LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC with'A' Grade & NBA (Under Tier - I),
An ISO 21001:2018,14001:2015,50001:2018 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
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DEPARTMENT OF COMPUTER SCIENCE &ENGINEERING

COURSE HANDOUT

PROGRAM : B.Tech.V-Sem.(A)

ACADEMICYEAR : 2023-24

COURSENAME&CODE : **ComputerNetworks–20CS12**

L-T-PSTRUCTURE : **3**-0-0

COURSE CREDITS : 3

COURSEINSTRUCTOR : **Mr. R.Ashok**

COURSECOORDINATOR : **Mr. R.Ashok**

PRE-REQUISITE:BasicComputerFundamentalsandConcepts

COURSEOBJECTIVE: The Objective of the course is to provide a foundation to understand computer networks using layered architectures. It also helps students to understand the various network models, addressing concept, routing protocols and design aspects of computer networks.

COURSEOUTCOMES (CO): After the completion of this 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 collisions problems. (Apply-L3)

CO3: Demonstrate the network Layer functionalities **(Understand-L2)**

CO4: Outline the functions of transport layer protocols (Understand-L2)

CO5: Examinedifferentapplicationlayerprotocols. **(Understand-L2)**

COURSEARTICULATIONMATRIX (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	PS O1	PS O2	PS O3
CO1	2	2	2											1	
CO2	1	2	2									1		1	
CO3	1	3	3									1		1	
CO4	2	3	3	1								1	1		
CO5	2	2	2									1	1		

Note: Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'1-** Slight(Low),**2 -** Moderate(Medium),**3 -**Substantial (High).

TEXT BOOKS:

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

REFERENCE BOOKS:

1. William Stallings, "Data and Computer Communication", Pearson Prentice Hall India, 8th Edition.
2. Douglas Comer, Internetworking with TCP/IP, Prentice Hall of India, Volume 1, 6th Edition, 2009.
3. Richard Stevens, "TCP/IP Illustrated", Addison-Wesley, Volume 1, 2001.
4. http://www.cse.iitk.ac.in/users/dheeraj/cs425/
5. http://www.tcpipguide.com/free/t_OSIReferenceModelLayers.htm

COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I

S.No.	Topicstobecovered	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.	Introductionto computernetworks	1	03-7-23		TLM2	CO1	T1,T2	
2.	**Data Communication Components**	1	05-7-23		TLM2	CO1	T1	
3.	Representationofdata anditsflowNetworks	1	07-7-23		TLM2	CO1	T1	
4.	Various Connection Topology	1	08-7-23		TLM2	CO1	T1,R3	
5.	Protocols And Standards	1	10-7-23		TLM2	CO1	T1,R3	
6.	OSI Model	1	12-7-23		TLM2	CO1	T1,R1	
7.	TCP/IP Model	1	14-7-23		TLM2	CO1	T1,R2	
8.	TransmissionMedia	2	15-7-23 17-7-23		TLM2	CO1	T1,T2	
9.	LAN: Wired LAN, Wireless LANs	1	19-7-23		TLM2	CO1	T1	
10.	Connecting LAN and Virtual LAN.	2	21-7-23 22-7-23		TLM2	CO1	T1	
No. of classes required tocompleteUNIT-I		12			No. of classes taken:			

UNIT-II

S.No.	Topicstobecovered	No.of ClassesRequired	Tentative Date of Completion	Actual Dateof Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
11.	**DATA LINKLAYER AND MEDIUM ACCESS SUBLAYER**	1	24-7-23		TLM2	CO2	T1,R1	
12.	Error Detection and Error Correction-	1	26-7-23		TLM2	CO2	T1,R1	
13.	Block coding, Hamming Distance, CRC	1	28-7-23		TLM2	CO2	T1,R2	
14.	Flow Control and Error& control protocols	2	31-7-23 02-8-23		TLM2	CO2	T1,R3	
15.	Stop and Wait, Go back N & ARQ	1	04-8-23		TLM2	CO2	T1,R2	
16.	Selective Repeat ARQ	1	05-8-23		TLM2	CO2	T1,R2	
17.	Sliding Window & Piggybacking	2	07-8-23 09-8-23		TLM2	CO2	T1,R3	
18.	RandomAccess,Multiple accessprotocols-Pure ALOHA,SlottedALOHA	1	11-8-23		TLM2	CO2	T1,R3	
19.	CSMA/CD,CDMA/CA	2	12-8-23 14-8-23		TLM2	CO2	T1,R3	
No. of classes required tocompleteUNIT-II		**12**			No.ofclassestaken:			

UNIT-III:

S.No.	Topicstobecovered	No. of Classes Required	Tentative Dateof Completion	Actual Dateof Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
20.	Network Layer	1	16-08-23		TLM2	CO3	T1,R3	
21.	Switching	1	18-08-23		TLM2	CO3	T1	
22.	Logical addressing—IPV4,IPV6	2	19-08-23 21-08-23		TLM2	CO3	T1	
23.	Address mapping—ARP	1	23-08-23		TLM2	CO3	T1	

24.	RARP,BOOTPand DHCP—Delivery	2	25-08-23 26-08-23		TLM2	CO3	T1,R2	
25.	Forwarding	1	04-09-23		TLM2	CO3	T1	
26.	Unicast Routing protocols.	3	08-09-23 09-09-23 11-09-23		TLM2	CO3	T1	
No. of classes required tocompleteUNIT-III		**11**			No.ofclassestaken:			

UNIT-IV:

S.No.	**Topicstobecovered**	**No. ofClasses Required**	**Tentative Dateof Completion**	**Actual Dateof Completion**	**Teaching Learning Methods**	**Learning Outcome COs**	**Text Book followed**	**HOD Sign Weekly**
27.	Transport Layer	1	13-09-23		TLM2	CO4	T1,R1	
28.	ProcesstoProcessCommunication	2	15-09-23 16-09-22		TLM2	CO4	T1	
29.	User Datagram Protocol (UDP)	1	20-09-23		TLM2	CO4	T1	
30.	Transmission Control Protocol (TCP)	2	22-09-23 23-09-23		TLM2	CO4	T1	
31.	SCTP CongestionControl	1	25-09-23		TLM2	CO4	T1	
32.	Quality of Service	1	27-09-23		TLM2	CO4	T1	
33.	QoS improving techniques: Leaky Bucket and Token Bucket algorithm.	2	29-09-23 30-09-23		TLM2	CO4	T1	
No. of classes required tocompleteUNIT-IV		**10**			No.ofclassestaken:			

UNIT-V:

S.No.	**Topicstobecovered**	**No. of Classes Required**	**Tentative Dateof Completion**	**Actual Dateof Completion**	**Teaching Learning Methods**	**Learning Outcome COs**	**Text Book followed**	**HOD Sign Weekly**
34.	ApplicationLayer	1	03-10-23		TLM2	CO5	T1,R3	
35.	Domain Name Space(DNS),DDNS	2	06-10-23 07-10-23		TLM2	CO5	T1,R3	
36.	TELNET,EMAIL	2	09-10-23 11-10-23		TLM2	CO5	T1,R4	

37.	File Transfer Protocol (FTP)	1	13-10-23		TLM2	CO5	T1,R3	
38.	WWW,HTTP	2	14-10-23 16-10-23		TLM2	CO5	T1,R3	
39.	SNMP,Bluetooth, Firewalls	3	18-10-23 20-10-23 21-10-23		TLM2	CO5	T1,R3	
40.	Revision	2	25-10-23 27-10-23					
No. of classes required tocompleteUNIT-V		**13**			No.ofclassestaken:			

TeachingLearningMethods					
TLM1	ChalkandTalk	**TLM4**	ProblemSolving	**TLM7**	SeminarsorGD
TLM2	PPT	**TLM5**	Programming	**TLM8**	LabDemo
TLM3	Tutorial	**TLM6**	AssignmentorQuiz	**TLM9**	CaseStudy

EVALUATION PROCESS:

EvaluationTask	**Marks**
Assignment-I(Units-I,II&UNIT-III(HalfoftheSyllabus))	A1=5
I-DescriptiveExamination(Units-I,II&UNIT-III(HalfoftheSyllabus))	M1=15
I-QuizExamination(Units-I,II&UNIT-III(HalfoftheSyllabus))	Q1=10
Assignment-II(Unit-III(RemainingHalfoftheSyllabus),IV&V)	A2=5
II-DescriptiveExamination(UNIT-III(RemainingHalfoftheSyllabus),IV&V)	M2=15
II-QuizExamination(UNIT-III(RemainingHalfoftheSyllabus),IV&V)	Q2=10
MidMarks=80%ofMax((M1+Q1+A1),(M2+Q2+A2))+20%ofMin((M1+Q1+A1),(M2+Q2+A2))	M=30
CumulativeInternalExamination(CIE):M	30
SemesterEndExamination(SEE)	70
TotalMarks=CIE+SEE	100

PROGRAM OUTCOMES (Pos)

PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and anengineeringspecializationtothesolutionofcomplexengineeringproblems.
PO2	Problem analysis: Identify, formulate ,review research literature, and analyze complex Engineering problemsreachingsubstantiatedconclusionsusingfirstprinciplesofmathematics, 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,legalandculturalissuesandtheconsequentresponsibilitiesrelevanttotheprofessional engineering practice.
PO7	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.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and teamwork: 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 reportsanddesigndocumentation,makeeffectivepresentations,andgiveand 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

Title	**CourseInstructor**	**CourseCoordinator**	**ModuleCoordinator**	**HeadoftheDepartment**
Name oftheFaculty	Mr. R.Ashok	Dr.KNagaPrasanthi	Dr.D.V.Subbaiah	Dr.DVeeraiah
Signature				

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. P. Bhagath
Course Name & Code : Machine Learning & 20AD04
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : B.Tech/ V/ B **A.Y.:** 2023-24
PREREQUISITES : **Probability and Statistics**

COURSE EDUCATIONAL OBJECTIVES (CEOs): The Objective of the course is to introduce the concepts of data warehouse and data mining, which gives a complete description about the principles, used, architectures, applications, design and implementation of data mining and data warehousing concepts.

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

CO1	Identify the characteristics of machine learning. (Understand- L2)
CO2	Summarize the Model building and evaluation approaches **(Understand- L2)**
CO3	Apply Bayesian learning and regression algorithms for real-world Problems. **(Apply- L3)**
CO4	Apply supervised learning algorithms to solve the real-world Problems. **(Apply- L3)**
CO5	Apply unsupervised learning algorithms for the real-world data. (Apply- L3)

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	2	2	1	-	-	-	-	-	-	-	-	1	1	-	3
CO2	3	2	-	2	-	-	-	-	-	-	-	-	2	-	-
CO3	2	3	2	2	-	-	-	-	-	-	-	2	-	2	2
CO4	2	2	-	2	-	-	-	-	-	-	-	-	2	-	-
CO5	2	2	2	2	-	-	-	-	-	-	-	2	2	2	-
1 - Low				**2 –**Medium								**3 -** High			

TEXTBOOKS:

T1 Subramanian Chandramouli, Saikat Dutt, Amit Kumar Das, "Machine Learning", Pearson Education India ,1 st edition, 2015.

T2 Tom M. Mitchell, "Machine Learning', MGH, 1997.

REFERENCE BOOKS:

R1 Shai Shalev-Shwartz, ShaiBen David, "Understanding Machine Learning: From Theory to Algorithms", Cambridge.

R2 Peter Harington, "Machine Learning in Action", Cengage, 1st edition, 2012.

R3 Peter Flach, "Machine Learning: The art and science of algorithms that make sense of data", Cambridge university press, 2012.

R4 Jason Brownlee, "Machine Learning Mastery with Python Understand Your Data, Create Accurate Models and Work Projects End-To-End", Edition: v1.4, 2011.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction to Machine Learning and Preparing to Model

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 course outcomes	1	11. 07. 23		TLM1,2	
2.	Introduction to Machine Learning	1	12. 07. 23		TLM1,2	
3.	Types of Machine Learning	1	13. 07. 23		TLM1,2	
4.	Applications of Machine Learning	1	14. 07. 23		TLM1,2	
5.	Machine learning Activities	1	18. 07. 23		TLM1,2	
6.	Basic types of data in ML	1	19. 07. 23		TLM1,2	
7.	Exploring structure of data	1	20. 07. 23		TLM1,2	
8.	Data quality and Remediation	1	21. 07. 23		TLM1,2	
9.	Data Pre-processing	1	25. 07. 23		TLM1,2	
No. of classes required to complete UNIT-I: 09				**No. of classes taken:**		

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
1.	Introduction	1	26. 07. 23		TLM1,2	
2.	Selecting a Model	1	27. 07. 23		TLM1,2	
3.	Training a Model	1	28. 07. 23		TLM1,2	
4.	Model Representation and Interpretability	1	01. 08.23		TLM1,2	
5.	Evaluating performance of a model	1	02. 08.23		TLM1,2	
6.	Introduction to Feature Engineering	1	03. 08.23		TLM1,2	
7.	Feature transformation	1	04. 08.23		TLM1,2	
8.	Principal Component Analysis	1	08.08.23		TLM1,2	
9.	Singular Value Decomposition	1	09.08.23		TLM1,2	
10.	Linear Discriminant Analysis (LDA)	1	10.08.2023		TLM1,2	
11.	Feature Subset Selection	1	11.08.2023		TLM1,2	
No. of classes required to complete UNIT-II: 11				**No. of classes taken:**		

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
1.	Introduction to regression analysis	1	16.08.2023		TLM1,2	
2.	Simple linear regression	1	17.08.2023		TLM1,2	
3.	Multiple linear regression	1	18.08.2023		TLM1,2	
4.	Assumptions in Regression Analysis	1	22.08.2023		TLM1,2	
5.	Main Problems in Regression Analysis	1	23.08.2023		TLM1,2	
6.	Improving Accuracy of the linear regression model	1	24.08.2023		TLM1,2	
7.	Polynomial Regression Model	1	25.08.2023		TLM1,2	
8.	Logistic Regression	1	05.09.2023		TLM1,2	
9.	Regularization	1	06.09.2023		TLM1,2	
10.	Regularized Linear Regression	1	07.09.2023		TLM1,2	
11.	Regularized Logistic Regression	1	08.09.2023		TLM1,2	
No. of classes required to complete UNIT-III: 11				**No. of classes taken:**		

UNIT-IV: Supervised 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 Supervised learning	1	12.09.2023		TLM1,2	
2.	Classification Model and Classification Learning Steps	2	13.09.2023 14.09.2023		TLM1,2	
3.	k-Nearest Neighbor (kNN)	2	15.09.2023 19.09.2023		TLM1,2	
4.	Support vector Machines (SVM)	2	20.09.2023 21.09.2023		TLM1,2	
5.	Random Forest model	2	22.09.2023 26.09.2023		TLM1,2	
No. of classes required to complete UNIT-IV: 09				**No. of classes taken:**		

UNIT-V: Other Types of Learning and Reinforcement 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 Ensemble learning	1	27.09.2023		TLM1,2	
2.	Bagging	1	28.09.2023		TLM1,2	
3.	Boosting	1	29.09.2023		TLM1,2	
4.	Stacking and its impact on bias and variance	1	03.10.2023		TLM1,2	
5.	AdaBoost	1	04.10.2023		TLM1,2	
6.	Gradient Boosting Machines	1	05.10.2023		TLM1,2	
7.	XGBoost	1	06.10.2023		TLM1,2	
8.	Introduction to Reinforcement learning	1	09.10.2023		TLM1,2	
9.	Q Learning	1	10.10.2023		TLM1,2	
No. of classes required to complete UNIT-V: 09				**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
1.	Applications of Regularization	1	11.10.2023		TLM1,2	
2.	Image processing applications	1	12.10.2023		TLM1,2	

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 professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of 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.
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

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	Dr P Bhagath	Dr K Devipriya	Dr K Naga Prasanthi	Dr D Veeraiah
Signature				

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. N V NAIK
Course Name & Code : THEORY OF COMPUTATION & 20CS13
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : B.Tech/V/A **A.Y.:** 2023-24

PREREQUISITE: Discrete Mathematical Structures

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The objective of the course is to provide a formal connection between algorithmic problem solving and the theory of automata and languages, and develop them into a mathematical view towards algorithmic design and in general computation itself.

