Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

A Constituent Institute of Manipal University, Manipal

VI SEMESTER B.TECH END SEMESTER EXAMINATIONS, JUNE 2017

SUBJECT: (OE II) INTRODUCTION TO QUALITY CONTROL
[MME 3289]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.
- Use of SQC tables permitted.

1A. Explain the quality of design and quality of conformance. **(02)**

1B. What is patterns of variation? Explain the methods used to describe patterns of variation. **(03)**

1C. Find mean and standard deviation of the following frequency distribution. What percent of normal distribution with this average and standard deviation will fall above the limit of 105? **(05)**

Cell boundaries	Frequency
190-199	3
180-189	4
170-179	6
160-169	10
150-159	17
140-149	24
130-139	31
120-129	33
110-119	21
100-109	11
90-99	7
80-89	4

2A. Explain the effect of increasing the subgroup size with respect to $\bar{X}$ chart. **(02)**

2B. Write a note on control charts for process mean and dispersion. **(03)**

2C. A control chart has been used to monitor a certain process during a considerable period of time. The process is sampled in subgroups of four at intervals of about 2 hours and the $\overline{X}$ control chart has 3 sigma control limits of 121.0 and 129.0 with the target $\overline{X}_0$ at 125.0.

(i) If this product is sold to a user who has a specification of 127 $\pm$ 8.0, what percent of the product will meet specifications assuming a normally distributed output?

(ii) If the target value of this process can be shifted without effect on the process standard deviation, what target value would minimize the amount of product being produced outside the specification values?

(iii) At this new target value, what percent of the product will not meet the required specifications? **(05)**

3A. How do you interpret high spots and low spots in control charts for attributes? **(02)**

3B. Explain the construction and use of c and u charts. **(03)**

3C. 100% inspection of an electrical part reveals that a total of 600 items were defective in the first 50 lots of 300 each.

(i) Compute the trial three sigma control limits for an np chart for this process.

(ii) If the process average μ_{np} remains unchanged, what is the probability that 51st lot will have exactly 12 defectives?

(iii) If the process average value μ_{np} increases by three, what is the probability that this shift in the process average will not be detected in the 51st lot? **(05)**

4A. Explain the Failure costs with regard to cost of quality. **(02)**

4B. Write a note on AOQ curve and explain AOQL. **(03)**

4C. A c chart is used to monitor the number of nonconformities on sheets of photographic film. The chart is presently set up based on $\overline{c}$ of 2.6.

(i) Find 3 sigma control limits for this process.

(ii) Use Poisson's distribution table to determine the probability that a point will fall outside these limits while the process is actually operating at a μ_c of 2.6?

(iii) If the process average shifts to 4.8, what is the probability of not detecting the shift? **(05)**

5A. Explain the importance of acceptance sampling. **(02)**

5B. A double sampling plan is n_1 = 100, c_1 = 1, n_2 = 200, c_2 = 3. Compute the probability of acceptance of a 2.5% defective lot. Assume lot size is large in comparison with sample size. **(04)**

5C. Two mating parts A and B have normal distributions and are assembled at random. The standard deviations of the dimensions A and B are 0.0025 inch and 0.0075 inch respectively. What should be the average clearance if the probability of interference between the parts should not exceed 0.001 inch? **(04)**