Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – III • EXAMINATION – WINTER • 2014

Subject code: 732901 Date: 25-11-2014

Subject Name: Reliability and Maintainability Engineering

Time: 02:30 pm - 05:00 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)**	Write brief note on accelerated testing for reliability of system.	**07**
	(b)	Explain bayeôs theorem for reliability concept.	**07**
Q.2	**(a)**	Explain Hypo-exponential failure law. Also find its expected value and hazard rate.	**07**
	(b)	Two components are connected in parallel each component having reliability of $R(t) = e^{-\lambda t}$. Calculate (i) reliability (ii) MTTF of parallel connected system.	**07**
		OR	
	(b)	The reliability of missile is 0.85. If the simultaneously set of three missiles is fired, what is the probability of at least one hit? (Assume independence of missile hits).	**07**
Q.3	**(a)**	Write a brief note on load sharing system.	**07**
	(b)	Explain part count method for evaluation of reliability of electronics components.	**07**
		OR	
Q.3	**(a)**	Discuss the following terms (i) Reliability (ii) MTTF (iii)Availability	**07**
	(b)	Explain redundancy techniques in system design. Also discuss how system reliability can be increased with redundancy?	**07**
Q.4	**(a)**	Discuss bath-tub curve of system with reference to hazard rate.	**07**
	(b)	Find f(t), R(t) and MTTF for following cdf function, $$F(t) = 1 - \frac{8}{7}e^{-t} + \frac{1}{7}e^{-8t}$$	**07**
		OR	
Q.4	**(a)**	Discuss event state space method for reliability evaluation with illustration.	**07**
	(b)	Explain the cut set method for evaluation of the reliability of system.	**07**
Q.5	**(a)**	Find mean and variance of Binomial Distribution.	**07**
	(b)	A random variable X is uniformly distributed in range (1, 4). Find, (1) pdf f(x). (2) cdf F(x) (3) Expected mean value E(x). If another random variable y is defined as $y = 4x^2$, obtain probability density function of random variable y.	**07**
		OR	
Q.5	**(a)**	Discuss the effect of perfect preventive maintenance on reliability of a component.	**07**
	(b)	Write a short note on the reliability of system comprises the component in series.	**07**