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

CO1	Construct finite automata for regular languages and prove it's equivalence **(Apply-L3)**
CO2	Construct regular expression for regular languages and prove the equivalence of regular expression and Finite Automata **(Apply-L3)**
CO3	Design Pushdown automata for the context free languages. **(Understand-L2)**
CO4	Design Turing Machine to model computational problems **(Apply-L3)**
CO5	Distinguish decidable and undecidable problems with the help of Turing machine **(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											1		
CO2	3	2											1		
CO3	3	2													
CO4	3	2													
CO5	1	2													
1 - Low					**2** –Medium								**3** - High		

TEXTBOOKS:

T1 John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, "Introduction to Automata Theory, Languages, and Computation", Pearson Education Asia, 1997

REFERENCE BOOKS:

R1	Harry R. Lewis and Christos H. Papadimitriou, "Elements of the Theory of Computation", Pearson Education Asia,2000
R2	Dexter C. Kozen, "Automata and Computability", Springer,2011.
R3	Michael Sipser, "Introduction to the Theory of Computation", PWS Publishing,2005.
R4	John Martin, Introduction to Languages and The Theory of Computation, Tata McGraw Hill,2nd Edition,2003

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: FINITE 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
1.	Introduction- Course Objective & Outcomes	1	04-07-2023		TLM1	
2.	Basic Concepts of Finite Automata	1	06-07-2023		TLM1	
3.	Finite automata Classification	1	07-07-2023		TLM1	
4.	DFA Construction	2	10-07-2023 11-07-2023		TLM1	
5.	NFA Construction	1	13-07-2023		TLM1	
6.	Equivalence of NFA & DFA	1	14-07-2023		TLM1	
7.	NFA with epsilon to NFA without epsilon	1	17-07-2023		TLM1	
8.	Minimization of Finite Automata	2	18-07-2023 20-07-2023		TLM1	
9.	Finite Automata with output	1	21-07-2023		TLM1	
10.	Construction of Moore and Melay Machine	2	24-07-2023 25-07-2023		TLM1	
11.	Equivalence of Moore and Melay	2	27-07-2023 28-07-2023		TLM1	
No. of classes required to complete UNIT-I: 15				**No. of classes taken:**		

UNIT-II: Regular Expression and Regular Languages

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	Introduction to Regular Expressions	1	31-07-2023		TLM1	
13.	Construction of RE	1	01-08-2023		TLM1	
14.	RE to Finite Automata	1	03-08-2023		TLM1	
15.	FA to Regular expressions	1	04-08-2023		TLM1	
16.	Regular grammar, Construction	1	07-08-2023		TLM1	
17.	Parse Trees	1	08-08-2023		TLM1	
18.	Equivalence of grammar to Finite Automata	1	10-08-2023		TLM1	
19.	Pumping Lemma for regular languages	1	11-08-2023		TLM1	
20.	Closure Properties for Regular Language	1	14-08-2023		TLM1	
No. of classes required to complete UNIT-II: 09				**No. of classes taken:**		

UNIT-III: CONTEXT FREE GRAMMER AND PUSH DOWN 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
21.	Context Free Grammer	1	17-08-2023		TLM1	
22.	Ambiguity of CFG	1	18-08-2023		TLM1	
23.	Simplification of CFG	1	21-08-2023		TLM1	
24.	CNF	1	22-08-2023		TLM1	
25.	GNF	2	24-08-2023 25-08-2023		TLM1	
26.	PDA Definition	1	04-09-2023		TLM1	
27.	Deterministic PDA and Non Deterministic PDA	1	05-09-2023		TLM1	
28.	Construction of PDA	1	07-09-2023		TLM1	
29.	CFG to PDA	1	08-09-2023		TLM1	
30.	PDA to CFG	1	11-09-2023		TLM1	
31.	Pumping lemma for CFL's	1	12-09-2023		TLM1	
32.	Closure properties of CFL's	1	14-09-2023		TLM1	
No. of classes required to complete UNIT-III: 13				**No. of classes taken:**		

UNIT-IV: Turing Machine

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
33.	Introduction, Basic Model of TM	1	15-09-2023		TLM1	
34.	Languages, closure properties	1	18-09-2023		TLM1	
35.	TM Construction	3	21-09-2023 22-09-2023 25-09-2023		TLM1	
36.	Variants of TM	2	26-09-2023 29-09-2023		TLM1	
37.	NDTM equivalence with DTM	2	03-10-2023 05-10-2023		TLM1	
38.	Unrestricted Grammar and its equivalence TM	1	06-10-2023		TLM1	
39.	TM as enumerators	2	09-10-2023 10-10-2023			
No. of classes required to complete UNIT-IV: 12				**No. of classes taken:**		

UNIT-V: Undecidability

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.	Introduction	1	12-10-2023		TLM1	
41.	Church Turing Thesis	1	13-10-2023		TLM1	
42.	Universal Turing Machine	1	16-10-2023		TLM1	
43.	The universal and diagonalization Languages	1	17-10-2023		TLM1	
44.	Reduction between Languages	1	19-10-2023		TLM1	
45.	Rice Theorem	1	20-10-2023		TLM1	
46.	PCP Problem	1	26-10-2023		TLM1	
47.	Undecidable problems about Languages	1	27-10-2023		TLM1	
No. of classes required to complete UNIT-V: 08				**No. of classes taken:**		

Contents 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
1.	Phases of Compiler	1	28-10-2023		**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 inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.
PSO 2	To inculcate an ability to analyze, design and implement data driven applications into the students
PSO 3	Develop an ability to implement various processes/methodologies/practices employed in design, validation, testing and maintenance of software products.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Mr. N V NAIK**	**Dr. D.Veeraiah**	**Dr. S.Jayaprada**	**Dr. D.Veeraiah**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC with'A' Grade & NBA (Under Tier - I),
ISO 21001:2018,14001:2015,50001:2018 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
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hodcse@lbrce.ac.in, cseoffice@lbrce.ac.in, Phone: 08659-222933, Fax: 08659-222931
DEPARTMENT OF COMPUTER SCIENCE &ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Ms Ch. Nagamani
Course Name & Code **:** PAI & 20CS16
L-T-P Structure **:3-0-0** **Credits:** 3
Program/Sem/Sec :BTECH/V/A **A.Y.:** 2023-24

PREREQUISITE: Basic Engineering and Mathematics knowledge

COURSE EDUCATIONAL OBJECTIVES (CEOs):

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

CO1	Understand the fundamentals of Artificial Intelligence types of AI agents and their structures to solve engineering problems. (**Understand – L2**)
CO2	Identify different search algorithms to find and optimise the solution for the given problem. (**Understand-L2**)
CO3	Apply different gaming algorithms and identify the importance of knowledge representations in Artificial Intelligence. (**Apply-L3**)
CO4	Make use of predicate logic and rule-based system to represent the knowledge in AI domain. (**Understand-L2**)
CO5	Interpret the forms of learning in the AI domain as well as present efficient technologies to remove uncertainty in knowledge domain. (**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	1	-	-	-	-	-	-	-	-	1	-	2	-
CO2	2	3	1	1	-	-	-	-	-	-	-	-	-	2	-
CO3	2	3	1	1	-	-	-	-	-	-	-	1	-	2	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	2	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-	-	2	-
1 - Low **2 –**Medium **3 -** High															

TEXTBOOKS:

T1	Stuart J. Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", Pearson Education Asia, third edition, 2009.can also second edition,2003.
T2	Elaine Rich, Kevin Knight Artificial Intelligence, TMH, second edition, 2007.

REFERENCE BOOKS:

R1	Nils J.Nilsson "Artificial Intelligence - A New Synthesis", ,Morgan Kaufmann, 1988
R2	David poole,Alan Mackworth, "Artificial Intelligence: Foundations for computational agents",Cambridge Univ.press,2010.
R3	Ronald Brachman, "Knowledge representation and Reasoning", Morgan Kaufmann,2004.
R4	Frank van Harmelen,Vladimir Lifschitz,Bruce Porter(Eds),"Handbook of Knowledge representation",Elsevier,2008.
R5	Ivan Bratko," Prolog Programming for Artificial Intelligence",4th Ed., Addition-Wesley,2011.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I:

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.	AI Introduction	1	05-7-2023		TLM1	
2.	Applications of AI	1	06-7-2023		TLM1	
3.	History of AI	1	10-7-2023		TLM1	
4.	Types of AI	1	12-7-2023		TLM1	
5.	Agents and rationality	1	13-7-2023		TLM2	
6.	Structure of the agents	1	15-7-2023		TLM2	
7.	Agent environment and nature of the environment	1	17-7-2023		TLM2	
8.	Types of agents-Simple reflex agents and model-based agents	1	19-7-2023		TLM2	
9.	Types of agents-Goal based agents and Utility-based agents	1	20-7-2023		TLM2	
10.	Types of agents-Learning agents	1	22-7-2023		TLM2	
11.	Problems, search spaces	1	24-7-2023		TLM2	
12.	Defining the problem as state space search	1	26-7-2023		TLM2	
13.	Production system	1	27-7-2023		TLM2	
14.	Problem characteristics	1	02-8-2023		TLM2	
15.	Issues in the design of search programs.	1	03-7-2023		TLM2	
No. of classes required to complete UNIT-I: 15				**No. of classes taken:**		

UNIT-II:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
16.	Problem solving agents and search algorithm terminologies	1	05-8-2023		TLM2	
17.	Properties of search algorithms and types of search algorithms	1	07-8-2023		TLM2	
18.	Uninformed search algorithms: Breadth-first Search	1	09-8-2023		TLM2	
19.	Depth-first Search and Depth-limited Search	1	10-8-2023		TLM2	
20.	Iterative deepening depth-first search.	1	12-8-2023		TLM2	
21.	Uniform cost search, Bidirectional search.	1	14-8-2023		TLM2	
22.	Informed/Heuristic Search algorithms: Greedy best-first search algorithm	1	16-8-2023		TLM2	
23.	A* Search algorithm	1	17-7-2023		TLM2	
24.	Hill climbing algorithm	1	19-8-2023		TLM2	
25.	Constraint satisfaction problem	1	21-8-2023		TLM2	
26.	Means-Ends Analysis	1	23-8-2023		TLM2	
No. of classes required to complete UNIT-II: 11				**No. of classes taken:**		

UNIT-III:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
27.	Adversarial search/Game playing: Introduction	1	24-8-2023		TLM2	
28.	Minmax Algorithm	1	26-8-2023		TLM2	
29.	Alpha-Beta Pruning	1	04-9-2023		TLM2	
30.	Knowledge representation: Representations and mappings	2	07-9-2023 09-9-2023		TLM2	
31.	Approaches of Knowledge representation	2	11-9-2023 13-9-2023		TLM2	
32.	Issues in Knowledge Representation	2	14-9-2023 16-9-2023		TLM2	
No. of classes required to complete UNIT-III: 09				**No. of classes taken:**		

UNIT-IV:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
33.	Knowledge Representation Using predicate logic: Representing simple facts in logic.	1	20-9-2023		TLM2	
34.	Representing instance and Isa relationships	2	21-9-2023 23-9-2023		TLM2	
35.	Computable functions and predicates	1	25-9-2023		TLM2	
36.	Resolution	1	27-9-2023		TLM2	
37.	Natural deduction	1	30-9-2023		TLM2	
38.	Representing knowledge using Rules: Procedural verses declarative knowledge	1	4-10-2023		TLM2	
39.	Logic programming	1	5-10-2023		TLM2	
40.	Forward verses backward reasoning	1	7-10-2023		TLM2	
41.	Matching	1	9-10-2023		TLM2	
42.	Control knowledge	1	11-10-2023		TLM2	
No. of classes required to complete UNIT-IV: 11				**No. of classes taken:**		

UNIT-V:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
43.	Uncertain knowledge and Reasoning: Probability and Bayes theorem	1	12-10-2023		TLM2	
44.	Certainty factors and rule-based systems	2	14-10-2023 16-10-2023		TLM2	
45.	Bayesian networks	1	18-10-2023		TLM2	
46.	Dempster – Shafer Theory	1	19-10-2023		TLM2	
47.	Fuzzy logic	1	21-10-2023		TLM2	
48.	Learning: Overview of different forms of learning	1	25-10-2023		TLM2	
49.	Learning Decision Trees	1	27-10-2023		TLM2	
50.	Neural networks	1	28-10-2023		TLM2	
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 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 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 engineer**ing 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 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	**Ms. Ch Nagamani**	**Mr G.V.Suresh**	**Dr.D.V Subbaiah**	**Dr.D Veeraiah**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(Autonomous)

