CHRIST UNIVERSITY, BENGALURU - 560029

End Semester Examination March - 2017 Bachelor of Science - CMS/EMS II SEMESTER

Code: STA231 Max.Marks: 100
Subject: STATISTICAL METHODS Duration: 3Hrs

SECTION A

ANSWER ANY TEN QUESTIONS

10X3 = 30

- 1 How do you define independence in terms of distribution functions for discrete random variables?
- 2 Give an expression for variance of a linear combination of a random variable X.
- 3 Name the distribution for which (i) mean is greater than variance (ii) mean is equal to variance and (iii) mean is less than variance.
- 4 Write the p m f of a hyper geometric distribution, explaining each term. State its mean and variance.
- **5** Give the situation where the following distributions can be applied. (i) geometric (ii) hyper geometric (iii) negative binomial.
- **6** Write the relationship among QD, SD and MD in a normal distribution. If the standard deviation of a normal distribution is 10, find approximately its mean deviation and quartile deviation.
- 7 Define a beta distribution of first kind and second kind.
- **8** Mention the importance of Chebychev's inequality.
- 9 In the computer industry the average age of professional employees tends to be younger than in many other professions. Suppose the average age of a professional employee in a particular computer firm is 28 years with a standard deviation of 5 years. Apply Chebychev's theorem to determine within what range of ages at least 85% of the workers ages would fall.
- 10 Explain different methods of filtering (selecting cases) in SPSS.
- 11 Explain the procedure to convert categorical variables into numerical values.
- **12** How do find you find regression coefficients in SPSS?

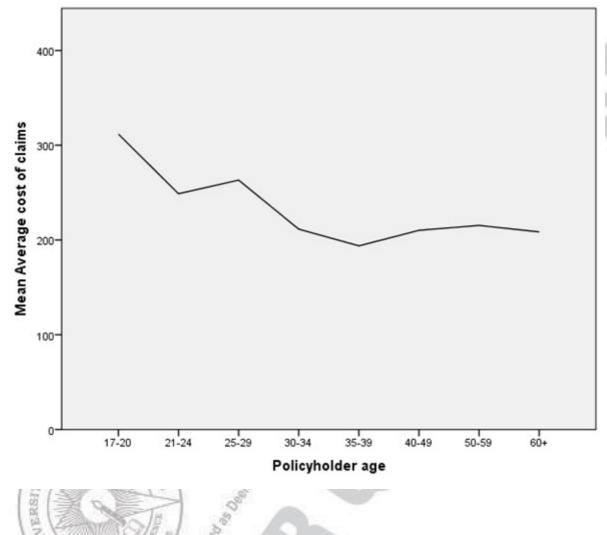
SECTION B

ANSWER ANY FIVE QUESTIONS

5X6=30

- 13 Explain the terms (i) conditional expectation and (ii) conditional variance.
- ${f 14}$ (i)Comment on the following: The mean of a binomial distribution is 3 and variance is ${f 4}$
 - (ii)The mean and variance of a binomial distribution are 4 and 4/3 respectively. Write the pmf.
 - (iii)The mean and variance of a binomial distribution are 4 and 4/3 respectively. Obtain the values of the parameters.
 - (iv) For a B(17, $\frac{1}{4}$) find mode.
- **15** Solve the following:
 - (i) A representative from the National Football League's Marketing Division randomly selects people on a random street in Kansas City, Kansas until he finds a person who attended the last home football game. Let p, the probability that he succeeds in finding such a person, equal 0.20. And, let X denote the number of people he selects until he finds his first success. What is the probability that the marketing representative must select 4 people before he finds one who attended the last home football game?
 - (ii) A small voting district has 101 female voters and 95 male voters. A random sample of 10 voters is drawn. What is the probability exactly 7 of the voters will be female?
- **16** Find the mean deviation of a normal variate.

- 17 During the last week of the semester students at certain college spent on an average 4.2 hours using the college computer terminals with the standard deviation of 1.8 hours. For a random sample of 36 students at that college, find the probability that the average time spent using computer terminals during the last week of semester is a. at least 4.8 hours b. between 4.1 and 4.5 hours.
- 18 (a) Explain the procedure of constructing various graphs using SPSS.
 - (b) The following is the output from SPSS. Identify the graph and write the procedure to plot it.



SECTION C

Answer any FOUR questions.

4X10 = 40

19 The joint probability density function of a two dimensional random variable is given by,

$$(f(x,y) = 2, 0 < x < 1, 0 < y < x, f(x,y) = 0 Otherwise$$

- (i) Find marginal density function of X and Y.
- (ii) Find the conditional density function of X given Y and Y given X.
- (iii) Check for the independence of X and Y.
- (iv) P(X<1, Y<3).
- **20** (a) Find the value of k given the following probability distribution and then obtain its mean and variance.

X	2	4	6	8	10

P(X)	1/12	k	1/3	1/4	1/6	
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- (b) There 100 tickets in lottery. There is one first prize worth Rs.25 and two second prizes worth Rs.10 each.
 - i. What is the expected prize amount that a particular lottery ticket will fetch?
 - ii. A lottery ticket is bought for Rs.1. What is the expected loss?
- 21 A pharmaceutical lab states that a drug causes negative side effects in 3 of every 100 patients. To confirm this affirmation, another laboratory chooses 5 people at random who have consumed the drug. Which distribution could this be? Derive the recurrence relation for the moments of this distribution and obtain the coefficients of skewness and kurtosis.
- 22 (a) Derive the mgf of two parameter gamma distribution and hence obtain the mean and variance. Show the relationship between the mean and variance.
 - (b) The daily consumption of milk in a city, in excess of 20,000 litres, is approximately distributed as a gamma variate with parameters a=1/10000 and $\lambda=2$. The city has a daily stock of 30,000 litres. What is the probability that the stock is insufficient on a particular day?
- What are the steps to find probability in a normal distribution? A health club lets members use, on each visit, their facilities for as long as they wish. The club's records suggest that the length of a visit can be modeled by a normal distribution with mean 90 minutes. Only 20% of the members stay for more than 125 minutes.
 - (i) Find the standard deviation of the distribution.

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- (ii) Find the probability that a visit lasts less than 25 minutes.
- (iii) What is the probability that a visit lasts for more than 100 minutes
- 24 Explain this construction in SPSS. State some features of SPSS software.

