

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

**CS-08 (S) : NUMERICAL & STATISTICAL
 COMPUTING**

Time : 3 hours

Maximum Marks : 75

Note : Question number 1 is **compulsory**. Attempt any **three** questions from the rest. Use of calculators is **not** allowed.

1. (a) Write a FORTRAN-90 statement for each of the following : 3
- (i) $\sin^{-1} (3\pi x)$
- (ii) $e^{|2a|} \tan (b)$
- (iii) $\sqrt{\frac{a-b}{c+4d}}$
- (b) Which of the following are valid variable names ?
 Give reason for your answer. 3
- (i) 1 station
- (ii) 'She''shappy'
- (iii) Circumference

(c) Write a program that prints the powers of 2 between 1 and 256. 3

(d) Write a program to read the radius r of the circle centered at the origin and the points (x, y) successively. Now your program should comment on the position of point (x, y) with respect to the circle i.e. if the condition $(x^2 + y^2)^{0.5} < r$ is true then the point is described to lie inside the circle otherwise describe that it is lying outside. Terminate the program when $(x^2 + y^2)^{0.5} > 2r$. 5

(e) Assume the real variable X and Y have the values of -0.12345 and -0.98765 , integer values I and J have the values 4567 and 890 . How would the output appear for the following PRINT/FORMAT pairs? 3

PRINT 10

10 FORMAT (' ', T4, 'X', T16, 'Y', T27, 'I',
T36, 'J', 11)

PRINT 12, X, Y, I, J

12 FORMAT (' ', 2 (F8-3, 4X), 2 (I5, 4X))

(f) Fit the straight line of y on x from the following data : 5

x	-3	-2	0	3	4
y	18	10	2	2	5

(g) A cyclist pedals from his house to his college at a speed of 10 mph and back from the college to his house at 15 mph. Find the average speed. 2

- (h) If independent random variables X , Y are Binomially distributed with $n = 3$, $p = 1/3$ and $n = 5$, $p = 1/3$, find probability $X + Y \geq 1$. 6

2. (a) The following figures relate to the prices and quantities of certain commodities. Construct an appropriate index number. 5

Commodities	2004		2005	
	Price	Quantity	Price	Quantity
A	30	50	32	50
B	25	40	30	35
C	18	50	16	55

- (b) Write a program that reads a list of values from the terminal, stores them in an array and returns the maximum absolute value. 5
- (c) What are the structures available for file manipulation? Briefly describe any one file structure with the help of an example. 5

3. (a) The ranks of some 16 students in Mathematics and Statistics are as follows. Two numbers within brackets denote the ranks of the students in Mathematics and Statistics.

(1, 1), (2, 10), (3, 3), (4, 4), (5, 5), (6, 7), (7, 2),
(8, 6), (9, 8), (10, 11), (11, 15), (12, 9), (13, 14),
(14, 12), (15, 16), (16, 13)

Calculate rank correlation coefficient for proficiencies of this group in Mathematics and Statistics. 6

- (b) Predict the output of the code given below. Assume an input of (X1, Y1, Z1) and (X2, Y2, Z2) as (0, 0, 0); (100, 50, 25) for following code : 6

Print *, 'Enter position 1 (X, Y, Z) and position 2 (X, Y, Z)'

Read *, X1, Y1, Z1, X2, Y2, Z2

Dist = SQRT ((X1 - X2) ** 2 + (Y1 - Y2) ** 2 + (Z1 - Z2) ** 2)

XM = (X1 + X2)/2.0

YM = (Y1 + Y2)/2.0

ZM = (Z1 + Z2)/2.0

Print *, 'Distance between points ', DIST

Print *, 'Midpoint location ', XM, YM, ZM

End.

- (c) Is the given statement valid or invalid; support with reason :

DIST : = Y2 - Y1. 3

4. (a) Write a program to determine the value of

$$e = \sum_{n=0}^{\infty} \frac{1}{n!}$$

for five terms in the series. Modify it

to compute the approximation for n terms of the series. 6

- (b) An analysis of monthly wages paid to the workers in two firms A, B belonging to same industry gives the following results :

9

	A	B
No. of workers	500	600
Average monthly wages	Rs. 186	Rs. 175
Variance of dist. of wages	81	100

- (i) Which firm, A or B, has larger wage bill ?
(ii) In which firm, A or B, is there greater variability in individual wages ?
(iii) Calculate average monthly wages and the variance of the distribution of wages, of all the workers taken together.

5. (a) Let X be a non-negative integer valued random

variable. Prove that $E[X] = \sum_{n=1}^{\infty} P[X \geq n]$.

5

- (b) If A and B are two matrices, initialised for following values :

$$A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \\ 1 & 4 \end{bmatrix} \text{ and } B = \begin{bmatrix} 1 & 1 & 2 & 3 \\ 2 & 3 & 1 & 2 \end{bmatrix}$$

write a program to find the product of A and B .

5

- (c) What do you mean by the term “connecting a file to a unit” and “releasing a file from a unit” ? Write the syntax of OPEN statement and discuss any two control specifiers related to OPEN statement.

5