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

Accredited by NAAC and NBA (CSE, IT, ECE, EEE & ME) under Tier - I

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

Part-A

PROGRAM : B.Tech., VI-Sem., CSE.,A-SECTION

ACADEMIC YEAR : 2023-24

COURSE NAME & CODE : RENEWABLE ENERGY SOURCES- 20ME81

L-T-P STRUCTURE : 4-0-0

COURSE CREDITS : 3

COURSE INSTRUCTOR : MALLIKARJUNA RAO DANDU

COURSE COORDINATOR : **Dr V Dhana Raju**

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	1	10-07-2023		TLM1/ TLM2	CO1	T1	
2.	Over view of conventional & renewable energy sources	1	12-07-2023		TLM1/ TLM2	CO1	T1	
3.	Need & Development of renewable energy sources	1	13-07-2023		TLM1/ TLM2	CO1	T1	
4.	Types of renewable energy systems.	1	15-07-2023		TLM1/ TLM2	CO1	T1	
5.	Energy available from Sun	1	17-07-2023		TLM1/ TLM2	CO1	T1	
6.	Solar radiation data,	1	19-07-2023		TLM1/ TLM2	CO1	T1	
7.	Flat plate and Concentrating collectors	1	20-07-2023		TLM1/ TLM2	CO1	T1	
8.	Mathematical analysis of Flat plate collectors	1	22-07-2023		TLM1/ TLM2	CO1	T1	
9.	collector efficiency	1	24-07-2023		TLM1/ TLM2	CO1	T1	
10.	Solar water Heating, Space Heating	1	25-07-2023		TLM1/ TLM2	CO1	T1	
11.	Active and Passive heating	1	27-07-2023		TLM1/ TLM2	CO1	T1	
12.	solar stills and ponds	1	31-07-2023		TLM1/ TLM2	CO1	T1	
13.	basic principle of power generation in photovoltaic cell	1	02-08-2023		TLM1/ TLM2	CO1	T1	
14.	Problems	1	03-08-2023		TLM1/ TLM2	CO1	T1	
15.	**Quiz/Assignment**	1	05-08-2023					
No. of classes required to complete UNIT-I		14			No. of classes taken:			

UNIT-II : 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
16.	Wind – characteristics – wind energy conversion systems	1	07-08-2023		**TLM1/ TLM2**	CO2	T1	

17.	Types of wind energy	1	07-08-2023		**TLM1/ TLM2**	CO2	T1	
18.	Betz model & Interference factor	1	09-08-2023		**TLM1/ TLM2**	CO2	T1	
19.	Power Coefficient Torque Coefficient and thrust coefficient	1	09-08-2023					
20.	site selection requirements.	1	10-08-2023		**TLM1/ TLM2**	CO2	T1	
21.	GEOTHERMAL ENERGY: Structure of Earth, Geothermal sources	1	10-08-2023		**TLM1/ TLM2**	CO2	T1	
22.	Hot springs, Hot Rocks& Hot Aquifers	1	14-08-2023		**TLM1/ TLM2**	CO2	T1	
23.	Interconnection of geothermal fossil systems	1	16-08-2023		**TLM1/ TLM2**	CO2	T1	
24.	Problems	1	17-08-2023		**TLM1/ TLM2**	CO1	T1	
25.	**Quiz/Assignment**		19-08-2023					
No. of classes required to complete UNIT-II		9			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
26.	**Tidal Energy**- Introduction, Origin of Tides	1	21-08-2023		**TLM1/ TLM2**	CO3	T1, R8	
27.	Tidal Power generation	1	24-08-2023		**TLM1/ TLM2**	CO3	T1, R8	
28.	Classification of Tidal Power Plant,	1	24-08-2023		**TLM1/ TLM2**	CO3	T1	
29.	Site requirements	1	26-08-2023		**TLM1/ TLM2**	CO3	T1	
30.	**WAVE ENERGY**: Introduction, Wave energy and Power	1	04-09-2023		**TLM1/ TLM2**	CO3	T1	
31.	Wave Energy devices – Merits and Demerits	1	06-09-2023		**TLM1/ TLM2**	CO3	T1	
32.	**OCEAN THERMAL ENERGY**: Introduction	1	11-09-2023		**TLM1/ TLM2**	CO3	T1	
33.	Working principle of Ocean Thermal Energy Conversion	1	11-09-2023		**TLM1/ TLM2**	CO3	T1	
34.	OTEC Systems,	1	13-09-2023		**TLM1/ TLM2**	CO3	T1	
35.	Advantages and Disadvantages of OTEC plants.	1	13-09-2023		**TLM1/ TLM2**	CO3	T1	
36.	**Quiz/Assignment**		14-09-2023			CO3		
No. of classes required to complete UNIT-III		10			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
37.	**BIO – ENERGY**: Introduction	1	16-09-2023		**TLM1/ TLM2**	CO4	T1	
38.	Biomass Energy Sources	1	20-09-2023		**TLM1/ TLM2**	CO4	T1	
39.	Aerobic and Anaerobic bio-conversion processes	1	21-09-2023		**TLM1/ TLM2**	CO4	T1	
40.	Types of Biogas plants	3	23-09-2023 25-09-2023 27-09-2023		**TLM1/ TLM2**	CO4	T1	
41.	Raw Materials and properties of Bio-gas	1	30-09-2023		**TLM1/ TLM2**	CO4	T1	
42.	Bio-gas plant Technology and Status	1	04-10-2023		**TLM1/ TLM2**	CO4	T1	
43.	Biomass gasification	2	05-10-2023		**TLM1/ TLM2**	CO4	T1	
44.	Types and application of gasifier	1	07-10-2023		**TLM1/ TLM2**	CO4	T1	
45.	**Quiz/Assignment**		09-10-2023			CO4		
No. of classes required to complete UNIT-IV		11			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
46.	DIRECT ENERGY CONVERSION SYSTEMS: Introduction	2	11-10-2023		**TLM1/ TLM2**	CO5	T1	
47.	Peltier effect, seebeck effect, Thomson effect,	1	12-10-2023		**TLM1/ TLM2**	CO5	T1	
48.	Fuel Cells-Types.	2	16-10-2023		**TLM1/ TLM2**	CO5	T1	
49.	Efficiency of Fuel Cells.	1	18-10-2023		**TLM1/ TLM2**	CO5	T1	
50.	Thermoelectric power Generation	1	19-10-2023		**TLM1/ TLM2**	CO5	T1	
51.	Thermionic electro power Generation	1	21-10-2023					
52.	MHD Generator	1	21-10-2023		**TLM1/ TLM2**	CO5	T1	
53.	Open and closed systems	1	26-10-2023		**TLM1/ TLM2**	CO5	T1	
54.	applications of direct energy energy conversion systems	1	28-10-2023		**TLM1/ TLM2**	CO5	T1	
55.	**Quiz/Assignment**		28-10-2023			CO5		
No. of classes required to complete UNIT-V		11			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 Max(B1,B2)+25% of Min(B1,B2)	1,2,3,4,5	B=15
Evaluation of Quiz Marks: Q=75% of Max(Q1,Q2)+25% of 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
MALLIKARJUNA RAO DANDU	Dr V Dhana Raju	Dr. P. Vijay Kumar	Dr. S. Pichi Reddy

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DEPARTMENT OF COMPUTER SCIENCE &ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : R. Ashok
Course Name & Code : **COMPUTER NETWORKS LAB**&20CS60
L-T-P Structure : 0-0-3 Credits: 1.5
Program/Sem/Sec : B.Tech. CSE., V-Sem., Section-A **A.Y: 2023-24**

PRE-REQUISITES: Data Structures and Operating Systems

COURSE EDUCATIONAL OBJECTIVES (CEOs): The main objective of this 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
CO 2	Demonstrate Transport Layer functionalities
CO 3	Analyze Application layer protocols using Wireshark
CO 4	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	3	3	-	-	-	-	-	-	-	1	-	-	-
CO2	1	2	3	3	-	-	-	-	-	-	-	1	-	-	-
CO3	1	2	3	3	-	-	-	-	-	-	-	1	-	-	-
CO4	-	-	-	-	-	-	-	1	3	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	HOD Sign
1.	Introduction	3	06-07-2023		
2.	Basic network commands & utilities	3	13-07-2023		
3.	Network layer tools and analyzecaptures for congestion	3	20-07-2023		
4.	Network layer tools and analyzecaptures for congestion	3	27-07-2023		
5.	Queue management techniques and global routing in NS3	3	03-08-2023		
6.	Broadcasting, multicasting and bridging in LAN using ns3	3	10-08-2023		
7.	Learn about Wifi and mobile Adhoc topologies with NS3	3	17-08-2022		
8.	Socket programming in TCP andUDP	3	24-08-2023		
9.	Observation of TCP Connection states, Flags and Flow control	3	07-09-2023		
10.	TCP Flow control, Error controland Congestion	3	14-09-2023		
11.	Wireshark & tcpdump, observation of packets in a LAN	3	21-09-2023		
12.	Analyze HTTP packets using Wireshark tool and understand records returned by DNS Server.	3	05-10-2023		
13.	Practise	3	12-10-2023		
14.	Practise	3	19-10-2023		
15.	Lab Internal Exam		26-10-2023		

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	**Ethic**s: 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	Programming Paradigms: To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms. 2. Data Engineering: To inculcate an ability to Analyze, Design and implement data driven applications into the students. 3. Software Engineering: Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products.
PSO 2	Data Engineering: To inculcate an ability to Analyze, Design and implement data driven applications into the students.
PSO 3	Software Engineering: Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr. R. Ashok	Dr. K. Naga Prasanthi	Dr. D. Venkata Subbaiah	Dr. D. Veeraiah

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. P. Bhagath
Course Name & Code : Machine Learning using Python Lab (20AD54)
L-T-P Structure : 0-0-3 Credits: 1.5
Program/Sem/Sec : B.Tech, CSE, V-Sem., Sec-A A.Y: 2023-24

PRE-REQUISITE : Python Programming and Data Mining

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objective of this lab is to Practical exposure on implementation of well-known data mining algorithms and Learning performance evaluation of data mining algorithms in a supervised and an unsupervised setting.

COURSE OUTCOMES (COs): At the end of the course, students can

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 & PSOs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2	1	-	-	-	-	-	-	-		1	1	-	3
CO2	3	2	-	2	-	-	-	-	-	-	-	-	2	-	-
CO3	2	3	2	2	-	-	-	-	-	-	-	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	Installing Virtual Environment and libraries required for Machine Learning	3	11.07.23		TLM4	
2	Basic statistical functions for data exploration	6	18.07.23 25.07.23		TLM4	
3	Data Visualization: Box plot, scatter plot, histogram	6	01.08.23 08.08.23		TLM4	
4	Data Pre-processing: Handling missing values, outliers, normalization, Scaling	6	15.08.23 22.08.23		TLM4	
5	Principal Component Analysis (PCA)	3	05.09.23		TLM4	
6	Singular Value Decomposition (SVD)	3	12.09.23		TLM4	
7	Linear Discriminant Analysis (LDA)	3	19.09.23		TLM4	
8	Regression Analysis: Linear regression, Logistic regression,	6	26.09.23 03.10.23		TLM4	
9	Polynomial Regression, Regularized Regression	6	10.10.23 17.10.23		TLM4	
10	K-Nearest Neighbour (kNN) Classifier	3	24.10.23		TLM4	
11	Support Vector Machines (SVMs)	3	31.10.23		TLM4	
12	Random Forest model	3	07.11.23		TLM4	
13	AdaBoost Classifier and XGBoost	3	14.11.23		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	**Ethic**s: 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 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	**Dr. P. Bhagath**	**Dr. K. Devi Priya**	**Dr. K. Naga Prasanthi**	**Dr. D. Veeraiah**
Signature				

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr.P.Somaraju
Course Name & Code **:** Mean Stack Technologies - 20CSS3
L-T-P Structure **:** 1-0-3 **Credits:** 2
Program/Sem/Sec : B.Tech. - CSE/V/A **A.Y.:** 2022-24

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, embedded media which includes images, audio, video and CSS Styles **(Apply-L3)**
CO2	Build a basic web server using Node.js , Exress.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, Robet 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	19-07-23&22-07-23		**DM5/ DM6**	
2.	Cycle -2(HTML)	4	26-07-23&29-07-23		**DM5/ DM6**	
3.	Cycle-3(JS)	4	02-08-23&05-08-23		**DM5/ DM6**	
4.	Cycle-4(JS)	4	09-08-23&12-08-23		**DM5/ DM6**	
5.	Cycle-5(JS)	4	16-08-23&19-08-23		**DM5/ DM6**	
6.	Cycle-6(Node.JS)	4	23-08-23&26-08-23		**DM5/ DM6**	
7.	Cycle-6(Node.JS)	4	09-09-23&13-09-23		**DM5/ DM6**	
8.	Cycle-7(Express.js)	4	20-09-23&23-09-23		**DM5/ DM6**	
9.	Cycle-8(Express.js)	4	27-09-23&30-09-23		**DM5/ DM6**	
10.	Cycle-9 (Typescript)	4	04-10-23&07-10-23		**DM5/ DM6**	
11.	Cycle-10 (Typescript)	4	11-10-23&14-10-23		**DM5/ DM6**	
12.	Cycle-11 (Typescript)	4	18-10-23&21-10-23		**DM5/ DM6**	
13.	Cycle-12 (Typescript)	4	18-10-23&21-10-23		**DM5/ DM6**	
14.	Cycle-12 (Typescript)	4	25-10-23&28-10-23		**DM5/ DM6**	
15.	Assessment	4	25-10-23&28-10-23		**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.
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	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	(Mr.P.Somaraju)	(Dr.Y.Bhaskar Reddy)	(Dr. K.Naga Prasathi)	(Dr. D. Veeraiah)
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
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DEPARTMENT OF COMPUTER SCIENCE &ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr B SIVARAMAKRISHNA
Course Name & Code : Computer Networks (20CS12)
L-T-P Structure : 3-0-0 **Credits:** 3
Program/Sem/Sec : B.Tech V SemSec –B CSE **A.Y.:** 2023-24

PREREQUISITE: Data Structures and Operating Systems

COURSE EDUCATIONAL OBJECTIVES (CEOs): The Objective of the course is to provide a foundation to understand computer networks using layered architectures. It also helps students to understand the various network models, addressing concept, routing protocols and design aspects of computer networks.

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

TEXTBOOKS:

T1 BehrouzA. Forouzan, , "Data Communication andNetworking",McGraw-Hill,4thEdition,2011.
T2 AndrewS.Tanenbaum, "Computer Networks", Pearson New InternationalEdition,8thEdition,2013.

