

Jagan Institute of Management Studies
End-Term Examination, December, 2016 – January, 2017
Trimester II – PGDM 2016-18

Quantitative Techniques II
ET_PG_QT-II_0201

Time: 3 Hrs.

M. Marks: 70

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

- Q 1** a) A husband and a wife appear in an interview for two vacancies in the same post, the probability that husband's selection is $1/7$ and that of wife's selection is $1/5$, what is the probability that:
- i) Both of them will be selected
 - ii) None of them will be selected
 - iii) Only one of them will be selected
- b) From a computer based tally based on employee records, the personal manager of the large manufacturing firm finds that 15% of the firm's employees are supervisors and 25% of the firm's employees are college graduates, he also discovers that 5% of the firm's employees are both supervisor and college graduates. Suppose an employee selected at random from the firm's personal record. Find the
- i) Probability of selecting a person who is both a college graduate and a supervisor
 - ii) Probability of selecting a person who is neither a supervisor nor a college graduate. **10**
- Q 2** a) In a game of throwing a dice, the reward for each of the numbers 1, 2, 3, 4, 5 and 6 is equal to the number of dots, i.e. Re.1, Rs.2, Rs.3, Rs.4, Rs.5 and Rs.6. If the chances of each of these numbers are equal, what is the expected value of the reward?
- b) If the probability of recovering loan amount according to repayment schedule is 0.8 for a particular category of loans, what is the probability of recovering at least 4 out of 6 loans sanctioned in this category? Also calculate the expected number of recoveries and the extent of variation. **10**
- Q 3** a) The marks of the students in a class are normally distributed with mean 70 and s.d. 5. If the instructor decides to give 'A' grade to the top 15% of the class, how many marks a student must get to be able to get 'A' grade? ($Z=1.04$ area is 0.35)
- b) Why do businessmen often prefer sampling to census? Is cost of sampling the only consideration in favour of sampling? **10**

Q 4 A car firm has 2 cars, which hires out day by day. The number of demands for a car on each day is distributed in accordance to Poisson distribution with mean 1.5. Calculate the proportion of days on which neither car is used, and the proportion of days on which some demand is refused. If each car is used an equal amount, on what proportion of days is one of the cars is not in use? What proportion of demand has to be refused? **10**

Q 5 What do you understand by hypothesis and estimation? Discuss importance of hypothesis testing for a manager; refer a virtual business situation to explain. Discuss type I and type II errors, along with suitable examples. **10**

Q 6 The mean breaking strength of the cables supplied by a manufacturer is 1800 with a SD 100. By a new technique in the manufacturing process it is claimed that the breaking strength of the cables have increased. In order to test this claim a sample of 50 cables is tested. It is found that the mean breaking strength is 1850. Can we support the claim at 5% level of significance?

OR

An independent research agency conducted a survey of 500 randomly selected homes in Northern India during the first quarter of the current year and found that between 8.30 p.m. to 9.30 p.m. 162 audiences watched Star TV programmes, 147 Sony, 118 Zee and remaining watched programmes aired by other channels. Use Chi-Square Test at 5% level of significance to test the belief that the viewership proportion is 32% for Star, 30% for Sony, 25% for Zee and 13% for other channels. ($\chi^2 =_{0.05; 3} \square 7.81$). **10**

Q 7 A mobile phone service provider found that its customers pay bills by three modes: cheques, credit card and internet. It collected samples of the number of days three types of customers take in making the payment after the receipt of billing SMS/bill. The company believes that the three samples below have been obtained from normal population with equal variances. Test the hypothesis at 5% level that the mean time is equal for the three modes. (Relevant table value is 3.88).

X ₁	X ₂	X ₃
8	7	12
10	5	9
7	10	13
14	9	12
11	9	14

10

Q 8 A group of 5 patients treated with medicine A weight 42, 39, 48, 60 and, 41 Kgs. Second group of 7 patients from the same hospital treated with medicine B weight 38, 42, 56, 64, 68, 69 and, 62 Kgs. Do you agree with the claim that, medicine B increases that weight slightly? **10**

Q 9 A farmer applies three types of fertilizers on 4 separate plots. The figures on yield per acre are tabulated below:

Fertilizers\ Plots	Yield				Total
	A	B	C	D	
Nitrogen	6	4	8	6	24
Potash	7	6	6	9	28
Phosphates	8	5	10	9	32
Total	21	15	24	24	84

Find out if the plots are materially different in fertility, as also, if the three fertilizers make any material difference in yields. ($F_{3 \& 6; 0.05} = 4.76$ and $F_{2 \& 6; 0.05} = 5.14$). **10**

Q 10 50 students selected at random from 500 students enrolled in a computer crash programme were classified according to age and grade points giving the following data:

Grade Points	Age (in years)		
	20 and under	21 - 30	Above 30
Up to 5.0	3	5	2
5.0 to 7.5	8	7	5
7.6 to 10.0	4	8	8

Test at 5% level of significance the hypothesis that age and grade points are independent (χ^2 is 5.991 for 2 d.f. at 5%). **10**
