LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC & NBA (Under Tier - I), ISO 9001:2015 Certified Institution
Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF ECE

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. P. Lachi Reddy, Professor
Course Name & Code : Data Communication & Computer Networks – 20EC14
Regulation: R20
L-T-P Structure : 3-0-0 **Credits:** 03
Program/Sem/Sec : B. Tech. V-Sem., ECE A-Section **A.Y.:** 2024-25

PREREQUISITE: Digital Communications

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course provides knowledge on Data Communication and Computer Networks and various protocols used in different layers.

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

CO1	**Understand** the functions of the OSI, TCP/IP reference models. **(Understand – L2)**
CO2	**Summarize** design issues for layer protocols. **(Understand – L2)**
CO3	**Examine** the routing algorithms to find shortest paths for packet delivery. **(Apply – L3)**
CO4	**Interpret** the operations of 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	2	3	1	-	-	-	-	-	-	-	-	3	3	-	-
CO2	2	1	1	-	-	-	-	-	-	-	-	2	3	-	-
CO3	3	3	-	2	2	-	-	-	-	-	-	2	3	-	-
CO4	2	2	-	-	-	-	-	-	-	-	-	3	3	-	-
1 - Low			**2** –Medium							**3** - High					

TEXTBOOKS:

T1 Tanenbaum and Wetherall, "Computer Networks", Pearson Education, 5th Edition.

T2 Behrouz A. Forouzan, "Data Communication and Networking", 4th Edition, Tata McGraw hill, New Delhi, 2006.

REFERENCE BOOKS:

R1 S. Keshav, "An Engineering Approach to Computer Networks", Pearson Education, 2nd Edition.

R2 W. A. Shay, "Understanding Communications and Networks", Cengage Learning, 3rd Edition

PART-B

COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I: Introduction, Physical 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
1.	CO discussion and Introduction to Course	1	02-07-2024			
2.	Overview of Syllabus	1	03-07-2024			
3.	Introduction to Networks	1	05-07-2024			
4.	Network Hardware	1	06-07-2024			
5.	Network software	1	09-07-2024			
6.	Network models LAN, MAN, WAN	1	10-07-2024			
7.	OSI Reference Model	1	12-07-2024			
8.	TCP/IP Reference Model	1	16-07-2024			
9.	Comparison between OSI and TCP/IP	1	19-07-2024			
10.	Critique of OSI and TCP/IP	1	20-07-2024			
11.	Physical Layer: Guided Transmission Medium	1	23-07-2024			
12.	Guided Transmission Medium	1	24-07-2024			
13.	Wireless Transmission Medium	1	26-07-2024			
14.	Revision / Tutorial	1	27-07-2024			
No. of classes required to complete UNIT-I: 14				**No. of classes taken:**		

UNIT-II: Data Link Layer, Medium Access Control 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
15.	Introduction to DLL, Design Issues	1	30-07-2024			
16.	Framing Methods	1	31-07-2024			
17.	Error Detection and Correction Codes	1	02-08-2024			
18.	CRC, Checksum	1	03-08-2024			
19.	Stop & wait, Sliding window, one bit	1	06-08-2024			
20.	Go-back -n, Selective repeat protocols	1	07-08-2024			
21.	MAC sub layer, channel allocation problem	1	09-08-2024			
22.	Multiple Access protocols- ALOHA,	1	13-08-2024			
23.	CSMA protocols, CSMA with collision detection, Collision free protocols	1	14-08-2024			
24.	Ethernet, Wireless LANs- Infrastructure, Protocol stack	1	16-08-2024			
25.	MAC frame, 802.11 services	1	17-08-2024			
26.	Bluetooth-Architecture, Protocol stack, Frame structure	1	20-08-2024			
27.	Revision / Tutorial	1	21-08-2024			
No. of classes required to complete UNIT-II: 13				**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
28.	Network Layer Design Issues- store and forward	1	23-08-2024			
29.	Datagrams and virtual circuits	1	24-08-2024			
30.	Routing algorithms- Optimality Principle	1	27-08-2024			
31.	Shortest Path Algorithm, Flooding,	1	28-08-2024			
32.	Distance vector routing	1	30-08-2024			
33.	Link state routing	1	31-08-2024			
34.	Hierarchical routing	1	10-09-2024			
35.	Board cast routing & Multicast Routing	1	11-09-2024			
36.	Congestion control in data subnets, warning bits	1	13-09-2024			
37.	Load shedding, choke packets, Jitter control, RED	1	17-09-2024			
38.	Revision / Tutorial	1	18-09-2024			
No. of classes required to complete UNIT-III: 11				**No. of classes taken:**		

UNIT-IV: Internetworking, 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
39.	Internetworking	1	20-09-2024			
40.	Tunneling, Packet Fragmentation	1	21-09-2024			
41.	Network Layer in the Internet	1	24-09-2024			
42.	IPv4	1	25-09-2024			
43.	IPV6, comparison between IPv4 and IPv6	1	27-09-2024			
44.	Internet control protocols, OSPF BGP	1	28-09-2024			
45.	Transport layer services to the upper Layers	1	01-10-2024			
46.	Addressing, Connection establishment	1	04-10-2024			
47.	Connection release, Crash Recovery	1	05-10-2024			
48.	Revision / Tutorial	1	08-10-2024			
No. of classes required to complete UNIT-IV: 10				**No. of classes taken:**		

UNIT-V: The Internet Transport Protocols, 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
49.	Internet transport protocols: UDP-RPC, Real Time Transport Protocols	1	09-10-2024			
50.	Internet transport protocols: TCP, TCP service model	1	15-10-2024			
51.	TCP Segment Header	1	16-10-2024			
52.	Domain Name system	1	18-10-2024			
53.	Email Architecture and services, SMTP	1	19-10-2024			
54.	WWW and its architecture	1	22-10-2024			
55.	FTP, FTP Commands & Replies	1	23-10-2024			
56.	Structure of Management Information	1	25-10-2024			
57.	Management Information Base	1	26-10-2024			

58.	Simple Network Management Protocol	1	29-10-2024			
59.	Revision / Tutorial	1	30-10-2024			
No. of classes required to complete UNIT-V: 11				**No. of classes taken:**		

Contents beyond the Syllabus:

S. No.	Topics	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
60.	Network Security	1	01-11-2024			
61.	Network Security	1	02-11-2024			
No. of classes required to complete beyond syllabus: 02				**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 EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	To Attain a solid foundation in Electronics & Communication Engineering fundamentals with an attitude to pursue continuing education
PEO 2	To Function professionally in the rapidly changing world with advances in technology
PEO 3	To Contribute to the needs of the society in solving technical problems using Electronics & Communication Engineering principles, tools and practices
PEO 4	To Exercise leadership qualities, at levels appropriate to their experience, which addresses issues in a responsive, ethical, and innovative manner?

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	Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry
PSO 2	Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3	Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Date: 29-06-2024

Course Instructor	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Dr. P. Lachi Reddy	**Dr. K. Ravi Kumar**	**Dr. M. V. Sudhakar**	**Dr. G. Srinivasulu**

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L.B.Reddy Nagar, Mylavaram-521230, NTR Dist, Andhra Pradesh, India.
Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. V.Ravi Sekhara Reddy
Course Name & Code : Antennas and Wave Propagation & 20EC10
L-T-P Structure : 3-0-0 Credits: 3
Program/Sem/Sec : B.Tech., ECE., V-Sem., Sections- A A.Y :2024-25

Pre-Requisites: EM Waves and Transmission Lines.

Course Objectives: This course provides the knowledge on Antennas and Radiation fundamentals. The course will expose different types of Antennas and their applications. The course also gives the complete information regarding Propagation of Radio wave in atmosphere.

Course Outcomes (COs): At the end of the course, students are able to

CO1	**Understand** basic antenna parameters**,** radiation mechanism, characteristics of radio wave propagations **(Understand – L2)**
CO2	**Analyze** wire antenna, ground, space, and sky wave propagation mechanism for communication purpose and various Antenna Arrays **(Analyze – L4)**
CO3	**Design** HF, VHF and UHF Antennas **(Apply – L3)**
CO4	**Apply** antenna measurement methods to assess antenna's performance **(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	1	1	-		-	-	-		-	1	3	-	-
CO2	3	2	1	1	-	-	-	-	-	-	-	1	3	-	-
CO3	2	3	2	1	-	-	-	-	-	-	-	2	3	-	-
CO4	1	2	3	2	-	-			-	-	-	2	3	-	-

Correlation Levels: **1**-Slight (Low), **2**-Moderate (Medium), **3**-Substantial (High) and No correlation: **'-'**

TEXT BOOK(S):

T1 Constantine A. Balanis, "Antenna Theory: Analysis and Design", John Wiley & sons Publishers,2nd Edition

T2 G.S.N Raju, "Antennas and Wave Propagation", Pearson Education Publishers.

REFERENCE BOOK(S):

R1 Jordan and Balmain, Electromagnetic fields and Radiating systems, Pearson Education Publishers.

R2 John D. Kraus, "Antennas and Wave Propagation", TMH Publishers

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT-I: Antenna Fundamentals and Radiation fundamentals:

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Course and COs	2	03-07-2024 04-07-2024			
2.	Introduction to Unit-I	1	05-07-2024			
3.	Radiation mechanism-Single wire Antenna	1	05-07-2024			
4.	Current Distribution on a thin wire antenna	1	10-07-2024			
5.	Isotropic Radiators, Directional Antennas	1	11-07-2024			
6.	Antenna Parameters**:** Radiation intensity, Radiation Pattern,	1	12-07-2024			
7.	Total Power radiated, gain, Directivity, Radiation efficiency	1	12-07-2024			
8.	Power gain, HPBW, FNBW, effective aperture, effective length, Band Width	2	18-07-2024 19-07-2024			
9.	Potential functions-heuristic approach, Maxwell's equation approach	2	19-07-2024 24-07-2024			
10.	Potential functions for sinusoidal oscillations	1	25-07-2024			
11.	Analysis of Radiation fields of a Alternating current element	1	26-07-2024			
12.	Quarter wave Monopole and half wave dipole	2	26-07-2024 31-07-2024			
13.	Power radiated by current element	1	01-08-2024			
14.	Radiation resistance of current element, quarter wave Monopole and half wave dipole	1	02-08-2024			
No. of classes required to complete UNIT-I : 18			No. of classes taken :			

UNIT-II: Antennas Array Analysis:

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
15.	Various forms of Antenna Arrays	1	02-08-2024			
16.	Linear Array of Two Point Sources	1	07-08-2024			
17.	Linear Array of and N-Point Sources	1	08-08-2024			
18.	Expression for electric field from two element arrays	1	09-08-2024			
19.	Expression for electric field from N element arrays,	1	09-08-2024			
20.	Broad-side array	1	12-08-2024			
21.	End-Fire array	1	14-08-2024			
22.	Method of pattern multiplication	1	16-08-2024			

23.	Binomial array	1	16-08-2024			
24.	Loop Antenna	1	21-08-2024			
No. of classes required to complete UNIT-II		**10**	No. of classes taken:			

UNIT-III: HF, VHF and UHF Antennas:

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
25.	Resonant and Non resonant antennas	1	22-08-2024			
26.	Helical Antenna	2	23-08-2024 23-08-2024			
27.	Travelling wave antennas – V Antenna	1	28-08-2024			
28.	Inverted V Antenna	1	29-08-2024			
29.	Rhombic Antenna	1	30-09-2024			
30.	Broadband Antennas-Folded Dipole	2	30-09-2024 11-09-2024			
31.	Yagi-Uda Antenna	1	12-09-2024			
32.	Log-Periodic Antenna	1	13-09-2024			
No. of classes required to complete UNIT-III : 10				No. of classes taken:		

UNIT-IV: Microwave Antennas & Antenna Measurements:

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
33.	Horn Antenna & Types	2	13-09-2024 18-09-2024			
34.	Reflector Antennas- Corner Reflector	1	19-09-2024			
35.	Parabolic Reflector – (Geometry, types of feeds, F/D Ratio, Spill Over, Back Lobes)	2	20-09-2024 20-09-2024			
36.	Lens Antenna, Fundamentals of Rectangular Patch antenna	2	25-09-2024 26-09-2024			
37.	Measurement of Antenna parameters-Directional pattern	1	27-09-2024			
38.	Radiation resistance	1	27-09-2024			
39.	Gain (Two Antenna, Three Antenna Methods)	1	03-10-2024			
40.	Directivity, Beam width	1	04-10-2024			
41.	SLR	1	04-10-2024			
42.	Polarization, Impedance	1	09-10-2024			
No. of classes required to complete UNIT-IV: 13			No. of classes taken:			

UNIT-V: Wave Propagation, Ground Wave Propagation, Sky Wave Propagation, Space Wave Propagation

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly

43.	Concepts of Propagation-frequency ranges	1	10-10-2024			
44.	Types of propagation	1	11-10-2024			
45.	Formation of Ionospheric Layers and their Characteristics	1	11-10-2024			
46.	Mechanism of Reflection and Refraction	1	16-10-2024			
47.	Critical Frequency	1	17-10-2024			
48.	MUF & Skip Distance	1	18-10-2024			
49.	Optimum Frequency	1	18-10-2024			
50.	LUHF, Virtual Height	1	23-10-2024			
51.	Fundamental Equation for free space Propagation	1	24-10-2024			
52.	Basic Transmission Loss Calculations	1	25-10-2024			
53.	Space Wave Propagation Mechanism	1	25-10-2024			
54.	LOS and Radio Horizon	1	30-10-2024			
55.	Duct Propagation	1	01-11-2024			
No. of classes required to complete UNIT-V :13			No. of classes taken			

Contents beyond the Syllabus

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Design of microstrip patch Antennas	1	01-11-2024		TLM2	

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:

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
Cumulative Internal Examination (CIE) = 80% of Max((M1+Q1+A1) , (M2+Q2+A2)) + 20% of Min((M1+Q1+A1) , (M2+Q2+A2))	30
Semester End Examination (SEE) (Unit-I, Unit – II, Unit –III, Unit-IV and Unit-V)	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:	**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:	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2:	**VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3:	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Date:

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr. V.Ravi Sekhara Reddy	Dr. B.Y.V.N.R.Swamy	Dr. M.V.Sudhakar	Dr. G.Srinivasulu

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DEPARTMENT OF ELECTRONICS & COMMUNICATIONS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : **Dr. Kavuluru VenuGopal**
Course Name & Code : DATABASE MANAGEMENT SYSTEM CONCEPTS & **20ITM3**
L-T-P Structure : 3-1-0 **Credits : 4**
Program/Sem/Sec : B. Tech (Minor)., ASE, ECE, EEE,MECH **A. Y : 2024-24**

PREREQUISITE: Elementary set theory, concepts of relations and functions, propositional logic data structures (trees, Graphs, dictionaries) & File Concepts.

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course enables the students to know about DBMS basic concepts, Database Languages, Database Design, Normalization process and Transaction processing and Indexing.

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

CO 1	**Demonstrate** the Basic Components of Database Management System. **(Understand -L2)**
CO 2	**Design** Entity-Relationship Diagrams for different applications. **(Apply –L3)**
CO 3	**Examine** the relational data model and various constraints. **(Apply- L3)**
CO 4	**Demonstrate** Structured Query Language languages (SQL) to manage relational databases and perform various operations on the data. **(Apply- L3)**
CO 5	**Employ** principles of normalization for effective database design & transaction management. **(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	1	1	2	-	-	-	-	-	-	-	-	-	3	2	2
CO2	3	3	-	-	-	-	-	-	-	-	-	-	2	3	2
CO3	3	2	-	-	-	-	-	-	-	-	-	-	2	3	2
CO4	2	1	2	-	-	-	-	-	-	-	-	-	3	2	3
CO5	2	1	2	-	-	-	-	-	-	-	-	-	2	3	3

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	Henry F. Korth, Abraham Silberschatz, S. Sudarshan, "Database Concepts", McGraw Hill, 6th edition, 2009. B
T2	RamezElmasri, Shamkanth . Navathe, "Fundamentals Of Database Systems", Addision Wesley, 6th edition, 2010.

REFERENCE BOOKS:

R1	Raghu Ramakrishna, Johannes Gehrke, "Database Management System", McGraw Hill 3rd edition, 2000.
R2	Date C. J, "An Introduction to Database System", Pearson Education, 8th edition, 2003.
R3	Shara Maheshwari, Ruchi Jain, "DBMS: Complete Practical Approach", Firewall Media, New Delhi, 2005.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction

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 and COs	2	3-07-2024		TLM1,2	
2.	Introduction, An overview of database management system, Database system Vs file system	2	4.07. 2024		TLM1,2	
3.	Database system concepts and architecture, Data models schema and instances	2	10.07. 2024		TLM1,2	
4.	Data independence and database language and interfaces	2	11.07. 2024		TLM1,2	
5.	Data definitions language, DML, Overall Database Structure	2	18-07. 2024		TLM1,2	
6.	**Revision on Unit-1**	2	24.07. 2024		TLM1,2	
No. of classes required to complete UNIT-I: 10				No. of classes taken:		

UNIT-II: Entity Relationship 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.	ER model concepts - attributes, entity, Relationships	2	25.07. 2024		TLM1,2	
2.	notation for ER diagram, Mapping constraints	2	31.07. 2024		TLM1,2	
3.	Relationships of higher degree, keys -Concepts of Super Key, and identity key, primary key	2	01.08. 2024		TLM1,2	
4.	Generalization,Aggregation	2	07.08. 2024		TLM1,2	
5.	Reduction of ER diagrams to tables	2	14.08. 2024		TLM1,2	
6.	**Revision on Unit - II**	2	21.08. 2024		TLM1,2	
No. of classes required to complete UNIT-II: 12				No. of classes taken:		

UNIT-III: Relational Data 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.	Relational data model concepts	2	22.08. 2024		TLM1,2	
2.	Integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints	2	28.08. 2024		TLM1,2	
3.	referential integrity	2	29.08. 2024		TLM1,2	
4.	Keys constraints	2	11.09. 2024		TLM1,2	
5.	Domain constraints	2	12.09. 2024		TLM1,2	
6.	Relational Algebra	2	18.09. 2024		TLM1,2	
7.	**Revision of UNIT-3 & Assignment-I**	2	19.09. 2024		TLM1,2	
No. of classes required to complete UNIT-III: 14				No. of classes taken:		
I MID EXAMINATIONS				**28/08/ 2024 TO 02/09/ 2024**		

UNIT-IV: Introduction to SQL

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.	Characteristics of SQL, Advantage of SQL	2	15.09. 2024		TLM1,2	
2.	SQL Data types and Literals	2	25.09. 2024		TLM1,2	
3.	Insert, Update and Delete Operations	2	26.09. 2024		TLM1,2	
4.	Tables, Views and Indexes	2	02.10. 2024		TLM1,2	
5.	Nested Queries, Aggregate Functions	2	09.10. 2024		TLM1,2	
6.	Joins, Unions, Intersection, Minus.	2	16.10. 2024		TLM1,2	
7.	Revision of Unit-4	1	17.10. 2024		TLM1,2	
No. of classes required to complete UNIT-IV: 14				No. of classes taken:		

Unit -V : Normalization

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.	Functional Dependencies	2	17.10. 2024		TLM1,2	
2.	Normal Forms - First, Second	2	23.10. 2024		TLM1,2	
3.	Third Normal Forms, BCNF.	1	23.10. 2024		TLM1,2	
4.	Transaction System, Testing of Serializability	1	24.10. 2024		TLM1,2	
5.	Serializability of Schedules, Conflict & View Serializability	1	24.10. 2024		TLM1,2	
6.	Recoverability, Deadlock Handling.	1	30.10. 2024		TLM1,2	
7.	**Revision of UNIT-5 & Assignment-II**	2	30.10. 2024		TLM1,2	
No. of classes required to complete UNIT-V: 7				No. of classes taken:		

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM1,2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

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

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**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	**Organize, Analyze and Interpret the data to extract meaningful conclusions.**
PSO 2	**Design, Implement and Evaluate a computer-based system to meet desired needs.**
PSO 3	**Develop IT application services with the help of different current Engineering tools.**

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr. Kavuluru Venu Gopal	Dr. Kavuluru Venu Gopal	Dr. B.Srinivasa Rao	Dr.B.Srinivasa Rao

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L B Reddy Nagar, Mylavaram-521 230, NTR District, Andhra Pradesh.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr. K.V.Ashok

Course Name & Code : Digital Communications – 20EC09

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

Program/Sem/Sec : B.Tech., ECE., V-Sem., Section- A A.Y : 2024-25

PRE-REQUISITE: Analog Communications.

COURSE EDUCATIONAL OBJECTIVES (CEOs):
This course provides the knowledge on different digital modulation techniques. The course provides different concepts on information theory, block codes and convolution codes. It gives the methods of optimum receivers for digital communication systems and performance of probability of error for digital modulation techniques.

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

CO 1	**Understand** the concepts of digital communication system **(Understand – L2)**
CO 2	**Analyze** the Baseband and Pass band digital modulation techniques **(Analyze – L3)**
CO 3	**Examine** the optimum reception and probability of error of digital modulation **(Apply – L3)**
CO 4	**Apply** source coding and error control coding techniques in digital communication process **(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	1	1	-	-	-	-	-	-	-	-	2	1	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	2	3	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	2	3	-	-
CO4	3	2	2	2	-	-	-	-	-	-	-	2	3	-	-

Correlation Levels: **1**-Slight (Low), **2**-Moderate (Medium), **3**-Substantial (High) and No correlation: **'-'**

TEXT BOOKS:
T1: Simon Haykin, *"Digital Communications",* John Wiley & sons, 2nd Edition.
T2: Taub and Schilling, *"Principles of Communication Systems"*, TMH Publications, 3rd edition.

REFERENCE BOOKS:
R1: J. S. Chitode, *"Digital Communications",* Technical Publications, first edition.
R2: V.ChandraSekar**,** *"Communication Systems",*Oxford University Press**.**

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section - A

UNIT-I: Pulse Digital Modulation

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to the course – Digital Communications, CEOs, COs & POs	1	01-07-24			
2.	Introduction to Unit-I	1	03-07-24			
3.	Elements of a Digital Communication System	1	05-07-24			
4.	Sampling and Quantization of signals	1	06-07-24			
5.	Derivation for Quantization noise	1	08-07-24			
6.	Introduction to Pulse Code Modulation (PCM) System - Transmitter	1	10-07-24			
7.	Pulse Code Modulation (PCM) System - Receiver	1	12-07-24			
8.	Calculation of output SNR in PCM	1	15-07-24			
9.	Need for non-uniform quantization-Companding- μ-law, A-law	1	19-07-24			
10.	Differential Pulse Code Modulation	1	20-07-24			
11.	Delta Modulation	1	22-07-24			
12.	Examples on PCM and DM	1	24-07-24			
13.	Adaptive Delta Modulation	1	26-07-24			
No. of classes required to complete UNIT-I		**13**	**No. of classes taken**			

UNIT-II: Optimal Reception of Digital Signal

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
14.	Introduction to Unit-II	1	27-07-24			
15.	Model of digital communication system	1	29-07-24			
16.	Gram- Schmidt orthogonalization procedure	1	31-07-24			
17.	Gram- Schmidt orthogonalization procedure	1	02-08-24			
18.	Geometric interpretation of signals	1	03-08-24			
19.	Response of bank of correlators to noisy input	1	05-08-24			
20.	Detection of known signals in noise: Maximum likelihood detector	1	07-08-24			
21.	Probability of error	1	09-08-24			
22.	Correlation Receiver	1	12-08-24			
23.	Matched Filter Receiver	1	14-08-24			
24.	Matched Filter Receiver	1	16-08-24			
25.	Probability of error for matched filter	1	17-08-24			
No. of classes required to complete UNIT-II		**12**	**No. of classes taken**			

UNIT-III: Digital Modulation Techniques

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
26.	Introduction to Unit - III	1	19-08-24			
27.	Wave form representation of different digital modulation techniques	2	21-08-24 23-08-24			
28.	Amplitude Shift Keying	1	24-08-24			
29.	Coherent Binary Phase Shift Keying	1	28-08-24			
30.	**Quadrature Phase Shift Keying**	**2**	30-08-24 31-08-24			
31.	Differential PSK	1	09-09-24			
32.	Coherent Frequency Shift Keying	1	11-09-24			
33.	Probability of error for BASK	1	13-09-24			
34.	Probability of error for BPSK	1	18-09-24			
35.	Probability of error for BFSK	1	20-09-24			
No. of classes required to complete UNIT-III		**12**	**No. of classes taken**			

UNIT-IV: Information Theory and Source Coding

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
36.	Introduction to Unit-IV	1	21-09-24			
37.	Discrete message and information content	1	23-09-24			
38.	Concept of Information, Average Information, Entropy, Information rate	1	25-09-24			
39.	Mutual information and its properties	1	27-09-24			
40.	Introduction to source coding, source coding theorem	1	28-09-24			
41.	Shannon-Fano coding - Problems	1	30-09-24			
42.	Huffman coding - Problems	1	04-10-24			
43.	Solving Problems	1	05-10-24			
44.	Channel Capacity of Gaussian channel	1	07-10-24			
45.	BW-SNR tradeoff	1	09-10-24			
No. of classes required to complete UNIT-IV		**10**	**No. of classes taken**			

UNIT-V: Linear Block codes and Convolutional codes

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
46.	Introduction to Unit-IV – Channel coding	1	12-10-24			
47.	Linear Block Codes (LBC) – Matrix Representation, Encoding	1	14-10-24			
48.	Syndrome decoding of LBC	1	16-10-24			
49.	Error detection and correction capabilities of LBC	1	18-10-24			
50.	Solving Problems	1	19-10-24			
51.	Introduction to Binary cyclic codes – Systematic and non systematic form.	1	21-10-24			

52.	Binary cyclic codes – Encoding and Syndrome Calculation	1	23-10-24			
53.	Convolution codes- time domain, transform domain	1	25-10-24			
54.	Convolution codes- Transform domain	1	26-10-24			
55.	State diagrams, Trellis, Tree diagrams	1	28-10-24			
56.	Decoding using Viterbi algorithm	1	30-10-24			
57.	Decoding using Viterbi algorithm	1	01-11-24			
58.	Solving Problems	1	02-11-24			
No. of classes required to complete UNIT-V		**13**	**No. of classes taken**			

Contents beyond the Syllabus

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
59.		**1**				

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:

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
Cumulative Internal Examination (CIE) = 80% of Max((M1+Q1+A1) , (M2+Q2+A2)) + 20% of Min((M1+Q1+A1) , (M2+Q2+A2))	30
Semester End Examination (SEE) (Unit-I, Unit – II, Unit –III, Unit-IV and Unit-V)	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:	**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:	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2:	**VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3:	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. K.V. Ashok	Mr.M Sambasiva Reddy	Dr. M Venkata Sudhakar	Dr. G.Srinivasulu

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L.B.Reddy Nagar, Mylavaram-521230, NTR Dist, Andhra Pradesh, India.
Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. V.Ravi Sekhara Reddy
Course Name & Code : Design and Simulation of Antennas Lab & 20ECS3

L-T-P Structure : 1-0-2 Credits: 2
Program/Sem/Sec : B.Tech., ECE., V-Sem., Sections- A A.Y :2024-25

Pre-Requisites: Electromagnetic waves and Transmission Lines.

