Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

A Constituent Institute of Manipal University, Manipal

VI SEMESTER B.TECH END SEMESTER EXAMINATIONS, APR/MAY 2017

OPEN ELECTIVE - II

SUBJECT: 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 effect of common causes and special causes on a process. **(02)**

1B. Write a note on the graphical representation methods of frequency distribution. **(03)**

1C. Calculate mean, standard deviation, median and mode for the following frequency distribution:

Characteristic value	24.75	24.95	25.15	25.35	25.55	25.75
Frequency	2	8	14	18	7	1

(05)

2A. Explain the Appraisal costs with regard to cost of quality. **(02)**

2B. List the steps involved in the construction of for $\overline{X}$ and R charts. **(03)**

2C. A certain process with a standard deviation of 0.001mm has been statistically controlled at a mean of 0.036 mm. The product is currently sold to a user. The user specifications are 0.038 ± 0.004 mm.

(i) Assuming a normal distribution of the product what percentage of product meets the specifications?

(ii) If the process centering shifts to μ of 0.037, what is the probability of detecting the shift?

(iii) What is the percentage of nonconforming product results due to the shift In the process entering described in part (ii)? **(05)**

3A. What is meant by α error? How it can be minimized? **(02)**

3B. Write a note on p and np charts. **(03)**

3C. A control chart for np is run on batches of a certain item purchased regularly from an outside source. Each batch of 200 units is subjected to a 100% inspection as it is received. An estimate of μ_p from the most recent 30 batches received is 0.014.

(i) Calculate control limits for the np chart.

(ii) Use Poisson distribution table to find the approximate probability that, if batches should come into receiving at an average μ_p of 0.03, this fact would be detected on the first batch inspected. **(05)**

4A. Explain the control chart for nonconformities per multiple units. **(02)**

4B. Write a note on OC curve. **(03)**

4C. The following table gives the number of defects found in 25 subgroups of certain product at final inspection:

Subgroup no.	No. of defects	Subgroup no.	No. of defects
1	8	14	25
2	16	15	15
3	14	16	9
4	19	17	9
5	11	18	14
6	15	19	11
7	8	20	9
8	11	21	10
9	21	22	22
10	12	23	7
11	23	24	28
12	16	25	9
13	9		

Determine the central line and trial control limits for a c chart. What value of c_0 and control limits would you suggest for the subsequent period? **(05)**

5A. Explain α risk and β risk. **(02)**

5B. Two parts A and B are received in an assembly operation where each part is permanently attached to the other. If the combined width of the parts does not meet the required specification of 10.000 ± 0.020 inch, the assembled product must be scrapped. The width of part A is normally distributed with μ of 3.000 inch and σ of 0.004 inch. The width of part B is also normally distributed with μ of 7.000 inch and σ of 0.006 inch. Assembly is at random. Determine the percentage of the assembled product that will have to be scrapped. **(04)**

5C. A double sampling plan is n_1 = 32, c_1 = 0, n_2 = 38, c_2 = 2. Compute the probability of acceptance of a 2.0% defective lot. Assume lot size is large in comparison with sample size. **(04)**