

SATAVAHANA UNIVERSITY, KARIMNAGAR.

Department of Statistics

CBCS Pattern with Semester System (w.e.f.2021-2022)

B.Sc (Statistics) -Semester -VI

Paper –VII(A) Applied Statistics - II

(Design of Experiments, Vittal Statistics, Official Statistics and Index Numbers)

(Question Bank for Practical Examinations)

UNIT – I

1. Define ANOVA, Write the statement of Cochran's theorem and write any two assumptions of ANOVA.
2. Explain mathematical model of One-way classification
3. Explain the estimation of parameters in One-way classification.
4. What is Critical Deference and how it is calculated.
5. Three process A, B and C are tested to see whether their outputs are equalent. The following observations of outputs are made.

A	10	12	13	11	10	14	15	13
B	9	11	10	12	13	-	-	-
C	11	10	15	14	12	13	-	-

Carry out the analysis of variance and state your conclusions.

(Tab.Value :F_{5%, (2,16) = 3.63})

6. Find the expectations of sum of squares due to error in Two-way classification.
7. Define the terms: (i) Design of experiment.
(ii) Treatments.
(iii) Efficiency of a design.

8. Calculate the missing information in the following ANOVA table.

Source of Variation	Degrees of freedom	Sum of Squares	Mean sum of squares	F-calculated
Between Columns	-	-	756.67	
Between Rows	4	400	-	
Error	36	-	76.06	
TOTAL	49	-		

9. There are four doctors, if they wish to test the five medicines, they applied these five treatments i.e. medicines on four patients each and the reading were given below:

Doctors	Observations of treatments (Medicines)				
	A	B	C	D	E
1	12	16	18	21	24
2	16	25	20	23	28
3	14	20	23	16	20
4	15	24	23	25	36

Test the significance between the medicines and doctors at 1% level of significance.

(Tab.Value: $F_{1\%,(4,12)} = 5.41$, Tab.Value: $F_{1\%,(3,12)} = 5.95$)

10. The retail prices of a commodity in four cities A,B,C and D are given below Test whether the prices in four cities are significant or not. Analyse the data using one-way classification.

Cities	Prices of commodity in various shops						
	1	2	3	4	5	6	7
A	82	79	73	69	69	63	61
B	84	82	80	79	76	68	62
C	88	84	80	68	68	66	66
D	79	77	76	74	72	68	64

UNIT-II

11. What are the principles of experimental design and explain in detail with R.A.Fisher's diagram.
12. Define Completely Randomised Design. Obtain the layout of the following design: A CRD with 4 treatments A, B, C and D replicated 7, 6, 8 & 10 times.
13. Analyse the following Completely Randomised Design and give your conclusions:

A 10	B 12	C 12	B 8
B 12	C 14	A 10	C 11
A 8	B 12	A 8	C 10

14. Explain in detail Missing plot technique in C R D.
15. Obtain the expectations mean sum of squares due to error in R B D.
16. Find the missing observation in the following design and analyse the data.

Blocks	Treatments					
	1	2	3	4	5	6
1	18.5	15.7	16.2	14.1	13	13.6
2	11.7	-	12.9	14.4	16.9	12.5
3	15.4	16.6	15.5	20.3	18.4	21.5
4	16.5	18.6	12.7	15.7	16.5	18

17. Find the Efficiency of R B D over C R D.
18. Define Latin Square Design and explain its mathematical model.

19. Fill up the blanks in the following ANOVA table:

Source of Variation	Degrees of freedom	Sun of squares	Mean sun of squares
Rows	3	-	106.26
Columns	3	115.81	-
Treatments	3	855.65	-
Error	-	139.37	-
TOTAL	14		

20. Write the formulas for Relative Efficiency of L S D over R B D

When (i) Rows are taken as Blocks without Columns

(ii) Columns are taken as Blocks without Blocks.