Course Objectives: In this course, student will learn about how to design and analyze various transmission lines and antennas using Ansys HFSS Software

Course Outcomes (COs): At the end of the course, students are able to

CO1	Understand the basic concepts of transmission lines and antennas according to Requirement and applications. **(Understand – L2)**
CO2	Apply software tools for different transmission lines and antennas. **(Apply – L3)**
CO3	Design and Analyze the different parameters of transmission lines and antennas. **(Apply – L3)**
CO4	Adapt effective Communication, presentation and report writing skills (Apply – L3)

Course Articulation Matrix (Correlation between COs &POs, PSOs):

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

T1 Constantine A. Balanis, "Antenna Theory: Analysis and Design", John Wiley & sons Publishers,2nd Edition

T2 JR James, PS Hall "Handbook of Microstrip Antennas" IEE Electromagnetic waves series, 1986.

REFERENCE BOOK(S):

R1 Matthew N.O. Sadiku, "Elements of Engineering Electromagnetics", Oxford University Press, 4th Edition.

R2 David. M. Pozar "Microwave Engineering", 4th edition, WILEY Publication, 2013.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

S.No.	Experiment Name	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Course Introduction-Design and Simulation of Antennas	3	02-07-2024			
2.	Design of micro strip patch antennas using strip line feed and coaxial feed	3	09-07-2024			
3.	Design of patch antennas for Wi-Fi and Wi-Max applications.	3	16-07-2024			
4.	Design of Rectangular and Circular micro strip patch.	3	23-07-2024			
5.	Design of Dipole and dual band antenna,	3	30-07-2027			
6.	Design of microstrip line	3	06-08-2024			
7.	Design of open and short circuit transmission line	3	13-08-2024			
8.	Design of multi stub unit	3	20-08-2024			
9.	Study of characteristic impedances of transmission line	3	27-08-2024			
10.	Design of project by students	3	10-09-2024			
11.	Design of project by students	3	24-09-2024			
12.	Presentation	3	01-10-2024			
13.	Presentation	3	15-10-2024			
14.	Documentation	3	22-10-2024			
15.	Documentation	3	29-10-2024			
No. of classes required to complete UNIT-III : 15				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):

Report	**10**
Quality of work	10
Presentation	20
Interaction / Queries	10
Total	50

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	To Attain a solid foundation in Electronics & Communication Engineering fundamentals with an attitude to pursue continuing education
PEO 2	To Function professionally in the rapidly changing world with advances in technology
PEO 3	To Contribute to the needs of the society in solving technical problems using Electronics & Communication Engineering principles, tools and practices
PEO 4	To Exercise leadership qualities, at levels appropriate to their experience, which addresses issues in a responsive, ethical, and innovative manner?

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 a n d 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	Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry
PSO 2	Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3	Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Date:

Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**
Dr. V.Ravi Sekhara Reddy	Dr. V.Ravi Sekhara Reddy	Dr. M.V.Sudhakar	Dr. G.Srinivasulu

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr.K.VenuGopal
Course Name & Code : OOP through JAVA**(20IT81)**
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech. –ECE / V-Sem /A A.Y.: 2024 – 25

PRE-REQUISITE: Programming for Problem Solving Using C

COURSE EDUCATIONAL OBJECTIVE (CEO): Concentrates on the methodological and technical aspects of software design and Programming based on Object-Oriented Programming (OOP). Acquire the basic knowledge and skills necessary to implement Object-Oriented Programming Techniques in software development through JAVA. Know about the importance of Collections and GUI based applications through JAVA.

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

CO1	Understand Object Oriented Programming Concepts through constructs of JAVA. **(Understand- L2)**
CO2	Apply the concepts of Inheritance and Polymorphism on real-world applications. **(Apply - L3)**
CO3	Implement reusability using interface and packages**. (Understand- L2)**
CO4	Construct robust applications using exception handling. **(Apply - L3)**
CO5	Understand multi-threading concepts. **(Understand - L2)**

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

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

TEXTBOOK:

T1: **Java Fundamentals** – A comprehensive Introduction, Herbert Schildt and Dale Skrien, TMH.

REFERENCE BOOKS:

R1: The Java™ Programming Language: Ken Arnold, James Gosling, Pearson

R2: Introduction to Java Programming 7/e, Brief version, Y.Daniel Liang, Pearson

R3: Java for Programmers, P.J.Deitel and H.M.Deitel, Pearson education (OR) Java: How to Program P.J.Deitel and H.M.Deitel, PHI.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT – I: Introduction to OOP & JAVA:

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.	Java Buzzwords / Features	1	1-7-2024		TLM1,2	
2.	Object Oriented Programming **(OOP)** concepts	1	2-7-2024		TLM1,2	
3.	Java History, Advantages	1	3-7-2024		TLM1,2	
4.	Datatypes, Operators, Expressions	1	5-7-2024		TLM1,2	
5.	Control Statements	1	8-7-2024		TLM1,2	
6.	Methods and recursion , Sample programs	1	9-7-2024		TLM1,2	
7.	Java Objects and References	1	10-7-2024		TLM1,2	
8.	Constructors	2	16-7-2024		TLM1,2	
9.	this keyword	1	16-7-2024		TLM1,2	
10.	Arrays (single and multi-dimensional),	3	19-7-2024		TLM1,2	
11.	String, StringBuffer, StringTokenizer Classes	1	23-7-2024		TLM1,2	
No. of classes required to complete UNIT – I: 12				**No. of classes taken:**		

UNIT – II: Extending Classes/ Reusability

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.	**Inheritance :** Introduction , Derived Classes, Advantages and Types of Inheritance	1	22-7-2024		TLM1,2	
13.	Implementation of Inheritance	2	23-7-2024 24-7-2024		TLM1,2	
14.	Inheritance and Member Accessibility	1	26-7-2024		TLM1,2	
15.	Overriding, super keyword	1	29-7-2024		TLM1,2	
16.	abstract classes and methods	2	30-7-2024 31-7-2024		TLM1,2	
17.	final keyword, final methods and final classes	1	12-8-2024		TLM1,2	
18.	Dynamic Binding, Polymorphism	2	14-8-2024		TLM1,2	
No. of classes required to complete UNIT – II: 10				**No. of classes taken:**		

UNIT – III: Interfaces & Packages

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
19.	**Interfaces:** Differences between classes and interfaces	1	16-8-2024		TLM1,2	
20.	defining an interface	1	21-8-2024		TLM1,2	
21.	implementing interface	2	23-8-2024		TLM1,2	
22.	variables in interface, extending interfaces	2	26-8-2024		TLM1,2	
23.	**Packages:** Defining, Creating	1	28-8-2024		TLM1,2	
24.	Accessing a Package,	2	20-8-2024 21-8-2024		TLM1,2	
25.	importing packages,	1	23-8-2024		TLM1,2	
26.	access controls (public, protected, default and private).	1	26-8-2024		TLM1,2	
27.	Wrapper Classes (Like Integer, Float, Double).	1	28-8-2024		TLM1,2	
No. of classes required to complete UNIT – III: 12				**No. of classes taken:**		

UNIT – IV: Exception handling

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
28.	**Exception Handling:** Concepts of exception handling	1	9-9-2024		TLM1,2	
29.	benefits of exception handling	1	10-9-2024		TLM1,2	
30.	usage of try, catch	1	13-9-2024		TLM1,2	
31.	multiple catch clause	1	16-9-2024		TLM1,2	
32.	Nested try, throw	1	17-9-2024		TLM1,2	
33.	Throws	2	23-9-2024		TLM1,2	
34.	Finally	1	24-9-2024		TLM1,2	
35.	built in exceptions	2	27-9-2024		TLM1,2	
36.	creating own exception	2	2-10-2024		TLM1,2	
No. of classes required to complete UNIT – IV: 12				**No. of classes taken:**		

UNIT – V: Multithreading

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.	Multithreading: Introduction	1	4-10-2024		TLM1,2	
38.	Thread life cycle	1	7-10-2024		TLM1,2	
39.	creating threads (by extending thread class)	2	9-10-2024		TLM1,2	
40.	creating threads (implementing Runnable Interface)	2	14-10-2024		TLM1,2	
41.	Example programs on threads	2	18-10-2024		TLM1,2	
42.	Synchronization : method, Synchronization block	2	21-10-2024		TLM1,2	

43.	Thread Priorities	1	22-10-2024		TLM1,2	
44.	isAlive() and join() methods	2	24-10-2023		TLM1,2	
45.	Inter thread Communication	2	28-10-2024		TLM1,2	
46.	Examples on ITC	1	30-10-2024			
No. of classes required to complete UNIT – V:16				**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 – DescriptiveExamination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I – QuizExamination (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.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr.K.VenuGopal**	**Dr.K.Venu Gopal**	**Dr.K.Phaneendra**	**Dr.B.Srinivasa Rao**
Signature				

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DEPARTMENT OF ELECTRONICS&COMMUNICATION ENGINEERING

COURSEHANDOUT

Name of Course Instructors: Mrs. K.V.Ashok/Mr.P. Venkateswara Rao
Course Name: Self Learning
Program/Sem/Sec :B.Tech./ECEV-Sem/A,B &C-Sections A.Y :2024-2025

COURSEDELIVERYPLAN(LESSONPLAN):

S.No	Topics to be covered	Tentative Date of Completion	Actual Date of Completion	HOD Sign Weekly
1.	Library	04.07.2024		
2.	Swayam (MOOC/NPTEL course)	11.07.2024		
3.	Sports	18.07.2024		
4.	Library	25.07.2024		
5.	Swayam (MOOC/NPTEL course)	01.08.2024		
6.	Sports	08.08.2024		
7.	Library	22.08.2024		
8.	Swayam (MOOC/NPTEL course)	29.08.2024		
9.	Sports	12.09.2024		
10.	Library	19.09.2024		
11.	Swayam (MOOC/NPTEL course)	26.09.2024		
12.	Sports	03.10.2024		
13.	Library	10.10.2024		
14.	Swayam (MOOC/NPTEL course)	17.10.2024		
15.	Sports	24.10.2024		

CourseInstructors

Mr.K.V.Ashok
Mr. P. Venkateswara Rao

HOD

Dr.G.Srinivasulu

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DEPARTMENTOFELECTRONICS&COMMUNICATIONSENGINEERING

COURSEHANDOUT

Name ofCourseInstructors:Mrs.T.Kalpana/Mr.M.Sambasiva Reddy
Course Name:Association
Program/Sem/Sec :B.Tech./ECEV-Sem/A,B &C-Sections A.Y :2024-2025

COURSE DELIVERY PLAN(LESSONPLAN):

S.No	Topicstobecovered	TentativeDate ofCompletion	ActualDate ofCompletion	HOD SignWeekly
1.	Discussion about Association Activities by course instructors and Self-Introduction.	03.07.2024		
2.	Group Discussion on Advanced trends in Electronics & Communication	10.07.2024		
3.	Seminar on Medical Signal Processing & Medical Imaging	24.07.2024		
4.	Discussion on hardware & software tools that are used for technical projects.	31.07.2024		
5.	Machine Learning & Deep Learning Algorithms(ppt)	07.08.2024		
6.	Entrepreneurship and startups (ppt)	14.08.2024		
7.	Presentation on Small Satellite Launch Vehicle(SSLV).	21.08.2024		
8.	Debate on Trends and Threats of Artificial Intelligence.	28.08.2024		
9.	Discussion on Technical Magazines and Exploring the job opportunities in core companies.	04.09.2024		
10.	Presentation on Embedded Systems & IOT based projects.	11.09.2024		
11.	Discussion on role of AI in medical science.	18.09.2024		
12.	Presentation on 5G Antennas.	25.09.2024		
13.	Recent innovations in space technology(ppt)	09.10.2024		
14.	Technical Quiz on verbal/quantitative/reasoning/problem solving/logical/etc. skills.	16.10.2024		
15.	Seminar on Quantum Computing ,Cloud Computing & Edge Computing, Neuromorphic Computing	23.10.2024		
16.	Group Discussion on steps to be taken to improve the economy and literacy rate in India.	30.10.2024		

CourseInstructors
Mrs.T.Kalpana
Mr.M.Sambasiva Reddy

HOD
Dr.G.Srinivasulu

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DEPARTMENT OF ELECTRONICS& COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Smt.K.Balavani
Course Name & Code : Linear IC Applications – 20EC11
L-T-P Structure : 3-0-0 Credits: 3
Program/Sem/Sec : B.Tech., ECE., V-Sem., Section- A A.Y : 2024-25

PRE-REQUISITE: Analog electronic circuits

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course provides the knowledge on basic Integrated Circuit (IC), Op-amp internal structure and various open-loop and closed loop applications of it. Design of Active Filters and different waveform generators. It provides the importance of 555 timer and its applications. It also explains the Phased Locked Loop, its applications and ADC and DAC converters.

COURSE OUTCOMES (CO): At the end of the course, students will be able to

CO1:	**Identify** the building blocks of linear integrated circuits, characteristics and application of Op-Amps. (Understand – L2)
CO2:	**Apply** the concept of feedback to op-amps for linear and non-linear applications. (Apply – L3).
CO3:	**Analyze** Op-Amp, 555 timer applications, phase locked loops to perform addition and multiplication of signals and voltage regulators using Linear ICs. (Analyze – L4)
CO4:	**Design** active filters, waveform generators and data converters using Op Amps. (Apply – L3)

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	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	2	1	1	-	-	-	2	-	-	-	1	-	1	-
CO2	3	2	2	-	-	-	-	2	-	-	-	1	-	2	-
CO3	3	3	1	-	-	-	-	2	-	-	-	1	-	2	-
CO4	3	2	3	1	-	-	-	2	-	-	1	1	-	3	-

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 Ramakanth A.Gayakwad, Op-amps and Linear Integrated Circuits, Third edition, PHI Publishers, 2006.

T2 Roy Choudhury D., Linear Integrated Circuits, Second edition, New Age International (P) Ltd.

BOS APPROVED REFERENCE BOOKS:

R1 Adel S. Sedra and Kenneth Carless Smith, Microelectronic Circuits, Fifth Edition. Oxford University Press
R2 Rashid M. H., Microelectronic Circuits: Analysis and Design, Second edition, PWS Publishing Company.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN):
UNIT-I : TRANSISTOR CURRENT SOURCES & DIFFERENTIAL AMPLIFIERS

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 the Subject , Discussion about Syllabus and course outcomes	1	01-07-2024			
2.	Basic Current Source	1	02-07-2024			
3.	Widlar Current Source	1	05-07-2024			
4.	Cascode Current Source	1	06-07-2024			
5.	Wilson Current Source	1	08-07-2024			
6.	Differential Amplifier:Classifications	1	09-07-2024			
7.	DC & AC Analysis of Dual input balanced output & balanced output DA	1	12-07-2024			
8.	DC & AC Analysis of Dual input unbalanced output & unbalanced output DA	1	13-07-2024			
9.	DC & AC Analysis of Single input balanced output & unbalanced output DA	1	15-07-2024			
10.	DC & AC Analysis of single input unbalanced output & unbalanced output DA	1	16-07-2024			
11.	Specifications ,FET Differential amplifier	1	19-07-2024			
12.	Level Translator, Current mirror circuit	1	20-07-2024			
13.	Assignment	1	22-07-2024			
No. of classes required to complete UNIT-I :			13	No. of classes taken:		

UNIT-II : OPERATIONAL AMPLIFIERS (OP-AMPS) & APPLICATIONS OF OP-AMPS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
14.	OP- Amp: Block Diagram	1	23.07.2024			
15.	Ideal & Practical Op-Amp and its characteristics	1	26.07.2024			
16.	DC and AC Characteristics of Op-Amp	1	27.07.2024			
17.	IC 741 specifications	1	29.07.2024			
18.	Measurement of slew rate and CMMR	1	30.07.2024			
19.	Application of Op Amps:Inverting and Non-inverting amplifier	1	02.08.2024			
20.	Integrator & Differentiator	1	03.08.2024			
21.	Difference Amplifier, Instrumentation amplifier	1	05.08.2024			
22.	Analog Multiplier, V to I converters, I to V converters	1	06.08.2024			
23.	Rectifiers, Sample and Hold circuit	1	09.08.2024			
24.	Log and Antilog amplifier, Integrator & Differentiator	1	10.08.2024			
25.	Assignment	1	12.08.2024			
No. of classes required to complete UNIT-II		12	No. of classes taken:			

UNIT-III : OP-AMP ACTIVE FILTERS, OP-AMP WAVEFORM GENERATORS & OP-AMP SINE WAVE OSCILLATORS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
26.	Introduction to Op-amp Active Filters :1st order Low pass and High pass filter using OP-Amp	1	13.08.2024			

27.	2nd order Low pass and High pass filter using OP-Amp	1	16.08.2024			
28.	Band pass filter	1	17.08.2024			
29.	Band reject filters and All pass filter	1	19.08.2024			
30.	Op-amp wave form generators**:** Comparator,design and analysis of Schmitt trigger	2	20.08.2024 23.08.2024			
31.	Revision and problems	2	24.08.2024 27.08.2024			
32.	Astable Multivibrator	1	30.08.2024			
33.	Monostable Multivibrator	1	31.08.2024			
34.	Triangular wave Generators	1	09.09.2024			
35.	Op-amp sine wave oscillators:Design and analysis of RC phase shift oscillator, Wein Bridge oscillator	2	10.09.2024 13.09.2024			
36.	Assignment	1	14.09.2024			
No. of classes required to complete UNIT-III		14	No. of classes taken:			

UNIT-IV: 555 TIMER & IC VOLTAGE REGULATORS

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.	Introduction	1	16.09.2024			
38.	Functional Diagram-Monostable multivibrators	1	17.09.2024			
39.	Monostable multivibrators Applications	1	20.09.2024			
40.	Functional Diagram-Astable multivibrators	1	21.09.2024			
41.	Astable multivibrators and Applications	1	23.09.2024			
42.	VCO - IC 566 & its features	1	24.09.2024			
43.	IC 565 PLL Block Schematic	1	27.09.2024			

44.	Applications of PLL	1	28.09.2024			
45.	Applications of PLL	1	30.09.2024			
46.	IC Voltage Regulators: Fixed Voltage Regulators, IC723 General Purpose Regulator	2	01.10.2024 04.10.2024			
47.	Assignment	1	05.10.2024			
No. of classes required to complete UNIT-IV		12		No. of classes taken:		

UNIT-V: DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
48.	Introduction	1	07.10.2024			
49.	Digital to Analog Converters: Weighted resistor DAC,	1	08.10.2024			
50.	R-2R Ladder DAC	1	12.10.2024			
51.	Inverted R-2R DAC	1	14.10.2024			
52.	Analog to Digital Converters: Flash Type ADC	1	15.10.2024			
53.	Counter Type ADC	1	18.10.2024			
54.	Successive Approximation ADC	1	19.10.2024			
55.	Charge Balancing ADC	1	21.10.2024			
56.	Dual Slope ADC	1	22.10.2024 25.10.2024			
57	Assignment	1	26.10.2024			
58	Revision ,Problems	2	28.10.2024 29.10.2024			
No. of classes required to complete UNIT-V:		12		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

59.	Introduction to VLSI and Applications of VLSI	2	01.11.2024 02.11.2024			

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:

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
Cumulative Internal Examination (CIE) = 80% of Max((M1+Q1+A1) , (M2+Q2+A2)) + 20% of Min((M1+Q1+A1) , (M2+Q2+A2))	30
Semester End Examination (SEE)(Unit-I, Unit – II, Unit –III, Unit-IV and Unit-V)	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	**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	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2	**VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Course Instructor	Course Coordinator	Module Coordinator	HOD
Smt.K.Balavani	Dr.B.Poornaiah	Dr.T.Satyanarayana	Dr.Y.Amar Babu

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L B Reddy Nagar, Mylavaram-521 230, NTR District, Andhra Pradesh.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mrs.K.Balavani

Course Name & Code : Linear IC Applications Lab – 20EC58

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

Program/Sem/Sec : B.Tech., ECE., V-Sem., Section- A A.Y : 2024-2025

COURSE EDUCATIONAL OBJECTIVES (CEOs):

This course provides the practical knowledge on Op-Amp applications like arithmetic circuits, filters and oscillators also provides knowledge on IC555 timer and IC723.

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

CO1	**Demonstrate** the characteristics and applications of Op-Amps (Understand – L2)
CO2	**Apply** the 555 Timer circuit concepts for the realization of waveform generators (Apply – L3).
CO3	**Design** Active filters, arithmetic circuits, waveform generators and data converters using Op-Amp (Apply – L3)
CO4	**Adapt** effective Communication, presentation and report writing skills (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	3	1	2	-	-	-	2	1	2	-	1	-	2	-
CO2	2	3	1	1	-	-	-	2	1	2	-	1	-	2	-
CO3	2	3	1	2	-	-	-	2	1	2	-	1	-	3	-
CO4	-	-	-	2	-	-	-	1	2	3		1	-	-	-

Correlation Levels: **1**-Slight (Low), **2**-Moderate (Medium), **3**-Substantial (High) and No correlation: **'-'**

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

Batch-II (22761A0437 to 22761A0466 and 23765A0401 to 23765A0406) Monday – AN

Expt. No	Experiment/s	COs	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
--	Introduction to LIA Lab experiments, COs, POs and PSOs	--	3	01.07.2024			
Cycle – I							
1	Experiment – 1	CO1,CO3	3	08.07.2024			
2	Experiment – 2	CO1,CO3	3	15.07.2024			
3	Experiment – 3	CO1,CO3	3	22.07.2024			
4	Experiment – 4	CO1,CO3	3	29.08.2024			
5	Experiment – 5	CO1,CO3	3	05.08.2024			
6	Experiment – 6	CO1,CO3	3	12.08.2024			
Cycle – II							
7	Experiment – 3	CO2	3	19.08.2024			
8	Experiment – 7	CO2	3	09.09.2024			
9	Experiment – 9	CO1,CO3	3	16.09.2024			
10	Experiment – 10	CO1,CO3	3	23.09.2024			
11	Experiment – 11	CO1,CO3	3	30.09.2024			
12	Experiment beyond syllabus	CO3	3	07.10.2024			
13	Revision	--	3	14.10.2024			
--	Internal Examination	--	3	21.10.2024			

Batch-I (22761A0401 to 22761A0436) Thursday – FN

Expt. No	Experiment/s	COs	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
--	Introduction to LIA Lab experiments, COs, POs and PSOs	--	3	04.07.2024			
Cycle – I							
1	Experiment – 1	CO1,CO3	3	11.07.2024			
2	Experiment – 2	CO1,CO3	3	18.07.2024			
3	Experiment – 4	CO1,CO3	3	25.07.2024			
4	Experiment – 5	CO1,CO3	3	01.08.2024			
5	Experiment – 6	CO1,CO3	3	08.08.2024			
6	Experiment – 8	CO1,CO3	3	22.08.2024			
Cycle – II							
7	Experiment – 3	CO2	3	29.08.2024			
8	Experiment – 7	CO2	3	12.09.2024			
9	Experiment – 9	CO1,CO3	3	19.09.2024			
10	Experiment – 10	CO1,CO3	3	26.09.2024			
11	Experiment – 11	CO1,CO3	3	10.10.2024			
12	Experiment beyond syllabus	CO3	3	17.10.2024			
--	Internal Examination	--	3	24.10.2024			

Experiments to be conducted:

Exp. No	CYCLE-1	Exp. No	CYCLE-2
1	Verification of functionality of Inverting and Non-inverting amplifiers for the Sine and Square wave inputs.	7	Design and Realization of 555 timer based Monostable multivibrator for Pulse generation.
2	Realization of Adder and Subtractor using Op-Amp.	8	Design and Realization of 555 timer based Astable multivibrator for square wave generation
3	Realization of Differentiator and Integrator using Op-Amp	9	Design and Realization of RC phase shift Oscillator for sinusoidal signal generation using Op-Amp.
4	Design, Realization and plot the frequency response of First order Low pass and High pass filters using Op-Amp.	10	Design and Realization of Function generator for square wave and triangular waves using Op-Amps.
5	Design and plot the frequency response of Band pass filter using Op-Amp.	11	Design and Realization of 3-bit Digital to Analog converter using Op-Amp
6	Design and Realization of Op-Amp based Astable multivibrator for Square wave generation.		

