



LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

Accredited by NAAC with 'A' Grade, ISO 9001:2015 Certified Institution

Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada

L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.

hodads@lbrce.ac.in , _ads@lbrce.ac.in, Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor : K.Sudhakar

Course Name & Code : Computer Networks

L-T-P Structure : 3-0-0

Program/Sem/Sec : B.Tech / V /SEC-B

Credits: 3

A.Y.: 2022-23

PREREQUISITE: Data Structures and Operating Systems

COURSE EDUCATIONAL OBJECTIVES (CEOs):

COURSE OUTCOMES (COs): At the end of the course, student will be able to

CO1	Demonstrate the modern network architectures from a design perspective (Understand-L2)
CO2	Apply various Data Link layer design issues and error detection & correction techniques to solve collision problems. (Apply-L3)
CO3	Demonstrate the network Layer functionalities (Understand-L2)
CO4	Outline the functions of transport layer protocols (Understand-L2)
CO5	Examine different application layer protocols. (Understand-L2)

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	1	-	3	-	-	-	-	1		2	3	-	
CO2	3	2	1	-	3	-	-	-	-	1		2	3	-	
CO3	3	2	1	-	3	-	-	-	-	1		2	3	-	
CO4	3	2	1	-	3	-	-	-	-	1		2	3	-	
CO5	3	1	2	-	3	-	-	-	-	1		1	3	2	3

1 - Low 2 -Medium 3 - High



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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

TEXTBOOKS:

1. Behrouz A. Forouzan, , “Data Communication and Networking”, McGraw-Hill, 4thEdition, 2011.
2. Andrew S. Tanenbaum, “Computer Networks”, Pearson New International Edition, 8thEdition, 2013.

REFERENCE BOOKS:

1. WilliamStallings,“DataandComputerCommunication”,PearsonPrentice HallIndia, 8th Edition.
2. Douglas Comer, Internetworking with TCP/IP, Prentice Hall of India, Volume 1,6thEdition,2009. Richard Stevens, “TCP/IP Illustrated”, Addison-Wesley.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Computer Networks (20CS12)

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching & Learning Methods	HOD Sign Weekly
1	UNIT1:					
2	Data Communication Components	1	05.07.2023		TLM 1,2	
3	Representation of data and its flow Networks,	1	06.07.2023		TLM 1,2	
4	Various Connection Topology,	2	07.07.2023 12.07.2023		TLM 1,2	
5	Protocols and Standards	1	13.07.2023		TLM 1,2	
6	OSI model	1	14.07.2023		TLM 1,2	
7	Transmission Media	1	15.07.2023		TLM 1,2	
8	LAN :Wired LAN	1	19.07.2023		TLM 1,2	
9	Wireless LANs	1	20.07.2023		TLM 1,2	
10	Connecting LAN and Virtual LAN	2	21.07.2023 22.07.2023		TLM 1,2	
11	Summary & Notes	1	26.07.2023		TLM 1,2	



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UNIT-II: Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA,CSMA/CD,CDMA/CA

12	Data Link Layer and Medium Access Sub Layer	1	27.07.2023		TLM 1,2	
13	Error Detection and Error Correction	2	28.07.2023 29.07.2023		TLM 1,2	
14	Fundamentals, Block coding	1	02.08.2023		TLM 1,2	
15	Hamming Distance, CRC	2	03.08.2023 04.08.2023		TLM 1,2	
16	Flow Control and Error control protocols	1	04.08.2023		TLM 1,2	
17	Stop and Wait , Go back – N ARQ	1	05.08.2023		TLM 1,2	
18	Selective Repeat ARQ, Sliding Window	2	09.08.2023 10.08.2023		TLM 1,2	
19	Piggybacking, Random Access	2	11.08.2023 12.08.2023		TLM 1,2	
20	Multiple access protocols - Pure ALOHA	2	16.08.2023 17.08.2023		TLM 1,2	
21	Slotted ALOHA	2	17.08.2023 18.08.2023		TLM 1,2	
22	CSMA/CD	1	18.08.2023		TLM 1,2	
23	CDMA/CA	1	19.08.2023		TLM 1,2	
24	Summary & Notes	1	23.08.2023		TLM 1,2	

UNIT-III: Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping –ARP,RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols

25	Network Layer	1	24.08.2023		TLM 1,2	
26	Switching	1	25.08.2023		TLM 1,2	
27	Logical addressing – IPV4	1	26.08.2023		TLM 1,2	
28	IPV6	1	06.09.2023 07.09.2023		TLM 1,2	
29	Address mapping –ARP	2	08.09.2023 13.09.2023		TLM 1,2	
30	RARP, BOOTP and DHCP–Delivery	2	14.09.2023 15.09.2023		TLM 1,2	
31	Forwarding and Unicast Routing protocols	2	16.09.2023 20.09.2023		TLM 1,2	



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32	Summary & Notes	1	21.09.2023		TLM 1,2	
UNIT-IV: Transport Layer: Process to Process Communication ,User Datagram Protocol(UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm						
33	Transport Layer	1	22.09.2023		TLM 1,2	
34	Process to Process Communication	1	23.09.2023		TLM 1,2	
35	User Datagram Protocol(UDP)	2	27.09.2023 28.09.2023		TLM 1,2	
36	Transmission Control Protocol (TCP)	2	29.09.2023 30.09.2023		TLM 1,2	
37	SCTP Congestion Control	1	04.10.2023		TLM 1,2	
38	Quality of Service	1	05.10.2023		TLM 1,2	
39	QoS improving techniques	2	06.10.2023 07.10.2023		TLM 1,2	
40	Leaky Bucket and Token Bucket algorithm.	2	11.10.2023 12.10.2023		TLM 1,2	
41	Summary & Notes	1	05.10.2023		TLM 1,2	
UNIT-V: Application layer: Domain Name Space(DNS),DDNS,TELNET,EMAIL, File Transfer Protocol (FTP),WWW ,HTTP ,SNMP ,Bluetooth, Firewalls.						
42	Application layer	1	06.10.2023			
43	Domain Name Space(DNS)	2	07.10.2023 11.10.2023		TLM 1,2	
44	DDNS,TELNET	1	12.10.2023		TLM 1,2	
45	EMAIL, File Transfer Protocol (FTP)	1	13.10.2023		TLM 1,2	
46	WWW ,HTTP	1	18.10.2023		TLM 1,2	
47	SNMP ,Bluetooth	1	19.10.2023		TLM 1,2	
48	Firewalls.	2	20.10.2023 21.10.2023		TLM 1,2	
49	Summary & Notes	1	25.10.2023		TLM 1,2	
Total Number of Classes		65				

Content Beyond the Syllabus :

S No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
50	Advanced Protocols	1			TLM5	



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51	Introduction to Cyber Security	1			TLM5	
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Teaching Learning Methods			
TLM1	Chalk and Talk	TLM4	Demonstration (Lab/Field Visit)
TLM2	PPT	TLM5	ICT (NPTEL/Swayam Prabha/MOOCs)
TLM3	Tutorial	TLM6	Group Discussion/Project

PART-C

EVALUATION PROCESS (R20 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5
II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=15
II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):



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PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	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.
PO 3	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.
PO 4	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.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	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
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	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.



