# ADCA / MCA (II Year) 

Term-End Examination

December, 2011
CS-08 : NUMERICAL AND STATISTICAL COMPUTING

## Time : 3 hours

Maximum Marks
75
Note: (i) Use of calculator is permitted.
(ii) Question number 1 is compulsory.
(iii) Answer any three questions from the rest.

1. (a) What is the final value of $P$ in the following programme?
$10 \times 3=30$
$\mathrm{P}=2.34$
$\mathrm{P}=(\mathrm{P}+5.0) * * 2$
$\mathrm{J}=\mathrm{P}+1$
$\mathrm{P}=\mathrm{J}$
$P=P / 10.0$
$P=P+2.3$
Further, if the value of $P$ were taken as 2.94 instead of 2.34 at the begining of the above program, what would be the final value?
(b) What is the value of J calculating in the following arithmetic statements ?
(i) $\mathrm{J}=(\mathrm{J} * * 2)+\mathrm{K} / 3+\mathrm{J} * \mathrm{~K}-(\mathrm{j} * * 2) / 4$;

$$
(J=2, J=4)
$$

(ii) $\mathrm{J}=(\mathrm{M}+2) * 3+\mathrm{N} * * 2+(\mathrm{N} * \mathrm{M}) / 2$;

$$
(\mathrm{N}=4, \mathrm{M}=3)
$$

(iii) $\mathrm{J}=\mathrm{SQRT}(\mathrm{I} * \mathrm{M})+\mathrm{M} * * 2+5$;

$$
(\mathrm{I}=4, \mathrm{M}=9)
$$

(c) Write a FORTRAN 90 statement. For each of the following :

$$
\begin{equation*}
r=\left[\frac{\rho_{\omega}-\rho_{0}}{\rho_{0}}\right] g-\left[\frac{3}{4} \cdot \frac{f}{D} \cdot \frac{\rho_{\omega}}{\rho_{0}}\right] \mathrm{v}^{2} \tag{i}
\end{equation*}
$$

(ii) $\quad \mathrm{v}=\sqrt{\left(\Delta_{x}\right)^{2}+\left(\Delta_{y}\right)^{2}}$
(iii) $s=-\frac{R}{2 L}+\sqrt{\frac{R^{2}}{4 L^{2}}-\frac{1}{L C}}$
(d) The mean of first three terms is 14, and mean of next two terms is 18 . What is the mean of all the five term?
(e) Write a FORTRAN 90 programme to compute the roots of a quadratic equation. The programme should read the values of $a, b$ and $c$ and print the roots.
(f) Write a FORTRAN 90 programme to calculate and prints
$f(x)= \begin{cases}3 x+5 x^{3} & \text { for } 4.3 \leq x \leq 9.1 \\ 6 \underset{x}{x}+8 x^{2} & \text { for } 9.1<x<15.5\end{cases}$
for $x$ varying from 5.0 to 15.0 in steps of 0.5 .
(g) Find the line of regression of $y$ on $x$ :

| $x:$ | 10 | 9 | 8 | 7 | 6 | 4 | 3 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $y:$ | 8 | 12 | 7 | 10 | 8 | 9 | 6 |

(h) A formula-one racing car runs along the four sides of a square at speeds of 100,200 , 300 and $400 \mathrm{~km} /$ hour respectively. What is the average speed of the racing car in its race around the square.
(i) What value will be stored in location $L$ at the end of the following sequence? Justify your answer :
DO $90 \quad \mathrm{~J}=1,4$
$\mathrm{L}=5$
DO $90 \quad \mathrm{~N}=1,4$
$90 \mathrm{~L}=\mathrm{L}+\mathrm{N}$
PRINT * , L
2. (a) The mean of the following frequency table is 50 , but the frequencies $f_{1}$ and $f_{2}$ in classes 20-40, and 60-80 respectively are not known. Find these frequencies. $3 \times 5=15$

| Class | Frequency |
| :---: | :---: |
| $0-20$ | 17 |
| $20-40$ | $\mathrm{f}_{1}$ |
| $40-60$ | 32 |
| $60-80$ | $\mathrm{f}_{2}$ |
| $80-100$ | 19 |
| Total | 120 |

(b) A random variable $X$ has the following probability function :

| Values of X | -2 | -1 | 0 | 1 | 2 | 3 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathrm{p}(x)$ | 0.1 | k | 0.2 | 2 k | 0.3 | k |

