

Roll No. \_\_\_\_\_

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**SVIS 328 A-15**  
**B.Sc. VI th Semester Degree Examination**  
**Mathematical Statistics**  
**(Applied Statistics and Operations Research)**  
**Paper -VIII**

Time : 3 Hours

Maximum Marks : 80

**Instructions to Candidates:**

Statistical tables and graph sheets will be supplied on request

**Section-A**

**I. Answer the following**

**(15x1=15)**

**1** Quantity index numbers indicate the percentage change in

- a) time
- b) price
- c) quantity
- d) none

**2.** Laspeyre's and paasche's index numbers are 128 and 129 respectively. What is fisher's index number

- a) 128.60
- b) 128.499
- c) 128.8
- d) None

**3.** Changes of bank interest rates indicate

- a) trend
- b) Cyclic changes
- c) irratic changes

- d) seasonal changes
- 4. Additive mode of time series is
  - a) TS+CI
  - b) TSCI
  - c) T+S+C+I
  - d)  $(T+S) \times (C+I)$
- 5. In matrix form of a LPP  $Z=CX$  is called
  - a) Decision variable
  - b) Objective function
  - c) Non negativity restriction
  - d) None
- 6. In maximizing LPP if the feasible region is not closed, then the optimum solution is
  - a) Unbounded
  - b) psuedo optimum
  - c) does not exist
  - d) None
- 7. Transportation problem is a special case of
  - a) LPP
  - b) A.P
  - c) Inventory model
  - d) Network
- 8. Assignment problem is unbalanced if its cost matrix is
  - a) Square matrix
  - b) not square matrix
  - c) identity matrix
  - d) None
- 9. The time gap between placing of order and arrival of goods is called as
  - a) Slack time
  - b) Surplus time
  - c) lead time

- d) Interval
10. In a zero sum game the gains of all the players is:
- a) Positive
  - b) Zero
  - c) negative
  - d) Non zero
11. \_\_\_\_\_ index number is the G.M of laspeyre's and paasche's index number
12. Tests for an ideal index number are \_\_\_\_\_ and \_\_\_\_\_
13. Transportation problem is said to be unbalanced if \_\_\_\_\_
14. If the value of a game is zero, then it is called \_\_\_\_\_ game
15. PERT stands for \_\_\_\_\_

### Section-B

II. Answer any five questions (5×5=25)

16. Explain the methods of computation of index numbers
17. What are the methods of measurement of trend? Describe any two of them
18. Solve the following LPP graphically
- Max  $Z=2x_1+4x_2$
- s.t.c.  $x_1+2x_2 \leq 5$
- $x_1+x_2 \leq 4$
- $x_1, x_2 \geq 0$
19. Describe vogels approximation method
20. From the following data find the unknown value if the ratio of laspeyre's and paashe's index numbers is L:P::28:27

Item	$P_0$	$P_1$	$Q_0$	$Q_1$
X	2	4	20	10
Y	2	x	10	2

21. What is network analysis? Explain PERT and CPM
22. Explain various types of costs associated with Inventories

### Section-C

III. Answer any four questions (4×10=40)

23. Explain the main steps in the construction of an index number

24. Describe simple averages method and ratio to moving average method of computing seasonal indices
25. Describe big -m -method
26. Solve the following assignment problem to maximum the Sales(Rs. Lakhs)

		District			
		A	B	C	D
salesman	P	140	112	98	154
	Q	90	72	63	99
	R	110	88	77	121
	S	80	64	56	88

27. For a (2x2) two person zero sum game without saddle point, having pay off matrix for player A

$$\begin{matrix} & B_1 & B_2 \\ A_1 & \begin{bmatrix} a_{11} & a_{12} \end{bmatrix} \\ A_2 & \begin{bmatrix} a_{21} & a_{22} \end{bmatrix} \end{matrix}$$

Prove that the optimum mixed strategies  $S_A = \begin{bmatrix} A_1 & A_2 \\ P_1 & P_2 \end{bmatrix}$  and  $S_B = \begin{bmatrix} B_1 & B_2 \\ q_1 & q_2 \end{bmatrix}$

are given by  $\frac{p_1}{p_2} = \frac{a_{22} - a_{21}}{a_{11} - a_{12}}, \frac{q_1}{q_2} = \frac{a_{22} - a_{12}}{a_{12} - a_{21}}$  where  $p_1 + p_2 = 1, q_1 + q_2 = 1$  and the value of the

game is  $V = \frac{a_{11}a_{21} - a_{21}a_{12}}{(a_{11} + a_{22}) - (a_{12} + a_{21})}$

28. The time required for various activities of a project are as follows

Activity	1-2	1-3	1-4	2-4	3-4	4-5
time(days)	9	8	15	5	10	2

- i) Draw network diagram
- ii) Obtain the critical path
- iii) Find minimum duration of the project.

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