

IMBA Semester-4 Examination

IIS_IMBA38

Statistics

April-2024

Time : 2-30 Hours]

[Max. Marks : 70

Instructions:

- 1) The figures on right hand side indicates marks.
- 2) Use of scientific calculators is **Allowed**.
- 3) Use of Statistical Tables is **Allowed**.

Question 1

A sample of 30 students is to be drawn from a population consisting of 300 students belonging to two colleges A and B. The means and standard deviations of their marks are given below:

	Total Number of Students (N_i)	Mean (\bar{Y}_{N_i})	Standard Deviation (σ_i)
College A	200	30	10
College B	100	60	40

How would you draw the sample using proportional allocation technique? Hence obtain the variance of estimate of the population mean. [14 Marks]

OR

Question 1

- (A) Explain in detail the types of sampling. [7 Marks]
- (B) Explain the principal steps in a sample survey. [7 Marks]

Question 2

Write the assumptions of F-test and hence solve the following:

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 F-test at 5% and 1% level of significance whether the two populations have the same variances. [14 Marks]

OR

Question 2

- (A) A sample of 400 male students is found to have a mean height 67.47 inches. Can it be reasonably regarded as a sample from a large population with mean height 67.39 inches and standard deviation 1.30 inches? Test using z-test at 5% level of significance. (Tabulated value at 5% level of significance = 1.96) [7 Marks]

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- (B) Raju Restaurant near the railway station at Falna has been having average sales of 500 tea cups per day. Because of the development of bus stand nearby, it expects to increase its sales. During the first 12 days after the start of the bus stand, the sales were as under:

550, 570, 490, 615, 505, 580, 570, 460, 600, 580, 530, 526

On the basis of this sample information, can one conclude that Raju Restaurant's sales have increased? Use t-test at 5% level of significance. [7 Marks]

Question 3

State the conditions for the application of chi-square test and hence solve the following:
Two research workers classified some people in income groups on the basis of sampling studies. Their results are as follows:

Investigators	Income groups			Total
	Poor	Middle	Rich	
A	160	30	10	200
B	140	120	40	300
Total	300	150	50	500

Show that the sampling technique of at least one research worker is defective. [14 Marks]

OR

Question 3

- (A) What do you mean by chi-square test? Explain the steps involved in applying chi-square test. [7 Marks]

- (B) A die is thrown 132 times with following results:

Number turned up	1	2	3	4	5	6
Frequency	16	20	25	14	29	28

Is the die unbiased? Apply chi-square test. [7 Marks]

Question 4

The values in one samples are 53, 38, 69, 57, 46, 39, 73, 48, 73, 74, 60 and 78. In another sample they are 44, 40, 61, 52, 32, 44, 70, 41, 67, 72, 53 and 72. Test at the 10% level the hypothesis that they come from populations with the same mean. Apply U-test. [14 Marks]

OR

Question 4

- (A) State the important Non-Parametric Tests. [7 Marks]

- (B) The following are the numbers of artifacts dug up by two archaeologists at an ancient cliff dwelling on 30 days. Use the sign test at 1% level of significance to test the null hypothesis that the two archaeologists, X and Y, are equally good at finding artifacts against the alternative hypothesis that X is better. [7 Marks]

By X	By Y
1	0
0	0
2	1
3	0

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1	2
0	0
2	0
2	1
3	1
0	2
1	0
1	1
4	2
1	1
2	1
1	0
3	2
5	2
2	6
1	0
3	2
2	3
4	0
1	2
3	1
2	0
0	1
2	0
4	1
2	0

Question 5 (Attempt any seven) [14 Marks]

- 1) Define population, sample and sample size.
- 2) Cost function in stratified random sampling is given as _____.
- 3) State names of methods using which simple random sample can be obtained.
- 4) Define Type-I and Type-II error.
- 5) Define Null and Alternative Hypothesis.
- 6) State test statistic for testing the hypothesis for differences between means given populations variances are known or the samples happen to be large samples.
- 7) State alternative formula for χ^2 chi-square test.
- 8) As a non-parametric test, chi-square test can be used for what?
- 9) State any four characteristics of Non-parametric tests.
- 10) State the Rank Sum Tests.
- 11) Define simple random sampling of attributes.
- 12) State two advantages of stratified random sampling.

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