

REVISED MODEL QUESTION PAPER
STATISTICS
(with mathematics combination)
Common to B.A./B.Sc.

SEMESTER – VI

PAPER – VII(A): APPLIED STATISTICS

SECTION – A

Answer any **FIVE** of the following. **5 x 5 = 25**

1. Define Time series. Explain the uses of time series.
2. Explain Graphic method to find the trend values.
3. Explain about un-weighted index numbers.
4. Explain the concepts of base shifting and splicing.
5. Explain about the statistical system in India before and after independence.
6. Explain the sources of obtaining vital statistics.
7. Explain the concepts of Crude rate of natural increase and Pearle's Vital index.
8. Express Gross Reproduction Rate in terms of Total Fertility Rate.

SECTION – B

Answer **ALL** the following questions. **5 x 10 = 50**

UNIT – I

9. (a) Explain the components of time series and also explain the mathematical models used in time series analysis.

(OR)

(b) Explain Link Relatives method to measure the seasonal indices for a given time series data.

UNIT – II

10. (a) Define Index numbers. Explain the problems involved in the construction of index numbers.

(OR)

(b) Describe about various mathematical tests to check whether the given index number is good or not.

UNIT – III

11. (a) Explain about Central Statistical Organization.

(OR)

(b) Define National Income. Explain the methods for determining the national income.

UNIT – IV

12. (a) Explain various mortality rates.

(OR)

(b) Explain various fertility rates.

UNIT – V

13. (a) Define life tables and explain the components of life tables.

(OR)

(b) Explain about GRR and NRR.

LIST OF PRACTICALS FOR PAPER – VII(A)

1. Computation of trend by method of least squares
2. Computation of trend by method of moving averages
3. Computation of seasonal indices by ratio – to – trend method
4. Computation of seasonal indices by ratio – to – moving averages method
5. Computation of seasonal indices by link relatives method
6. Computation of weighted and un-weighted index numbers
7. Computation of cost of living index numbers
8. Computation of death rates
9. Computation of birth rates
10. Computation of reproduction rates

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SEMESTER – VI

PAPER – VII(B): DEMOGRAPHY & VITAL STATISTICS

SECTION – A

Answer any **FIVE** of the following. $5 \times 5 = 25$

1. Explain the sources of obtaining vital statistics.
2. Explain uses of balancing equations.
3. Explain about population composition and dependency ratio.
4. Explain about (i) Stable and Stationary Population (ii) Central Mortality rate and (iii) Forces of Mortality.
5. Explain about the construction of abridged life tables.
6. Explain King's method.
7. Explain uses of life tables.
8. Express Gross Reproduction Rate in terms of Total Fertility Rate.

SECTION – B

Answer ALL the following questions. $5 \times 10 = 50$

UNIT – I

9. (a) Explain Coverage and Content errors in demographic data.
(OR)
(b) Explain Chandra Sekharan – Deming formula to check the completeness of the registration data.

UNIT – II

10. (a) Explain Crude Death Rate and Specific Death Rate.
(OR)
(b) Explain Infant Mortality Rate and Standardized Death Rate.

UNIT – III

11. (a) Define Life tables and explain the components of life tables.
(OR)
(b) Derive the relationship between the components of life tables and also explain the uses of life tables.

UNIT – IV

12. (a) Explain Goreville's method to construct abridged life tables.

(OR)

(b) Explain various fertility rates.

UNIT – V

13. (a) Explain crude rate of natural increase and Pearle's vital index.

(OR)

(b) Explain about GRR and NRR.

LIST OF PRACTICALS FOR PAPER – VII(B)

1. Computation of mortality rates
2. Construction of life tables
3. Construction of abridged life tables
4. Computation of birth rates
5. Computation of reproduction rates.

**REVISED MODEL QUESTION PAPER
STATISTICS**

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**SEMESTER – VI CLUSTER – A
PAPER – VIII(A-1): OPTIMIZATION TECHNIQUES**

SECTION – A

Answer any **FIVE** questions.

5 X 5 = 25 Marks

1. Define meaning of OR.
2. Explain general formulation of L.P.P.
3. What are the characteristics of a standard form of L.P.P.?
4. Explain artificial variable technique.
5. Explain the concept of duality.
6. Explain slack and surplus variables with examples.
7. State fundamental theorem of duality.
8. Explain Big – M method.

SECTION – B

Answer **ALL** questions.

5 x 10 = 50 Marks

UNIT - I

9. (a) Write the origin and scope O.R.

