Total No. of printed pages = 5

3(Sem-4) STS M Pr

2019

STATISTICS

(Major Practical)

Paper : 4.3

Full Marks – 50

Pass Marks – 20

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer any *three* questions from first half.

FIRST HALF

1. (a) Find a set of three orthonormal eigen vectors for the matrix : 7

$$A = \begin{vmatrix} 3 & 0 & 0 \\ 0 & 4 & \sqrt{3} \\ 0 & \sqrt{3} & 6 \end{vmatrix}$$

[Turn over

(b) Verify Cayley-Hamilton theorem for the matrix : 3

$$A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$$

2. Solve the following LPP by Simplex Method : 10

Maximize $z_1 = x_1 + 2x_2$

Subject to constraints :

$$-x_1 + 2x_2 \leq 8$$

$$x_1 + 2x_2 \leq 12$$

$$x_1 - 2x_2 \leq 3 ;$$

$$x_1 \geq 0 \text{ and } x_2 \geq 0$$

Or

Determine an initial feasible solution to the following transportation problem using VAM. 10

TRANSPORTATION COSTS

Factory	Distribution centres				
	Guwahati	Nagaon	Nalbari	Tezpur	Factory capacities
Dibrugarh	6	5	8	8	30
Jorhat	5	11	9	7	40

Factory	Distribution centres				
	Guwahati	Nagaon	Nalbari	Tezpur	Factory capaci-ties
Bongaigaon	8	9	7	13	50
Centre demands	35	28	32	25	

Costs are expressed in terms of rupees per unit shipped.

3. The t.p.m of a Markov chain $\{X_n, n = 1, 2,...\}$ having three states 1, 2 and 3 is

$$P = \begin{bmatrix} 0.1 & 0.5 & 0.4 \\ 0.6 & 0.2 & 0.2 \\ 0.3 & 0.4 & 0.3 \end{bmatrix}$$

and the initial distribution is

$\pi_0 = (0.7,\ 0.2,\ 0.1)$

Find

(i) $P_a \{X_2 = 3\}$

(ii) $P_a \{X_3 = 2,\ X_2 = 3,\ X_1 = 3,\ X_0 = 2\}$

(iii) $P_{12}^{(2)}$ 3+4+3=10

4. (a) The average GPA of major students of Statistics is 4.89 for the whole class, with a standard deviation 0.6. If a sample of 20 students is being taken, then find the probability of getting the average of this sample to be more than 5. 5

(b) It is hoped that a newly developed pain reliever will more quickly produce perceptible reduction in pain to patients after minor surgeries than a standard pain reliever. The standard pain reliever is known to being relief in an average of 3.5 minutes with standard deviation 2.1 minutes. To test whether the new pain reliever works more quickly than the standard one, 50 patients with minor surgeries were given the new pain reliever and their times to relieve were recorded. The experiment yielded sample mean $\bar{x} = 3.1$ minutes and sample s.d.s = 1.5 minutes. Is there sufficient evidence in the sample to indicate, at the 5% level of significance, that the newly developed pain reliever does deliver perceptible relief more quickly ? 5

SECOND HALF

5.	Viva voce.	5
6.	Practical Notebook.	5
7.	Internal assessment.	10