AR – 616

Sixth Semester B. Sc. (Part – III) Examination

6S : STATISTICS

P. Pages : 8

Time : Three Hours] [Max. Marks : 80

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1. (A) Fill in the blanks :—

(i) A NS condition for a basic feasible solution to a LPP to be optimum is that —— .

(ii) For the existance of saddle point in a game maximin value —— to the minimax value.

(iii) The term analysis of variance was introduced by —— .

(iv) The division of experimental unit into relatively homogenious subgroups is called as —— . 2

(B) Choose the correct alternatives from the following :—

(i) A NS condition for the existance of feasible solution to the transportation problem is ——

(a) $\sum_{i=1}^{m} ai = \sum_{j=1}^{n} bj$

(b) $\sum_{i=1}^{n} ai > \sum_{j=1}^{n} bj$

(c) $\sum_{i=1}^{n} ai < \sum_{j=1}^{n} bj$

(d) $\sum_{i=1}^{n} ai \neq \sum_{j=1}^{n} bj$.

(ii) For zero sum games the algebraic sum of gains of losses is ——— .

(a) 1

(b) – 1

(c) 0

(d) ∞.

(iii) The repetition of treatments under investigation is known as ——— .

(a) replication

(b) randomisation

(c) Local control

(d) experimental error.

(iv) An incomplete three way layout is ———.

(a) CRD

(b) RBD

(c) LSD

(d) Factorial experiment. 2

(C) Answer in **one** sentence each :—

(i) Define objective function of general LPP.

(ii) What do you mean by balanced transportation problem ?

(iii) Give the mathematical model in Randomised Block Design.

(iv) State the expression of treatment combinations to obtain main effect A in 2^2 factorial experiment. 4

2. (A) Explain the general Linear programming problem. 4

(B) Define slack and surplus variables in a LPP. 4

(C) Explain simplex algorithm in brief in LPP. 4

OR

3. (P) Explain graphical method to solve LPP. Give its limitations. 4

(Q) Define standard and canonical form of LPP. 4

(R) Use graphical method to solve the following LPP

Maximise $Z = 3x_1 + 4x_2$

subject to the constraints :

$$4x_1 + 2x_2 \leq 80$$
$$2x_1 + 5x_2 \leq 180$$
$$x_1 , x_2 \geq 0$$ 4

4. (A) What do you mean by Transportation problem ? Give its mathematical formulation. 4

(B) Determine an initial basic feasible solution to the following T. P. using the row minima method.

		To		
From	A	B	C	Avilability
I	50	30	220	1
II	90	45	170	3
III	250	200	50	4
Requirement	4	2	2	

8

OR

5. (P) State and prove a necessary and sufficient condition for the existance of a feasible solution for a transporation problem. 4

(Q) A manufacturer has distribution centres located at Agra, Allahabad and Calcutta. These centres have available 40, 20 and 40 units of his product. Its retail outlets require the following number of units A – 25, B – 10, C – 20, D – 30, E – 15. The shipping cost per unit in rupees between each centre and outlet is given in the following table :—

	Retail outlets				
Distribution Centres	A	B	C	D	E
Agra	55	30	40	50	50
Allahabad	35	30	100	45	60
Calcutta	40	60	95	35	30

Determine the optimal shipping cost by North West Corner Rule. 8

6. (A) Explain an assignment problem. Give its mathematical formulation. 4

(B) State the optimal sequence algorithm for n jobs and 2 machines problem. 4

(C) Define two person zero sum game with example. 4

OR

7. (P) We have seven jobs each of which has to go through the machines M_1 and M_2 in the order M_1 M_2. Processing Times (in hours)

are given as follows. Determine the optimal sequence of jobs and total elapsed time.

Jobs	1	2	3	4	5	6	7
Machine M_1	3	12	15	6	10	11	9
Machine M_2	8	10	10	6	12	1	3

4

(Q) Give the outline of assignment problem for a minimisation problem. 4

(R) Define saddle point of pay off matrix. Explain the rules for determining a saddler point. 4

8. (A) Describe the technique of analysis of variance. 4

(B) State the mathematical model used in analysis of variance in two – way classification with one observation per cell. Explain the hypothesis to be used. 4

(C) Describe the analysis of variance table for a 2 – way classified data with K observations per cell. 4

OR

9. (P) State the basic assumptions used in analysis of variance. 4