(OR)

- (b) Discuss the importance of models in the solution of Operations Research problems.

UNIT – II

10. (a) Explain graphical method to solve L.P.P.

(OR)

- (b) Solve the following L.P.P by Graphical Method.

$$\text{Maximize } Z = 4x_1 + 3x_2$$

Subject to

$$2x_1 + x_2 \leq 1000$$

$$x_1 + x_2 \leq 800$$

$$x_1 \leq 400$$

$$x_2 \leq 700$$

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

UNIT - III

11. (a) Describe the Simplex procedure to solve L.P.P.

(OR)

- (b) Use Simplex method to solve the following L.P.P.

$$\text{Maximize } Z = 4x_1 + 10x_2$$

Subject to

$$2x_1 + x_2 \leq 50$$

$$2x_1 + 5x_2 \leq 100$$

$$2x_1 + 3x_2 \leq 90$$

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

UNIT - IV

12. (a) Explain two phase simplex method.

(OR)

(b) Use the Big M Method to solve the following L.P.P.

$$\text{Maximize } Z = 3x_1 + 5x_2$$

Subject to

$$x_1 + x_2 \geq 2$$

$$x_2 \leq 6$$

$$3x_1 + 2x_2 = 18$$

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

UNIT - V

13. (a) Describe Dual Simplex procedure to solve the L.P.P.

(OR)

(b) Apply the principle of duality to solve the LPP.

$$\text{Maximize } Z = 3x_1 + 2x_2$$

subject to

$$x_1 + x_2 \geq 1$$

$$x_1 + x_2 \leq 7$$

$$x_1 + 2x_2 \leq 10$$

$$x_2 \leq 3$$

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

LIST OF PRACTICALS FOR PAPER – VIII(A-1)

1. Formulation of LPP
2. Solution of LPP by Graphical method
3. Solution of LPP by Simplex method
4. Solution of LPP by Penalty method
5. Solution of LPP by Two – phase Simplex method
6. Solution of LPP by Dual Simplex method

REVISED MODEL QUESTION PAPER
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SEMESTER – VI CLUSTER – A
PAPER – VIII(A-2): OPERATIONS RESEARCH

SECTION – A

Answer any **FIVE** questions.

5 X 5 = 25 Marks

1. Explain revised simplex method.
2. Define feasible solution and optimum solution.
3. Explain Modi method.
4. Explain Least Cost Entry Method (LCEM).
5. Explain travelling salesman problem.
6. Define unbalanced assignment problem.
7. Define sequencing problem and its assumptions.
8. Explain Vogel's approximation method (VAM).

SECTION – B

Answer **ALL** questions.

5 x 10 = 50 Marks

UNIT – I

9. (a) Describe the revised simplex procedure for the solution of linear programming problem.

(OR)

- (b) Use revised simplex method to solve the following LPP.

$$\text{Maximize } Z = 6x_1 - 2x_2 - 3x_3$$

Subject to

$$2x_1 - x_2 + 2x_3 \leq 2$$

$$x_1 + 4x_3 \leq 4$$

$$x_1, x_2, x_3 \geq 0$$

UNIT – II

10. (a) Discuss how the transportation problem is a special case of L.P.P.

(OR)

- (b) Determine an IBFS to the following transportation problem by using NWCR and VAM.

From	To				SUPPLY
	I	II	III	IV	
A	13	11	15	20	2000
B	17	14	12	13	6000
C	18	18	15	12	7000
DEMAND	3000	3000	4000	5000	

UNIT – III

11. (a) Explain the procedure for Stepping Stone Method.

(OR)

(b) Solve the following transportation problem using Vogel's method.

SOURCE	DESTINATION				SUPPLY
	A	B	C	D	
1	11	20	7	8	50
2	21	16	20	12	40
3	8	12	8	9	70
DEMAND	60	25	35	40	

UNIT – IV

12. (a) Describe the Hungarian method of solving the assignment problem.

(OR)

(b) Using the following cost matrix, determine (i) Optimal job assignment (ii) the cost of assignments

Mechanic	Job				
	1	2	3	4	5
A	10	3	3	2	8
B	9	7	8	2	7
C	7	5	6	2	4
D	3	5	8	2	4
E	9	10	9	6	10

13. (a) Explain optimal sequence algorithm for n jobs on 2 machines.

(OR)

(b) Find the sequence that minimizes the total time required for performing the following jobs on 3 machines in the order ABC.

