



# SWARNANDHRA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

Accredited by National Board of Accreditation, AICTE, New Delhi, Accredited by NAAC with "A" Grade – 3.32 CGPA, Recognized under 2(f) & 12(B) of UGC Act 1956, Approved by AICTE, New Delhi, Permanent Affiliation to JNTUK, Kakinada Seetharampuram, W.G.DT., Narsapur-534280, (Andhra Pradesh)

## DEPARTMENT OF S & H TEACHING PLAN

Course Code	Course Title	Semester	Branches	Contact Periods /Week	Academic Year	Date of commencement of Semester
24MC1T05	Mathematical and Statistical Foundations	I	MCA	6	2024-25	04-09-24
<b>COURSE OUTCOMES:</b> Students are able to						
CO1	Understand the basic concepts of probability, random variables of a discrete and continuous variables. (K2)					
CO2	Apply sampling methods and estimation techniques to compute population parameters and evaluate point and interval estimates. (K3)					
CO3	Analyze and conduct hypothesis tests, including significance tests for small and large samples, and apply chi-square tests for goodness of fit. (K4)					
CO4	Evaluate algebraic structures such as groups, monoids, and homomorphisms, and apply number theory concepts like Euclidean algorithms and modular arithmetic. (K3)					
CO5	Design and analyze graphs using concepts like Eulerian and Hamiltonian circuits, graph coloring, and spanning trees, applying algorithms for practical problems. (K4)					
UNIT	Out Comes / Bloom's Level	Topic No.	Topics/Activity	Text Book/ Reference	Contact Hour	Delivery Method
I	CO1 Students are able to Understand the basic concepts of probability, random variables of a discrete and continuous variables. (K2)	<b>Basic Probability and Random Variables</b>				
		1.1	Random Experiments, Sample space and Events	T <sub>1</sub> &T <sub>2</sub>	1	PPT& BB
		1.2	Concept of Probability the Axioms of Probability	T <sub>1</sub> &T <sub>2</sub>	1	PPT& BB
		1.3	Some Important Theorems on Probability Assignment of Probabilities	T <sub>1</sub> &T <sub>2</sub>	1	PPT& BB
				T <sub>1</sub> &T <sub>2</sub>	1	PPT& BB
		1.4	Conditional Probability Theorems and Independent Events	T <sub>1</sub> &T <sub>2</sub>	1	PPT& BB
				T <sub>1</sub> &T <sub>2</sub>	1	
		1.5	Bayes Theorem or Rule	T <sub>1</sub> &T <sub>2</sub>	1	PPT& BB
		1.6	Random Variables and Discrete Probability Distributions	T <sub>1</sub> &T <sub>2</sub>	1	PPT& BB
T <sub>1</sub> &T <sub>2</sub>	1			PPT& BB		
1.7	Distribution Functions for Random Variables	T <sub>1</sub> &T <sub>2</sub>	1	PPT& BB		



