

Question bank for CIE-II

Module 3: A: (05Marks)

1. In a city A 20% of a random sample of 900 school boys had a certain slight physical defect. In another city B, 18.5% of a random sample of 1600 school boys had the same defect. Is the difference between the proportions significant?
2. In two large populations there are 30% and 25% respectively of fair haired people. Is this difference likely to be hidden in samples of 1200 and 900 respectively from the two populations?
3. A machine produces 16 defective objects in a sample of 500. After machine is overhauled, it produces 3 defective objects in a batch of 100. Has the machine been improved?
4. One type of aircraft is found to develop engine trouble in 5 flights out of 100, and another type in 7 flights out of 200 flights. Is there a significant difference in the two types of aircrafts so far as engine defects are concerned?
5. Out of two vending machines at a super bazar, the first machine fails to work 13 times in 250 trials and second machine fails to work 7 times in 200 trials. Test whether the difference between the corresponding sample proportions is significant?
6. If 57 out of 150 patients with certain disease are cured by allopathy and 33 out of 100 patients with same disease are cured by homeopathy. Is there reason to believe that allopathy is better than homeopathy for that disease at 0.05 level of significance.
7. In a study of the effect of drugs on cancer two groups of 80 such patients were considered. One group was treated with allopathic drug while the other group with homeopathic drug. It was observed that 23 in the first group and 41 in the second group were cured. Test the hypothesis that true percentage of patients cured by allopathic drug is at least 8% less than the homeopathic drug in 5% level of significance.

Module 4**A: (05 Marks)**

1. Define Central limit theorem. A sample of 900 members is found to have a mean of 3.4cm . Can it be reasonably regarded as truly random sample from a large population with mean 3.25cm and standard deviation 1.61cm ?
2. The mean of a certain normal population is equal to the standard error of the mean of samples of 100 from that distribution. Find the probability that the mean of the sample of 25 from the distribution will be negative.
3. Determine the probability that the sample mean area covered by a sample of 40 of one liter paint boxes will be between 510 to 520 square feet given that one liter of such paint box covers on an average 513.3 square feet with standard deviation 31.5 s. ft.
4. An unbiased coin is thrown n times. It is desired that the relative frequency of the appearance of heads should lie between 0.49 and 0.51. Find the smallest value of n that will ensure this result with 90% confidence.
5. Define Central limit theorem. The means of simple samples of sizes 1000 and 2000 are 67.5 and 68.0 cm respectively. Can the samples be drawn from the same population of S.D. 2.5cm?
6. Define Central limit theorem. A sample of height of 6400 soldiers has a mean of 67.85 inches and S.D. 2.56 inches while a sample of heights of 1600 sailors has a mean of 68.55 inches and S.D. 2.52 inches. Do the data indicate that sailors are on the average taller than the soldiers?
7. Ten individuals are chosen at random from a population and their heights in inches are found to be 63, 63,

66, 67, 68, 69, 70, 70, 71, 71. Test the hypothesis that the mean height of the universe is 66 inches.

(For d.f. 9, $t_{0.05} = 2.262$)

8. A machinist is making engine parts with axle diameter of 0.7 inch. A random sample of 10 parts shows mean diameter 0.742 inch with a S.D 0.04 inch. On the basis of this sample, would you say that the work is inferior?

For $\nu = 9$, $t_{0.05} = 2.262$.

9. Two horses A and B were tested according to the time (in seconds) to run a particular race gives the

following results

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

Test whether you can discriminate between the two horses. (For, $\nu = 11$, $t_{0.05} = 2.2$, $t_{0.02} = 2.72$)

10. A group of boys and girls were given an intelligence test. The mean score, S.D.s and numbers in each group are as follows.

	Boys	Girls
Mean	124	121
S.D.	12	10
n	18	14

Is the mean score of boys significantly different from that of girls?

B: (05 Marks)

1. In experiments on pea breeding, the following frequencies of seeds were obtained.

Round and yellow	Wrinkled and yellow	Round and green	Wrinkled and green	Total
295	91	94	20	500

Theory predicts that the frequencies should be in proportions 9: 3: 3: 1. Examine the correspondence between theory and experiment. For $\nu = 3$, $\chi_{0.05}^2 = 7.815$.

2. A set of five similar coins is tossed 320 times and the result is

No. of heads	0	1	2	3	4	5
f	12	45	92	104	54	13

Test the hypothesis that the data follow a binomial distribution. For $\nu = 5$, $\chi_{0.05}^2 = 11.07$.

3. The following table gives the number of aircraft accidents that occurred during the various days of the week.

Find whether the accidents are uniformly distributed over the week.

Days	Sun	Mon	Tue	Wed	Thru	Fri	Sat
No. of accidents	12	14	6	10	9	7	12

For d.f. $\nu = 6$, $\chi_{0.05}^2 = 12.59$.

4. A die was thrown 60 times and the result is

Faces	1	2	3	4	5	6
f	15	6	4	7	11	17

Test the hypothesis that the die is unbiased. For $\nu = 5$, $\chi_{0.05}^2 = 11.07$.

5. Test for goodness of fit of a Poisson distribution at 5% level to the following frequency distribution.

x	0	1	2	3	4	5	6	7	8
f	52	151	130	102	45	12	5	2	1

6. Two independent samples of size 7 and 6 have the following values.

Sample-A	28	30	32	33	33	29	34
Sample-B	29	30	30	24	27	29	

Examine whether the samples have been drawn from normal populations having the same variance.

