



SNS COLLEGE OF ENGINEERING

AN AUTONOMOUS INSTITUTION

Academic Year 2022 – 2023(Even semester)



QUESTION BANK (IAE-I)

19MA407-STATISTICS AND NUMERICAL METHODS

UNIT I- TESTING OF HYPOTHESIS

PART A

1. Define Type-I error and Type-II error?
2. What are null and alternate hypothesis?
3. What is the essential difference between confidence limits and tolerance limits?
4. What are the parameters and statistics in sampling
5. A coin is tossed 400 times and it turns up head 216 times. Discuss whether the coin may be unbiased one at 5% level of significance.
6. Write down the formula of test statistics 't' to test the significance
7. What are the applications of t-test?
8. What are the expected frequencies of 2x2 contingency table?

a	b
c	d
9. State any two applications of ψ^2 -test.
10. Write the application of 'F' test.

PART B

1. A sample of 900 members has a mean 3.4 cm and standard deviation 2.61 cm. Is the sample from a large population of mean 3.25 cm and standard deviation of 2.61 cm?
2. The mean life time of a sample of 100 light tubes produced by a company is found to be 1580 hours with standard deviation of 90 hours. Examine the hypothesis that the mean life time of the tubes produced by the company is 1600 hours.
3. A sample of 100 students is taken from a large population. The mean height of the students in this sample is 160cms. Can it be reasonably regarded that this sample is from a population of mean 165 cm and standard deviation 10 cm?
4. The means of two large samples of 1000 and 2000 members are 67.5 inches and 68.0 inches respectively. Can the samples be regarded as drawn from the same population of standard deviation 2.5 inches?
5. A mathematics test was given to 50 girls and 75 boys. The girls made an average grade of 75 with a SD of 6, while boys made an average grade of 82 with a SD of 2. Test whether there is any significant difference between the performance of boys and girls.
6. Two horses were tested according to the time (in seconds) to run a particular race with the following results. Test whether horse A is running faster than horse B at 5% level.

Horse A	28	30	32	33	33	29	34
Horse B	29	30	30	24	27	29	

7. A random sample of 10 boys had the following I.Q's:70, 120, 110, 101, 88, 83, 95, 98, 107, 100. Test whether the population mean I.Q may be 100.

8. Examine whether the difference in the variability in yields is significant at 5% level of signification for the following :

	Set of 40 plots	Set of 60 plots
Mean Yield per plot	1258	1243
S.D per plot	34	28

9. Test if the difference in the means is significant for the following data:

Sample I	76	68	70	43	94	68	33	
Sample II	40	48	92	85	70	76	68	22

10. Two random samples gave the following results:

Sample	Size	Sample mean from the mean	Sum of Squares of deviation
1	10	15	90
2	12	14	108

Test whether the samples have come from the same normal population

11. A group of 10 rats fed on diet A and another group of 8 rats fed on diet B, recorded the following increase in weight

Diet A	5	6	8	1	12	4	3	9	6	10
Diet B	2	3	6	8	10	1	2	8		

Test the hypothesis that the sampled have same populations with equal variances at 5% level of significance.

12. The time taken by workers in performing a job by Method I and Method II is given below:

Method I	20	16	26	27	23	22	
Method II	27	33	42	35	32	34	38

Do the data show that the variances of time distribution from population from which these samples are drawn do not differ significantly?

13. Test whether there is any significant difference between the variances of the population from which the following samples are taken:

Sample I	20	16	26	27	23	22	
Sample II	27	33	42	35	32	34	38

14. The following data gives the number of aircraft accidents that occurred during the various days of a week. Find whether the accidents are uniformly distributed over the week.

Days	Sun	Mon	Tue	Wed	Thu	Fri	Sat
No. of Accidents	14	16	8	12	11	9	14

15. 4 coins were tossed 160 times and the following results were obtained:

No. of heads:	0	1	2	3	4
Observed frequencies:	17	52	54	31	6

Under the assumption that the coins are unbiased, find the expected frequencies of getting 0, 1, 2, 3, 4 heads and test the goodness of fit.

16. Theory predicts that the proportion of beans in four groups A, B, C, D should be 9: 3: 3: 1. In an experiment among 1600 beans, the numbers in the four groups were 882, 313, 287 and 118. Does the experiment support the theory?
17. Out of 8000 graduates in a town 800 are females, out of 1600 graduate employees 120 are females. Use chi square to determine if any distinction is made in appointment on the basis of sex. Value of chi square at 5% level for one degree of freedom is 3.84.
18. Test the fidelity and selectivity of 190 radio receivers produced the results shown in the following table:

	Fidelity		
Selectivity	Low	Average	High
Low	6	12	32
Average	33	61	18
High	13	15	0

Use the 0.01 level of significance to test whether there is a relationship between fidelity and selectivity.

19. Two sample polls of votes for two candidates A and B for a public office are taken one form among residents of rural areas. The results ate given below. Examine whether the nature of the area is related to voting preference in the election.

Area / Votes for	A	B	Total
Rural	620	380	1000
Urban	550	450	1000
Total	1170	830	2000

UNIT II- DESIGN OF EXPERIMENTS

1. State the basic principles of design of experiments.
2. State the assumptions involved in Analysis of variance
3. What are the basic steps in ANOVA
4. What are the uses of ANOVA
5. Define Mean sum of squares
6. What are the advantages of a CRD?

PART B

1. The following are the number of mistakes made in successive days by 4 technicians working for a photographic laboratory test at a level of significance $\alpha = 0.01$. Test whether the difference among the 4 sample means cab be attributed to chance.

Technician I (X ₁)	Technician II (X ₂)	Technician III (X ₃)	Technician IV (X ₄)
6	14	10	9
14	9	12	12
10	12	7	8
8	10	15	10
11	14	11	11

2. There are three main brands of a certain powder. A set of 120 sample values is examined and found to be allocated among four groups (A, B, C and D) and three brands (I, II, III) as shown here under:

Brands	Groups			
	A	B	C	D
I	0	4	8	15
II	5	8	13	6
III	8	19	11	13

Is there any significant difference in brands preference? Answer at 5% level.

3. A completely randomised design experiment with 10 plots and 3 treatments gave the following results:

Plot No:	1	2	3	4	5	6	7	8	9	10
Treatment:	A	B	C	A	C	C	A	B	A	B
Yield:	5	4	3	7	5	1	3	4	1	7

Analyse the results for treatment effects.

4. A random sample is selected from each of three makes of ropes and their breaking strength (in pounds) are measured with the following results.

I	70	72	75	80	83		
II	100	110	108	112	113	120	107
III	60	65	57	84	87	73	

Test whether the breaking strength of the ropes differs significantly.