

H-22  
P157 2014

**M.Tech/1st/RFM(ETC)  
Inspection & Quality Assurance**

Full Marks : 70

Time : 3 hours

Answer Q. No. 1 and any five of the following questions

The figures in the right-hand margin indicate marks

1. Answer the following questions in brief: 2 x 10

- (a) Distinguish between precision and accuracy.
- (b) Differentiate between gaging and measurement.
- (c) What do you understand by selective assembly?
- (d) Define Limits, fits and tolerance.
- (e) Distinguish between hole-basis and shaft-basis system? Which one of the two is preferred and why?

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- (f) Differentiate between roughness and waviness.
  - (g) What do you mean by the best size of the wire as used in measuring screw thread effective diameter?
  - (h) Distinguish between quality and reliability.
  - (i) What do you mean by producer's risk and consumer's risk?
  - (j) What is quality circle?
2. Explain the Taylor's principle of limit gauge design. Determine the size of GO and NO-GO gauges for components having  $30 H_7/f_6$  fit. Being given with usual notations,  $i$  (microns) =  $0.45 \sqrt{D} + 0.001 D$  ( $D$  in mm). The upper deviation for shaft  $f = -5.5 D^{0.41}$  and 30 mm falls in the diameter step of 18 mm and 30 mm.
3. (a) Explain with a diagram the working principle of a profilometer to measure the surface roughness of a machined component.

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- (b) Describe with neat sketch the two-wire method of measuring the effective diameter of screw thread. 6
4. (a) In an accelerated test programme concerning the survival rate of electronic equipment under severe environmental conditions, the results show that the time to failure obeys a normal probability law with  $\mu = 2$  and  $\sigma = 2$ . Calculate the reliability of the equipment for at least 3 hours. 5
- (b) For two identical units connected in series the system reliability is less than that when connected in parallel configuration. Justify with an example. 5
5. (a) Distinguish between control charts for variables and control charts for attributes and state their relative merits and demerits. 4
- (b) Twenty lots of parts were taken from a production line for gauging each lot containing 100 parts, the following numbers of defectives were noted in each lot:

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- 4, 5, 3, 5, 6, 7, 5, 8, 6, 4, 3, 5, 6, 4, 5, 7, 3, 6 and 4.
- (i) Compute the control limits
  - (ii) Plot the appropriate control chart and state whether the process is in control or not. 6
6. (a) Explain the characteristics of OC-curve. 4
- (b) In a double sampling 2% AOQL acceptance plan :
 
$$n_1 = 32 \quad c_1 = 0$$

$$n_2 = 38 \quad c_2 = 2$$

$$N = 1000$$
 Determine (i) the probability of acceptance of a 2% defective lot
  - (ii) the average total inspection. 6
7. (a) Define quality circle and enumerate its advantages and limitations. 5
- (b) What do you understand by ISO 9000? Explain the benefits of ISO 9000 series. 5

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8. Write notes on : 5 x 2
- (i) Total quality control
  - (ii) Kaizen system.

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