UNIT-III

21. Explain what are the various sources of Vital Statistics.

22. Compute crude death rates of the two populations A and B to the following data.

Age group (Years)	A		B	
	Population	Deaths	Population	Deaths
Under 10	20000	600	12000	372
10-20	12000	240	30000	660
20-40	50000	1250	62000	1612
40-60	30000	1050	15000	325
Above 60	10000	500	3000	180

23. Define Life table and explain in detail the various columns of life table.

24. Calculate the Standardised Death Rates for the following data of two countries.

Age Group (in Years)	Death rate per 1,000		Standardised Population (in Lakhs)
	Country -A	Country -B	
0-4	20	5	100
5-14	1	0.5	200
15-24	1.4	1	190
25-34	2	1	180
35-44	3.3	2	120
45-54	7	5	100
55-64	15	12	70
65-74	40	35	30
75 and above	120	110	10

25. Compute (i) GFR (ii) A.S.F.R (iii) T.F.R from the data given below:

Age group of Child bearing females	15-19	20-24	25-29	30-34	35-39	40-44	45-49
No. of Women ('000)	16.0	16.4	15.8	15.2	14.8	15.0	14.5
Total Births	260	2244	1894	1320	916	280	14.5

Assume the proportion of female births is 46.2%

26. Given the age returns of the two ages $x = 9$ and $(x+1) = 10$ years with a few life table values as $l_9 = 75,824$, $l_{10} = 75,362$, $d_{10} = 418$, $T_{10} = 49,53,195$. Find the complete life table for the ages of persons.

27. Fill in the blanks in the following life table given below:

Age:	x	l_x	d_x	p_x	q_x	L_x	T_x	e^0_x
	4	95000	500	-	-	-	48,50,300	-
	5	-	400	-	-	-	-	-

28. From the data given below, calculate the GRR and NRR.

Age Group	No. of children born to 1000 women passing through the age group	Mortality rate (per 1000)
16-20	150	120
21-25	1500	180
26-30	2000	150
31-35	800	200
36-40	500	220
41-45	200	230
46-50	100	250

Sex ratio being males: females = 52 : 48

29. The values of l_x ; i.e. the no. of persons lying at age x are given below:

x	102	103	104	105	106	107	108
l_x	97	89	82	75	6	2	0

30. Define the terms: (i) Stationary Population (ii) Stable Population

(iii) Expectation of life (iv) Complete expectation of life.

UNIT-IV

31. Explain CSO and write its two important publications.

32. Explain NSSO and write its two important publications.

33. Explain Agricultural Statistics.

34. Explain National Income and write its uses.

35. Explain the various methods to measure National Income.

36. Construct Laspeyre's and Paasch's index numbers for the year 1990 with 1980 as the base year to the following data.

Commodity	Price		Quantity	
	1980	1990	1980	1990
A	10	12	12	15
B	7	5	15	20
C	5	9	24	20
D	16	14	5	5

37. Show that the Fisher's index number satisfy Time Reversal Test and Factor Reversal Test to the following data.

Commodity	Price		Quantity	
	2010	2013	2010	2013
A	17	19	40	42
B	14	17	30	35
C	19	21	10	17
D	13	16	20	14
E	21	31	16	12
F	50	60	15	10

38. Compute Cost of Living Index Numbers (COLIN) by Aggregate Expenditure Method and Family Budget Method to the following data.

Commodity	Quantity consumed	Price(Rs) in 2005	Price(Rs) in 2005
Rice	50 kgs	15	30
Wheat	4 kgs	10	18
Pulses	3 kgs	30	85
Ghee	1 kg	47	73
Jaggery	2 kg	12	18
Sugar	5 kg	16	28
Oil	3 liters	32	63
Clothing	10 meters	15	27
Fuel	30 liters	10	17
House rent	-	1200	2000

39 Two price index Series are given splicing the two series.

Year	2003	2004	2005	2006	2007	2008	2009
Series-I	100	130	150	120			
Series-II				100	130	160	140

40. The annual Wages (in Rs) of workers are given along with consumer Price Indices.

Find (i) The real wages (ii) The real wage indices.

Year	2000	2001	2002	2003
Wages	1800	2200	3400	3600
Consumer Price Index	100	170	300	320
