



Sri Indu

College of Engineering & Technology

UGC Autonomous Institution

Recognized under 2(f) & 12(B) of UGC Act 1956,
NAAC, Approved by AICTE &
Permanently Affiliated to JNTUH



NAAC
NATIONAL ASSESSMENT AND
ACCREDITATION COUNCIL



HANDOUT

II Year I Semester

DEPARTMENT OF COMPUTER SCIENCE
ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

ACADEMIC YEAR 2022-2023



SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

**(Permanently Affiliated to JNTUH, Approved by AICTE, New Delhi and Accredited by NBA, NAAC)
Sheriguda Village, Ibrahimpatnam Mandal, Ranga Reddy Dist. – 501 510**

DEP

**ARTMENT OF COMPUTER SCIENCE ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

HANDOUT- INDEX

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VISION OF THE INSTITUTE

To be a premier institution in engineering & technology and management for competency, values and social consciousness.

MISSION OF THE INSTITUTE

IM₁: Provide high quality academic programs, training activities and research facilities.

IM₂: Promote continuous industry-institute interaction aimed at promoting employability, entrepreneurship, leadership and research aptitude among stakeholders.

IM₃: Contribute to the economic and technological development of the region, state and nation.

VISION OF THE DEPARTMENT

To be a technologically adaptive centre for computing by grooming the students as top notch professionals.

MISSION OF THE DEPARTMENT

The Department has following Missions:

DM₁: To offer quality education in computing.

DM₂: To provide an environment that enables overall development of all the stakeholders.

DM₃: To impart training on emerging technologies like Data Analytics, Artificial Intelligence and Internet of Things.

DM₄: To encourage participation of stakeholders in Research and Development.



Sri Indu College of Engineering & Technology :: Sheriguda (V), R.R.Dist
Department of Computer Science and Engineering

Program Educational Objectives (PEOs)

PEO1	Higher Studies: Graduates with an ability to apply knowledge of Basic Sciences and programming skills in their career and higher education.
PEO2	Lifelong Learning: Graduates with an ability to adopt new technologies for ever changing IT industry needs through Self-Study, Critical thinking and Problem solving skills.
PEO3	Professional Skills : Graduates will be ready to work in projects related to complex problems involving multidisciplinary projects with effective analytical skills
PEO4	Engineering citizenship: Graduates with an ability to communicate well and exhibit social, technical and ethical responsibility in process or product.

Program Outcomes(POs)

PO1	Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design / Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
	Environment and sustainability: Understand the impact of the professional engineering

PO7	solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

	Program specific Outcomes(PSOs)
PSO1	Software Development: To apply the knowledge of Software Engineering, Data Communication, Web Technology and Operating Systems for building IOT and Cloud Computing applications.
PSO2	Industrial Skills Ability: Design, develop and test software systems for world-wide network of computers to provide solutions to real world Problems.
PSO3	Project Implementation: Analyze and recommend the appropriate IT Infrastructure required for the implementation of a project.

	SRI INDU COLLEGE OF ENGG & TECH (Regulation :R20)			Page(s):
	Department of CSE (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)			
	Sub. Code & Title	(R20MTH2104) Mathematical and Statistical Foundations		
	Academic Year: 2022-23	Year/Sem./Section	II/I : AIML	
	Faculty Name & Designation	M.LEELA, Associate Professor		

Department of CSE

(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE OUTCOMES (CO's)

Academic Year: 2022-23

Class: II YEAR-I SEM.

Course Name: MATHEMATICAL AND STATISTICAL FOUNDATION (R20MTH2104)

At the end of the course, the student will be able to

CO'S	Course outcomes
C213.1	Apply the number theory concepts to cryptography domain (k3-apply)
C213.2	Apply the concepts of probability and distributions to some case studies(k3-apply)
C213.3	Calculate the areas under the normal curve& applications of the normal distribution(k3-apply)
C213.4	Analyze the fundamental sampling distributions(k4-Analyze)
C213.5	Test the Hypothesis of single mean, double mean , single proportion, double proportion (k2-understand)
C213.6	Evaluate Transition Probability matrix(K5-Evaluate)

	SRI INDU COLLEGE OF ENGG & TECH (Regulation :R20)			Page(s):
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	Sub. Code & Title	(R20MTH2104) Mathematical and Statistical Foundations		
	Academic Year: 2022-23	Year/Sem./Section	II/I :AIML	
	Faculty Name & Designation	M.LEELA, Associate Professor		

Department of CSE

(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

MAPPING OF CO's WITH PO/PSO;

Course Name: MATHEMATICAL AND STASTICAL FOUNDATION

Mapping of Course Outcomes (CO's) with PO's:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C213.1	3	2	2	2	-	-	-	-	-	-	-	3	2	3	-
C213.2	3	3	2	2	-	-	-	-	-	-	-	3	3	3	-
C213.3	3	3	3	2	-	-	-	-	-	-	-	3	2	3	-
C213.4	3	3	3	3	-	-	-	-	-	-	-	3	3	3	-
C213.5	3	3	3	3	-	-	-	-	-	-	-	2	3	3	-
C213.6	3	3	3	3	-	-	-	-	-	-	-	2	2	3	-
C213	3	2.8	2.7	2.5	-	-	-	-	-	-	-	2.7	2.5	3	-

3- High

2- Medium

1- Low

Faculty

	SRI INDU COLLEGE OF ENGG & TECH (Regulation :R20)		Page(s):
	Department of CSE (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)		
	Sub. Code & Title	(R20MTH2104) Mathematical and Statistical Foundations	
	Academic Year: 2022-23	Year/Sem./Section	II/I : AIML
	Faculty Name & Designation	M.LEELA, Associate Professor	

Department of HUMANITIES & SCIENCES

INDIVIDUAL TIME TABLE

NAME OF THE FACULTY		M LEELA		SUBJECT		II/I:MSF	
TIME	09:40am To 10:40am	10:40am To 11:40am	11:40am To 12:40pm	L U N C H	1:30pm To 2:20pm	2:20pm To 3:10pm	3:10pm To 4:00pm
DAY	1	2	3		4	5	6
MON			CS				AIML(T)
TUE	CS	AIDS(T)				AIML	
WED		AIDS					
THU			AIML		AIDS	CS(T)	
FRI		AIML			AIDS		
SAT	AIDS		AIML		CS		

HOD

PRINCIPAL

SRI INDU COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

DEPARTMENT CALENDAR – 2022-2023 (FIRST SEMESTER)

DAY S										JANUARY'23		FEBRUARY'23		
SUNDAY		AUGUST'22							1					
MONDAY	1						NOVEMBER'22		2	LAB EXAM (III YR)				
TUESDAY	2					1		DECEMBER'22	3	LAB EXAM (III YR)				
WEDNESDAY	3		SEPTEMBER'22			2		1 CLASS COMMITTEE MEETING-III YEAR	4	LAB EXAM (III YR)	1	LAB EXTERNALEXAM S(II YR)		
THURSDAY	4		1			3	MID-I MARKS SUBMISSION(III YEAR)	2 CLASS COMMITTEE MEETING-II YEAR	5	LAB EXAM (III YR)	2	RMT (II YR)		
FRIDAY	5		2		OCTOBER'22	4		3	6	LAB EXAM (III YR)	3	RMT (II YR)		
SATURDAY	6		3	1		5	WEBINAR ON ENTERPRENEUR SHIP	4 CODING COMPETITION	7	LAB EXAM (III YR)	4	RMT (II YR)		
SUNDAY	7	HOLIDAY	4	HOLIDAY	2	HOLIDAY	6	HOLIDAY	5	HOLIDAY	8	HOLIDAY	5	HOLIDAY
MONDAY	8		5	TEACHERS DAY CELEBRATIONS	3	DUSSEH RA HOLIDAY	7		6		9	RMT (III YR)	6	END EXAM (II YR)
TUESDAY	9	MOHARAM	6		4	DUSSEH RA HOLIDAY	8	GURUNANAK JAYANTHI	7		10	RMT (III YR)	7	END EXAM (II YR)
WEDNESDAY	10		7	SUBMISSION OF HANDOUTS(III YR)	5	DUSSEH RA HOLIDAY	9		8		11	RMT (III YR)	8	END EXAM (II YR)
THURSDAY	11		8		6	DUSSEHRA HOLIDAY	10		9		12		9	END EXAM (II YR)
FRIDAY	12		9		7	PAC-I	11		10	SYLLABUS COMPELETION STATUS -IV	13	SYLLABUS COMPELETION STATUS(II YR)	10	END EXAM (II YR)
SATURDAY	13		10	WEEKLY ATTENDACE UPDATE(III YEAR)	8	GUEST LECTURE ON C PROGRAMMING(II YEAR)	12	INTER COLLEGE IDEATHON	11		14	WOKSHOP ON PYTHON PROGRAMMING (II YEAR)	11	END EXAM (II YR)
SUNDAY	14	HOLIDAY	11	HOLIDAY	9	HOLIDAY	13	HOLIDAY	12	HOLIDAY	15	HOLIDAY	12	HOLIDAY
MONDAY	15	INDEPENDENCE DAY	12	DEPARTMENT MEETING	10		14	CLASS COMMITTEE MEETING-II(III YEAR)	13		16	END EXAM (III YR)	13	END EXAM (II YR)
TUESDAY	16		13		11		15	SYLLABUS COMPELETION STATUS(II YR)	14		17	END EXAM (III YR)	14	END EXAM (II YR)
WEDNESDAY	17		14		12		16		15		18	END EXAM (III YR)	15	END EXAM (II YR)
THURSDAY	18		15		13		17		16		19	END EXAM (III YR)	16	END EXAM (II YR)
FRIDAY	19		16	SYLLABUS COMPELETION STATUS(III YR)	14		18		17		20	END EXAM (III YR)	17	END EXAM (II YR)
SATURDAY	20	SRI KRISHNA ASTAMI	17	ENGINEERS' DAY CELEBRATION	15	INTRA COLLEGE IDEATHON	19	DEPARTMENT LEVEL IDEATHON	18	ASSIGNMENT II SUBMISSION(III YR)	21	END EXAM (III YR)	18	