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PO 11	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.
PO 12	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.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	To apply the fundamental engineering knowledge, computational principles, and methods for extracting knowledge from data to identify, formulate and solve real time problems.
PSO 2	To develop multidisciplinary projects with advanced technologies and tools to address social and environmental issues.
PSO 3	To provide a concrete foundation and enrich their abilities for Employment and Higher studies in Artificial Intelligence and Data science with ethical values.

Course Instructor	Course Coordinator	Module Coordinator	HoD
K Sudhakar	K Sudhakar	Dr O. Rama Devi	Dr O. Rama Devi

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction To Machine Learning

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Machine Learning - Introduction	1	03/07/2023		1 & 2	
2.	Types of Machine Learning	1	06/07/2023-07/07/2023		1 & 2	
3.	Applications of Machine Learning	1	08/07/2023		1 & 2	
4.	Issues in Machine Learning	1	08/07/2023		1 & 2	
5.	Preparing to Model- Introduction	1	10/07/2023		1 & 2	
6.	Machine Learning Activities	1	13/07/2023		1 & 2	
7.	Basic Types of Data in Machine Learning	1	14/07/2023		1 & 2	
8.	Exploring Structure of Data,	1	15/07/2023		1 & 2	
9.	Data Quality and Remediation	1	17/07/2023		1 & 2	
10.	Data Pre-Processing	1	20/07/2023		1 & 2	
No. of classes required to complete UNIT-I: 10				No. of classes taken:10		

UNIT-II: Modeling & Evaluation, Basics of Feature Engineering

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
11.	Modeling & Evaluation- Introduction,	1	21/07/2023		1 & 2	
12.	Selecting a Model	1	22/07/2023		1 & 2	
13.	Training a Model (for Supervised Learning)	1	24/07/2023		1 & 2	
14.	Model Representation and Interpretability	1	27/07/2023		1 & 2	
15.	Evaluating Performance of a Model.	1	28/07/2023		1 & 2	
16.	Basics of Feature Engineering- Introduction	1	31/07/2023		1 & 2	
17.	Feature Transformation – Feature Construction	1	03/08/2023		1 & 2	
18.	Feature Extraction, Principal Component Analysis (PCA)	1	04/08/2023		1 & 2	
19.	Singular Value Decomposition (SVD),	1	05/08/2023		1 & 2	
20.	Linear Discriminate Analysis (LDA), Feature Subset Selection	1	07/08/2023		1 & 2	
No. of classes required to complete UNIT-II: 10				No. of classes taken:10		

UNIT-III: Regression

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
21.	Improving Accuracy of the linear regression model	1	10/08/2023		1 & 2	
22.	Improving Accuracy of the linear regression model	1	11/08/2023		1 & 2	
23.	Improving Accuracy of the linear regression model	1	12/08/2023		1 & 2	
24.	Improving Accuracy of the linear regression model,	1	14/08/2023		1 & 2	
25.	Polynomial Regression Model	1	17/08/2023		1 & 2	
26.	Logistic Regression, Regularization,	1	18/08/2023		1 & 2	

			23		
27.	Regularized Linear Regression, Regularized Logistic Regression	1	19/08/20 23		1 & 2
No. of classes required to complete UNIT-III: 07				No. of classes taken:	

UNIT-IV: Supervised Learning: Classification

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
28.	Supervised Learning: Classification- Introduction	1	21/08/2023		1 & 2	
29.	Example of Supervised Learning	1	24/08/2023		1 & 2	
30.	Example of Supervised Learning	1	25/08/2023		1 & 2	
31.	Classification Model	1	26/08/2023		1 & 2	
32.	Classification Model	1	04/09/2023		1 & 2	
33.	Classification Learning Steps.	1	08/09/2023		1 & 2	
34.	Classification Learning Steps.	1	09/09/2023		1 & 2	
35.	Common Classification Algorithms	1	11/09/2023		1 & 2	
36.	Common Classification Algorithms	1	14/09/2023		1 & 2	
37.	k-Nearest Neighbor (kNN),	1	15/09/2023		1 & 2	
38.	Support vector Machines (SVM),	1	16/09/2023		1 & 2	
39.	Random Forest model	1	18/09/2023		1 & 2	
No. of classes required to complete UNIT-IV: 12				No. of classes taken:		

UNIT-V: Other Types of Learning

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
40.	Other Types of Learning	1	21/09/2023		1 & 2	
41.	Ensemble Learning	1	22/09/2023		1 & 2	
42.	Bagging, Boosting	1	23/09/2023		1 & 2	
43.	Stacking and its impact on bias and variance	1	25/09/2023		1 & 2	
44.	AdaBoost	1	29/09/2023		1 & 2	
45.	Gradient Boosting Machines	1	30/09/2023		1 & 2	
46.	XGBoost	1	05/10/2023		1 & 2	
47.	Reinforcement Learning	1	06/10/2023		1 & 2	
48.	Introduction, Q Learning	1	07/10/2023		1 & 2	
No. of classes required to complete UNIT-V: 09				No. of classes taken:		

Teaching Learning Methods

TLM1	Chalk and Talk	TLM4	Demonstration (Lab/Field Visit)
TLM2	PPT	TLM5	ICT (NPTEL/Swayam Prabha/MOOCs)
TLM3	Tutorial	TLM6	Group Discussion/Project

PART-C

EVALUATION PROCESS (R20 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5
II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=15
II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	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.
PO 3	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.
PO 4	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.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	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
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to
PO 11	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.
PO 12	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.
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PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	The ability to apply Software Engineering practices and strategies in software project development using open-source programming environment for the success of organization.
PSO 2	The ability to design and develop computer programs in networking, web applications and IoT as per the society needs.
PSO 3	To inculcate an ability to analyze, design and implement database applications.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	M.KISHORE KUMAR	Dr.P.Bagath	Dr.K.Naga Prasanthi	O. RAMA DEVI
Signature				



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DEPARTMENT OF ARTIFICIAL INTELLIGENCE & DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: P.NARENDHRA BABU

Course Name & Code : AUTOMATA AND COMPILER DESIGN & 20AD05

L-T-P Structure : 3-0-0

Credits: 3

Program/Sem/Sec : B.Tech V Sem AI & DS/B

A.Y.: 2023-24

PREREQUISITE:

The students are expected to have a strong background in the fundamentals of discrete Mathematics, algorithms, and data structures. Some knowledge of programming languages, programming, and computer architecture will be helpful.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

To introduce students to the mathematical foundations of computation like automata theory, the theory of formal languages and grammars, the notion of algorithm, decidability, complexity, and computability. Understand the theory and practice of compiler implementation.

