University of Rajshahi
Dept. of Computer Science and Engineering
B.Sc. Engg. Part-I, Even Semester, Examination 2020
Course Code: STAT 1211   Course Title: Statistics for Engineers
Time: 2 Hours   Full Marks: 35
[N.B. Answer FOUR questions taking at least TWO from each Section.]

Section- A

1(a) Which of the given figure does present a descriptive statistics or an inferential statistics? Explain your answer.   3
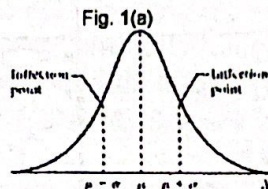
Fig. 1(a)   Fig. 1(b)

(b) The Chairman of the Dept. of Computer Science and Engineering wants to compare the academic performance between the students of session 2019 and 2020. He has the CGPA of all students and he wishes to get this comparison done by you since you have studied a course of Stat-1211. Explain the statistical approaches you may follow for this task. Mention pros and cons of those approaches if any.   2.75

(c) The probability distribution is shown by the given figures. What will be approximate position of mode, median and mean? Explain your answer.   3

Fig.1(c)   Fig. 1(d)   Fig. 1(e)
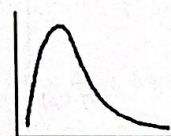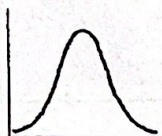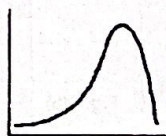
2(a) What is central tendency? Write down the measure of central tendency.   2.75

(b) For non-zero positive observations show that $AM \geq GM \geq HM$ (Notations are usual).   3

(c) How can we measure the symmetry and asymmetry of a data distribution? Explain.   3

3(a) A box contains two **Red** balls. Another box of identical appearance contains one **Red** and one **White** ball. If a box is selected by chance and one ball is drawn from it, what is the probability that the **first box** was the selected one, if the drawn ball turns out to be **Red**?   4

(b) A bag contains **two white** and **four black** balls. Two balls are drawn. In $f(x, y)$, let x and y represent the results of the two drawings; 0 corresponding to a black ball, 1 corresponding to a white ball. Find, $f(0,1)$, $f(0,0)$, $f(1,0)$, $f(1,1)$, then from these four values, find $f(0)$ and $f(1)$.   4.75
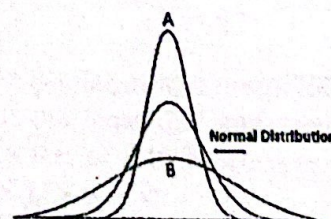
Section-B

4(a) X denotes (i) the chance of **exact amount** rain tomorrow, (ii) **sum of the points** obtained in rolling two dices, which one is discrete and which one is continuous random variable? And why?   2
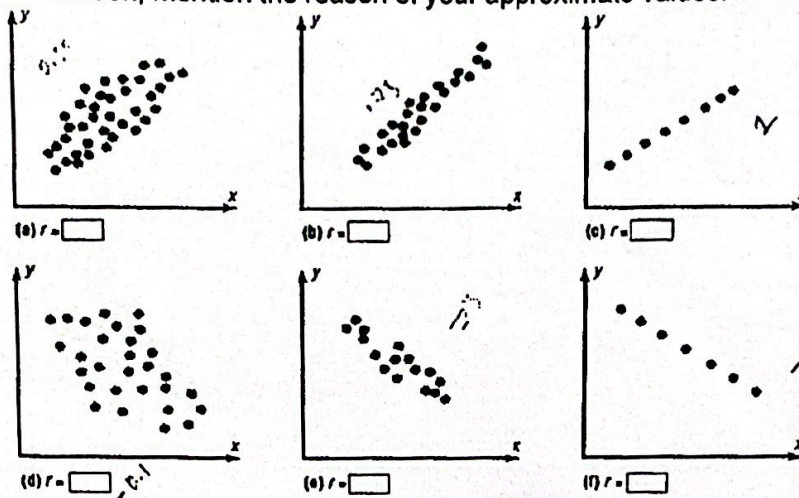
(b) For the distribution given in the figure, between A and B, which one is **platykurtic** and which one is **leptokurtic**? Explain your answer.   2

A

Normal Distribution

B

(c) Interprete the distribution given below. Assign an approximate value of **Correlation Coefficient** for each of following distribution, mention the reason of your approximate values.   3

