LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

**B.Sc.** DEGREE EXAMINATION – **COMMERCE & BUSIN. ADM.**

FOURTH SEMESTER – APRIL 2011

# ST 4208 - STATISTICS FOR MANAGEMENT

Date : 05-04-2011 Dept. No. Max. : 100 Marks

Time : 1:00 - 4:00

**SECTION A** **(10 X 2 = 20 marks)**

**Answer ALL questions**.

1. Define probability and give an example.
2. State addition theorem on probability.
3. State the Central Limit Theorem.
4. Explain the term standard error.
5. Define index number and discuss their importance.
6. Discuss any two steps in the construction of a cost of living index by the family budget method.
7. Distinguish between the control limits and tolerance limits.
8. Distinguish between np chart and p chart.
9. Define the term feasible solution.
10. What is meant by balanced and unbalanced transportation problem.

**SECTION B (5 X 8 = 40 Marks)**

**Answer any FIVE questions**

1. State and prove Baye's theorem.
2. A sub-committee of 6 members is to be formed out of a group consisting of 7 men and 4 women calculate the probability that sub-committee will consist of.

a) exactly 2 women b) at least 2 women.

13. Two Urns contain respectively 10 white, 6 red and 9 black and 3 white 7 red and 15 black balls.

One ball is drawn from each Urn. Find the probability that (i) Both balls are red (ii) Both balls

are of the same colour.

14.If a random variable X follows a Poisson distribution such that P[ X = 2 ] = P[X=1].

Find P[X=0]. ( e -2 = 0.13534).

15. In a survey of 200 boys, of which 75 are intelligent, 40 of the intelligent boys have skilled fathers while 85 of the unintelligent boys have unskilled fathers. Do these figures support the hypothesis that

skilled fathers have intelligent boys. Use chi-square – test of 5 % level.

16. From the following data of the whole sale prices of wheat for the ten years construct

Index numbers taking (a) 1979 as base and (b)by chain base method

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **year** | **1988** | **1989** | **1990** | **1991** | **1992** | **1993** | **1994** | **1995** | **1996** | **1997** |
| **Price of**  **Wheat** | **50** | **60** | **62** | **65** | **70** | **78** | **82** | **84** | **88** | **90** |

17. The following table gives the number of defective items found in 20 successive samples of 100 items each

2 6 2 4 4 15 0 4 10 18 2 4 6 4 8 0 2 2 4 0

Comment whether the process is under control. Suggest suitable control limits for the future.

18. A company has 4 machine to be assigned to 4 of the 4 workers available for this purpose.

The expected production from each machine operated by each workers is given below.

WORKERS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | W1 | W2 | W3 | W4 |
| I | 41 | 72 | 39 | 52 |
| II | 22 | 29 | 49 | 65 |
| III | 27 | 39 | 60 | 51 |
| IV | 45 | 50 | 48 | 52 |

MACHINE

Suggest optimal assignment of workers to machine.

**SECTION C (2 X 20 = 40 Marks)**

**Answer any TWO questions**

19.(a) A Company has four production sections viz. S1, S2, S3 and S4 , which contribute 30%, 20%, 28% and 22% of the total output. It was observed that those sections respectively produced 1%, 2%, 3% and 4% defective units. If a unit is selected at random and found to be defective, what is the probability that the units so selected has come from either S1 or S4.? (10)

19.(b)The customer accounts of a certain departmental store have an average balance of Rs.120 and a standard deviation of Rs.40. Assuming that the account balances are normally distributed, find

1. What proportion of accounts is over Rs.150?
2. What proportion of accounts is between Rs.100 and Rs.150?

(iii) What proportion of accounts is between Rs.60 and Rs.90 ? (10)

20. (a) The sales manager of a large company conducted a sample survey in states A and B taking 400

Samples in each case. The results were as follow

State A State B

Average sales Rs.2500 Rs.2200

Standard Deviation Rs.400 Rs.550

Test whether the average sales is the same in the two states. Test at 1% level. (10)

20(b) The following table gives the fields of 15 samples of plot under three varieties of seed.

|  |  |  |
| --- | --- | --- |
| A | B | C |
| 20 | 18 | 25 |
| 21 | 20 | 28 |
| 23 | 17 | 22 |
| 16 | 15 | 28 |
| 20 | 25 | 32 |

Test using analysis of variance whether there is a significant difference in the average yield of seeds

21.(a) The following data show the values of sample mean (x) and the range (R) for ten samples of size 5 each calculate the values for central line and control limits for mean chart and determine whether the process is control.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sample** | **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** | **10.6** |
| **Range(R)** | **7** | **4** | **8** | **5** | **7** | **4** | **8** | **4** | **7** | **9** |

( For n = 5 , A2=0.577,D2 = 0, D4= 2.115)

21(b).Calculate Laspeyre’s Index number, Paasche’s price index number and Marshall-Edgeworth Index and how it satisfies Time reversal test and Factor reversal test.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Commodity** | **1980** | | **1981** | |
| **Price**  **(in Rs.)** | **Quantity**  **(in kgs.)** | **Price**  **(in Rs.)** | **Quantity**  **(in kgs.)** |
| **A** | **20** | **15** | **30** | **10** |
| **B** | **30** | **18** | **40** | **15** |
| **C** | **10** | **20** | **45** | **10** |
| **D** | **15** | **25** | **25** | **5** |

22(a)Find the initial basic feasible solution by Vogel's Approximation method.

Distribution Centers

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Plants |  | D1 | D2 | D3 | Supply |
| P1 | 16 | 19 | 12 | 14 |
| P2 | 22 | 13 | 19 | 16 |
| P3 | 14 | 28 | 8 | 12 |
| Demand | 10 | 15 | 17 |  |

22(b) Solve the following game by graphical method.

Player A

a1 a2 a3 a4

b1 -2 5 6 -4

Player B

b2 4 -3 -1 6

X --------------------X