

**T.E. Production Engineering (2015 Course)**  
**METROLOGY AND QUALITY ASSURANCE**

**Time: Three Hours**

**Maximum Marks: 70**

**Instructions:**(i) Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.

(ii) Neat diagrams must be drawn wherever necessary.

(iii) Figures to the right indicate full marks.

(iv) Assume suitable data, if necessary.

(v) Use of electronic pocket calculator and logarithmic tables is allowed.

- Q.1 a) Distinguish between Line standard and End standard. [4]  
b) How measurements of effective diameter of metric screw thread is taken using Floating Carriage Micrometer (FCM)? [6]

**OR**

- Q.2 a) Describe the role of coordinate measuring machine (CMM) in modern manufacturing industries. [6]  
b) Which are the important parameters of gear to be measured? How gear tooth vernier caliper works? [4]  
Q.3 a) What do you mean by comparators? On what basis comparators are classified and used in industry. [6]  
b) Is there any measuring device which commonly used for linear and angular measurements? Describe its working with sketch. [4]

**OR**

- Q.4 a) Which are the different methods used for surface roughness measurement? [4]  
b) Design workshop type limit plug gauges for checking 100H<sub>8</sub> and specify the dimensions of gauges in unilateral system. [6]  
Given: (i) The range of diameters are: 18-30, 30-50, 50-80, 80-120, 120-180 and (ii) IT8 = 25i.  
Q.5 a) What does the word "quality" mean to you? Which are the different dimensions of quality? [8]  
b) Explain correlation between quality and different costs. [4]  
c) What is process capability? Sketch graphical details and write equations to quantify process capability. [6]

**OR**

- Q.6 a) Why we need quality in any product/service? [4]  
b) What do you mean by "OC curve"? Describe terms in connection with OC curve: Producer's Risk, Consumer's Risk, Acceptable Quality Level (AQL), Lot Tolerance Percent Defectives (LTPD). [6]  
c) The St. Patrick's Hospital is starting a quality improvement project on [8]

the time to admit a patient using X-bar and R Charts. Determine the limits for the X-bar and R charts and check to see if there are any out-of-control points.

Subgroup Number	Observations			Subgroup p	Observations		
	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>		X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>
1	6.0	5.8	6.1	7	5.6	5.1	5.2
2	5.2	6.4	6.9	8	6.0	5.8	6.8
3	5.5	5.8	5.2	9	5.5	4.9	5.7
4	5.0	5.7	6.5	10	4.3	6.4	6.3
5	6.7	6.5	5.5	11	6.2	6.9	5.0
6	5.8	5.2	5.0	12	6.7	7.1	6.2

Use suitable values from the table given below:

n	A <sub>2</sub>	D <sub>4</sub>	D <sub>3</sub>
3	1.023	2.574	0.0

- Q.7 a) What do you mean by Total Quality Management (TQM)? Describe the six basic elements of TQM. [6]
- b) List out seven quality tool and explain any one in detail. [6]
- c) Describe schematically house of quality i.e. Quality Function Deployment (QFD) [4]

**OR**

- Q.8 a) What is Kaizen and its benefits to industry? [6]
- b) Differentiate between quality control and quality assurance. [4]
- c) How quality circle works in any manufacturing industry? [6]
- Q.9 a) Describe the role of Quality Management Systems (QMS) of ISO 9000 series in the effective functioning of any organization. [8]
- b) Explain details under ISO 14000 standard. [8]

**OR**

- Q.10a) What do you mean by Environment Management System (EMS)? List out the goals and benefits of EMS. [8]
- b) How ISO 9000 series of standards helps to any business or organization to be more efficient and improve customer satisfaction? [8]