(a) r = ☐   (b) r = ☐   (c) r = ☐

(d) r = ☐   (e) r = ☐   (f) r = ☐

(d) Which of the given figures, does not comply Pearson Correlation and why?   1.75
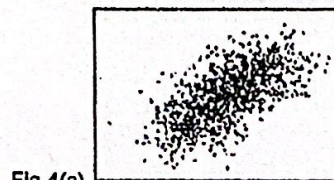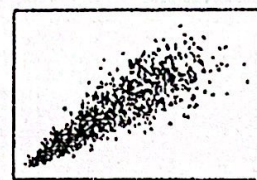

Fig 4(a)   Fig. 4(b)

5(a) Mention, which of the given distribution complies with the assumption of Poisson distributions or not. Explain your answer.   3
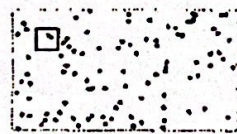

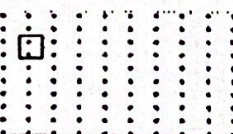Fig. 5(a)   Fig. 5(b)   Fig. 5(c)
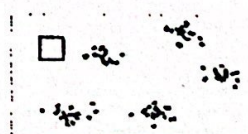
(b) A survey from Teenage Research Unlimited (Northbrook, Illinois) found that 30% of teenage consumers receive their spending money from part-time jobs. If 5 teenagers are selected at random, find the probability that at least 3 of them will have part-time jobs.   3.75

(c) The both two curves in each figure present the Normal distribution. But what is the difference between two curves in each figure?   2

Fig.5(d)   Fig. 5(e)

6(a) Define null hypothesis and alternative hypothesis.   2.75

(b) Describe the test procedure for comparing two means.   3

(c) How can you test differences of variances of two populations? Is it possible to test variances using t-test? Which statistical test is applicable for test of independence?   3

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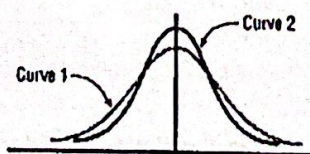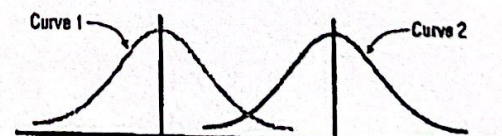Course: STAT-1211 [Statistics for Engineers]

Marks: 35   [Answer any four (04) questions taking two (02) from each section.]   Time: 02 Hours

Section-A

1.a) What is variable? Define with example different types of variable.   3
  b) What do you mean by dispersion? Discuss different measures of dispersion   2¾
  c) Calculate the standard deviation from the following data   3
     40, 60, 65, 65, 65, 68, 68, 70, 70, 70, 70, 70, 70, 74, 75, 75, 90, 95.

2.a) Define outcome, sample space and event of an experiment.   3
  b) State the law of total probability.   2
  c) What is conditional probability? If $P(A) = 0.4, P(B) = 0.5$ and $P(A \cap B) = 0.3$, then   3¾
     find $P(A|B)$ and $P(B|A)$.

3.a) What do you mean by random variable?   2
  b) Write down the probability density function of a normal distribution. What are the properties of   3¾
     standard normal distribution?
  c) Given that X is a random variable whose mean $= 3$, find the variance of $4X + 2$.   3

Section-B

4.a) Define correlation coefficient, partial correlation coefficient and multiple correlation coefficient.   3
  b) How do you interpret the range of correlation coefficient?   2¾
  c) Find the value of the correlation coefficient from the following table: 3

Age (X)	43	21	25	42	57	59
Glucose Level (Y)	99	65	79	75	87	81

5.a) Explain the simple linear regression model.   2¾
  b) Discuss the principles of least-square method.   3
  c) Fit the regression equation from the following data with x as the independent variable.   3

X (aptitude test)	95	85	80	70	60
Y (Statistics grade)	85	95	70	65	70

6.a) Write down the goal and different steps of hypothesis testing.   2
  b) Describe the test procedure for comparing two means.   4
  c) The average daily intakes of dairy products for men (sample size=50, sample mean=756 and sample   2¾
     standard deviation=35) and women (sample size=50, sample mean=762 and sample standard
     deviation=30). Is there a difference in the average daily intakes of dairy products for men versus
     women? (At 5% level of significance, the critical region is $z > 1.96$ or $z < -1.96$)