STUDENTS LIST OF AIML (2022-2023)

s.no	HTNo	NAME OF STUDENT
1	21D41A6601	BANDARU SRINIVAS
2	21D41A6602	BANDI ABHINAY
3	21D41A6603	BANDI AKANKSHA
4	21D41A6604	BEESAM NAVYA REDDY
5	21D41A6605	BODDULA SRIRAM
6	21D41A6606	BOMMA SAI TEJA
7	21D41A6607	BUSHARAJU HARI PRASAD
8	21D41A6608	CHAMARTHI BABA VENKATA SAILESH SASTHRULU
9	21D41A6609	CHENNOJU SRINATH
10	21D41A6610	CHENREDDY AKSHAY REDDY
11	21D41A6611	CHERIPELLI POOJA
12	21D41A6612	CHILKAMARRI DEEPNA
13	21D41A6613	CHILUVERU SREEJA
14	21D41A6614	CHITTIREDDY VASHISTA
15	21D41A6615	DANNE SUMANTH KUMAR
16	21D41A6616	DEVALABADRA SRAVAN KUMAR
17	21D41A6617	DONIPATI ANUSRI
18	21D41A6618	DUBBA PALLAVI
19	21D41A6619	DUBBA PRANAY
20	21D41A6620	DUVVURI SAINATH
21	21D41A6621	GADDAM AKHIL
22	21D41A6622	GADDAM NEHA
23	21D41A6623	GANJI DHEERAJ KUMAR
24	21D41A6624	GARAPATI SAI HARSHITHA DEVI
25	21D41A6625	JELLAMPALLI JOYANCE PAUL
26	21D41A6626	JUKANTI RUCHITHA
27	21D41A6627	K NARESH
28	21D41A6628	KAMA REDDY SIDDHARTHA REDDY
29	21D41A6629	KAMALLA MURALIDHAR
30	21D41A6630	KAMBALA SAITEJA
31	21D41A6631	KAMMAMPATY VAMSHI
32	21D41A6632	KAMPALLY MANOHAR
33	21D41A6633	KANDADI NANDITHA
34	21D41A6634	KATAMONI LOKESH
35	21D41A6635	KAVALI ANKITHA
36	21D41A6636	MALLAMPALLI RUPIN
37	21D41A6637	METTU MANICHANDAN
38	21D41A6638	MOHAMMAD AL HURAIZ
39	21D41A6639	MOHAMMED ABDUL SAYEED
40	21D41A6640	MUSKU DIVYA
41	21D41A6641	MYADAM ANIRUDH JAYAKAR
42	21D41A6642	NALLA VARUN
43	21D41A6643	NANDHYALA SRAVAN KUMAR REDDY

44	21D41A6644	NIKHIL KUMAR BELLAMKONDA
45	21D41A6645	PATHEPURAM UDAYKIRAN
46	21D41A6646	POLAMONI AKHIL KUMAR
47	21D41A6647	PRANITA MOHANTY
48	21D41A6648	PULIGILLA YASHWANTH RAO
49	21D41A6649	RASAMOLLA VAISHNAVI
50	21D41A6650	RENUKUNTLA PUJITHA
51	21D41A6651	SAI CHARAN SHIKHARAMMETLA
52	21D41A6652	SANA TABUSSUM
53	21D41A6653	SANKA NOKSHITHA
54	21D41A6654	SANYUKTA SAHA
55	21D41A6655	SHAIK ASIF
56	21D41A6656	SNEHA GEORGE
57	21D41A6657	TIPPANA SHARMILA REDDY
58	21D41A6658	TALARI HARATHI
59	21D41A6659	U DASA ANJANEYA VENKAT KUMAR
60	21D41A6660	UPPUNUTHALA ABHILASH
61	21D41A6661	VALIPE MADHURIMA
62	21D41A6662	VALMIKI GANESH
63	21D41A6663	YAPARLAGANDLA RAVIKANTH
64	21D41A6664	YARREDLA SAI KEERTHI
65	22D45A6601	JANJIRALA SHIVA PRASAD
66	22D45A6602	BODDUPALLY MOHAN BABU
67	22D45A6603	GOSHIKA MANOHAR
68	22D45A6604	VAITLA SRINITHA
69	22D45A6605	JHAINI KARTHIK CHARY
70	22D45A6606	PODILA SHYAMALA



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D4

BR-20

LR.NO.SICET/AUTO/DAE/BR-20/ACADEMIC-CA/520/2022

DATE: 05.09.2022

II B.TECH ACADEMIC CALENDAR
ACADEMIC YEAR : 2022-2023

Dr. G. SURESH,
Principal,
To,
All the HODs.
Sir,

Sub: SICET (Autonomous) - Academic & Evaluation - Academic Calendar for
II B.Tech - I & II Semester for the academic year **2022-23** – Reg.

The approved Academic Calendar for **II B.Tech – I & II Semester** for the academic
Year **2022-23** is given below:

ACADEMIC CALENDAR - II B.TECH - I & II SEMESTER
ADMITTED BATCH – (2021 – 2022) of BR-20 Regulation.

I SEMESTER

Commencement of I Sem class work	26.09.2022	
I Spell of Instructions (Including Dussehra Holidays).	26.09.2022 - 26.11.2022	9 Weeks
Dussehra Holidays.	03.10.2022 - 08.10.2022	1 Week
I Mid Examinations for II B.Tech I Sem Students.	28.11.2022 - 30.11.2022	3 Days
II Spell of Instructions.	01.12.2022 - 28.01.2023	8 Weeks 3 Days
Sankranti Holidays.	13.01.2023 - 16.01.2023	4 Days
II Mid Examinations for II B.Tech I Sem Students.	30.01.2023 - 01.02.2023	3 Days
Preparation Holidays, Practical Lab Examinations and Remedial Mid Test (RMT).	02.02.2023 - 11.02.2023	10 Days
II B.Tech I Semester End Examinations (Main) and Supplementary Examinations.	13.02.2023 - 25.02.2023	2 Weeks
Commencement of Class-Work for II B.Tech - II Semester 27.02.2023 (Monday).		

II SEMESTER

Commencement of II Sem class work.	27.02.2023	
I Spell of Instructions.	27.02.2023 - 22.04.2023	8 Weeks
I Mid Examinations for II B.Tech. II Sem. Students.	24.04.2023 - 26.04.2023	3 Days
II Spell of Instructions.	27.04.2023 - 05.07.2023	10 Weeks
Summer Vacation.	15.05.2023 - 27.05.2023	2 Weeks
II Mid Examinations for II B.Tech. II Sem. Students.	06.07.2023 - 08.07.2023	3 Days
Preparation Holidays, Practical Lab Examinations Remedial Mid Test (RMT).	10.07.2023 - 19.07.2023	10 Days
II B.Tech II Semester End Examinations (Main) and Supplementary Examinations.	20.07.2023 - 02.08.2023	2 Weeks
Commencement of Class-Work for III B.Tech - I Semester 07.08.2023 (Monday).		

ACE

Copy to: All the Heads of the Depts., A.O. Sir.

CONTROLLER OF EXAMINATIONS

Sri Indu College of Engineering & Technology
(An Autonomous Institution under JNTUH)
Sheriguda (V), Ibrahimpatnam, R.R. Dist-501510.

CE

DIRECTOR

DIRECTOR

(Academic Audit)

Sri Indu College of Engineering & Technology
Sheriguda, IBP, R.R. Dist-501510.

PRINCIPAL

PRINCIPAL

Sri Indu College of Engineering & Technology
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MATHEMATICAL AND STASTICAL FOUNDATION

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY (An Autonomous Institution under UGC, New Delhi)

B.Tech. - II Year – I Semester

L	T	P	C
3	1	0	4

(R20MTH2104) Mathematical and Statistical Foundations

Prerequisites: Mathematics courses of first year of study.

Course Objectives:

- The Number Theory basic concepts useful for cryptography etc
- The theory of Probability, and probability distributions of single random variables
- The sampling theory and testing of hypothesis and making inferences
- Stochastic process and Markov chains.

Course Outcomes: After learning the contents of this course, the student must be able to

- Apply the number theory concepts to cryptography domain
- Apply the concepts of probability and distributions to some case studies
- Correlate the material of one unit to the material in other units
- Resolve the potential misconceptions and hazards in each topic of study.

