

ADCA / MCA (II Year)

Term-End Examination

December, 2008

**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 ?
- (i) COUNT
 - (ii) INTEREST
 - (iii) NUMR.
 - (iv) 2ND
 - (v) ID-NO
 - (vi) MIN50

(b) Pick the incorrect type declarations from the following list. Explain why they are incorrect.

(i) REAL LIFE, ITEM, LAMDA, MASS

(ii) INTEGER BIG, MIX, EXTV,

(iii) REAL LABC, MIX.

(c) WRITE FORTRAN expressions corresponding to the following algebraic expressions :

(i) $\frac{ax + b}{ax - b}$

(ii) $(4x + 3)(3y + 2z - 4)$

(iii) $\frac{1}{\alpha \sqrt{2\pi}} e^{\sqrt{2\sigma}(x-m)^2}$

(d) What is the value of I calculating in the following arithmetic statements ?

(i) $I = J * 2/3 + K/4 + 6 - J ** 3/8$

$(J = 2, K = 5)$

(ii) $I = B/2.0 + B * 4.0/(A - B) + A ** 3$

$(A = 1.5, B = 3.0)$

(iii) $I = J/2 * 4 + 3/8 + J ** 3$

$(J = 3)$

- (e) Economic Order Quantity may be calculated from the equation $Q = \sqrt{\frac{2RS}{I}}$ where R is the yearly requirement, S the set-up cost and I the carrying cost per item. The values of R, S and I for 15 items in a factory are given. Write a FORTRAN program using DO loop to calculate the Economic Order Quantity for each of these items.
- (f) Suppose X, Y and Z have been defined. Write a FORTRAN program fragment which interchanges the values of X, Y and Z so that X has Y's value, Y has Z's value, and Z has X's value.
- (g) Find the mean deviation about the mean for the following data :
- 12, 3, 18, 17, 4, 9, 17, 19, 20, 15, 8, 17, 2, 3, 16, 11, 3, 1, 0, 5
- (h) Suppose that an automobile starts from rest and has constant acceleration f for t seconds. The final velocity v and the distance travelled 'd' by the automobile is given by the formula
- $$v = ft, \text{ and } d = \frac{1}{2} ft^2.$$

Write a FORTRAN program that reads f and t, and prints t, d and v.

- (j) Write a FORTRAN program that reads the co-efficients A, B and C of the quadratic equation $Ax^2 + Bx + C = 0$ and computes its real roots.
- (k) In an electrical engineering class, there are 20 juniors, 15 seniors and 5 graduate students. If the juniors averaged 71 in the mid-term examination, the seniors averaged 80 and the mean for the entire class is 76.625, then find the average for the graduates. $10 \times 3 = 30$

2. (a) A, B and C are three mutually exclusive and exhaustive events associated with a random experiment. Find $P(A)$, if $P(B) = \frac{3}{2} P(A)$ and $P(C) = \frac{1}{2} P(B)$.

- (b) Write a FORTRAN program which will sum up the terms in the series

$$S = 1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{100}$$

and print the result.

- (c) Find the co-efficient of correlation for the given data :

x	10	14	18	22	26	30
y	18	12	24	6	30	36

$$3 \times 5 = 15$$

3. (a) The probability that machine A will be performing a usual function in 5 years' time is $\frac{1}{4}$ while the probability that machine B will still be operating usefully at the end of the same period is $\frac{1}{3}$. Determine the probability that
- Both machines will be performing a usual function.
 - Neither will be operating.
 - Only machine B will be operating.
 - At least one of the machines will be operating.
- (b) Write a FORTRAN program which will store the largest of three input values A, B and C into location BIG. Also print A, B, C and BIG.

- (c) Determine the mean, median and mode for the following data :

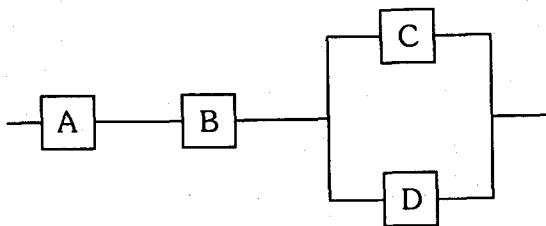
3, 10, 8, 7, 5, 14, 2, 9, 8

$3 \times 5 = 15$

4. (a) A system consists of four components as shown in the figure. System functions if components A and B both function and at least one of the components C or D functions. If the probabilities of functioning components A, B, C and D respectively are 0.8, 0.8, 0.6 and 0.6, find the probability that

- (i) entire system functions, and
- (ii) the component C does not function given that the system functions.

Assume that the components function independently.



- (b) The following data gives the weight and chest size of 10 infants at birth in a city hospital. Compare the variability of the two characteristics in the infants.

Weight (in kg)	Chest size (in cm)
2.75	29.1
3.12	30.1
4.15	32.1
5.50	36.1
3.20	30.2
4.32	33.1
2.31	28.2
5.12	35.1
4.12	31.9
3.72	31.1

- (c) Are any of the following sequences illegal in standard FORTRAN 77 ? If so, indicate why they are illegal.

```
(i) DO 3 I = 1, 5
      DO 3 J = 2, 6, 5
        K = 1 * J - 2
        PRINT *, K
      3 CONTINUE
```

```

(ii)      IF(J)  20, 20, 30
           DO   20 I = 1, 10
20        PRINT *, I, I**2
30        PRINT *, 'OVER'           3x5=15

```

5. (a) If the life of a component X has a probability density function

$$f(x) = \begin{cases} 2e^{-2x} & \text{for } x > 0 \\ 0 & \text{for } x \leq 0 \end{cases}$$

find the probabilities that it will take on a value

- (i) between 1 and 3.
(ii) greater than 0.5.
- (b) Following data give the daily emission (in tonnes) of sulphur oxides from an industrial plant observed for 80 days. Calculate the mean, variance and S.D. of the daily emission.

Emission (in tonnes)	No. of days
5 - 9	3
9 - 13	10
13 - 17	14
17 - 21	25
21 - 25	17
25 - 29	9
29 - 33	2

- (c) Find the regression line of y on x for the following data :

x	1	3	4	6	8	9	11	14
y	1	2	4	4	5	7	8	9

$$3 \times 5 = 15$$