REFERENCE BOOKS:

R1 WilliamStallings,"DataandComputerCommunication",PearsonPrent iceHallIndia,8th Edition.
R2 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):

UNIT-I: Data Communication Components

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, Computer Networks Syllabus Discussion	1	03,04-07-2023		1 & 2	
2.	Data Communication components :Representation of data	1	08-07-2023		1 & 2	
3.	Data Flow	1	10,11-07-2023		1 & 2	
4.	Network	1	13,15-07-2023		1 & 2	
5.	Connection in topology	1	17,18-07-2023		1 & 2	
6.	Protocols and standards	1	20,22-07-2023		1 & 2	
7.	OSI Model	1	24,26-07-2023		1 & 2	
8.	Transmission Media	1	28,31-07-2023		1 & 2	
9.	LAN :Wired LAN, Wireless LANs	1	02-08-2023		1 & 2	
10.	Connecting LAN and Virtual LAN	1	04-08-2023		1 & 2	
No. of classes required to complete UNIT-I: 10				**No. of classes taken:**		

UNIT-II: Data Link Layer and Medium Access Sub Layer

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.	Error Detection and Error Correction - Fundamentals,	1	05-08-2023		1 & 2	
12.	Block coding, Hamming Distance,	1	07-08-2023		1 & 2	
13.	CRC	1	09-08-2023		1 & 2	
14.	Flow Control and Error control protocols - Stop and Wait	1	11-08-2023		1 & 2	
15.	Go back – N ARQ	1	12-08-2023		1 & 2	
16.	Selective Repeat ARQ,	1	14,16-08-2023		1 & 2	
17.	Sliding Window, Piggybacking	1	18-08-2023		1 & 2	
18.	Random Access, Multiple access protocols -Pure ALOHA	1	19-08-2023		1 & 2	
19.	Slotted ALOHA,	1	21,23-08-2023		1 & 2	
20.	CSMA/CD,CDMA/CA	1	25-08-2023		1 & 2	
No. of classes required to complete UNIT-II: 10				**No. of classes taken:**		

UNIT-III: Network Layer

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.	Switching	1	26-08-2023		1 & 2	
22.	Logical addressing – IPV4	2	29,30-08-23		1 & 2	
23.	IPV6	1	04,06-09-2023		1 & 2	
24.	Address mapping –ARP,RARP	1	08,09-09-2023		1 & 2	
25.	BOOTP	1	20-09-2023		1 & 2	
26.	DHCP–Delivery	1	27-09-2023		1 & 2	
27.	Forwarding protocols	1	29-09-2023		1 & 2	
28.	and Unicast Routing protocols	1	30-09-2023			
No. of classes required to complete UNIT-III: 09				**No. of classes taken:**		

UNIT-IV: Transport Layer

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
29.	Process to Process Communication	1	06-10-2023		1 & 2	
30.	User Datagram Protocol(UDP),	1	07-10-2023		1 & 2	
31.	Transmission Control Protocol (TCP)	2	10-10-2023 11-10-2023		1 & 2	
32.	SCTP	1	13-10-2023		1 & 2	
33.	Congestion Control	2	14-10-2023 17-10-2023		1 & 2	
34.	Quality of Service	1	18-10-2023		1 & 2	
35.	QoS improving techniques: Leaky Bucket	1	20-10-2023		1 & 2	
36.	Token Bucket algorithm	1	21-10-2023		1 & 2	
No. of classes required to complete UNIT-IV: 10				**No. of classes taken:**		

UNIT-V: Application layer

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
37.	Domain Name Space(DNS)	2	25-10-2023		1 & 2	
38.	DDNS	1	27-10-2023		1 & 2	
39.	TELNET	1	28-10-2023		1 & 2	
40.	EMAIL,	1	01-11-2023		1 & 2	
41.	File Transfer Protocol (FTP)	1	03-11-2023		1 & 2	
42.	WWW ,HTTP	1	04-11-2023		1 & 2	
43.	SNMP	1	07-11-2023		1 & 2	
44.	Bluetooth,	1	10-11-2023		1 & 2	
45.	Firewalls	2	11-11-2023 13-11-2023		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- DescriptiveExamination (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	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	**Dr.B S R Krishna**	**Dr.K Naga Prasanthi**		**Dr. D Veeraiah**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

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

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DEPARTMENT OF COMPUTER SCIENCE &ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mrs B.Swathi
Course Name & Code : Machine Learning (20AD04)
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., CSE., V-B A.Y: 2022-23

PRE-REQUISITE: Probability and Statistics, Data Warehousing and Data Mining

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The objective of the course provides the basic concepts and techniques of Machine Learning and helps to use recent machine learning software for solving practical problems. It enables students to gain experience by doing independent study and research.

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

CO 1	Identify the characteristics of machine learning. (Understand- L2)
CO 2	Understand the Model building and evaluation approaches (Understand- L2)
CO 3	Apply regression algorithms for real-world Problems. (Apply- L3)
CO 4	Handle classification problems via supervised learning algorithms. (Apply- L3)
CO 5	Learn advanced learning techniques to deal with complex data (Apply- L3)

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	-	2	-	-	-	-	-	-	-	2	-	2	-
CO2	3	2	-	2	-	-	-	-	-	-	-	2	-	2	-
CO3	3	2	-	-	-	-	-	-	-	-	-	2	-	2	-
CO4	3	-	-	3	-	-	-	-	-	-	-	2	-	2	-
CO5	3	1	-	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).

TEXT BOOKS:

1. Subramanian Chandramouli, Saikat Dutt, Amit Kumar Das, "Machine Learning", Pearson Education India ,1st edition,2015.

2. Tom M. Mitchell, "Machine Learning', MGH, 1997.

REFERENCE BOOKS:

1. Shai Shalev-Shwartz, ShaiBen David, "Understanding Machine Learning: From Theory to Algorithms", Cambridge
2. Peter Harington, "Machine Learning in Action" , Cengage, 1st edition, 2012.
3. Peter Flach, "Machine Learning: The art and science of algorithms that make sense of data", Cambridge university press,2012.

4. Jason Brownlee, “Machine Learning Mastery with Python Understand Your Data, Create Accurate Models and Work Projects End-To-End”, Edition: v1.4, 2011.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section C

UNIT-I : Introduction to Machine Learning and Preparing to Model

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	1	03-07-2023		TLM1	
2.	Types of Machine Learning-supervise Learning	1	05-07-2023		TLM1	
3.	Unsupervised Learning	1	06-07-2023		TLM1	
4.	Reinforcement Learning	1	10-07-2023		TLM1	
5.	Applications of Machine Learning,	1	12-07-2023		TLM1	
6.	Issues in Machine Learning	1	13-07-2023		TLM1	
7.	Introduction, Machine Learning Activities	1	15-03-2023		TLM1	
8.	Basic Types of Data in Machine Learning	1	17-07-2023		TLM1	
9.	Exploring Structure of Data	1	19-07-2023		TLM1	
10.	Exploring Structure of Data	1	20-07-2023		TLM1	
11.	Data Quality and Remediation,	1	22-07-2023		TLM1	
12.	Data PreProcessing	1	24-07-2023		TLM1	
No. of classes required to complete UNIT-I		**12**		**No of classes taken**		

UNIT-II: Modelling & 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
13	Introduction,	1	26-07-2023			
14.	selecting a Model, training a Model (for Supervised Learning),	2	27-07-2023		TLM1	
15.	, Model Representation and Interpretability	1	31-07-2023		TLM1	
16.	Evaluating Performance of a Model.	1	02-08-2023		TLM1	
17.	Feature Transformation	1	03-08-2023		TLM1	
18.	Feature Construction	1	05-08-2023		TLM1	
19.	Feature Extraction	1	07-08-2023		TLM1	
20.	Principal Component Analysis (PCA),	1	09-08-2023		TLM1	
21.	Singular Value Decomposition	1	10-08-2023		TLM1	
22	Linear Discriminant Analysis (LDA), Feature Subset Selection	1	14-08-2023			

No. of classes required to complete UNIT-II	**12**		**No of classes taken**

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
23.	Introduction to regression analysis, Simple linear regression	1	16-08-2023		TLM1	
24.	Multiple linear regression	2	17-08-2023& 19-08-2023		TLM1	
25.	Assumptions in Regression Analysis, Main Problems in Regression Analysis	1	21-08-2023		TLM1	
26.	Improving Accuracy of the linear regression model,	2	23-08-2023		TLM1	
27.	Polynomial Regression Model	1	24-08-2023		TLM1	
28.	Logistic Regression	1	26-08-2023		TLM1	
29.	Regularization	1	04-09-2023		TLM1	
30.	Regularized Linear Regression	1	07-09-2023		TLM1	
31.	Regularized Logistic Regression.	1	11-09-2023		TLM1	
No. of classes required to complete UNIT-III		**11**		**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
32.	Supervised Learning Introduction and example	1	13-09-2023		TLM1	
33.	Classification Model	2	14-09-2023		TLM1	
34.	Classification Learning Steps	1	16-09-2023		TLM1	
35.	k-Nearest Neighbour (kNN)	2	20-09-2023		TLM1	
36.	Support vector Machines	2	21-09-2023		TLM1	
37.	Random Forest model	2	23-09-2023		TLM1	
No. of classes required to complete UNIT-IV		**10**		**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
38.	Bagging	2	25-09-2023& 27-09-2023		TLM1	
39.	Boosting	2	30-09-2023& 04-10-2023		TLM2	
40	Stacking and its impact on bias and variance	2	05-10-2023& 07-10-2023		TLM2	
41	AdaBoost	2	09-10-2023& 11-10-2023		TLM2	
42	,Gradient Boosting Machines	2	12-10-2023& 16-10-2023		TLM2	
43	XGBoost	2	18-10-2023& 19-10-2023		TLM2	
44	Reinforcement Learning- Q learning	3	21-10-2023& 26-10-2023		TLM2	
45	Revision	1	28-10-2023		**TLM3**	
46	Revision	1	30-10-2023		**TLM3**	
47	Revision	1	01-11-2023		**TLM3**	
No. of classes required to complete UNIT-V		**14**		**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 Regulations):

Evaluation Task	**Marks**
Assignment-I (Unit-I , Unit-II , Unit-III)	A1=5
Assignment-II (Unit-III , Unit-IV , Unit-V)	A2=5
I-Mid Examination (Units-I & II)	M1=20
I-Quiz Examination (Units-I & II)	Q1=10
Assignment-III (Unit-III)	A3=5
Assignment-IV (Unit-IV)	A4=5
Assignment-V (Unit-V)	A5=5
II-Mid Examination (Units-III, IV & V)	M2=20
II-Quiz Examination (Units-III, IV & V)	Q2=10
Attendance	B=5

Assignment Marks = Best Four Average of A1, A2, A3, A4, A5	A=5
Mid Marks =75% of Max(M1,M2)+25% of Min(M1,M2)	M=20
Quiz Marks =75% of Max(Q1,Q2)+25% of Min(Q1,Q2)	B=10
Cumulative Internal Examination (CIE) : A+B+M+Q	40
Semester End Examination (SEE)	60
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	**Ethic**s: 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	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.

Course Instructor	Course Coordinator	Module Coordinator	HOD

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. D VEERAIAH
Course Name & Code : THEORY OF COMPUTATION & 20CS13
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : B.Tech/V/B **A.Y.:** 2023-24

PREREQUISITE: Discrete Mathematical Structures

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The objective of the course is to provide a formal connection between algorithmic problem solving and the theory of automata and languages, and develop them into a mathematical view towards algorithmic design and in general computation itself.

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

CO1	Construct finite automata for regular languages and prove it's equivalence **(Apply-L3)**
CO2	Construct regular expression for regular languages and prove the equivalence of regular expression and Finite Automata **(Apply-L3)**
CO3	Design Pushdown automata for the context free languages. **(Understand-L2)**
CO4	Design Turing Machine to model computational problems **(Apply-L3)**
CO5	Distinguish decidable and undecidable problems with the help of Turing machine **(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											1		
CO2	3	2											1		
CO3	3	2													
CO4	3	2													
CO5	1	2													
1 - Low					**2 –**Medium								**3 -** High		

TEXTBOOKS:

T1 John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, "Introduction to Automata Theory, Languages, and Computation", Pearson Education Asia, 1997

REFERENCE BOOKS:

R1	Harry R. Lewis and Christos H. Papadimitriou, "Elements of the Theory of Computation", Pearson Education Asia,2000
R2	Dexter C. Kozen, "Automata and Computability", Springer,2011.
R3	Michael Sipser, "Introduction to the Theory of Computation", PWS Publishing,2005.
R4	John Martin, Introduction to Languages and The Theory of Computation, Tata McGraw Hill,2nd Edition,2003

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: FINITE 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
1.	Introduction- Course Objective & Outcomes	1	04-07-2023		TLM1	
2.	Basic Concepts of Finite Automata	1	06-07-2023		TLM1	
3.	Finite automata Classification	1	07-07-2023		TLM1	
4.	DFA Construction	2	08-07-2023 11-07-2023		TLM1	
5.	NFA Construction	1	12-07-2023		TLM1	
6.	Equivalence of NFA & DFA	1	14-07-2023		TLM1	
7.	NFA with epsilon to NFA without epsilon	1	15-07-2023		TLM1	
8.	Minimization of Finite Automata	2	18-07-2023 19-07-2023		TLM1	
9.	Finite Automata with output	1	21-07-2023		TLM1	
10.	Construction of Moore and Melay Machine	2	22-07-2023 25-07-2023		TLM1	
11.	Equivalence of Moore and Melay	2	26-07-2023 28-07-2023		TLM1	
No. of classes required to complete UNIT-I: 15				**No. of classes taken:**		

UNIT-II: Regular Expression and Regular Languages

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	Introduction to Regular Expressions	1	01-08-2023		TLM1	
13.	Construction of RE	1	02-08-2023		TLM1	
14.	RE to Finite Automata	1	04-08-2023		TLM1	
15.	FA to Regular expressions	1	05-08-2023		TLM1	
16.	Regular grammar, Construction	1	08-08-2023		TLM1	
17.	Parse Trees	1	09-08-2023		TLM1	
18.	Equivalence of grammar to Finite Automata	1	11-08-2023		TLM1	
19.	Pumping Lemma for regular languages	1	12-08-2023		TLM1	
20.	Closure Properties for Regular Language	1	16-08-2023		TLM1	
No. of classes required to complete UNIT-II: 09				**No. of classes taken:**		

UNIT-III: CONTEXT FREE GRAMMER AND PUSH DOWN 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
21.	Context Free Grammer	1	18-08-2023		TLM1	
22.	Ambiguity of CFG	1	19-08-2023		TLM1	
23.	Simplification of CFG	1	22-08-2023		TLM1	
24.	CNF	1	23-08-2023		TLM1	
25.	GNF	2	25-08-2023 26-08-2023		TLM1	
26.	PDA Definition	1	05-09-2023		TLM1	
27.	Deterministic PDA and Non Deterministic PDA	1	08-09-2023		TLM1	
28.	Construction of PDA	1	09-09-2023		TLM1	
29.	CFG to PDA	1	12-09-2023		TLM1	
30.	PDA to CFG	1	13-09-2023		TLM1	
31.	Pumping lemma for CFL's	1	15-09-2023		TLM1	
32.	Closure properties of CFL's	1	16-09-2023		TLM1	
No. of classes required to complete UNIT-III: 13				**No. of classes taken:**		

UNIT-IV: Turing Machine

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
33.	Introduction, Basic Model of TM	1	20-09-2023		TLM1	
34.	Languages, closure properties	1	22-09-2023		TLM1	
35.	TM Construction	3	23-09-2023 26-09-2023 27-09-2023		TLM1	
36.	Variants of TM	2	29-09-2023 30-09-2023		TLM1	
37.	NDTM equivalence with DTM	2	03-10-2023 04-10-2023		TLM1	
38.	Unrestricted Grammar and its equivalence TM	1	06-10-2023		TLM1	
39.	TM as enumerators	2	07-10-2023 10-10-2023			
No. of classes required to complete UNIT-IV: 12				**No. of classes taken:**		