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:

Evaluation Task	**Expt. no's**	**Marks**
Day to Day work = **A**	1,2,3,4,5,6,7,8…	A = 05
Record = **B**	1,2,3,4,5,6,7,8…	B = 05
Internal Test = **C**	1,2,3,4,5,6,7,8…	C = 05
Cumulative Internal Examination : A + B + C = 15	1,2,3,4,5,6,7,8…	**15**
Semester End Examinations = D	1,2,3,4,5,6,7,8…	**D = 35**
Total Marks: A + B + C + D = 50	1,2,3,4,5,6,7,8…	**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
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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.
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PO 12:	**Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1:	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2:	**VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3:	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mrs.K.Balavani	Mrs.T.Kalpana	Dr. T.Satyanarayana	Dr. G.Srinivasulu

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr. K.V. Ashok

Course Name & Code : Digital Communication Lab – 20EC57

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

Program/Sem/Sec : B.Tech., ECE., V-Sem., Section- A A.Y : 2024-25

PRE-REQUISITE: Analog Communications.

COURSE EDUCATIONAL OBJECTIVES (CEOs):
This Course provides practical exposure on different aspects of digital communications. It demonstrates the importance of different modulation techniques in digital communication systems. It also gives the knowledge about different encoding and decoding techniques used in digital communication systems.

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

CO1	**Interpret** baseband and pass band modulation and demodulation techniques **(Understand– L2)**
CO2	**Apply** coding techniques for error detection and correction in digital data transmission **(Apply – L3)**
CO3	**Implement** frequency and phase shift keying techniques using Software Defined Radio **(Apply – L3).**
CO4	**Adopt** effective communication, presentation and report writing skills **(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	3	-	-
CO2	3	2	1	2	-	-	-	-	-	-	-	-	3	-	-
CO3	3	2	-	2	3	-	-	-	-	-	-	-	3	-	-
CO4	-	-	-	2	-	-	-	1	2	3		1	-	-	-

Correlation Levels: **1**-Slight (Low), **2**-Moderate (Medium), **3**-Substantial (High) and No correlation: **'-'**

TEXT BOOKS:

T1: Simon Haykin, *"Digital Communications",* John Wiley & sons, 2nd Edition.

T2: Taub and Schilling, *"Principles of Communication Systems"*, TMH Publications, 3rd edition.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section – A

Batch-1(22761A0401 to 22761A0436) Tuesday – AN

Expt. No	Experiment/s	COs	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
--	Introduction to DC Lab experiments, COs, POs and PSOs	--	3	01.07.2024			
Cycle – I							
1	Experiment – 1	CO1,CO4	3	08.07.2024			
2	Experiment – 2	CO1,CO4	3	15.07.2024			
3	Experiment – 4	CO1,CO4	3	22.07.2024			
4	Experiment – 5	CO1,CO4	3	29.07.2024			
5	Experiment – 10	CO1,CO4	3	05.08.2024			
6	Experiment – 11	CO2,CO4	3	12.08.2024			
Cycle – II							
7	Experiment – 3	CO1,CO4	3	19.08.2024			
8	Experiment – 6	CO1,CO4	3	09.09.2024			
9	Experiment – 7	CO2,CO4	3	23.09.2024			
10	Experiment – 8	CO3,CO4	3	30.09.2024			
11	Experiment – 9	CO3,CO4	3	07.10.2024			
12	Experiment – 12	CO3,CO4	3	14.10.2024			
13	Experiment beyond the syllabus		3	21.10.2024			
--	Internal Examination	--	3	28.10.2024			

Batch-2 (22761A0437 to 22761A0466 & 23765A0401 to 23765A0406) Friday – FN

Expt. No	Experiment/s	COs	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
--	Introduction to DC Lab experiments, COs, POs and PSOs	--	3	04.07.2024			
Cycle – I							
1	Experiment – 1	CO1,CO4	3	11.07.2024			
2	Experiment – 2	CO1,CO4	3	18.07.2024			
3	Experiment – 4	CO1,CO4	3	25.07.2024			
4	Experiment – 5	CO1,CO4	3	01.08.2024			
5	Experiment – 10	CO1,CO4	3	08.08.2024			
6	Experiment – 11	CO2,CO4	3	22.08.2024			
Cycle – II							
7	Experiment – 3	CO1,CO4	3	29.08.2024			
8	Experiment – 6	CO1,CO4	3	12.09.2024			
9	Experiment – 7	CO2,CO4	3	19.09.2024			
10	Experiment – 8	CO3,CO4	3	26.09.2024			
11	Experiment – 9	CO3,CO4	3	10.10.2024			
12	Experiment – 12	CO3,CO4	3	17.10.2024			
13	Internal Examination		3	24.10.2024			

Experiments to be conducted:

Exp. No	CYCLE-1	Exp. No	CYCLE-2
1	Generate digital signal from analog using Pulse Code Modulation and reconstruct original signal.	3	Perform Adaptive Delta Modulation and obtain the reconstructed original signal.
2	Demonstrate the analog to digital conversion using Delta Modulation and Demodulation	6	Perform a digital modulation using Binary Phase Shift Keying and reconstruct theoriginal signal using coherent detection
4	Generate the Amplitude Shift Keying Modulated signal and reconstruct the originalsignal using demodulation.	7	Generate the digital modulated signal using Quadrature Phase shift Keying Modulation and reconstruct the original signal
5	Obtain the modulated and demodulated signals for Frequency Shift Keying	8	Examine the error detection and correction process using Linear Block Code
10	Binary Frequency Shift Keying Modulation and Demodulation	9	Apply the Binary Cyclic Code for error detection and correction of digital data
11	Binary Phase Shift Keying Modulation and Demodulation	12	Quadrature Phase Shift Keying Modulation and Demodulation

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:

Evaluation Task	**Expt. no's**	**Marks**
Day to Day work = **A**	1,2,3,4,5,6,7,8…	A = 05
Record = **B**	1,2,3,4,5,6,7,8…	B = 05
Internal Test = **C**	1,2,3,4,5,6,7,8…	C = 05
Cumulative Internal Examination : A + B + C = 15	1,2,3,4,5,6,7,8…	**15**
Semester End Examinations = D	1,2,3,4,5,6,7,8…	**D = 35**
Total Marks: A + B + C + D = 50	1,2,3,4,5,6,7,8…	**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
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PO 9:	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10:	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
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PO 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:	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2:	**VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3:	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

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Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. K.V. Ashok	Mr. K.V. Ashok	Dr. M Venkata Sudhakar	Dr. G.Srinivasulu

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Department of Electronics and Communication Engineering

COURSE HANDOUT
PART-A

Name of Course Instructor : Dr. B.Y.V.N.R.Swamy
Course Name & Code : Antennas and Wave Propagation & 20EC10
L-T-P Structure : 3-0-0 Credits: 3
Program/Sem/Sec : B.Tech., ECE., V-Sem., Sections- B A.Y :2024-25

Pre-Requisites: EM Waves and Transmission Lines.

Course Objectives: This course provides the knowledge on Antennas and Radiation fundamentals. The course will expose different types of Antennas and their applications. The course also gives the complete information regarding Propagation of Radio wave in atmosphere.

Course Outcomes (COs): At the end of the course, students are able to

CO1	**Understand** basic antenna parameters**,** radiation mechanism, characteristics of radio wave propagations **(Understand – L2)**
CO2	**Analyze** wire antenna, ground, space, and sky wave propagation mechanism for communication purpose and various Antenna Arrays **(Analyze – L4)**
CO3	**Design** HF, VHF and UHF Antennas **(Apply – L3)**
CO4	**Apply** antenna measurement methods to assess antenna's performance **(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	1	1	-		-	-	-		-	1	3	-	-
CO2	3	2	1	1	-	-	-	-	-	-	-	1	3	-	-
CO3	2	3	2	1	-	-	-	-	-	-	-	2	3	-	-
CO4	1	2	3	2	-	-			-	-	-	2	3	-	-

Correlation Levels: **1**-Slight (Low), **2**-Moderate (Medium), **3**-Substantial (High) and No correlation: **'-'**

TEXT BOOK(S):

T1 Constantine A. Balanis, "Antenna Theory: Analysis and Design", John Wiley & sons Publishers,2nd Edition

T2 G.S.N Raju, "Antennas and Wave Propagation", Pearson Education Publishers.

REFERENCE BOOK(S):

R1 Jordan and Balmain, Electromagnetic fields and Radiating systems, Pearson Education Publishers.

R2 John D. Kraus, "Antennas and Wave Propagation", TMH Publishers

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-C

UNIT-I: Antenna Fundamentals and Radiation fundamentals:

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Course and COs	2	01-07-2024 02-07-2024			
2.	Introduction to Unit-I	1	03-07-2024			
3.	Radiation mechanism-Single wire Antenna	1	04-07-2024			
4.	Current Distribution on a thin wire antenna	1	08-07-2024			
5.	Isotropic Radiators, Directional Antennas	1	09-07-2024			
6.	Antenna Parameters**:** Radiation intensity, Radiation Pattern,	1	10-07-2024			
7.	Total Power radiated, gain, Directivity, Radiation efficiency	1	11-07-2024			
8.	Power gain, HPBW, FNBW, effective aperture, effective length, Band Width	2	15-07-2024 16-07-2024			
9.	Potential functions-heuristic approach, Maxwell's equation approach	2	18-07-2024 22-07-2024			
10.	Potential functions for sinusoidal oscillations	1	23-07-2024			
11.	Analysis of Radiation fields of a Alternating current element	1	24-07-2024			
12.	Quarter wave Monopole and half wave dipole	2	25-07-2024 29-07-2024			
13.	Power radiated by current element	1	30-07-2024			
14.	Radiation resistance of current element, quarter wave Monopole and half wave dipole	1	31-07-2024			
No. of classes required to complete UNIT-I : 18			No. of classes taken :			

UNIT-II: Antennas Array Analysis:

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
15.	Various forms of Antenna Arrays	1	01-08-2024			
16.	Linear Array of Two Point Sources	1	05-08-2024			
17.	Linear Array of and N-Point Sources	1	06-08-2024			
18.	Expression for electric field from two element arrays	1	07-08-2024			
19.	Expression for electric field from N element arrays,	1	08-08-2024			
20.	Broad-side array	1	12-08-2024			
21.	End-Fire array	1	13-08-2024			
22.	Method of pattern multiplication	1	14-08-2024			

23.	Binomial array	1	19-08-2024			
24.	Loop Antenna	1	20-08-2024			
No. of classes required to complete UNIT-II		**10**	No. of classes taken:			

UNIT-III: HF, VHF and UHF Antennas:

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
25.	Resonant and Non resonant antennas	1	21-08-2024			
26.	Helical Antenna	2	22-08-2024 27-08-2024			
27.	Travelling wave antennas – V Antenna	1	28-08-2024			
28.	Inverted V Antenna	1	29-08-2024			
29.	Rhombic Antenna	1	09-09-2024			
30.	Broadband Antennas-Folded Dipole	2	10-09-2024 11-09-2024			
31.	Yagi-Uda Antenna	1	12-09-2024			
32.	Log-Periodic Antenna	1	17-09-2024			
No. of classes required to complete UNIT-III : 10				No. of classes taken:		

UNIT-IV: Microwave Antennas & Antenna Measurements:

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
33.	Horn Antenna & Types	2	18-09-2024 19-09-2024			
34.	Reflector Antennas- Corner Reflector	1	23-09-2024			
35.	Parabolic Reflector – (Geometry, types of feeds, F/D Ratio, Spill Over, Back Lobes)	2	24-09-2024 25-09-2024			
36.	Lens Antenna, Fundamentals of Rectangular Patch antenna	2	26-09-2024 30-09-2024			
37.	Measurement of Antenna parameters-Directional pattern	1	01-10-2024			
38.	Radiation resistance	1	03-10-2024			
39.	Gain (Two Antenna, Three Antenna Methods)	1	07-10-2024			
40.	Directivity, Beam width	1	08-10-2024			
41.	SLR	1	09-10-2024			
42.	Polarization, Impedance	1	10-10-2024			
No. of classes required to complete UNIT-IV: 13			No. of classes taken:			

UNIT-V: Wave Propagation, Ground Wave Propagation, Sky Wave Propagation, Space Wave Propagation

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly

43.	Concepts of Propagation-frequency ranges	1	14-10-2024			
44.	Types of propagation	1	15-10-2024			
45.	Formation of Ionospheric Layers and their Characteristics	1	16-10-2024			
46.	Mechanism of Reflection and Refraction	1	17-10-2024			
47.	Critical Frequency	1	21-10-2024			
48.	MUF & Skip Distance	1	22-10-2024			
49.	Optimum Frequency	1	23-10-2024			
50.	LUHF, Virtual Height	1	24-10-2024			
51.	Fundamental Equation for free space Propagation	1	28-10-2024			
52.	Basic Transmission Loss Calculations	1	29-10-2024			
53.	Space Wave Propagation Mechanism	1	30-10-2024			
54.	LOS and Radio Horizon	1	30-10-2024			
55.	Duct Propagation	1	01-11-2024			
No. of classes required to complete UNIT-V :13			No. of classes taken			

Contents beyond the Syllabus

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Design of microstrip patch Antennas	1	02-11-2024		TLM2	

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:

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
Cumulative Internal Examination (CIE) = 80% of Max((M1+Q1+A1) , (M2+Q2+A2)) + 20% of Min((M1+Q1+A1) , (M2+Q2+A2))	30
Semester End Examination (SEE) (Unit-I, Unit – II, Unit –III, Unit-IV and Unit-V)	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:	**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:	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2:	**VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3:	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Date:

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr. B.Y.V.N.R.Swamy	Dr. B.Y.V.N.R.Swamy	Dr. M.V.Sudhakar	Dr. Y. Amar Babu

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

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. K.Ravi Kumar, Associate Professor
Course Name & Code : Data Communication & Computer Network – 20EC14 **Regulation**: R20
L-T-P Structure : 3-0-0 **Credits:** 03
Program/Sem/Sec : B. Tech. V-Sem., ECE B-Section **A.Y.:** 2024-25

PREREQUISITE: Digital Communications

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course provides knowledge on Data Communication and Computer Networks and various protocols used in different layers.

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

CO1	**Understand** the functions of the OSI, TCP/IP reference models. **(Understand – L2)**
CO2	**Summarize** design issues for layer protocols. **(Understand – L2)**
CO3	**Examine** the routing algorithms to find shortest paths for packet delivery. **(Apply – L3)**
CO4	**Interpret** the operations of 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	2	3	1	-	-	-	-	-	-	-	-	3	3	-	-
CO2	2	1	1	-	-	-	-	-	-	-	-	2	3	-	-
CO3	3	3	-	2	2	-	-	-	-	-	-	2	3	-	-
CO4	2	2	-	-	-	-	-	-	-	-	-	3	3	-	-
1 - Low					**2** –Medium						**3** - High				

TEXTBOOKS:

T1 Tanenbaum and Wetherall, "Computer Networks", Pearson Education, 5th Edition.

T2 Behrouz A. Forouzan, "Data Communication and Networking", 4th Edition, Tata McGraw hill, New Delhi, 2006.

REFERENCE BOOKS:

R1 S. Keshav, "An Engineering Approach to Computer Networks", Pearson Education, 2nd Edition.

R2 W. A. Shay, "Understanding Communications and Networks", Cengage Learning, 3rd Edition

PART-B

COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I: Introduction, Physical 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
1.	CO discussion and overview of Syllabus	1	01-07-2024			
2.	Introduction to Data Communication and Computer Networks	2	02-07-2024 04-07-2024			
3.	Network Hardware	2	05-07-2024 08-07-2024			
4.	Network software	1	09-07-2024			
5.	Network models LAN, WAN, MAN,	1	11-07-2024			
6.	OSI Reference Model	1	12-07-2024			
7.	TCP/IP Reference Model	1	15-07-2024			
8.	Comparison between OSI and TCP/IP	1	16-07-2024			
9.	Critique of OSI and TCP/IP	1	18-07-2024			
10.	Physical Layer: Guided Transmission Medium	1	19-07-2024			
11.	Guided Transmission Medium	1	22-07-2024			
12.	Wireless Transmission Medium	1	23-07-2024			
No. of classes required to complete UNIT-I: 14				**No. of classes taken:**		

UNIT-II: Data Link Layer, Medium Access Control 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
13.	Introduction to DLL, Design Issues	1	25-07-2024			
14.	Framing Methods	1	26-07-2024			
15.	Error Detection and Correction Codes	1	29-07-2024			
16.	CRC, Checksum	1	30-07-2024			
17.	Stop & wait, Sliding window, one bit, go-back -n, Selective repeat protocols,	2	01-08-2024 02-08-2024			
18.	MAC sub layer, channel allocation problem	1	05-08-2024			
19.	Multiple Access protocols- ALOHA, CSMA protocols, CSMA with collision detection, Collision free protocols	2	06-08-2024 08-08-2024			
20.	Ethernet	1	09-08-2024			
21.	Wireless LANs-Infrastructure, Protocol stack	1	12-08-2024			
22.	MAC frame, 802.11 services	1	13-08-2024			
23.	Bluetooth-Architecture, Protocol stack, Frame structure	2	16-08-2024 19-08-2024			
No. of classes required to complete UNIT-II: 14				**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
24.	Network Layer Design Issues- store and forward	1	20-08-2024			

25.	Datagrams and virtual circuits	1	22-08-2024			
26.	Routing algorithms- Optimality Principle	1	23-08-2024			
27.	Shortest Path Algorithm, Flooding,	1	27-08-2024			
28.	Distance vector routing	2	29-08-2024 30-08-2024			
29.	Link state routing	1	09-09-2024			
30.	Hierarchical routing	1	10-09-2024			
31.	Board cast routing & Multicast Routing	1	12-09-2024			
32.	Congestion control in data subnets, warning bits	1	13-09-2024			
33.	Load shedding, choke packets, Jitter control, RED	2	17-09-2024 19-09-2024			
No. of classes required to complete UNIT-III: 12				**No. of classes taken:**		

UNIT-IV: Internetworking, 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
34.	Internetworking	1	20-09-2024			
35.	Tunneling, Packet Fragmentation	1	23-09-2024			
36.	Network Layer in the Internet	2	24-09-2024 26-09-2024			
37.	IPv4	1	27-09-2024			
38.	IPV6, comparison between IPv4 and IPv6	1	30-09-2024			
39.	Internet control protocols, OSPF BGP	1	01-10-2024			
40.	Transport layer services to the upper Layers	1	03-10-2024			
41.	Addressing, Connection establishment	2	04-10-2024 07-10-2024			
42.	Connection release, Crash Recovery	1	08-10-2024			
No. of classes required to complete UNIT-IV: 11				**No. of classes taken:**		

UNIT-V: The Internet Transport Protocols, 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
43.	Internet transport protocols: UDP-RPC, Real Time Transport Protocols	1	10-10-2024			
44.	Internet transport protocols: TCP, TCP service model	1	17-08-2024			
45.	TCP Segment Header	1	18-10-2024			
46.	Domain Name system	1	21-10-2024			
47.	Email Architecture and services, SMTP	1	22-10-2024			
48.	WWW and its architecture	1	24-10-2024			
49.	FTP, FTP Commands & Replies	1	25-10-2024			
50.	Structure of Management Information	1	28-10-2024			
51.	Management Information Base	1	29-10-2024			
52.	Simple Network Management Protocol	1	01-11-2024			
No. of classes required to complete UNIT-V: 10				**No. of classes taken:**		

Contents beyond the Syllabus:

S. No.	Topics	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
55.	Network Security	1	14-10-2024			
56.	Mobile Networks	1	15-10-2024			
No. of classes required to complete beyond syllabus: 02				**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 EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	To Attain a solid foundation in Electronics & Communication Engineering fundamentals with an attitude to pursue continuing education
PEO 2	To Function professionally in the rapidly changing world with advances in technology
PEO 3	To Contribute to the needs of the society in solving technical problems using Electronics & Communication Engineering principles, tools and practices
PEO 4	To Exercise leadership qualities, at levels appropriate to their experience, which addresses issues in a responsive, ethical, and innovative manner?

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	Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry
PSO 2	Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3	Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Date: 27-06-2024

Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Dr. K. Ravi Kumar	**Dr.K.Ravi Kumar**	**Dr. M. V. Sudhakar**	**Dr. G. Srinivasulu**

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DEPARTMENT OF ELECTRONICS& COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : **Dr. B. Poornaiah** (T197)
Course Name & Code : **Linear IC Applications** – 20EC11
L-T-P Structure : 3-0-0 Credits: 3
Program/Sem/Sec : B.Tech., ECE., V-Sem., Section- B A.Y : 2024-25

PRE-REQUISITE: Analog Electronic Circuits

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course provides the knowledge on basic Integrated Circuit (IC), Op-amp internal structure and various open-loop and closed loop applications of it. Design of Active Filters and different waveform generators. It provides the importance of 555 timer and its applications. It also explains the Phased Locked Loop, its applications and ADC and DAC converters.

COURSE OUTCOMES (CO): At the end of the course, students will be able to

CO1:	**Identify** the building blocks of linear integrated circuits, characteristics and application of Op-Amps (Understand – L2)
CO2:	**Apply** the concept of feedback to op-amps for linear and non-linear applications. (Apply – L3).
CO3:	**Analyze** Op-Amp, 555 timer applications, phase locked loops to perform addition and multiplication of signals and voltage regulators using Linear ICs (Analyze – L4)
CO4:	**Design** active filters, waveform generators and data converters using Op Amps (Apply – L3)

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	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	2	1	1	-	-	-	2	-	-	-	1	-	1	-
CO2	3	2	2	-	-	-	-	2	-	-	-	1	-	2	-
CO3	3	3	1	-	-	-	-	2	-	-	-	1	-	2	-
CO4	3	2	3	1	-	-	-	2	-	-	1	1	-	3	-

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

BOS APPROVED TEXT BOOKS:

T1 Ramakanth A.Gayakwad, Op-amps and Linear Integrated Circuits, Third edition, PHI Publishers, 2006.

T2 Roy Choudhury D., Linear Integrated Circuits, Second edition, New Age International (P) Ltd.

