

**NEW**  
**Part II 3-Tier**  
**2015**

**STATISTICS**

**(Honours)**

**PAPER—VA**

**(PRACTICAL)**

Full Marks : 50

Time : 4 Hours

*The figures in the margin indicate full Marks.*

Answer all questions.

1. The following table shows the group indices and the corresponding weights for the year 1995 with 1981 as the base (= 100) of a given community :

Group	Group Index	Weight
Food	212.45	65.3
Clothing	328.06	4.8
Fuel & light	345.89	8.5
House Rent	173.41	7.6
Miscellaneous	201.35	13.8

- (a) Find the Cost of Living Index for the year 1995.
- (b) What was the purchasing power in 1995 as compared to 1981?

(Turn Over)

- (c) If Ms. Dasgupta's salary increased from Rs. 2400-00 in 1981 to Rs. 4950-00 in 1995, how had her economic status changed?
- (d) The weights are proportional to the consumption expenditure of each group. Suppose Ms. Dasgupta had to maintain the same status for each of first four groups and could only adjust her spending on the miscellaneous items. Find her spendings for each of the groups in 1995. 10

2. The following table gives the production of Iron Ore (Lakh Tonnes) in India from 1976 to 1979 for different quarters of the year :

Year	1st qutr.	2nd qutr.	3rd qutr.	4th qutr.
1976	126	108	79	113
1977	131	110	73	110
1978	116	90	72	108
1979	124	97	69	101

Obtain the seasonal indices by the method of trend-ratios, assuming a linear trend. 10

3. Control charts for  $\bar{X}$  and R are maintained for an important quality characteristic. The sample size (n) is equal to 7.  $\bar{X}$  and R are computed for each sample. After

35 samples it is found that  $\sum_{i=1}^{35} \bar{X}_i = 7805$  and  $\sum_{i=1}^{25} R_i = 1200$ .

- (i) Set up  $\bar{X}$  and R charts using these data.
- (ii) Assuming that both charts exhibit control, estimate process mean and process s.d.

- (iii) If the quality characteristic is normally distributed and if the specifications are  $220 \pm 35$ , can the process meet specification? Estimate fraction non-conforming.

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4. The following information is obtained from a rural sample survey :

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Age group (in years)	No. of Women	Proportion Married	No. of Births	Proportion surveying from birth to mid-point of Age-group among married women
15 — 19	16952	0.82	2642	0.902
20 — 24	19139	0.83	4270	0.891
25 — 29	10858	0.84	2181	0.878
30 — 34	4993	0.85	796	0.865
35 — 39	2460	0.74	205	0.849
40 — 44	925	0.64	48	0.430

Calculate GFR, TFR, GRR and NRR assuming that there is no illegitimate birth and ratio of female to total birth is 0.485. Comment on your results.

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7. Laboratory Note Book.

5

8. Viva-voce.

5

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Answer all questions.

1. For the following matrix :

$$A = \begin{pmatrix} 1 & 0 & 1 & 1 \\ 3 & 5 & 4 & -1 \\ 13 & 21 & 18 & -3 \\ 8 & 5 & 3 & -2 \end{pmatrix}$$

find (i) the rank and (ii) an orthogonal basis of the row-space of A.

4+4

(Turn Over)

2. Find the solution of the following system of equations :

$$1.67x + 7.64y + 33.08z - 2.67 = 0$$

$$2.14x + 10.62y + 7.64z + 4.21 = 0$$

$$9.85x + 2.14y + 1.67z + 5.82 = 0 \quad 6$$

3. Write a program in C to find the value of  $\log_{10} 3.58$  by using the following data : 6

$$x \quad : \quad 3.1 \quad 3.3 \quad 3.6 \quad 4.0 \quad 4.1 \quad 4.3$$

$$\log_{10} x \quad : \quad 0.49136 \quad 0.51851 \quad 0.55630 \quad 0.60206 \quad 0.61278 \quad 0.63347$$

4. Write a program in C to calculate  $A^2 - A^3$  for a square matrix A of order m. Run the program for the following matrix and give the output :

$$A = \begin{pmatrix} 1 & 1 & 1 \\ -1 & -1 & -1 \\ 0 & 0 & 1 \end{pmatrix}$$

Also give printouts of A and  $A^2 - A^3$ . 10

5. Using MS-EXCEL find a rank correlation coefficient for the following pairs of marks obtained by 10 students :

x : 66 39 75 63 57 55 20 48 35 53

y : 53 33 77 59 50 40 26 15 30 63

Using MS-EXCEL, also obtain a linear regression equation of x on y and supply an estimate of x if  $y = 60$ . Interpret the result. 6+4

6. Laboratory Note Book. 5
7. Viva-voce. 5
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