Time Allowed: 2Hrs. & 30Mins.

<div align="center">

SECTION-A   **(Marks: 3X10)**

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Q.1 Fifty percent of American think we are in a recession, even though technically we have not had two straight quarters of negative growth. For a sample of 20 Americans, make the following calculations.

  (a) Compute the probability that exactly 12 people think we are in recession.

  (b) How many people would you expect to say we are in a recession?

  (c) Compute the variance and standard deviation of the number of people who think we are in a recession.   **CILO 1**

<div align="center">OR</div>

Q.1 At the US mint in Philadelphia, 10 machines stamp out pennies in lots of 50. These lots are arranged sequentially on a single conveyor belt, which passes an inspection station. An inspector decides to use systematic sampling in inspecting the pennies and is trying to decide whether to inspect every fifth or every seventh lot of pennies. Which is better? Why?   **CILO 1**

Q.2 Concert pianist Donna Prima has become quite upset at the number of coughs occurring in the audience just before she begins to play. On her latest tour, Donna estimates that on average eight coughs occurs just before the start of her performance. Ms Prima has sworn to her conductor that if she hears more than five coughs at tonight's performance, she will refuse to play. What is the probability that she will play tonight?   **CILO 2**

<div align="center">OR</div>

Q.2 On the basis of past experience, automobile inspectors in Pennsylvania have noticed that 5 percent of all cars coming in for their annual inspection fail to pass. Using the normal approximation to the binomial, find the probability that between 7 and 18 of the next 200 cars to enter the Lancaster inspection station will fail the inspection. **CILO 2**

Q.3 The US custom agency routinely checks all passengers arriving from foreign countries as they enter the US. The department reports that the number of people per day found to be carrying contraband material as they enter the US through John F. Kennedy airport in New York averages 42 and has a standard deviation of 11. What is the probability that in five days at the airport, the average number of passengers found carrying contraband will exceed 50? **CILO3**

<div align="center">OR</div>

Q.3 A research analyst dispute a trade group's prediction that back-to-school spending will average $606.40 per family this year. She believes that average back-to-school

spending will significantly differ from this amount. She decides to conduct a test on the basis of a random sample of 30 households with school-age children. She calculates the sample mean as $622.85. She also believes that back-to-school spending is normally distributed with a population standard deviation of $65.

(a) Specify the competing hypothesis in order to test the research analyst's claim.

(b) Calculate the value of the test statistics.

(c) At the 5% significance level, does average back-to-school spending differ from $606.40?   **CILO3**

SECTION-B   **(Marks: 2X15)**

Case Study   **CILO 3**

The significant decline of savings in the US from the 1970s and 1980s to the 1990s and 2000s has been widely discussed by economist. According to the bureau of Economic analysis, the savings rate of American households, defined as a percentage of the disposable personal income, was 4.20% in 2009. The reported savings rate is not uniform across the country. A public policy institute conducts two of its own surveys to compute the savings rate in the Midwest. In the first survey, a sample of 160 households is taken and the average savings rate is found to be 4.48%. Another sample of 40 households finds an average saving rate of 4.60%. Assume that the population standard deviation is 1.4%.
In a report, use the above information to:

(1) Compute the probability of obtaining a sample mean that is at least as high as the one computed in each of the two surveys.
(2) Use these probabilities to decide which of the two samples is likely to be more representative of the US as whole.