Full Marks: 35

Time: 2 Hours

Answer any four questions taking two from each Section

SECTION: A

1 (a) What is central tendency? Write down the measures of central tendency. — 2.75

(b) For non-zero positive observations show that $AM \geq GM \geq HM$ (Notations are usual). — 3

(c) The daily profit of 100 shops in a market are distributed as follow: — 3

Profits (in lac Tk)	50-60	60-70	70-80	80-90	90-100
No. of Shops	18	32	24	16	10

Calculate mean, median and mode.

2 (a) Define coefficient of variance (c.v). Why do you prefer coefficient of variation instead of standard deviation? — 2.75

(b) For two observations, show that standard deviation is the half of the range. — 3

(c) Show that variance is independent of origin but not of scale. — 3

3 (a) Define probability, probability function and probability density function. — 2.75

(b) State and prove Baye's theorem. — 3

(c) Two unbiased dice are tossed simultaneously. What is the probability of getting a total of point 6 or even numbers from both the dice? — 3

SECTION: B

4 (a) Define Binomial distribution. Write down few of its properties. — 2.75

(b) Find mean, variance and coefficient of skewness(β_1) of Poisson distribution. — 3

(c) If electricity power failures occur according to a Poisson distribution with an average of failures every twenty weeks, calculate the probability that there will not be more than one failure during a particular week. — 3

5 (a) What is correlation? Write down the properties of correlation. — 2.75

(b) Derive the correlation co-efficient and interpret it. — 3

(c) If X and Y are independent then show that they are uncorrelated. — 3

6 (a) Define null hypothesis and alternative hypothesis. — 2.75

(b) Describe how will you test the null hypothesis $H_0: \mu = \mu_0$ vs. $H_1: \mu \neq \mu_0$. — 3

(c) Distinguish between normal test and t-test. — 3

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[Answer FOUR (04) questions taking TWO (02) from each Section.]

Section A

1. (a) What is meant by dispersion? What are the important measures of dispersion? — 2.75
   (b) If $\bar{x}$ and s denote respectively the mean and standard deviation of a set of n observations, show that $\bar{x}\sqrt{(n-1)} \geq s$. — 3
   (c) Calculate the mean and variance of the first n natural numbers. — 3

2. (a) Define with example event, mutually exclusive event and sample space. — 2.75
   (b) State and prove the additive law of probability for two events. — 3.5
   (c) Three events A_1, A_2 and A_3 are mutually exclusive and their union is the sample space S. If $P(A_1) = \frac{3}{2}P(A_2), P(A_2) = 2P(A_3)$, then find $P(A_1)$, $P(A_2)$ and $P(A_3)$. — 2.5

3. (a) Define binomial distribution. — 2.75
   (b) If X is distributed as binomial, show that mean $\geq$ variance. — 3
   (c) Let three unbiased coins are tossed at a time. What is the probability that (i) no head, (ii) at least two heads will appear? — 3

Section B

4. (a) How do you distinguish between correlation and regression? — 2.75
   (b) Show that correlation coefficient is independent of change of origin and scale of the variables. — 3
   (c) Calculate the rank correlation coefficient from the following data on hourly sales (x) and expenses (y) of 10 stores — 3

x	50	50	55	60	65	65	65	60	60	60
y	11	13	14	16	16	15	15	14	13	13

5. (a) What is a scatter diagram? What are the uses of scatter diagram? — 2.75
   (b) Discuss the principles of least square method. — 3
   (c) Estimate the parameters of the simple linear regression model using ordinary least square method. — 3

6. (a) Define (i) parameter and (ii) level of significance. — 2.75
   (b) Prices of shares in (Tk.) of a company on the different days in a month were found to be 66, 65, 69, 70, 69, 68, 71, 63, 64, and 68. Test whether the mean price of shares in the month is 65 or not (critical value at 5% level of significance is 2.26). — 3
   (c) The mean yields (in gm) of two sets of plots and their standard deviation are given below. Test the hypothesis that whether the difference in the mean yields of the two set of plots is significant or not. — 3

	Set of 40 plots	Set of 60 plots
Mean yield/plot	1259	1243
Standard deviation	34	28