Job	1	2	3	4	5	6
Machine A	8	3	7	2	5	1
Machine B	3	4	5	2	1	6
Machine C	8	7	6	9	10	9

LIST OF PRACTICALS FOR PAPER – VIII(A-2)

1. Solution of LPP by Revised Simplex method
2. Computation of Initial Basic Feasible Solution for Transportation problem
3. Computation of Optimum solution for Transportation problem by MODI method
4. Computation of Optimum solution for Transportation problem by Stepping Stone method
5. Computation of Optimum solution for Assignment Problem
6. Computation of Optimum solution for Travelling Salesman Problem
7. Computation of Optimal sequencing of N jobs on 2 machines
8. Computation of Optimal sequencing of N jobs on 3 machines

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SEMESTER – VI

CLUSTER – B

PAPER – VIII(B-1): ADVANCED EXPERIMENTAL DESIGNS

SECTION – A

Answer any **FIVE** of the following. $5 \times 5 = 25$

1. What is the layout of Completely Randomized Design? And also discuss its merits, demerits and applications.
2. Explain the missing plot technique for one missing observation in Latin Square Design.
3. Explain the concept of Analysis of Covariance (ANCOVA).
4. Distinguish between Factorial Designs and Non Factorial Designs.
5. Explain about 2^2 factorial design.
6. Explain the concept of Incomplete Block Design.
7. Distinguish between BIBD and PBIBD.
8. Describe the layout of Latin Square Design.

SECTION – B

Answer ALL the following questions. $5 \times 10 = 50$

UNIT – I

9. (a) Explain the layout, statistical analysis and inference for a Randomized Block Design.
(OR)
(b) Explain Latin Square Design.

UNIT – II

10. (a) Explain the missing plot technique in RBD with one missing observation.
(OR)
(b) Explain the missing Plot technique in RBD with two missing observations.

UNIT – III

11. (a) Explain analysis of covariance for one – way classification with one concomitant variable in CRD.
(OR)
(b) Explain analysis of covariance for two – way classification with one concomitant variable in RBD.

UNIT – IV

12. (a) Explain 2^3 factorial design.

(OR)

(b) Explain 3^3 factorial design.

UNIT – V

13. (a) Explain BIBD

(OR)

(b) Explain PBIBD

LIST OF PRACTICALS FOR PAPER – VIII(B-1)

1. Completely Randomized Design
2. Randomized Block Design
3. Latin Square Design
4. RBD with one and two missing observations
5. LSD with one missing observations
6. ANCOVA for CRD
7. ANCOVA for RBD

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SEMESTER – VI **CLUSTER – B**
PAPER – VIII(B-2): ACTUARIAL STATISTICS
SECTION – A

Answer any **FIVE** of the following. **5 x 5 = 25**

1. What are (a) Discrete distributions (b) Continuous distributions and (c) Mixed probability distributions? Explain.
2. Describe Insurance applications briefly.
3. Explain the properties of premium principles.
4. What are the principles for premium calculations? Explain with examples.
5. Explain the concepts (a) Uncertainty of age at death (b) Survival function and (c) Force of mortality
6. Explain the concept of life tables with examples.
7. Distinguish between discrete life annuities and continuous life annuities.
8. Distinguish between discrete premiums and continuous premiums.

SECTION – B

Answer **ALL** the following questions. **5 x 10 = 50**

UNIT – I

9. (a) Explain (i) Utility functions and (ii) Expected utility criterion
(OR)
(b) Explain (i) Types of utility functions and (ii) Insurance and utility theory.

UNIT – II

10. (a) Explain Individual risk models for individual claims with applications.
(OR)
(b) Explain Individual risk models for the sum of independent claims with applications.

UNIT – III

11. (a) Explain about deterministic survivorship group.
(OR)
(b) Explain life table characteristics and assumptions for fractional age.

UNIT – IV

12. (a) Explain the insurance models for insurance payable at moment of death.

(OR)

(b) Explain the insurance models for insurance payable at the end of the year of death.

UNIT – V

13. (a) Explain various principles of premium calculation with properties and examples.

(OR)

(b) Explain the concept of life annuities with periodic payments.

LIST OF PRACTICALS FOR PAPER – VIII(B-2)

1. Utility functions.
2. Models for individual claims
3. Models for the sum of independent claims
4. Models for insurance payable at the moment of death
5. Models for insurance payable at the end of the year of death
6. Life annuities with periodic payments