COURSE OUTCOMES (COs): At the end of the course, student will be able to

CO1	Design Finite Automata and Regular expression for regular languages. (Understand- L2)
CO2	Design Context free grammar and push down automata for CFL. (Apply - L3)
CO3	Design and implement lexical analyzer and syntax analyzer. (Apply - L3)
CO4	Create framework for syntax directed translation schemes and understand the runtime organization of the program. (Understand- L2)
CO5	Analyze various code optimization techniques and code generation algorithms. (Understand- L2)

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3										1		
CO2	3	2	3									1	1		
CO3	2	1	3									1	1		
CO4	2	1	2									1	1		
CO5	2	3	1									1	1		
	1 - Low			2 - Medium						3 - High					

BOS APPROVED TEXT BOOKS:

T1 John.E .Hopcroft and J.D Ullman, "Introduction to Automata Theory Languages and Computation", Narosa Publications,1999.

T2 Alfred V.Aho,Jeffery Ullman,Ravi sethi,"Compiler Principles, Techniques and Tools",Pearson Education,2nd Edition,2008.

BOS APPROVED REFERENCE BOOKS:

1.Sipser —Introduction to Theory of Computation, Thomson,2nd Edition

2.Mishra and Chandrashekar, Theory of Computer Science –Automata languages and computation —2nd edition, PHI

3.ParagH.Dave, HimanshuB.Dave —Compilers Principles and Practicel , Person Education, First Edition, 2012.

4.Andrew W.appel —Modern compiler implementation in C Cambridge, Revised Edition, 2010.

5.<http://nptel.ac.in/courses/111103016/> (Video lectures for Automata theory and formal languages)

6.<http://nptel.ac.in/courses/106108052/> (Video lectures for Compiler design)

PART-B**COURSE DELIVERY PLAN (LESSON PLAN):****UNIT-I: Introduction to Automata and formal language theory & Regular Expressions**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Basic Mathematical notations and techniques	1	03-07-23		TLM1 & TLM2	
2.	Classification of Automata, definitions and its applications.	1	04-07-23		TLM1 & TLM2	
3.	Deterministic Finite state Automaton (DFA)	1	05-07-23		TLM1 & TLM2	
4.	Nondeterministic Finite state Automaton (NFA), Equivalence of NFA and DFA	1	06-07-23		TLM1 & TLM2	
5.	Minimization of DFA, examples.	1	10-07-23		TLM 1& TLM2	
6.	Equivalence of Regular	1	11-07-23		TLM1	

	expressions and Finite Automata				
7.	Pumping lemma	1	12-07-23		1 & 2
8.	Closure properties.	1	14-07-23		1 & 2
9.	TUTORIAL – 1	1	17-07-23		1 & 2
10.	Assignment / Quiz – 1	1	18-07-23		1 & 2
No. of classes required to complete UNIT-I: 10				No. of classes taken:	

UNIT-II: Introduction to Grammar, Pushdown Automata

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
11.	Context free Grammar (CFG)	1	19-07-23		1 & 2	
12.	Derivation, parse tree, ambiguity	1	21-07-23		1 & 2	
13.	Simplification of CFG,	1	24-07-23		1 & 2	
14.	Chomsky Normal Form (CNF) and Greibach Normal Form (GNF)	1	25-07-23		1 & 2	
15.	Push Down Automata-Definition	1	26-07-23		1 & 2	
16.	Equivalence of Context Free Languages.	1	28-07-23		1 & 2	
17.	Deterministic Pushdown Automaton.	1	31-07-23		1 & 2	
18.	Pumping lemma of Context Free languages.	1	01-08-23		1 & 2	
19.	Properties of Context Free languages.	1	02-08-23		1 & 2	
20.	TUTORIAL – 2	1	04-08-23		1 & 2	
21.	Assignment / Quiz – 2	1	07-08-23		1 & 2	
No. of classes required to complete UNIT-II: 11				No. of classes taken:		

UNIT-III: Introduction to compiler, Lexical Analysis, Syntax Analysis

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
22.	Basic Language processing system, phases of a compiler	1	08-08-23		1 & 2	
23.	Bootstrapping.	1	09-08-23		1 & 2	
24.	The role of a Lexical analyser, input buffering	1	11-08-23		1 & 2	

25.	Specification and Recognition of tokens	1	14-08-23		1 & 2	
26.	LEX tool	1	16-08-23		1 & 2	
27.	The role of a Parser top down parsing-recursive descent and predictive parsing	1	04-09-23		1 & 2	
28.	Bottom -up parsing-Handle pruning, shift-reduce parsing	1	05-09-23		1 & 2	
29.	LR parsers-SLR, CLR and LALR, YACC tool.	1	06-09-23		1 & 2	
30.	TUTORIAL – 3	1	08-09-23		1 & 2	
31.	Assignment / Quiz – 3	1	11-09-23		1 & 2	
No. of classes required to complete UNIT-III: 10				No. of classes taken:		

UNIT-IV: Syntax-Directed translation (SDT), Intermediate Code Representations, Run-time Environment

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
32.	Attribute grammar, Syntax-Directed Definitions (SDD), and Translation schemes	1	12-09-23		1 & 2	
33.	Applications of SDT's.	1	13-09-23		1 & 2	
34.	Syntax tree, three-address code and static single-Assignment.	1	15-09-23		1 & 2	
35.	Translation of expressions and statements.	1	18-09-23		1 & 2	
36.	Storage organization	1	20-09-23		1 & 2	
37.	Storage allocation strategies	1	22-09-23		1 & 2	
38.	Access to non-local data	1	25-09-23		1 & 2	
39.	Parameter passing techniques.	1	26-09-23		1 & 2	
40.	TUTORIAL – 4	1	27-09-23		1 & 2	
41.	Assignment / Quiz – 4	1	29-09-23		1 & 2	
No. of classes required to complete UNIT-IV: 12				No. of classes taken:		

