Instructions:

1. Formula sheet will be provided to you in exam. You are not allowed to bring, with you, formula sheet or any other printed/written paper.

2. Mobiles are not allowed in exam. If you have your mobile with you, turn it off and put it under your seat so that it is visible to proctor.

3. Make sure you have both exam paper (multiple choice and written) with the same code.

4. For written (not multiple choice) questions, show all the calculation steps. There are points for the steps so if your miss them, you would lose points. Also, define all the events in every question of probability.
Blank page for rough work
Q.No.1: - (2×18 = 36 points) Please mark the correct answer to each of the questions by completely darkening the oval of your choice with a dark pen or pencil. Multiple choice problems are provided in a separate book.

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Scenario 1:
The manager of the customer service division of a major consumer electronics company is interested in determining whether the customers who have purchased a videocassette recorder made by the company over the past 12 months are satisfied with their products.

(1.1) Referring to Scenario 1, the population of interest is

A) all the customers who have bought a videocassette recorder made by the company over the past 12 months.
B) all the customers who have bought a videocassette recorder made by the company and brought it in for repair over the past 12 months.
C) all the customers who have used a videocassette recorder over the past 12 months.
D) all the customers who have ever bought a videocassette recorder made by the company.
E) None of the choices

(1.2) Referring to Scenario 1, the possible responses to the question "How many videocassette recorders made by other manufacturers have you used?" are values from a

A) discrete random variable.
B) continuous random variable.
C) categorical random variable.
D) Parameter variable.
E) Sample variable.

(1.3) Referring to Scenario 1, the possible responses to the question "How many videocassette recorders made by other manufacturers have you used?" result in

A) a ratio scale variable.
B) a nominal scale variable.
C) an ordinal scale variable.
D) an interval scale variable.
E) None of the choices.

(1.4) Referring to Scenario 1, the possible responses to the question "Are you happy, indifferent, or unhappy with the performance per dollar spent on the videocassette recorder?" result in

A) an ordinal scale variable.
B) a nominal scale variable.
C) an interval scale variable.
D) a ratio scale variable.
E) None of the choices.
Scenario 2:

Every spring semester, the School of Business coordinates with local business leaders a luncheon for graduating seniors, their families, and friends. Corporate sponsorship pays for the lunches of each of the seniors, but students have to purchase tickets to cover the cost of lunches served to guests they bring with them. The following histogram represents the attendance at the senior luncheon, where \( X \) is the number of guests each graduating senior invited to the luncheon and \( f \) is the number of graduating seniors in each category.

(1.5) Referring to the histogram from Scenario 2, how many graduating seniors attended the luncheon?

A) 275  
B) 152  
C) 4  
D) 388  
E) 169

(1.6) Referring to the histogram from Scenario 2, if all the tickets purchased were used, how many guests attended the luncheon?

A) 388  
B) 152  
C) 169  
D) 275  
E) 4
(1.7) A professor of economics at a small Texas university wanted to determine what year in school students were taking his tough economics course. Shown below is a pie chart of the results.

What percentage of the class took the course prior to reaching their senior year?

A) 86%  
B) 44%  
C) 54%  
D) 14%  
E) 6%

(1.8) The possible responses to the question “What brand of Blu-ray player did you purchase?” results in

A) a nominal scale variable.  
B) an ordinal scale variable.  
C) an interval scale variable.  
D) a ratio scale variable.  
E) a parameter scale variable.

(1.9) An insurance company evaluates many numerical variables about a person deciding on an appropriate policy for automobile insurance. The distance a person drives in a year is an example of a _______ variable.

A) continuous numerical  
B) discrete numerical  
C) categorical  
D) nominal  
E) ordinal

(1.10) When studying the simultaneous responses to two categorical questions, you should set up

A) a contingency table.  
B) frequency table.  
C) cumulative percentage table.  
D) histogram.  
E) pie chart.
Scenario 3:
The stem-and-leaf display below represents the number of cargo companies (range from 16 to 32) approved by customs inspectors of a certain port in a sample of 35 days.

