LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : K.RANI RUDRAMA
Course Name & Code : MICROWAVE ENGINEERING-17EC27
L-T-P Structure : 2-2-0 Credits: 3
Program/Sem/Sec : B.Tech., ECE., VII-Sem., Section- A A.Y : 2020-21

PRE-REQUISITE: Electromagnetics, waveguides

Course Educational Objective: This course provides the knowledge on microwave communications in terms of various bands, advantages, applications. The course will give an idea about microwave active and passive devices. The course also gives the complete information regarding microwave bench setup and microwave measurements

Course Outcomes (COs):

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

CO1	Understand the operation and use of Microwave solid state devices
CO2	Analyze the characteristics of Microwave tubes.
CO3	Apply the properties of S-parameters to waveguide components.
CO4	Evaluate the various microwave parameters using microwave bench setup

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	-	-	-	-	-	-	-	-	1	2	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	1	3	-	-
CO3	3	3	1	-	-	-	-	-	-	-	-	2	3	-	-
CO4	2	3	1	-	-	-	-	-	-	-	-	2	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 Samuel Y. Liao, "Microwave Devices and Circuits", PHI Publishers, 3rdEdition, 2003.

T2 David M.Pozar, "Microwave Engineering", John Wiley Publishers, 4thEdition.

REFERENCES:

1. G. S. N. Raju," Microwave Engineering", IK International Publishers, New Delhi
2. Robert E. Collin "Foundations for microwave engineering" Tata McGraw Hill,2nd edition
3. M. Kulakarni, "Microwave and Radar Engineering",Umesh Publications,New Delhi 5 thEdition,
4.Peter A. Rizzi, "Microwave Engineering Passive Circuits", Prentice-Hall Publishers.
5. G. Sasibhushana Rao, "Microwave and Radar Engineering", Pearson Education India.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I : Microwave Tubes

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 microwave Engineering, Course Outcomes	1	17.08.2020		**TLM2**	
2.	Introduction, Microwave Spectrum and Bands	1	18.08.2020		**TLM2**	
3.	Advantages and Applications of Microwaves.	1	19.08.2020		**TLM2**	
4.	Limitations and Losses of conventional tubes at microwave frequencies	1	24.08.2020		**TLM2**	
5.	Microwave tubes-O type and M type classifications	1	25.08.2019		**TLM2**	
6.	Two Cavity Klystron – Structure, Velocity Modulation Process	1	26.08.2020		**TLM2**	
7.	Applegate Diagram, Bunching Process	1	31.08.2020		**TLM2**	
8.	Expressions for o/p Power and Efficiency	1	01.09.2020		**TLM2**	
9.	Reflex Klystron-Structure, Applegate Diagram and Principle of working	1	02.09.2020		**TLM2**	
10.	Mathematical Theory of Bunching, Power Output, Efficiency, o/p Characteristics	1	07.09.2020		**TLM2**	
11.	TUTORIAL-1	1	08.09.2020		**TLM2**	
No. of classes required to complete UNIT-I :		11	No. of classes taken:			

UNIT-II : Helix TWT

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.	Helix TWT Significance, Types and Characteristics of Slow Wave Structures	1	09.09.2020		**TLM2**	
13.	Structure of TWT and Amplification Process	1	14.09.2020		**TLM2**	
14.	Axial Electric Field ,Convection Current	1	15.09.2020		**TLM2**	
15.	Propagation Constants, Gain Considerations	1	16.09.2020		**TLM2**	
16.	M-type tubes : Introduction, Cross-field effects ,Different Types of Magnetrons	1	21.09.2020		**TLM2**	
17.	8-Cavity Cylindrical Travelling Wave Magnetron	1	22.09.2020		**TLM2**	
18.	Hull Cut-off and Hartee Conditions	1	23.09.2020		**TLM2**	
19.	Modes of Resonance and PI-Mode Operation	1	24.09.2020		**TLM2**	
20.	o/p characteristics, Frequency Pulling and pushing, Strapping	1	28.09.2020		**TLM2**	
21.	TUTORIAL-2	1	29.09.2020		**TLM2**	
No. of classes required to complete UNIT-II :		10	No. of classes taken:			

