

MOHAMMED SATHAK A J COLLEGE OF ENGINEERING

Siruseri IT park, OMR, Chennai - 603103

LESSON PLAN							
Department of COMPUTER SCIENCE				Engineering			
Name of the Subject	Probability andQueueingTheory			Name of the handling Faculty	S.SUDHA		
Subject Code	MA8402			Year / Sem	II/IV		
Acad Year	2018-2019			Batch	2017-2021		
Course Objective							
To describe the necessary and basic concepts in probability and random processes for applications such as random signals, linear systems in communication engineering.							
To illustrate the basic concepts of probability, one and two dimensional random variables and to introduce some standard distributions applicable to engineering which can describe real life phenomenon.							
To examine the basic concepts of random processes which are widely used in IT fields.							
To deliver the concept of queueing models and apply in engineering abd tge significance of advanced queueing models.							
To classify the required mathematical support in real life problems and develop probabilistic models which can be used in several areas of science and engineering.							
Course Outcome							
To Analyse the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.							
To express the basic concepts of one and two dimensional random variables and apply in engineering applications.							
Apply the concept of random processes in engineering disciplines.							
Acquire skills in analyzing queueing models.							
Relate the characterize phenomenon which evolve with respect to time in a probabilistic manner							
Lesson Plan							
Sl. No.	Topic(s)	T / R*	Periods Required	Mode of Teaching (BB / PPT / NPTEL /	Blooms Level (L1-L6)	CO	PO
		Book					
UNIT I PROBABILITY AND RANDOM VARIABLES							
1	Introduction to Random variables.	T1	1	PPT/BB	L1	CO1	PO1,PO3
2	Probability – Axioms of probability	T1	1	PPT/BB	L2	CO1	PO1,PO3
3	Conditional probability	T1	1	PPT/BB	L2	CO1	PO1,PO3
4	Predicates and quantifiers	T1	1	PPT/BB	L2	CO1	PO1,PO3

5	Baye's theorem	T1	1	PPT/BB	L1	CO1	PO1,PO3
6	Discrete random variables-Problems	T1	1	PPT/BB	L3	CO1	PO1,PO3
7	Continuous random variables-Problems	T1	1	PPT/BB	L2	CO1	PO1,PO3
8	Moments	T1	1	PPT/BB	L3	CO1	PO1,PO3
9	Binomial Distribution.	T1	1	PPT/BB	L3	CO1	PO1,PO3
10	Poisson Distribution.	R1	1	PPT/BB	L3	CO1	PO1,PO3
11	Geometric Distribution & Uniform Distribution.	R1	1	PPT/BB	L3	CO1	PO1,PO3
12	Exponential Distribution & Normal distribution	R1	1	PPT/BB	L3	CO1	PO1,PO3

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any: Assignment-1 given on Normal Distribution

Evaluation method :

UNIT II		DIMENSIONAL RANDOM VARIABLES					
13	Introduction - Joint distributions.	T1	1	PPT/BB	L1	CO2	PO1,PO2, PO3
14	Marginal distributions.	T1	1	PPT/BB	L2	CO2	PO1,PO2, PO3
15	Conditional distributions.	T1	1	PPT/BB	L2	CO2	PO1,PO2, PO3
16	Covariance.	T1	1	PPT/BB	L2	CO2	PO1,PO2, PO3
17	Properties, Problems on Correlation	T1	1	PPT/BB	L2	CO2	PO1,PO2, PO3
18	Regression – properties.	T1	1	PPT/BB	L2	CO2	PO1,PO2, PO3
19	Problems on regression.	T1	1	PPT/BB	L3	CO2	PO1,PO2, PO3
20	Problems on regression.	T1	1	PPT/BB	L3	CO2	PO1,PO2, PO3
21	Problems on Transformation of random variables	T1	1	PPT/BB	L2	CO2	PO1,PO2, PO3
22	Problems on Transformation of random variables	R2	1	PPT/BB	L3	CO2	PO1,PO2, PO3
23	Central Limit Theorem	R2	1	PPT/BB	L3	CO2	PO1,PO2, PO3
24	Problems based on the Central limit theorem.	R2	1	PPT/BB	L3	CO2	PO1,PO2, PO3

