

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

[Total No. of Pages : 4

SVIS- 324 A-17

**B.Sc. Vith Semester Degree Examination**

**Mathematical Statistics**

**(Applied Statistics and Operations Research)**

**Paper : 6.2 VIII**

Time : 3 Hours

Maximum Marks : 80

**Instructions to Candidates : Statistical tables and graph sheets will be supplied on request.**

**Section - A**

I. Answer ALL the following questions :

(15 × 1 = 15)

- 1) If  $\sum p_{ij} = 580$  and  $\sum p_{0j} = 490$ , then price index number is
  - a) 110.78
  - b) 118.37
  - c) 108.73
  - d) 84.98
- 2) Which index number satisfies only time reversal test
  - a) Laspeyre's
  - b) Fisher's
  - c) Paasche's
  - d) Marshal Edgeworth's
- 3) Fall in production due to factory lockout indicates which component of time series.
  - a) Secular trend
  - b) Cyclic variation.
  - c) Irregular variation
  - d) Seasonal variation.
- 4) In fitting of linear trend  $U_t = a + bt$ . If  $\sum t = 0$  then b is given by
  - a)  $\frac{\sum U_t t}{\sum t^2}$
  - b)  $\frac{\sum U_t t^2}{\sum U_t}$
  - c)  $\frac{\sum t^2}{\sum U_t}$
  - d)  $\frac{\sum t U_t}{\sum U_t^2}$

- 5) In LPP, the function to be optimised is known as
- a) Probability function                      b) Objective function  
c) Trigonometric function                  d) Linear function
- 6) Assignment problem is balanced if
- a) Number of columns > Number of rows  
b) Number of columns = Number of rows  
c) Number of columns < Number of rows  
d) None.
- 7) In inventory shortage cost is denoted by
- a)  $C_1$     b)  $C_2$   
c)  $C_3$     d) None
- 8) Slack in CPM is defined as
- a)  $L_j - E_i$                                       b)  $L_j - E_j$   
c)  $E_j - L_j$                                       d) None
- 9) Graphical method of solving LPP is applicable when the decision variables are
- a) only two                                        b) less than two  
c) more than two                                d) None
- 10) In game, maximin is obtained by
- a) maximum (row minimum)                  b) maximum (column minimum)  
c) minimum (row maximum)                  d) minimum (column maximum)
- 11) Time series graph is known as \_\_\_\_\_.
- 12) In balanced TP, the condition is \_\_\_\_\_.
- 13) In LPP, feasible solution Satisfies \_\_\_\_\_ and \_\_\_\_\_.
- 14) Game is known as fair game if value of game is \_\_\_\_\_.
- 15) If  $P_{oi}^L = 118$  and  $P_{oi}^P = 128$  then  $P_{oi}^F =$  \_\_\_\_\_.

**Section - B**

**II** Answer any **FIVE** of the following questions. **(5 × 5 = 25)**

- 16) Show that Fisher's index number lies between Laspeyres's and Paasche's index numbers.
- 17) Explain business cycle in a time series.
- 18) Solve the following LPP graphically.

$$\text{Max } z = 5x_1 + 3x_2$$

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$$3x_1 + 5x_2 \leq 15$$

$$5x_1 + 2x_2 \leq 10$$

$$x_1, x_2 \geq 0$$

- 19) Describe Vogel's approximation method.
- 20) Solve following assignment problem.

	Jobs			
Man	A	B	C	D
1	5	3	2	8
2	7	9	2	6
3	6	4	5	7
4	3	7	7	8

- 21) Define Inventory, what are the different types of inventories?
- 22) Solve the following game by dominance property.

	Player B				
player A	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	B <sub>4</sub>	B <sub>5</sub>
A <sub>1</sub>	-2	0	0	5	3
A <sub>2</sub>	3	3	1	2	2
A <sub>3</sub>	-4	-3	0	-2	6
A <sub>4</sub>	5	3	-4	2	-6

**Section - C**

**III** Answer any **FOUR** of the following questions. **(4 × 10 = 40)**

- 23) Show that Fisher's index number satisfies time reversal and factor reversal test.
- 24) Explain the method of ratio to moving average to find seasonal indices.
- 25) Explain simplex method of solving LPP.

26) Solve following TP

	To				capacity
From	5	5	4	7	5
	6	4	1	2	5
	5	9	1	4	6
	8	3	2	4	4
	6	5	3	1	6
supply	5	8	3	10	

27) Find the sequence that minimizes the total elapsed time required to complete the following tasks.

Tasks	A	B	C	D	E	F	G	H	I
Time on machine I	2	5	4	9	6	8	7	5	4
Time on machine II	6	8	7	4	3	9	3	8	11

28) A project has the following time schedules. Draw the network diagram. Find critical path and duration of the project.

Activity	time
1 - 2	2
1 - 3	2
1 - 4	1
2 - 6	4
3 - 7	5
3 - 5	8
4 - 5	3
5 - 9	5
6 - 8	1
7 - 8	4
8 - 9	3