UNIT-V: Basics of Code optimization, Code generation

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
42.	Basic blocks and flow graphs.	1	03-10-23		1 & 2	

43.	The principal sources of optimization	1	04-10-23		1 & 2
44.	Optimization of Basic blocks	1	06-10-23		1 & 2
45.	Loops in flow graph	1	09-10-23		1 & 2
46.	Issues in the design of a code generator	1	10-10-23		1 & 2
47.	Generic code generation algorithm	1	11-10-23		1 & 2
48.	Register allocation and assignment	1	13-10-23		1 & 2
49.	DAG representation of basic blocks	1	16-10-23		1 & 2
50.	DAG representation of basic blocks	1	17-10-23		1 & 2
51.	Peep hole optimization Generating code from DAG.	1	18-10-23		1 & 2
52.	Peep hole optimization Generating code from DAG.	1	20-10-23		1 & 2
53.	TUTORIAL – 5	1	27-10-23		1 & 2
54.	Assignment / Quiz – 5	1	30-10-23		1 & 2
No. of classes required to complete UNIT-V: 12				No. of classes taken:	

Teaching Learning Methods			
TLM1	Chalk and Talk	TLM4	Demonstration (Lab/Field Visit)
TLM2	PPT	TLM5	ICT (NPTEL/Swayam Prabha/MOOCs)
TLM3	Tutorial	TLM6	Group Discussion/Project

PART-C

EVALUATION PROCESS (R20 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5
II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=15
II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	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.
PO 3	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.
PO 4	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.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	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
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to

PO 11	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.
PO 12	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.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	To apply the fundamental engineering knowledge, computational principles, and methods for extracting knowledge from data to identify, formulate and solve real time problems.
PSO 2	To develop multidisciplinary projects with advanced technologies and tools to address social and environmental issues.
PSO 3	To provide a concrete foundation and enrich their abilities for Employment and Higher studies in Artificial Intelligence and Data science with ethical values.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Narendra Babu Pamula	Dr.D.Veeraiah	Dr.S.Jayaprada	Dr.O.Ramadevi
Signature				



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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: V. Chandra Kumar

Course Name & Code : CLOUD COMPUTING & 20CS24

L-T-P Structure : 3-0-0

Program/Sem/Section : B.Tech/V/B

Credits: 3

A.Y.: 2023-24

PREREQUISITE: Computer networks, and Distributed Operating Systems.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- ✓ To explain the evolving computer model caned cloud computing.
- ✓ To introduce the various levels of services that can be achieved by cloud.
- ✓ To describe the security aspects in cloud.
- ✓ To motivate students to do programming and experiment with the various cloud computing environments.

COURSE OUTCOMES (COs): At the end of the course, student will be able to

CO1	Illustrate the key dimensions of the challenge of Cloud Computing.(Understand-L2)
CO2	Classify the Levels of Virtualization and mechanism of tools. (Understand-L2)
CO3	Analyze Cloud infrastructure including Google Cloud and Amazon Cloud.(Analyze-L4)
CO4	Create Combinatorial Auctions for cloud resource and design scheduling algorithms for computing cloud.(Apply-L3)
CO5	Assess control storage systems and cloud security, the risks involved its impact and develop cloud application.(Analyze-L4)

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3												2		
CO2		2	3									1	2		
CO3			3										2		
CO4		3											2		
CO5			2									1	2		
	1 - Low			2 -Medium						3 - High					

TEXTBOOKS:

- T1** Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier.
T2 Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.

REFERENCE BOOKS:

- R1** Cloud Computing, A Hands on approach, Arshadeep Bahga, Vijay Madiseti, University Press
R2 Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH
R3 Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammaraiselvi, TMH

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Systems Modeling, Clustering and Virtualization

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	CEOs and COs discussion, Introduction to Cloud Computing	1	4-7-2023		TLM1	
2.	Systems Modeling	1	5-7-2023		TLM1	
3.	Clustering	1	6-7-2023		TLM1	
4.	Virtualization	1	7-7-2023		TLM2	
5.	Scalable Computing over the Internet	1	10-7-2023		TLM1	
6.	The Age of Internet Computing	1	11-7-2023		TLM1	
7.	Technologies for Network Based Systems	1	12-7-2023		TLM1	
8.	System models for Distributed	1	13-7-2023		TLM2	
9.	System models for Distributed	1	14-7-2023		TLM1	
10.	Cloud Computing	1	15-7-2023		TLM1	
11.	Performance	1	17-7-2023		TLM1	
12.	Security	1	18-7-2023		TLM1	
13.	Energy Efficiency	1	19-7-2023		TLM1	
14.	Assignment-1	1	20-7-2023		TLM1	
No. of classes required to complete UNIT-I: 14				No. of classes taken:		

UNIT-II: Virtual Machines and Virtualization of Clusters and Data Centers

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
15.	Virtual Machines	1	21-7-2023		TLM1	
16.	Virtualization of Clusters and Data Centers	1	22-7-2023		TLM1	
17.	Virtualization of Clusters and Data Centers	1	24-7-2023		TLM1	
18.	Implementation Levels of Virtualization	1	25-7-2023		TLM2	
19.	Implementation Levels of Virtualization	1	26-7-2023		TLM2	
20.	Virtualization Structures	1	27-7-2023		TLM2	
21.	Tools and Mechanisms	1	28-7-2023		TLM1	
22.	Tools and Mechanisms	1	31-7-2023		TLM1	
23.	Virtualization of CPU	1	1-8-2023		TLM1	
24.	Memory and I/O Devices,	1	2-8-2023		TLM1	
25.	Virtual Clusters	1	3-8-2023		TLM1	
26.	Resource Management	1	4-8-2023		TLM1	
27.	Virtualization for Data-Center Automation	1	5-8-2023		TLM1	
28.	Virtualization for Data-Center Automation	2	7-8-2023		TLM2	
29.	Assignment-2	1	8-8-2023		TLM1	
No. of classes required to complete UNIT-II: 13				No. of classes taken:		