UNIT - I

Greatest Common Divisors and Prime Factorization: Greatest common divisors, The Euclidean algorithm, The fundamental theorem of arithmetic, Factorization of integers and the Fermat numbers

Congruences: Introduction to congruences, Linear congruences, The Chinese remainder theorem, Systems of linear congruences

UNIT - II

Simple Linear Regression and Correlation: Introduction to Linear Regression, The Simple Linear Regression Model, Least Squares and the Fitted Model, Properties of the Least Squares Estimators, Inferences Concerning the Regression Coefficients, Prediction, Simple Linear Regression Case Study Random Variables and Probability Distributions: Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions, Statistical Independence.

Discrete Probability Distributions: Binomial Distribution, Poisson distribution.

UNIT - III

Continuous Probability Distributions: Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial

Fundamental Sampling Distributions: Random Sampling, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, Sampling Distribution of S^2 , t-Distribution, F- Distribution.

UNIT - IV

Estimation & Tests of Hypotheses: Introduction, Statistical Inference, Classical Methods of Estimation. Estimating the Mean, Standard Error of a Point Estimate, Prediction Intervals, Tolerance Limits, Estimating the Variance, Estimating a Proportion for single mean, Difference between Two Means, between Two Proportions for Two Samples and Maximum Likelihood Estimation.

	SRI INDU COLLEGE OF ENGG & TECHNOLOGY LESSON PLAN (Regulation :R20) Department of CSE (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)		Rev1: Pages :
	Sub. Code & Title	(R20MTH2104) Mathematical and Statistical Foundations	

COMPUTER SCIENCE & ENGINEERING (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

UNIT - V

Stochastic Processes and Markov Chains: Introduction to Stochastic processes- Markov

	Academic Year: 2022-23	Year/Sem./Section	II-I:AIML
	Faculty Name & Designation	M.LEELA, ASSC.PROFESSOR	

Unit/ Item No.	Topic (s)	Book Reference	Page (s)		Teaching Methodology	Proposed No. of Periods	Actual Date of Handled	CO/RBT
			From	To				
	UNIT – I							
I	Greatest Common Divisors and Prime Factorization:					11		
1.1	Greatest common divisors	T1	53	55	Black board	01		CO-1,k5
1.2	The Euclidean algorithm	T1	55	59	Black board	01		CO-1,k3
1.3	The fundamental theorem of arithmetic	T1	60	62	Black board	01		CO-1,k3
1.5	Factorization of integers	T1	65	70	Black board	01		CO-1, k5
1.6	The Fermat numbers	T1	82	85	Black board	01		CO-1,k1
1.7	Introduction to congruences	T1	91	96	Black board	01		CO-1,k2
1.8	Linear congruences	T1	97	101	Black board	01		CO-1,k1
1.9	The Chinese remainder theorem,	T1	102	103	Presentation	01		CO-1,k4
1.10	Systems of linear congruences	W1			Presentation	01		CO1,k3
1.11	Problems on congruence	W2			Presentation	01		CO1,k5
		Signature of the HOD/Coordinator						

Unit/ Item No.		Book Reference	Page (s)		Teaching Methodolog y	Proposed No. of Periods	Actual Date of Handled	CO/RBT
UNIT-II								
II	Simple Linear Regression and Correlation					15		
2.1	Introduction to Linear Regression	T2	357	357	Black board	01		CO2,k2
2.2	The Simple Linear Regression Model	T2	358	358	Black board	01		CO2,k1
2.3	Least Squares and the Fitted Model	T2	358	359	Black board	01		CO2,k5
2.4	Properties of the Least Squares Estimators	T2	360	361	Demonstratio n	01		CO2,k4
2.5	Inferences Concerning the Regression Coefficients	T2	362	367	Black board	01		CO2,k1
2.6	Random Variables	T3	1	3	Black board	01		CO2,k1
2.7	Probability Distributions	T3	10	15	Demonstratio n	01		CO2,k2

2.8	Concept of a Random Variable	T3	16	22	Black board	01		CO2,k2
2.9	Discrete Probability Distributions	T3	24	26	Black board	01		CO2,k5
2.10	Problems on discrete probability distributions	T3	28	35	Black board	01		CO2,k5
2.11	Continuous Probability Distributions	T3	36	37	Black board	01		CO2,k4
2.12	Problems on Continuous Probability Distributions	T3	38	50	Black board	01		CO2,k5
2.13	Statistical Independence	T1	36	36	Black board	01		CO2,k1
2.14	Binomial Distribution	T3	121	140	Black board	01		CO2,k1
2.15	Poisson distribution.	T3	141	165	Black board	01		CO2,k1
		Signature of the HOD/Coordinator						

UNIT-III

III	Continuous Probability Distributions:					11		
3.1	Normal Distribution,	T3	166	167	Presentation	01		CO3,k2
3.2	Areas under the Normal Curve	T3	168	168	Presentation	01		CO3,k3
3.3	Applications of the Normal Distribution,	W4	170	174	Black board	01		CO3,k3
3.4	Problems on the Normal Distribution,	T1	50	65	Black board	01		CO3,k5
3.5	Normal Approximation to the Binomial	T1	65	75	Black board	01		CO3,k4
3.6	Fundamental Sampling Distributions	T1	89	90	Black board	01		CO4,k4

3.7	Random Sampling,	T1	91	95	Black board	01		CO4,k2
3.8	Sampling Distribution of Means and the Central Limit Theorem	T1	100	126	Black board	01		CO4,k5
3.9	Sampling Distribution of chi-square test	T2	4.5	4.25	Black board	01		CO4,k3
3.10	Sampling Distribution of t- test	T2	4.26	4.30	Black board	01		CO4,k4
3.11	Sampling Distribution of f-test	T2	4.45	4.50	Black board	01		CO4,k3
	Review	Signature of the HOD/Coordinator						

UNIT-IV

IV	Estimation & Tests of Hypotheses:					11		
4.1	Introduction Estimation & Tests of Hypotheses:	T1	250	251	Presentation	01		CO5,k3
4.2	Classical Methods of Estimation.	T1	253	253	Presentation	01		CO5,k4
4.3	Estimating the Mean	T1	254	255	Black board	01		CO5,k1
4.4	Standard Error of a Point Estimate	T1	260	269	Black board	01		CO5,k4
4.5	Prediction Intervals,	R1	4.61	4.72	Presentation	01		CO5,k5
4.7	Estimating the Variance,	R1	4.73	4.80	Presentation	01		CO5,k5
4.8	Estimating a Proportion for single mean	T1	280	290	Black board	01		CO5,k4
4.9	Estimating Difference between Two Means	T1	300	304	Black board	01		CO5,k4

4.10	Estimating Difference between Two proportion	T3	5.4	5.14	Black board	01		CO5k4
4.11	Maximum Likelihood Estimation.	T3	5.24	5.40	Black board	01		CO5,k1
		Signature of the HOD/Coordinator						
UNIT-V								
V	Stochastic Processes and Markov Chains					08		
5.1	Introduction to Stochastic processes-Markov process	R1	8.1	8.2	Black board	01		CO6,k1
5.2	Transition Probability	R1	8.2	8.7	Black board	01		CO6k2
5.3	Transition Probability Matrix,	R1	8.7	8.36	Black board	01		CO6,k5
5.4	First order and Higher order Markov process	R1	8.2	8.36	Black board	01		CO6,k4
5.5	n-step transition probabilities	R1	8.25	8.27	Black board	01		CO6,k4
5.6	Markov chain,	R1	8.01	8.22	Black board	01		CO6,k3
5.7	Steady state condition,	R1	8.31	8.38	Black board	01		CO6,k1
5.8	Markov analysis	R1	8.39	8.46	Black board	01		CO6,k4
		Signature of the HOD/Coordinator						-

	SRI INDU COLLEGE OF ENGG & TECH (Regulation :R20)			Page(s):
	Department of CSE (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)			
	Sub. Code & Title	(R20MTH2104) Mathematical and Statistical Foundations		
	Academic Year: 2022-23	Year/Sem./Section	II/I : AIML	
	Faculty Name & Designation	M.LEELA, Associate Professor		

LEARNING RESOURCES:

1. TEXT BOOKS:

- T1: Kenneth H. Rosen, Elementary number theory & its applications, sixth edition, Addison-Wesley, ISBN 9780-321-50031-1
- T2: Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics for Engineers & Scientists, 9th Ed. Pearson Publishers.
- T3: S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications Ltd, 2004.

2. REFERENCE BOOK:

- R1: Sheldon M Ross, Probability and statistics for Engineers and scientists, Academic Press.

3. E -Text Books: 1. <https://www.e-booksdirectory.com/details.php?ebook=10166>

4. MOOCS Course:

1. <https://swayam.gov.in/>
2. <https://onlinecourses.nptel.ac.in/>

5. WEB RESOURCES:

This course uses exclusively for providing electronic resource, such as lecturer notes, assignment papers, and sample solutions. Students should make appropriate use of this resource

1. [https://eng.libretexts.org/Bookshelves/Computer_Science/Programming_and_Computation_Fundamentals/Mathematics_for_Computer_Science_\(Lehman_Leighton_and_Meyer\)/02%3A_Structures/08%3A_Number_Theory/8.02%3A_The_Greatest_Common_Divisor](https://eng.libretexts.org/Bookshelves/Computer_Science/Programming_and_Computation_Fundamentals/Mathematics_for_Computer_Science_(Lehman_Leighton_and_Meyer)/02%3A_Structures/08%3A_Number_Theory/8.02%3A_The_Greatest_Common_Divisor)
2. <https://www.studocu.com/in/document/cochin-university-of-science-and-technology/btech-computer-science-engineering/congruence-relation/30273245>
3. <https://www.analyticssteps.com/blogs/simple-linear-regression-applications-limitations-examples>
4. <https://study.com/academy/lesson/the-correlation-coefficient-definition-formula-example.html>
5. https://www.iitp.ac.in/~sourav/CS244_2022/7.Continuous-Probability-distribution.pdf
6. https://onlinecourses.nptel.ac.in/noc19_ma30/preview
7. <https://swayam.gov.in/>
8. <https://onlinecourses.nptel.ac.in/>

6. **Mathematics Websites:** The following information on the Mathematics Web sites will be an additional source of information for references and historical development of the Mathematics. Some biographies of outstanding mathematicians are also available.