Find the value of ' $k$ ' and calculate mean and variance.
(c) Write a short note on forecasting models.
3. (a) Given an array of numbers. Locate the position of the smallest number. Print its value and the corresponding element, by writing a FORTRAN 90 programme. $\mathbf{3 \times 5 = 1 5}$
(b) The mean deviation of size N is defined as:

$$
\mathrm{M} . \mathrm{D}=\frac{1}{\mathrm{~N}} \sum_{i=1}^{\mathrm{N}}\left|x_{i}-\bar{x}\right| \text { where } \bar{x}=\frac{1}{\mathrm{~N}} \sum_{i=1}^{\mathrm{N}} x_{i}
$$

write a FORTRAN 90 programme to compute this Mean Deviation.
(c) The probability that a student will pass the final examination in both Thermodynamics and Fluid Mechanics is 0.5 and the probability of passing neither is 0.1 . If the probability of passing the Thermodynamics examination is 0.75 , what is the probability of passing the Fluid Mechanics examination?
4. (a) The adjoining Pie-chart shows the numbre of students of a college using different modes of travel to college. If 360 students come to the college on bicycle, then
$3 \times 5=15$

(i) How many students are there in the college?
(ii) How many students travel by taxi to reach the college ?
(iii) What is the ratio of students coming by college bus to those who come on foot?
(b) Given the statement:

DIMENSION $\mathrm{A}(50), \mathrm{B}(30,30), \mathrm{C}(40)$ identify errors, if any in the following FORTRAN statements :
(i) $\mathrm{C}(5)=\mathrm{A}(-3) * 5+\mathrm{B}$
(ii) $\mathrm{DO} 55 \mathrm{MAX}=1,50.5,1.5$
(iii) $\mathrm{DO} 9 \mathrm{I}=1255$
(iv) $\mathrm{DO} 77 \mathrm{~J}=1,20, \mathrm{~N}$
(v) $\mathrm{DO} 33 \mathrm{~L}=\mathrm{M}, \mathrm{N}(3), 1$
(c) A students takes his examination in four subjects $P, Q, R$ and $S$. He estimates his chances of passing in $P$ as $4 / 5$, in $Q$ as $3 / 4$, in $R$ as $5 / 6$, and in $S$ as 2/3. To qualify, he must pass in $P$ and at least two other subjects. What is the probability that he qualities?
5. (a) The regression equations of two variables $x$ and $y$ are :
$3 \times 5=15$
$x=0.7 y+5.2$, and
$y=0.3 x+2.8$.
Compute : (i) Mean of $x^{\prime}$ s
(ii) Mean of $y^{\prime}$ s
(iii) the correlation coefficient between $x$ and $y$.
(b) Given Formula $W=\frac{911.8}{\frac{1}{n^{2}}-\frac{1}{\mathrm{~m}^{2}}}$
write a FORTRAN program to produce a table of values of $W$ for all combinations of $\mathrm{m}=2,3,4,5, \ldots . . . . ., 50$ $\mathrm{n}=1,2,3,4, \ldots . . . ., \mathrm{m}-1$.
(c) A class consists of 80 students, 25 of them girls and 55 boys. While 10 of them are rich and the remaining poor, it is found that 20 are fair complexioned. What is the probability of selecting a fair complexioned, rich girl or a poor boy who is not fair complexioned?
6. (a) Find the correlation co-efficient between $x$ and $y$ for the given value :
$3 \times 5=15$

| $x$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $y$ | 10 | 12 | 16 | 28 | 25 | 36 | 41 | 49 | 40 | 50 |

(b) Write FORTRAN 90 statement for each of the following :
(i) $\quad P_{n}=\frac{A(1+r)\left[(1+r)^{\mathrm{n}}-1\right]}{r}$
(ii) $\mathrm{n}=\frac{\log (\mathrm{A})-\log \left(\mathrm{A}-\mathrm{P}_{\mathrm{r}}\right)}{\log (1+\mathrm{r})}$
(iii) $\bar{x}=\frac{\mathrm{f}_{1} x_{1}+\mathrm{f}_{2} x_{2}+\mathrm{f}_{3} x_{3}+\mathrm{f}_{4} x_{4}}{\mathrm{f}_{1}+\mathrm{f}_{2}+\mathrm{f}_{3}+\mathrm{f}_{4}}$

$$
\text { (iv) } \begin{array}{r}
R=X^{2 / 9} Y^{1 / 4}+X^{2} Y^{3}+\frac{X+Y}{X^{2}+Y^{2}}+ \\
|X-Y|+9 X^{3}
\end{array}
$$

$$
\text { (v) } \mathrm{f}=\frac{1}{2 \pi} \sqrt{\frac{1}{\mathrm{LC}}}
$$

(c) Write short note on MAD.