UNIT-III : Microwave Solid State Devices

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
22	Introduction, Classification, Applications	1	30.09.2020		**TLM2**	
23	Transferred Electron Devices: Introduction, Gunn Diode –Principle	1	01.10.2020		**TLM2**	
24	Two Valley Model Theory, Characteristics	1	05.10.2020		**TLM2**	
25	RWH Theory Characteristics, Modes of Operation	1	06.10.2020		**TLM2**	
26	Avalanche Transit Time Devices: Introduction	1	07.10.2020		**TLM2**	
27	IMPATT Diodes Principle of Operation	1	08.10.2020		**TLM2**	
28	Characteristics, related expressions	1	12.10.2020		**TLM2**	
29	TRAPATT Diodes Principle of Operation	1	13.10.2020		**TLM2**	
30	Characteristics related expressions		14.10.2020		**TLM2**	
31	TUTORIAL-3	1	15.10.2020		**TLM2**	
No. of classes required to complete UNIT-III :		10	No. of classes taken:			

UNIT-IV : Waveguide Components-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
32	Waveguide Multiport Junctions	1	19.10.2020		**TLM2**	
33	Working principle of E plane Tee and H plane Tee,	1	20.10.2020		**TLM2**	
34	Working principle of Magic Tee	1	21.10.2020		**TLM2**	
35	Working principle of Hybrid Ring 2 Hole-Directional Couplers	1	22.10.2020		**TLM2**	
36	Working principle of Bethe Hole Directional Couplers	1	26.10.2020		**TLM2**	
37	Scattering Matrix- S-parameters Formulation	1	27.10.2020		**TLM2**	
38	Properties of S Matrix	1	28.10.2020		**TLM2**	
39	S Matrix Calculations for E plane Tee and H plane Tee	1	29.10.2020		**TLM2**	
40	S -Matrix Calculations for Magic Tee, Directional Coupler	1	02.11.2020		**TLM2**	
41	TUTORIAL-4	1	03.11.2020		**TLM2**	
No. of classes required to complete UNIT-IV		10	No. of classes taken:			

UNIT-V : Waveguide Components-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.	Waveguide Discontinuities, Waveguide irises	1	04.11.2020		**TLM2**	
2.	TuningScrewsandPosts Matched Loads	1	05.11.2020		**TLM2**	
3.	Waveguide Attenuators , Resistive Card, Rotary Vane types	1	09.11.2020		**TLM2**	
4.	Waveguide Phase Shifters :Dielectric, Rotary Vane types	1	10.11.2020		**TLM2**	
5.	Ferrites–Composition and Characteristics, Faraday Rotation	1	11.11.2020		**TLM2**	
6.	Ferrite Components :Gyrator, Isolator, Circulator	1	12.11.2020		**TLM2**	
7.	Description of Microwave Bench Different Blocks and their Features ,Precautions	1	16.11.2020		**TLM2**	
8.	Measurement of Attenuation, Frequency VSWR.	1	17.11.2020		**TLM2**	
9.	Measurement of Cavity Q, Impedance, Power	1	18.11.2020		**TLM2**	
No. of classes required to complete UNIT-V		9	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
10.	RADAR, RF Microstrip Passive Devices	1	19.11.2020			

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 (Unit-I)	A1=5
Assignment-II (Unit-II)	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	**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
(K.RANI RUDRAMA)	(K.RANI RUDRAMA)	(Dr. Y.S.V.RAMAN)	(Dr.Y.Amar Babu)

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DEPARTMENT OF Electronics & Communication Engineering

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr.A.Narendra Babu
Course Name & Code : COMMUNICATION NETWORKS & 17EC92
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., ECE., VII-Sem., Section- A A.Y : 2019-20

PRE-REQUISITE: Telecommunication Switching Systems and Networks

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

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

CO 1	**Understand** the layered architecture of OSI and TCP/IP Reference models.
CO 2	**Analyze** the Protocols of OSI and TCP/IP Reference models
CO 3	**Evaluate** routing algorithms, congestion control Algorithms, IP addressing used in Network layer.
CO 4	**Apply** the knowledge of protocols in networking applications.