1. <http://scienceworld.wolfram.com/biography/topics/Mathematicians.html>
2. <http://teachers.sduhsd.k12.ca.us/abrown/index2.html>
3. <http://www.maths.tcd.ie/pub/HistMath/People/RBallHist.html> Mathematicians of the 17th and 18th Centuries
4. <http://www.geometry.net/math.html> A Geometry Site
5. http://www-history.mcs.st-andrews.ac.uk/history/Indexes/Full_Alph.html

Site of Biographies of Mathematicians

6. <http://mathforum.org>

This site includes resources in mathematics for school students, teachers, parents. Also contains some research related material on mathematics teaching and learning. The 'Problems of the Week' contains problems at different levels of mathematics. It includes selected alternative solutions posted by problem solvers which is really nice. The 'Ask Dr. Math' gives useful explanations of math concepts and the discussion groups are about teaching methods.

7. <http://www.cut-the-knot.org>

Contains interesting puzzles, problems, theorems, proofs, etc. Also has links to other good sites (including all those listed below).

8. <http://nrich.maths.org>

The site is run by the University of Cambridge. It contains problems for different age groups (5 to 18) that one can post solutions to. Selected solutions are published at the website. One can also post questions. There is an archive of questions posted earlier with answers (in blue coloured font). There are also articles, features, etc.

9. <http://archives.math.utk.edu/>

A fairly comprehensive archive: contains teaching materials, public domain software, shareware, books, articles, etc.

10. <http://www-groups.dcs.st-and.ac.uk/~history/>

The MacTutor history of mathematics archive. The best known website for historical information about mathematicians and mathematics.

11. <http://www.maa.org/>

This is the website of the Mathematical Association of America. Contains useful resources for college mathematics teachers including book reviews.

12. <http://e-math.ams.org/>

Website of the main professional organization in mathematics: American Mathematical Society. The journal 'Notices of the AMS' is online. Plus Interesting essays.

8. Recommended Resources:

1. Applied Mathematics, Vol. I & II, P. N. Wartikar and J. N. Wartikar, VidyarthiPrakashan.
2. A first course in Probability, S. M. Ross, Prentice Hall.
3. Probability and Statistics for Engineers, (Fourth Edition), I. R. Miller, J.E. Freund and R. Johnson, PHI.
4. Introduction to the Theory of Statistics, A. M. Mood, F.A. Graybill and D.C. Boes, McGraw Hill Education.
5. Advanced Engineering Mathematics, (Seventh Edition), Peter V. O'Neil, Thomson Learning
6. Probability and Statistics with Examples using R. Author: Siva Athreya, Deepayan Sarkar and Steve Tanner

QUESTION BANK WITH BLOOMS TAXONOMY LEVEL (BTL)

(1.Remembering 2. Understanding 3. Applying 4. Analyzing 5. Evaluating 6. Creating)



**SRI INDU COLLEGE OF ENGG &
TECHNOLOGY**
(Regulation :R20)
Department of CSE
(COMMON TO DS,CS,AI&ML,AI&DS)

**Prepared
on Rev1:**

Sub. Code & Title

(R20MTH2104)MATHEMATICAL STATISTICAL AND FOUNDATION

Academic Year: 2022-23

Year/Sem./Section

II-I

Faculty Name & Designation

M.LEELA, ASSC.PROFESSOR

M.CHALAPATHI RAO . ASST.PROFESSOR

UNIT-1			
1 MARK QUESTIONS		BT Level	Course Outcome
1.	Define Greatest Common Divisor.	I	CO1
2.	Find the greatest common factor of 15 and 35.	V	CO1
3.	Find the greatest common divisor for the set of integers 5, 25, 75.	V	CO1
4..	State Fundamental Theorem of Arithmetic.	I	CO1
5.	Find the prime factorization of 515.	V	CO1
6.	Express in terms of divisibility $a \equiv b \pmod{m}$.	II	CO1
7.	Find the least nonnegative residue modulo 13 of (-100) .	V	CO1
8	Find an inverse modulo 17 of 5.	V	CO1
9	State Chinese Remainder Theorem.	I	CO1
10.	Find an inverse modulo 5 for the matrix $\begin{bmatrix} 2 & 2 \\ 1 & 2 \end{bmatrix}$	V	CO1
10 MARKS QUESTIONS			
1	Show that if a and b are integers, that are not both zero and c is non-zero then $(ca, cb) = c (a, b)$.	IV	CO1
2	State and Prove Fundamental Theorem of Arithmetic.	I	CO1
3	If a and b are integers and $a = bq + r$ then $(a, b) = (b, r)$.	III	CO1
4	Using Fermat's factorization method, factor the following positive integer 6077	IV	CO1
5	For the following set of integers, express the greatest common divisor as a linear combination of these integers (280, 330, 405, 490)	II	CO1
6	Prove that the relation "Congruence mod m" is an equivalence relation.	II	CO1
7	Solve the linear congruence of $17x \equiv 14 \pmod{21}$	III	CO1
8	Solve the following system of congruence's $x \equiv 2 \pmod{9}$ $x \equiv 8 \pmod{15}$ $x \equiv 10 \pmod{25}$.	III	CO1
9	Find the solutions of the following systems of linear congruence's $2x + 3y \equiv 5 \pmod{7}$ $x + 5y \equiv 6 \pmod{7}$	V	CO1
10	Find an inverse modulo 7 of $\begin{bmatrix} 1 & 2 & 3 \\ 1 & 2 & 5 \\ 1 & 4 & 6 \end{bmatrix}$	V	CO1
Unit -II			
1 MARK QUESTIONS			
1.	What is the formula of Karl Pearson's coefficient for exact mean?	I	CO2
2.	Write the regression equations?	II	CO2
3.	What are the normal equations for straight line?	I	CO2
4.	Define the probability.	I	CO2
5.	Find the probability of drawing 2 red balls in succession from a bag containing 4 red and 5 black balls, when the ball that is drawn first is not replaced	V	CO2
6.	Find the probability of getting a sum of 10 if we throw two dice.	V	CO2
7.	What is the probability that a card is drawn at random from the pack of cards may be either king or queen?	V	CO2
8	Write the mean, variance and standard deviation of a discrete probability distribution.	V	CO2

9	Define mean and variance of binomial distribution.	I	CO2																		
10	Write the recurrence relation of Poisson distribution.	I	CO2																		
10 MARKS QUESTIONS																					
1	From a sample of 200 pairs of observation the following quantities were calculated $\sum X=11.34$, $\sum Y=20.78$, $\sum X^2=12.16$, $\sum Y^2=84.96$, $\sum XY=22.13$ from the above data compute the regression coefficients of the equation $Y= \alpha+\beta X$	V	CO2																		
2.	Calculate the regression equation of Y on X from the data given below taking deviations from actual means of X and Y <table><tr><td>Price(rs)</td><td>10</td><td>12</td><td>13</td><td>12</td><td>16</td><td>15</td></tr><tr><td>Amount demanded</td><td>40</td><td>38</td><td>43</td><td>45</td><td>37</td><td>43</td></tr></table> Estimate the likely demand when the price is Rs 20.	Price(rs)	10	12	13	12	16	15	Amount demanded	40	38	43	45	37	43	IV	CO2				
Price(rs)	10	12	13	12	16	15															
Amount demanded	40	38	43	45	37	43															
3.	In the following table S is weight of potassium bromide which will dissolve in 100 grams of water at v°c. Fit an equation of the form $S = mT + b$ by the method of least squares .use this relation to estimate S when $T = 50^\circ$ <table><tr><td>T</td><td>0</td><td>20</td><td>40</td><td>60</td><td>80</td></tr><tr><td>S</td><td>54</td><td>65</td><td>75</td><td>85</td><td>96</td></tr></table>	T	0	20	40	60	80	S	54	65	75	85	96	IV	CO2						
T	0	20	40	60	80																
S	54	65	75	85	96																
4.	If A and B are events with $P(A) = \frac{1}{3}$, $P(B) = \frac{1}{4}$, $P(A \cup B) = \frac{1}{2}$. find a) $P(A \cap B)$ b) $P(A B)$ c) $P(B A)$ d) $P(A \bar{B})$ e) $P(A \cap \bar{B})$	III	CO2																		
5.	In a bolt factory machines A, B, C manufacture 20%, 30% and 50% of the total of their output and 6%, 3% and 2% are defective. A bolt is drawn at random and found to be defective. Find the probabilities that it is manufactured from (i) Machine A (ii) Machine B (iii) Machine C.	I	CO2																		
6.	A random variable X has the following probability function <table><tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr><tr><td>P(x)</td><td>0</td><td>K</td><td>2K</td><td>2K</td><td>3K</td><td>K²</td><td>2K²</td><td>7K²+K</td></tr></table> i) Determine K ii) Evaluate $P(X<6)$, $P(X\geq6)$, $P(0<X<5)$ iii) $P(X\leq K) > \frac{1}{2}$, find the minimum value of K and iv) determine the distribution of X v) Mean vi) Variance	x	0	1	2	3	4	5	6	7	P(x)	0	K	2K	2K	3K	K ²	2K ²	7K ² +K	II	CO2
x	0	1	2	3	4	5	6	7													
P(x)	0	K	2K	2K	3K	K ²	2K ²	7K ² +K													
7.	If the probability density of a random variable is given by $f(x) = \begin{cases} k(1-x^2) , & \text{for } 0 < x < 1 \\ 0 , & \text{otherwise} \end{cases}$ Find the value of K and the probabilities that a random variable having this probability density will take on a value i) between 0.1 and 0.2 ii) greater than 0.5.	IV	CO2																		
8	20% of items produced from a factory are defective. Find the probability that in a sample of 5 chosen at a random i)none is defective ii)one is defective iii) $P(1 < x < 4)$	III	CO2																		
9	If X is a Poisson variate such that $3P(X=4) = \frac{1}{2}P(X=2) + P(X=0)$, Find i) the mean of x ii) $P(x \leq 2)$	IV	CO2																		
10	Find the probability of getting an even number 3 or 4 or 5 times in throwing 10 dice. Using binomial distribution.	V	CO2																		