UNIT-V: Undecidability

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.	Introduction	1	11-10-2023		TLM1	
41.	Church Turing Thesis	1	13-10-2023		TLM1	
42.	Universal Turing Machine	1	14-10-2023		TLM1	
43.	The universal and diagonalization Languages	1	17-10-2023		TLM1	
44.	Reduction between Languages	1	18-10-2023		TLM1	
45.	Rice Theorem	1	21-10-2023		TLM1	
46.	PCP Problem	1	25-10-2023		TLM1	
47.	Undecidable problems about Languages	1	27-10-2023		TLM1	
No. of classes required to complete UNIT-V: 08				**No. of classes taken:**		

Contents 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
1.	Phases of Compiler	1	28-10-2023		**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 inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.
PSO 2	To inculcate an ability to analyze, design and implement data driven applications into the students
PSO 3	Develop an ability to implement various processes/methodologies/practices employed in design, validation, testing and maintenance of software products.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr. D.Veeraiah**	**Dr. D.Veeraiah**	**Dr. S.Jayaprada**	**Dr. D.Veeraiah**
Signature				

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. G.V.Suresh
Course Name & Code **:** PAI & 20CS16
L-T-P Structure **:3-0-0** **Credits:** 3
Program/Sem/Sec :BTECH/V/B **A.Y.:** 2023-24

PREREQUISITE: Basic Engineering and Mathematics knowledge

COURSE EDUCATIONAL OBJECTIVES (CEOs):

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

CO1	Understand the fundamentals of Artificial Intelligence types of AI agents and their structures to solve engineering problems. (**Understand – L2**)
CO2	Identify different search algorithms to find and optimise the solution for the given problem. (**Understand-L2**)
CO3	Apply different gaming algorithms and identify the importance of knowledge representations in Artificial Intelligence. (**Apply-L3**)
CO4	Make use of predicate logic and rule-based system to represent the knowledge in AI domain. (**Understand-L2**)
CO5	Interpret the forms of learning in the AI domain as well as present efficient technologies to remove uncertainty in knowledge domain. (**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	1	-	-	-	-	-	-	-	-	1	-	2	-
CO2	2	3	1	1	-	-	-	-	-	-	-	-	-	2	-
CO3	2	3	1	1	-	-	-	-	-	-	-	1	-	2	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	2	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-	-	2	-
1 - Low **2 –**Medium **3 -** High															

TEXTBOOKS:

T1	Stuart J. Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", Pearson Education Asia, third edition, 2009.can also second edition,2003.
T2	Elaine Rich, Kevin Knight Artificial Intelligence, TMH, second edition, 2007.

REFERENCE BOOKS:

R1	Nils J.Nilsson “Artificial Intelligence - A New Synthesis", ,Morgan Kaufmann, 1988
R2	David poole,Alan Mackworth, “Artificial Intelligence: Foundations for computational agents”,Cambridge Univ.press,2010.
R3	Ronald Brachman, “Knowledge representation and Reasoning”, Morgan Kaufmann,2004.
R4	Frank van Harmelen,Vladimir Lifschitz,Bruce Porter(Eds),”Handbook of Knowledge representation”,Elsevier,2008.
R5	Ivan Bratko,” Prolog Programming for Artificial Intelligence”,4th Ed., Addition-Wesley,2011.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I:

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.	AI Introduction	1	03-07-23		TLM1	
2.	Applications of AI	1	05-07-23		TLM1	
3.	History of AI	1	06-07-23		TLM1	
4.	Types of AI	1	07-07-23		TLM1	
5.	Agents and Rationality	1	10-07-23		TLM2	
6.	Structure of the Agents	1	12-07-23		TLM2	
7.	Agent environment and nature of the environment	1	13-03-23		TLM2	
8.	Types of agents-Simple reflex agents and model-based agents	1	14-07-23		TLM2	
9.	Types of agents-Goal based agents and Utility-based agents	1	17-07-23		TLM2	
10.	Types of agents-Learning agents	1	19-07-23		TLM2	
11.	Problems, search spaces	1	20-07-23		TLM2	
12.	Defining the problem as state space search	1	21-07-23		TLM2	
13.	Production System	1	24-07-23		TLM2	
14.	Problem Characteristics	1	26-07-23		TLM2	
15.	Issues in the design of search programs.	1	27-07-23		TLM2	
No. of classes required to complete UNIT-I: 15				**No. of classes taken:**		

UNIT-II:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
16.	Problem solving agents and search algorithm terminologies	1	28-07-23		TLM2	
17.	Properties of search algorithms and types of search algorithms	1	31-07-23		TLM2	
18.	Uninformed search algorithms: Breadth-first Search	1	02-08-23		TLM2	
19.	Depth-first Search and Depth-limited Search	1	03-08-23 04-08-23		TLM2	
20.	Iterative deepening Depth-First Search.	1	05-08-23		TLM2	
21.	Uniform cost search, Bidirectional search.	1	07-08-23		TLM2	
22.	Informed/Heuristic Search algorithms: Greedy Best-First Search algorithm	1	09-08-23		TLM2	
23.	A* Search algorithm	1	10-08-23		TLM2	
24.	Hill climbing algorithm	1	14-08-23		TLM2	
25.	Constraint satisfaction problem	1	16-08-23		TLM2	
26.	Means-Ends Analysis	1	17-08-23		TLM2	
No. of classes required to complete UNIT-II: 11				**No. of classes taken:**		

UNIT-III:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
27.	Adversarial search/Game playing: Introduction	1	17-08-23		TLM2	
28.	Minmax Algorithm	1	21-08-23		TLM2	
29.	Alpha-Beta Pruning	1	23-08-23		TLM2	
30.	Knowledge representation: Representations and mappings	1	24-08-23		TLM2	
31.	Approaches of Knowledge representation	1	25-08-23		TLM2	
32.	Issues in Knowledge Representation	1	28-08-23		TLM2	
No. of classes required to complete UNIT-III: 09				**No. of classes taken:**		

UNIT-IV:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
33.	Knowledge Representation Using predicate logic: Representing simple facts in logic.	1	04-09-23		TLM2	
34.	Representing instance and Isa relationships	2	07-09-23 08-09-23		TLM2	
35.	Computable functions and predicates	1	11-09-23		TLM2	
36.	Resolution	1	13-09-23		TLM2	
37.	Natural deduction	1	14-09-23		TLM2	
38.	Representing knowledge using Rules: Procedural verses declarative knowledge	1	15-09-23		TLM2	
39.	Logic programming	1	20-09-23		TLM2	
40.	Forward verses backward reasoning	1	21-09-23		TLM2	
41.	Matching	1	22-09-23		TLM2	
42.	Control knowledge	1	25-09-23		TLM2	
No. of classes required to complete UNIT-IV: 12				**No. of classes taken:**		

UNIT-V:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
43.	Uncertain knowledge and Reasoning: Probability and Bayes theorem	1	27-09-23		TLM2	
44.	Certainty factors and rule-based systems	1	30-09-23		TLM2	
45.	Bayesian networks	1	04-10-23		TLM2	
46.	Dempster – Shafer Theory	1	05-10-23		TLM2	
47.	Fuzzy logic	1	07-10-23		TLM2	
48.	Learning: Overview of different forms of learning	1	09-10-23		TLM2	
49.	Learning Decision Trees	1	11-10-23		TLM2	
50.	Neural networks	1	12-10-23		TLM2	
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 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 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 engineer**ing 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 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	**G.V.Suresh**	**G.V.Suresh**	**Dr.D V Subbaiah**	**Dr.D Veeraiah**
Signature				

DEPARTMENT OF MECHANICAL ENGINEERING
COURSE HANDOUT

Part-A

PROGRAM : B.Tech., V-Sem., CSE.,B-SECTION

ACADEMIC YEAR : 2022-23

COURSE NAME & CODE : RENEWABLE ENERGY SOURCES- 20ME81

L-T-P STRUCTURE : 4-0-0

COURSE CREDITS : 3

COURSE INSTRUCTOR : KAMALA PRIYA B

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	1	03.07.2023		**TLM1/ TLM2**	CO1		
2.	Over view of conventional & renewable energy sources	1	05.07.2023		**TLM1/ TLM2**	CO1	T1	
3.	Need & Development of renewable energy sources	1	07.07.2023		**TLM1/ TLM2**	CO1	T1	
4.	Types of renewable energy systems.	1	10.07.2023		**TLM1/ TLM2**	CO1	T1	
5.	Energy available from Sun	1	12.07.2023		**TLM1/ TLM2**	CO1	T1	
6.	Solar radiation data,	1	14.07.2023		**TLM1/ TLM2**	CO1		
7.	Flat plate and Concentrating collectors	1	15.07.2023		**TLM1/ TLM2**	CO1	T1	
8.	Mathematical analysis of Flat plate collectors	1	17.07.2023		**TLM1/ TLM2**	CO1	T1	
9.	collector efficiency	1	19.07.2023		**TLM1/ TLM2**	CO1		
10.	Solar water Heating, Space Heating	1	21.07.2023		**TLM1/ TLM2**	CO1	T1	
11.	Active and Passive heating	1	22.07.2023		**TLM1/ TLM2**	CO1		
12.	solar stills and ponds	1	24.07.2023		**TLM1/ TLM2**	CO1	T1	
13.	basic principle of power generation in photovoltaic cell	1	26.07.2023		**TLM1/ TLM2**	CO1	T1	
14.	Problems	1	28.07.2023		**TLM1/ TLM2**	CO1	T1	
15.	**Quiz/Assignment**							

No. of classes required to complete UNIT-I	14	No. of classes taken:

UNIT-II : 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
16.	Wind – characteristics – wind energy conversion systems	1	02.08.2023		**TLM1/ TLM2**	CO2	T1	
17.	Types of wind energy	1	04.08.2023		**TLM1/ TLM2**	CO2		
18.	Betz model & Interference factor	1	05.08.2023		**TLM1/ TLM2**	CO2	T1	
19.	Power Coefficient Torque Coefficient and thrust coefficient	1	07.08.2023		**TLM1/ TLM2**	CO2		
20.	site selection requirements.	1	09.08.2023		**TLM1/ TLM2**	CO2	T1	
21.	GEOTHERMAL ENERGY: Structure of Earth, Geothermal sources	1	11.08.2023		**TLM1/ TLM2**	CO2	T1	
22.	Hot springs, Hot Rocks& Hot Aquifers	1	14.08.2023		**TLM1/ TLM2**	CO2	T1	
23.	Interconnection of geothermal fossil systems	1	16.08.2023		**TLM1/ TLM2**	CO2	T1	
24.	Problems	1	18.08.2023		**TLM1/ TLM2**	CO2	T1	
25.	**Quiz/Assignment**							
No. of classes required to complete UNIT-II		9			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
26.	**Tidal Energy**- Introduction, Origin of Tides	1	19.08.2023		**TLM1/ TLM2**	CO3	T1, R8	
27.	Tidal Power generation	1	21.08.2023		**TLM1/ TLM2**	CO3		
28.	Classification of Tidal	1	23.08.2023		**TLM1/ TLM2**	CO3	T1	

	Power Plant,							
29.	Site requirements	1	28.08.2023		**TLM1/ TLM2**	CO3	T1	
30.	**WAVE ENERGY**: Introduction, Wave energy and Power	1	26.08.2023		**TLM1/ TLM2**	CO3	T1	
31.	Wave Energy devices – Merits and Demerits	1	04.09.2023 08.09.2023		**TLM1/ TLM2**	CO3	T1	
32.	**OCEAN THERMAL ENERGY**: Introduction	1	09.09.2023		**TLM1/ TLM2**	CO3	T1	
33.	Working principle of Ocean Thermal Energy Conversion	1	11.09.2023		**TLM1/ TLM2**	CO3	T1	
34.	OTEC Systems,	1	13.09.2023		**TLM1/ TLM2**	CO3	T1	
35.	Advantages and Disadvantages of OTEC plants.	1	15.09.2023		**TLM1/ TLM2**	CO3		
36.	**Quiz/Assignment**					CO3		
No. of classes required to complete UNIT-III		09			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
37.	**BIO – ENERGY**: Introduction	1	16.09.2023		**TLM1/ TLM2**	CO4	T1	
38.	Biomass Energy Sources	1	20.09.2023		**TLM1/ TLM2**	CO4	T1	
39.	Aerobic and Anaerobic bio-conversion processes	1	22.09.2023		**TLM1/ TLM2**	CO4	T1	
40.	Types of Biogas plants	3	23.09.2023 25.09.2023 27.09.2023		**TLM1/ TLM2**	CO4		
41.	Raw Materials and properties of Bio-gas	1	29.09.2023		**TLM1/ TLM2**	CO4	T1	
42.	Bio-gas plant Technology and Status	1	30.09.2023		**TLM1/ TLM2**	CO4	T1	
43.	Biomass gasification	2	04.10.2023 06.10.2023		**TLM1/ TLM2**	CO4	T1	

44.	Types and application of gasifier	1	07.10.2023		**TLM1/ TLM2**	CO4	T1	
45.	**Quiz/Assignment**					CO4		
No. of classes required to complete UNIT-IV		11			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
46.	DIRECT ENERGY CONVERSION SYSTEMS: Introduction	2	09.10.2023 11.10.2023		**TLM1/ TLM2**	CO5	T1	
47.	Peltier effect, seebeck effect, Thomson effect,	1	13.10.2023		**TLM1/ TLM2**	CO5	T1	
48.	Fuel Cells-Types.	2	14.10.2023 16.10.2023		**TLM1/ TLM2**	CO5	T1	
49.	Efficiency of Fuel Cells.	1	18.10.2023		**TLM1/ TLM2**	CO5	T1	
50.	Thermoelectric power Generation	1	20.10.2023		**TLM1/ TLM2**	CO5	T1	
51.	Thermionic electro power Generation	1	21.10.2023		**TLM1/ TLM2**	CO5		
52.	MHD Generator	1	25.10.2023		**TLM1/ TLM2**	CO5	T1	
53.	Open and closed systems	1	27.10.2023		**TLM1/ TLM2**	CO5	T1	
54.	applications of direct energy energy conversion systems	1	28.10.2023		**TLM1/ TLM2**	CO5	T1	
55.	**Quiz/Assignment**					CO5		
No. of classes required to complete UNIT-V		11			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 Max(B1,B2)+25% of Min(B1,B2)	1,2,3,4,5	B=15
Evaluation of Quiz Marks: Q=75% of Max(Q1,Q2)+25% of 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
Kamala Priya B	K Lakshmi Prasad	Dr. P. Vijay Kumar	Dr. S. Pichi Reddy

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT COMPUTER SCIENCE AND ENGINEERING

COURSE HANDOUT
PART-A

Name of Course Instructor: Mr B SIVARAMAKRISHNA
Course Name & Code : Computer Networks Lab (20CS60)
L-T-P Structure : 0-0-3 **Credits:** 1.5
Program/Sem/Sec : B.Tech V Sem Sec _B CSE **A.Y.:** 2022-23

PRE-REQUISITE : 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 Wire shark.(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	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	To gain familiarity with the basic network commands & utilities available in the Linux OS.	3	05,12.07.23		TLM4	
2	To learn about network layer tools and analyze captures for congestion.	3	19,26.07.23		TLM4	
3	To learn about queue management techniques, and global routing inns3.	3	02.08.23		TLM4	
4	To learn about broadcasting, multicasting, and bridging in a Local Area Network using ns3.	3	09.08.23		TLM4	
5	To learn about Wifi and Mobile Adhoc topologies with ns3.	3	16.08.23		TLM4	
6	To introduce Socket Programming in TCP and UDP.	3	23.08.23/06.09.23		TLM4	
7	Observations of Transmission Control Protocol(TCP) Connection states, Flags and Flow control.	3	13.09.23		TLM4	
8	To learn Transmission Control Protocol(TCP) Flow Control, ErrorControl, and Congestion.	3	20.09.23		TLM4	
9	To introduce Wire shark & tcp dump, and observation of packets in a LAN network.	3	27.09.23/04.10.23		TLM4	
10	To analyze HTTP packets using Wire shark tool, and understand the records returned by a DNS server.	3	11,18.10.23		TLM4	
11	Internal Exam	3	23.10.23		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	**Ethic**s: 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 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	B S R Krishna	Dr.K Naga Prasanthi	Dr.D.V. Subbaiah	Dr. D Veeraiah
Signature				

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Mrs B.Swathi

Course Name & Code :- Machine learning Lab-20AD53
L-T-P Structure :0-0-2 **Credits:1**
Program/Sem/Sec : B.Tech. – CSE V/A **A.Y.:**2023-24

PREREQUISITE:Knowledge of basic Computer hardware & software.

