Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – III • EXAMINATION – SUMMER • 2013

Subject code: 732901 **Date: 13-05-2013**

Subject Name: Reliability and Maintainability Engineering

Time: 10.30 am – 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Define and explain following terms, **07**

(1) Reliability
(2) MTBF
(3) Up time and down time.

(b) Discuss bath-tub curve of system with reference to hazard rate. **07**

Q.2 **(a)** Discuss tie set method for reliability evaluation with illustration. **07**

(b) Write a brief note on accelerated testing for reliability of the system. **07**

OR

(b) Assume that 50% of all engineering students are good in mathematics. Determine the probabilities that among 18 engineering students (1) exactly 10 (2) at least 10 (3) at most 8 (4) at least 2 and at most 9, are good in mathematics. **07**

Q.3 **(a)** Explain exponential failure law in reliability engineering. **07**

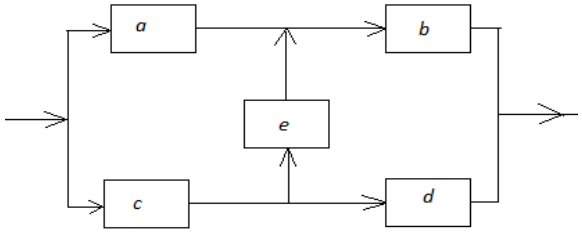
(b) If x is discrete random variable with pdf f(x) given by, **07**

$f(x) = kq^x$, where x=0, 1, 2, 3,é é é . and q=0.02

Find the value of constant k. also obtain mean expected value E(x).

OR

Q.3 **(a)** Obtain the reliability expression of following system, **07**



Each component of system is having reliability of R.

(b) If x is uniformly distributed in $-2 \le x \le 2$. Find (1) $P(X) \le 1$ (2) $P(X) \ge 1$ and (3) $P(|X-1| \ge \frac{1}{2})$. **07**

Q.4 **(a)** Discuss event state space method for reliability evaluation with illustration. **07**

(b) Explain low level and high level redundancy for improving reliability of the system. **07**

OR

Q.4 **(a)** Explain part stress method for electronics system reliability. **07**

(b) Write a brief note on binomial distribution. Obtain mean and variance for binomial distribution. **07**

Q.5 **(a)** Write a brief note on load sharing system. **07**

(b) Discuss the system reliability model with components in series. **07**

OR

Q.5	**(a)**	Obtain relation between reliability and hazard rate.	**07**
	(b)	The failure law of the system is given as $f(t) = \lambda^2 t e^{-\lambda t}$. Find the followings, (1) Reliability R (t) (2) hazard rate h (t) (3) MTTF.	**07**

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