

Jagan Institute of Management Studies
End-Term Examination, December 2017 – January 2018
Trimester II – PGDM 2017-19

Quantitative Techniques II
ET_PG_QT-II_3012

Time: 3 Hrs.

M. Marks: 70

INSTRUCTIONS: Attempt any SEVEN questions. All questions carry equal marks.

- Q 1 a)** Golden Fitness Centre claims that completion of the weight loss programme will result in a weight loss. To test this claim, six persons were selected at random and they were put through the weight loss programme and their weights before and after the programme were recorded. Test the claim of the Fitness Centre at $\alpha = 0.05$. The weights (in pounds) of these six persons recorded before and after the programme are as follows:

Persons	Weight (before)	Weight (after)
1	145	143
2	200	190
3	160	165
4	185	183
5	164	160
6	175	175

(Table value of t test at 5% for 5 d.f. is 2.015)

- b)** Random samples of 200 bolts manufactured by machine A and 100 bolts manufactured by machine B showed 19 and 5 defective bolts, respectively. Test the hypothesis
- That the two machines are showing different qualities of performance; and
 - That the machine B is performing better than A.

Use the 0.05 level of significance.

(Table value of Z test at 5% is 1.96 for two tail and 1.64 for one tail)

10

- Q 2 a)** The average monthly salary of officers under Indian Administrative Services is normally distributed and found to be Rs. 28,500 with a standard deviation of Rs.3,925. A random sample of 100 such officers was taken by the Group of Concerned Citizens and their monthly salary is found to be Rs.27,980. At $\alpha=0.02$, can this estimate of the Group of Concerned Citizens regarding the average monthly salary of IAS

officers may be accepted?

(Table value of Z test at 2% is 2.33 for two tail)

- b) The manufacturer of a patent medicine claims that its product is more than 70 per cent effective in giving immediate relief from skin itches, from any cause. The Indian Medical Association, hoping to verify this claim, appoints a Committee of seven skin specialists to evaluate the effectiveness of the medicine. Some members of the Committee are confident that the manufacturer's claim could not possibly be true (owing to their past experience with similar drugs), but others suspect that the claim might be valid, so it is finally agreed that both alternatives should be considered. After some thought, it is decided to set α at 0.01 and try the medicine on 200 patients who have skin disorders. It was found that 125 of these patients experienced immediately relief. What conclusion the Committee is likely to reach?

(Table value of Z test at 1% is 2.33 for one tail)

10

- Q 3 a) Give a brief discussion on application of Byes' theorem in positively diagnosed test results of rare diseases.

3

- b) A factory has two machines A and B. Past records show that machine A produces 30% of the total output and machine B the remaining 70%. Machine A produces 5% defective articles and machine B produces 1% of defective items. An item is selected at random and found to be defective. What is the probability that it was produced (i) by machine A (ii) by machine B?

7

- Q 4 Three varieties of coal were analyzed by 5 chemists and the ash content in the varieties was found as under:

Varieties	C h e m i s t s				
	I	II	III	IV	V
A	9	7	6	5	8
B	7	4	5	4	5
C	6	5	6	7	6

Do the varieties differ significantly in their ash contents? (For 2 and 12 d.f. $F = 3.88$)

10

- Q 5 a) There are two coins; the first is fair and the second, the two-tailed. A coin is chosen at random; we toss it twice and tail shows both times. Find the probability that the coin picked up is fair.

- b) An importer is offered a shipment of machine tools for Rs.1,40,000, and the probabilities that he will be able to sell them for Rs.1,80,000, Rs.1,70,000, or Rs.1,50,000 are 0.32, 0.55, and 0.13. What is the importers expected gross profit?

10

Q 6 a) State the conditions under which binomial distribution is used. Find the distribution if the mean is 48 and standard deviation is 4.

b) Five hundred television sets are inspected as they came off the production line and the number of defects per set is given below:

<i>No. of Defects:</i>	0	1	2	3	4
<i>No of set:</i>	368	72	52	7	1

Estimate the average number of defects per set and expected frequencies of 0, 1, 2, 3 and 4 defects, assuming Poisson distribution. (Given $e^{-0.40} = 0.67$).

10

Q 7 a) Out of 500 scripts from Bombay Stock Exchange (BSE) a sample of 50 scripts that have been paying dividend every year since 1995 was taken. The average dividend is found to be 18% per annum with a variance of 9%. Construct 95% confidence interval estimate of average annual dividend for all the 500 scripts of BSE.

b) A pathologist wants to determine, on the basis of sample study, the mean time required to complete a certain analysis so that he may be 98 percent confident that the mean may remain within ± 3 days of the true mean. As per the available record, the population variance is 81 days. What must be the size of the sample for his study? How large a sample would be required if the precision is to be doubled? (Table value of z corresponding to 98 percent confidence interval is 2.33)

10

Q 8 a) What do you mean by hypothesis? How do you test a hypothesis?

b) To test the IQ level of boys and girls of a certain university a sample of 83 boys and 95 girls were taken for an IQ test. The average marks girls scored were 29.91 with a standard deviation of 11.56 marks and boy secured 30.92 marks on an average with standard deviation of 7.81 marks, Is the difference amongst the mean scores is significant enough to believe that boys are having a better IQ in the university. Test your hypothesis at 5% level of significance.

10

Q 9 a) In a survey of buying habits, 400 women shoppers are chosen at random in super-market A located in the certain section of the city. The average weekly food expenditure is Rs.250 with a standard deviation of Rs.40. For 400 women shoppers chosen at random in super-market B located in another section of the city, the average weekly food expenditure is Rs.220 with a standard deviation of Rs.55. Test at five percent level of significance whether the average weekly food expenditures of the population of shoppers are equal. (Z at 5% is 1.96).

b) What is point estimate? What are the qualities of a good estimator?

10

Q 10

The mean and standard deviation of the wages of 6,000 workers engaged in a factory are Rs 1200 and Rs 400 respectively. Assuming that the distribution to be normal estimate;

- i) Percentage of workers getting wages above Rs 1600.
- ii) Number of workers getting wages between Rs 600 and Rs 900.
- iii) Number of workers getting wages between Rs 1100 and Rs 1500.

OR

Importance of quantitative techniques in business decision making is now well recognized. Explain this philosophy by taking examples in any business organization.

10
