CWM-1.1

Ph.D Course Work Examinations, July-2023

MATHEMATICS

Course-I: Research Methodology

Time: 3 Hours **Max. Marks:70**

Instructions to Candidates: (i) Answer any Five full questions.

(ii) Each question carries equal marks.

1. (a) What do you mean by research? Explain its significance in modern times.
   (b) How do you define a research problem. Explain various techniques used in defining a problem. (8+6)
2. (a) Describe the characteristics that the secondary data should process.
   (b) State the importance of statistic in research and discuss the measure of central tendency? (7+7)
3. (a) Discuss the measure of asymmetry.
   (b) Define the following parameters
      (i) Sampling error.
      (ii) Sampling distribution.
   (c) Write a note on standard error. (6+4+4)
4. (a) In a random selection of 64 of the 2400 intersections in a small city, the mean number of scooter accidents per year was 3.2 and the sample standard deviation was 0.8.
      (i) Make an estimate of the standard deviation of the population from the sample standard deviation.
      (ii) Work out the standard error of the mean for this finite population.
      (iii) If the desired confidence level is 90, what will be the upper and lower limits of the confidence interval for the mean number of accidents per intersection per year?
   (b) What should be the size of the sample if a simple random sample from a population of 4000 items is to be drawn to estimate the percent defective within 2 percent of the value with 95.5 percent probability? What would be the size of the sample of the population is assumed to be infinite in the given case? (9+5)
5. (a) Discuss hypothesis testing for differences between means.

(b) In a group of seven-week-old chickens reached on a high protein diet weight50 12, 15, 11, 16, 14, 14 and 16 ounces; a second group of chickens, similarly treated except that they receive a low protein diet weight 8, 10, 14, 10 and 13 ounces. Test at 5% level whether there is significant evidence that additional protein has increased the weight of the chickens. Use assumed mean as 10 for the sample of 7 and assumed mean as 8 for the sample of 5 chickens in your calculations.

(7+7)

6. (a) Write a note on testing the equality of variance of two normal populations.

(b) Two random samples drawn from two normal populations are

Sample 1: 20, 16, 26, 27, 23, 22, 18, 24, 25, 19.

Sample 2: 27, 33, 42, 35, 32, 34, 38, 28, 41, 43, 30, 37.

Test using variances ratio at 5%, and 1% level of significance. Whether the two

populations have same variances.

(c) List any two limitations of the test of hypothesis. (6+6+2)

7. (a) Write a note on conversion of chi-square into coefficient of contingency and Various characteristics of χ^2 test.

(b) Eight coins were tossed 256 times and the following results were obtained:

No. of heads	0	1	2	3	4	5	6	7	8
Frequency	2	6	30	52	67	56	32	10	1

(6+8)

Are the coins biased? Use χ^2 test.

8. (a) Discuss chi-square as a non-parametric test.

(b) The table given below shows the data obtained during outbreak of small pox:

	Attacked	Not attacked	Total
Vaccinated	31	469	500
Not Vaccinated	185	1315	1500
Total	216	1784	2000

Test the effectiveness of vaccination in preventing the attack from small pox. Test your result with the help of χ^2 at 5 percent level of significance.

(c) Find the value of chi-square, applying Yate's correction to the following data:

	Passed	Failed	Total

Day Classes	10	20	30
Evening Classes	4	66	70
Total	14	86	100

Also state whether the association, if any, between passing in the examination and studying in day classes is significant using chi-square test. (4+5+5)

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