BOS APPROVED REFERENCE BOOKS:

R1 Adel S. Sedra and Kenneth Carless Smith, Microelectronic Circuits, Fifth Edition. Oxford University Press

R2 Rashid M. H., Microelectronic Circuits: Analysis and Design, Second edition, PWS Publishing Company.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN):
UNIT-I : TRANSISTOR CURRENT SOURCES & DIFFERENTIAL AMPLIFIERS

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 the Subject , Discussion about Syllabus and course outcomes	1	02.07.2024		**TLM2**	
2.	Introduction to IC, Advantages,Applications	1	03.07.2024		**TLM2**	
3.	Basic Current Source	1	05.07.2024		**TLM1**	
4.	Widlar Current Source	1	06.07.2024		**TLM1**	
5.	Cascode Current Source	1	09.07.2024		**TLM1**	
6.	Wilson Current Source	1	10.07.2024		**TLM1**	
7.	Differential Amplifier: Classifications	1	12.07.2024		**TLM1**	
8.	DC & AC Analysis of Dual input balanced output & balanced output DA	1	16.07.2024		**TLM1**	
9.	DC & AC Analysis of Dual input unbalanced output & unbalanced output DA	1	19.07.2024		**TLM1**	
10.	DC & AC Analysis of Single input balanced output & unbalanced output DA	1	20.07.2024		**TLM1**	
11.	DC & AC Analysis of single input unbalanced output & unbalanced output DA	1	23.07.2024		**TLM1**	
12.	Specifications ,FET Differential amplifier	1	24.07.2024		**TLM1**	
13.	Level Translator, Current mirror circuit	1	26.07.2024		**TLM1**	
No. of classes required to complete UNIT-I :		13		No. of classes taken:		

UNIT-II : OPERATIONAL AMPLIFIERS (OP-AMPS) & APPLICATIONS OF OP-AMPS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
14.	OP- Amp: Block Diagram	1	27.07.2024		**TLM2**	
15.	Ideal & Practical Op-Amp and its characteristics	1	30.07.2024		**TLM2**	
16.	DC and AC Characteristics of Op-Amp	1	31.07.2024		**TLM2**	
17.	IC 741 specifications	1	02.08.2024		**TLM2**	
18.	Measurement of slew rate and CMMR	1	03.08.2024		**TLM1**	
19.	Application of Op Amps: Inverting and Non-inverting amplifier	1	06.08.2024		**TLM1**	
20.	Integrator & Differentiator	1	07.08.2024		**TLM1**	
21.	Difference Amplifier, Instrumentation amplifier	1	09.08.2024		**TLM1**	
22.	Analog Multiplier, V to I converters	1	13.08.2024		**TLM1**	
23.	I to V converters, Rectifiers	1	14.08.2024		**TLM1**	
24.	Sample and Hold circuit, Log and Antilog amplifier	1	16.08.2024		**TLM1**	
25.	Integrator & Differentiator	1	17.08.2024		**TLM1**	
No. of classes required to complete UNIT-II		12	No. of classes taken:			

UNIT-III : OP-AMP ACTIVE FILTERS, OP-AMP WAVEFORM GENERATORS & OP-AMP SINE WAVE OSCILLATORS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
26.	Introduction to Op-amp Active Filters :1st order Low pass and High pass filter using OP-Amp	2	20.08.2024& 21.08.2024		**TLM2**	
27.	2nd order Low pass and High pass filter using OP-Amp	2	23.08.2024& 24.08.2024		**TLM1**	
28.	Band pass filter	1	27.08.2024		**TLM2**	
29.	Band reject filters	1	30.08.2024		**TLM1**	

30.	All pass filter Problem Solving	1	31.08.2024		**TLM1**	
31.	Op-amp wave form generators**:** Comparator, design and analysis of Schmitt trigger	1	10.09.2024		**TLM1**	
32.	Astable Multivibrator	1	11.09.2024		**TLM1**	
33.	Monostable Multivibrator	1	13.09.2024		**TLM1**	
34.	Triangular wave Generators	1	17.09.2024		**TLM1**	
35.	Op-amp sine wave oscillators: Design and analysis of RC phase shift oscillator	1	18.09.2024		**TLM1**	
36.	Wein Bridge oscillator	1	20.09.2024		**TLM1**	
37.	Assignment -1	1	21.09.2024		**TLM3**	
No. of classes required to complete UNIT-III		14	No. of classes taken:			

UNIT-IV : 555 TIMER & IC VOLTAGE REGULATORS

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.	Introduction	1	24.09.2024		**TLM2**	
39.	Functional Diagram-Monostable multivibrators	1	25.09.2024		**TLM2**	
40.	Monostable multivibrators Applications	1	27.09.2024		**TLM2**	
41.	Functional Diagram-Astable multivibrators	1	28.09.2024		**TLM1**	
42.	Astable multivibrators and Applications	1	01.10.2024		**TLM1**	
43.	VCO - IC 566 & its features	1	03.10.2024		**TLM1**	
44.	IC 565 PLL Block Schematic	1	04.10.2024		**TLM1**	
45.	Applications of PLL	1	05.10.2024		**TLM1**	
46.	IC Voltage Regulators: Fixed Voltage Regulators	2	08.10.2024		**TLM1**	
47.	IC723 General Purpose Regulator	1	09.10.2024		**TLM1**	
No. of classes required to complete UNIT-IV		11		No. of classes taken:		

UNIT-V : DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
49.	Introduction	1	15.10.2024		**TLM2**	
50.	Digital to Analog Converters	1	16.10.2024		**TLM2**	
51.	Weighted resistor DAC	1	18.10.2024		**TLM2**	
52.	R-2R Ladder DAC	1	19.10.2024		**TLM2**	
53.	Inverted R-2R DAC	1	22.10.2024		**TLM2**	
54.	Problems	1	23.10.2024		**TLM3**	
55.	Analog to Digital Converters: Flash Type ADC	1	25.10.2024		**TLM1**	
56.	Counter Type ADC	1	26.10.2024		**TLM1**	
57.	Successive Approximation ADC	1	29.10.2024		**TLM1**	
58.	Charge Balancing ADC	1	30.10.2023		**TLM1**	
59.	Dual Slope ADC	1	01.11.2024		**TLM1**	
60.	Problems	1	02.11.2024		**TLM3**	
61.	Assignment-II	1	05.11.2024		**TLM3**	
No. of classes required to complete UNIT-V:		13		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
58.	Introduction to VLSI and Applications of VLSI	1	06.11.2024		**TLM2**	

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:

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
Cumulative Internal Examination (CIE) = 80% of Max((M1+Q1+A1) , (M2+Q2+A2)) + 20% of Min((M1+Q1+A1) , (M2+Q2+A2))	30
Semester End Examination (SEE)(Unit-I, Unit – II, Unit –III, Unit-IV and Unit-V)	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	**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	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2	**VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr.B.Poornaiah	Dr.B.Poornaiah	Dr. T. Satyanarayana	Dr.G. Srinivasulu

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : B. Sarath Chandra
Course Name & Code : OOP through JAVA**(20IT81)**
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech. –ECE / V-Sem /B A.Y.: 2024 – 25

PRE-REQUISITE: Programming for Problem Solving Using B

COURSE EDUCATIONAL OBJECTIVE (CEO): Concentrates on the methodological and technical aspects of software design and Programming based on Object-Oriented Programming (OOP). Acquire the basic knowledge and skills necessary to implement Object-Oriented Programming Techniques in software development through JAVA. Know about the importance of Collections and GUI based applications through JAVA.

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

CO1	Understand Object Oriented Programming Concepts through constructs of JAVA. **(Understand- L2)**
CO2	Apply the concepts of Inheritance and Polymorphism on real-world applications. **(Apply - L3)**
CO3	Implement reusability using interface and packages**. (Understand- L2)**
CO4	Construct robust applications using exception handling. **(Apply - L3)**
CO5	Understand multi-threading concepts. **(Understand - L2)**

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

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

TEXTBOOK:

T1: **Java Fundamentals** – A comprehensive Introduction, Herbert Schildt and Dale Skrien, TMH.

REFERENCE BOOKS:

R1: The Java™ Programming Language: Ken Arnold, James Gosling, Pearson

R2: Introduction to Java Programming 7/e, Brief version, Y.Daniel Liang, Pearson

R3: Java for Programmers, P.J.Deitel and H.M.Deitel, Pearson education (OR) Java: How to Program P.J.Deitel and H.M.Deitel, PHI.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT – I: Introduction to OOP & JAVA:

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.	Java Buzzwords / Features	1	1-7-2024		TLM1,2	
2.	Object Oriented Programming **(OOP)** concepts	1	2-7-2024		TLM1,2	
3.	Java History, Advantages	1	4-7-2024		TLM1,2	
4.	Datatypes, Operators, Expressions	1	6-7-2024		TLM1,2	
5.	Control Statements	1	8-7-2024		TLM1,2	
6.	Methods and recursion , Sample programs	1	9-7-2024		TLM1,2	
7.	Java Objects and References	1	11-7-2024		TLM1,2	
8.	Constructors	2	13-7-2024 15-7-2024		TLM1,2	
9.	this keyword	1	16-7-2024		TLM1,2	
10.	Arrays (single and multi-dimensional),	1	18-7-2024		TLM1,2	
11.	String, StringBuffer, StringTokenizer Classes	1	20-7-2024		TLM1,2	
No. of classes required to complete UNIT – I: 12				**No. of classes taken:**		

UNIT – II: Extending Classes/ Reusability

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.	**Inheritance :** Introduction , Derived Classes, Advantages and Types of Inheritance	1	22-7-2024		TLM1,2	
13.	Implementation of Inheritance	2	23-7-2024 25-7-2024		TLM1,2	
14.	Inheritance and Member Accessibility	1	27-7-2024		TLM1,2	
15.	Overriding, super keyword	1	29-7-2024		TLM1,2	
16.	abstract classes and methods	2	30-7-2024 1-8-2024		TLM1,2	
17.	final keyword, final methods and final classes	1	3-8-2024		TLM1,2	
18.	Dynamic Binding, Polymorphism	2	5-8-2024 6-8-2024		TLM1,2	
No. of classes required to complete UNIT – II: 10				**No. of classes taken:**		

UNIT – III: Interfaces & Packages

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
19.	**Interfaces:** Differences between classes and interfaces	1	8-8-2024		TLM1,2	
20.	defining an interface	1	10-8-2024		TLM1,2	
21.	implementing interface	2	12-8-2024 13-8-2024		TLM1,2	
22.	variables in interface, extending interfaces	2	17-8-2024 19-8-2024		TLM1,2	
23.	**Packages:** Defining, Creating	1	20-8-2024		TLM1,2	
24.	Accessing a Package,	2	24-8-2024 27-8-2024		TLM1,2	
25.	importing packages,	1	29-8-2024		TLM1,2	
26.	access controls (public, protected, default and private).	1	31-8-2024		TLM1,2	
27.	Wrapper Classes (Like Integer, Float, Double).	1	9-9-2024		TLM1,2	
No. of classes required to complete UNIT – III: 12				**No. of classes taken:**		

UNIT – IV: Exception handling

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
28.	**Exception Handling:** Concepts of exception handling	1	10-9-2024		TLM1,2	
29.	benefits of exception handling	1	12-9-2024		TLM1,2	
30.	usage of try, catch	1	14-9-2024		TLM1,2	
31.	multiple catch clause	1	17-9-2024		TLM1,2	
32.	Nested try, throw	1	19-9-2024		TLM1,2	
33.	Throws	2	21-9-2024 23-9-2024		TLM1,2	
34.	Finally	1	24-9-2024		TLM1,2	
35.	built in exceptions	2	26-9-2024 28-9-2024		TLM1,2	
36.	creating own exception	2	30-9-2024 1-10-2024		TLM1,2	
No. of classes required to complete UNIT – IV: 12				**No. of classes taken:**		

UNIT – V: Multithreading

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.	Multithreading: Introduction	1	3-10-2024		TLM1,2	
38.	Thread life cycle	1	5-10-2024		TLM1,2	
39.	creating threads (by extending thread class)	2	7-10-2024 8-10-2024		TLM1,2	
40.	creating threads (implementing Runnable Interface)	2	10-10-2024 12-10-2024		TLM1,2	
41.	Example programs on threads	2	14-10-2024 15-10-2024		TLM1,2	
42.	Synchronization : method, Synchronization block	2	17-10-2024 19-10-2024		TLM1,2	

43.	Thread Priorities	1	21-10-2024		TLM1,2	
44.	isAlive() and join() methods	2	22-10-2023 24-10-2024		TLM1,2	
45.	Inter thread Communication	2	26-10-2024 28-10-2024		TLM1,2	
46.	Examples on ITC	2	29-10-2024 02-11-2024			
No. of classes required to complete UNIT – V:17				**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 – DescriptiveExamination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I – QuizExamination (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.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**B.Sarath Chandra**	**Dr.K.Venu Gopal**	**Dr.K.Phaneendra**	**Dr.B.Srinivasa Rao**
Signature				

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L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. Y AMAR BABU
Course Name & Code : Real Time Operating Systems – 20ECH2
L-T-P Structure : 3-1-0 Credits : 4
Program/Sem/Sec : B.Tech., ECE., V-Sem., Section-Honor A.Y : 2024-25

PRE-REQUISITES: Digital Circuits.

COURSE EDUCATIONAL OBJECTIVES (CEOs): In this course student will learn about fundamental concepts of real time operating systems, operating system objects, services and I/O concepts, various interrupts and timers.

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

CO1	Understand the basic set of commands and utilities in Linux/UNIX systems
CO2	Explain the fundamental concepts of real-time operating systems
CO3	Analyze real-time operating systems objects, services and I/O concept
CO4	Evaluate various Interrupts and Timers real time embedded systems using the concepts of RTOS

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	-	1	-
CO2	3	3	1	-	-	-	-	-	-	-	-	2	-	2	-
CO3	2	3	3	-	-	-	-	-	-	-	-	3	-	3	-
CO4	3	3	3	-	-	-	-	-	-	-	-	3	-	3	-

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 Real Time Concepts for Embedded Systems – Qing Li, Elsevier, 2011

REFERENCE BOOKS:

R1 Embedded Systems- Architecture, Programming and Design by Rajkamal, 2007, TMH

R2 Advanced UNIX Programming, Richard Stevens

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section - Honor

UNIT-I: Introduction

S. No.	Topics	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to UNIX/LINUX	2	03-07-2024		TLM2	
2.	Overview of Commands	2	04-07-2024		TLM2	
3.	File I/O (open, create, close, lseek, read, write)	2	10-07-2024		TLM2	
4.	File I/O (open, create, close, lseek, read, write)	2	11-07-2024		TLM2	
5.	Process Control	2	18-07-2024		TLM2	
6.	Process Control (fork, vfork, exit, wait, waitpid, exec)	2	24-07-2024		TLM2	
7.	Assignment/Tutorial-I	1	25-07-2024		TLM4	
No. of classes required to complete UNIT-I:		**13**	No. of classes taken:			

UNIT-II: Real Time Operating Systems-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.	Brief History of OS, Defining RTOS,The Scheduler, Objects	2	25-07-2024		TLM2	
2.	Services, Characteristics of RTOS	2	31-08-2024		TLM2	
3.	Defining a Task, Tasks States and Scheduling ,Task Operations	2	01-08-2024		TLM2	
4.	Structure, Synchronization, Communication and Concurrency	2	07-08-2024		TLM2	
5.	Defining Semaphores, Operations and Use, Defining Message Queue,	2	08-08-2024		TLM2	
6.	States, Content, Storage, Operations and Use	2	14-08-2024		TLM2	
7.	Assignment/Tutorial-II	1	21-08-2024		TLM4	
No. of classes required to complete UNIT-II:		**13**	No. of classes taken:			

UNIT-III: Real Time Operating Systems-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
1.	Objects, Services and I/O Pipes	2	21-08-2024		TLM2	
2.	Event Registers, Signals	2	22-08-2024		TLM2	
3.	Other Building Blocks	2	28-08-2024		TLM2	
4.	Component Configuration	2	29-08-2024		TLM2	
5.	Basic I/O Concepts	2	11-09-2024		TLM2	
6.	I/O Subsystem	2	12-09-2024		TLM2	
7.	Assignment/Tutorial-III	1	18-09-2024		TLM4	
No. of classes required to complete UNIT-III:		**13**	No. of classes taken:			

UNIT-IV: Exceptions, Interrupts and Timers

S. No.	Topics to be covered	No. of	Tentative	Actual	Teaching	HOD

		Classes Required	Date of Completion	Date of Completion	Learning Methods	Sign Weekly
1.	Exceptions, Interrupts	2	18-09-2024		TLM2	
2.	Applications, Processing of Exceptions	2	19-09-2024		TLM2	
3.	Spurious Interrupts	2	25-09-2024		TLM2	
4.	Real Time Clocks, Programmable Timers	2	26-09-2024		TLM2	
5.	Timer Interrupt Service Routines (ISR), Soft Timers, Operations	2	03-10-2024		TLM2	
6.	Assignment/Tutorial-IV	1	09-10-2024		TLM4	
No. of classes required to complete UNIT-IV:		**11**	No. of classes taken:			

UNIT-V: RT Linux

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.	RT Linux	2	09-10-2024		TLM2	
2.	MicroC/OS-II	2	10-10-2024		TLM2	
3.	Vx Works	2	16-10-2024		TLM2	
4.	Embedded Linux, Tiny OS	2	17-10-2024		TLM2	
5.	Basic Concepts of Android OS	1	23-10-2024		TLM2	
6.	Assignment/Tutorial-V	1	24-10-2024		TLM4	
No. of classes required to complete UNIT-V:		**11**	No. of classes taken:			

Contents beyond the Syllabus

S. No.	Topics	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Xilinx Petalinux	1	30-10-2024		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

EVALUATION PROCESS (R17 Regulations):

Evaluation Task	Marks
Assignment-I (Units-2 1/2)	A1=5
I-Mid Examination (Units-2 1/2)	M1=15
I-Quiz Examination (Units-2 1/2)	Q1=10

Assignment-II (Units-2 1/2)	A2=5
II-Mid Examination (Units-2 1/2)	M2=15
II-Quiz Examination (Units-2 1/2)	Q2=10
Mid Marks =80% of Max(M1, M2)+20% of Min(M1, M2)	M=15
Quiz Marks =80% of Max(Q1, Q2)+20% of Min(Q1, Q2)	Q=10
Assignment Marks = Average of Best two of A1, A2	A=5
Cumulative Internal Examination (CIE) : M+Q+A	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	**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	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2	**VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Date: 01-07-2024

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr. Y. Amar Babu	Dr. Y. Amar Babu	Dr. P. Lachi Reddy	Dr. G. Srinivasulu

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DEPARTMENT OF ELECTRONICS & COMMUNICATIONS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : **Dr. Kavuluru VenuGopal**
Course Name & Code : DATABASE MANAGEMENT SYSTEM CONCEPTS & **20ITM3**
L-T-P Structure : 3-1-0 **Credits : 4**
Program/Sem/Sec : B. Tech (Minor)., ASE, ECE, EEE,MECH **A. Y : 2024-24**

PREREQUISITE: Elementary set theory, concepts of relations and functions, propositional logic data structures (trees, Graphs, dictionaries) & File Concepts.

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course enables the students to know about DBMS basic concepts, Database Languages, Database Design, Normalization process and Transaction processing and Indexing.

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

CO 1	**Demonstrate** the Basic Components of Database Management System. **(Understand -L2)**
CO 2	**Design** Entity-Relationship Diagrams for different applications. **(Apply –L3)**
CO 3	**Examine** the relational data model and various constraints. **(Apply- L3)**
CO 4	**Demonstrate** Structured Query Language languages (SQL) to manage relational databases and perform various operations on the data. **(Apply- L3)**
CO 5	**Employ** principles of normalization for effective database design & transaction management. **(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	1	1	2	-	-	-	-	-	-	-	-	-	3	2	2
CO2	3	3	-	-	-	-	-	-	-	-	-	-	2	3	2
CO3	3	2	-	-	-	-	-	-	-	-	-	-	2	3	2
CO4	2	1	2	-	-	-	-	-	-	-	-	-	3	2	3
CO5	2	1	2	-	-	-	-	-	-	-	-	-	2	3	3

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	Henry F. Korth, Abraham Silberschatz, S. Sudarshan, "Database Concepts", McGraw Hill, 6th edition, 2009. B
T2	RamezElmasri, Shamkanth . Navathe, "Fundamentals Of Database Systems", Addision Wesley, 6th edition, 2010.

REFERENCE BOOKS:

R1	Raghu Ramakrishna, Johannes Gehrke, "Database Management System", McGraw Hill 3rd edition, 2000.
R2	Date C. J, "An Introduction to Database System", Pearson Education, 8th edition, 2003.
R3	Shara Maheshwari, Ruchi Jain, "DBMS: Complete Practical Approach", Firewall Media, New Delhi, 2005.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction

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 and COs	2	3-07-2024		TLM1,2	
2.	Introduction, An overview of database management system, Database system Vs file system	2	4.07. 2024		TLM1,2	
3.	Database system concepts and architecture, Data models schema and instances	2	10.07. 2024		TLM1,2	
4.	Data independence and database language and interfaces	2	11.07. 2024		TLM1,2	
5.	Data definitions language, DML, Overall Database Structure	2	18-07. 2024		TLM1,2	
6.	**Revision on Unit-1**	2	24.07. 2024		TLM1,2	
No. of classes required to complete UNIT-I: 10				No. of classes taken:		

UNIT-II: Entity Relationship 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.	ER model concepts - attributes, entity, Relationships	2	25.07. 2024		TLM1,2	
2.	notation for ER diagram, Mapping constraints	2	31.07. 2024		TLM1,2	
3.	Relationships of higher degree, keys -Concepts of Super Key, and identity key, primary key	2	01.08. 2024		TLM1,2	
4.	Generalization,Aggregation	2	07.08. 2024		TLM1,2	
5.	Reduction of ER diagrams to tables	2	14.08. 2024		TLM1,2	
6.	**Revision on Unit - II**	2	21.08. 2024		TLM1,2	
No. of classes required to complete UNIT-II: 12				No. of classes taken:		

UNIT-III: Relational Data 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.	Relational data model concepts	2	22.08. 2024		TLM1,2	
2.	Integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints	2	28.08. 2024		TLM1,2	
3.	referential integrity	2	29.08. 2024		TLM1,2	
4.	Keys constraints	2	11.09. 2024		TLM1,2	
5.	Domain constraints	2	12.09. 2024		TLM1,2	
6.	Relational Algebra	2	18.09. 2024		TLM1,2	
7.	**Revision of UNIT-3 & Assignment-I**	2	19.09. 2024		TLM1,2	
No. of classes required to complete UNIT-III: 14				No. of classes taken:		
I MID EXAMINATIONS				**28/08/ 2024 TO 02/09/ 2024**		

UNIT-IV: Introduction to SQL

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.	Characteristics of SQL, Advantage of SQL	2	15.09. 2024		TLM1,2	
2.	SQL Data types and Literals	2	25.09. 2024		TLM1,2	
3.	Insert, Update and Delete Operations	2	26.09. 2024		TLM1,2	
4.	Tables, Views and Indexes	2	02.10. 2024		TLM1,2	
5.	Nested Queries, Aggregate Functions	2	09.10. 2024		TLM1,2	
6.	Joins, Unions, Intersection, Minus.	2	16.10. 2024		TLM1,2	
7.	Revision of Unit-4	1	17.10. 2024		TLM1,2	
No. of classes required to complete UNIT-IV: 14				No. of classes taken:		

Unit -V : Normalization

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.	Functional Dependencies	2	17.10. 2024		TLM1,2	
2.	Normal Forms - First, Second	2	23.10. 2024		TLM1,2	
3.	Third Normal Forms, BCNF.	1	23.10. 2024		TLM1,2	
4.	Transaction System, Testing of Serializability	1	24.10. 2024		TLM1,2	
5.	Serializability of Schedules, Conflict & View Serializability	1	24.10. 2024		TLM1,2	
6.	Recoverability, Deadlock Handling.	1	30.10. 2024		TLM1,2	
7.	**Revision of UNIT-5 & Assignment-II**	2	30.10. 2024		TLM1,2	
No. of classes required to complete UNIT-V: 7				No. of classes taken:		

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM1,2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

Evaluation Task	Marks
Assignment – I(Units-I, II & UNIT-III (Half of the Syllabus))	A1=5
I – DescriptiveExamination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I – QuizExamination (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.
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PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	**Organize, Analyze and Interpret the data to extract meaningful conclusions.**
PSO 2	**Design, Implement and Evaluate a computer-based system to meet desired needs.**
PSO 3	**Develop IT application services with the help of different current Engineering tools.**

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr. Kavuluru Venu Gopal	Dr. Kavuluru Venu Gopal	Dr. B.Srinivasa Rao	Dr.B.Srinivasa Rao

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DEPARTMENT OF COMPUTER SCIENCE &ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mrs G V Rajya Lakshmi
Course Name & Code : IDAA (20CSM7)
L-T-P Structure : 3-1-0 Credits : 4
Program/Sem/Sec : B.Tech., ECE, EEE V-A,B,C A.Y: 2024-25

PRE-REQUISITE: Data structures and DMS

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The objective of the course is to learn various algorithm design techniques and analyze the computing resources of the algorithms and motivate the students to design new algorithms for various problems.

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

CO 1	Identify the characteristic of an algorithm and analyses its time and space complexity. (UnderstandL2)
CO 2	Apply the divide-and-conquer method for solving problems like searching and sorting. (Apply - L3)
CO 3	Design Greedy algorithms for the optimization problems like knapsack problem, minimum cost spanning tree, single source shortest path problem. (Apply - L3)
CO 4	Apply dynamic programming paradigm to solve optimization problems like travelling salesperson problem, 0/1 knapsack problem, Optimal binary search tree (Apply– L3)
CO 5	Analyze the backtracking and branch and bound search methods on optimization problems like N-queen, sum of subsets.0/1 knapsack, Hamiltonian circuit and so on. (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	3	-	-	-	-	-	-	-	-	-	-	-	-	3
CO2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	2
CO3	2	2	-	1	-	-	-	-	-	-	-	-	-	-	3
CO4	2	3	-	1	-	-	-	-	-	-	-	-	-	-	1
CO5	2	3	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: Ellis Horowitz, SartajSahni, 'Fundamentals of Computer Algorithms', Galgotia Publications.

T2: Data Structures and Algorithm Analysis in C++, 3/e, Mark Allen Weiss, Pearson , 2007.

REFERENCE BOOKS:

R1: Aho, Hopcroft& Ullman, 'The Design and Analysis of Computer Algorithms', Addison Wesley publications

R2: Thomas H. Cormen et al, 'Introduction to Algorithms', PHI.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I : Introduction

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	03.07.24		TLM1	
2.	Algorithm definition and Specifications	1	03.07.24		TLM1	
3.	Performance Analysis	1	04.07.24		TLM1	
4.	Time Complexity and space complexity	1	04.07.24		TLM1	
5.	Asymptotic Notations-Big-Oh, Omega and Theta	2	10.07.24		TLM1	
No. of classes required to complete UNIT-I		6		**No of classes taken**		

UNIT-II: Divide & Conquer

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
6.	Divide & Conquer Technique: General Method	1	18.07.24		TLM1	
7.	Binary Search and its analysis	1	18.07.24		TLM1	
8.	Finding Maximum and Minimum and its Analysis	1	24.07.24		TLM1	
9.	Merge sort and its Analysis	1	24.07.24		TLM1	
10.	Quick Sort algorithm and its analysis	1	25.07.24		TLM1	
11.	Closest pair of points	1	25.07.24		TLM1	
12.	Tutorial – 1	2	31.07.24		**TLM3**	
No. of classes required to complete UNIT-II		**8**		**No of classes taken**		

UNIT-III: The Greedy method

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
14.	Greedy Method – Introduction, General method	2	01.08.24		TLM1	
15.	Knapsack problem,	2	07.08.24		TLM1	

	Example problem					
16.	Job sequencing with deadlines, Example problem	2	08.08.24		TLM1	
17.	Minimum cost spanning trees, example problem	2	14.08.24		TLM1	
18.	Optimal storage on tapes, Example problem	2	21.08.24		TLM1	
19.	Single source shortest path problem	2	22.08.24		TLM1	
20.	Huffman coding	2	28.08.24		TLM1	
21.	Tutorial – II / Quiz - II	2	29.08.24		TLM3	
No. of classes required to complete UNIT-III		**16**		**No of classes taken**		

UNIT-IV: Dynamic Programming

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.	Dynamic Programming-General method	2	11.09.24		TLM1	
23.	Multistage Graph, Example problem	2	12.09.24		TLM1	
24.	All pairs shortest path, Example problem	2	18.09.24		TLM1	
25.	Optimal Binary Search Tree, Example problem	2	19.09.24		TLM1	
26.	0/1 Knapsack Problem	2	25.09.24		TLM1	
27.	Travelling Salesperson Problem	2	26.09.24		TLM1	
28.	Single source shortest path problem, Example Problem	2	03.10.24		TLM1	
29.	Reliability design, Example Problem	2	09.10.24		TLM1	
30.	Tutorial – III / Quiz – III	2	10.10.24		**TLM3**	
No. of classes required to complete UNIT-IV		**18**		**No of classes taken**		

UNIT-V: Back tracking

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
31.	General Methods	1	16.10.24		TLM1	
32.	The 8-Queens problem	2	17.10.24		TLM1	
33.	Sum of subsets problem	2	23.10.24		TLM1	
34.	Graph coloring problem	2	24.10.24		TLM1	

35.	Hamiltonian cycles	2	30.10.24		TLM1	
36.	Tutorial – IV / Quiz - IV	1	30.10.24		**TLM3**	
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
1.	Convex hull	1			TLM2	

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
Mrs G V Rajya Lakshmi			Dr.D.Veeraiah

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

PROGRAM : **B. Tech**, V-Sem

ACADEMIC YEAR : 2024-25

COURSE NAME & CODE : **Fundamentals of Data Science – 20ADM2**

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

COURSE CREDITS 4

COURSE INSTRUCTOR : M. Sabitha

COURSE COORDINATOR : M. Sabitha

PRE-REQUISITE: Basic Mathematical Knowledge.

