

Documentation Research and Training Centre
Indian statistical Institute, 8th Mile Mysore Road, Bangalore-59
M.S.(Library & Information Science) (2015-2016)
Semester II-June 2016

Paper 8: Elements of Statistics & Research Methodology

Time: 3 Hours

Date: 6th June 2016

Max. Marks: 100

PART – I (60 marks)

This part carries “70” Marks. Answer as many questions as you can but the maximum marks you can score is “60”

1. Tick the most appropriate answer for the following. Justify your answer for question (a), (c), (f), (g), and (h)

a. If a sample size of 16 yields an average of 12, and a standard deviation of 3, the 95% confidence interval for the normally distributed population mean μ

- i. $10.4 \leq \mu \leq 13.6$
- ii. $10.45 \leq \mu \leq 13.55$
- iii. $10.53 \leq \mu \leq 13.47$
- iv. $10.77 \leq \mu \leq 13.23$

(4)

b. For a normal distribution, two standard deviations on each side of the mean would include _____ percentage of the total populations

- i. 68.27%
- ii. 76.93%
- iii. 95.45%
- iv. 98.73%

(1)

c. The hybrid option on a Rs 25 lakhs car costs Rs 3 lakhs. A mileage test found the hybrid averaged 39.1 mpg and the standard model averaged 34.7 mpg and a p-value of 0.024. At a level of significance of 5%, the difference is:

- i. Not statistically significant, buy the standard car
- ii. Not practically significant, buy the hybrid car
- iii. Statistically significant, but not practically significant
- iv. Statistically significant, one should buy the hybrid

(2)

d. In the regression equation $Y=mX+b$, Y increases with X in all cases

- i. If b is positive
- ii. If b is negative
- iii. If m is positive
- iv. If m is negative

(1)

- e. How are the expected values in a Contingency Table calculated?
- (Column Total-Row Total)/Grand Total
 - ((Column Total)*(Row Total))/Grand Total
 - (Column Total +Row Total)/Grand Total
 - (Row Total-Column Total)/Grand Total
- (1)
- f. The α critical region, to determine if a new pen lasts longer, would be placed:

- In the upper tail
 - In both upper and lower tails
 - In the lower tail
 - In neither tail
- (2)

- g. The critical value of Chi-square for a sample size of 15 with a 95% confidence level for a two tail case:

- 2.7 and 19.023 respectively
 - 6.26 and 27.49
 - 5.63 and 26.12
 - None of the above
- (2)

- h. The lower tail critical value of $F_{0.975, 11, 9} = \text{-----}$

- 0.45
 - 0.28
 - 1.00
 - 3.59
- (2)

2. A corporation owns several companies. The strategic planner for the corporation believes dollars spent on advertising (X) can to some extent be a predictor of total sales dollars (Y). As an aid in long term planning, she gathers the sales and advertising information from eight companies. Summary quantities are:

$$n = 8, \sum X = 199.5, \sum Y = 2670, \sum XY = 107610.4, \sum X^2 = 7667.15, \sum Y^2 = 1587328$$

- Calculate the least square estimates of the slope and intercept. (4)
- (a) What is the mean total sales (\$) when the dollars spent on advertising is 21.6\$

- (b) What is the residual. (2 + 2 = 4)

3. A bank has an average random arrival rate of 3.2 customers every 4 minutes. What is the probability of getting exactly 10 customers during an 8 minutes interval? (5)

4. A company has to choose among three pension plans. Management wishes to know whether the preference for plans is independent of job classification and wants to use $\alpha = 0.05$. The opinions of a random sample of 500 employees are shown in the following table:

Job Classification	Pension Plan			Total
	1	2	3	
Salaried Workers	160	-----	40	340
Hourly Workers	-----	-----	60	160
Total	200	200	100	-----

- (a) Fill in the missing (blank) frequencies in the table above (2)
- (b) Is the preference for pension plans is independent of job classification? (6)
- (c) What's the probability that a randomly selected employee is both "Hourly Worker" and "Prefers Pension Plan 1"? (2)

5. The speed of a file transfer from a server on campus to a personal computer at a student's home on a week day evening is normally distributed with a mean of 60 Kilobits/Sec. and standard deviation of 4 Kilobits/Sec.

- (a) What is the probability that the file will transfer at a speed of 70 Kilobits/Sec. or more?
- (b) What is the probability that the file will transfer at a speed of less than 58 kilobits/Sec.?
- (c) If the file is 1 megabyte, what is the average time it will take to transfer the file?

[Assume i) 1 byte = 8 bits
ii) 1 megabyte = 1000 kilobyte]

(5 + 5 + 2 = 12)

6. In order to compare the mileage yield of two kinds of petrol, i.e Petrol A & Petrol B, several tests were run and the following results obtained as miles per gallon:

Petrol A	Petrol B
21	17
19	20
18	19
20	21
21	17
21	20

Test the null hypothesis that there is no difference in the true average mileage yield of the two kinds of gasoline against that there is

- Assume (i) $\alpha = 0.05$
(ii) the two samples come from populations with same variances.

(10)

7. Write short notes on any two of the following:

- i. One way ANOVA
- ii. Binomial distribution
- iii. Bayes' Theorem

(5+5=10)

PART-II

I Explain briefly any SIX of the following questions

[6X5=30 Marks]

1. Distinguish between Covert and Overt Observation.
2. Define Focussed Interview.
3. What is a Confounding Variable? Explain with examples.
4. Explain Validity and its types in context of experimental research.
 5. Write Reference for an Article in a Periodicals & a print Conference Proceedings following (APA or Chicago) style.
 6. Describe the advantages of 'Quantitative Research' in comparison with 'Qualitative Research'.
 7. Describe different scenarios where 'Participant Observation' & 'Direct Observation' could be the best practice as research methods and justify your answer.
8. Write the differences between: (2.5 + 2.5)
 - a. Ethnography & Ethnomethodology
 - b. Action Research & Participant Observation

II Answer in details any One of the following

[1X10=10 Marks]

9. Discuss the different types of Research Designs.
10. Explain Sampling and its types with examples.
11. Discuss different types of Research Methodologies.