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any: Assignment-2 given on Central Limit theorem

Evaluation method :

UNIT III RANDOM PROCESSES

25	Random processes- Introduction, classification.	T1	1	PPT/BB	L1	CO3	PO1,PO2
26	Stationary process – Wide Sense Stationary	T1	1	PPT/BB	L3	CO3	PO1,PO2
27	Strict Sense Stationary	T1	1	PPT/BB	L1	CO3	PO1,PO2
28	Markov Process	T1	1	PPT/BB	L3	CO3	PO1,PO2
29	Markov Chain	T1	1	PPT/BB	L3	CO3	PO1,PO2
30	Problems based on Markov Process.	T1	1	PPT/BB	L3	CO3	PO1,PO2
31	Poisson Process - Properties	T1	1	PPT/BB	L3	CO3	PO1,PO2
32	Poisson Process - Problems	T1	1	PPT/BB	L3	CO3	PO1,PO2
33	Discrete parameter Markov chain	R1	1	PPT/BB	L3	CO3	PO1,PO2
34	Discrete parameter Markov chain-problems	R1	1	PPT/BB	L3	CO3	PO1,PO2
35	Discrete parameter Markov chain	R1	1	PPT/BB	L3	CO3	PO1,PO2
36	ChapmanKolmogorov equations Limiting distributions	R1	1	PPT/BB	L3	CO3	PO1,PO2

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any: Assignment-3 given on Markov process

Evaluation method :

UNIT IV QUEUEING MODELS

37	Queueing system – introduction	T1	1	PPT/BB	L2	CO4	PO1
38	Markovian queues	T1	1	PPT/BB	L2	CO4	PO1
39	Birth and Death Process.	T1	1	PPT/BB	L2	CO4	PO1
40	M/M/1, Infinite Capacity	T1	1	PPT/BB	L2	CO4	PO1

41	M/M/1, Finite Capacity	T1	1	PPT/BB	L2	CO4	PO1
42	M/M/c, Infinite Capacity	T1	1	PPT/BB	L3	CO4	PO1
43	M//M/c, Finite Capacity	T1	1	PPT/BB	L3	CO4	PO1
44	Little's Formula	T1	1	PPT/BB	L3	CO4	PO1
45	Queues with finite waiting rooms	T1	1	PPT/BB	L3	CO4	PO1
46	Queues with finite waiting rooms	R2	1	PPT/BB	L3	CO4	PO1
47	Queues with impatient customers : Balking and reneging	R2	1	PPT/BB	L3	CO4	PO1
48	Queues with impatient customers : Balking and reneging	R2	1	PPT/BB	L3	CO4	PO1

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any: Assignment-4 Given with real time problems with queues

Evaluation method :

UNIT V ADVANCED QUEUEING MODELS

49	Introduction-Finite source models	T1	1	PPT/BB	L1	CO5	PO1,PO3
50	M/G/1 queue	T1	1	PPT/BB	L2	CO5	PO1,PO3
51	Pollaczek- Khintchine formula	T1	1	PPT/BB	L2	CO5	PO1,PO3
52	Pollaczek- Khintchine formula- Problems	T1	1	PPT/BB	L3	CO5	PO1,PO3
53	Problems on M/G/1 queue	T1	1	PPT/BB	L3	CO5	PO1,PO3
54	M/D/1 and M/EK/1 as special cases	T1	1	PPT/BB	L3	CO5	PO1,PO3
55	Series queues	T1	1	PPT/BB	L3	CO5	PO1,PO3
56	Series queues-Problems	T1	1	PPT/BB	L3	CO5	PO1,PO3
57	Open Jackson networks	T1	1	PPT/BB	L3	CO5	PO1,PO3
58	Open Jackson networks	R1	1	PPT/BB	L3	CO5	PO1,PO3
59	Open Jackson networks -Problemes	R1	1	PPT/BB	L3	CO5	PO1,PO3
60	Open Jackson networks -Problemes	R1	1	PPT/BB	L3	CO5	PO1,PO3

