CHRIST (DEEMED TO BE UNIVERSITY),BENGALURU - 560029

End Semester Examination October/November - 2018

Master of Computer Applications I SEMESTER

Code: MCA134 **Max.Marks: 100**

Course: PROBABILITY AND STATISTICS **Duration: 3Hrs**

SECTION A

Answer any TEN questions **10X2=20**

1 There were 500 workers in a factory. Their mean wage was calculate as Rs. 200. Later on it was discovered that wages of two workers were misread as 180 and 20 in place of 80 and 220. Evaluate the corrected mean.

2 The coefficient of variation of a distribution is 60% and its standard deviation is 12. Identify its mean.

3 List any two uses of regression.

4 Hydraulic landing assemblies coming from an aircraft rework facility are inspected for defects. Historical records indicate that 8% have defects in shafts only, 6% have defects in bushings only and 2% have defects in both shafts and bushings. One of the hydraulic assemblies is selected randomly. what is the probability that the assembly has neither type of defects?

5 Differentiate between a variable and a random variable.

6 If the mean of a Poisson distribution is 1.5 find P(X=3).

7 Write the pdf of Chi square distribution with n degrees of freedom.

8 Define null hypothesis and give example.

9 Give the region of rejection for a two sided alternative hypothesis in testing for one proportion.

10 Health Electronics Inc., a manufacturer of pacemaker batteries specifies that the life of each battery is equal to or greater than 28 months. If scheduling for replacement surgery for the batteries is to be based upon this claim, which error , type I or type Ii is considered to be serious and why?

11 Name the two types of estimation.

12 Distinguish between one way and two way analysis of variance.

SECTION B

Answer any TWO QUESTIONS **2X20=40**

13 (a) Evaluate mean using the empirical formula.

Weekly Income (in Rs)	Below 100	100-200	200-300	300-400	400-500	500 and above
No. of families	50	50	55	75	35	40

(b) The mean and standard deviation of two brands of light bulbs are given below:

	Brand I	Brand II
Mean	800 hours	770 Hours
Standard deviation	100 Hours	60 Hours

Evaluate a measure of relative dispersion for the two brands and interpret the result.

(c) The administrator of a Georgia hospital conducted a survey of the number of days 200 randomly chosen patients stayed in the hospital following an operation. The data are given below:

Hospital Stay	1-	4-	7-	10-	13-	16-	19-	22-

in Days	3	6	9	12	15	18	21	24
frequency	18	90	44	24	9	9	4	2

Evaluate Bowley's measure of skewness.

14 a) Find the lines of regression for the following data and hence estimate the maintenance cost if the age of a car is 11 years age of car if the maintenance cost is Rs. 15.50/-

Age of cars(in yrs)	2	4	6	7	8	10	12
Maintenance cost (Rs.)	6	8	9	10	9	4	6

b) A dealer in refrigerators estimates from his past experience the probabilities of his selling refrigerators in a day. these are as follows:

No. of refrigerators	0	1	2	3	4	5
Probability	0.03	0.2	0.23	0.25	0.12	0.10

Find the mean number of refrigerators sold in a day. What is the probability that more than 3 refrigerators are sold in a day.

c) A can solve 90 % of the problems given in a book, B can solve 85% and C can solve 70%. What is the probability that:

(i) the problem is solved?

(ii) all three of them solve the problems?

(iii) exactly two solve the problems?

15 a) The speed in which the home page of a website is downloaded is an important quality characteristic of that website. Suppose that the mean time to download the home page for the Internal Revenue Service is 1.2 seconds. Suppose that the download time is normally distributed, with a standard deviation of 0.2 second. Identify the probability that a download time is:

(i) less than 2 seconds? (i) between 1.5 and 2.5 seconds? (iii) above 1.8 seconds?

(iv) 99% of the download times are slower (higher) than how many seconds ?

b) Assume that the number of network errors experienced in a day on a local area network (LAN) is distributed as a Poisson random variable. The mean number of network errors experienced in a day is 2.4. Identify the probability that in any given day

(i) zero network errors will occur? (ii) exactly one network error will occur? (iii). two or more network errors will occur?

c) An agricultural cooperative claims that 95 percent of the watermelons that are shipped out are ripe and ready to eat. Identify the probabilities that among ten watermelons randomly selected to be shipped out

(i) at least eight are ripe and ready to eat; (ii) from seven to nine are ripe and ready to eat.

SECTION C

Answer any TWO questions **2X20=40**

16 a) A test of breaking strengths of 25 rods manufactured by a company show a mean breaking strength of 7750 kg with a standard deviation of 145 kg while the manufacturer's claim is that the mean breaking strength is 8000 kg. Does the data justify the manufacturer's claim? Test at 1% level of significance.

b) Describe the test procedure for testing equality of two means when variances are unknown.

c) A random sample of 100 families from community A and a random sample of 150 families from community B yield the following data on length of residence in current homes.

	Mean	Variance
Community A	33 months	900 months
Community B	49 months	1050 months

Do these data provide sufficient evidence to indicate that on the average families in community A have been living in their homes for less time than families in community B? Take $\alpha = 0.05$.

17 a) Describe the test procedure for testing single proportion.

b) General Nucleonics, the major energy corporation is attempting to take over a small concern Sergeant Nucleonics. General's consultant reports that 60% of Sergeant's shareholders support the takeover bid.To be sure of this, General's president requests a telephone survey of a random sample of sergeant's share holders. The staff polls 1500 share holders and find that 784 support the takeover bid. At level of significance 0.01,examine whetehr the poll refute the consultant's report?

c) Acme Drug Company develops a new drug, designed to prevent colds. The company states that the drug is equally effective for men and women. To test this claim, they choose a simple random sample of 100 women and 200 men from a population of 100,000 volunteers. At the end of the study, 38% of the women caught a cold and 51% of the men caught a cold. Based on these findings, can we reject the company's claim that the drug is equally effective for men and women? Use a 0.05 level of significance.

18 a) Several Insurance adjusters were concerned about the unusually high repair estimates they seemed to be getting from Fosbert's U-Bet Repair Station. To test their suspicions, they brought each of eight damaged cars to Fosbert's and also to the auto repair shop of Nickle's Department Store, a concern generally regarded as reliable. They obtained the following estimates, in hundreds of dollars:

Car number	1	2	3	4	5	6	7	8
Fosbert estimate	2.1	4.5	6.3	3.0	1.2	5.4	7.3	9.3
Nickle estimate	2.0	3.8	5.9	2.8	1.3	5.0	6.5	8.9

At level of significance 0.01 can the adjusters conclude from their survey that Fosbert's estimates are significantly higher than Nickle's?

b) In a randomized, double blind clinical test of a new vaccine, rats were randomly divided into 2 groups. Subjects in group 1 received new vaccine, group 2 received control vaccine. After the first dose, 114 of the 716 subjects in the experimental group (group 1) experienced vomiting as a side effect. After the first dose, 62 of 613 subjects in control group (group 2) experienced vomiting as a side effect. Find 99% confidence interval for the difference between the two populations proportions.

c) The alcohol content of wine depends on the grape variety, the way in which the wine is produced from grapes, the weather and other factors. Here is the data on the percent of alcohol in wine produced from the same grape variety in the same year by 18 winemakers in the same region of Europe. Give a 95% confidence interval for the mean alcohol content of wine of this sample.

12.86	12.88	12.81	12.7	12.51	12.6	12.25	12.53	13.49
12.84	12.93	13.38	13.52	13.62	12.25	13.16	13.88	12.87