UNIT-III: Cloud Platform Architecture

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
30.	Cloud Computing and Architecture	1	9-8-2023		TLM2	
31.	Service Models	1	11-8-2023		TLM2	
32.	Service Model	1	16-8-2023		TLM1	
33.	Public Cloud Platforms	1	17-8-2023		TLM2	
34.	Service Oriented Architecture	1	19-8-2023		TLM1	
35.	Programming on Amazon AWS	1	21-8-2023		TLM1	
36.	Microsoft Azure	1	23-8-2023		TLM1	
37.	Revision/Assignment-3	1	23-8-2023		TLM1	
No. of classes required to complete UNIT-III: 08				No. of classes taken:		

UNIT-IV: Cloud Resource Management and Scheduling

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
38.	Cloud Resource Management	1	4-9-2023		TLM1	
39.	Scheduling	1	5-9-2023		TLM1	
40.	Policies and Mechanisms for Resource Management	1	6-9-2023		TLM1	
41.	Applications of Control Theory to Task Scheduling on a Cloud	1	7-9-2023		TLM1	
42.	Stability of a Two-Level Resource Allocation Architecture	1	8-9-2023		TLM1	
43.	Feedback Control Based on Dynamic Thresholds	1	11-9-2023		TLM1	
44.	Coordination of Specialized Autonomic Performance Managers,	1	15-9-2023		TLM1	
45.	Resource Bundling	1	17-9-2023		TLM1	
46.	Scheduling Algorithms for Computing Clouds-Fair Queuing	1	19-9-2023		TLM1	
47.	Start Time Fair Queuing.	1	21-9-2023		TLM1	
48.	Revision/Assignment-4	1	22-9-2023		TLM1	
No. of classes required to complete UNIT-IV: 11				No. of classes taken:		

UNIT-V: Storage Systems

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
49.	Introduction	1	3-10-2023		TLM1	
50.	Storage Systems	1	4-10-2023		TLM1	
51.	Evolution of storage technology	1	5-10-2023		TLM1	
52.	storage models	1	6-10-2023		TLM1	
53.	storage models	1	7-10-2023		TLM1	
54.	file systems and database	1	11-10-2023		TLM1	
55.	file systems and database	1	12-10-2023		TLM1	
56.	distributed file systems	1	14-10-2023		TLM1	
57.	general parallel file systems	1	17-10-2023		TLM1	

58.	Google file system	1	18-10-2023		TLM1	
59.	Assignment-5	1	20-10-2023		TLM1	
No. of classes required to complete UNIT-V: 12				No. of classes taken:		

Content Beyond the Syllabus:

S No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
50	Case study AWS	1	25-10-2023		TLM1	
51	Case study AWS	1	26-10-2023		TLM1	

Teaching Learning Methods			
TLM1	Chalk and Talk	TLM4	Demonstration (Lab/Field Visit)
TLM2	PPT	TLM5	ICT (NPTEL/Swayam Prabha/MOOCs)
TLM3	Tutorial	TLM6	Group Discussion/Project

PART-C

EVALUATION PROCESS (R20 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5
II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=15
II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	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.
PO 3	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.
PO 4	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.

PO 5	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.
PO 6	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.
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	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.
PO 11	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.
PO 12	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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	To apply the fundamental engineering knowledge, computational principles, and methods for extracting knowledge from data to identify, formulate and solve real time problems.
PSO 2	To develop multidisciplinary projects with advanced technologies and tools to address social and environmental issues.
PSO 3	To provide a concrete foundation and enrich their abilities for Employment and Higher studies in Artificial Intelligence and Data science with ethical values.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	V. Chandra Kumar	Dr.S. Jayaprada	Dr. S. Jayaprada	Dr. O. Rama Devi
Signature				



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DEPARTMENT OF ARTIFICIAL INTELLIGENCE & DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. K.Sudhakar

Course Name & Code : Computer Networks Lab (20CS60)

L-T-P Structure : 0-0-3

Program/Sem/Sec : B.Tech V Sem AI & DS SEC-B

Credits: 1.5

A.Y.: 2023-24

PREREQUISITE: Data Structures, and Operating Systems

COURSE EDUCATIONAL OBJECTIVES (CEOs): The Objective of the course is to prepare students to write programs to illustrate communication in networks, configure different networks (LAN,WAN) and prepare students to differentiate various protocols and their performance.

COURSE OUTCOMES (COs): At the end of the course, students are able to

CO 1	Implement Network layer functionalities using NS3 simulator.(Apply-L3)
CO 2	Demonstrate Transport Layer functionalities.(Understand-L2)
CO 3	Analyze Application layer protocols using Wireshark.(Analyze-L4)
CO 4	Improve individual / team work skills, communication & report writing skills with ethical values.

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		PSO 2	PSO 3
CO1	-	2	2	-	2	-	-	-	-	-	-	-	-	-	3
CO2	-	1	1	1	1	-	-	-	-	-	-	-	-	-	3
CO3	3	-	1	1	1	-	-	-	-	-	-	-	-	-	3
CO4	-	-	-	-	-	-	-	2	2	2	-	-	-	-	-

Note: Enter Correlation Levels 1 or 2 or 3. If there is no correlation, put '-'

1- Slight (Low), 2 – Moderate (Medium), 3 - Substantial (High).

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	To gain familiarity with the basic network commands & utilities available in the Linux OS.	3	03-07-2023		TLM4	

2	To learn about network layer tools and analyze captures for congestion.	3	10-07-2023		TLM4	
3	To learn about queue management techniques, and global routing in ns3.	3	17-07-2023		TLM4	
4	To learn about broadcasting, multicasting, and bridging in a Local Area Network using ns3.	6	24-07-2023 31-07-2023		TLM4	
5	To learn about Wifi and Mobile Adhoc topologies with ns3.	6	31-07-2023 07-08-2023		TLM4	
6	To introduce Socket Programming in TCP and UDP.	3	14-08-2023		TLM4	
7	Observations of Transmission Control Protocol(TCP) Connection states, Flags and Flow control.	3	21-08-2023		TLM4	
8	To learn Transmission Control Protocol(TCP) Flow Control, ErrorControl, and Congestion.	6	04-09-2023 11-09-2023		TLM4	
9	To introduce Wire shark & tcp dump, and observation of packets in a LAN network.	6	18-09-2023 25-09-2023		TLM4	
10	To analyze HTTP packets using Wire shark tool, and understand the records returned by a DNS server.	3	09-10-2023		TLM4	
11	Internal Exam	3	16-10-2023 3		TLM4	

Teaching Learning Methods			
TLM1	Chalk and Talk	TLM4	Demonstration (Lab/Field Visit)
TLM2	PPT	TLM5	ICT (NPTEL/Swayam Prabha/MOOCs)
TLM3	Tutorial	TLM6	Group Discussion/Project

PART-C

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	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.
PO 3	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.

