PG/IIS/COM-203/13

M.COM. 2nd Semester Examination, 2013

ADVANCED BUSINESS STATISTICS

PAPER—COM - 203

Full Marks : 50

Time : 2 hours

The figures in the right-hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

Illustrate the answers wherever necessary

UNIT – I

1. Answer any *two* questions : 5 × 2

(*a*) Define a uniform distribution. Why is this distribution so called ? Illustrate your answer with graphs.

(*b*) A life insurance company insures the lives of 5000 persons aged 45. If studies show the

probability that any 45-years old person will die in a given year to be 0·001, find the probability that the company will have to pay at least two claims during a given year.

(*c*) Write a short note on purposive sampling. When would you prefer this sampling design to other sampling designs ?

(*d*) A multiple -choice test contains 8 questions with 3 answers to each question (of which only one is correct). A student answers each question by rolling a balanced dice and he ticks the first answer if he gets 1 or 2, the second answer if he gets 3 or 4, and the third answer if he gets 5 or 6. To get a star marks, the student must secure at least 75 percent correct answers. If there is no negative marking, what is the probability that the student secures a star marks ?

2. Answer any *one* question : 10×1

(*a*) (*A*) Suppose 10 percent of new scooters

will require warranty service within the first month of its sales. A scooter manufacturing company sells 1000 scooters in a month.

(*i*) Find the mean and standard deviation of scooters that require warranty service.

(*ii*) Calculate the skewness and kurtosis of the distributions.

(*B*) The income of a group of 10,000 persons was found to be normally distributed with mean Rs. 1,750 p.m. and standard deviation Rs 50.

(*i*) Find out the expected number of persons getting more than Rs 1,832 p.m.

(*ii*) What was the lowest income among the richest 100 ? 4 + 6

(*b*) (*A*) What is meant by "stratified random sampling" ? Explain the procedure and advantages of stratification.

(*B*) How do you distinguish between 'standard error' and 'standard deviation' ? 6 + 4

UNIT – II

3. Answer any *two* questions : 5 × 2

(*a*) Distinguish between type I error and type II error. Explain your answer as clearly as you can.

(*b*) Define a likelihood function and hence explain the concept of the maximum likelihood method of estimation.

(*c*) What steps would you follow in the case of testing of any statistical hypothesis ?

(*d*) In a laboratory experiment, two random samples gave the following results :

Sample	Size	Sample mean	Sum of squares of deviations from mean
1	10	15	90
2	12	14	108

Test the equality of variances at 10 % level of significance.

[Given $F_{0\cdot05;9,11} = 2\cdot90$ and $F_{0\cdot05;11,9} = 3\cdot07$]

4. Answer any *one* question : 10×1

(*a*) (*i*) In the following cases, state which test out of z-test, paired-t test, 't'-test, F-test, χ^2-test, U-test, H-test is appropriate ?

(*A*) To test the significance of mean of a sample of size 25, where σ is known.

(*B*) To test for independence of attributes.

(*C*) To test the equality of means of 6 populations, where the populations are non-normal.

(*D*) To test the significance of difference between the means of two large samples.

(*E*) To test the equality of two population means, where two samples are pairwise-dependent.

(*F*) To test the equality of two population variances with two samples of size 20 each.

(*ii*) In a certain city 250 men in a sample of 1000 were found to be smokers. In another city, the number of smokers was 750 in a random sample of 2000. Does this indicate that there is a greater proportion of smokers in the second city than in the first ? Test at $\alpha = 0{\cdot}05$.

$\left(\frac{1}{2} \times 6\right) + 7$

(*b*) (*A*) Write down the situation when we are compelled to apply non-parametric test for testing a statistical hypothesis.

(*B*) A paper of 10 students on International Finance has been examined and marked by three teachers A, B and C independently. The final marks obtained by them are recorded as follows :

Student Roll No.	1	2	3	4	5	6	7	8	9	10
Marks by A	73	82	64	53	75	72	45	60	80	68
Marks by B	78	77	68	60	73	70	48	63	77	72
Marks by C	68	79	63	55	70	80	48	61	73	74

Apply Kruskal-Wallis H test to determine whether the marks given by three teachers differ significantly, at $\alpha = 0{\cdot}05$.

[Given : $\chi^2_{0{\cdot}05,9} = 16{\cdot}92$; $\chi^2_{0{\cdot}05,2} = 5{\cdot}99$] 3 + 7

[*Internal Assessment* : 10 Marks]