DALMIA HR.SEC.SCHOOL-DALMIAPURAM

STD: XII **BUSINESS MATHEMATICS & STATISTICS** **MARKS: 90**
Date: **UNIT TEST(8,9&10)** **TIME: 3.00 HRS**

PART-I

I. Choose the correct or most suitable answer: **20 x 1 = 20**

1. A time series consists of
   (a) Five components (b) Two components
   (c) Three components (d) Four components
2. Factors responsible for seasonal variations are
   (a) Weather (b) Festivals (c) Social customs (d) All the above
3. The additive model of the time series with the components T, S, C and I is
   (a) y=T+S+C+I (b) y=T+S×C×I (c) y=T+S+C×I (d) y=T+S×C+I
4. The component of a time series attached to long term variation is trended as
   (a) Cyclic variation (b) Irregular variation
   (c) Secular variations (d) Seasonal variations
5. Another name of consumer's price index number is:
   (a) Whole-sale price index number (b) Composite
   (c) Sensitive (d) Cost of living index
6. Laspeyre's index = 110, Paasche's index = 108, then Fisher's Ideal index is equal to:
   (a) 110 (b) 109 (c) 100 (d) 108
7. How many causes of variation will affect the quality of a product?
   (a) 2 (b) 3 (c) 4 (d) 1
8. The transportation problem is said to be unbalanced if _____
   (a) m+n–1 (b) Total supply = Total demand
   (c) m = n (d) Total supply ≠ Total demand
9. The Penalty in VAM represents difference between the first _____
   (a) Two largest costs (b) Smallest two costs
   (c) Largest and Smallest costs (d) None of these
10. North-West Corner refers to _____
   (a) bottom left corner (b) top right corner
   (c) bottom right corner (d) top left corner
11. Solution for transportation problem using _____method is nearer to an optimal solution.
   (a) VAM (b) LCM (c) NWCM (d) Row Minima
12. A type of decision –making environment is
   (a) certainty (b) uncertainty (c) risk (d) all of the above
13. While computing a weighted index, the current period quantities are used in the:
   (a) Laspeyre's method (b) Marshall Edge worth method
   (c) Paasche's method (d) Fisher's ideal method

14. A time series is a set of data recorded
    (a) Periodically (b) Weekly
    (c) successive points of time (d) all the above
15. The standard error of sample mean is
    (a) $\frac{\sigma}{\sqrt{n}}$ (b) $\frac{\sigma}{n}$ (c) $\frac{\sigma}{\sqrt{2n}}$ (d) $\frac{\sigma^2}{\sqrt{n}}$
16. Errors in sampling are of
    (a) four types (b) three types (c) Two types (d) five types
17. In simple random sampling from a population of units, the probability of drawing any unit at the first draw is
    (a) $\frac{n}{N}$ (b) 1 (c) $\frac{N}{n}$ (d) $\frac{1}{N}$
18. A random sample is a sample selected in such a way that every item in the population has an equal chance of being included
    (a) Karl Pearson (b) Fisher (c) Harper (d) Dr. Yates
19. Any statistical measure computed from sample data is known as ……...
    (a)parameter (b) uncountable measure (c) infinite measure (d) statistic
20. A …… of statistical individuals in a population is called a sample.
    (a) finite subset (b) Infinite set (c) finite set (d) entire set

PART-II

II. Answer any SEVEN questions .Question number 30 is compulsory. 7 x 2 = 14

21. Find the sample size for the given standard deviation 10 and the standard error with respect of sample mean is 3.
22. State any two merits of simple random sampling.
23. Determine the standard error of proportion for a random sample of 500 pineapples was taken from a large consignment and 65 were found to be bad.
24. What is null hypothesis? Give an example.
25. Mention the components of the time series.
26. Fit a trend line by the method of freehand method for the given data.

Year	2000	2001	2002	2003	2004	2005	2006	2007
Sales	30	46	25	59	40	60	38	65

27. Explain the method of fitting a straight line.
28. Consider the following pay-off matrix

Alternative	Pay – offs (Conditiional events)			
	A_1	A_2	A_3	A_4
E_1	7	12	20	27
E_2	10	9	10	25
E_3	23	20	14	23
E_4	32	24	21	17

Using minmax principle, determine the best alternative.

29. what is feasible solution and non degenerate solution in transportation problem?
30. What is the difference between Assignment Problem and Transportation Problem?

PART-III

III. Answer any SEVEN questions .Question number 40 is compulsory. 7 x 3 = 21

31. Three jobs A, B and C one to be assigned to three machines U, V and W. The processing cost for each job machine combination is shown in the matrix given below. Determine the allocation that minimizes the overall processing cost.

		Machine		
		U	V	W
Job	A	17	25	31
	B	10	25	16
	C	12	14	11

(cost is in ` per unit)

32. A person wants to invest in one of three alternative investment plans: Stock, Bonds and Debentures. It is assumed that the person wishes to invest all of the funds in a plan. The pay-off matrix based on three potential economic conditions is given in the following table:

Alternative	Economic conditions		
	High growth(Rs.)	Normal growth(Rs.)	Slow growth (Rs.)s
Stocks	10000	7000	3000
Bonds	8000	6000	1000
Debentures	6000	6000	6000

Determine the best investment plan using each of following criteria i) Maxmin ii) Minimax.