COURSE OBJECTIVE: In this Course student will learn about- The objective of the course is to perform the operations associated with relations and functions. Relate practical examples to the functions and relations and interpret the associated operations and terminology used in the context. Use formal logic proofs and/or informal but rigorous logical reasoning to, for example, predict the behavior of software or to solve problems such as puzzles.

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

CO1	Construct mathematical arguments using logical connectives & quantifiers and verify them. **(Understand – L2)**
CO2	Demonstrate the basic terminology of functions, relations, lattices and their operations. **(Understand – L2)**
CO3	Apply the properties of graphs to solve the graph theory problems in Computer science. **(Apply – L3)**
CO4	Illustrate the basic principles/techniques to solve different algebraic structures & combinatorial problems. **(Apply – L3)**
CO5	Solve linear recurrence relations by recognizing homogeneity using constant coefficients characteristic roots and Generating functions. **(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**	**3**													
CO2	**3**	**3**	**1**	**2**											
CO3	**3**	**3**	**1**	**2**											
CO4	**3**	**3**	**2**	**1**											
CO5	**3**	**3**	**1**												
1 - Low							**2** –Medium					**3** – High			

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 Python for Data Analysis [1,2,3,4,5]

BOS APPROVED REFERENCE BOOKS:

R1 Python :The complete Reference, Martin C.Brown, McGraw Hill Education

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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1	Introduction to python, Python Features	1	3-7-2024		2,4	CO1	T1,R1	
2	Python Data Types,	1	3-7-2024		2,4	CO1	T1,R1	
3	Python Operators	1	4-7-2024		2,4	CO1	T1,R1	
4	Input and output statements	1	4-7-2024		2,4	CO1	T1,R1	
5	Control statements	1	10-7-2024		2,4	CO1	T1,R1	
6	String operations in python	1	10-7-2024		2,4	CO1	T1,R1	
7	String Testing methods in python	1	11-7-2024		2,4	CO1	T1,R1	
8	Lists in python	1	11-7-2024		2,4	CO1	T1,R1	
9	Dictionaries in python	1	17-7-2024		2,4	CO1	T1,R1	
10	Tuples in python	1	17-7-2024		2,4	CO1	T1,R1	
No. of classes required to complete UNIT-I		10			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	Learning Outcome COs	Text Book Followed	HOD Sign Weekly
11.	What is Data Science, Introduction to Data Science	1	18-7-2024		2,4	CO2	T1,R1	
12.	Data Science Applications, Data Science Life Cycle	1	18-7-2024		2,4	CO2	T1,R1	
13.	Data Analysis in Python	1	24-7-2024		2,4	CO2	T1,R1	
14.	Exploratory Data Analysis in python	1	24-7-2024		2,4	CO2	T1,R1	

15	Data Science process	1	25-7-2024		2,4	CO2	T1,R1	
16	Role of Data Scientist	1	25-7-2024		2,4	CO2	T1,R1	
17	Data Cleaning	1	31-7-2024		2,4	CO2	T1,R1	
18	Data transformation techniques	1	31-7-2024		2,4	CO2	T1,R1	
19	Principle Data Analysis	1	01-8-2024		2,4	CO2	T1,R1	
20	Principle Data Analysis example	1	01-8-2024		3			
No. of classes required to complete UNIT-II		10			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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
21	Introduction to NumPy	1	07-8-2024		2,4	CO3	T1,R2	
22	Basics of NumPy	1	07-8-2024		2,4	CO3	T1,R2	
23	Multi-Dimensional Array object	2	08-8-2024		2,4	CO3	T1,R2	
24	Creating nd Arrays	1	14-8-2024		2,4	CO3	T1,R2	
25	Data types nor nd Arrays	1	14-8-2024		2,4	CO3	T1,R2	
26	Operations between Arrays and Scalars	2	15-8-2024		2,4	CO3	T1,R2	
27	Basic Indexing and Slicing operations	2	21-8-2024		2,4	CO3	T1,R2	
28	Boolean Indexing and Fancy Indexing	2	22-8-2024		2,4	CO3	T1,R2	
29	Data processing Using Arrays, Expressing conditional logic arrays	2	28-8-2024		2,4	CO3	T1,R2	
30	Methods for Boolean Arrays	2	29-8-2024		3			
No. of classes required to complete UNIT-III		16			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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
31	Introduction to Pandas	1	11-9-2024		1,4,5	CO4	T1,R2	
32	Pandas Libraries	1	11-9-2024		1,4,5	CO4	T1,R2	
33	Architecture For Pandas Libraries	1	12-9-2024		1,4,5	CO4	T1,R2	
34	Features of Pandas	1	12-9-2024		1,4,5	CO4	T1,R2	
35	Applications of Pandas	1	18-9-2024		1,4,5	CO4	T1,R2	
36	Data Structure Series in python	1	18-9-2024		1,4,5	CO4	T1,R2	
37	Data frame, Index objects	1	19-9-2024		1,4,5	CO4	T1,R2	
38	Functionality of Re indexing	1	19-9-2024		1,4,5	CO4	T1,R2	
39	Dropping Entries from an axis in Pandas	1	25-9-2024		1,4,3	CO4	T1,R2	
40	Indexing, selection in pandas	1	25-9-2024		1,4,5	CO4	T1,R2	
41	Filtering, Sorting in Pandas	1	26-9-2024		1,4,5	CO4	T1,R2	

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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
42	Introduction to Data Preprocessing	1	26-09-2024		1,4,5	CO5	T1,R2	
43	Data loading, Storage and File Formats	2	02-10-2024		1,4,5	CO5	T1,R2	
44	Reading and Writing data in text format, Binary Data formats	2	03-10-2024		1,4,5	CO5	T1,R2	
45	Interacting with html and web apis	2	09-10-2024		1,4,5	CO5	T1,R2	
46	Combining and merging Datasets	2	10-10-2024		1,4,5	CO5	T1,R2	
47	Reshaping and pivoting data transformation	2	16-10-2024		1,4,3	CO5	T1,R2	
48	Data Aggregation and Group Operations	2	17-10-2024		1,4,3	CO5	T1,R2	
49	Group by operations and Transformations	1	23-10-2024		1,4,3	CO5	T1,R2	
50	Pivot tables in data pre processing	1	23-10-2024		1,4,3	CO5	T1,R2	
51	Cross Tabulation Format in data Preprocessing	2	24-10-2024		1,4,3	CO5	T1,R2	
No. of classes required to complete UNIT-V		17			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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
52	Applications of Data science	2	30-10-2024					
53	Introduction to Data Analytics in Python	2	31-10-2024					

Teaching Learning Methods					
TLM1	Chalk and Talk	**TLM4**	Problem Solving	**TLM7**	Seminars or GD
TLM2	PPT	**TLM5**	Programming	**TLM8**	Lab Demo
TLM3	Tutorial	**TLM6**	Assignment or Quiz	**TLM9**	Case Study

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	01-07-2024	31-08-2024	9W
I Mid Examinations	02-09-2024	07-09-2024	1W
II Phase of Instructions	09-09-2024	02-11-2024	8W
II Mid Examinations	04-11-2024	09-11-2024	1W
Preparation and Practicals	11-11-2024	16-11-2024	1W
Semester End Examinations	18-11-2024	30-11-2024	2W

PART-C

EVALUATION PROCESS (R20 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issue 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.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Mrs. M. Sabitha**	**Mrs. M. Sabitha**	**Dr. O. Rama Devi**	**Dr. O. Rama Devi**
Signature				

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L B Reddy Nagar, Mylavaram-521 230, NTR District, Andhra Pradesh.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr. M.Sambasiva Reddy

Course Name & Code : Digital Communication Lab – 20EC57

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

Program/Sem/Sec : B.Tech., ECE., V-Sem., Section- B A.Y : 2024-25

PRE-REQUISITE: Analog Communications.

COURSE EDUCATIONAL OBJECTIVES (CEOs):
This Course provides practical exposure on different aspects of digital communications. It demonstrates the importance of different modulation techniques in digital communication systems. It also gives the knowledge about different encoding and decoding techniques used in digital communication systems.

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

CO1	**Interpret** baseband and pass band modulation and demodulation techniques **(Understand– L2)**
CO2	**Apply** coding techniques for error detection and correction in digital data transmission **(Apply – L3)**
CO3	**Implement** frequency and phase shift keying techniques using Software Defined Radio **(Apply – L3).**
CO4	**Adopt** effective communication, presentation and report writing skills **(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	3	-	-
CO2	3	2	1	2	-	-	-	-	-	-	-	-	3	-	-
CO3	3	2	-	2	3	-	-	-	-	-	-	-	3	-	-
CO4	-	-	-	2	-	-	-	1	2	3		1	-	-	-

Correlation Levels: **1**-Slight (Low), **2**-Moderate (Medium), **3**-Substantial (High) and No correlation: **'-'**

TEXT BOOKS:

T1: Simon Haykin, *"Digital Communications",* John Wiley & sons, 2nd Edition.

T2: Taub and Schilling, *"Principles of Communication Systems"*, TMH Publications, 3rd edition.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section – B

Batch-1(22761A0467 to 22761A04A1) Tuesday – AN

Expt. No	Experiment/s	COs	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
--	Introduction to DC Lab experiments, COs, POs and PSOs	--	3	02.07.2024			
Cycle – I							
1	Experiment – 1	CO1,CO4	3	09.07.2024			
2	Experiment – 2	CO1,CO4	3	16.07.2024			
3	Experiment – 4	CO1,CO4	3	23.07.2024			
4	Experiment – 5	CO1,CO4	3	30.07.2024			
5	Experiment – 10	CO1,CO4	3	06.08.2024			
6	Experiment – 11	CO2,CO4	3	13.08.2024			
Cycle – II							
7	Experiment – 3	CO1,CO4	3	20.08.2024			
8	Experiment – 6	CO1,CO4	3	27.08.2024			
9	Experiment – 7	CO2,CO4	3	10.09.2024			
10	Experiment – 8	CO3,CO4	3	17.09.2024			
11	Experiment – 9	CO3,CO4	3	24.09.2024			
12	Experiment – 12	CO3,CO4	3	01.10.2024			
13	Experiment beyond the syllabus		3	08.10.2024			
--	Internal Examination	--	3	29.10.2024			

Batch-2 (22761A04A2 to 22761A04D2 & 23765A0407 to 23765A0411) Friday – FN

Expt. No	Experiment/s	COs	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
--	Introduction to DC Lab experiments, COs, POs and PSOs	--	3	15.07.2024			
Cycle – I							
1	Experiment – 1	CO1,CO4	3	22.07.2024			
2	Experiment – 2	CO1,CO4	3	05.08.2024			
3	Experiment – 4	CO1,CO4	3	12.08.2024			
4	Experiment – 5	CO1,CO4	3	19.08.2024			
5	Experiment – 10	CO1,CO4	3	26.08.2024			
6	Experiment – 11	CO2,CO4	3	09.09.2024			
Cycle – II							
7	Experiment – 3	CO1,CO4	3	16.09.2024			
8	Experiment – 6	CO1,CO4	3	23.09.2024			
9	Experiment – 7	CO2,CO4	3	30.09.2024			
10	Experiment – 8	CO3,CO4	3	07.10.2024			
11	Experiment – 9	CO3,CO4	3	14.10.2024			
12	Experiment – 12	CO3,CO4	3	21.10.2024			
13	Internal Examination		3	28.10.2024			

Experiments to be conducted:

Exp. No	CYCLE-1	Exp. No	CYCLE-2
1	Generate digital signal from analog using Pulse Code Modulation and reconstruct original signal.	3	Perform Adaptive Delta Modulation and obtain the reconstructed original signal.
2	Demonstrate the analog to digital conversion using Delta Modulation and Demodulation	6	Perform a digital modulation using Binary Phase Shift Keying and reconstruct theoriginal signal using coherent detection
4	Generate the Amplitude Shift Keying Modulated signal and reconstruct the originalsignal using demodulation.	7	Generate the digital modulated signal using Quadrature Phase shift Keying Modulation and reconstruct the original signal
5	Obtain the modulated and demodulated signals for Frequency Shift Keying	8	Examine the error detection and correction process using Linear Block Code
10	Binary Frequency Shift Keying Modulation and Demodulation	9	Apply the Binary Cyclic Code for error detection and correction of digital data
11	Binary Phase Shift Keying Modulation and Demodulation	12	Quadrature Phase Shift Keying Modulation and Demodulation

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:

Evaluation Task	**Expt. no's**	**Marks**
Day to Day work = **A**	1,2,3,4,5,6,7,8…	A = 05
Record = **B**	1,2,3,4,5,6,7,8…	B = 05
Internal Test = **C**	1,2,3,4,5,6,7,8…	C = 05
Cumulative Internal Examination : A + B + C = 15	1,2,3,4,5,6,7,8…	**15**
Semester End Examinations = D	1,2,3,4,5,6,7,8…	**D = 35**
Total Marks: A + B + C + D = 50	1,2,3,4,5,6,7,8…	**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:	**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:	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2:	**VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3:	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

.

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. M.Sambasiva Reddy	Mr.K.V Ashok	Dr. M Venkata Sudhakar	Dr. G.Srinivasulu

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

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. B.Poornaiah / Mrs. K. Balavani

Course Name & Code : Linear IC Applications Lab – 20EC58

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

Program/Sem/Sec : B.Tech., ECE., V-Sem., Section - B A.Y : 2024-25

COURSE EDUCATIONAL OBJECTIVES (CEOs):

This course provides the practical knowledge on Op-Amp applications like arithmetic circuits, filters and oscillators also provides knowledge on IC555 timer and IC723.

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

CO1	**Demonstrate** the characteristics and applications of Op-Amps (Understand – L2)
CO2	**Apply** the 555 Timer circuit concepts for the realization of waveform generators (Apply – L3).
CO3	**Design** Active filters, arithmetic circuits, waveform generators and data converters using Op-Amp (Apply – L3)
CO4	**Adapt** effective Communication, presentation and report writing skills (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	3	1	2	-	-	-	2	1	2	-	1	-	2	-
CO2	2	3	1	1	-	-	-	2	1	2	-	1	-	2	-
CO3	2	3	1	2	-	-	-	2	1	2	-	1	-	3	-
CO4	-	-	-	2	-	-	-	1	2	3		1	-	-	-

Correlation Levels: **1**-Slight (Low), **2**-Moderate (Medium), **3**-Substantial (High) and No correlation: **'-'**

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section – B

Batch-1:22761A04A3 to 4D2 & 23765A0407 to 411 **Tuesday – AN**

Expt. No	Experiment/s	COs	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
--	Introduction to LIA Lab experiments, COs, POs and PSOs	--	3	02-07-2024			
Cycle – I							
1	Experiment – 1	CO1,CO3	3	09-07-2024			
2	Experiment – 2	CO1,CO3	3	16-07-2024			
3	Experiment – 3	CO1,CO3	3	23-07-2024			
4	Experiment – 4	CO1,CO3	3	30-07-2024			
5	Experiment – 5	CO1,CO3	3	06-08-2024			
6	Experiment – 6	CO1,CO3	3	13-08-2024			
Cycle – II							
7	Experiment – 3	CO2	3	20-08-2024			
8	Experiment – 7	CO2	3	27-08-2024			
9	Experiment – 9	CO1,CO3	3	10-09-2024			
10	Experiment – 10	CO1,CO3	3	17-09-2024			
11	Experiment – 11	CO1,CO3	3	24-09-2024			
12	Revision	CO1,CO3	3	01-10-2024			
13	Experiment beyond syllabus	CO3	3	08-10-2024			
--	Internal Examination	--	3	15-10-2024			

Batch-2 : 22761A0467 to 4A2 **Friday – FN**

Expt. No	Experiment/s	COs	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
--	Introduction to LIA Lab experiments, COs, POs and PSOs	--	3	05-07-2024			
Cycle – I							
1	Experiment – 1	CO1,CO3	3	12-07-2024			
2	Experiment – 2	CO1,CO3	3	19-07-2024			
3	Experiment – 4	CO1,CO3	3	26-07-2024			
4	Experiment – 5	CO1,CO3	3	02-08-2024			
5	Experiment – 6	CO1,CO3	3	09-08-2024			
6	Experiment – 8	CO1,CO3	3	16-08-2024			
Cycle – II							
7	Experiment – 3	CO2	3	23-08-2024			
8	Experiment – 7	CO2	3	30-08-2024			
9	Experiment – 9	CO1,CO3	3	13-09-2024			
10	Experiment – 10	CO1,CO3	3	20-09-2024			
11	Experiment – 11	CO1,CO3	3	27-09-2024			
12	Revision	CO1,CO3	3	04-10-2024			
13	Experiment beyond syllabus	CO3	3	18-10-2024			
--	Internal Examination	--	3	25-10-2024			

Experiments to be conducted:

Exp. No	CYCLE-1	Exp. No	CYCLE-2
1	Verification of functionality of Inverting and Non-inverting amplifiers for the Sine and Square wave inputs.	7	Design and Realization of 555 timer based Monostable multivibrator for Pulse generation.
2	Realization of Adder and Subtractor using Op-Amp.	8	Design and Realization of 555 timer based Astable multivibrator for square wave generation
3	Realization of Differentiator and Integrator using Op-Amp	9	Design and Realization of RC phase shift Oscillator for sinusoidal signal generation using Op-Amp.
4	Design, Realization and plot the frequency response of First order Low pass and High pass filters using Op-Amp.	10	Design and Realization of Function generator for square wave and triangular waves using Op-Amps.
5	Design and plot the frequency response of Band pass filter using Op-Amp.	11	Design and Realization of 3-bit Digital to Analog converter using Op-Amp
6	Design and Realization of Op-Amp based Astable multivibrator for Square wave generation.		

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:

Evaluation Task	**Expt. no's**	**Marks**
Day to Day work = **A**	1,2,3,4,5,6,7,8…	A = 05
Record = **B**	1,2,3,4,5,6,7,8…	B = 05
Internal Test = **C**	1,2,3,4,5,6,7,8…	C = 05
Cumulative Internal Examination : A + B + C = 15	1,2,3,4,5,6,7,8…	**15**
Semester End Examinations = D	1,2,3,4,5,6,7,8…	**D = 35**
Total Marks: A + B + C + D = 50	1,2,3,4,5,6,7,8…	**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:	**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:	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2:	**VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3:	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr. B. Poornaiah	Mrs. T.Kalpana	Dr.T.Satyanarayana	Dr. G.Srinivasulu

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L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. B.Y.V.N.R.Swamy
Course Name & Code : Design and Simulation of Antennas Lab & 20ECS3

L-T-P Structure : 1-0-2 Credits : 2
Program/Sem/Sec : B.Tech., ECE., V-Sem., Sections- B A.Y :2024-25

Pre-Requisites: Electromagnetic waves and Transmission Lines.

Course Objectives: In this course, student will learn about how to design and analyze various transmission lines and antennas using Ansys HFSS Software

Course Outcomes (COs): At the end of the course, students are able to

CO1	Understand the basic concepts of transmission lines and antennas according to Requirement and applications. **(Understand – L2)**
CO2	Apply software tools for different transmission lines and antennas. **(Apply – L3)**
CO3	Design and Analyze the different parameters of transmission lines and antennas. **(Apply – L3)**
CO4	Adapt effective Communication, presentation and report writing skills (Apply – L3)

Course Articulation Matrix (Correlation between COs &POs, PSOs):

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

T1 Constantine A. Balanis, "Antenna Theory: Analysis and Design", John Wiley & sons Publishers,2nd Edition

T2 JR James, PS Hall "Handbook of Microstrip Antennas" IEE Electromagnetic waves series, 1986.

REFERENCE BOOK(S):

R1 Matthew N.O. Sadiku, "Elements of Engineering Electromagnetics", Oxford University Press, 4th Edition.

R2 David. M. Pozar "Microwave Engineering", 4th edition, WILEY Publication, 2013.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

S.No.	Experiment Name	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Course Introduction-Design and Simulation of Antennas	3	06-07-2024			
2.	Design of micro strip patch antennas using strip line feed and coaxial feed	3	20-07-2024			
3.	Design of patch antennas for Wi-Fi and Wi-Max applications.	3	27-07-2024			
4.	Design of Rectangular and Circular micro strip patch.	3	03-08-2024			
5.	Design of Dipole and dual band antenna,	3	10-08-2024			
6.	Design of microstrip line	3	17-08-2024			
7.	Design of open and short circuit transmission line	3	24-08-2024			
8.	Design of multi stub unit	3	31-08-2024			
9.	Study of characteristic impedances of transmission line	3	14-09-2024			
10.	Design of project by students	3	21-09-2024			
11.	Design of project by students	3	28-09-2024			
12.	Presentation	3	05-10-2024			
13.	Presentation	3	12-10-2024			
14.	Documentation	3	29-10-2024			
15.	Documentation	3	26-10-2024			
No. of classes required to complete the LAB : 15				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):

Report	**10**
Quality of work	10
Presentation	20
Interaction / Queries	10
Total	50

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	To Attain a solid foundation in Electronics & Communication Engineering fundamentals with an attitude to pursue continuing education
PEO 2	To Function professionally in the rapidly changing world with advances in technology
PEO 3	To Contribute to the needs of the society in solving technical problems using Electronics & Communication Engineering principles, tools and practices
PEO 4	To Exercise leadership qualities, at levels appropriate to their experience, which addresses issues in a responsive, ethical, and innovative manner?

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 a n d 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	Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry
PSO 2	Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3	Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Date:

Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**
Dr. B.Y.V.N.R.Swamy	Dr. V.Ravi Sekhara Reddy	Dr. M.V.Sudhakar	Dr. G.Srinivasulu

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L B Reddy Nagar, Mylavaram-521 230, NTR District, Andhra Pradesh.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr. M.Sambasiva Reddy

Course Name & Code : Digital Communications – 20EC09

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

Program/Sem/Sec : B.Tech., ECE., V-Sem., Section- B A.Y : 2024-25

PRE-REQUISITE: Analog Communications.

COURSE EDUCATIONAL OBJECTIVES (CEOs):
This course provides the knowledge on different digital modulation techniques. The course provides different concepts on information theory, block codes and convolution codes. It gives the methods of optimum receivers for digital communication systems and performance of probability of error for digital modulation techniques.

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

CO 1	**Understand** the concepts of digital communication system **(Understand – L2)**
CO 2	**Analyze** the Baseband and Pass band digital modulation techniques **(Analyze – L3)**
CO 3	**Examine** the optimum reception and probability of error of digital modulation **(Apply – L3)**
CO 4	**Apply** source coding and error control coding techniques in digital communication process **(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	1	1	-	-	-	-	-	-	-	-	2	1	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	2	3	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	2	3	-	-
CO4	3	2	2	2	-	-	-	-	-	-	-	2	3	-	-

Correlation Levels: **1**-Slight (Low), **2**-Moderate (Medium), **3**-Substantial (High) and No correlation: **'-'**

TEXT BOOKS:

T1: Simon Haykin, *"Digital Communications",* John Wiley & sons, 2nd Edition.
T2: Taub and Schilling, *"Principles of Communication Systems"*, TMH Publications, 3rd edition.