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any: Assignment -5 given compare these topics with real time applications

Evaluation method :											
Content Beyond the Syllabus Planned											
1	Go to your locality hospital or bank or barbar shop and observe the approaching of the customer and analyse how they where getting the service. Create a real time problem and solve it.										
2											
Text Books											
1	Gross, D., Shortle, J.F, Thompson, J.M and Harris. C.M., —Fundamentals of Queueing Theory", Wiley Student 4th Edition, 2014.										
2	Ibe, O.C., —Fundamentals of Applied Probability and Random Processes", Elsevier, 1st Indian Reprint, 2007.										
Reference Books											
1	Hwei Hsu, "Schaum’s Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill Edition, New Delhi, 2004.										
2	Taha, H.A., "Operations Research", 9th Edition, Pearson India Education Services, Delhi, 2016.										
2	Trivedi, K.S., "Probability and Statistics with Reliability, Queueing and Computer Science Applications", 2nd Edition, John Wiley and Sons, 2002.										
3	4. Yates, R.D. and Goodman. D. J., "Probability and Stochastic Processes", 2nd Edition, Wiley India Pvt. Ltd., Bangalore, 2012.										
Website / URL References											
1	https://onlinecourses.nptel.ac.in										
2											
3											
Blooms Level											
Level 1 (L1) : Remembering		Lower Order Thinki ng	Fixed Hour Exams	Level 4 (L4) : Analysing					Higher Order Thinki ng	Projects / Mini Projects	
Level 2 (L2) : Understanding				Level 5 (L5) : Evaluating							
Level 3 (L3) : Applying				Level 6 (L6) : Creating							
Mapping syllabus with Bloom’s Taxonomy LOT and HOT											
Unit No	Unit Name		L1	L2	L3	L4	L5	L6	LOT	HOT	Total
Unit 1	PROBABILITY AND RANDOM VARIABLES		2	4	6	0	0	0	12	0	12
Unit 2	DIMENSIONAL RANDOM VARIABLES		1	5	6	0	0	0	12	0	12
Unit 3	RANDOM PROCESSES		2	0	10	0	0	0	12	0	12
Unit 4	QUEUEING MODELS		0	5	7	0	0	0	12	0	12

Unit 5		ADVANCED QUEUEING MODELS				1	2	9	0	0	0	12	0	12
Total						6	16	38	0	0	0	60	0	60
Total Percentage						10	26.7	63.33	0	0	0	100	0	100
CO PO Mapping														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	-	0	-	-	-	1	1	-	1	0	-
CO2	3	3	3	-	-	-	-	-	1	1	-	1	0	-
CO3	3	3	3	-	-	-	-	-	1	1	-	1	0	-
CO4	3	3	3	-	-	-	-	-	1	1	-	1	0	-
CO5	3	3	3	-	-	-	-	-	1	1	-	1	0	-
Avg	3	3	3	-	-	0	0	0	1	1	0	1	0	0
Justification for CO-PO mapping														
CO1	Identify the functions of discrete and continuous random variables, moments and moment generationong function													
CO2	Solve problems in marginal conditional distributions, using the concepts of correletion, regression and transformatio													
CO3	Determine the process is either SSS or WSS, find the TPM of Markov chain and its classification													
CO4	Analyze the concepts of queuing models.													
CO5	Apply non markovian queues to open and closed networks.													
3		High level			2		Moderate level			1		Low level		
Name & Sign of Faculty Incharge : S,SUDHA														
Name & Sign of Subject Expert :														
Head of the Department :														