12122

University of Sargodha

BS 3rd Term Examination 2016

Subject: Software Engineering **Paper: Probability & Statistics (Math:2110)**

Time Allowed: 2:30 Hours **Maximum Marks: 80**

OBJECTIVE PART (Compulsory)

Maximum Marks: 32

Q#1 Answer the following short questions. Each question carries **02** marks. (16*2=32)

i. Define Statistical Inference.
ii. State Bays' Rule.
iii. Define random variable.
iv. Write down the expression for the variance of a random variable.
v. What is mean and variance of the binomial probability distribution?
vi. Write down the parameters of the normal distribution.
vii. Stat Central Limit Theorem.
viii. What is meant by more efficient estimator?
ix. Define standard error of a point estimate.
x. Define outlier.
xi. Define null hypothesis.
xii. Define type I error.
xiii. Describe power of a test.
xiv. Define P-value.
xv. Define scatter diagram.
xvi. Define R^2.

SUBJECTIVE PART

Maximum Marks: 48

Note: Attempt any three questions. All questions carry equal marks.

Q#2 The tensile strength of silicone rubber is thought to be a function of curing temperature. A study was carried out in which samples of twelve specimens of the rubber was prepared using curing temperature of 20°C and 45°C. The data below show the tensile strength values in megapascals.

20°C:	2.07	2.14	2.22	2.03	2.21	2.03
	2.05	2.13	2.09	2.14	2.11	2.02
45°C:	2.52	2.15	2.49	2.03	2.37	2.05
	1.99	2.42	2.08	2.42	2.29	2.01

i) Compute sample mean tensile strength for both groups.

ii) Compute sample standard deviation for both data groups.

iii) Construct box and whisker plot for both groups to discuss main features of data.

Q#3 a) A random sample of 200 adults are classified below by gender and their level of education attained.

Education	Male	Female
Elementary	38	45
Secondary	28	50
College	22	17

If a person is picked at random from this group, find the probability that

i) the person is a male, given that the person has a secondary education;

ii) the person does not have a college degree, given that the person is a female.

b) During a laboratory experiment, the average number radioactive particles passing through a counter in 1 millisecond is 4. What is the probability that 6 particles enter the counter in a given millisecond?

Q#4(a) An electrical firm manufactures light bulbs that have a life, before burn-out, that is normally distributed with mean equal to 800 hours and a standard deviation of 40 hours. Find the probability that a bulb burns between 778 and 834 hours.

b) Assume the sample variances to be continuous measurements. Find the probability that a random sample of 25 observations, from a normal distribution with $\sigma^2 = 6$, will have a sample variance S^2

i) greater than 9.1

ii) between 3.462 and 10.745.

Q#5 a) A random sample of 100recorded deaths in U.S. during the past year showed an average life span of 71.8 years. Assuming a population standard deviation of 8.9 years, does this seem to indicate that the mean life span today is greater than 70 years? Use $\alpha = 0.05$.

b) A fuel oil company claims that one-fifth of the homes in a certain city are heated by oil. Do we have reason to believe that fewer than one-fifth are heated by oil if, in a random sample of 1000 homes in this city, 136 are heated by oil? $\alpha = 0.05$

Q#6 a) A study was done to study the effect of ambient temperature 'x' on the electric power consumed by a chemical plant 'y'. Other factors are held constant, and the data were collected from an experimental pilot plant.

y	250	285	320	295	265	298	267	321
x	27	45	72	58	31	60	34	74

Estimate the slop and intercept in a simple linear regression model.

b) Given the following set of values:

X	78	89	97	69	59	79	68	69
Y	125	137	156	112	107	136	123	108

Find coefficient of correlation r_{xy}.