REFERENCE BOOKS:

R1: J. S. Chitode, *"Digital Communications",* Technical Publications, first edition.
R2: V.ChandraSekar**,** *"Communication Systems",*Oxford University Press**.**

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section - B

UNIT-I: Pulse Digital Modulation

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to the course – Digital Communications, CEOs, COs & POs	1	03-07-24			
2.	Introduction to Unit-I	1	04-07-24			
3.	Elements of a Digital Communication System	1	05-07-24			
4.	Sampling and Quantization of signals	1	06-07-24			
5.	Derivation for Quantization noise	1	10-07-24			
6.	Introduction to Pulse Code Modulation (PCM) System - Transmitter	1	11-07-24			
7.	Pulse Code Modulation (PCM) System - Receiver	1	12-07-24			
8.	Calculation of output SNR in PCM	1	18-07-24			
9.	Need for non-uniform quantization-Companding- μ-law, A-law	1	19-07-24			
10.	Differential Pulse Code Modulation	1	20-07-24			
11.	Delta Modulation	1	24-07-24			
12.	Examples on PCM and DM	1	25-07-24			
13.	Adaptive Delta Modulation	1	26-07-24			
No. of classes required to complete UNIT-I		**13**	**No. of classes taken**			

UNIT-II: Optimal Reception of Digital Signal

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
14.	Introduction to Unit-II	1	27-07-24			
15.	Model of digital communication system	1	31-07-24			
16.	Gram- Schmidt orthogonalization procedure	1	01-08-24			
17.	Gram- Schmidt orthogonalization procedure	1	02-08-24			
18.	Geometric interpretation of signals	1	03-08-24			
19.	Response of bank of correlators to noisy input	1	07-08-24			
20.	Detection of known signals in noise: Maximum likelihood detector	1	08-08-24			
21.	Probability of error	1	09-08-24			
22.	Correlation Receiver	1	14-08-24			
23.	Matched Filter Receiver	1	16-08-24			
24.	Matched Filter Receiver	1	17-08-24			
25.	Probability of error for matched filter	1	21-08-24			
No. of classes required to complete UNIT-II		**12**	**No. of classes taken**			

UNIT-III: Digital Modulation Techniques

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
26.	Introduction to Unit - III	1	22-08-24			
27.	Wave form representation of different digital modulation techniques	2	23-08-24 24-08-24			
28.	Amplitude Shift Keying	1	28-08-24			
29.	Coherent Binary Phase Shift Keying	1	29-08-24			
30.	**Quadrature Phase Shift Keying**	**2**	30-08-24 31-08-24			
31.	Differential PSK	1	11-09-24			
32.	Coherent Frequency Shift Keying	1	12-09-24			
33.	Probability of error for BASK	1	13-09-24			
34.	Probability of error for BPSK	1	18-09-24			
35.	Probability of error for BFSK	1	19-09-24			
No. of classes required to complete UNIT-III		**12**	**No. of classes taken**			

UNIT-IV: Information Theory and Source Coding

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
36.	Introduction to Unit-IV	1	20-09-24			
37.	Discrete message and information content	1	21-09-24			
38.	Concept of Information, Average Information, Entropy, Information rate	1	25-09-24			
39.	Mutual information and its properties	1	26-09-24			
40.	Introduction to source coding, source coding theorem	1	27-09-24			
41.	Shannon-Fano coding - Problems	1	28-09-24			
42.	Huffman coding - Problems	1	03-10-24			
43.	Solving Problems	1	04-10-24			
44.	Channel Capacity of Gaussian channel	1	05-10-24			
45.	BW-SNR tradeoff	1	09-10-24			
No. of classes required to complete UNIT-IV		**10**	**No. of classes taken**			

UNIT-V: Linear Block codes and Convolutional codes

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
46.	Introduction to Unit-IV – Channel coding	1	10-10-24			
47.	Linear Block Codes (LBC) – Matrix Representation, Encoding	1	12-10-24			
48.	Syndrome decoding of LBC	1	16-10-24			
49.	Error detection and correction capabilities of LBC	1	17-10-24			
50.	Solving Problems	1	18-10-24			
51.	Introduction to Binary cyclic codes – Systematic and non systematic form.	1	19-10-24			

52.	Binary cyclic codes – Encoding and Syndrome Calculation	1	23-10-24			
53.	Convolution codes- time domain, transform domain	1	24-10-24			
54.	Convolution codes- Transform domain	1	25-10-24			
55.	State diagrams, Trellis, Tree diagrams	1	26-10-24			
56.	Decoding using Viterbi algorithm	1	30-10-24			
57.	Decoding using Viterbi algorithm	1	01-11-24			
58.	Solving Problems	1	02-11-24			
No. of classes required to complete UNIT-V		**13**	**No. of classes taken**			

Contents beyond the Syllabus

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
59.		**1**				

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:

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
Cumulative Internal Examination (CIE) = 80% of Max((M1+Q1+A1) , (M2+Q2+A2)) + 20% of Min((M1+Q1+A1) , (M2+Q2+A2))	30
Semester End Examination (SEE) (Unit-I, Unit – II, Unit –III, Unit-IV and Unit-V)	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.
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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.
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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.
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PO 12:	**Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1:	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
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PSO 3:	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. M Sambasiva Reddy	Mr.M Sambasiva Reddy	Dr. M Venkata Sudhakar	Dr. G.Srinivasulu

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L B Reddy Nagar, Mylavaram-521 230, NTR District, Andhra Pradesh.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr. M.Sambasiva Reddy

Course Name & Code : Digital Communications – 20EC09

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

Program/Sem/Sec : B.Tech., ECE., V-Sem., Section- C A.Y : 2024-25

PRE-REQUISITE: Analog Communications.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

This course provides the knowledge on different digital modulation techniques. The course also provides different concepts on information theory, block codes and convolution codes. It gives the methods of optimum receivers for digital communication systems and performance of probability of error for digital modulation techniques.

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

CO 1	**Understand** the concepts of digital communication system **(Understand – L2)**
CO 2	**Analyze** the Baseband and Pass band digital modulation techniques **(Analyze – L3)**
CO 3	**Examine** the optimum reception and probability of error of digital modulation **(Apply – L3)**
CO 4	**Apply** source coding and error control coding techniques in digital communication process **(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	1	1	-	-	-	-	-	-	-	-	2	1	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	2	3	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	2	3	-	-
CO4	3	2	2	2	-	-	-	-	-	-	-	2	3	-	-

Correlation Levels: **1**-Slight (Low), **2**-Moderate (Medium), **3**-Substantial (High) and No correlation: **'-'**

TEXT BOOKS:

T1: Simon Haykin, *"Digital Communications",* John Wiley & sons, 2nd Edition.

T2: Taub and Schilling, *"Principles of Communication Systems"*, TMH Publications, 3rd edition.

REFERENCE BOOKS:

R1: J. S. Chitode, *"Digital Communications",* Technical Publications, first edition.

R2: V.ChandraSekar**,** *"Communication Systems",*Oxford University Press**.**

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section - C

UNIT-I: Pulse Digital Modulation

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to the course – Digital Communications, CEOs, COs & POs	1	01-07-24			
2.	Introduction to Unit-I	1	01-07-24			
3.	Elements of a Digital Communication System	1	04-07-24			
4.	Sampling and Quantization of signals	1	06-07-24			
5.	Derivation for Quantization noise	1	08-07-24			
6.	Introduction to Pulse Code Modulation (PCM) System - Transmitter	1	08-07-24			
7.	Pulse Code Modulation (PCM) System - Receiver	1	11-07-24			
8.	Calculation of output SNR in PCM	1	15-07-24			
9.	Need for non-uniform quantization-Companding- μ-law, A-law	1	15-07-24			
10.	Differential Pulse Code Modulation	1	18-07-24			
11.	Delta Modulation	1	20-07-24			
12.	Examples on PCM and DM	1	22-07-24			
13.	Adaptive Delta Modulation	1	22-07-24			
No. of classes required to complete UNIT-I		**13**	**No. of classes taken**			

UNIT-II: Optimal Reception of Digital Signal

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
14.	Introduction to Unit-II	1	25-07-24			
15.	Model of digital communication system	1	27-07-24			
16.	Gram- Schmidt orthogonalization procedure	1	29-07-24			
17.	Gram- Schmidt orthogonalization procedure	1	01-08-24			
18.	Geometric interpretation of signals	1	03-08-24			
19.	Response of bank of correlators to noisy input	1	05-08-24			
20.	Detection of known signals in noise: Maximum likelihood detector	1	05-08-24			
21.	Probability of error	1	08-08-24			
22.	Correlation Receiver	1	12-08-24			
23.	Matched Filter Receiver	1	12-08-24			
24.	Matched Filter Receiver	1	17-08-24			
25.	Probability of error for matched filter	1	19-08-24			
No. of classes required to complete UNIT-II		**12**	**No. of classes taken**			

UNIT-III: Digital Modulation Techniques

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
26.	Introduction to Unit - III	1	19-08-24			
27.	Wave form representation of different digital modulation techniques	2	22-08-24 24-08-24			
28.	Amplitude Shift Keying	1	28-08-24			
29.	Coherent Binary Phase Shift Keying	1	29-08-24			
30.	**Quadrature Phase Shift Keying**	**1**	31-08-24			
31.	Differential PSK	1	09-09-24			
32.	Coherent Frequency Shift Keying	1	09-09-24			
33.	Probability of error for BASK	1	12-09-24			
34.	Probability of error for BPSK	1	16-09-24			
35.	Probability of error for BFSK	1	16-09-24			
No. of classes required to complete UNIT-III		**12**	**No. of classes taken**			

UNIT-IV: Information Theory and Source Coding

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
36.	Introduction to Unit-IV	1	19-09-24			
37.	Discrete message and information content	1	21-09-24			
38.	Concept of Information, Average Information, Entropy, Information rate	1	23-09-24			
39.	Mutual information and its properties	1	23-09-24			
40.	Introduction to source coding, source coding theorem	1	26-09-24			
41.	Shannon-Fano coding - Problems	1	28-09-24			
42.	Huffman coding - Problems	1	30-09-24			
43.	Solving Problems	1	30-09-24			
44.	Channel Capacity of Gaussian channel	1	03-10-24			
45.	BW-SNR tradeoff	1	05-10-24			
No. of classes required to complete UNIT-IV		**10**	**No. of classes taken**			

UNIT-V: Linear Block codes and Convolutional codes

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
46.	Introduction to Unit-IV – Channel coding	1	07-10-24			
47.	Linear Block Codes (LBC) – Matrix Representation, Encoding	1	07-10-24			
48.	Syndrome decoding of LBC	1	10-10-24			
49.	Error detection and correction capabilities of LBC	1	14-10-24			
50.	Solving Problems	1	14-10-24			
51.	Introduction to Binary cyclic codes – Systematic and non systematic form.	1	17-10-24			

52.	Binary cyclic codes – Encoding and Syndrome Calculation	1	19-10-24			
53.	Convolution codes- time domain, transform domain	1	21-10-24			
54.	Convolution codes- Transform domain	1	21-10-24			
55.	State diagrams, Trellis, Tree diagrams	1	24-10-24			
56.	Decoding using Viterbi algorithm	1	26-10-24			
57.	Decoding using Viterbi algorithm	1	28-10-24			
58.	Solving Problems	1	28-10-24			
No. of classes required to complete UNIT-V		**13**	**No. of classes taken**			

Contents beyond the Syllabus

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
59.		**1**	02-11-24			

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:

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
Cumulative Internal Examination (CIE) = 80% of Max((M1+Q1+A1) , (M2+Q2+A2)) + 20% of Min((M1+Q1+A1) , (M2+Q2+A2))	30
Semester End Examination (SEE) (Unit-I, Unit – II, Unit –III, Unit-IV and Unit-V)	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:	**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:	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2:	**VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3:	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. M Sambasiva Reddy	Mr.M Sambasiva Reddy	Dr. M Venkata Sudhakar	Dr. G.Srinivasulu

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L.B.Reddy Nagar, Mylavaram-521230, NTR Dist, Andhra Pradesh, India.
Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. B. Siva Hari Prasad
Course Name & Code : Antennas and Wave Propagation & 20EC10
L-T-P Structure : 3-0-0 Credits: 3
Program/Sem/Sec : B.Tech., ECE., V-Sem., Sections- C A.Y :2024-25

Pre-Requisites: EM Waves and Transmission Lines.

Course Objectives: This course provides the knowledge on Antennas and Radiation fundamentals. The course will expose different types of Antennas and their applications. The course also gives the complete information regarding Propagation of Radio wave in atmosphere.

Course Outcomes (COs): At the end of the course, students are able to

CO1	**Understand** basic antenna parameters**,** radiation mechanism, characteristics of radio wave propagations **(Understand – L2)**
CO2	**Analyze** wire antenna, ground, space, and sky wave propagation mechanism for communication purpose and various Antenna Arrays **(Analyze – L4)**
CO3	**Design** HF, VHF and UHF Antennas **(Apply – L3)**
CO4	**Apply** antenna measurement methods to assess antenna's performance **(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	1	1	-		-	-	-		-	1	3	-	-
CO2	3	2	1	1	-	-	-	-	-	-	-	1	3	-	-
CO3	2	3	2	1	-	-	-	-	-	-	-	2	3	-	-
CO4	1	2	3	2	-	-			-	-	-	2	3	-	-

Correlation Levels: **1**-Slight (Low), **2**-Moderate (Medium), **3**-Substantial (High) and No correlation: **'-'**

TEXT BOOK(S):

T1 Constantine A. Balanis, "Antenna Theory: Analysis and Design", John Wiley & sons Publishers,2nd Edition

T2 G.S.N Raju, "Antennas and Wave Propagation", Pearson Education Publishers.

REFERENCE BOOK(S):

R1 Jordan and Balmain, Electromagnetic fields and Radiating systems, Pearson Education Publishers.

R2 John D. Kraus, "Antennas and Wave Propagation", TMH Publishers

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-C

UNIT-I: Antenna Fundamentals and Radiation fundamentals:

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Course and COs	2	01-07-2024 03-07-2024			
2.	Introduction to Unit-I	1	04-07-2024			
3.	Radiation mechanism-Single wire Antenna	1	05-07-2024			
4.	Current Distribution on a thin wire antenna	1	08-07-2024			
5.	Isotropic Radiators, Directional Antennas	1	10-07-2024			
6.	Antenna Parameters**:** Radiation intensity, Radiation Pattern,	1	11-07-2024			
7.	Total Power radiated, gain, Directivity, Radiation efficiency	1	12-07-2024			
8.	Power gain, HPBW, FNBW, effective aperture, effective length, Band Width	2	15-07-2024			
9.	Potential functions-heuristic approach, Maxwell's equation approach	2	18-07-2024 19-07-2024			
10.	Potential functions for sinusoidal oscillations	1	22-07-2024			
11.	Analysis of Radiation fields of a Alternating current element	1	24-07-2024			
12.	Quarter wave Monopole and half wave dipole	2	25-07-2024 26-07-2024			
13.	Power radiated by current element	1	29-07-2024			
14.	Radiation resistance of current element, quarter wave Monopole and half wave dipole	1	31-07-2024			
No. of classes required to complete UNIT-I : 17			No. of classes taken :			

UNIT-II: Antennas Array Analysis:

S. No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
15.	Various forms of Antenna Arrays	1	01-08-2024			
16.	Linear Array of Two Point Sources	1	02-08-2024			
17.	Linear Array of and N-Point Sources	1	05-08-2024			
18.	Expression for electric field from two element arrays	1	07-08-2024			
19.	Expression for electric field from N element arrays,	1	08-08-2024			
20.	Broad-side array	1	09-08-2024			
21.	End-Fire array	1	12-08-2024			
22.	Method of pattern multiplication	1	14-08-2024			

23.	Binomial array	1	16-08-2024			
24.	Loop Antenna	1	19-08-2024			
No. of classes required to complete UNIT-II		**10**	No. of classes taken:			

UNIT-III: HF, VHF and UHF Antennas:

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
25.	Resonant and Non resonant antennas	1	21-08-2024			
26.	Helical Antenna	2	22-08-2024 23-08-2024			
27.	Travelling wave antennas – V Antenna	1	28-08-2024			
28.	Inverted V Antenna	1	29-08-2024			
29.	Rhombic Antenna	1	30-08-2024			
30.	Broadband Antennas-Folded Dipole	2	09-09-2024 11-09-2024			
31.	Yagi-Uda Antenna	1	12-09-2024			
32.	Log-Periodic Antenna	1	13-09-2024			
No. of classes required to complete UNIT-III : 10				No. of classes taken:		

UNIT-IV: Microwave Antennas & Antenna Measurements:

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
33.	Horn Antenna & Types	2	18-09-2024 19-09-2024			
34.	Reflector Antennas- Corner Reflector	1	20-09-2024			
35.	Parabolic Reflector – (Geometry, types of feeds, F/D Ratio, Spill Over, Back Lobes)	2	23-09-2024 25-09-2024			
36.	Lens Antenna, Fundamentals of Rectangular Patch antenna	2	26-09-2024 27-09-2024			
37.	Measurement of Antenna parameters-Directional pattern	1	30-09-2024			
38.	Radiation resistance	1	03-10-2024			
39.	Gain (Two Antenna, Three Antenna Methods)	1	04-10-2024			
40.	Directivity, Beam width	1	07-10-2024			
41.	SLR	1	09-10-2024			
42.	Polarization, Impedance	1	10-10-2024			
No. of classes required to complete UNIT-IV: 13			No. of classes taken:			

UNIT-V: Wave Propagation, Ground Wave Propagation, Sky Wave Propagation, Space Wave Propagation

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly

43.	Concepts of Propagation-frequency ranges	1	14-10-2024			
44.	Types of propagation	1	16-10-2024			
45.	Formation of Ionospheric Layers and their Characteristics	1	17-10-2024			
46.	Mechanism of Reflection and Refraction	1	18-10-2024			
47.	Critical Frequency	1	21-10-2024			
48.	MUF & Skip Distance	1	23-10-2024			
49.	Optimum Frequency	1	24-10-2024			
50.	LUHF, Virtual Height	1	25-10-2024			
51.	Fundamental Equation for free space Propagation	1	28-10-2024			
52.	Basic Transmission Loss Calculations	1	30-10-2024			
53.	Space Wave Propagation Mechanism	1	01-11-2024			
54.	LOS and Radio Horizon	1	04-10-2024			
55.	Duct Propagation	1	06-11-2024			
No. of classes required to complete UNIT-V :13			No. of classes taken			

Contents beyond the Syllabus

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Design of microstrip patch Antennas	1	07-11-2024 08-11-2024		TLM2	

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:

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
Cumulative Internal Examination (CIE) = 80% of Max((M1+Q1+A1) , (M2+Q2+A2)) + 20% of Min((M1+Q1+A1) , (M2+Q2+A2))	30
Semester End Examination (SEE) (Unit-I, Unit – II, Unit –III, Unit-IV and Unit-V)	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 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:	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2:	**VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3:	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Date:

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr. B. Siva Hari Prasad	Dr. B.Y.V.N.R.Swamy	Dr. M. V. Sudhakar	Dr. Y. Amar Babu

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L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF ELECTRONICS& COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Smt.T.Kalpana
Course Name & Code : Linear IC Applications – 20EC11
L-T-P Structure : 3-0-0 Credits: 3
Program/Sem/Sec : B.Tech., ECE., V-Sem., Section- C A.Y : 2024-25

PRE-REQUISITE: Analog electronic circuits

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course provides the knowledge on basic Integrated Circuit (IC), Op-amp internal structure and various open-loop and closed loop applications of it. Design of Active Filters and different waveform generators. It provides the importance of 555 timer and its applications. It also explains the Phased Locked Loop, its applications and ADC and DAC converters.

COURSE OUTCOMES (CO): At the end of the course, students will be able to

CO1:	**Identify** the building blocks of linear integrated circuits, characteristics and application of Op-Amps (Understand – L2)
CO2:	**Apply** the concept of feedback to op-amps for linear and non-linear applications. (Apply – L3).
CO3:	**Analyze** Op-Amp, 555 timer applications, phase locked loops to perform addition and multiplication of signals and voltage regulators using Linear ICs (Analyze – L4)
CO4:	**Design** active filters, waveform generators and data converters using Op Amps (Apply – L3)

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	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	2	1	1	-	-	-	2	-	-	-	1	-	1	-
CO2	3	2	2	-	-	-	-	2	-	-	-	1	-	2	-
CO3	3	3	1	-	-	-	-	2	-	-	-	1	-	2	-
CO4	3	2	3	1	-	-	-	2	-	-	1	1	-	3	-

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 Ramakanth A.Gayakwad, Op-amps and Linear Integrated Circuits, Third edition, PHI Publishers, 2006.

T2 Roy Choudhury D., Linear Integrated Circuits, Second edition, New Age International (P) Ltd.

BOS APPROVED REFERENCE BOOKS:

R1 Adel S. Sedra and Kenneth Carless Smith, Microelectronic Circuits, Fifth Edition. Oxford University Press
R2 Rashid M. H., Microelectronic Circuits: Analysis and Design, Second edition, PWS Publishing Company.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN):
UNIT-I : TRANSISTOR CURRENT SOURCES & DIFFERENTIAL AMPLIFIERS

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 the Subject , Discussion about Syllabus and course outcomes	1	01.07.2024			
2.	Basic Current Source	1	02.07.2024			
3.	Widlar Current Source	1	05.07.2024			
4.	Cascode Current Source	1	06.07.2024			
5.	Wilson Current Source	1	08.07.2024			
6.	Differential Amplifier:Classifications	1	09.07.2024			
7.	DC & AC Analysis of Dual input balanced output & balanced output DA	1	12.07.2024			
8.	DC & AC Analysis of Dual input unbalanced output & unbalanced output DA	1	13.07.2024			
9.	DC & AC Analysis of Single input balanced output & unbalanced output DA	1	15.07.2024			
10.	DC & AC Analysis of single input unbalanced output & unbalanced output DA	1	16.07.2024			
11.	Specifications ,FET Differential amplifier	1	19.07.2024			
12.	Level Translator	1	20.07.2024			
13.	Current mirror circuit	1	22.07.2024			
14.	Assignment	1	23.07.2024			
No. of classes required to complete UNIT-I :		14	No. of classes taken:			

UNIT-II : OPERATIONAL AMPLIFIERS (OP-AMPS) & APPLICATIONS OF OP-AMPS

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

		Required	Completion	Completion	Methods	Weekly
15.	OP- Amp: Block Diagram	1	26.07.2024			
16.	Ideal & Practical Op-Amp and its characteristics	1	27.07.2024			
17.	DC and AC Characteristics of Op-Amp	1	29.07.2024			
18.	IC 741 specifications	1	30.07.2024			
19.	Measurement of slew rate and CMMR	1	02.08.2024			
20.	Application of Op Amps:Inverting and Non-inverting amplifier	1	03.08.2024			
21.	Integrator & Differentiator	1	05.08.2024			
22.	Difference Amplifier, Instrumentation amplifier	1	06.08.2024			
23.	Analog Multiplier, V to I converters, I to V converters	1	09.08.2024			
24.	Rectifiers , Sample and Hold circuit	1	10.08.2024			
25.	Log and Antilog amplifier	1	12.08.2024			
26.	Integrator & Differentiator	1	13.08.2024			
27.	Assignment	1	16.08.2024			
No. of classes required to complete UNIT-II		13	No. of classes taken:			

UNIT-III : OP-AMP ACTIVE FILTERS, OP-AMP WAVEFORM GENERATORS & OP-AMP SINE WAVE OSCILLATORS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
28.	Introduction to Op-amp Active Filters :1st order Low pass filter using OP-Amp	1	17.08.2024			
29.	1st order High pass filter using OP-Amp	1	19.08.2024			
30.	2nd order Low pass s filter using OP-Amp	1	20.08.2024			
31.	2nd order High pass filter using OP-Amp	1	23.08.2024			

32.	Band pass filter	1	24.08.2024			
33.	Band reject filters and All pass filter	1	27.08.2024			
34.	Op-amp wave form generators**:** Comparator	1	30.08.2024			
35.	Design and analysis of Schmitt trigger	1	31.08.2024			
36.	Astable Multivibrator	1	09.09.2024			
37.	Monostable Multivibrator	1	10.09.2024			
38.	Triangular wave Generators	1	13.09.2024			
39.	Op-amp sine wave oscillators:Design and analysis of RC phase shift oscillator	1	14.09.2024			
40.	Wein Bridge oscillator	1	16.09.2024			
41.	Assignment	1	17.09.2024			
No. of classes required to complete UNIT-III		14	No. of classes taken:			

UNIT-IV : 555 TIMER & IC VOLTAGE REGULATORS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
42.	Introduction	1	20.09.2024			
43.	Functional Diagram-Monostable multivibrators	1	21.09.2024			
44.	Monostable multivibrators Applications	1	23.09.2024			
45.	Monostable Applications	1	24.09.2024			
46.	Functional Diagram-Astable multivibrators	1	27.09.2024			
47.	Astable multivibrators and Applications	1	28.09.2024			
48.	VCO - IC 566 & its features	1	30.09.2024			
49.	IC 565 PLL Block Schematic	1	01.10.2024			
50.	Applications of PLL	1	04.10.2024			
51.	Applications of PLL	1	05.10.2024			

52.	IC Voltage Regulators: Fixed Voltage Regulators	1	07.10.2024			
53.	IC723 General Purpose Regulator	1	08.10.2024			
54.	Assignment	1	12.10.2024			
No. of classes required to complete UNIT-IV		13		No. of classes taken:		

UNIT-V : DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
55.	Introduction	1	14.10.2024			
56.	Digital to Analog Converters: Weighted resistor DAC	1	15.10.2024			
57.	Digital to Analog Converters: Weighted resistor DAC	1	18.10.2024			
58.	R-2R Ladder DAC	1	19.10.2024			
59.	Inverted R-2R DAC	1	21.10.2024			
60.	Analog to Digital Converters: Flash Type ADC	1	22.10.2024			
61.	Counter Type ADC	1	25.10.2024			
62.	Successive Approximation ADC	1	26.10.2024			
63.	Charge Balancing ADC	1	28.10.2024			
64.	Dual Slope ADC	1	29.10.2024			
65.	Assignment	1	01.11.2024			
No. of classes required to complete UNIT-V:		11		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
66.	Introduction to VLSI and Applications of VLSI	1	02.11.2024			

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:

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
Cumulative Internal Examination (CIE) = 80% of Max((M1+Q1+A1) , (M2+Q2+A2)) + 20% of Min((M1+Q1+A1) , (M2+Q2+A2))	30
Semester End Examination (SEE)(Unit-I, Unit – II, Unit –III, Unit-IV and Unit-V)	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	**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	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2	**VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Course Instructor	Course Coordinator	Module Coordinator	HOD
Smt.T.Kalpana	Dr.B.poornaiah	Dr.T.Satyanarayana	Dr.G.Srinivasulu

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

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. K.Ravi Kumar, Associate Professor
Course Name & Code : Data Communication & Computer Network – 20EC14 **Regulation**: R20
L-T-P Structure : 3-0-0 **Credits:** 03
Program/Sem/Sec : B. Tech. V-Sem., ECE C-Section **A.Y.:** 2024-25

PREREQUISITE: Digital Communications

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course provides knowledge on Data Communication and Computer Networks and various protocols used in different layers.