33. Fit a trend line by the method of semi-averages for the given data.

Year	2000	2001	2002	2003	2004	2005	2006
Production	105	115	120	100	110	125	135

34. The following figures relates to the profits of a commercial concern for 8 years

Year	1986	1987	1988	1989	1990	1991	1992	1993
Profit (`)	15,420	15,470	15,520	21,020	26,500	31,950	35,600	34,900

Find the trend of profits by the method of three yearly moving averages.

35. Discuss about Cost of Living Index Number.
36. A machine drills hole in a pipe with a mean diameter of 0.532 cm and a standard deviation of 0.002 cm. Calculate the control limits for mean of samples 5.
37. Using the following random number table (Kendall-Babington Smith) Draw a random sample of 10 four- figure numbers starting from 1550 to 8000.

38. Explain in detail about systematic random sampling with example.
39. A wholesaler in apples claims that only 4% of the apples supplied by him are defective. A random sample of 600 apples contained 36 defective apples. Calculate the standard error concerning of good apples
40. A sample of 100 items, draw from a universe with mean value 4 and S.D 3, has a mean value 63.5. Is the difference in the mean significant?

PART-IV

IV. Answer all the questions . **7 x 5 = 35**

41. **(a)** Explain Vogel's approximation method by obtaining initial basic feasible solution of the following transportation problem.

		Destination				
		D_1	D_2	D_3	D_4	supply
Origin	O_1	2	3	11	7	6
	O_2	1	0	6	1	1
	O_3	5	8	15	9	10
	Demand	7	5	3	2	

(or)

(b) Following pay-off matrix, which is the optimal decision under each of the following rule (i) maxmin (ii) minimax

Act	States of nature			
	S_1	S_2	S_3	S_4
A_1	14	9	10	5
A_2	11	10	8	7
A_3	9	10	10	11
A_4	8	10	11	13

42. **(a)** Obtain an initial basic feasible solution to the following transportation problem using least cost method.

	D_1	D_2	D_3	D_4	supply
O_1	1	2	3	4	6
O_2	4	3	2	5	8
O_3	5	2	2	1	10
Demand	4	6	8	6	

(or)

(b) Determine basic feasible solution to the following transportation problem using North west Corner rule.

		Sinks				
		A	B	C	D	E	Supply
Origins	P	2	11	10	3	7	4
	Q	1	4	7	2	1	8
	R	3	9	4	8	12	9
	Demand	3	3	4	5	6	

43. **(a)** Fit a straight line trend by the method of least squares to the following data.

Year	1980	1981	1982	1983	1984	1985	1986	1987
Sales	50.3	52.7	49.3	57.3	56.8	60.7	62.1	58.7

(or)

(b) The following data show the values of sample mean ($\bar{X}$) and its range (R) for the samples of size five each. Calculate the values for control limits for mean , range chart and determine whether the process is in control.

Sample number	1	2	3	4	5	6	7	8	9	10
Mean	11.2	11.8	10.8	11.6	11.0	9.6	10.4	9.6	10.6	10.0
Range	7	4	8	5	7	4	8	4	7	9

(conversion factors for n= 5, A_2 = 0.58, D_3 = 0 and D_4= 2.115)

44. **(a)** Calculate Fisher's index number to the following data. Also show that it satisfies Time Reversal Test.

Commodity	2016		2017	
	Price (Rs.)	Quantity (Kg)	Price (Rs.)	Quantity (Kg)
Food	40	12	65	14
Fuel	72	14	78	20
Clothing	36	10	36	15
Wheat	20	6	42	4
Others	46	8	52	6

(or)

(b) The following table shows the number of salesmen working for a certain concern:

Year	1992	1993	1994	1995	1996
No. of salesmen	46	48	42	56	52

Use the method of least squares to fit a straight line and estimate the number of salesmen in 1997.

45. **(a)** In a sample of 400 population from a village 230 are found to be eaters of vegetarian items and the rest non-vegetarian items. Compute the standard error assuming that both vegetarian and non-vegetarian foods are equally popular in that village? **(or)**

(b) The mean weekly sales of soap bars in departmental stores were 146.3 bars per store. After an advertising campaign the mean weekly sales in 400 stores for a typical week increased to 153.7 and showed a standard deviation of 17.2. Was the advertising campaign successful?

46. **(a)** Calculate the seasonal index for the monthly sales of a product using the method of simple averages.

Months / Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
2001	15	41	25	31	29	47	41	19	35	38	40	30
2002	20	21	27	19	17	25	29	31	35	39	30	44
2003	1	16	20	28	24	25	30	34	30	38	37	39

(or)

(b) A departmental head has four subordinates and four tasks to be performed. The subordinates differ in efficiency and the tasks differ in their intrinsic difficulty. His estimates of the time each man would take to perform each task is given below

		Tasks			
		1	2	3	4
Subordinates	P	8	26	17	11
	Q	13	28	4	26
	R	38	19	18	15
	S	9	26	24	10

How should the tasks be allocated to subordinates so as to minimize the total man-hours?

47. **(a)** Calculate four-yearly moving averages of number of students studying in a higher secondary school in a particular city from the following data.

Year	2001	2002	2003	2004	2005	2006	2007	2008
Sales	124	120	135	140	145	158	162	170

(or)

(b) A die is thrown 9000 times and a throw of 3 or 4 is observed 3240 times. Find the standard error of the proportion for an unbiased die .