Given that $F_{0.05}(6, 5) = 4.95$ and $F_{0.05}(5, 6) = 4.39$.

7. Two independent samples of size 8 and 5 have the following values.

Sample-A	12	10	8	7	13	16	15	9
Sample-B	11	7	9	14	17			

Examine whether the samples have been drawn from normal populations having the same variance.

Given that $F_{0.05}(7, 4) = 6.09$ and $F_{0.05}(4, 7) = 4.12$.

Module 5:

A: (05 Marks)

1. Test the hypothesis $\mu_1 = \mu_2 = \dots = \mu_5$ at the 0.05 level of significance for the data given below on absorption of moisture by various types of cement aggregates. $F_{0.05}[4, 15] = 3.06$ and $F_{0.05}[15, 4] = 5.86$.

Aggregate	I	II	III	IV	V
	5	5	6	4	5
	4	3	5	5	4
	4	6	5	5	5
	7	4	3	4	6

2. The varieties of wheat A, B, C were shown in four plots and yields in quintals per acre is as follows.

A	8	4	6	7
B	7	6	5	3
C	4	5	4	4

Test the significance difference between the yields of varieties.

Given that, $F_{0.05}[2, 9] = 4.26$, $F_{0.05}[9, 2] = 19.38$

3. A company wishes to test whether its three salesmen A, B and C tend to make sales of the same size or whether they differ in their selling ability as measured by the average size of their sales. During one week there have been 14 sale calls; A made 5 calls, B made 4 calls and C make 5 calls. Following are the sales record.

A	300	400	300	500	100
B	600	300	300	400	-
C	700	300	400	600	500

Perform the Anova by coding method. (Dividing by 100) and draw your conclusion.

4. Profit of three types of products A, B, C of a company in different cities given bellow.

A	B	C
2000	4000	1000
3000	2000	2000
4000	2000	3000
1000		1000
		5000

Test whether the three product differs as profit is concerned.

$$F_{0.05}[2, 9] = 4.26 \text{ and } F_{0.05}[9, 2] = 19.38.$$

5. There are three brands I, II and III of powder, a set of its 120 sales among 4 groups A, B, C and D is given below.

Group Brand	A	B	C	D
I	0	4	8	15
II	5	8	13	6
III	18	19	11	13

Is there any significant difference in brand's preference? Using one way Anova answer the question.

$$\text{Given that } F_{0.05}[2, 9] = 4.26, F_{0.05}[9, 2] = 19.38.$$

6. Set up Anova table for the following per hector yield for three types of wheat A, B, C in four plots by coding method (take code =5) . Test whether there is any significant difference in the 4 plots.

Wheat Plot	A	B	C
I	6	5	5
II	7	5	4
III	3	3	3
IV	8	7	4

B: (05 Marks)

1. Yield of Four varieties of wheat in 3 different plots per hectare is given bellow.

Wheat Plot	A	B	C	D
I	4	5	6	6
II	6	4	5	4
III	5	6	4	5

Set up the two-way Anova, and test whether varieties differ significantly, whether Plots differ significantly.

2. Set up the two-way Anova table for the data given bellow. (Use coding method by taking 40 as code)

Factor-I Factor-II	A	B	C	D
P	45	40	38	37
Q	43	41	45	38
R	39	39	41	41

3. To establish the yield producing ability of four types of soya beans A, B, C and D three blocks of land X, Y, Z may be with different fertility are considered. Each block of land are divided into 4 plots and the four types of soya beans are assigned to the plots in each blocks randomly. Following results obtained.

Soya bean Block	A	B	C	D
X	5	9	11	10
Y	4	7	8	10
Z	3	5	8	9

Test, whether A, B, C, D are significantly differ? Whether X, Y, Z are with same fertility?

4. Analyze and interpret the following statistics concerning output of wheat per field obtained as result of experiment conducted to test 3 varieties of wheat A, B, C under the Latin- Square Design.

C 15	B 20	A 21
A 19	C 18	B 15
B 18	A 16	C 17

$$F_{0.05}[2, 2] = 19.$$

5. Analyze and interpret the following under the Latin- Square Design.

C 3	A 5	B 5	D 2
A 4	B 3	D 3	C 5
B 3	D 4	C 4	A 3
D 5	C 4	A 3	B 1

$$F_{0.05}[3, 6] = 4.76.$$

6. Effectiveness in reducing blood pressure for three different groups of people; amount of blood pressure reduction in millimeters of mercury is as follows.

Drug \ Group of people	X	Y	Z
A	14 15	10 9	11 11
B	12 11	7 8	10 11
C	10 11	11 11	8 7

Answer the following in 5% level of significance.

1. Do the drugs act differently?
2. Are the different groups of people affected differently?
3. Is the interaction term significant?

Question paper pattern

Part1 (Module 1)-10 Marks		
1 a. (5 Marks)	Or	2 a. (5 Marks)
Part2 (Module 4)-10 Marks		
3 a. (5 Marks) b. (5 Marks)	Or	4 a. (5 Marks) b. (5 Marks)
Part3 (Module 5)-05 Marks		
5 a. (5 Marks) b. (5 Marks)	Or	6 a. (5 Marks) b. (5 Marks)