Answer all the following questions: (**Statistical tables and graphs are allowed**)

Question No. 1 [20 Marks]

I. All the following statements are **false**. **Rewrite it each statement in your answer paper after making all the necessary correction(s).** [5 Marks]

a) Descriptive statistics is concerned with the process of making estimates, predictions, or decisions about a population based on sample data.

b) In case of machine failure, when the data are classified as mechanical, electrical, electronic, etc., the most appropriate measure of central tendency to be used is the mean.

c) If P (A) = 0.2; P (B) = 0.6; and A & B are independent events, then the P (A or B) =0.8.

d) Probability assessment based on observations obtained from probability experiments is called subjective probability.

e) Waiting time in a bank is an example of discrete variable data.

II. Consider the grouped data given in the following Table: [15 Marks]

Class limits	0-4	5-9	10-14	15-19	20-24
Frequency	6	11	6	4	3

a) Find the mean, the mode, and the median. Discuss the symmetry of the distribution.

b) Find the mean deviation

c) Find the coefficient of variation.

d) Given that the 4th moment about the mean $m_4 = 3324$, is this distribution normal, leptokurtic, or platykurtic? Why?

Question No. 2 [15 Marks]

I. Consider the following probability density function: $f(x) = \begin{cases} 0.5x, & 0 \leq x \leq 2 \\ 0, & otherwise \end{cases}$

Find $P(1 \leq X \leq 1.5)$, and find also the mean of the distribution. [6 Marks]

II. In a certain assembly plant, three machines B_1, B_2 and B_3 produce 30%, 45% and 25% of the products, respectively. It is known from past experience that 2%, 3% and 2% of the products made by each machine, respectively, are defective. [5 Marks]

a) If a product is selected randomly, what is the probability that it is defective?

b) If a product is selected randomly and it is found to be defective, what is the probability that it was produced by machine B_3?

III. The following circuit operates if and only if there is a path of functional devices from left to right. The probabilities that each device operates properly are as shown in the figure below. Assume that the devices fail independently. What is the probability that the circuit operates? [4 Marks]
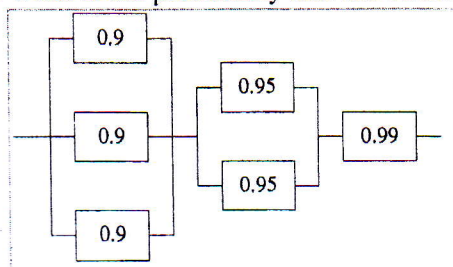
Question (3): (20 Marks)

I- In an inventory study it was determined that on the average demands for a particular item at a warehouse were made five per day. What is the probability that on a given day this item is requested

  a- More than five times?
  b- Not at all?

II- The life, in years, of a certain type of electrical switch has an exponential distribution with an average life $\beta = 2$. If 100 of these switches are installed in different systems, what is the probability that at most 30 fail during the first year?

Question (4): (15 Marks)

A circuit fuse is designed to burn out as the average electric current reaches 20 amperes with standard deviation $\sigma = 1.5$ amperes. From a lot of 10,000 fuses, 36 are selected at random and tested for their breaking point. What do you conclude about the amperage specification of the lot if the sample reveals a mean of 20.9 amperes and a standard deviation of 1.5 amperes? Use a level of significance of 0.01. Construct the OC curve for your test.

Good Luck,
Dr. Mohamed Sharaf, and
Dr. Omayma Nada

This exam measures the following ILOs					
Question Number	Q1-I.II	Q2-III.Q4	Q1-I,II,Q3	Q1-I, Q2-III	Q2-II,III, Q3	Q1-II. Q4
Skills	a5-1	a6-1	a6-2	b11-1	b14-1	c12-1
	Knowledge &Understanding Skills			Intellectual Skills		Professional Skills