Paper / Subject Code: 37501 / METROLOGY AND QUALITY ENGINEERING

(3 Hours)   Total Marks: 80

N.B. 1) Question No.1 is compulsory.
2) Attempt any three questions out of the remaining five questions.
3) Figures to the right indicate full marks.
4) Assume suitable data wherever required but justify the same.

Q1.	**Attempt any four**	
A.	Define Quality. What are its different meanings?	**(5)**
B.	What are the single and double sampling plans?	**(5)**
C.	What is optical flat? How are the patterns of fringes interpreted?	**(5)**
D.	What are the different errors in in screw thread measurement?	**(5)**
E.	Explain the construction of Tool maker's microscope.	**(5)**

Q2. A. Explain one wire, two wire and three wire method in the measurement of effective **(10)** diameter of screw thread.

B. Explain the different types of 3D-CMM with their neat sketches and advantages. **(10)**

Q3. A. Define cost of quality and value of quality. With the help of neat sketch explain the **(10)** relation between them.

B. What are the different elements of surface texture? **(10)**

Q4. A In a filling process, 500 gms of certain liquid was to be filled in bags. The permissible **(10)** variation is ± 5 gms. For investigating the process capability, 5 bags were taken at random from each batch for 10 successive batches and results were plotted as shown in table. Establish control chart limits for $\overline{X}$ and R charts. Plot the charts and interpret the meaning. Take $A_2 = 0.58$, $D_3 = 0$ and $D_4 = 2.11$. Will the process be able to meet the specifications?

Batch	1	2	3	4	5	6	7	8	9	10
Mean	501	498	500	503	501	500	497	502	503	496
Range	3	4	2	4	3	5	4	2	6	4

B. How is the Parkinson's gear tester used for gear measurement? **(10)**

Q5. A. With the help of a neat sketch explain the construction and working of electrical **(10)** comparator. What are its advantages and disadvantages?

B. What are the standards of measurements? What are the subdivisions of standards? **(10)**

Q6.	Write short notes on:-	
A.	Laser Interferometer	**(5)**
B.	Pie Chart	**(5)**
C.	Gantt chart	**(5)**
D.	Difference between Precision and Accuracy.	**(5)**

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