

G 1629

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Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2016

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

Statistical tables permitted.

Answer all questions.

Each full question carries 20 marks.

1. (a) Explain reliability and durability with examples. (7 marks)
- (b) How reliability is determined ? (6 marks)
- (c) The time to failure of a high speed rotor under adverse thermal environment follows a uniform distribution law over the interval 60 hours to 74 hours. Calculate the MTTF for the rotor. (7 marks)

Or

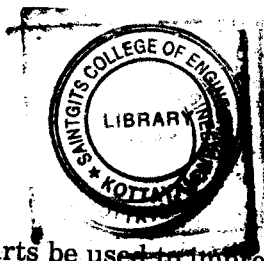
2. (a) What do you mean by the useful life of a component ? (5 marks)
- (b) How does the operating stress affect the failure rate ? (5 marks)
- (c) How does the human error affect the system reliability ? (5 marks)
- (d) Compare and contrast reliability and maintainability. (5 marks)
3. (a) Use neat sketches to explain bath tub curve in failure. Explain with an example. (10 marks)
- (b) A system is composed of five identical independent elements in parallel. What should be the reliability of each element to achieve a system reliability of 0.96 ? (10 marks)

Or

4. (a) Explain the hazard models of failure analysis. (10 marks)
- (b) Three identical units each with a reliability of 0.9 for 1000 hr are operating in parallel. What is the system reliability for 1000 hr if only one of the units is required for the system to be successful. If one more unit with identical reliability is added, what will be the increase in system reliability and mean life ? (10 marks)

Turn over





5. (a) How can run charts be used to improve quality of a product? (5 marks)
(b) Explain the three concepts of quality control, quality assurance and quality management. (15 marks)

Or

6. (a) Explain the need and procedure for prototype tests in quality control. (8 marks)
(b) What is meant by manufacturing planning for quality? Explain the quality aspects of planning for manufacture. (12 marks)

7. (a) Explain the steps in the construction of p -chart. (6 marks)
(b) Specifications on a certain quality characteristic are 155.0 ± 20.0 . Subgroup size is 5. After 50 subgroups $\Sigma \bar{X} = 7660.0$ and $\Sigma R = 880.0$

- (i) Calculate control limits for \bar{X} and R charts.
(ii) Assuming the process is in control and the characteristic is normally distributed, what fraction of non-conforming product is likely?
(iii) If the process is exactly centered at 155.0, what fraction of non-conforming product is likely to be produced?

(14 marks)

Or

8. (a) List the areas of application where C chart can be used. (5 marks)
(b) AC chart is used to monitor the number of surface imperfections on sheets of photographic film. The chart presently is set up based on a \bar{c} of 2.6.

- (i) Find 3-sigma control limits for this purpose.
(ii) Use Poisson's approximation table to determine the probability that a point will fall outside these control limits while the process is actually operating at a μ_c of 2.6.
(iii) If the process average shifts to 4.8, what is the probability of not detecting the shift on the first sample taken after the shift occurs?

(15 marks)

9. (a) Discuss the situations prevailing in our country with respect to the labour welfare and social security. (10 marks)

- (b) Differentiate between wages and incentives. Explain piece-rate incentive plan. (10 marks)

Or

10. (a) Explain the theories of motivation applicable in Indian Industries. (10 marks)
(b) Discuss different factors leading to Industrial fatigue. (10 marks)

[5 × 20 = 100 marks]