PO 4	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.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	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
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	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.

PO 11	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.
PO 12	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.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	The ability to apply Software Engineering practices and strategies in software project development using open-source programming environments for the success of organization.
PSO 2	The ability to design and develop computer programs in networking, web applications and IoT as per the society needs.
PSO 3	To inculcate an ability to analyze, design and implement database applications.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	K.SUDHAKAR	T.S.R.Rajeswari	K.Sudhakar	O.RamaDevi
Signature				



LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (Under Tier - I), ISO 9001:2015 Certified Institution

Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada

L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.

Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF ARTIFICIAL INTELLIGENCE & DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. M.KISHORE KUMAR

Course Name & Code : Machine Learning Lab (20AD54)

L-T-P Structure : 0-0-3

Program/Sem/Sec : B.Tech V Sem AI & DS

Credits: 1.5

A.Y.: 2023-24

PRE-REQUISITE: Probability and Statistics, Python Programming

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objective of this lab is to Make use of Data sets in implementing the machine learning algorithms in any suitable language of choice.

COURSE OUTCOMES (COs): At the end of the course, students are able to

CO 1	Apply the appropriate pre-processing techniques on data set. (Apply – L3)
CO 2	Implement supervised Machine Learning algorithms. (Apply – L3)
CO 3	Implement advanced Machine Learning algorithms (Apply – L3)
CO 4	Improve individual / teamwork skills, communication & report writing skills with ethical values.

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSO_s):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	2	-	2	-	-	-	-	-	-	-	-	-	3
CO2	-	1	1	1	1	-	-	-	-	-	-	-	-	-	3
CO3	3	-	1	1	1	-	-	-	-	-	-	-	-	-	3
CO4	-	-	-	-	-	-	-	2	2	2	-	-	-	-	-

Note: Enter Correlation Levels **1** or **2** or **3**. If there is no correlation, put '-'

1- Slight (Low), **2** – Moderate (Medium), **3** - Substantial (High).

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	Basic statistical functions for data exploration	3	10/07/2023		TLM4	
2	Data Visualization: Box plot, scatter plot, histogram	3	17/07/2023		TLM4	
3	Data Pre-processing: Handling missing values, outliers, normalization, Scaling	3	24/07/2023		TLM4	
4	Principal Component Analysis (PCA)	3	31/07/2023		TLM4	
5	Singular Value Decomposition (SVD)	3	07/08/2023		TLM4	
6	Linear Discriminant Analysis (LDA)	3	14/08/2023		TLM4	
7	Regression Analysis: Linear regression, Logistic regression, Polynomial regression	3	21/08/2023		TLM4	
8	Regularized Regression	3	04/09/2023		TLM4	
9	K-Nearest Neighbour (kNN) Classifier	3	11/09/2023		TLM4	
10	Support Vector Machines (SVMs)	3	18/09/2023		TLM4	
11	Random Forest model	3	25/08/2023		TLM4	
12	AdaBoost Classifier and XGBoost	3	09/10/2023		TLM4	
13	Internal Exam	3	16/10/2023		TLM4	

Teaching Learning Methods			
TLM1	Chalk and Talk	TLM4	Demonstration (Lab/Field Visit)
TLM2	PPT	TLM5	ICT (NPTEL/Swayam Prabha/MOOCs)
TLM3	Tutorial	TLM6	Group Discussion/Project

PART-C

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	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.
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PO 4	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.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	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
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
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PO 12	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.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	The ability to apply Software Engineering practices and strategies in software project development using open-source programming environment for the success of organization.
PSO 2	The ability to design and develop computer programs in networking, web applications and IoT as per the society needs.
PSO 3	To inculcate an ability to analyze, design and implement database applications.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	M.KISHORE KUMAR	Dr.P.Bagath	Dr.K.Naga Prasanthi	Dr. O.RamaDevi
Signature				



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DEPARTMENT OF ARTIFICIAL INTELLIGENCE & DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. AMANATULLA MOHAMMAD

Course Name & Code : Mean Stack Technologies - 20CSS3

L-T-P Structure : 1-0-3

Credits: 2

Program/Sem/Sec : B.Tech. – AI&DS/V/B

A.Y.: 2023-24

PREREQUISITE: Full Stack Development

COURSE OUTCOMES (COs): At the end of the course, student will be able to

CO1	Develop professional web pages of an application using HTML elements like lists, navigations, tables, various form elements, and embedded media which includes images, audio, video and CSS Styles (Apply-L3)
CO2	Build a basic web server using Node.js , Express.js and also working with Node Package Manager (NPM) (Apply-L3)
CO3	Make use of Typescript to optimize JavaScript code by using the concept of strict type checking. (Apply-L3)
CO4	Improve individual / teamwork skills, communication & report writing skills with ethical values

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	2	-	2	-	-	-	-	-	-	2	-	3	-
CO2	1	-	2	-	2	-	-	-	-	-	-	2	-	3	-
CO3	1	-	2	-	2	-	-	-	-	-	-	2	-	3	-
CO4	-	-	-	-	-	-	-	2	2	2	-	-	-	-	-
	1 - Low			2 -Medium				3 - High							

Text Books &REFERENCE BOOKS:

T1	Programming the World Wide Web, 7th Edition, Robert W Sebesta, Pearson
T2	Pro Mean Stack Development, 1st Edition, ELadElrom, Apress O'Reilly.
T3	Budi Kurniawan, "Struts 2 Design and Programming: A Tutorial", BrainySoftware, 2nd Edition, 2008.
R1	Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, 1st Edition, Dream Tech.
R2	An Introduction to Web Design, Programming, 1st Edition, Paul S Wang, Sanda S Katila, Cengage Learning.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Cycle-1(HTML)	4	07-07-2023		DM5/ DM6	
2.	Cycle -2(HTML)	4	14-07-2023		DM5/ DM6	
3.	Cycle-3(JS)	4	21-07-2023		DM5/ DM6	
4.	Cycle-4(JS)	4	28-07-2023		DM5/ DM6	
5.	Cycle-5(JS)	4	04-08-2023		DM5/ DM6	
6.	Cycle-6(Node.JS)	4	11-08-2023 & 18-08-2023		DM5/ DM6	
7.	Cycle-7(Express.js)	4	25-08-2023 & 08-09-2023		DM5/ DM6	
8.	Cycle-8(Express.js)	4	15-09-2023 & 22-09-2023		DM5/ DM6	
9.	Cycle-9 (Typescript)	4	29-09-2023		DM5/ DM6	
10.	Cycle-10 (Typescript)	4	06-10-2023		DM5/ DM6	
11.	Cycle-11 (Typescript)	4	13-10-2023		DM5/ DM6	
12.	Cycle-12 (Typescript)	4	20-10-2023		DM5/ DM6	
13.	Assessment	4	27-10-2023		DM5/ DM6	