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

CO1	**Understand** the functions of the OSI, TCP/IP reference models. **(Understand – L2)**
CO2	**Summarize** design issues for layer protocols. **(Understand – L2)**
CO3	**Examine** the routing algorithms to find shortest paths for packet delivery. **(Apply – L3)**
CO4	**Interpret** the operations of 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	2	3	1	-	-	-	-	-	-	-	-	3	3	-	-
CO2	2	1	1	-	-	-	-	-	-	-	-	2	3	-	-
CO3	3	3	-	2	2	-	-	-	-	-	-	2	3	-	-
CO4	2	2	-	-	-	-	-	-	-	-	-	3	3	-	-
1 - Low					**2** –Medium							**3** - High			

TEXTBOOKS:

T1 Tanenbaum and Wetherall, "Computer Networks", Pearson Education, 5th Edition.

T2 Behrouz A. Forouzan, "Data Communication and Networking", 4th Edition, Tata McGraw hill, New Delhi, 2006.

REFERENCE BOOKS:

R1 S. Keshav, "An Engineering Approach to Computer Networks", Pearson Education, 2nd Edition.

R2 W. A. Shay, "Understanding Communications and Networks", Cengage Learning, 3rd Edition

PART-B

COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I: Introduction, Physical 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
1.	CO discussion and overview of Syllabus	1	01-07-2024			
2.	Introduction to Data Communication and Computer Networks	2	02-07-2024 04-07-2024			
3.	Network Hardware	2	05-07-2024 08-07-2024			
4.	Network software	1	09-07-2024			
5.	Network models LAN, WAN, MAN,	1	11-07-2024			
6.	OSI Reference Model	1	12-07-2024			
7.	TCP/IP Reference Model	1	15-07-2024			
8.	Comparison between OSI and TCP/IP	1	16-07-2024			
9.	Critique of OSI and TCP/IP	1	18-07-2024			
10.	Physical Layer: Guided Transmission Medium	1	19-07-2024			
11.	Guided Transmission Medium	1	22-07-2024			
12.	Wireless Transmission Medium	1	23-07-2024			
No. of classes required to complete UNIT-I: 14				**No. of classes taken:**		

UNIT-II: Data Link Layer, Medium Access Control 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
13.	Introduction to DLL, Design Issues	1	25-07-2024			
14.	Framing Methods	1	26-07-2024			
15.	Error Detection and Correction Codes	1	29-07-2024			
16.	CRC, Checksum	1	30-07-2024			
17.	Stop & wait, Sliding window, one bit, go-back -n, Selective repeat protocols,	2	01-08-2024 02-08-2024			
18.	MAC sub layer, channel allocation problem	1	05-08-2024			
19.	Multiple Access protocols- ALOHA, CSMA protocols, CSMA with collision detection, Collision free protocols	2	06-08-2024 08-08-2024			
20.	Ethernet	1	09-08-2024			
21.	Wireless LANs-Infrastructure, Protocol stack	1	12-08-2024			
22.	MAC frame, 802.11 services	1	13-08-2024			
23.	Bluetooth-Architecture, Protocol stack, Frame structure	2	16-08-2024 19-08-2024			
No. of classes required to complete UNIT-II: 14				**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
24.	Network Layer Design Issues- store	1	20-08-2024			

	and forward					
25.	Datagrams and virtual circuits	1	22-08-2024			
26.	Routing algorithms- Optimality Principle	1	23-08-2024			
27.	Shortest Path Algorithm, Flooding,	1	27-08-2024			
28.	Distance vector routing	2	29-08-2024 30-08-2024			
29.	Link state routing	1	09-09-2024			
30.	Hierarchical routing	1	10-09-2024			
31.	Board cast routing & Multicast Routing	1	12-09-2024			
32.	Congestion control in data subnets, warning bits	1	13-09-2024			
33.	Load shedding, choke packets, Jitter control, RED	2	17-09-2024 19-09-2024			
No. of classes required to complete UNIT-III: 12				**No. of classes taken:**		

UNIT-IV: Internetworking, 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
34.	Internetworking	1	20-09-2024			
35.	Tunneling, Packet Fragmentation	1	23-09-2024			
36.	Network Layer in the Internet	2	24-09-2024 26-09-2024			
37.	IPv4	1	27-09-2024			
38.	IPV6, comparison between IPv4 and IPv6	1	30-09-2024			
39.	Internet control protocols, OSPF BGP	1	01-10-2024			
40.	Transport layer services to the upper Layers	1	03-10-2024			
41.	Addressing, Connection establishment	2	04-10-2024 07-10-2024			
42.	Connection release, Crash Recovery	1	08-10-2024			
No. of classes required to complete UNIT-IV: 11				**No. of classes taken:**		

UNIT-V: The Internet Transport Protocols, 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
43.	Internet transport protocols: UDP-RPC, Real Time Transport Protocols	1	10-10-2024			
44.	Internet transport protocols: TCP, TCP service model	1	17-08-2024			
45.	TCP Segment Header	1	18-10-2024			
46.	Domain Name system	1	21-10-2024			
47.	Email Architecture and services, SMTP	1	22-10-2024			
48.	WWW and its architecture	1	24-10-2024			
49.	FTP, FTP Commands & Replies	1	25-10-2024			
50.	Structure of Management Information	1	28-10-2024			
51.	Management Information Base	1	29-10-2024			
52.	Simple Network Management Protocol	1	01-11-2024			

No. of classes required to complete UNIT-V: 10	No. of classes taken:

Contents beyond the Syllabus:

S. No.	Topics	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
55.	Network Security	1	14-10-2024			
56.	Mobile Networks	1	15-10-2024			
No. of classes required to complete beyond syllabus: 02				**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 EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	To Attain a solid foundation in Electronics & Communication Engineering fundamentals with an attitude to pursue continuing education
PEO 2	To Function professionally in the rapidly changing world with advances in technology
PEO 3	To Contribute to the needs of the society in solving technical problems using Electronics & Communication Engineering principles, tools and practices
PEO 4	To Exercise leadership qualities, at levels appropriate to their experience, which addresses issues in a responsive, ethical, and innovative manner?

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	Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry
PSO 2	Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3	Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Date: 27-06-2024

Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Dr. K. Ravi Kumar	**Dr.K.Ravi Kumar**	**Dr. M. V. Sudhakar**	**Dr. G. Srinivasulu**

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : B. Sarath Chandra

Course Name & Code : OOP through JAVA**(20IT81)**

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

Program/Sem/Sec : B.Tech. –ECE / V-Sem /C A.Y.: 2024 – 25

PRE-REQUISITE: Programming for Problem Solving Using C

COURSE EDUCATIONAL OBJECTIVE (CEO): Concentrates on the methodological and technical aspects of software design and Programming based on Object-Oriented Programming (OOP). Acquire the basic knowledge and skills necessary to implement Object-Oriented Programming Techniques in software development through JAVA. Know about the importance of Collections and GUI based applications through JAVA.

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

CO1	Understand Object Oriented Programming Concepts through constructs of JAVA. **(Understand- L2)**
CO2	Apply the concepts of Inheritance and Polymorphism on real-world applications. **(Apply - L3)**
CO3	Implement reusability using interface and packages**. (Understand- L2)**
CO4	Construct robust applications using exception handling. **(Apply - L3)**
CO5	Understand multi-threading concepts. **(Understand - L2)**

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

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

TEXTBOOK:

T1: Java Fundamentals – A comprehensive Introduction, Herbert Schildt and Dale Skrien, TMH.

REFERENCE BOOKS:

R1: The Java™ Programming Language: Ken Arnold, James Gosling, Pearson

R2: Introduction to Java Programming 7/e, Brief version, Y.Daniel Liang, Pearson

R3: Java for Programmers, P.J.Deitel and H.M.Deitel, Pearson education (OR) Java: How to Program P.J.Deitel and H.M.Deitel, PHI.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT – I: Introduction to OOP & JAVA:

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.	Java Buzzwords / Features	1	1-7-2024		TLM1,2	
2.	Object Oriented Programming **(OOP)** concepts	1	3-7-2024		TLM1,2	
3.	Java History, Advantages	1	4-7-2024		TLM1,2	
4.	Datatypes, Operators, Expressions	1	6-7-2024		TLM1,2	
5.	Control Statements	1	8-7-2024		TLM1,2	
6.	Methods and recursion , Sample programs	1	10-7-2024		TLM1,2	
7.	Java Objects and References	1	11-7-2024		TLM1,2	
8.	Constructors	2	13-7-2024 15-7-2024		TLM1,2	
9.	this keyword	1	18-7-2024		TLM1,2	
10.	Arrays (single and multi-dimensional),	1	20-7-2024		TLM1,2	
11.	String, StringBuffer, StringTokenizer Classes	1	22-7-2024		TLM1,2	
No. of classes required to complete UNIT – I: 12				**No. of classes taken:**		

UNIT – II: Extending Classes/ Reusability

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.	**Inheritance :** Introduction , Derived Classes, Advantages and Types of Inheritance	1	24-7-2024		TLM1,2	
13.	Implementation of Inheritance	2	25-7-2024 27-7-2024		TLM1,2	
14.	Inheritance and Member Accessibility	1	29-7-2024		TLM1,2	
15.	Overriding, super keyword	1	31-7-2024		TLM1,2	
16.	abstract classes and methods	2	1-8-2024 3-8-2024		TLM1,2	
17.	final keyword, final methods and final classes	1	5-8-2024		TLM1,2	
18.	Dynamic Binding, Polymorphism	2	7-8-2024 8-8-2024		TLM1,2	
No. of classes required to complete UNIT – II: 10				**No. of classes taken:**		

UNIT – III: Interfaces & Packages

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
19.	**Interfaces:** Differences between classes and interfaces	1	10-8-2024		TLM1,2	
20.	defining an interface	1	12-8-2024		TLM1,2	
21.	implementing interface	2	14-8-2024 17-8-2024		TLM1,2	
22.	variables in interface, extending interfaces	2	19-8-2024 21-8-2024		TLM1,2	
23.	**Packages:** Defining, Creating	1	22-8-2024		TLM1,2	
24.	Accessing a Package,	2	24-8-2024 28-8-2024		TLM1,2	
25.	importing packages,	1	29-8-2024		TLM1,2	
26.	access controls (public, protected, default and private).	1	31-8-2024		TLM1,2	
27.	Wrapper Classes (Like Integer, Float, Double).	1	9-9-2024		TLM1,2	
No. of classes required to complete UNIT – III: 12				**No. of classes taken:**		

UNIT – IV: Exception handling

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
28.	**Exception Handling:** Concepts of exception handling	1	11-9-2024		TLM1,2	
29.	benefits of exception handling	1	12-9-2024		TLM1,2	
30.	usage of try, catch	1	14-9-2024		TLM1,2	
31.	multiple catch clause	1	18-9-2024		TLM1,2	
32.	Nested try, throw	1	19-9-2024		TLM1,2	
33.	Throws	2	21-9-2024 23-9-2024		TLM1,2	
34.	Finally	1	25-9-2024		TLM1,2	
35.	built in exceptions	2	26-9-2024 28-9-2024		TLM1,2	
36.	creating own exception	2	30-9-2024 3-10-2024		TLM1,2	
No. of classes required to complete UNIT – IV: 12				**No. of classes taken:**		

UNIT – V: Multithreading

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.	Multithreading: Introduction	1	5-10-2024		TLM1,2	
38.	Thread life cycle	1	7-10-2024		TLM1,2	
39.	creating threads (by extending thread class)	2	9-10-2024 10-10-2024		TLM1,2	
40.	creating threads (implementing Runnable Interface)	2	12-10-2024 14-10-2024		TLM1,2	
41.	Example programs on threads	2	16-10-2024 17-10-2024		TLM1,2	
42.	Synchronization : method, Synchronization block	2	19-10-2024 21-10-2024		TLM1,2	

43.	Thread Priorities	1	23-10-2024		TLM1,2	
44.	isAlive() and join() methods	2	24-10-2023 26-10-2024		TLM1,2	
45.	Inter thread Communication	2	28-10-2024 30-10-2024		TLM1,2	
46.	Examples on ITC	1	2-11-2024			
No. of classes required to complete UNIT – V:16				**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 – DescriptiveExamination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I – QuizExamination (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.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**B.Sarath Chandra**	**Dr.K.Venu Gopal**	**Dr.K.Phaneendra**	**Dr.B.Srinivasa Rao**
Signature				

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Accredited by NAAC with "A" Grade and NBA (ECE, EEE, CSE, IT, MECH, CE & ASE) Under Tier-I
L B Reddy Nagar, Mylavaram-521 230, NTR District, Andhra Pradesh.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr.K.Ravi Kumar/ Mr.K.V. Ashok

Course Name & Code : Digital Communication Lab – 20EC57

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

Program/Sem/Sec : B.Tech., ECE., V-Sem., Section- C A.Y : 2024-25

PRE-REQUISITE: Analog Communications.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

This Course provides practical exposure on different aspects of digital communications. It demonstrates the importance of different modulation techniques in digital communication systems. It also gives the knowledge about different encoding and decoding techniques used in digital communication systems.

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

CO1	**Interpret** baseband and pass band modulation and demodulation techniques **(Understand– L2)**
CO2	**Apply** coding techniques for error detection and correction in digital data transmission **(Apply – L3)**
CO3	**Implement** frequency and phase shift keying techniques using Software Defined Radio **(Apply – L3).**
CO4	**Adopt** effective communication, presentation and report writing skills **(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	3	-	-
CO2	3	2	1	2	-	-	-	-	-	-	-	-	3	-	-
CO3	3	2	-	2	3	-	-	-	-	-	-	-	3	-	-
CO4	-	-	-	2	-	-	-	1	2	3		1	-	-	-

Correlation Levels: **1**-Slight (Low), **2**-Moderate (Medium), **3**-Substantial (High) and No correlation: **'-'**

TEXT BOOKS:

T1: Simon Haykin, *"Digital Communications",* John Wiley & sons, 2nd Edition.

T2: Taub and Schilling, *"Principles of Communication Systems"*, TMH Publications, 3rd edition.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section – B

Batch-1(22761A04D3 to 22761A04G7) Wednesday – AN

Expt. No	Experiment/s	COs	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
--	Introduction to DC Lab experiments, COs, POs and PSOs	--	3	03-07-2024			
Cycle – I							
1	Experiment – 1	CO1,CO4	3	10-07-2024			
2	Experiment – 2	CO1,CO4	3	24-07-2024			
3	Experiment – 4	CO1,CO4	3	31-07-2024			
4	Experiment – 5	CO1,CO4	3	07-08-2024			
5	Experiment – 10	CO1,CO4	3	14-08-2024			
6	Experiment – 11	CO2,CO4	3	21-08-2024			
Cycle – II							
7	Experiment – 3	CO1,CO4	3	28-08-2024			
8	Experiment – 6	CO1,CO4	3	11-09-2024			
9	Experiment – 7	CO2,CO4	3	18-09-2024			
10	Experiment – 8	CO3,CO4	3	25-09-2024			
11	Experiment – 9	CO3,CO4	3	09-10-2024			
12	Experiment – 12	CO3,CO4	3	16-10-2024			
13	Experiment beyond the syllabus		3	23-10-2024			
--	Internal Examination	--	3	30-10-2024			

Batch-2 (22761A04G8 to 22761A04J7 & 23765A0413 to 23765A0418) Saturday – FN

Expt. No	Experiment/s	COs	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
--	Introduction to DC Lab experiments, COs, POs and PSOs	--	3	06-07-2024			
Cycle – I							
1	Experiment – 1	CO1,CO4	3	20-07-2024			
2	Experiment – 2	CO1,CO4	3	27-07-2024			
3	Experiment – 4	CO1,CO4	3	03-08-2024			
4	Experiment – 5	CO1,CO4	3	17-08-2024			
5	Experiment – 10	CO1,CO4	3	24-08-2024			
6	Experiment – 11	CO2,CO4	3	31-08-2024			
Cycle – II							
7	Experiment – 3	CO1,CO4	3	21-09-2024			
8	Experiment – 6	CO1,CO4	3	28-09-2024			
9	Experiment – 7	CO2,CO4	3	05-10-2024			
10	Experiment – 8	CO3,CO4	3	12-10-2024			
11	Experiment – 9	CO3,CO4	3	19-10-2024			
12	Experiment – 12	CO3,CO4	3	26-10-2024			
13	Internal Examination		3	02-11-2024			

Experiments to be conducted:

Exp. No	CYCLE-1	Exp. No	CYCLE-2
1	Generate digital signal from analog using Pulse Code Modulation and reconstruct original signal.	3	Perform Adaptive Delta Modulation and obtain the reconstructed original signal.
2	Demonstrate the analog to digital conversion using Delta Modulation and Demodulation	6	Perform a digital modulation using Binary Phase Shift Keying and reconstruct theoriginal signal using coherent detection
4	Generate the Amplitude Shift Keying Modulated signal and reconstruct the originalsignal using demodulation.	7	Generate the digital modulated signal using Quadrature Phase shift Keying Modulation and reconstruct the original signal
5	Obtain the modulated and demodulated signals for Frequency Shift Keying	8	Examine the error detection and correction process using Linear Block Code
10	Binary Frequency Shift Keying Modulation and Demodulation	9	Apply the Binary Cyclic Code for error detection and correction of digital data
11	Binary Phase Shift Keying Modulation and Demodulation	12	Quadrature Phase Shift Keying Modulation and Demodulation

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:

Evaluation Task	**Expt. no's**	**Marks**
Day to Day work = **A**	1,2,3,4,5,6,7,8…	A = 05
Record = **B**	1,2,3,4,5,6,7,8…	B = 05
Internal Test = **C**	1,2,3,4,5,6,7,8…	C = 05
Cumulative Internal Examination : A + B + C = 15	1,2,3,4,5,6,7,8…	**15**
Semester End Examinations = D	1,2,3,4,5,6,7,8…	**D = 35**
Total Marks: A + B + C + D = 50	1,2,3,4,5,6,7,8…	**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:	**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:	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2:	**VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3:	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

.

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr.K.Ravi Kumar	Mr.K.V. Ashok	Dr. M Venkata Sudhakar	Dr. G.Srinivasulu

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COURSE HANDOUT

Part-A

PROGRAM : B.Tech., V-Sem., ECE-C

ACADEMIC YEAR : 2024-25

COURSE NAME & CODE : Linear IC Applications Lab – 20EC58
L-T-P STRUCTURE : 0-0-2

COURSE CREDITS : 1

COURSE INSTRUCTOR : Mrs.T.kalpana/Mrs.K.Balavani

COURSE COORDINATOR : Mrs.T.Kalpana

COURSE OBJECTIVES: This course provides the practical knowledge on Op-Amp applications like arithmetic circuits, filters and oscillators also provides knowledge on IC555 timer and IC723.

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

CO1 : Demonstrate the characteristics and applications of Op-Amps **(Understand – L2)**

CO2 : Apply the 555 Timer circuit concepts for the realization of waveform generators **(Apply – L3)**.

CO3 : Design Active filters, arithmetic circuits, waveform generators and data converters using Op-Amp **(Apply – L3)**

CO4 : Adapt effective Communication, presentation and report writing skills **(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	3	1	2	-	-	-	2	1	2	-	1	-	2	-
CO2	2	3	1	1	-	-	-	2	1	2	-	1	-	2	-
CO3	2	3	1	2	-	-	-	2	1	2	-	1	-	3	-
CO4	-	-	-	2	-	-	-	1	2	3		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).

Part-B

Batch-1

S. No.	Experiments	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Learning Outcome COs	Teaching Learning Methods	HOD Sign Weekly
1	Demonstration	3	03.07.2024		-	TLM1	
2	Experiment-1	3	10.07.2024		CO1&3	TLM4	
3	Experiment-2	3	24.07.2024		CO1&3	TLM4	
4	Experiment -3	3	31.07.2024		CO1	TLM4	
5	Experiment-4	3	07.08.2024		CO3	TLM4	
6	Experiment-5	3	14.08.2024		CO3	TLM4	
7	Experiment-6	3	21.08.2024		CO3	TLM4	
8	Experiment-7	3	28.08.2024		CO2	TLM4	
9	Experiment-8	3	04.09.2024		CO2	TLM4	
10	Experiment-9	3	11.09.2024		CO3	TLM4	
11	Experiment-10	3	18.09.2024		CO3	TLM4	
12	Experiment-11	3	25.09.2024		CO3	TLM4	
13	Revision	3	09.10.2024		-	TLM4	
14	Revision	3	16.10.2024		-	TLM4	
15	Experiment beyond syllabus	3	23.10.2024		-	TLM4	
16	Internal lab Exam	3	30.10.2024		-		

Batch-2

S. No.	Experiments	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Learning Outcome COs	Teaching Learning Methods	HOD Sign Weekly
1.	Demonstration	3	06.07.2024		-	TLM1	
2.	Experiment-1	3	13.07.2024		CO1&3	TLM4	
3.	Experiment-2	3	20.07.2024		CO1&3	TLM4	
4.	Experiment -3	3	27.07.2024		CO1	TLM4	
5.	Experiment-4	3	03.08.2024		CO3	TLM4	
6.	Experiment -5	3	10.08.2024		CO3	TLM4	
7.	Experiment-6	3	17.08.2024		CO3	TLM4	
8.	Experiment-7	3	24.08.2024		CO2	TLM4	
9.	Experiment-8	3	31.09.2024		CO2	TLM4	

10	Experiment-9	3	14.09.2024		CO3	TLM4	
11	Experiment-10	3	21.09.2024		CO3	TLM4	
12	Experiment-11	3	28.09.2024		CO3	TLM4	
13	Experiment beyond syllabus	3	05.10.2024		-	TLM4	
14	Revision	3	12.10.2024		-	TLM4	
15	Revision	3	19.10.2024		-	TLM4	
16	Internal lab Exam	3	26.10.2024		-		

List of Experiments:

Exp. No	Experiments to be conducted	Exp. No	Experiments to be conducted
CYCLE-1			CYCLE-2
1.	Verification of functionality of Inverting and Non-inverting amplifiers for the Sine and Square wave inputs.	7.	Design and Realization of 555 timer based Monostable multivibrator for Pulse generation.
2.	Realization of Adder and Subtractor using Op-Amp.	8.	Design and Realization of 555 timer based Astable multivibrator for square wave generation
3.	Realization of Differentiator and Integrator using Op-Amp	9.	Design and Realization of RC phase shift Oscillator for sinusoidal signal generation using Op-Amp.
4.	Design, Realization and plot the frequency response of First order Low pass and High pass filters using Op-Amp.	10.	Design and Realization of Function generator for square wave and triangular waves using Op-Amps.
5.	Design and plot the frequency response of Band pass filter using Op-Amp.	11.	Design and Realization of 3-bit Digital to Analog converter using Op-Amp
6.	Design and Realization of Op-Amp based Astable multivibrator for Square wave generation.		

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:

Evaluation Task	Cos	Marks
Day to Day Work	1,2,3,4	A=10
Record	1,2,3,4	B=10
Viva Voce	1,2,3,4	C=5
Internal Exam	1,2,3,4	D=10
Attendance	-	E=5
Cumulative Internal Examination :	1,2,3,4	**A+B+C+D+E=40**
Semester End Examinations	1,2,3,4	**F=60**
Total Marks: A+B+C+D+E+F	**1,2,3,4**	**100**

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: To Attain a solid foundation in Electronics & Communication Engineering fundamentals with an attitude to pursue continuing education.
PEO2: To Function professionally in the rapidly changing world with advances in technology
PEO3: To Contribute to the needs of the society in solving technical problems using Electronics & Communication Engineering principles, tools and practices.
PEO4: To Exercise leadership qualities, at levels appropriate to their experience, which addresses issues in a responsive, ethical, and innovative manner?

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: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

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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: Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.

PSO2: Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools

PSO3: Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mrs.T.Kalpana	Mrs.Kalpana	Dr.T.Satyanarayana	Dr.G.Srinivasulu

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. B. Siva Hari Prasad
Course Name & Code : Design and Simulation of Antennas Lab & 20ECS3

L-T-P Structure : 1-0-2 Credits: 2
Program/Sem/Sec : B.Tech., ECE., V-Sem., Section- C A.Y :2024-25

Pre-Requisites: Electromagnetic waves and Transmission Lines.

Course Objectives: In this course, student will learn about how to design and analyze various transmission lines and antennas using Ansys HFSS Software

Course Outcomes (COs): At the end of the course, students are able to

CO1	Understand the basic concepts of transmission lines and antennas according to Requirement and applications. **(Understand – L2)**
CO2	Apply software tools for different transmission lines and antennas. **(Apply – L3)**
CO3	Design and Analyze the different parameters of transmission lines and antennas. **(Apply – L3)**
CO4	Adapt effective Communication, presentation and report writing skills (Apply – L3)

Course Articulation Matrix (Correlation between COs &POs, PSOs):

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

T1 Constantine A. Balanis, "Antenna Theory: Analysis and Design", John Wiley & sons Publishers,2nd Edition

T2 JR James, PS Hall "Handbook of Microstrip Antennas" IEE Electromagnetic waves series, 1986.

REFERENCE BOOK(S):

R1 Matthew N.O. Sadiku, "Elements of Engineering Electromagnetics", Oxford University Press, 4th Edition.