1 MARK QUESTIONS			
1.	Define normal distribution.	I	CO3
2.	Write any three characteristics of the normal distribution?	I	CO3
3	What is the standard error of the statistic sample mean?	I	CO3
4.	Find the equation of normal distribution if the $\mu=5$ S.D=2 ?	V	CO3
5	The marks of 5 students in one subject are 45,47,49,61,48 and mean of the population is 52. then t value ?	V	CO3
6.	What is sampling?	I	CO4
7	If 36 size of sample mean and standard deviation are 157, 15 and population mean is 155 then z is?	II	CO4
8.	What the central limit theorem.	I	CO4
9.	How many different samples of size two can be chosen, from a finite population of size 25?	II	CO4
10.	What is finite population correction factor if $n=5$ and $N=200$.	II	CO4
11.	A population consists of five numbers 2,3,6,8 and 11. Consider all possible samples of size which can be drawn without replacement from this population. Find the standard deviation of sampling distribution of means	IV	CO4
10 MARKS QUESTIONS			
1.	Give the Applications of normal distribution.	II	CO3
2	In a Normal distribution 7% of the items are under 35 and 89% are under 63. Determine the mean and variance of the distribution.	II	CO3
3	The marks obtained in mathematics by 1000 students is normally distributed with mean 78% and standard deviation 11%. Determine (i) How many students got marks above 90% (ii) What is the highest mark obtained by the lowest 10 % of the students Within what limits did the middle of 90 % of the students lie.	III	
4.	In a sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 2.5, Assuming the distribution to be normal, find a) How many students score between 12 and 15? b) How many score above 18 c) How many score below 18	III	CO3
5	If X is a normal variate, find the area A I. to the left of $z = -1.78$ II. to the right of $z = -1.45$ III. Corresponding to $-0.8 \leq z \leq 1.53$ IV. to the left of $z = -2.52$ and to the right of $z = 1.83$	IV	CO3
6.	A random sample of size 100 is taken from an infinite population having the mean $\mu=76$ and variance 256. What is the probability that x will be between 75 and 78.	IV	CO4
7	A population consists of six numbers 4,8,12,16,20,24. Consider all samples of size two which can be drawn without replacement from this population. Find a. The populations mean. b. The population standard deviation. c. The mean of the sampling distribution of means. d. The standard deviation of the sampling distribution of means.	II	CO4
8.	A random sample of size 100 is taken from an infinite population having the mean $\mu = 76$ and the variance $\sigma^2 = 256$. What is the probability that $\bar{x}$ will be between 75 and 78?	III	CO4

9.	Explain briefly chi- square distribution.	II	CO4												
10.	A random variance of size 16 values from a normal population showed a mean of 53 and a sum of squares of deviations from the mean equals to 150. Can this sample be regarded as taken from the population having 56 as mean? Obtain 95% confidence limits of the mean of the population?	II	CO4												
Unit-IV :															
1 MARK QUESTIONS															
1.	Define an unbiased estimator.	I	CO5												
2.	Define point estimation and interval estimation.	I	CO5												
3.	What is the formula for sample size for estimating population mean?	II	CO5												
4.	What is the formula to calculate maximum error of estimate E ?	II	CO5												
5.	What is the formula for Bayesian interval for μ	II	CO5												
6.	Define maximum likelihood estimation function.	I	CO5												
7.	Write the test statistic for single mean.	I	CO5												
8.	Write the test statistic for difference of two means.	II	CO5												
9.	Write the test statistic for single proportion.	II	CO5												
10.	Write the test statistic for difference of two proportions.	II	CO5												
10 MARKS QUESTIONS															
1.	The mean life of a sample of 10 electric bulbs was found to be 1456 hours with S.D of 423 hours. A second sample of 17 bulbs chosen from a different batch showed a mean life of 1280 hours with S.D of 398 hours. Is there a significant difference between the means of two batches?	IV	CO5												
2.	What is the size of the smallest sample required to estimate an unknown proportion to within a maximum error of 0.06 with at least 95% confidence.	II	CO5												
3.	Find 95% confidence limits for the mean of a normally distributed population from which the following sample was taken 15,17,10,18,16,9,7,11,13,14.	II	CO5												
4.	A sample of 400 items is taken from a population whose standard deviation is 10.The mean of the sample is 40.Test whether the sample has come from a population with mean 38.Also calculate 95% confidence interval for the population	III	CO5												
5.	Explain the procedure of testing of hypothesis.	II	CO5												
6.	In a city A, 20% of a random sample of 900 school boys had a certain slight physical defect. In another city B, 18.5% of a random sample of 1600 school boys has the same defect. Is the difference between the proportions significant at 0.05 level of significance?	V	CO5												
7.	What is the maximum error one can expect to make with probability 0.90 when using the mean of a random sample of size $n = 64$ to estimate the mean of population with $\sigma^2 = 2.56$.	III	CO5												
8.	The samples of students were drawn from two universities and from their weights in kilograms, means and standard deviations are calculated below. Make a large sample test to test the significance of the difference between the means. <table border="1"> <thead> <tr> <th></th><th>Size of sample</th><th>Means</th><th>S.D's</th></tr> </thead> <tbody> <tr> <td>University A</td><td>400</td><td>55</td><td>10</td></tr> <tr> <td>University B</td><td>100</td><td>57</td><td>15</td></tr> </tbody> </table>		Size of sample	Means	S.D's	University A	400	55	10	University B	100	57	15	IV	CO5
	Size of sample	Means	S.D's												
University A	400	55	10												
University B	100	57	15												
9.	In a sample of 1000 people in Karnataka 540 are rice eaters and the rest are wheat eaters. Can we assume that the both rice and wheat are equally popular in this state at 1% level of significance?	V	CO5												
10.	In two large populations, there are 30% and 25% respectively of fair haired people. Is this difference likely to be hidden in samples of 1200 and 900 respectively from two	III	CO5												

	populations?		
Unit-V:			
1 MARK QUESTIONS			
1.	Define State space and parameter space.	I	CO6
2.	Define stochastic process.	I	CO6
3.	What are the formulae for the measure of Gambler's ruin in biased and unbiased cases?	II	CO6
4.	Define the Markov process.	I	CO6
5.	Define the Stochastic matrix.	I	CO6
6.	What are the properties of stochastic matrix?	II	CO6
7.	What is the condition for the regular and non-regular matrices?	II	CO6
8.	Classify the stochastic process.	II	CO6
9.	What is the formula for expected duration of the game?	II	CO6
10.	Define the ergodicity?	I	CO6
10 MARKS QUESTIONS			
1	Find expected duration of the game (d_z) if $p=\frac{1}{3}$, $q=\frac{1}{2}$, $z=1$ and $a=1000$.	III	CO6
2	Ashok bought a share of stock for \$10, and it is believed that the stock price moves (day by day) as a simple random walk with $p = 0.55$. a) What is the probability that Ashok's stock reaches the high value of \$15 before the low value of \$5? b) What is the probability that Ashok will become infinitely rich?	II	CO6
3.	Which of the following are regular matrices? i) $\begin{bmatrix} 0 & 0 & 1 \\ \frac{1}{2} & 0 & \frac{1}{2} \\ 0 & 1 & 0 \end{bmatrix}$ ii) $\begin{bmatrix} \frac{1}{2} & \frac{1}{4} & \frac{1}{4} \\ 0 & 1 & 0 \\ \frac{1}{2} & 0 & \frac{1}{2} \end{bmatrix}$ iii) $\begin{bmatrix} \frac{1}{2} & \frac{1}{2} & 0 \\ \frac{1}{2} & \frac{1}{2} & 0 \\ \frac{1}{4} & \frac{1}{4} & 0 \end{bmatrix}$	I	CO6
4.	A fair die is tossed repeatedly. If X_n denotes the maximum of the numbers occurring in the first n tosses, Find the transition probability matrix P of the markovchain $\{X_n\}$. Find also P^2 and $P(X_2 = 6)$	III	CO6
5.	Which of the following are stochastic matrices? i) $\begin{bmatrix} 1 & 0 \\ \frac{1}{2} & \frac{1}{2} \end{bmatrix}$ ii) $\begin{bmatrix} \frac{1}{2} & -\frac{1}{2} \\ \frac{1}{4} & \frac{3}{4} \end{bmatrix}$ iii) $\begin{bmatrix} \frac{1}{3} & \frac{2}{3} & \frac{4}{3} \\ \frac{1}{2} & 1 & \frac{1}{2} \end{bmatrix}$	III	CO6
6.	The transition probability matrix(tpm) is given as follows. Is the matrix irreducible? $\begin{bmatrix} 0.3 & 0.7 & 0 \\ 0.1 & 0.4 & 0.5 \\ 0 & 0.2 & 0.8 \end{bmatrix}$	II	CO6
7.	A training process considered as a two state Markov chain. If it rains, it is considered to be in state '0' and it does not rains is in the state of '1'. The transition probability of the Markov chain is defined by $P = \begin{bmatrix} 0.6 & 0.4 \\ 0.2 & 0.8 \end{bmatrix}$ Find the probability that it will rain for 3 days from today assuming that	IV	CO6

