GAUTAM BUDDHA UNIVERSITY

Course Name: RAMS Fundamentals

Course Credit: 04

Total Contact Hours: 60

S No	Topics	Total Hours: 40
1	**Introduction**	**3**
	RAMS- Historical perspective and basic concepts (elements of RAMS). Definition and Industrial applications of RAMS. RAMS Engineering? Limitation of RAMS Engineering	1.5
	Reliability concepts and characterization: Function, Performance, Failure, Faults, General measure of reliability, repairable items and non-repairable items, Fields of Reliability: Hardware reliability, Software Reliability, Human Reliability, Limitations of Reliability Concept	1.5
2	**RAMS Mathematics: Overview 1**	**1.5**
	Random variables, discrete and continuous random variables, Number of Failure as Discrete random variable, Time to failure (TTF) Time between Failure (TBF) as continuous random variable, Times to failure	1.5
	Probability, Laws, Conditional Probability, Total Probability Theorem,	
3	**RAMS Mathematics: Overview 2**	**3**
	Discrete: Binomial, Negative Binomial, Geometric , Poisson, examples and exercises.	1.5
	Continuous: Normal, Exponential, Weibull, Lognormal, Gamma, Joint Probability Distribution, examples and exercises.	1.5
4	**Reliability, Hazard Functions and Preliminary Reliability / Maintainability Data Analysis and Estimation**	**9**
	Reliability and Hazard function, Bathtub Curve, Reliability functions for various distributions, Reliability Metrics, maintainability function, maintainability metrics (MTTR, MTR, MACMT etc.), availability.	3
	Parametric: Probability Graph and Plotting for reliability measures, examples and exercises, Non parametric Field data analysis).	6
5	**Reliability Maintainability Modelling and Evaluation Techniques: Basic**	**6**
	Modelling: Series, Parallel, Mixed configuration (Series- Parallel, etc), k-out-of-m, Basic Standby model.	3
	Maintainability and Availability, Trade Off between Reliability and Maintainability,	3

6	**Safety Engineering** Definition and explanation of Safety and related terms like Hazard, Risk, Risk analysis and the concept of Acceptable Risk, Hazard Analysis, Concept of Safety Integrity Levels (SIL), methods of assignment of safety targets to a system	**4.5**
7	**RAMS Tools**	**3**
	FMEA/FMECA: Introduction, Application and Examples	1.5
	Fault Tree: Introduction, Application and Examples	1.5
8	**RAMS Verification in Industrial and Infrastructure projects**	**3**
9	**Introduction to Reliability life Testing, Reliability Tools & Commercial Software**	**3**
10	**RAMS Program Management and Commonly used Reliability Engineering standards,**	**3**
	217 FN2/ 217+, IL XXXX, IEC, ARP, SAE, EN, ISO etc. and Industrial case studies	