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End Semester Examination of Semester–III, 2015
Subject : STATISTICS (HONS.)
Paper : 302 (Gr. A + Gr. B)
Full Marks : 40
Time : 2 Hrs.

The figures in the margin indicate the marks corresponding to the question.

Candidates are requested to give their answers in their own word as far as practicable.

Illustrate the answers wherever necessary.

Group A

Group A(a)

Answer **any one** out of two questions : 10x1=10

1. a) What are the differences in the following three loop statements :

   i) for loop statement

   ii) while loop statement

   iii) do while loop statement.

   Explain the differences with examples.

   b) Write a program in C to calculate transpose of a given square matrix. 6+4

2. a) What do you mean by conditional operator in C? Write a C program to obtain minimum of three numbers using conditional operator.

   b) What are the roles of 'break' and 'continue' statement in the looping structure? Give examples. 5+5

Group A(b)

Answer **any one** out of two questions : 6x1=6

3. Write a C-program to find out the value of f(x) at x = p using Lagrange's interpolation formula for the given values of x and f(x). 6

4. a) Draw a flow-chart to calculate the mean and standard deviation of N-numbers.

   b) What are the different type of constants in C? 4+2

Group A(c)

Answer **any two** out of four questions : 2x2=4

5. i) $(21{\cdot}04)_8$ = Hexadecimal?

   ii) $(111{\cdot}110)_2$ = Decimal?

6. Rewrite the following program using conditional operator.

```
#include<stdio.h>
#include<conio.h>
void main()
```

```
{
    int x, min, max;
    clrscr();
    scanf ("%d %d", &max, &x);
    If (x > max)
        max = x;
        else
            min = x;
        getch();
}
```

7. What are the criteria for variable name in C.

8. What is the difference between ++i and i++.

Group B

Group B(a)

Answer **any one** out of two questions : 10X1=10

1. a) Suppose that $\underset{\sim}{X} \sim N_p\left(\underset{\sim}{\mu}, \Sigma\right)$, then find the distribution of $\left(\underset{\sim}{X}-\underset{\sim}{\mu}\right)' \Sigma^{-1}\left(\underset{\sim}{X}-\underset{\sim}{\mu}\right)$.

   b) Let $X_1, X_2, \ldots, X_k$ are k independent Poisson variates with parameters $\lambda_1, \lambda_2, \ldots. \lambda_k$ respectively. Show that the conditional distribution of $X_1, X_2. \ldots, X_k$ given

$\sum_{i=1}^{k} X_i = x$ is multinational distribution with parameters

$x, \frac{\lambda_1}{\lambda}, \frac{\lambda_2}{\lambda}, \ldots\ldots\ldots, \frac{\lambda_k}{\lambda}$, where $\lambda = \sum_{i=1}^{k} \lambda_i$. 5+5

2. Show that,

$r^2_{1.23\ldots p} = r^2_{1p} + r^2_{1(p-1.p)} + \ldots\ldots\ldots + r^2_{1(2.34\ldots.p)}$

Where $r^2_{1(23\ldots p)}$ is the correlation between x_1 and the residual of x_2 removing the regression of x_2 on $x_3, x_4, \ldots., x_p$.

Group B(b)

Answer **any one** out of two questions : 6x1=6

3. Show that if $r_{ij} = 0$, $j = 2, 3, \ldots. P$ then $r_{1.23\ldots p} = 0$. Is the converse also true?

4. a) Let $\underset{\sim}{X} = (X_1, X_2, X_3)'$ be distributed as $N_3(\underset{\sim}{\mu}, \Sigma)$

where $\underset{\sim}{\mu} = (2,1,2)'$ and $\Sigma = \begin{bmatrix} 2 & 1 & 1 \\ 1 & 3 & 0 \\ 1 & 0 & 1 \end{bmatrix}$.

Find the joint probability density function of $(X_1 + X_2 + X_3,\ X_1 - X_2)'$.

b) Each of the random variables X, Y and Z has mean '0' and variance '1', while $aX + bY + cZ = 0$. Find the dispersion matrix of X, Y an Z. 3+3

Group B(c)

Answer **any two** out of four questions : 2x2=4

5. What do you mean by concentration Ellipsoid of a multivariate probability distribution?

6. What is the correlation co-efficient between X_1 and X_2 when they jointly follow a trinomial distribution with parameters n, p_1 and p_2? Justify the sign of a correlation co-efficient.

7. Show that residual part $e_{1.23....p}$ is uncorrelated with each of the independent variables.

8. What is the moment generating function of $\underset{\sim}{X}$ following $Nq(\underset{\sim}{O}, \Sigma)$, where $\underset{\sim}{O}$ is qx1 null vector and Σ = diceg(d_1, ..., d_q), $d_i > 0$, i = 1, ...q.