	it is raining today.		
8.	Three boys A, B and C are throwing a ball to each other. A always throw the ball to B and B always throws the ball to C: but C is just as likely to throw the ball to B as to A. Show that the process is the Markov chain. Find the transition matrix and classify the states.	IV	CO6
9.	The transition probability matrix (t p m) of a markov chain{ X_n }1,2,3,..... having three states 1,2, and 3 is $P = \begin{bmatrix} 0.3 & 0.7 & 0 \\ 0.1 & 0.4 & 0.5 \\ 0 & 0.2 & 0.8 \end{bmatrix}$ And the initial distribution is, $P^0 = [0.7, 0.2, 0.1]$ Find (i) $P\{X_2=3\}$ (ii) $P\{X_3=2, X_2=3, X_1=3, X_0=2\}$	V	CO6
10	Explain briefly about the stochastic matrix and the Markov process.	V	CO6

	Sub. Code & Title		(R20MTH2104) Mathematical and Statistical Foundations	
	Academic Year: 2022-23		Year/Sem./Section	II/I : AIML
	Faculty Name & Designation		M.LEELA, Assosciate Professor	

ASSIGNMENT FOR MID1

S.No.	Assignment Questions	BT LEVELS	Course Outcome																		
1	Solve the following system of congruence's $x \equiv 2 \pmod{9}$ $x \equiv 8 \pmod{15}$ $x \equiv 10 \pmod{25}$.	III	CO1																		
2.	If c and d are integers and $c = dq + r$ then $(c , d) = (d , r)$.	III	CO1																		
3.	In the following table S is weight of potassium bromide which will dissolve in 100 grams of water at v°c. Fit an equation of the form $S = mT + b$ by the method of least squares .use this relation to estimate S when $T = 50^{\circ}$ <table><tr><td>T</td><td>0</td><td>20</td><td>40</td><td>60</td><td>80</td></tr><tr><td>S</td><td>54</td><td>65</td><td>75</td><td>85</td><td>96</td></tr></table>	T	0	20	40	60	80	S	54	65	75	85	96	IV	CO2						
T	0	20	40	60	80																
S	54	65	75	85	96																
4.	A random variable X has the following probability function <table><tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr><tr><td>P(x)</td><td>0</td><td>K</td><td>2K</td><td>2K</td><td>3K</td><td>K²</td><td>2K²</td><td>7K²+ K</td></tr></table> i) Determine K ii) Evaluate $P(X<6)$, $P(X\geq6)$, $P(0<X<5)$ iii) $P(X\leq K) > \frac{1}{2}$, find the minimum value of K and iv) determine the distribution of X v) Mean vi) Variance	x	0	1	2	3	4	5	6	7	P(x)	0	K	2K	2K	3K	K ²	2K ²	7K ² + K	II	CO2
x	0	1	2	3	4	5	6	7													
P(x)	0	K	2K	2K	3K	K ²	2K ²	7K ² + K													
5.	In a Normal distribution 7% of the items are under 35 and 89% are under 63. Determine the mean and variance of the distribution.	II	CO3																		

	Sub. Code & Title		(R20MTH2104) Mathematical and Statistical Foundations	
	Academic Year: 2022-23		Year/Sem./Section	II/I : AIML
	Faculty Name & Designation		M.LEELA, Associate Professor	

ASSIGNMENT FOR MID II

S.No.	Assignment Questions	BT LEVELS	Course Outcome												
1.	A population consists of six numbers 4,8,12,16,20,24. Consider all samples of size two which can be drawn without replacement from this population. Find - The populations mean. - The population standard deviation. - The mean of the sampling distribution of means. - The standard deviation of the sampling distribution of means.	II	CO4												
2.	A sample of 400 items is taken from a population whose standard deviation is 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 38. Also calculate 95% confidence	III	CO5												
3.	The samples of students were drawn from two universities and from their weights in kilograms, means and standard deviations are calculated below. Make a large sample test to test the significance of the difference between the means. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th><th>Size of sample</th><th>Mean s</th><th>S.D's</th></tr> </thead> <tbody> <tr> <td>University A</td><td>400</td><td>55</td><td>10</td></tr> <tr> <td>University B</td><td>100</td><td>57</td><td>15</td></tr> </tbody> </table>		Size of sample	Mean s	S.D's	University A	400	55	10	University B	100	57	15	IV	CO5
	Size of sample	Mean s	S.D's												
University A	400	55	10												
University B	100	57	15												
4.	A fair die is tossed repeatedly. If X_n denotes the maximum of the numbers occurring in the first n tosses, Find the transition probability matrix P of the markovchain $\{X_n\}$. Find also P^2 and $P(X_2=6)$	III	CO6												
5..	The transition probability matrix (t p m) of a markov chain $\{X_n\}$ 1,2,3,..... having three states 1,2, and 3 is $P = \begin{bmatrix} 0.3 & 0.7 & 0 \\ 0.1 & 0.4 & 0.5 \\ 0 & 0.2 & 0.8 \end{bmatrix}$ And the initial distribution is, $P^0 = [0.7, 0.2, 0.1]$ Find (i) $P\{X_2=3\}$ (ii) $P\{X_3=2, X_2=3, X_1=3, X_0=2\}$	V	CO6												

	SRI INDU COLLEGE OF ENGG & TECH (Regulation :R20)			Page(s):
	Department of CSE (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)			
	Sub. Code & Title	(R20MTH2104) Mathematical and Statistical Foundations		
	Academic Year: 2022-23	Year/Sem./Section	II/I : AIML	
	Faculty Name & Designation	M.LEELA, Associate Professor		

Topic-wise Link of Video Lectures

Unit 1	Greatest Common Divisors and Prime Factorization	https://archive.nptel.ac.in/courses/111/103/111103020/
Unit 2	Simple Linear Regression and Correlation	https://archive.nptel.ac.in/courses/111/104/111104098/
Unit 3	Continuous Probability Distributions	https://archive.nptel.ac.in/courses/111/104/111104079/
Unit 4	Estimation & Tests of Hypotheses	https://archive.nptel.ac.in/courses/103/106/103106120/
Unit 5	Stochastic Processes and Markov Chains	https://nptel.ac.in/courses/111102014

	SRI INDU COLLEGE OF ENGG & TECH (Regulation :R20)	Page(s):
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	Department of CSE (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)		
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	Academic Year: 2022-23	Year/Sem./Section	II/I : AIML
	Faculty Name & Designation	M.LEELA, Associate Professor	

CONTENT BEYOND THE SYLLABUS

S. No	Topics	Proposed Actions	Date	Resource Person/Mode	POs	PSOs
1	Bernoulli's and exponential distributions	To get knowledge		M.Leela/ Black Board	PO1	PSO1,PSO2
2	Classification of samples	To get knowledge		M.Leela/ Black Board	PO1	PSO1,PSO2

	SRI INDU COLLEGE OF ENGG & TECH (Regulation :R20) Department of CSE (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)	Page(s):
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	Sub. Code & Title		(R20MTH2104) Mathematical and Statistical Foundations	
	Academic Year: 2022-23		Year/Sem./Section	II/I : AIML
	Faculty Name & Designation		M.LEELA, Associate Professor	

SELF STUDY TOPICS			
S.No.	Topics	Books & Journals	Course Outcomes
1.	Algebraic formulas	https://journals.uwyo.edu/index.php/ela	CO1
2.	2 – D and 3-D dimensional coordinate system	http://www.geometry.net/math.html	CO2
3.	Binomial theorem	NCERT BOOK	CO3
4.	Limits and continuity	NCERT BOOK	CO3
5.	Trigonometric functions	NCERT BOOK	CO4
6.	Partial fractions	R.D Sharma	CO3

MID AND END QUESTION PAPERS

BR-20

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
II B.Tech - I Semester - I Mid Term Examination, (MODEL PAPER)
(R20MTH2104) MATHEMATICAL and STATISTICAL METHODS

D4

(For CS, AIML and DS)

Duration: 90 Mins**Dt: 17-12-2021, Day-2 (FN)****Max Marks: 25M****Section – A****Answer All the questions****Marks: 5Qx1M = 5M**

(*L1-Remembering, L2-Understanding, L3-Appling, L4-Analyzing, L5-Evaluating, L6-Creating.)