Teaching Learning Methods			
DM1	Chalk and Talk	DM4	Assignment/Test/Quiz
DM2	ICT Tools	DM5	Laboratory/Field Visit
DM3	Tutorial	DM6	Web-based Learning

PART-C

EVALUATION PROCESS (R20 Regulation):

Evaluation Task	Marks
Report	10
Quality of work	10
Presentation	20
Interaction / Queries	10
Total	50

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
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PO 4	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.
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PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to
PO 11	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.
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PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	The ability to apply Software Engineering practices and strategies in software project development using an open-source programming environment for the success of the organization.
PSO 2	The ability to design and develop computer programs in networking, web applications and IoT as per the society needs.
PSO 3	To inculcate an ability to analyze, design and implement database applications.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr. MD. Amanatulla	Dr. K. Devi Priya	Dr. Y. V. B. Reddy	Dr. D. Veeraiyah
Signature				



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L.B. Reddy Nagar, Mylavaram, NTR District, Andhra Pradesh - 521230



DEPARTMENT OF MECHANICAL ENGINEERING **COURSE HANDOUT**

Part-A

PROGRAM : B.Tech., V-Sem., AI &DS, B-Section
ACADEMIC YEAR : 2023-24
COURSE NAME & CODE : RENEWABLE ENERGY SOURCES- 20ME81
L-T-P STRUCTURE : 4-0-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : K. Lakshmi Prasad
COURSE COORDINATOR : K. Lakshmi Prasad
PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES (CEOs): To provide the insights on different non-conventional energy sources, potential, salient features and utilization of solar, wind, geothermal, ocean thermal energy, bio energy and direct energy conversion systems.

COURSE OUTCOMES (COs)

After completion of the course, the student will be able to

CO1: Compute the performance of solar energy harnessing devices and its energy scenario. **(Applying- L3)**

CO2: Apply the principles of energy conversion for wind and geothermal power generating plants. **(Applying - L3)**

CO3: Compare the power generating capacities of tidal energy, wave energy and ocean thermal energy plants. **(Understanding - L2)**

CO4: Illustrate the various biomass power generation system technologies. **(Understanding - L2)**

CO5: Comprehend the direct energy power generation systems. **(Understanding - L2)**

COURSE ARTICULATION MATRIX (Correlation between COs&POs,PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	-	-	-	3	3	-	-	-	-	2	2	-	-
CO2	2	1	-	-	-	3	3	-	-	-	-	2	2	-	-
CO3	1	1	-	-	-	3	3	-	-	-	-	2	2	-	-
CO4	1	1	-	-	-	3	3	-	-	-	-	2	2	-	-
CO5	1	1	-	-	-	3	3	-	-	-	-	2	2	-	-

Note: Enter Correlation Levels **1** or **2** or **3**. If there is no correlation, put '-'

1- Slight (Low), **2** – Moderate (Medium), **3** - Substantial (High).

BOS APPROVED TEXT BOOKS:

- T1** G.D.Rai, Non-Conventional Energy Sources, 5th Edition 2011, Khanna Publishers, New Delhi, India.
- T2** Kreith, F and Kreider, J. F., Principles of Solar Engineering, McGraw-Hill, 1978.

BOS APPROVED REFERENCE BOOKS:

- R1** John Twidell&Tony Weir, Renewable Energy Resources – 2nd Edition, Taylor & Francis
- R2** G.N.Tiwari, Solar Energy – Fundamentals, Design, Modelling and Applications –Narosa Publication Ltd.,2000.
- R3** Ashok V Desai, Non-Conventional Energy- Wiley Eastern, 2000.

Part-B**COURSE DELIVERY PLAN (LESSON PLAN): Section-A****UNIT-I : GLOBAL AND NATIONAL ENERGY SCENARIO & SOLAR ENERGY HARNESSING DEVICES**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Course Outcomes & Blooms Taxonomy Levels	2	04.07.23 05.07.23		TLM1/ TLM2			
2.	Over view of conventional & renewable energy sources	2	06.07.23 11.07.23		TLM1/ TLM2	CO1	T1	
3.	Need & Development of renewable energy sources	1	12.07.23		TLM1/ TLM2	CO1	T1	
4.	Types of renewable energy systems.	2	13.07.23 15.07.23		TLM1/ TLM2	CO1	T1	
5.	Energy available from Sun, Solar radiation data,	1	18.07.23		TLM1/ TLM2	CO1	T1	
6.	Flat plate and Concentrating collectors	1	19.07.23		TLM1/ TLM2	CO1	T1	
7.	Mathematical analysis of Flat plate collectors and collector efficiency	2	20.07.23 22.07.23		TLM1/ TLM2	CO1	T1	
8.	Solar water Heating, Space Heating – Active and Passive heating	1	25.07.23		TLM1/ TLM2	CO1	T1	
9.	solar stills and ponds	1	26.07.23		TLM1/ TLM2	CO1	T1	
10.	basic principle of power generation in photovoltaic cell	1	27.07.23		TLM1/ TLM2	CO1	T1	
11.	Problems	1	01.08.23		TLM1/	CO1	T1	

					TLM2			
12.	Quiz/Assignment							
No. of classes required to complete UNIT-I		15			No. of classes taken:			

UNIT-II : Z-WIND ENERGY & GEOTHERMAL ENERGY

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
13.	Wind – characteristics – wind energy conversion systems – types	2	02.08.23 03.08.23		TLM1/ TLM2	CO2	T1	
14.	Betz model & Interference factor, Power Coefficient Torque Coefficient and thrust coefficient	3	05.08.23 08.08.23 09.08.23		TLM1/ TLM2	CO2	T1	
15.	site selection requirements.	1	10.08.23		TLM1/ TLM2	CO2	T1	
16.	GEOTHERMAL ENERGY: Structure of Earth, Geothermal sources	1	16.08.23		TLM1/ TLM2	CO2	T1	
17.	Hot springs, Hot Rocks & Hot Aquifers	1	17.08.23		TLM1/ TLM2	CO2	T1	
18.	Interconnection of geothermal fossil systems	1	19.08.23		TLM1/ TLM2	CO2	T1	
19.	Problems	1	22.08.23		TLM1/ TLM2	CO1	T1	
20.	Quiz/Assignment							
No. of classes required to complete UNIT-II		10			No. of classes taken:			

