# 2011

## MCA

## 1st Semester Examination

### NUMERICAL ANALYSIS

**PAPER—MCA-106**

*Full Marks :* 100

*Time :* 3 Hours

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

*Illustrate the answers wherever necessary.*

**Group—A**

Answer Q. No. *1* and any *two* from the rest.

**1.** Write a programme in C-language :

(a) form a difference table for a set of n-values.

*Or*

(b) for solving a set linear equations by Gauss-Seidal method. 5

**2.** (a) Describe Newton-Cotes quadrature formula. Hence

deduce trapezoidal formula for $\int_a^b f(x)dx$.

(b) Describe the 'convergency rate' of Runge-Kutta method. 8+7

**3.** (a) Describe the 'power method' for finding the largest eigen value of a square matrix.

(b) Describe LU decomposition method for solving a set of linear equations.

Hence find the solutions of

$$x + y + 2z = 4$$
$$x - y + 3z = 3$$
$$x + 2y + z = 2.$$

7+8

**4.** (a) Solve the differential equ$^n$. $\frac{dy}{dx} = x^2 + y$, $y = 1$, when $x = 0$, for $x = 1$ by Euler's modified method.

(b) Describe Newton-Raphson method for solving the eqn$^n$ $f(x) = 0$.

(c) Compute the real root of the equ$^n$ $x^2e^{-x} - x + 0{\cdot}2 = 0$, correct upto 3 decimal places by Iteration method. 6+5+4

## Group—B

Answer Q. No. *1* and any *two* from the rest

**1.** Write short notes on any two of the following : $2\frac{1}{2} \times 2$

(a) moment generating function ;

(b) multiple correlation coefficient ;

(c) skewness ;

(d) critical region.

**2.** (a) What do you mean by sample survey. Write down the advantages of sample survey than complete census.

(b) Estimate the population parameter '$\alpha$' for the following probability distribution $f(x) = \frac{2(\alpha - x)}{\alpha^2}$, $0 < x < 1$, of unit sample.

(c) The first three moments of a distribution about 3 are 2, 10 and 40. Find the mean and standard deviation.

5+5+5

**3.** (a) Describe $\chi^2$ test for goodness of fit.

Five(5) coins are tossed simultaniously 320 times, No of heads in each set of trial are shown as :

| 5 Heads | 4 Heads | 3 Heads | 2 Heads | 1 Head | No Heads |
|---|---|---|---|---|---|
| 18 | 56 | 110 | 88 | 14 | 8 |

Text at 5% level of significance, whether the coin if fair or not.

$\left(\chi^2_{0\cdot05}(5\text{d.f}) = 11\cdot01\right)$.

(b) Prove that correlation coefficient (r) is independent of change of scale and origins what is the significance of $r = \pm 1$. 8+7

**4.** (a) If the rank of 10 students in 2 different exams are given below, find the correlation coefficient of these two exams ?

| *Student* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Rank in Exam.-I : | 2nd | 1st | 3rd | 2nd | 4th | 5th | 6th | 8th | 7th | 2nd |
| Rank in Exam.-2 : | 8th | 7th | 7th | 6th | 6th | 5th | 4th | 2nd | 1st | 3rd |

(b) The mean cystolic blood pressure of 40 young men amounted to 120.7 mm Hg with SD 25.9 Is the mean blood pressure for normal men to be 139.5 mm Hg ? (Given that $Z_{0.01} = 3.01$).

(c) Write a "C-programme" for calculating the S.D of a set of intervals $(x_i, y_i)$ with frequencies $f_i$ respectively $(i = 1, 2, \ldots n)$. 5+5+5

C.

**5.** (a) The weight loose of ten students after change of a diet are recorded as :

2, 0, 1, 3, –1, –3, 4, 3, 4, –4.

Test at 1% level of significance, is there any effect of the diet in favour of weight loose. ($t_{0.01}$ υ df) = 2.27).

(b) By method 'least square' fit a regression line of the form $y = C_0 + C_1x$ on the basis of the sample $(x_1, y_1), (x_2, y_2) \ldots\ldots (x_n, y_n)$.

***[ Internal Assessment — 30 ]***