Blooms Taxonomy Levels *	Course Outcomes
--------------------------------	--------------------

- | | | |
|--|------|-----|
| 1. Find the prime factorization of 515 | (L5) | CO1 |
| 2. State Fundamental Theorem of Arithmetic. | (L1) | CO1 |
| 3. Find the probability of getting a sum of 10 if we throw two dies. | (L5) | CO2 |
| 4. Write the recurrence relation of Poisson distribution. | (L1) | CO2 |
| 5. What is the standard error of the statistic sample mean?. | (L1) | CO3 |

Section – B**Answer any FOUR questions****Marks: 4Qx5M = 20M**

- | | | |
|---|------|-----|
| 6. Show that the greatest common divisor of the integers a and b that are not both zero, is the least positive integer that is a linear combination of a and b. | (L4) | CO1 |
| 7. Find the solutions of the following systems of linear congruences
$2x + 3y \equiv 5 \pmod{7}$
$x + 5y \equiv 6 \pmod{7}$ | (L5) | CO1 |
| 8. State and prove Chinese Remainder Theorem | (L1) | CO1 |
| 9. The mean and variance of a binomial variable X with parameters n and p are 16 and 8. Then find $P(X \geq 1)$ and $P(X > 2)$. | (L5) | CO2 |
| 10. If 2% of light bulbs are defective, Find (i) At least one is defective (ii) Exactly 7 are defective (iii) $P(1 < x < 8)$ in a sample of 100. | (L5) | CO2 |
| 11. In a Normal distribution 7% of the items are under 35 and 89% are under 63. Determine the mean and variance of the distribution. | (L1) | CO3 |

BR-20

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
II B.Tech - I Semester - II Mid Term Examination, (MODEL PAPER)

D4

(R20MTH2104) MATHEMATICAL and STATISTICAL FOUNDATIONS**(For AMIL, DS and CS)****Duration: 90 Mins****Dt: 15-02-2022, Day-2 (FN)****Max Marks: 25M****BR-20****D4****Answer All the questions****Marks: 5Qx1M = 5M***** (L1-Remembering, L2-Understanding, L3-Appling, L4-Analyzing, L5-Evaluating, and L6-Creating.)**

*Blooms Taxonomy Levels	Course Outcomes
(L2)	CO4
(L1)	CO5
(L5)	CO5
(L1)	CO6
(L1)	CO6

- How many different samples of size two can be chosen, from a finite population of size 25?
- Define point estimation and interval estimation.
- Write the test statistic for difference of two means..
- What are the formulae for the measure of Gambler's ruin in biased and unbiased cases?
- Define the Markov process.

Section – B**Answer any FOUR questions****Marks: 4Qx5M = 20M**

- Explain briefly chi- square distribution
- A random sample of 100 teachers in a large metropolitan area revealed a mean weekly salary of Rs,487 with a standard deviation Rs.48. With what degree of confidence can we assert that the average weekly salary of all teachers in the metropolitan area is between 472 to 502 ?.
- A researcher wants to know the intelligence of students in a school. He selected two groups of students. In the first group there are 150 students having the mean IQ of 75 with a S.D of 15, in the second group there are 250 students having the mean IQ of 70 with S.D of 20..
- In two large populations, there are 30% and 25% respectively of fair haired people. Is this difference likely to be hidden in samples of 1200 and 900 respectively from two populations?
- The transition probability matrix (t p m) of a markov chain{ X_n }1,2,3,..... having three states 1,2, and 3 is $P = \begin{pmatrix} 0.3 & 0.7 & 0 \\ 0.1 & 0.4 & 0.5 \\ 0 & 0.2 & 0.8 \end{pmatrix}$ And the initial distribution is, $P^0 = [0.7, 0.2, 0.1]$
Find (i) $P\{X_2=3\}$ (ii) $P\{X_3=2, X_2=3, X_1=3, X_0=2\}$
- A fair die is tossed repeatedly. If X_n denotes the maximum of the numbers occurring in the first n tosses , Find the transition probability matrix P of the markov chain $\{X_n\}$. Find also P^2 and $P(X_2 = 6)$



SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi) - Recognized under 2(f) and 12(B) of UGC Act 1956

II B.Tech. I Semester (Regular) End Examinations, (MODEL PAPER)

(R20MTH2104) MATHEMATICAL and STATISTICAL FOUNDATIONS

05/03/2022

(For CS, AIML and DS)

Day- 3 (FN)

Duration: 3 Hrs

Maximum Marks: 70M

Blooms Taxonomy : (L1-Remembering, L2-Understanding, L3-Appling, L4-Analyzing, L5-Evaluating and L6-Creating)

Course Outcomes : CO

Answer any FIVE questions from the following.

(5Qx14M=70M)

1. For the following set of integers, express the greatest common divisor as a linear combination of these integers (280, 330, 405, 490) L2 CO1

2. Prove that the relation "Congruence mod m" is an equivalence relation . L2 CO1

3. Calculate the regression equation of Y on X from the data given below taking deviations from actual means of X and Y L4 CO2

Price(rs)	10	12	13	12	16	15
Amount demanded	40	38	43	45	37	43

Estimate the likely demand when the price is Rs 20.

4. A random variable X has the following probability function L2 CO3

x	0	1	2	3	4	5	6	7
P(x)	0	K	2K	2K	3K	K ²	2K ²	7K ² +K

- i) Determine K ii) Evaluate $P(X < 6)$, $P(X \geq 6)$, $P(0 < X < 5)$ iii) $P(X \leq K) > \frac{1}{2}$, find the minimum value of K and iv) determine the distribution of X v) Mean vi) Variance

5. Give the Applications of normal distribution. L2 CO4

6. Find 95% confidence limits for the mean of a normally distributed population from which the following sample was taken 15,17,10,18,16,9,7,11,13,14. L2 CO5

7. Explain briefly about the stochastic matrix and the Markov process. L5 CO6

8. a) Define Greatest Common Divisor with example. L1 CO1
- b) If X is a Poisson variate such that
 $3P(X=4) = \frac{1}{2}P(X=2) + P(X=0)$, Find i) the mean of x ii) $P(x \leq 2)$ L4 CO2
- c) Give the Applications of normal distribution L2 CO3
- d) Which of the following are regular matrices? L1 CO6

$$i) \begin{bmatrix} 0 & 0 & 1 \\ \frac{1}{2} & 0 & \frac{1}{2} \\ 0 & 1 & 0 \end{bmatrix} \quad ii) \begin{bmatrix} \frac{1}{2} & \frac{1}{4} & \frac{1}{4} \\ 0 & 1 & 0 \\ \frac{1}{2} & 0 & \frac{1}{2} \end{bmatrix} \quad iii) \begin{bmatrix} \frac{1}{2} & \frac{1}{2} & 0 \\ \frac{1}{2} & \frac{1}{2} & 0 \\ \frac{1}{4} & \frac{1}{4} & 0 \end{bmatrix}$$

PREVIOUS MID AND END QUESTION PAPERS

BR-20

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

D4

II B.Tech - I Semester - I Mid Term Examination, December – 2021**(R20MTH2104) MATHEMATICAL and STATISTICAL METHODS****(For CS, AIML and DS)****Duration: 90 Mins****Dt: 17-12-2021, Day-2 (FN)****Max Marks: 25M****Section – A****Answer All the questions****Marks: 5Qx1M = 5M****(*L1-Remembering, L2-Understanding, L3-Appling, L4-Analyzing, L5-Evaluating, L6-Creating.)**

Blooms Taxonomy Levels *	Course Outcomes
--------------------------------	--------------------

- | | | |
|---|------|-----|
| 1. Find the greatest common divisor for the set of integers 5, 25, 75. | (L5) | CO1 |
| 2. State Chinese Remainder Theorem. | (L1) | CO1 |
| 3. What is the probability that a card is drawn at random from the pack of cards may be either king or queen? | (L5) | CO2 |
| 4. Define Binomial distribution and mean of binomial distribution. | (L1) | CO2 |
| 5. Define normal distribution. | (L1) | CO3 |

Section – B**Answer any FOUR questions****Marks: 4Qx5M = 20M**

- | | | |
|---|------|-----|
| 6. Show that if p is a prime and a is an integer with $p \mid a^2$, then $p \mid a$. | (L4) | CO1 |
| 7. Find the solutions of the following systems of linear congruences.
$x + 2y \equiv 1 \pmod{5}$
$2x + y \equiv 1 \pmod{5}$ | (L5) | CO1 |
| 8. State and Prove Fundamental Theorem of Arithmetic. | (L1) | CO1 |
| 9. From a sample of 200 pairs of observation the following quantities were calculated
$\sum X = 11.34$, $\sum Y = 20.78$, $\sum X^2 = 12.16$, $\sum Y^2 = 84.96$, $\sum XY = 22.13$ from the above data compute the regression coefficients of the equation $Y = \alpha + \beta X$. | (L5) | CO2 |
| 10. If the probability density of a random variable is given by,
$f(x) = K(1 - x^2); 0 < x < 1$ and $f(x) = 0$ otherwise
Find the value of 'K' and the probabilities that a random variable will take on a value:
a) Between 0.1 and 0.2 b) Greater than 0.5. | (L5) | CO2 |
| 11. In a sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 2.5,
Assuming the distribution to be normal, find:
a) How many students score between 12 and 15?
b) How many score above 18.
c) How many score below 18. | (L1) | CO3 |