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

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

TEXT BOOKS

1. Tanenbaum and Wetherall, "Computer Networks", Pearson Education, Fifth Edition.
2. Behrouz. A. Forouzan, "Data Communication and Networking", Fourth Edition, Tata McGraw-hill, New Delhi, 2006

REFERENCES

1. S.Keshav," An Engineering Approach to Computer Networks", Pearson Education, 2nd Edition,
2. W.A.Shay,"Understanding communications and Networks", Cengage Learning, 3rd Edition
3. Chwan-Hwa (John) Wu, J. David Irwin," Introduction to Computer Networks and Cyber Security", CRC Press.
4. L.L.Peterson and B.S.Davie," Computer Networks", ELSE VIER, 4th 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	20-08-20			
2.	Introduction to Communication Networks	1	21-08-20			
3.	Network Hardware , Network software	1	27-08-20			
4.	Network models LAN, WAN, MAN, Network software-protocols, layer issues	1	28-08-20			
5.	connection oriented and connection less services, Reference models-OSI	1	29-08-20			
6.	TCP/IP, Comparison between OSI and TCP/IP	1	03-09-20			
7.	Critics of OSI and TCP/IP model	1	04-09-20			
8.	Physical Layer- Guided Transmission Medium	1	05-09-20			
9.	Wireless Transmission Media, EM Spectrum, Radio, Light, Infrared and Microwave Transmission	1	10-09-20			
10.	Digital Modulation and Multiplexing, Bassband and Passband, FDM, TDM and Code Division Multiplexing	1	11-09-20			
No. of classes required to complete UNIT-I:10				No. of classes taken:		

UNIT-II: Data Link 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.	Introduction of DLL, Design Issues	1	12-09-20			
2.	Services provided to Network Layer Farming Methods, Error control and Flow Control	1	17-09-20			
3.	Error Detection and Correction, , Hamming codes, CRC, Checksum	1	18-09-20			
4.	Stop & wait , Sliding window, one bit, go-back -n, Selective repeat protocols, Medium Access control sub layer	1	19-09-20			
5.	channel allocation problem, Multiple Access protocols- ALOHA, CSMA protocols, CSMA with collision detection, Collision free protocols	1	23-09-20			
6.	Ethernet	1	24-09-20			
7.	Wireless Lans-Infrastructure, Protocol stack, MAC frame , 802.11 services	1	25-09-20			
8.	Bluetooth-Architecture, Protocol stack, Frame structure	1	26-09-20			
No. of classes required to complete UNIT-II:8						

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
1.	Network Layer Design Issues- store and forward, datagrams and virtual circuits	1	07-10-20			
2.	Routing algorithms- Optimality Principle, Shortest Path	1	08-10-20			
3.	Flooding, Distance vector routing ,	1	09-10-20			
4.	Link state routing , Hierarchical routing	1	10-10-20			
5.	Board cast routing & Multicast Routing	1	14-10-20			
6.	Congestion control in data subnets, warning bits	1	15-10-20			
7.	Load shedding, choke packets, Jitter control, RED	1	16-10-20			
No. of classes required to complete UNIT-III:07				No. of classes taken:		

UNIT-IV : Transport Layer

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Internetworking	1	17-10-20			
2.	Tunneling, Packet Fragmentation	1	21-10-20			
3.	IPV4	1	22-10-20			
4.	IPV6, comparision between IPV4 and IPV6	1	23-10-20			
5.	Internet control protocols, OSPF BGP	1	28-10-20			
6.	Transport layer services to the upward Layers	1	29-10-20			
7.	Addressing Address connection establishment	1	31-10-20			
8.	Connection release, Crash Recvoery	1	04-11-20			
No. of classes required to complete UNIT-IV:8				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
1.	Internet transport protocols: UDP- RPC, Real Time Transport Protocols	1	05-11-20			
2.	Internet transport protocols: TCP-I, TCP service model	1	06-11-20			
3.	TCP Segment Header	1	07-11-20			
4.	Domain Name system	1	11-11-20			
5.	Email Architecture and services	1	12-11-20			
6.	SMTP, WWW and its architecture	1	13-11-20			
No. of classes required to complete UNIT-V:6				No. of classes taken:		

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.						
2.						
No. of classes required to complete UNIT-V:5				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 (R17 Regulations):

Evaluation Task	**Marks**
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	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	**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.A.Narendra Babu)	(Dr.A.Narendra Babu)	(Dr.M.Venkata Sudhakar)	(Dr.Y.Amar Babu)

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr. K. Ravi Kumar

Course Name & Code : Optical Communications – 17EC28

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

Program/Sem/Sec : B.Tech., ECE., VII-Sem., Section- A A.Y : 2020-21

PRE-REQUISITE: Electromagnetic Theory, Analog Communications, Digital Communications.