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(1.11) Referring to Scenario 3, the value of mode is equal to

A) 22  
B) 2  
C) 16  
D) 35  
E) None of the others

(1.12) Referring to Scenario 3, the value of upper quartile is equal to

A) 27  
B) 23  
C) 19  
D) 32  
E) None of the others.

(1.13) The graph below shows cumulative proportion plotted against land values (in dollars per acre) for farms on sale in a rural community.

What is the median land value?

A) $1900  
B) $3000  
C) $3100  
D) $2600  
E) $1000

(1.14) If the age distribution of customers at a major retail chain is thought to be bell-shaped with a mean equal to 43 years and a standard deviation equal to 7 years, the percentage of customers between the ages of 29 and 57 years is

A) 95%  
B) 81.5%  
C) 68%  
D) 99.7%  
E) 16.5%
(1.15) Which of the following is **not** true?

A) A population with 200 elements has a mean of 10. From this information, it can be shown that the population standard deviation is 1.5.
B) In a sample of size 40, the sample mean is 15, in this case, the sum of all observations in the sample is 600.
C) In data analysis, a boxplot can be used to illustrate the median, quartiles and the extreme values.
D) The median of a data set with 20 items would be the average of the 10\textsuperscript{th} and the 11\textsuperscript{th} items in the ordered array.
E) The coefficient of variation is expressed as a percentage.

(1.16) When extreme values present in a set of data, which of the following descriptive summary measures are most appropriate?

A) Interquartile range and median
B) Coefficient of variation and range
C) Mean and standard deviation
D) Variance
E) Z- Score

(1.17) From a batch of 100 items of which 20 are defective, exactly three items are chosen, one at a time, without replacement. The probabilities that all three items chosen are not defective equals

A) 0.5081
B) 0.5120
C) 0.0384
D) 0.8
E) 0.2

(1.18) if two events are collectively exhaustive and mutually exclusive, what is the probability that one or the other occurs?

A) 1
B) 0
C) 0.5
D) 0.9
E) Cannot be determine from the information
Q.No.2: (3 points) The AMI Company has two assembly lines in its Kansas City plant. Line A produces an average of 335 units per day with a standard deviation equal to 11 units. Line B produces an average of 145 units per day with a standard deviation equal to 8 units. Based on this information, which line is relatively more consistent? Why?

Note: No points for answer without justification
Q.No.3: - (5+3+3 = 11 points) Health care issues are perceiving much attention in both academic and political arenas. A sociologist recently conducted a survey of citizens over 60 years of age whose net worth is too high to qualify for Medicaid. The ages of 10 senior citizens were as follows:

75  63  84  61  92  65  63  98  68  62

(a) Estimate the mean, the median and the standard deviation of the ages of the senior citizens. Comment on the shape.

Note: No points for answer without justification
(b) Calculate the interquartile range of the ages of the senior citizens.

Note: No points for answer without justification

(c) Construct a box-plot of the ages of the senior citizens. Looking at the box-plot, comment on the shape of the data.

Note: No points for answer without justification
Q.No.4: - (3+3+3 = 9 points) A building contractor has an urgent electrical wiring job to complete on one of his sites. He usually subcontracts electrical work to one of two small firms. The probability subcontractor Hamza will be available to perform the job at such short notice is equal to 0.65, while for subcontractor Bilal the probability is 0.7 (that he will be available). The probability that neither subcontractor is available from this job is equal to 0.2.

(a) Calculate the probability that both subcontractors are available for this job.

(b) Calculate the probability that only one of the two (subcontractors) is available for this job.

(b) Calculate the probability that Subcontractor Bilal is available given that the other subcontractor is unavailable for this job.
Q.No.5: (6 points) A computer specialty manufacturer has a two-person technical support staff who work independently of each other. In the past, Omar has been able to solve 75% of the problems he has handled, and Khaled has been able to solve 95% of the problems he has handled. Incoming problems are randomly assigned to either Omar or Khaled. If a technical problem has just been assigned to the support department, both (Omar and Khaled) are equally likely to handle it. Suppose that the problem was solved, what is the probability that it was handled by Omar?

Note: No points for answer without justification