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		1.8	Distribution Functions for Discrete Random Variables	T <sub>1</sub> &T <sub>2</sub>	1	PPT& BB
				T <sub>1</sub> &T <sub>2</sub>	1	
		1.9	Continuous Random Variables	T <sub>1</sub> &T <sub>2</sub>	1	PPT& BB
				T <sub>1</sub> &T <sub>2</sub>	1	
<b>Total</b>					<b>14</b>	
<b>II</b>	CO2 Students are able to Apply sampling methods and estimation techniques to compute population parameters and evaluate point and interval estimates. (K3)	<b>Sampling and Estimation Theory</b>				
		2.1	Population and Sample	T <sub>1</sub> & T <sub>2</sub>	1	PPT& BB
		2.2	Sampling With and Without Replacement Random Samples,	T <sub>1</sub> &T <sub>2</sub>	1	
				T1&T2	1	
		2.3	Sampling Distributions and Frequency Distributions	T <sub>1</sub> &T <sub>2</sub>	1	PPT& BB
				T1&T2	1	
		2.4	Computation of Mean, Variance, and Moments for Grouped Data	T <sub>1</sub> &T <sub>2</sub>	1	PPT& BB
				T1&T2	1	
		2.5	Unbiased Estimates and Efficient Estimates Point	T <sub>1</sub> &T <sub>2</sub>	1	PPT& BB
				T1&T2	1	
2.6	Estimates and Interval Estimates	T <sub>1</sub> &T <sub>2</sub>	1	PPT& BB		
		T1&T2	1			
2.7	Reliability Confidence Interval Estimates of Population Parameters	T <sub>1</sub> &T <sub>2</sub>	1	PPT& BB		
		T1&T2	1			
2.8	Maximum Likelihood Estimates	T <sub>1</sub> &T <sub>2</sub>	1	PPT& BB		
		T1&T2	1			
<b>Total</b>					<b>15</b>	
<b>III</b>	CO3 Students are able to Analyze and conduct hypothesis tests, including significance tests for small and large samples, and apply chi-square tests for goodness of fit.( K4)	<b>Tests of Hypothesis and Significance</b>				
		3.1	Statistical Decisions and Statistical Hypotheses	T <sub>1</sub> &T <sub>2</sub>	1	PPT& BB
		3.2	Null Hypotheses Tests of Significance ,Type I and Type II Errors	T <sub>1</sub> &T <sub>2</sub>	1	
				T1&T2	1	
		3.3	Level of Significance, One Tailed and Two Tailed tests	T <sub>1</sub> &T <sub>2</sub>	1	PPT& BB
		T1&T2	1			



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		3.4	Tests of Significance for Large Samples	T <sub>1</sub> &T <sub>2</sub>	1	Chalk & Talk, Active Learning, PPT & Tutorial		
				T <sub>1</sub> &T <sub>2</sub>	1			
		3.5	Tests of Significance for Small Samples	T <sub>1</sub> &T <sub>2</sub>	1			
				T <sub>1</sub> &T <sub>2</sub>	1			
		3.6	Relationship between Estimation Theory and Hypothesis Testing	T <sub>1</sub> &T <sub>2</sub>	1			
				T <sub>1</sub> &T <sub>2</sub>	1			
		37	The Chi-Square Test for Goodness of Fit, Contingency Tables	T <sub>1</sub> &T <sub>2</sub>	1			
				T <sub>1</sub> &T <sub>2</sub>	1			
		<b>Total</b>					<b>13</b>	
		<b>Algebraic Structures and Number Theory</b>						
IV	CO4 Students are able to Evaluate algebraic structures such as groups, monoids, and homomorphisms, and apply number theory concepts like Euclidean algorithms and modular arithmetic ( K3)	4.1	Algebraic Systems, Examples and General Properties	T <sub>3</sub> &T <sub>4</sub>	1	Chalk & Talk, Active Learning, PPT & Tutorial		
				T <sub>3</sub> &T <sub>4</sub>	1			
		4.2	Semi Groups and Monoids	T <sub>3</sub> &T <sub>4</sub>	1			
		4.3	Homomorphism of Semi Groups Semi Groups and Monoids	T <sub>3</sub> &T <sub>4</sub>	1			
		4.4	Group, Subgroup and Abelian Group	T <sub>3</sub> &T <sub>4</sub>	1			
				T <sub>3</sub> &T <sub>4</sub>	1			
		4.5	Homomorphism and Isomorphism	T <sub>3</sub> &T <sub>4</sub>	1			
		4.6	Properties of Integers and Division Theorem	T <sub>3</sub> &T <sub>4</sub>	1			
		4.7	The Greatest Common Divisor and Euclidean Algorithm	T <sub>3</sub> &T <sub>4</sub>	1			
		4.8	Least Common Multiple and Testing for Prime Numbers	T <sub>3</sub> &T <sub>4</sub>	1			
4.9	The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat's Theorem and Euler's Theorem)	T <sub>3</sub> &T <sub>4</sub>	1					
		T <sub>3</sub> &T <sub>4</sub>	1					
		T <sub>3</sub> &T <sub>4</sub>	1					
<b>Total</b>				<b>13</b>				
<b>Graph Theory</b>								
V		4.1	Basic Concepts of Graphs and Sub graphs	T <sub>3</sub> &T <sub>4</sub>	1			
				T <sub>3</sub> &T <sub>4</sub>	1			
		4.2	Matrix Representation of Graphs, Adjacency Matrices and Incidence Matrices	T <sub>3</sub> &T <sub>4</sub>	1			
				T <sub>3</sub> &T <sub>4</sub>	1			



