

B.TECH. DEGREE EXAMINATION, MAY 2014**Fourth Semester**

Branch : Electronics and Communication / Applied Electronics and Instrumentation /
Electronics and Instrumentation Engineering

RELIABILITY AND HUMANITIES (L, A, S)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each full question carries 20 marks.

1. (a) Define and explain (i) failure rate ; (ii) failure density ; and (iii) reliability. (6 marks)
- (b) The CFL has a uniform failure rate of 0.00002 per hour. What is its reliability for a specified period of service of (i) 2000 hours ; (ii) 5000 hours ; and (iii) 10,000 hours ? (6 marks)
- (c) A parallel system is composed of 10 identical components. If the system reliability $P(5)$ is to be 0.9, find how poor can the components be ? (8 marks)

Or

2. (a) Explain MTBF ? Explain how components may have an extremely high MTBF and a comparatively short mean life. (8 marks)
- (b) Calculate the probability of survival of SMF battery having to operate for 500 hours and which consists of four subsystems having the following MTBF :

Subsystem A : MTBF = 5000 hours.

Subsystem B : MTBF = 10000 hours.

Subsystem C : MTBF = 15000 hours.

Subsystem D : MTBF = 15000 hours.



(12 marks)

Turn over

3. (a) Explain different periods, with reference to the bath tub curve.
(b) Describe any two hazard models used for failure analysis.

(10 marks)

(10 marks)

Or

4. (a) Explain how Weibull model can be used for failure analysis.
(b) With suitable sketches, describe the linearly increasing hazard model.

(10 marks)

(10 marks)

5. (a) What are the factors that has to be considered for manufacturing a quality product with reliability? Explain with an example.

(15 marks)

(5 marks)

- (b) Mention and describe different steps of bench marking.

Or

6. (a) Explain the concept of quality function deployment. State the relationship of QFD to other tools.

(15 marks)

- (b) What are the objectives of quality circles?

(5 marks)

7. (a) Explain the steps in constructing a C chart?

(5 marks)

- (b) Draw a P chart for the following data. Explain your conclusion :

Sample (each of 100 units)	1	2	3	4	5	6	7	8	9	10
No. of defective	13	10	8	8	7	7	9	10	11	7

(15 marks)

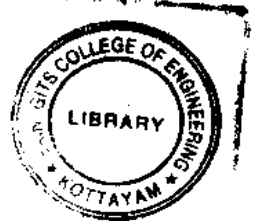
Or

8. (a) " \bar{X} and R charts always go hand in hand." Elaborate.

(5 marks)

- (b) Subgroup of 5 item each are taken from a manufacturing process at regular intervals. A certain quality characteristic is measured and \bar{X} and R values computed for each subgroup. After 25 subgroup $\Sigma \bar{x} = 357.5$, $\Sigma R = 8.80$. Assume that all the points are within the control limits on both the charts. The specifications are 14.4 ± 0.4 .

- (i) Compute the control limits for \bar{X} and R chart.
(ii) What is the process capability?
(iii) Determine the percentage rejections, if any?



(15 marks)

9. (a) Explain the major types of wage payment. (5 marks)
- (b) What are the causes and effects of industrial fatigue? Explain any *two* cases of elimination of fatigue. (8 marks)
- (c) Explain incentive? Describe any two wage incentive plans. (7 marks)
- Or*
10. (a) Explain the interaction between human behaviour and work environment. (5 marks)
- (b) Explain the two-factor theory of motivation. (8 marks)
- (c) What are the causes and effects of industrial disputes? (7 marks)
- [5 × 20 = 100 marks]

