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

Time: 2 Hrs 30 min. **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, End and wavelength standards. **[6]**

b) How is Floating Carriage Micrometer (FCM) used for the measurement of effective diameter of metric screw thread? **[4]**

OR

Q.2 a) Explain uses of coordinate measuring machine (CMM) in modern manufacturing industries. **[6]**

b) Explain with sketch how is gear tooth vernier caliper used for gear parameters measurement? **[4]**

Q.3 a) Define comparator? Explain working of pneumatic comparator with sketch. **[6]**

b) Describe working with sketch how is profile projector used for linear and angular measurements? **[4]**

OR

Q.4 a) Which are the different factors affect on surface roughness generated during machining? **[4]**

b) Design workshop type limit plug gauges for checking $70H_8$ 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) Define quality. Which are the different dimensions of quality? **[8]**

b) Explain correlation between quality and costs. **[4]**

c) What do you mean by process capability? How to quantify process capability. **[6]**

OR

Q.6 a) Why everyone needs quality in any product/service? **[4]**

b) What do you understand from "OC curve"? Define following terms in connection with OC curve: Producer's Risk, Consumer's Risk, Acceptable Quality Level (AQL), Lot Tolerance Percent Defectives (LTPD). **[6]**

c) The ABC company is starting a quality improvement project on 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. **[8]**

Subgroup Number	Observations			Subgroup Number	Observations		
	X_1	X_2	X_3		X_1	X_2	X_3
1	5.0	5.7	6.1	7	5.6	5.1	5.2
2	6.2	6.3	6.9	8	6.0	5.8	6.8
3	5.5	5.9	5.2	9	5.5	4.9	5.7
4	5.0	5.7	6.5	10	4.3	6.4	6.3

5	6.5	6.4	5.8	11	6.2	6.6	5.6
6	5.5	5.2	5.0	12	6.2	7.0	6.2

Use suitable values from the table given below:

n	A_2	D_4	D_3
3	1.023	2.574	0.0

Q.7 a) What is the role of Total Quality Management (TQM) in manufacturing industry? Describe the six basic elements of TQM. **[8]**

b) List out seven quality tool and explain any one in detail. **[4]**

c) Describe schematically house of quality i.e. Quality Function Deployment (QFD) **[4]**

OR

Q.8 a) What are the benefits of Kaizen to modern 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]**