DHANALAKSHMI SRINIVASAN INSTITUTE OF TECHNOLOGY
SAMAYAPURAM, TRICHY
DEPARTMENT OF MATHEMATICS
COURSE PLAN

Sub. Code : MA 8391	**Branch / Year / SEM**: BME/II /IV
Sub. Name : PROBABILITY AND STATISTICS	**Batch**: 2018-2022
Staff Name : MS. R MANONMANI	**Academic Year**: 2019-20 (EVEN)

COURSE OBJECTIVE

OBJECTIVES:

- This course aims at providing the required skill to apply the statistical tools in engineering problems.

- To introduce the basic concepts of probability and random variables.

- To introduce the basic concepts of two dimensional random variables.

- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems?

- To introduce the basic concepts of classifications of design of experiments, this plays very important roles in the field of agriculture and statistical quality control.

TEXT BOOKS:

T1. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

T2. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th Edition, 2007.

REFERENCE BOOKS

R1. Devore. J.L., "Probability and Statistics for Engineering and the Sciences‖, Cengage Learning, New Delhi, 8th Edition, 2014.

R2. Papoulis, A. and Unnikrishnapillai, S., "Probability, Random Variables and Stochastic Processes", McGraw Hill Education India, 4th Edition, New Delhi, 2010.

R3. Ross, S.M., "Introduction to Probability and Statistics for Engineers and Scientists", 3rd Edition, Elsevier, 2004.

R4. Spiegel. M.R., Schiller. J. and Srinivasan, R.A., "Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 2004.

R5. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia, 8th Edition, 2007.

SUPPLEMENTARY BOOKS

S1. Dr. A.Singaravelu, " Probability and Statistics ", 22 nd Edition, Meenakshi Agency,TamilNadu 2017.

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UNIT I PROBABILITY AND RANDOM VARIABLES 12

Probability – The axioms of probability – Conditional probability – Baye's theorem - Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.

UNIT II TWO - DIMENSIONAL RANDOM VARIABLES 12

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

UNIT III TESTING OF HYPOTHESIS 12

Sampling distributions - Estimation of parameters - Statistical hypothesis - Large sample tests based on Normal distribution for single mean and difference of means -Tests based on t, Chi-square and F distributions for mean, variance and proportion - Contingency table (test for independent) - Goodness of fit.

UNIT IV DESIGN OF EXPERIMENTS 12

One way and Two way classifications - Completely randomized design – Randomized block design – Latin square design - 2_2 factorial design.

UNIT V STATISTICAL QUALITY CONTROL ` 12

Control charts for measurements (X and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits - Acceptance sampling.

TOTAL : 60 PERIODS

S. No	Topic Name	Books for Reference	Page No	Teaching Methodology	No. of Periods required	Cumulative no. of Periods
UNIT – I RANDOM VARIABLES.						
1	Introduction to Probability	S1	1.1-1.14	BB	1	1
2	Axioms of probability	S1	1.15-1.19	BB	1	2
3	Conditional probability	S1	1.20-1.40	BB	1	3
4	Baye's theorem	S1	1.41-1.63	BB	1	4
5	Discrete random variables	S1	1.64-1.80	BB	1	5
6	Continuous random variables	S1	1.81-1.111	BB	1	6
7	Continuous Distribution	S1	1.112-1.142	BB	1	7
8	Mathematical Expectation	S1	1.143-1.164	BB	1	8
9	Moment generating functions	S1	1.165-1.188	BB	1	9
10	Binomial, Poisson distributions.	S1	1.189-1.247	BB	1	10
11	Geometric, Uniform distribution	S1	1.248-1.268	BB	1	11
12	Exponential, Normal distribution.	S1	1.269-1.303	BB	1	12

LEARNING OUTCOME:
    At the end of unit, Student should able to
- Know about the random variables.
- Apply of one dimensional random variable in real life problem.

S. No	Topic Name	Books for Reference	Page No	Teaching Methodology	No. of Periods required	Cumulative no. of Periods
UNIT – II TWO-DIMENSIONAL RANDOM VARIABLE						
13	Two-dimensional random variable	S1	2.1-2.2	BB	1	13
14	Joint distribution	S1	2.2-2.3	BB	1	14
15	Marginal distribution	S1	2.3-2.4	BB	1	15
16	Conditional distribution	S1	2.4-2.23	BB	1	16
17	Problem based on marginal and conditional distribution	S1	2.23-2.67	BB	1	17
18	Covariance	S1	2.68	BB	1	18
19	Correlation	S1	2.68-2.71	BB	1	19
20	Properties , problems on correlation	S1	2.71-2.122	BB		20
21	Linear regression-properties	S1	2.123-2.126	BB		21
22	Problem on regression	S1	2.127-2.136	BB	1	22
23	Transformation of random variables	S1	2.136-2.184	BB	1	23
24	Central limit theorem	S1	2.184-2.198	BB	1	24

LEARNING OUTCOME:
    At the end of unit, Student should able to
- Know about the Covariance.

	• Appy of correlation and Regression in real life problem.					