UNIT-III : TIDAL ENERGY, WAVE ENERGY and OCEAN THERMAL ENERGY

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
21.	Tidal Energy- Introduction, Origin of Tides, Tidal Power generation	2	23.08.23 24.08.23		TLM1/ TLM2	CO3	T1, R8	
22.	Classification of Tidal Power Plant,	1	26.08.23		TLM1/ TLM2	CO3	T1	

23.	Site requirements	1	05.09.23		TLM1/ TLM2	CO3	T1	
24.	WAVE ENERGY: Introduction, Wave energy and Power	2	07.09.23 12.09.23		TLM1/ TLM2	CO3	T1	
25.	Wave Energy devices – Merits and Demerits	1	13.09.23		TLM1/ TLM2	CO3	T1	
26.	OCEAN THERMAL ENERGY: Introduction	1	14.09.23		TLM1/ TLM2	CO3	T1	
27.	Working principle of Ocean Thermal Energy Conversion	1	16.09.23		TLM1/ TLM2	CO3	T1	
28.	OTEC Systems, Advantages and Disadvantages of OTEC plants.	2	19.09.23 20.09.23		TLM1/ TLM2	CO3	T1	
29.	Quiz/Assignment					CO3		
No. of classes required to complete UNIT-III		11			No. of classes taken:			

UNIT-IV : BIO – ENERGY

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
30.	BIO – ENERGY: Introduction	1	21.09.23		TLM1/ TLM2	CO4	T1	
31.	Biomass Energy Sources	1	23.09.23		TLM1/ TLM2	CO4	T1	
32.	Aerobic and Anaerobic bio-conversion processes	1	26.09.23		TLM1/ TLM2	CO4	T1	
33.	Types of Biogas plants	2	27.09.23 30.09.23					
34.	Raw Materials and properties of Bio-gas	1	03.10.23		TLM1/ TLM2	CO4	T1	
35.	Bio-gas plant Technology and Status	1	04.10.23		TLM1/ TLM2	CO4	T1	
36.	Biomass gasification	1	05.10.23		TLM1/ TLM2	CO4	T1	
37.	Types and application of gasifier	2	07.10.23 10.10.23		TLM1/ TLM2	CO4	T1	
38.	Quiz/Assignment					CO4		
No. of classes required to complete UNIT-IV		10			No. of classes taken:			

UNIT-V : DIRECT ENERGY CONVERSION SYSTEMS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
39.	DIRECT ENERGY CONVERSION SYSTEMS: Introduction	1	11.10.23		TLM1/ TLM2	CO5	T1	
40.	Peltier effect, seebeck effect, Thomson effect,	1	12.10.23		TLM1/ TLM2	CO5	T1	
41.	Fuel Cells-Types.	1	17.10.23		TLM1/ TLM2	CO5	T1	
42.	Efficiency of Fuel Cells.	1	18.10.23		TLM1/ TLM2	CO5	T1	
43.	Thermoelectric power Generation	2	19.10.23 21.10.23		TLM1/ TLM2	CO5	T1	
44.	Thermionic electro power Generation	1	24.10.23					
45.	MHD Generator	1	25.10.23		TLM1/ TLM2	CO5	T1	
46.	Open and closed systems	1	26.10.23		TLM1/ TLM2	CO5	T1	
47.	applications of direct energy conversion systems	1	28.10.23		TLM1/ TLM2	CO5	T1	
48.	Quiz/Assignment					CO5		
No. of classes required to complete UNIT-V		10			No. of classes taken:			

Teaching Learning Methods			
TLM1	Chalk and Talk	TLM4	Demonstration (Lab/Field Visit)
TLM2	PPT	TLM5	ICT (NPTEL/Swayam Prabha/MOOCs)
TLM3	Tutorial	TLM6	Group Discussion/Project

Academic Calender-A.Y-2023-24

Description	From	To	Weeks
B Tech V Semester			
Commencement of class work	03.07.2023		
I phase of Instructions	03.07.2023	26.08.2023	8
I Mid Examination	28.08.2023	02.09.2023	1
II phase of Instructions	04.09.2023	28.10.2023	8
II Mid Examination	30.10.2023	04.11.2023	1
Preparation and Practical	06.11.2023	11.11.2023	1
Semester End Examination	13.11.2023	25.11.2023	2

Part - C

EVALUATION PROCESS:

Evaluation Task	COs	Marks
Assignment 1	1	A1=5
Assignment 2	2	A2=5
I-Mid Examination	1,2,3	B1=15
Quiz – 1	1,2,3	Q1=10
Assignment 3	3	A3=5
Assignment 4	4	A4=5
Assignment 5	5	A5=5
II-Mid Examination	3,4,5	B2=15
Quiz – 2	3,4,5	Q2=10
Evaluation of Assignment: $A=(A1+A2+A3+A4+A5)/5$	1,2,3,4,5	A=5
Evaluation of Mid Marks: $B=75\%$ of $\text{Max}(B1,B2)+25\%$ of $\text{Min}(B1,B2)$	1,2,3,4,5	B=15
Evaluation of Quiz Marks: $Q=75\%$ of $\text{Max}(Q1,Q2)+25\%$ of $\text{Min}(Q1,Q2)$	1,2,3,4,5	Q=10
Cumulative Internal Examination: A+B+Q	1,2,3,4,5	CIE=30
Semester End Examinations	1,2,3,4,5	SEE=70
Total Marks: CIE+SEE	1,2,3,4,5	100

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: To build a professional career and pursue higher studies with sound knowledge in Mathematics, Science and Mechanical Engineering.

PEO2: To inculcate strong ethical values and leadership qualities for graduates to become successful in multidisciplinary activities.

PEO3: To develop inquisitiveness towards good communication and lifelong learning.

PROGRAMME OUTCOMES (POs)

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. 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.

3. 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.

4. 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.

5. 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.

6. 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.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. 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.

11. 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.

12. 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.

PSOs

1. To apply the principles of thermal sciences to design and develop various thermal systems.

2. To apply the principles of manufacturing technology, scientific management towards improvement of quality and optimization of engineering systems in the design, analysis and manufacturability of products.

3. To apply the basic principles of mechanical engineering design or evaluation of performance of various systems relating to transmission of motion and power, conservation of energy and other process equipment.

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. K Lakshmi Prasad	Mr. K Lakshmi Prasad	Dr. P. Vijay Kumar	Dr. S. Pichi Reddy