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, student will be able to

CO1	Apply the appropriate pre-processing techniques on data set. (**Apply – L3**)
CO2	Implement supervised Machine Learning algorithms. (**Apply – L3)**
CO3	Implement unsupervised Machine Learning algorithms (**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	-	2	-	2	3	-	-	-	-	-	-	-	-	-	-
CO2	-	2	-	2	3	-	-	-	-	-	-	-	-	-	-
CO3	2	2	-	-	3	-	-	-	-	-	-	-	-	2	-
CO4	-	-	-	-	-	-	-	-	-	2	-	-	-	2	-
1 - Low **2 –**Medium **3 -** High															

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.	Basic statistical functions for data exploration	3	10-07-2023		**DM5**	
2.	Data Visualization: Box plot, scatter plot, histogram	3	17-07-2023		**DM5**	

3.	Data Pre-processing: Handling missing values, outliers, normalization, Scaling	3	24-07-2023		**DM5**	
4.	Principal Component Analysis (PCA)	3	31-07-2023		**DM5**	
5.	Singular Value Decomposition (SVD)	3	07-08-2023		**DM5**	
6.	Linear Discriminant Analysis (LDA)	3	14-08-2023		**DM5**	
7.	Regression Analysis: Linear regression, Logistic regression, Polynomial regression	3	21-08-2023		**DM5**	
8.	Regularized Regression	3	04-09-2023		**DM5**	
9.	K-Nearest Neighbour (kNN) Classifier	3	11-09-2023		**DM5**	
10.	Support Vector Machines (SVMs)	3	25-09-2023		**DM5**	
11.	Random Forest model	3	9-10-2023		**DM5**	
12.	AdaBoost Classifier and XGBoost	3	16-10-2023		**DM5**	
13.	Internal exam	3	30-10-2023			

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 Regulations):

Evaluation Task	**Marks**
Day-to-day work	A1 = 05
Record	A2 = 05
Internal test	A3 = 05
CIE Total: (A1+A2+A3)	**M1 = 15**
Procedure/Algorithm	B1 = 5
Experimentation/Program execution	B2 = 10
Observations/Calculations/Validation	B3 = 10
Result/Inference	B4 = 5
Viva voce	B5 = 5
SEE Total: (B1+B2+B3+B4+B5)	**M2 = 35**
Total Marks = CIE + SEE = (M1+M2)	**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.
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	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	Mrs B.Swathi	(Dr. K.DeviPriya)	(Dr.K Naga prasanthi)	(Dr. D. Veeraiah)
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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DEPARTMENT OF COMPUTER SCIENCE &ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr.K DeviPriya
Course Name & Code **:**Mean Stack Technologies -20CSS3
L-T-P Structure **:**1-0-3 **Credits:**2
Program/Sem/Sec : B.Tech. - CSE/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, embedded media which includes images, audio, video and CSS Styles **(Apply-L3)**
CO2	Build a basic web server using Node.js , Exress.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, Robet 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	4-7-2023		**DM5/ DM6**	
2.	Cycle -2(HTML)	4	11-7-2023		**DM5/ DM6**	
3.	Cycle-3(JS)	4	18-7-2023		**DM5/ DM6**	
4.	Cycle-4(JS)	4	25-7-2023		**DM5/ DM6**	
5.	Cycle-5(JS)	4	1-8-2023		**DM5/ DM6**	
6.	Cycle-6(Node.JS)	4	8-8-2023		**DM5/ DM6**	
7.	Cycle-6(Node.JS)	4	22-8-2023		**DM5/ DM6**	
8.	Cycle-7(Express.js)	4	5-9-2023		**DM5/ DM6**	
9.	Cycle-8(Express.js)	4	12-9-2023		**DM5/ DM6**	
10.	Cycle-9 (Typescript)	4	19-9-2023		**DM4DM5/ DM6**	
11.	Cycle-10 (Typescript)	4	26-9-2023		**DM5/ DM6**	
12.	Cycle-11 (Typescript)	4	3-10-2023		**DM5/ DM6**	
13.	Cycle-12 (Typescript)	4	10-7-2023		**DM5/ DM6**	
14.	Cycle-12 (Typescript)	4	17-10-2023		**DM4/DM5/ DM6**	
15.	Assessment	4	24-10-2023		**DM4/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.
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	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	((Dr. K. Devi Priya)	Dr. Y.V. Bhaskar Reddy	Dr. Y.V. Bhaskar Reddy	(Dr. D. Veeraiah)
Signature				

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE HANDOUT
PART-A

Name of Course Instructor: Dr K N Prasanthi
Course Name & Code **:** ComputerNetworks- 20CS12
L-T-P Structure **:3-0-0** **Credits:** 3
Program/Sem/Sec : B.Tech-CSE/V/C **A.Y.:** 2023-24

PREREQUISITE: Basic Computer Fundamentals and Concepts

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The Objective of the course is to provide a foundation to understand computer networks using layered architectures. It also helps students to understand the various network models, addressing concept, routing protocols and design aspects of computer networks.

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

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

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	**2**	**2**	**2**											**1**	
CO2	**1**	**2**	**2**									**1**		**1**	
CO3	**1**	**3**	**3**									**1**		**1**	
CO4	**2**	**3**	**3**	**1**								**1**	**1**		
CO5	**2**	**2**	**2**									**1**	**1**		

Note: Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'**
1- Slight(Low), **2 -** Moderate(Medium), **3 -** Substantial (High).

TEXT BOOKS:

T1 1 B. A. Frouzan, Data Communication, Tata Mc Graw Hill.

2 S. Tanenbaum —Computer Network: Second Ed. Prentice Hall, India.

REFERENCE BOOKS:

R1 William Stallings, "Data and Computer Communication", Pearson Prentice Hall India, 8th Edition.

R2 Douglas Comer, Internetworking with TCP/IP, Prentice Hall of India, Volume 1, 6'h Edition, 2009.

R3 Richard Stevens, "TCP/IP Illustrated" , Addison-Wesley, Volume 1, 2001.

R4 http://www.cse.iitk.ac.in/users/dheeraj/cs425/
http://www.tcpipguide.com/free/t_OSIReferenceModelLayers.htm

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I:

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. 1	Introduction to computer	1	3-7-23		TLM2	
2.	**Data Communication Components**	1	5-7-23		TLM2	
3.	Representation of data and its flow Networks	1	6-7-23		TLM2	
4.	Various Connection Topology	1	10-7-23		TLM2	
5.	Protocols and Standards	1	12-7-23		TLM2	
6.	OSI model	2	13-7-23 15-7-23		TLM2	
7.	TCP/IP model	1	17-7-23		TLM2	
8.	Transmission Media	2	19-7-23 20-7-23		TLM2	

9.	LAN: Wired LAN, Wireless LANs	2	22-7-23 24-7-23		TLM2	
10.	Connecting LAN and Virtual LAN.	1	26-7-23		TLM2	
No. of Classes Required to complete:13			No. of Classes Taken:			

UNIT-II

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. 1	Data Link Layer And Medium Access Sublayer	1	27-7-23		TLM2	
12.	Error Detection and Error Correction - Fundamentals	1	31-7-23		TLM2	
13.	Block coding, Hamming Distance, CRC	1	2-8-23		TLM2	
14.	Flow Control and Error control protocols	2	3-8-23 5-8-23		TLM2	
15.	Stop and Wait, Go back — N ARQ	1	7-8-23		TLM2	
16.	Selective Repeat ARQ	1	9-8-23		TLM2	
17.	Sliding Window, Piggybacking	2	10-8-23 11-8-23		TLM2	
18.	Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA	1	14-8-23		TLM2	
19.	CSMA/CD,CDMA/CA	2	16-8-23 17-8-23		TLM2	
No. of Classes Required to complete: 12				No. of Classes Taken:		

UNIT-III:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
20	**Network Layer**	1	19-8-23		TLM2	
21	Switching	1	21-8-23		TLM2	
22	Logical addressing — IPV4, IPV6	2	23-8-23 24-8-23		TLM2	
23	Address mapping — ARP	1	26-8-23		TLM2	
24	RARP, BOOTP and DHCP—Delivery	2	4-9-23 7-9-23		TLM2	
25	Forwarding	1	11-9-23		TLM2	
26	Unicast Routing protocols.	3	13-9-23 14-9-23 16-9-23		TLM2	
No. of Classes Required to complete:11				No. of Classes Taken:		

UNIT-IV:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
27. 2	**Transport Layer**	1	20-9-23		TLM2	
28.	Process to Process Communication	2	21-9-23 23-9-23		TLM2	
29.	User Datagram Protocol (UDP)	1	25-9-23		TLM2	
30.	Transmission Control Protocol (TCP)	2	27-9-23 30-9-23		TLM2	
31.	SCTP Congestion Control	1	4-10-23		TLM2	
32.	Quality of Service	1	5-10-23		TLM2	
33.	QoS improving techniques: Leaky Bucket and Token Bucket algorithm.	2	7-10-23 9-10-23		TLM2	
No. of Classes Required to complete:10				No. of Classes Taken:		

UNIT-V:

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

34. 3	Application Layer	1	11-10-23		TLM2	
35.	Domain Name Space (DNS), DDNS	2	12-10-23 16-10-23		TLM2	
36.	TELNET, EMAIL	2	18-10-23 19-10-23		TLM2	
37.	File Transfer Protocol (FTP)	1	21-10-23		TLM2	
38.	WWW, HTTP	1	25-10-23		TLM2	
39.	SNMP, Bluetooth, Firewalls	1	26-10-23		TLM2	
40.	Revision	1	28-10-23			
No. of Classes Required to complete:13				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 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 engineer**ing 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 inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.
PSO 2	To inculcate an ability to Analyse, Design and implement data driven applications into the students.
PSO 3	Develop an ability to implement various processes / methodologies /practices empl in design, validation, testing and maintenance of software products

itle	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Dr. K Naga Prasanthi	Dr. K Naga Prasanthi	Dr D.V. Subbaiah	Dr. D Veeraiah
Signature				

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr. Shaik Johny Basha
Course Name & Code : Machine Learning (20AD04)
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech. – CSE / V Sem / C A.Y. : 2023 – 24

PRE-REQUISITE: Probability and Statistics, Data Warehousing and Data Mining

COURSE EDUCATIONAL OBJECTIVE (CEO): The objective of the course provides the basic concepts and techniques of Machine Learning and helps to use recent machine learning software for solving practical problems. It enables students to gain experience by doing independent study and research.

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

CO1:	Identify the characteristics of machine learning.	Understand – Level 2
CO2:	Understand the Model building and evaluation approaches.	Understand – Level 2
CO3:	Apply regression algorithms for real-world Problems	Apply – Level 3
CO4:	Handle classification problems via supervised learning algorithms.	Apply – Level 3
CO5:	Learn advanced learning techniques to deal with complex data.	Apply – Level 3

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	-	2	-	-	-	-	-	-	-	2	-	2	-
CO2	3	2	-	2	-	-	-	-	-	-	-	2	-	2	-
CO3	3	2	-	-	-	-	-	-	-	-	-	2	-	2	-
CO4	3	-	-	3	-	-	-	-	-	-	-	2	-	2	-
CO5	3	1	-	3	-	-	-	-	-	-	-	2	-	2	-
1 – Low							**2 –** Medium						**3 –** High		

TEXTBOOKS:

T1: Subramanian Chandramouli, Saikat Dutt, Amit Kumar Das, "Machine Learning", Pearson Education India, 1st Edition, 2015.
T2: Tom M. Mitchell, "Machine Learning", MGH, 1997.

