

ADCA / MCA (II Year)
Term-End Examination
December, 2007

**CS-08 : NUMERICAL & STATISTICAL
COMPUTING**

Time : 3 hours

Maximum Marks : 75

Note : Question number 1 is **compulsory**. Attempt any **three** questions from the rest. Use of calculator is allowed.

1. (a) Which of the following are acceptable integer variable names ? If a name is not acceptable, state why ?

3

- (i) APPOLO
- (ii) ART
- (iii) XNS
- (iv) LXY*Z
- (v) XY/Z
- (vi) ISUM4

- (b) Write arithmetic assignment statements to compute the following formulae, using the letters in the formulae as variable names :

3

$$(i) \quad \lambda = \frac{9.118}{\frac{1}{N^2} - \frac{1}{M^2}}$$

$$(ii) \quad q = \left(\frac{2C}{3}\right) \sqrt{2} g BH^{3/2}$$

$$(iii) \quad v = \frac{2\pi^2 Me^4}{h^3} \left(\frac{1}{n_2^2} - \frac{1}{n_1^2}\right)$$

- (c) Ohm's law $V = IR$, where I is the current in amperes, V the potential difference in volts and R is the resistance in ohms, can be used to calculate the current when the potential difference and resistance are known. Write a FORTRAN program that will read R and V for computing I and print the results.

3

- (d) Given the statement

DIMENSION A(50), B(30, 30), C(40)

identify errors, if any, in the following FORTRAN statements :

3

- (i) $Z = A(5.0) + B(30.0)/7.5$
(ii) $C(5) = A(-3) * 5 + B$
(iii) $B(1, 1) = A/C * A(4)/B(2, 2)$

(e) Write a subroutine subprogram to multiply two matrices A and B of order (3×3) using common statement. 3

(f) What value will be stored in location K at the end of the following sequence ? 3

K = 1

DO 10 J = 1,3

DO 10 N = J+1, 4

10 K = K+J*N

PRINT *, K

(g) A bag contains 25 cards numbered from 1 to 25. One card is drawn from the bag. Find the probability that this card has a number which is divisible by both 2 and 3. 3

(h) Draw a pie chart for the following data regarding expenditure on different items of a household : 3

Item of expenditure	Expenditure (Rs.)
Water and Electricity	5250
Food and Clothing	3250
Rent	3000
Education	2000
Miscellaneous	4500

- (i) An unbiased die is tossed.
- (a) Write the sample space of the experiment.
- (b) Find the probability of getting a number greater than 4.
- (c) Find the probability of getting a prime number. 3
- (j) There are three groups A, B, C containing 22, 18 and 10 boys respectively, and the mean weight of the combined set of all these 50 boys is 47.6 kg. If the mean weights of groups A and B be 40 kg and 50 kg respectively, calculate the mean weight of group C. 3

2. (a) The students in a class are selected at random, one after the other, for an examination. Find the probability p that the boys and girls in the class are selected alternately if

- (i) the class consists of 4 boys and 3 girls.
- (ii) the class consists of 3 boys and 3 girls.

(b) Write a FORTRAN programme to compute and print the values of the safe loading S for $R = 25$ (25) 250 i.e. $R = 25, 50, 75, \dots, 250$ where

$$S = \begin{cases} 17000 - 0.485 R^2 & \text{for } R < 120 \\ \frac{18000}{1 + \frac{R^2}{18000}} & \text{for } R \geq 120 \end{cases}$$

- (c) If P is the effort required to lift a load W by means of a pulley block, find a linear law of the form $P = mW + C$, by the method of least squares, connecting P and W , using the following data :

P	12	15	21	25
W	50	70	100	120

where P and W are taken in Newtons. Also compute P when $W = 150$ N.

3×5=15

3. (a) A bag contains 10 white and 15 black balls. Two balls are drawn in succession. What is the probability that one of them is black and the other white ?
- (b) Define Sequential and Direct files. Discuss their advantages and disadvantages.
- (c) Find mean deviation about the mean for the following data :

x	2	5	6	8	10	12
f	2	8	10	7	8	5

3×5=15

4. (a) Two one-dimensional arrays X and Y have 50 elements each. Write a FORTRAN programme to compute and print the quantity

$$P = \sum_{k=1}^{50} (x_k + y_k)^2$$

- (b) What are various relational and logical operators available in FORTRAN ? Give an example of each.
- (c) In a bolt factory, there are three machines A, B, C manufacturing 25%, 35% and 40% of the total output respectively. Of their outputs 5%, 4% and 2% are defective bolts. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured by machines A, B or C ? 3×5=15

5. (a) Explain the general form of DO statement with example(s).

(b) Find the standard deviation for the following data :

x	3	8	13	18	23
f	7	10	15	10	6

(c) The two regression equations of the variables x and y are $x = 19.13 - 0.87 y$ and $y = 11.64 - 0.50 x$.

Find

- (i) mean of x's
- (ii) mean of y's, and
- (iii) the correlation coefficient between x and y.

3×5=15