R2 David. M. Pozar "Microwave Engineering", 4th edition, WILEY Publication, 2013.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

S.No.	Experiment Name	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Course Introduction-Design and Simulation of Antennas	3	05-07-2024			
2.	Design of micro strip patch antennas using strip line feed and coaxial feed	3	12-07-2024			
3.	Design of patch antennas for Wi-Fi and Wi-Max applications.	3	19-07-2024			
4.	Design of Rectangular and Circular micro strip patch.	3	26-07-2024			
5.	Design of Dipole and dual band antenna,	3	02-07-2027			
6.	Design of microstrip line	3	09-08-2024			
7.	Design of open and short circuit transmission line	3	16-08-2024			
8.	Design of multi stub unit	3	23-08-2024			
9.	Study of characteristic impedances of transmission line	3	30-08-2024			
10.	Design of project by students	3	13-09-2024			
11.	Design of project by students	3	20-09-2024			
12.	Presentation	3	27-09-2024			
13.	Presentation	3	04-10-2024			
14.	Documentation	3	18-10-2024			
15.	Documentation	3	25-10-2024			
No. of classes required to complete UNIT-III : 15				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):

Report	**10**
Quality of work	10
Presentation	20
Interaction / Queries	10
Total	50

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	To Attain a solid foundation in Electronics & Communication Engineering fundamentals with an attitude to pursue continuing education
PEO 2	To Function professionally in the rapidly changing world with advances in technology
PEO 3	To Contribute to the needs of the society in solving technical problems using Electronics & Communication Engineering principles, tools and practices
PEO 4	To Exercise leadership qualities, at levels appropriate to their experience, which addresses issues in a responsive, ethical, and innovative manner?

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 a n d 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	Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry
PSO 2	Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3	Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Date:

Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**
Dr. B. Siva Hari Prasad	Dr. V. Ravi Sekhara Reddy	Dr. M.V.Sudhakar	Dr. G. Srinivasulu

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. Y AMAR BABU
Course Name & Code : Real Time Operating Systems – 20ECH2
L-T-P Structure : 3-1-0 Credits : 4
Program/Sem/Sec : B.Tech., ECE., V-Sem., Section-Honor A.Y : 2024-25

PRE-REQUISITES: Digital Circuits.

COURSE EDUCATIONAL OBJECTIVES (CEOs): In this course student will learn about fundamental concepts of real time operating systems, operating system objects, services and I/O concepts, various interrupts and timers.

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

CO1	Understand the basic set of commands and utilities in Linux/UNIX systems
CO2	Explain the fundamental concepts of real-time operating systems
CO3	Analyze real-time operating systems objects, services and I/O concept
CO4	Evaluate various Interrupts and Timers real time embedded systems using the concepts of RTOS

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	-	1	-
CO2	3	3	1	-	-	-	-	-	-	-	-	2	-	2	-
CO3	2	3	3	-	-	-	-	-	-	-	-	3	-	3	-
CO4	3	3	3	-	-	-	-	-	-	-	-	3	-	3	-

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 Real Time Concepts for Embedded Systems – Qing Li, Elsevier, 2011

REFERENCE BOOKS:

R1 Embedded Systems- Architecture, Programming and Design by Rajkamal, 2007, TMH

R2 Advanced UNIX Programming, Richard Stevens

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section - Honor

UNIT-I: Introduction

S. No.	Topics	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to UNIX/LINUX	2	03-07-2024		TLM2	
2.	Overview of Commands	2	04-07-2024		TLM2	
3.	File I/O (open, create, close, lseek, read, write)	2	10-07-2024		TLM2	
4.	File I/O (open, create, close, lseek, read, write)	2	11-07-2024		TLM2	
5.	Process Control	2	18-07-2024		TLM2	
6.	Process Control (fork, vfork, exit, wait, waitpid, exec)	2	24-07-2024		TLM2	
7.	Assignment/Tutorial-I	1	25-07-2024		TLM4	
No. of classes required to complete UNIT-I:		**13**	No. of classes taken:			

UNIT-II: Real Time Operating Systems-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.	Brief History of OS, Defining RTOS,The Scheduler, Objects	2	25-07-2024		TLM2	
2.	Services, Characteristics of RTOS	2	31-08-2024		TLM2	
3.	Defining a Task, Tasks States and Scheduling ,Task Operations	2	01-08-2024		TLM2	
4.	Structure, Synchronization, Communication and Concurrency	2	07-08-2024		TLM2	
5.	Defining Semaphores, Operations and Use, Defining Message Queue,	2	08-08-2024		TLM2	
6.	States, Content, Storage, Operations and Use	2	14-08-2024		TLM2	
7.	Assignment/Tutorial-II	1	21-08-2024		TLM4	
No. of classes required to complete UNIT-II:		**13**	No. of classes taken:			

UNIT-III: Real Time Operating Systems-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
1.	Objects, Services and I/O Pipes	2	21-08-2024		TLM2	
2.	Event Registers, Signals	2	22-08-2024		TLM2	
3.	Other Building Blocks	2	28-08-2024		TLM2	
4.	Component Configuration	2	29-08-2024		TLM2	
5.	Basic I/O Concepts	2	11-09-2024		TLM2	
6.	I/O Subsystem	2	12-09-2024		TLM2	
7.	Assignment/Tutorial-III	1	18-09-2024		TLM4	
No. of classes required to complete UNIT-III:		**13**	No. of classes taken:			

UNIT-IV: Exceptions, Interrupts and Timers

S. No.	Topics to be covered	No. of	Tentative	Actual	Teaching	HOD

		Classes Required	Date of Completion	Date of Completion	Learning Methods	Sign Weekly
1.	Exceptions, Interrupts	2	18-09-2024		TLM2	
2.	Applications, Processing of Exceptions	2	19-09-2024		TLM2	
3.	Spurious Interrupts	2	25-09-2024		TLM2	
4.	Real Time Clocks, Programmable Timers	2	26-09-2024		TLM2	
5.	Timer Interrupt Service Routines (ISR), Soft Timers, Operations	2	03-10-2024		TLM2	
6.	Assignment/Tutorial-IV	1	09-10-2024		TLM4	
No. of classes required to complete UNIT-IV:		**11**	No. of classes taken:			

UNIT-V: RT Linux

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.	RT Linux	2	09-10-2024		TLM2	
2.	MicroC/OS-II	2	10-10-2024		TLM2	
3.	Vx Works	2	16-10-2024		TLM2	
4.	Embedded Linux, Tiny OS	2	17-10-2024		TLM2	
5.	Basic Concepts of Android OS	1	23-10-2024		TLM2	
6.	Assignment/Tutorial-V	1	24-10-2024		TLM4	
No. of classes required to complete UNIT-V:		**11**	No. of classes taken:			

Contents beyond the Syllabus

S. No.	Topics	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Xilinx Petalinux	1	30-10-2024		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

EVALUATION PROCESS (R17 Regulations):

Evaluation Task	Marks
Assignment-I (Units-2 1/2)	A1=5
I-Mid Examination (Units-2 1/2)	M1=15
I-Quiz Examination (Units-2 1/2)	Q1=10

Assignment-II (Units-2 1/2)	A2=5
II-Mid Examination (Units-2 1/2)	M2=15
II-Quiz Examination (Units-2 1/2)	Q2=10
Mid Marks =80% of Max(M1, M2)+20% of Min(M1, M2)	M=15
Quiz Marks =80% of Max(Q1, Q2)+20% of Min(Q1, Q2)	Q=10
Assignment Marks = Average of Best two of A1, A2	A=5
Cumulative Internal Examination (CIE) : M+Q+A	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
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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.
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PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2	**VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Date: 01-07-2024

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr. Y. Amar Babu	Dr. Y. Amar Babu	Dr. P. Lachi Reddy	Dr. G. Srinivasulu

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DEPARTMENT OF ELECTRONICS & COMMUNICATIONS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : **Dr. Kavuluru VenuGopal**
Course Name & Code : DATABASE MANAGEMENT SYSTEM CONCEPTS & **20ITM3**
L-T-P Structure : 3-1-0 **Credits : 4**
Program/Sem/Sec : B. Tech (Minor)., ASE, ECE, EEE,MECH **A. Y : 2024-24**

PREREQUISITE: Elementary set theory, concepts of relations and functions, propositional logic data structures (trees, Graphs, dictionaries) & File Concepts.

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course enables the students to know about DBMS basic concepts, Database Languages, Database Design, Normalization process and Transaction processing and Indexing.

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

CO 1	**Demonstrate** the Basic Components of Database Management System. **(Understand -L2)**
CO 2	**Design** Entity-Relationship Diagrams for different applications. **(Apply –L3)**
CO 3	**Examine** the relational data model and various constraints. **(Apply- L3)**
CO 4	**Demonstrate** Structured Query Language languages (SQL) to manage relational databases and perform various operations on the data. **(Apply- L3)**
CO 5	**Employ** principles of normalization for effective database design & transaction management. **(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	1	1	2	-	-	-	-	-	-	-	-	-	3	2	2
CO2	3	3	-	-	-	-	-	-	-	-	-	-	2	3	2
CO3	3	2	-	-	-	-	-	-	-	-	-	-	2	3	2
CO4	2	1	2	-	-	-	-	-	-	-	-	-	3	2	3
CO5	2	1	2	-	-	-	-	-	-	-	-	-	2	3	3

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	Henry F. Korth, Abraham Silberschatz, S. Sudarshan, "Database Concepts", McGraw Hill, 6th edition, 2009. B
T2	RamezElmasri, Shamkanth . Navathe, "Fundamentals Of Database Systems", Addision Wesley, 6th edition, 2010.

REFERENCE BOOKS:

R1	Raghu Ramakrishna, Johannes Gehrke, "Database Management System", McGraw Hill 3rd edition, 2000.
R2	Date C. J, "An Introduction to Database System", Pearson Education, 8th edition, 2003.
R3	Shara Maheshwari, Ruchi Jain, "DBMS: Complete Practical Approach", Firewall Media, New Delhi, 2005.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction

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 and COs	2	3-07-2024		TLM1,2	
2.	Introduction, An overview of database management system, Database system Vs file system	2	4.07. 2024		TLM1,2	
3.	Database system concepts and architecture, Data models schema and instances	2	10.07. 2024		TLM1,2	
4.	Data independence and database language and interfaces	2	11.07. 2024		TLM1,2	
5.	Data definitions language, DML, Overall Database Structure	2	18-07. 2024		TLM1,2	
6.	**Revision on Unit-1**	2	24.07. 2024		TLM1,2	
No. of classes required to complete UNIT-I: 10				No. of classes taken:		

UNIT-II: Entity Relationship 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.	ER model concepts - attributes, entity, Relationships	2	25.07. 2024		TLM1,2	
2.	notation for ER diagram, Mapping constraints	2	31.07. 2024		TLM1,2	
3.	Relationships of higher degree, keys -Concepts of Super Key, and identity key, primary key	2	01.08. 2024		TLM1,2	
4.	Generalization,Aggregation	2	07.08. 2024		TLM1,2	
5.	Reduction of ER diagrams to tables	2	14.08. 2024		TLM1,2	
6.	**Revision on Unit - II**	2	21.08. 2024		TLM1,2	
No. of classes required to complete UNIT-II: 12				No. of classes taken:		

UNIT-III: Relational Data 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.	Relational data model concepts	2	22.08. 2024		TLM1,2	
2.	Integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints	2	28.08. 2024		TLM1,2	
3.	referential integrity	2	29.08. 2024		TLM1,2	
4.	Keys constraints	2	11.09. 2024		TLM1,2	
5.	Domain constraints	2	12.09. 2024		TLM1,2	
6.	Relational Algebra	2	18.09. 2024		TLM1,2	
7.	**Revision of UNIT-3 & Assignment-I**	2	19.09. 2024		TLM1,2	
No. of classes required to complete UNIT-III: 14				No. of classes taken:		
I MID EXAMINATIONS				**28/08/ 2024 TO 02/09/ 2024**		

UNIT-IV: Introduction to SQL

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.	Characteristics of SQL, Advantage of SQL	2	15.09. 2024		TLM1,2	
2.	SQL Data types and Literals	2	25.09. 2024		TLM1,2	
3.	Insert, Update and Delete Operations	2	26.09. 2024		TLM1,2	
4.	Tables, Views and Indexes	2	02.10. 2024		TLM1,2	
5.	Nested Queries, Aggregate Functions	2	09.10. 2024		TLM1,2	
6.	Joins, Unions, Intersection, Minus.	2	16.10. 2024		TLM1,2	
7.	Revision of Unit-4	1	17.10. 2024		TLM1,2	
No. of classes required to complete UNIT-IV: 14				No. of classes taken:		

Unit -V : Normalization

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.	Functional Dependencies	2	17.10. 2024		TLM1,2	
2.	Normal Forms - First, Second	2	23.10. 2024		TLM1,2	
3.	Third Normal Forms, BCNF.	1	23.10. 2024		TLM1,2	
4.	Transaction System, Testing of Serializability	1	24.10. 2024		TLM1,2	
5.	Serializability of Schedules, Conflict & View Serializability	1	24.10. 2024		TLM1,2	
6.	Recoverability, Deadlock Handling.	1	30.10. 2024		TLM1,2	
7.	**Revision of UNIT-5 & Assignment-II**	2	30.10. 2024		TLM1,2	
No. of classes required to complete UNIT-V: 7				No. of classes taken:		

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM1,2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

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

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**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	**Organize, Analyze and Interpret the data to extract meaningful conclusions.**
PSO 2	**Design, Implement and Evaluate a computer-based system to meet desired needs.**
PSO 3	**Develop IT application services with the help of different current Engineering tools.**

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr. Kavuluru Venu Gopal	Dr. Kavuluru Venu Gopal	Dr. B.Srinivasa Rao	Dr.B.Srinivasa Rao

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DEPARTMENT OF COMPUTER SCIENCE &ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mrs G V Rajya Lakshmi
Course Name & Code : IDAA (20CSM7)
L-T-P Structure : 3-1-0 Credits : 4
Program/Sem/Sec : B.Tech., ECE, EEE V-A,B,C A.Y: 2024-25

PRE-REQUISITE: Data structures and DMS

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The objective of the course is to learn various algorithm design techniques and analyze the computing resources of the algorithms and motivate the students to design new algorithms for various problems.

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

CO 1	Identify the characteristic of an algorithm and analyses its time and space complexity. (UnderstandL2)
CO 2	Apply the divide-and-conquer method for solving problems like searching and sorting. (Apply - L3)
CO 3	Design Greedy algorithms for the optimization problems like knapsack problem, minimum cost spanning tree, single source shortest path problem. (Apply - L3)
CO 4	Apply dynamic programming paradigm to solve optimization problems like travelling salesperson problem, 0/1 knapsack problem, Optimal binary search tree (Apply– L3)
CO 5	Analyze the backtracking and branch and bound search methods on optimization problems like N-queen, sum of subsets.0/1 knapsack, Hamiltonian circuit and so on. (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	3	-	-	-	-	-	-	-	-	-	-	-	-	3
CO2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	2
CO3	2	2	-	1	-	-	-	-	-	-	-	-	-	-	3
CO4	2	3	-	1	-	-	-	-	-	-	-	-	-	-	1
CO5	2	3	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: Ellis Horowitz, SartajSahni, 'Fundamentals of Computer Algorithms', Galgotia Publications.

T2: Data Structures and Algorithm Analysis in C++, 3/e, Mark Allen Weiss, Pearson , 2007.

REFERENCE BOOKS:

R1: Aho, Hopcroft& Ullman, 'The Design and Analysis of Computer Algorithms', Addison Wesley publications

R2: Thomas H. Cormen et al, 'Introduction to Algorithms', PHI.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I : Introduction

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	03.07.24		TLM1	
2.	Algorithm definition and Specifications	1	03.07.24		TLM1	
3.	Performance Analysis	1	04.07.24		TLM1	
4.	Time Complexity and space complexity	1	04.07.24		TLM1	
5.	Asymptotic Notations- Big-Oh, Omega and Theta	2	10.07.24		TLM1	
No. of classes required to complete UNIT-I		6		**No of classes taken**		

UNIT-II: Divide & Conquer

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
6.	Divide & Conquer Technique: General Method	1	18.07.24		TLM1	
7.	Binary Search and its analysis	1	18.07.24		TLM1	
8.	Finding Maximum and Minimum and its Analysis	1	24.07.24		TLM1	
9.	Merge sort and its Analysis	1	24.07.24		TLM1	
10.	Quick Sort algorithm and its analysis	1	25.07.24		TLM1	
11.	Closest pair of points	1	25.07.24		TLM1	
12.	Tutorial – 1	2	31.07.24		**TLM3**	
No. of classes required to complete UNIT-II		**8**		**No of classes taken**		

UNIT-III: The Greedy method

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
14.	Greedy Method – Introduction, General method	2	01.08.24		TLM1	
15.	Knapsack problem,	2	07.08.24		TLM1	

	Example problem					
16.	Job sequencing with deadlines, Example problem	2	08.08.24		TLM1	
17.	Minimum cost spanning trees, example problem	2	14.08.24		TLM1	
18.	Optimal storage on tapes, Example problem	2	21.08.24		TLM1	
19.	Single source shortest path problem	2	22.08.24		TLM1	
20.	Huffman coding	2	28.08.24		TLM1	
21.	Tutorial – II / Quiz - II	2	29.08.24		TLM3	
No. of classes required to complete UNIT-III		**16**		**No of classes taken**		

UNIT-IV: Dynamic Programming

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.	Dynamic Programming-General method	2	11.09.24		TLM1	
23.	Multistage Graph, Example problem	2	12.09.24		TLM1	
24.	All pairs shortest path, Example problem	2	18.09.24		TLM1	
25.	Optimal Binary Search Tree, Example problem	2	19.09.24		TLM1	
26.	0/1 Knapsack Problem	2	25.09.24		TLM1	
27.	Travelling Salesperson Problem	2	26.09.24		TLM1	
28.	Single source shortest path problem, Example Problem	2	03.10.24		TLM1	
29.	Reliability design, Example Problem	2	09.10.24		TLM1	
30.	Tutorial – III / Quiz – III	2	10.10.24		**TLM3**	
No. of classes required to complete UNIT-IV		**18**		**No of classes taken**		

UNIT-V: Back tracking

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
31.	General Methods	1	16.10.24		TLM1	
32.	The 8-Queens problem	2	17.10.24		TLM1	
33.	Sum of subsets problem	2	23.10.24		TLM1	
34.	Graph coloring problem	2	24.10.24		TLM1	

35.	Hamiltonian cycles	2	30.10.24		TLM1	
36.	Tutorial – IV / Quiz - IV	1	30.10.24		**TLM3**	
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
1.	Convex hull	1			TLM2	

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
Mrs G V Rajya Lakshmi			Dr.D.Veeraiah

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC with Grade 'A', ISO 9001:2015 Certified Institution
Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

PROGRAM : **B. Tech**, V-Sem

ACADEMIC YEAR : 2024-25

COURSE NAME & CODE : **Fundamentals of Data Science – 20ADM2**

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

COURSE CREDITS 4

COURSE INSTRUCTOR : M. Sabitha

COURSE COORDINATOR : M. Sabitha

PRE-REQUISITE: Basic Mathematical Knowledge.

COURSE OBJECTIVE: In this Course student will learn about- The objective of the course is to perform the operations associated with relations and functions. Relate practical examples to the functions and relations and interpret the associated operations and terminology used in the context. Use formal logic proofs and/or informal but rigorous logical reasoning to, for example, predict the behavior of software or to solve problems such as puzzles.

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

CO1	Construct mathematical arguments using logical connectives & quantifiers and verify them. **(Understand – L2)**
CO2	Demonstrate the basic terminology of functions, relations, lattices and their operations. **(Understand – L2)**
CO3	Apply the properties of graphs to solve the graph theory problems in Computer science. **(Apply – L3)**
CO4	Illustrate the basic principles/techniques to solve different algebraic structures & combinatorial problems. **(Apply – L3)**
CO5	Solve linear recurrence relations by recognizing homogeneity using constant coefficients characteristic roots and Generating functions. **(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**	**3**													
CO2	**3**	**3**	**1**	**2**											
CO3	**3**	**3**	**1**	**2**											
CO4	**3**	**3**	**2**	**1**											
CO5	**3**	**3**	**1**												
1 - Low							**2** –Medium					**3** – High			

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 Python for Data Analysis [1,2,3,4,5]

BOS APPROVED REFERENCE BOOKS:

R1 Python :The complete Reference, Martin C.Brown, McGraw Hill Education

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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1	Introduction to python, Python Features	1	3-7-2024		2,4	CO1	T1,R1	
2	Python Data Types,	1	3-7-2024		2,4	CO1	T1,R1	
3	Python Operators	1	4-7-2024		2,4	CO1	T1,R1	
4	Input and output statements	1	4-7-2024		2,4	CO1	T1,R1	
5	Control statements	1	10-7-2024		2,4	CO1	T1,R1	
6	String operations in python	1	10-7-2024		2,4	CO1	T1,R1	
7	String Testing methods in python	1	11-7-2024		2,4	CO1	T1,R1	
8	Lists in python	1	11-7-2024		2,4	CO1	T1,R1	
9	Dictionaries in python	1	17-7-2024		2,4	CO1	T1,R1	
10	Tuples in python	1	17-7-2024		2,4	CO1	T1,R1	
No. of classes required to complete UNIT-I		10			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	Learning Outcome COs	Text Book Followed	HOD Sign Weekly
11.	What is Data Science, Introduction to Data Science	1	18-7-2024		2,4	CO2	T1,R1	
12.	Data Science Applications, Data Science Life Cycle	1	18-7-2024		2,4	CO2	T1,R1	
13.	Data Analysis in Python	1	24-7-2024		2,4	CO2	T1,R1	
14.	Exploratory Data Analysis in python	1	24-7-2024		2,4	CO2	T1,R1	

15	Data Science process	1	25-7-2024		2,4	CO2	T1,R1	
16	Role of Data Scientist	1	25-7-2024		2,4	CO2	T1,R1	
17	Data Cleaning	1	31-7-2024		2,4	CO2	T1,R1	
18	Data transformation techniques	1	31-7-2024		2,4	CO2	T1,R1	
19	Principle Data Analysis	1	01-8-2024		2,4	CO2	T1,R1	
20	Principle Data Analysis example	1	01-8-2024		3			
No. of classes required to complete UNIT-II		10			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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
21	Introduction to NumPy	1	07-8-2024		2,4	CO3	T1,R2	
22	Basics of NumPy	1	07-8-2024		2,4	CO3	T1,R2	
23	Multi-Dimensional Array object	2	08-8-2024		2,4	CO3	T1,R2	
24	Creating nd Arrays	1	14-8-2024		2,4	CO3	T1,R2	
25	Data types nor nd Arrays	1	14-8-2024		2,4	CO3	T1,R2	
26	Operations between Arrays and Scalars	2	15-8-2024		2,4	CO3	T1,R2	
27	Basic Indexing and Slicing operations	2	21-8-2024		2,4	CO3	T1,R2	
28	Boolean Indexing and Fancy Indexing	2	22-8-2024		2,4	CO3	T1,R2	
29	Data processing Using Arrays, Expressing conditional logic arrays	2	28-8-2024		2,4	CO3	T1,R2	
30	Methods for Boolean Arrays	2	29-8-2024		3			
No. of classes required to complete UNIT-III		16			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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
31	Introduction to Pandas	1	11-9-2024		1,4,5	CO4	T1,R2	
32	Pandas Libraries	1	11-9-2024		1,4,5	CO4	T1,R2	
33	Architecture For Pandas Libraries	1	12-9-2024		1,4,5	CO4	T1,R2	
34	Features of Pandas	1	12-9-2024		1,4,5	CO4	T1,R2	
35	Applications of Pandas	1	18-9-2024		1,4,5	CO4	T1,R2	
36	Data Structure Series in python	1	18-9-2024		1,4,5	CO4	T1,R2	
37	Data frame, Index objects	1	19-9-2024		1,4,5	CO4	T1,R2	
38	Functionality of Re indexing	1	19-9-2024		1,4,5	CO4	T1,R2	
39	Dropping Entries from an axis in Pandas	1	25-9-2024		1,4,3	CO4	T1,R2	
40	Indexing, selection in pandas	1	25-9-2024		1,4,5	CO4	T1,R2	
41	Filtering, Sorting in Pandas	1	26-9-2024		1,4,5	CO4	T1,R2	

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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
42	Introduction to Data Preprocessing	1	26-09-2024		1,4,5	CO5	T1,R2	
43	Data loading, Storage and File Formats	2	02-10-2024		1,4,5	CO5	T1,R2	
44	Reading and Writing data in text format, Binary Data formats	2	03-10-2024		1,4,5	CO5	T1,R2	
45	Interacting with html and web apis	2	09-10-2024		1,4,5	CO5	T1,R2	
46	Combining and merging Datasets	2	10-10-2024		1,4,5	CO5	T1,R2	
47	Reshaping and pivoting data transformation	2	16-10-2024		1,4,3	CO5	T1,R2	
48	Data Aggregation and Group Operations	2	17-10-2024		1,4,3	CO5	T1,R2	
49	Group by operations and Transformations	1	23-10-2024		1,4,3	CO5	T1,R2	
50	Pivot tables in data pre processing	1	23-10-2024		1,4,3	CO5	T1,R2	
51	Cross Tabulation Format in data Preprocessing	2	24-10-2024		1,4,3	CO5	T1,R2	
No. of classes required to complete UNIT-V		17			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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
52	Applications of Data science	2	30-10-2024					
53	Introduction to Data Analytics in Python	2	31-10-2024					

Teaching Learning Methods					
TLM1	Chalk and Talk	**TLM4**	Problem Solving	**TLM7**	Seminars or GD
TLM2	PPT	**TLM5**	Programming	**TLM8**	Lab Demo
TLM3	Tutorial	**TLM6**	Assignment or Quiz	**TLM9**	Case Study

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	01-07-2024	31-08-2024	9W
I Mid Examinations	02-09-2024	07-09-2024	1W
II Phase of Instructions	09-09-2024	02-11-2024	8W
II Mid Examinations	04-11-2024	09-11-2024	1W
Preparation and Practicals	11-11-2024	16-11-2024	1W
Semester End Examinations	18-11-2024	30-11-2024	2W

PART-C

EVALUATION PROCESS (R20 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issue 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.
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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.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Mrs. M. Sabitha**	**Mrs. M. Sabitha**	**Dr. O. Rama Devi**	**Dr. O. Rama Devi**
Signature				