REFERENCE BOOKS:

R1: Shai Shalev-Shwartz, ShaiBen David, "Understanding Machine Learning: From Theory to Algorithms", Cambridge
R2: Peter Harington, "Machine Learning in Action", Cengage, 1st edition, 2012.
R3: Peter Flach, "Machine Learning: The art and science of algorithms that make sense of data", Cambridge university Press, 2012.
R4: Jason Brownlee, "Machine Learning Mastery with Python Understand Your Data, Create Accurate Models and Work Projects End-To-End", Edition: v1.4, 2011.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT – I: Introduction to Machine Learning and Preparing to Model

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	04/07/23			
2.	Types of Machine Learning	1	06/07/23			
3.	Applications of Machine Learning	1	10/07/23			
4.	Issues in Machine Learning	1	11/07/23			
5.	**Preparing to Model** - Introduction	1	13/07/23			
6.	Machine Learning Activities	1	15/07/23			
7.	Basic Types of Data in Machine Learning	1	17/07/23			
8.	Exploring Structure of Data	2	18/07/23 20/07/23			
9.	Data Quality and Remediation	1	22/07/23			
10.	Data Pre-Processing	1	24/07/23			
No. of classes required to complete UNIT – I: 11				**No. of classes taken:**		

UNIT – II: Modelling & 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.	**Modelling & Evaluation** - Introduction	1	25/07/23			
12.	Selecting a Model	1	27/07/23			
13.	Training a Model (for Supervised Learning)	1	31/07/23			
14.	Model Representation and Interpretability	1	01/08/23			
15.	Evaluating Performance of a Model	1	03/08/23			
16.	**Basics of Feature Engineering** - Introduction	1	05/08/23			
17.	Feature Transformation – Feature Construction, Feature Extraction	1	07/08/23			
18.	Principal Component Analysis (PCA)	1	08/08/23			
19.	Singular Value Decomposition (SVD)	1	10/08/23			
20.	Linear Discriminant Analysis (LDA)	1	12/08/23			
21.	Feature Subset Selection	1	14/08/23			
No. of classes required to complete UNIT – II: 11				**No. of classes taken:**		

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
22.	Introduction to regression analysis	1	17/08/23			
23.	Simple linear regression	1	19/08/23			
24.	Multiple linear regression	1	21/08/23			
25.	Assumptions in Regression Analysis	1	22/08/23			
26.	Main Problems in Regression Analysis	1	24/08/23			
27.	Improving Accuracy of the linear regression model	1	26/08/23			

28.	Polynomial Regression Model	1	04/09/23			
29.	Logistic Regression	1	05/09/23			
30.	Regularization	1	07/09/23			
31.	Regularized Linear Regression and Regularized Logistic Regression	1	09/09/23			
No. of classes required to complete UNIT – III: 10				**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
32.	**Classification** – Introduction	1	11/09/23			
33.	Example of Supervised Learning	1	12/09/23			
34.	Classification Model	2	14/09/23 16/09/23			
35.	Classification Learning Steps	2	18/09/23 21/09/23			
36.	**Common Classification Algorithms** – k-Nearest Neighbour (kNN),	2	23/09/23 25/09/23			
37.	Support vector Machines (SVM)	1	26/09/23			
38.	Random Forest model	2	30/09/23 03/10/23			
No. of classes required to complete UNIT – IV: 11				**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
39.	**Ensemble Learning** – Bagging	1	05/10/23			
40.	Boosting	1	07/10/23			
41.	Stacking and its impact on bias and variance	2	09/10/23 10/10/23			
42.	AdaBoost	1	12/10/23			
43.	Gradient Boosting Machines	1	14/10/23			
44.	XGBoost	1	16/10/23			
45.	**Reinforcement Learning** – Introduction	1	17/10/23			
46.	Q Learning	2	19/10/23 21/10/23			
No. of classes required to complete UNIT – V: 10				**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
47.	Applications of Regularization		26/10/23			
48.	Image processing applications		28/10/23			

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):

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 modelling 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
PO7	**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.
PO8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and teamwork**: 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.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO1	The ability to apply Software Engineering practices and strategies in software project development using open-source programming environment for the success of organization.
PSO2	The ability to design and develop computer programs in networking, web applications and IoT as per the society needs.
PSO3	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. Shaik Johny Basha**	**Dr. K. Devi Priya**	**Dr. K. Naga Prasanthi**	**Dr. D. Veeraiah**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC with 'A' GRADE & NBA (Under Tier - I), 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.
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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. D. VEERAIAH
Course Name & Code : THEORY OF COMPUTATION & 20CS13
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : B.Tech/V/C **A.Y.:** 2023-24

PREREQUISITE: Discrete Mathematical Structures

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The objective of the course is to provide a formal connection between algorithmic problem solving and the theory of automata and languages, and develop them into a mathematical view towards algorithmic design and in general computation itself.

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

CO1	Construct finite automata for regular languages and prove it's equivalence **(Apply-L3)**
CO2	Construct regular expression for regular languages and prove the equivalence of regular expression and Finite Automata **(Apply-L3)**
CO3	Design Pushdown automata for the context free languages. **(Understand-L2)**
CO4	Design Turing Machine to model computational problems **(Apply-L3)**
CO5	Distinguish decidable and undecidable problems with the help of Turing machine **(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											1		
CO2	3	2											1		
CO3	3	2													
CO4	3	2													
CO5	1	2													
1 - Low					**2 –**Medium							**3 -** High			

TEXTBOOKS:

T1 John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, "Introduction to Automata Theory, Languages, and Computation", Pearson Education Asia, 1997

REFERENCE BOOKS:

R1	Harry R. Lewis and Christos H. Papadimitriou, "Elements of the Theory of Computation", Pearson Education Asia,2000
R2	Dexter C. Kozen, "Automata and Computability", Springer,2011.
R3	Michael Sipser, "Introduction to the Theory of Computation", PWS Publishing,2005.
R4	John Martin, Introduction to Languages and The Theory of Computation, Tata McGraw Hill,2nd Edition,2003

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: FINITE 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
1.	Introduction- Course Objective & Outcomes	1	04-07-2023		TLM1	
2.	Basic Concepts of Finite Automata	1	06-07-2023		TLM1	
3.	Finite automata Classification	1	07-07-2023		TLM1	
4.	DFA Construction	2	08-07-2023 11-07-2023		TLM1	
5.	NFA Construction	1	13-07-2023		TLM1	
6.	Equivalence of NFA & DFA	1	14-07-2023		TLM1	
7.	NFA with epsilon to NFA without epsilon	1	15-07-2023		TLM1	
8.	Minimization of Finite Automata	2	18-07-2023 20-07-2023		TLM1	
9.	Finite Automata with output	1	21-07-2023		TLM1	
10.	Construction of Moore and Melay Machine	2	22-07-2023 25-07-2023		TLM1	
11.	Equivalence of Moore and Melay	2	27-07-2023 28-07-2023		TLM1	
No. of classes required to complete UNIT-I: 15				**No. of classes taken:**		

UNIT-II: Regular Expression and Regular Languages

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	Introduction to Regular Expressions	1	01-08-2023		TLM1	
13.	Construction of RE	1	03-08-2023		TLM1	
14.	RE to Finite Automata	1	04-08-2023		TLM1	
15.	FA to Regular expressions	1	05-08-2023		TLM1	
16.	Regular grammar, Construction	1	08-08-2023		TLM1	
17.	Parse Trees	1	10-08-2023		TLM1	
18.	Equivalence of grammar to Finite Automata	1	11-08-2023		TLM1	
19.	Pumping Lemma for regular languages	1	12-08-2023		TLM1	
20.	Closure Properties for Regular Language	1	16-08-2023		TLM1	
No. of classes required to complete UNIT-II: 09				**No. of classes taken:**		

UNIT-III: CONTEXT FREE GRAMMER AND PUSH DOWN 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
21.	Context Free Grammer	1	17-08-2023		TLM1	
22.	Ambiguity of CFG	1	18-08-2023		TLM1	
23.	Simplification of CFG	1	19-08-2023		TLM1	
24.	CNF	1	22-08-2023		TLM1	
25.	GNF	2	24-08-2023 25-08-2023		TLM1	
26.	PDA Definition	1	26-08-2023		TLM1	
27.	Deterministic PDA and Non Deterministic PDA	1	05-09-2023		TLM1	
28.	Construction of PDA	1	07-09-2023		TLM1	
29.	CFG to PDA	1	08-09-2023		TLM1	
30.	PDA to CFG	1	09-09-2023		TLM1	
31.	Pumping lemma for CFL's	1	12-09-2023		TLM1	
32.	Closure properties of CFL's	1	14-09-2023		TLM1	
No. of classes required to complete UNIT-III: 13				**No. of classes taken:**		

UNIT-IV: Turing Machine

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
33.	Introduction, Basic Model of TM	1	15-09-2023		TLM1	
34.	Languages, closure properties	1	16-09-2023		TLM1	
35.	TM Construction	3	21-09-2023 22-09-2023 23-09-2023		TLM1	
36.	Variants of TM	2	26-09-2023 29-09-2023		TLM1	
37.	NDTM equivalence with DTM	2	30-09-2023 03-10-2023		TLM1	
38.	Unrestricted Grammar and its equivalence TM	1	05-10-2023		TLM1	
39.	TM as enumerators	2	06-10-2023 07-10-2023			
No. of classes required to complete UNIT-IV: 12				**No. of classes taken:**		

UNIT-V: Undecidability

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.	Introduction	1	10-10-2023		TLM1	
41.	Church Turing Thesis	1	12-10-2023		TLM1	
42.	Universal Turing Machine	1	13-10-2023		TLM1	
43.	The universal and diagonalization Languages	1	14-10-2023		TLM1	
44.	Reduction between Languages	1	17-10-2023		TLM1	
45.	Rice Theorem	1	19-10-2023		TLM1	
46.	PCP Problem	1	20-10-2023		TLM1	
47.	Undecidable problems about Languages	2	21-10-2023 26-10--2023		TLM1	
No. of classes required to complete UNIT-V: 09				**No. of classes taken:**		

Contents 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
1.	Phases of Compiler	1	28-10-2023		**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.
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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 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 inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.
PSO 2	To inculcate an ability to analyze, design and implement data driven applications into the students
PSO 3	Develop an ability to implement various processes/methodologies/practices employed in design, validation, testing and maintenance of software products.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr. D.Veeraiah**	**Dr. D.Veeraiah**	**Dr. S.Jayaprada**	**Dr. D.Veeraiah**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
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Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
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DEPARTMENT OF COMPUTER SCIENCE &ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Ms. Ch Nagamani
Course Name & Code **:** PAI & 20CS16
L-T-P Structure **:3-0-0** **Credits:** 3
Program/Sem/Sec :BTECH/V/C **A.Y.:** 2023-24

PREREQUISITE: Basic Engineering and Mathematics knowledge

COURSE EDUCATIONAL OBJECTIVES (CEOs):

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

CO1	Understand the fundamentals of Artificial Intelligence types of AI agents and their structures to solve engineering problems. (**Understand – L2**)
CO2	Identify different search algorithms to find and optimise the solution for the given problem. (**Understand-L2**)
CO3	Apply different gaming algorithms and identify the importance of knowledge representations in Artificial Intelligence. (**Apply-L3**)
CO4	Make use of predicate logic and rule-based system to represent the knowledge in AI domain. (**Understand-L2**)
CO5	Interpret the forms of learning in the AI domain as well as present efficient technologies to remove uncertainty in knowledge domain. (**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	1	-	-	-	-	-	-	-	-	1	-	2	-
CO2	2	3	1	1	-	-	-	-	-	-	-	-	-	2	-
CO3	2	3	1	1	-	-	-	-	-	-	-	1	-	2	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	2	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-	-	2	-
1 - Low **2 –**Medium **3 -** High															

TEXTBOOKS:

T1	Stuart J. Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", Pearson Education Asia, third edition, 2009.can also second edition,2003.
T2	Elaine Rich, Kevin Knight Artificial Intelligence, TMH, second edition, 2007.

REFERENCE BOOKS:

R1	Nils J.Nilsson "Artificial Intelligence - A New Synthesis", ,Morgan Kaufmann, 1988
R2	David poole,Alan Mackworth, "Artificial Intelligence: Foundations for computational agents",Cambridge Univ.press,2010.
R3	Ronald Brachman, "Knowledge representation and Reasoning", Morgan Kaufmann,2004.
R4	Frank van Harmelen,Vladimir Lifschitz,Bruce Porter(Eds),"Handbook of Knowledge representation",Elsevier,2008.
R5	Ivan Bratko," Prolog Programming for Artificial Intelligence",4th Ed., Addition-Wesley,2011.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I:

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.	AI Introduction	1	05-7-2023		TLM1	
2.	Applications of AI	1	07-7-2023		TLM1	
3.	History of AI	1	10-7-2023		TLM1	
4.	Types of AI	1	12-7-2023		TLM1	
5.	Agents and rationality	1	14-7-2023		TLM2	
6.	Structure of the agents	1	15-7-2023		TLM2	
7.	Agent environment and nature of the environment	1	17-7-2023		TLM2	
8.	Types of agents-Simple reflex agents and model-based agents	1	19-7-2023		TLM2	
9.	Types of agents-Goal based agents and Utility-based agents	1	21-7-2023		TLM2	
10.	Types of agents-Learning agents	1	22-7-2023		TLM2	
11.	Problems, search spaces	1	24-7-2023		TLM2	
12.	Defining the problem as state space search	1	26-7-2023		TLM2	
13.	Production system	1	28-7-2023		TLM2	
14.	Problem characteristics	1	02-8-2023		TLM2	
15.	Issues in the design of search programs.	1	04-8-2023		TLM2	
No. of classes required to complete UNIT-I: 15				**No. of classes taken:**		

UNIT-II:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
16.	Problem solving agents and search algorithm terminologies	1	05-8-2023		TLM2	
17.	Properties of search algorithms and types of search algorithms	1	07-8-2023		TLM2	
18.	Uninformed search algorithms: Breadth-first Search	1	09-8-2023		TLM2	
19.	Depth-first Search and Depth-limited Search	1	11-8-2023		TLM2	
20.	Iterative deepening depth-first search.	1	12-8-2023		TLM2	
21.	Uniform cost search, Bidirectional search.	1	14-8-2023		TLM2	
22.	Informed/Heuristic Search algorithms: Greedy best-first search algorithm	1	16-8-2023		TLM2	
23.	A* Search algorithm	1	18-8-2023		TLM2	
24.	Hill climbing algorithm	1	19-8-2023		TLM2	
25.	Constraint satisfaction problem	1	21-8-2023		TLM2	
26.	Means-Ends Analysis	1	23-8-2023		TLM2	
No. of classes required to complete UNIT-II: 11				**No. of classes taken:**		

UNIT-III:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
27.	Adversarial search/Game playing: Introduction	1	25-8-2023		TLM2	
28.	Minmax Algorithm	1	26-8-2023		TLM2	
29.	Alpha-Beta Pruning	1	04-9-2023		TLM2	
30.	Knowledge representation: Representations and mappings	2	08-9-2023 09-9-2023		TLM2	
31.	Approaches of Knowledge representation	2	11-9-2023 13-9-2023		TLM2	
32.	Issues in Knowledge Representation	2	15-9-2023 16-9-2023		TLM2	
No. of classes required to complete UNIT-III: 09				**No. of classes taken:**		

UNIT-IV:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
33.	Knowledge Representation Using predicate logic: Representing simple facts in logic.	1	20-9-2023		TLM2	
34.	Representing instance and Isa relationships	2	22-9-2023 23-9-2023		TLM2	
35.	Computable functions and predicates	1	25-9-2023		TLM2	
36.	Resolution	1	27-9-2023		TLM2	
37.	Natural deduction	1	29-9-2023		TLM2	
38.	Representing knowledge using Rules: Procedural verses declarative knowledge	1	30-9-2023		TLM2	
39.	Logic programming	1	4-10-2023		TLM2	
40.	Forward verses backward reasoning	1	6-10-2023		TLM2	
41.	Matching	1	7-10-2023		TLM2	
42.	Control knowledge	1	9-10-2023		TLM2	
No. of classes required to complete UNIT-IV: 11				**No. of classes taken:**		