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CO5 Students are able to Design and analyze graphs using concepts like Eulerian and Hamiltonian circuits, graph coloring, and spanning trees, applying algorithms for practical problems.(K4).	4.3	Isomorphic Graphs, Paths and Circuits	T <sub>3</sub> &T <sub>4</sub>	1	Chalk & Talk, Active Learning, PPT & Tutorial
			T <sub>3</sub> &T <sub>4</sub>	1	
	4.4	Eulerian and Hamiltonian Graphs	T <sub>3</sub> &T <sub>4</sub>	1	
	4.5	Multi graphs, Planar Graphs and Euler's Formula	T <sub>3</sub> &T <sub>4</sub>	1	
			T <sub>3</sub> &T <sub>4</sub>	1	
	4.6	Graph Coloring and Covering, Chromatic Number	T <sub>3</sub> &T <sub>4</sub>	1	
	4.7	Spanning trees and Algorithms for Spanning Trees	T <sub>3</sub> &T <sub>4</sub>	1	
T <sub>3</sub> &T <sub>4</sub>			1		
<b>Total</b>			<b>12</b>		
<b>Cumulative Proposed Periods</b>				<b>67</b>	

### Text Books:

S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
T1	Murray R. Spiegel, John J. Schiller, R. Alu Srinivasan, Probability & Statistics, 3rd Edition, Schaum's Outline Series, Tata McGraw-Hill Publishers, 2018.
T2	K. Trivedi, Probability and Statistics with Reliability, 2nd Edition, Wiley, 2011
T3	H. Rosen, Discrete Mathematics and its Applications with Combinatorics and Graph Theory, 7th Edition, Tata McGraw Hill, 2003.
T4	John Vince, Springer. Foundation Mathematics for Computer Science, 1st Edition, 2015

### S.No.

R1	M. Mitzenmacher and E. Upfal, Probability and Computing: Randomized Algorithms and Probabilistic Analysis, 1st Edition, 2005.
R2	Alan Tucker, Applied Combinatorics, 6th Edition, Wiley, 2012.

### Web Details

1	<a href="https://archive.nptel.ac.in/courses/106/102/106102064/">https://archive.nptel.ac.in/courses/106/102/106102064/</a>
2	<a href="https://ocw.mit.edu/courses/6-006-introduction-to-algorithms-spring-2020/video_galleries/lecture-videos/">https://ocw.mit.edu/courses/6-006-introduction-to-algorithms-spring-2020/video_galleries/lecture-videos/</a>
3	<a href="https://www.cs.usfca.edu/~galles/visualization/Algorithms.html">https://www.cs.usfca.edu/~galles/visualization/Algorithms.html</a>
4	<a href="https://visualgo.net/en">https://visualgo.net/en</a>
5	<a href="https://elearn.daffodilvarsity.edu.bd/course/view.php?id=11771">https://elearn.daffodilvarsity.edu.bd/course/view.php?id=11771</a>

	Name	Signature with Date
i. Faculty	Mr. P.V.Narayana (MCA- A, B & C)	P.V. Narayana
ii. Course Coordinator	Mr. P.V.Narayana	P.V. Narayana
iii. Module Coordinator	Mr. K.D.N.Murthy	
iv. Programme Coordinator	Dr. V. Swaminadham	V. Swaminadham

Principal