Final Exam   Date: November 11, 2019
Maximum marks: 50   Duration: 3 hours

Answer as many questions as you can. The maximum you can score is 50

1. Describe pre-control charts. Give step by step details of construction and usage of pre-control charts.   [5]

2. Briefly explain the advantages and disadvantages of acceptance sampling.   [5]

3. A machine is used to fill cans with a motor oil additive. A single sample can is selected every hour and the weight of the can is obtained. The data is given in the table below.   [15]

   a. Construct the moving range chart and compute process σ. Assuming that the process target is 8.02 oz, set up a tabular CUSUM for this process to quickly detect a shift of 1.5 σ.

SL No	Data
1	8.00
2	8.01
3	8.02
4	8.01
5	8.00
6	8.01
7	8.06
8	8.07
9	8.01
10	8.04
11	8.02
12	8.01

4. Explain rectifying inspection.   [15]

   a. Suppose that a supplier ships components in lots of size 5000. A single-sampling plan with $n = 40$ and $c = 2$ is being used for receiving inspection. Rejected lots are screened, and all defective items are reworked and returned to the lot. Management has objected to the use of the above sampling procedure and wants to use a plan with an acceptance number $c = 0$ with same $n = 40$. Draw the OC curve for both the plans and give your comments on the performance of the aforementioned plans?

   b. Suppose that incoming lots are 0.06 non-conforming. What is the probability of rejecting these lots under both plans? Calculate the ATI at this proportion nonconforming for both plans.

5. A company uses a double sampling plan with $n_1 = 40$, $c_1 = 1$, $n_2 = 50$ and $c_2 = 4$ for incoming inspection where the supplier ships the product in lots of size $N = 9000$. If the incoming lots have fraction nonconforming $p = 0.05$, what is the probability of acceptance on the first sample? What is the probability of final acceptance? Calculate the probability of rejection on the first sample? Assuming rectifying inspection, compute the AOQ and ASN?   [15]