UNIT-V:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
43.	Uncertain knowledge and Reasoning: Probability and Bayes theorem	2	11-10-2023 13-10-2023		TLM2	
44.	Certainty factors and rule-based systems	1	14-10-2023		TLM2	
45.	Bayesian networks	1	16-10-2023		TLM2	
46.	Dempster – Shafer Theory	2	18-10-2023 20-10-2023		TLM2	
47.	Fuzzy logic	1	21-10-2023		TLM2	
48.	Learning: Overview of different forms of learning	1	25-10-2023		TLM2	
49.	Learning Decision Trees	1	27-10-2023		TLM2	
50.	Neural networks	1	28-10-2023		TLM2	
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

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 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 engineer**ing 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 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	**Ms. Ch Nagamani**	**Mr G.V.Suresh**	**Dr.D.V Subbaiah**	**Dr.D Veeraiah**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(Autonomous)

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

Accredited by NAAC and NBA (CSE, IT, ECE, EEE & ME) under Tier - I

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

Part-A

PROGRAM : B.Tech., VI-Sem., CSE.,C-SECTION

ACADEMIC YEAR : 2023-24

COURSE NAME & CODE : RENEWABLE ENERGY SOURCES- 20ME81

L-T-P STRUCTURE : 4-0-0

COURSE CREDITS : 3

COURSE INSTRUCTOR : MALLIKARJUNA RAO DANDU

COURSE COORDINATOR : **Dr V Dhana Raju**

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	1	11-07-2023		TLM1/ TLM2	CO1	T1	
2.	Over view of conventional & renewable energy sources	1	12-07-2023		TLM1/ TLM2	CO1	T1	
3.	Need & Development of renewable energy sources	1	13-07-2023		TLM1/ TLM2	CO1	T1	
4.	Types of renewable energy systems.	1	15-07-2023		TLM1/ TLM2	CO1	T1	
5.	Energy available from Sun	1	18-07-2023		TLM1/ TLM2	CO1	T1	
6.	Solar radiation data,	1	19-07-2023		TLM1/ TLM2	CO1	T1	
7.	Flat plate and Concentrating collectors	1	20-07-2023		TLM1/ TLM2	CO1	T1	
8.	Mathematical analysis of Flat plate collectors	1	22-07-2023		TLM1/ TLM2	CO1	T1	
9.	collector efficiency	1	25-07-2023		TLM1/ TLM2	CO1	T1	
10.	Solar water Heating, Space Heating	1	26-07-2023		TLM1/ TLM2	CO1	T1	
11.	Active and Passive heating	1	27-07-2023		TLM1/ TLM2	CO1	T1	
12.	solar stills and ponds	1	01-08-2023		TLM1/ TLM2	CO1	T1	
13.	basic principle of power generation in photovoltaic cell	1	02-08-2023		TLM1/ TLM2	CO1	T1	
14.	Problems	1	03-08-2023		TLM1/ TLM2	CO1	T1	
15.	**Quiz/Assignment**	1	05-08-2023					
No. of classes required to complete UNIT-I		14			No. of classes taken:			

UNIT-II : 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
16.	Wind – characteristics – wind energy conversion systems	1	07-08-2023		**TLM1/ TLM2**	CO2	T1	

17.	Types of wind energy	1	08-08-2023		**TLM1/ TLM2**	CO2	T1	
18.	Betz model & Interference factor	1	09-08-2023		**TLM1/ TLM2**	CO2	T1	
19.	Power Coefficient Torque Coefficient and thrust coefficient	1	09-08-2023					
20.	site selection requirements.	1	10-08-2023		**TLM1/ TLM2**	CO2	T1	
21.	GEOTHERMAL ENERGY: Structure of Earth, Geothermal sources	1	10-08-2023		**TLM1/ TLM2**	CO2	T1	
22.	Hot springs, Hot Rocks& Hot Aquifers	1	16-08-2023		**TLM1/ TLM2**	CO2	T1	
23.	Interconnection of geothermal fossil systems	1	17-08-2023		**TLM1/ TLM2**	CO2	T1	
24.	Problems	1	19-08-2023		**TLM1/ TLM2**	CO1	T1	
25.	**Quiz/Assignment**		22-08-2023					
No. of classes required to complete UNIT-II		9			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
26.	**Tidal Energy**- Introduction, Origin of Tides	1	23-08-2023		**TLM1/ TLM2**	CO3	T1, R8	
27.	Tidal Power generation	1	24-08-2023		**TLM1/ TLM2**	CO3	T1, R8	
28.	Classification of Tidal Power Plant,	1	24-08-2023		**TLM1/ TLM2**	CO3	T1	
29.	Site requirements	1	26-08-2023		**TLM1/ TLM2**	CO3	T1	
30.	**WAVE ENERGY**: Introduction, Wave energy and Power	1	05-09-2023		**TLM1/ TLM2**	CO3	T1	
31.	Wave Energy devices – Merits and Demerits	1	07-09-2023		**TLM1/ TLM2**	CO3	T1	
32.	**OCEAN THERMAL ENERGY**: Introduction	1	12-09-2023		**TLM1/ TLM2**	CO3	T1	
33.	Working principle of Ocean Thermal Energy Conversion	1	12-09-2023		**TLM1/ TLM2**	CO3	T1	
34.	OTEC Systems,	1	13-09-2023		**TLM1/ TLM2**	CO3	T1	
35.	Advantages and Disadvantages of OTEC plants.	1	13-09-2023		**TLM1/ TLM2**	CO3	T1	
36.	**Quiz/Assignment**		14-09-2023			CO3		
No. of classes required to complete UNIT-III		10			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
37.	**BIO – ENERGY**: Introduction	1	16-09-2023		**TLM1/ TLM2**	CO4	T1	
38.	Biomass Energy Sources	1	19-09-2023		**TLM1/ TLM2**	CO4	T1	
39.	Aerobic and Anaerobic bio-conversion processes	1	20-09-2023		**TLM1/ TLM2**	CO4	T1	
40.	Types of Biogas plants	3	21-09-2023 23-09-2023 26-09-2023		**TLM1/ TLM2**	CO4	T1	
41.	Raw Materials and properties of Bio-gas	1	27-09-2023		**TLM1/ TLM2**	CO4	T1	
42.	Bio-gas plant Technology and Status	1	30-09-2023		**TLM1/ TLM2**	CO4	T1	
43.	Biomass gasification	2	05-10-2023		**TLM1/ TLM2**	CO4	T1	
44.	Types and application of gasifier	1	07-10-2023		**TLM1/ TLM2**	CO4	T1	
45.	**Quiz/Assignment**		03-10-2023			CO4		
No. of classes required to complete UNIT-IV		11			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
46.	DIRECT ENERGY CONVERSION SYSTEMS: Introduction	2	04-10-2023		**TLM1/ TLM2**	CO5	T1	
47.	Peltier effect, seebeck effect, Thomson effect,	1	05-10-2023		**TLM1/ TLM2**	CO5	T1	
48.	Fuel Cells-Types.	2	07-10-2023		**TLM1/ TLM2**	CO5	T1	
49.	Efficiency of Fuel Cells.	1	10-10-2023		**TLM1/ TLM2**	CO5	T1	
50.	Thermoelectric power Generation	1	11-10-2023		**TLM1/ TLM2**	CO5	T1	
51.	Thermionic electro power Generation	1	12-10-2023					
52.	MHD Generator	1	14-10-2023		**TLM1/ TLM2**	CO5	T1	
53.	Open and closed systems	1	17-10-2023		**TLM1/ TLM2**	CO5	T1	
54.	applications of direct energy energy conversion systems	1	18-10-2023		**TLM1/ TLM2**	CO5	T1	
55.	**Quiz/Assignment**		19-10-2023			CO5		
No. of classes required to complete UNIT-V		11			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 Max(B1,B2)+25% of Min(B1,B2)	1,2,3,4,5	B=15
Evaluation of Quiz Marks: Q=75% of Max(Q1,Q2)+25% of 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
MALLIKARJUNA RAO DANDU	Dr V Dhana Raju	Dr. P. Vijay Kumar	Dr. S. Pichi Reddy

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hodcse@lbrce.ac.in, cselbreddy@gmail.com, Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF COMPUTER SCIENCE &ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr K Naga Prasanthi
Course Name & Code : COMPUTER NETWORKS LAB&20CS60
L-T-P Structure : 0-0-3 Credits : 1.5
Program/Sem/Sec : B.Tech., CSE., V-Sem., Section-C A.Y: 2023-24

PRE-REQUISITES : Data Structures and Operating Systems

COURSE EDUCATIONAL OBJECTIVES (CEOs): The main objective of this 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
CO 2	Demonstrate Transport Layer functionalities
CO 3	Analyze Application layer protocols using Wireshark
CO 4	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	3	3	-	-	-	-	-	-	-	1	-	-	-
CO2	1	2	3	3	-	-	-	-	-	-	-	1	-	-	-
CO3	1	2	3	3	-	-	-	-	-	-	-	1	-	-	-
CO4	-	-	-	-	-	-	-	1	3	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	HOD Sign
1.	Introduction	3	4-7-23		
2.	Basic network commands & utilities	3	11-7-23		
3.	Network layer tools and analyze captures for congestion	3	18-7-23		
4.	Network layer tools and analyze captures for congestion	3	25-7-23		
5.	Queue management techniques and global routing in NS3	3	1-8-23		
6.	Broadcasting, multicasting and bridging in LAN using ns3	3	8-8-23		
7.	Learn about Wifi and mobile Adhoc topologies with NS3	3	22-8-23		
8.	Socket programming in TCP and UDP	3	5-9-23		
9.	Observation of TCP Connection states, Flags and Flow control	3	12-9-23		
10.	TCP Flow control, Error control and Congestion	3	19-9-23		
11.	Wireshark & tcpdump, observation of packets in a LAN	3	26-9-23		
12.	Analyze HTTP packets using Wireshark tool and understand records returned by DNS Server.	3	3-10-23		
13.	Practise	3	10-10-23		
14.	Practise	3	17-10-23		
15.	Lab Internal Exam		24-10-23		

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	**Ethic**s: 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	To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.
PSO 2	To inculcate an ability to Analyse, Design and implement data driven applications into the students.
PSO 3	Develop an ability to implement various processes / methodologies /practices emple in design, validation, testing and maintenance of software products

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	Dr.K. Naga Prasanthi	Dr.K. Naga Prasanthi	Dr. D. Venkata Subbaiah	Dr. D. Veeraiah
Signature				

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr. Shaik Johny Basha / Dr. P. Bhagath / Mr. N. Srikanth

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

L-T-P Structure : 0-0-3 Credits : 1.5

Program/Sem/Sec : B.Tech. – CSE / V Sem / C A.Y. : 2023 – 24

PRE-REQUISITE: Probability and Statistics, Programming Knowledge

COURSE EDUCATIONAL OBJECTIVE (CEO): 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, the student will be able to:

CO1:	Apply the appropriate pre-processing techniques on data set	Apply – Level 3
CO2:	Implement supervised Machine Learning algorithms	Apply – Level 3
CO3:	Implement advanced Machine Learning algorithms	Apply – Level 3
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	-	2	-	2	3	-	-	-	-	-	-	2	-	-	-
CO2	-	2	-	2	3	-	-	-	-	-	-	2	-	2	-
CO3	2	2	-	-	3	-	-	-	-	-	-	2	-	2	-
CO4	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
1 – Low							**2 –** Medium						**3 –** High		

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Programs to be covered	No. of Classes		Date of Completion	Delivery Method
		Required as per the Schedule	Taken		
1.	Basic statistical functions for data exploration	3			DM5
2.	Data Visualization: Box plot, scatter plot, histogram	3			DM5
3.	Data Pre-processing: Handling missing values, outliers, normalization, Scaling	3			DM5
4.	Principal Component Analysis (PCA)	3			DM5
5.	Singular Value Decomposition (SVD)	3			DM5
6.	Linear Discriminant Analysis (LDA)	3			DM5
7.	Regression Analysis: Linear regression, Logistic regression, Polynomial regression	6			DM5
8.	Regularized Regression	3			DM5
9.	K-Nearest Neighbour (kNN) Classifier	3			DM5
10.	Support Vector Machines (SVMs)	3			DM5
11.	Random Forest model	3			DM5
12.	AdaBoost Classifier and XGBoost	3			DM5
13.	Internal Lab Exam	3			DM4

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

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Mr. Shaik Johny Basha**	**Dr. K. Devi Priya**	**Dr. K. Naga Prasanthi**	**Dr. D. Veeraiah**
Signature				

PART-C

PROGRAMME 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.
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PO7	**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.
PO8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and teamwork**: 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.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO1	The ability to apply Software Engineering practices and strategies in software project development using open-source programming environment for the success of organization.
PSO2	The ability to design and develop computer programs in networking, web applications and IoT as per the society needs.
PSO3	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. Shaik Johny Basha**	**Dr. K. Devi Priya**	**Dr. K. Naga Prasanthi**	**Dr. D. Veeraiah**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC with 'A' Grade & NBA (Under Tier - I),
An ISO 21001:2018,14001:2015,50001:2018 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. S. Govindu
Course Name & Code : Mean Stack Technologies (Backend Development) & 20CSS3
L-T-P Structure : 1-0-3 **Credits:** 2
Program/Sem/Sec : B.Tech. - CSE/V/C **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, embedded media which includes images, audio, video and CSS Styles **(Apply-L3)**
CO2	Build a basic web server using Node.js , Exress.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	-	-	2	-	2	-	-	-	-	-	-	-	-	1	3
CO2	-	-	2	-	2	-	-	-	-	-	-	-	-	3	-
CO3	-	-	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, Robet 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, Cycle -2(HTML)	3	14-07-2023		**DM5**	
2.	Cycle-3(JS)	3	21-07-2023		**DM5**	
3.	Cycle-4,5(JS)	3	28-07-2023		**DM5**	
4.	Cycle-6(Node.JS)	3	04-08-2023		**DM5**	
5.	Cycle-6(Node.JS)	3	11-08-2023		**DM5**	
6.	Cycle-6(Node.JS)	3	18-08-2023		**DM5**	
7.	Cycle-6(Node.JS)	6	25-08-2023 08-09-2023		**DM5**	
8.	Cycle-7(Express.JS)	3	15-09-2023		**DM5**	
9.	Cycle-8(Expres.JS)	3	22-09-2023		**DM5**	
10.	Cycle-8(Expres.JS)	3	29-09-2023		**DM5**	
11.	Cycle-8(Expres.JS)	3	06-10-2023			
12.	Cycle-8(Expres.JS)	3	13-10-2023		**DM5**	
13.	Cycle-9(Type Script)	3	20-10-2023			
14.	Cycle-9(Type Script)	3	27-10-2023		**DM5**	

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

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Name of the Faculty	(Mr. S. Govindu)	(Dr. K. Devi Priya)	(Dr. K. Naga Prasanthi)	(Dr. D. Veeraiah)
Signature				