Romberg integration **(5)**

**b)** Predictor and corrector method **(5)**