BR-20

Write Your Ht.No.
HB.Tech - I Semester - II Mid Term Examination, February – 2022
(R20MTH2104) MATHEMATICAL and STATISTICAL FOUNDATIONS

D4

Duration: 90 Mins**Dt: 15-02-2022, Day-2 (FN)****Max Marks: 25M****Section – A****Answer All the questions****Marks: 5Qx1M = 5M***** (L1-Remembering, L2-Understanding, L3-Applying, L4-Analyzing, L5-Evaluating, and L6-Creating.)**

*Blooms Taxonomy Levels	Course Outcomes
-------------------------------	--------------------

- | | | |
|---|------|-----|
| 1. How many different samples of size two can be chosen, from a finite population of size 25? | (L2) | CO4 |
| 2. What is the formula to calculate maximum error of estimate E? | (L1) | CO5 |
| 3. Write the test statistic for difference of two means. | (L5) | CO5 |
| 4. Define the Stochastic matrix. | (L1) | CO6 |
| 5. What is the condition for the regular and non-regular matrices? | (L1) | CO6 |

Section – B**Answer any FOUR questions****Marks: 4Qx5M = 20M**

- | | | |
|---|------|-----|
| 6. A population consists of six numbers 4,8,12,16,20,24. Consider all samples of size two which can be drawn without replacement from this population. Find:
a) The populations mean.
b) The population standard deviation.
c) The mean of the sampling distribution of means.
d) The standard deviation of the sampling distribution of means. | (L1) | CO4 |
| 7. Explain the procedure of testing of hypothesis. | (L2) | CO5 |
| 8. A sample of 900 members has a mean of 3.4cms and S.D 2.61cm. Is this sample has been taken from a large population with mean 3.25cm If the population is normal and its mean is unknown, test the hypothesis and also find the 95% confidence limits of true mean. | (L4) | CO5 |
| 9. In a sample of 1000 people in Karnataka 540 are rice eaters and the rest are wheat eaters. Can we assume that the both rice and wheat are equally popular in this state at 1% level of significance? | (L4) | CO5 |
| 10. Which of the following are regular matrices? | (L1) | CO6 |

$$i) \begin{pmatrix} 0 & 0 & 1 \\ \frac{1}{2} & 0 & \frac{1}{2} \\ 0 & 1 & 0 \end{pmatrix} \quad ii) \begin{pmatrix} \frac{1}{2} & \frac{1}{4} & \frac{1}{4} \\ 0 & 1 & 0 \\ \frac{1}{2} & 0 & \frac{1}{2} \end{pmatrix} \quad iii) \begin{pmatrix} \frac{1}{2} & \frac{1}{2} & 0 \\ \frac{1}{2} & \frac{1}{2} & 0 \\ \frac{1}{4} & \frac{1}{4} & 0 \end{pmatrix}$$

- | | | |
|---|------|-----|
| 11. Which of the following are stochastic matrices? | (L3) | CO6 |
|---|------|-----|

$$i) \begin{pmatrix} 1 & 0 \\ \frac{1}{2} & \frac{1}{2} \end{pmatrix} \quad ii) \begin{pmatrix} \frac{1}{2} & -\frac{1}{2} \\ \frac{1}{4} & \frac{3}{4} \end{pmatrix} \quad iii) \begin{pmatrix} \frac{1}{3} & \frac{2}{3} & \frac{4}{3} \\ \frac{1}{2} & 1 & \frac{1}{2} \end{pmatrix}$$



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II B.Tech. I Semester (Regular) End Examinations, February – 2022.

(R20MTH2104) MATHEMATICAL and STATISTICAL FOUNDATIONS

05/03/2022

(For CS, AIML and DS)

Day- 3 (FN)

Duration: 3 Hrs

Maximum Marks: 70M

Blooms Taxonomy : (L1-Remembering, L2-Understanding, L3-Applying, L4-Analyzing, L5-Evaluating and L6-Creating)

Course Outcomes : CO

Answer any FIVE questions from the following.

(5Qx14M =70M)

1. Prove that a , b , and m be integers with $m > 0$ and $(a, m) = d$. If $d \nmid b$, then $ax \equiv b \pmod{m}$ has no solutions. If $d \mid b$, then $ax \equiv b \pmod{m}$ has exactly d incongruent solutions modulo m . L2 CO1

2. Find all integers x and y such that both of the congruences.
 $3x + 4y \equiv 5 \pmod{13}$ and $2x + 5y \equiv 7 \pmod{13}$. L2 CO1

3. The probability that a pen manufactured by a company will be defective is 0.1 if 12 such pens are selected; find the probability that: L4 CO2
 - a) Exactly 2 will be defective.
 - b) Etleast 2 will be defective.
 - c) None will be defective.

4. Derive mean and variance of Poisson distribution. L2 CO2

5. The mean weight of 500 students at a certain schools is 50kgs and the standard deviation is 6kgs. Assuming that the weights are normally distributed, find the excepted number of students weighing: L2 CO3
 - a) Between 40 and 50 kgs.
 - b) More than 60kgs.

given that $A(1.6667)=0.4525$, where $A(z) = \frac{1}{\sqrt{2\pi}} \int_0^z e^{-\left(\frac{1}{2}\right)z^2} dz$.

6. The average zinc concentration recovered from a sample of zinc measurements in 36 different locations is found to 2.6grams per milliliter. Find 95% and 99% confidence intervals for the mean zinc concentration in the river. Assume that the population standard deviation is 0.3. L2 CO4

P.T.O.

7. Find the fixed probability vector for the regular stochastic matrix $\begin{bmatrix} \frac{1}{3} & \frac{2}{3} \\ \frac{1}{4} & \frac{3}{4} \end{bmatrix}$.

8. a) Show that if a, b, k and m are integers such that $k > 0, m > 0$ and $a \equiv b \pmod{m}$ then $a^k \equiv b^k \pmod{m}$. L2 CO1 (4M)

- b) The probability distribution of a finite random variable X is given by the following table: L4 CO2 (4M)

x_i	-2	-1	0	1	2	3
$P(x_i)$	0.1	k	0.2	$2k$	0.3	k

Find the value of k , mean and variance?

- c) A continuous random variable X has density function given by L1 CO3 (3M)

$$f(x) = \begin{cases} 2e^{-2x}, & x > 0 \\ 0 & \text{otherwise} \end{cases}$$

Find mean and variance?

- d) Explain about Statistical hypothesis & Null hypothesis. L1 CO4 (3M)

BR-20

Write Your Ht.No.

D4



SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

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II B.Tech. I Semester (SUPPL.) End Examinations, Aug./Sept. – 2022.

(R20MTH2104) MATHEMATICAL and STATISTICAL FOUNDATIONS

02/09/2022

(For CS, AIML, and DS)

Day- 3 (FN)

Duration: 3 Hrs

Maximum Marks: 70M

Blooms Taxonomy : (I-Remembering, II-Understanding, III-Appling, IV-Analyzing, V-Evaluating and VI-Creating)

Course Outcomes : CO

Answer any FIVE questions from the following.

(5Qx14M = 70M)

1. State and prove Chines remainder theorem. II CO1
2. Find all integers x and y such that both of the congruences.
 $3x + 4y \equiv 5 \pmod{13}$ and $2x + 5y \equiv 7 \pmod{13}$. II CO1
3. Number of telephone lines busy at an instant of time is a binomial variate with probability 0.1 that a line is busy. If 10 lines are chosen at random, what is the probability that:
 - a) No line is busy.
 - b) All lines are busy.
 - c) Atleast one line busy.
 - d) Atmost two lines are busy.
 IV CO2
4. Derive mean and variance of Binomial Distribution. IV CO2
5. A sample of 12 measurements of the diameter of a metal ball gave the mean $\bar{x} = 7.38\text{mm}$ with standard deviation $s = 1.24\text{mm}$. Find:
 - a) 95% and
 - b) 99% confidence limits for the actual diameter.
 II CO3
6. A machine is producing metal pieces that are cylindrical in shape. A sample of these pieces is taken and the diameter are found to be 1.01, 0.97, 1.03, 1.04, 0.99, 0.98, 0.99, 1.01 and 1.03cms. Find the 99% tolerance limits that will contain 95% of metal pieces produced by this machine, assuming an approximate normal distribution. II CO4
7. Find the fixed probability vector for the regular stochastic matrix. V CO5

$$\begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1/2 & 1/2 & 0 \end{bmatrix}$$

P.T.O.

8. a) Show that if a, b and c are integers with $(a,b)=(a,c)=1$ then $(a,bc)=1$. II CO1 (4M)
- b) Explain briefly Linear Regression. IV CO2 (4M)
- c) Find the student's 't' for the following values in a sample of eight: I CO3 (3M)
-4, -2, -2, 0, 2, 2, 3, 3 taking the mean of the population to be zero.
- d) Explain unbiased estimator and variance of a point estimator. I CO4 (3M)

AUTONOMOUS/248