	UNIT – III TESTING OF HYPOTHESIS					
25	Introduction to sampling.	S1	3.1-3.2	BB	1	25
26	Estimation of parameters	S1	3.2	BB	1	26
27	Statistical parameter	S1	3.3-3.5	BB	1	27
28	Large sample	S1	3.5-3.10	BB	1	28
29	Difference of proportions	S1	3.10-3.16	BB	1	29
30	Test of significance for single mean	S1	3.17-3.18	BB	1	30
31	Test of significance for difference of mean	S1	3.19-3.23	BB	1	31
32	Test of significance for SMALL SAMPLES	S1	3.23	BB	1	32
33	Students t' test	S1	3.24-3.46	BB	1	33
34	F - test	S1	3.47-3.58	BB	1	34
35	Chi – square test for goodness of fit	S1	3.58-3.64	BB	1	35
36	Independence of attributes	S1	3.64-3.74	BB	1	36

LEARNING OUTCOME:
 At the end of unit, Student should able to
- Know about the test of significance.
- Know about different types of test.

	UNIT – IV DESIGN OF EXPERIMENT					
37	Design of experiment	S1	4.1-4.2	PPT	1	37
38	Analysis of variance.	S1	4.2-4.3	PPT	1	38
39	One-way classification.	S1	4.3-4.4	PPT	1	39
40	Anova Table	S1	4.5	PPT	1	40
41	Completely randomized design.	S1	4.5-4.12	PPT	1	41
42	Problems	S1	4.12-4.20	PPT	1	42
43	Two-way classification.	S1	4.21	PPT	1	43
44	Randomized block design.	S1	4.21-4.31	PPT	1	44
45	Problems	S1	4.31-4.41	PPT	1	45
46	Latin square.	S1	4.41-4.43	PPT	1	46
47	Problems	S1	4.43-4.64	PPT	1	47
48	2^2 - Factorial	S1	4.64-4.78	PPT	1	48

LEARNING OUTCOME: At the end of unit, Student should able to • Know about the Anova table • Analyse the problem in real life						
UNIT – V STATISTICAL QUALITY CONTROL						
49	Introduction - Reliability.	T2	649-650	BB	1	49
50	Properties of control chart	T2	650-652	BB	1	50
51	Control charts for measurements - x charts.	T2	655-659	BB	1	51
52	Control charts for measurements - R charts.	T2	659-662	BB	1	52
53	Control charts for attributes- p charts.	T2	662-665	BB	1	53
54	Control charts for attributes - c charts.	T2	665-666	BB	1	54
55	Control charts for attributes - np charts.	T2	666-667	BB	1	55
56	Tolerance limit two side	T2	667-668	BB	1	56
57	Tolerance limit one side	T2	668-669	BB	1	57
58	Non-parametric tolerance	T2	669-670	BB	1	58
59	Acceptance of sampling	T2	670-672	BB	1	59
60	Acceptance of sampling	T2	672-674	BB	1	60
LEARNING OUTCOME: At the end of unit, Student should able to • Know about the Control Chart • Know about the different types chart						

OUTCOMES:

Upon successful completion of the course, students will be able to:

- Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.

- Understand the basic concepts of one and two dimensional random variables and apply in engineering applications.

- Apply the concept of testing of hypothesis for small and large samples in real life problems.

- Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.

- Have the notion of sampling distributions and statistical techniques used in engineering and management problems

ASSESSMENT DETAILS

ASSESSMENT NUMBER	I	II	MODEL
Topic Nos.	1 – 24	25-48	1-60
Date			

ASSIGNMENT DETAILS.

ASSIGNMENT	I	II	III
Topic Nos. For reference	1 – 12	25-36	37-48
Deadline			

ASSIGNMENT NUMBER	BATCH	DESCRIPTIVE QUESTIONS /TOPIC (Minimum 8 Pages)
I	B1 Reg.No.	Assignment topic : 1. A random variable X has the following probability function X: 0 1 2 3 4 5 6 7 8 P(X): K 3K 5K 7K 9K 11K 13K 15K 17K (i) Find the value of K (ii) Find $P(X < 3)$, $P(X \geq 3)$, $P(0 < X < 4)$ (iii)Find the distribution function of X 2.If the random variable x takes the values 1, 2, 3 and 4 such that $2P(X = 1) = 3 P(X = 2) = P(X = 3) = 5P(X = 4)$. Find the probability distribution and find cumulative distribution function of X. 3. Moments of Binomial distribution about the origin. 4..Let X be a R. V with p.d.f given by $f(x) = 2x, 0 < x < 1$ 0, elsewhere Find the pdf of $Y = (3X + 1)$ 5. Find the moment generating function of an exponential random variable and hence find its mean and variance.
	B2 Reg.No.	Assignment topic: 1. Derive the all distributions.
II	B1 Reg.No.	Assignment topic: 1.Problems based on Test of Significances 2. Problems based on T-test

	B2 Reg.No.	Assignment topic: 1.Problems based on Chi-square test 2. Problems based on F-test
III	B1 Reg.No.	Assignment topic: 1.Problems based on One Way clssification 2. Problems based on Latin Square Design
	B2 Reg.No.	Assignment topic: 1.Problems based on Two Way classification 2. Problems based on 2^2 –Factorial Design