COURSE OBJECTIVE: This course gives knowledge on optical communication fundamentals, fiber types, and fiber materials. This course also describe about transmission losses in the fiber, optical sources, source to fiber coupling scheme, and optical receivers. This course also provides understanding of digital optical link, analog optical systems, wavelength division multiplexing and optical networks

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

CO1	**Understand** the concepts of optical communication systems, WDM systems, and optical networks.
CO2	**Apply** knowledge of signal transmission characteristics on fibers, optical sources and detectors.
CO3	**Analyze** the optical device characteristics and their signal degradation mechanisms in analog and digital signal transmission.
CO4	**Evaluate** the performance of optical fiber communication systems

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	1	-	-	-	-	-	-	-	-	-	1	1	-	-
CO2	3	3	1	-	-	-	-	-	-	-	-	2	3	-	-
CO3	2	3	1	-	-	-	-	-	-	-	-	2	2	-	-
CO4	2	2	1	-	-	-	-	-	-	-	-	2	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	Gerd Keiser, Optical Fiber Communications, Mc Graw-Hill International edition,4th Edition, 2008.
T2	Joseph C. Palais, Fiber Optic Communications, Pearson Education, 4th Edition, 2004.

REFERENCE BOOKS:

R1	John M. Senior, Optical Fiber Communications, PHI, 2nd Edition, 2002.
R3	Govind P. Agarwal,Fiber Optic Communication Systems, John Wiley, 3rd Edition, 2004
R3	S. C. Gupta,Text Book on Optical Fiber Communication and its Applications, PHI,2005.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT-I: Overview of Optical Fiber Communications

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, COs, POs	1	18.08.2020			
2.	The General System, The Evolution of Fiber Optic Systems	1	19.08.2020			
3.	Elements of Optical Fiber Link, Merits and Demerits of Optical Fiber Communications	1	21.08.2020			
4.	Applications of Optical Fiber Communications, Basic Optical Laws: Refractive Index, Refraction, Reflection	1	25.08.2020			
5.	Critical Angle, Total Internal Reflection,	1	26.08.2020			
6.	Optical Fiber Structure, Step Index Fiber Structure, Graded Index Fiber Structure	1	28.08.2020			
7.	Ray Optic Representation, Acceptance Angle, Numerical Aperture,	1	01.09.2020			
8.	Meridional and Skew Rays, Overview of Modes, Summary of Key Modal Concepts	1	02.09.2020			
9.	Cut-off Wavelength, Mode Field Diameter	1	04.09.2020			
10.	Revision of Unit-I	1	08.09.2020			
No. of classes required to complete UNIT-I		**10**	No. of classes taken			

UNIT-II: Fiber Materials and Signal Degradation in Optical Fibers

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 Unit-II	1	09.09.2020			
2.	Fiber Materials, Glass Fibers, Active Glass Fibers, Plastic Glass Fibers,	1	11.09.2020			
3.	Attenuation , Attenuation Units, Absorption, Scattering Losses	1	15.09.2020			
4.	Bending Losses, Core-Cladding Losses	1	16.09.2020			
5.	Signal Distortion in Optical Waveguides, Information Capacity Determination, Group delay	1	18.09.2020			
6.	Material Dispersion, Polarization-Mode Dispersion, Intermodal Dispersion, Pulse Broadening in Graded-Index Waveguides	1	22.09.2020			
7.	Mode Coupling, Design Optimization of Single-Mode Fibers, Refractive Index Profiles	1	23.09.2020			
8.	Revision of Unit-II	1	25.09.2020			
No. of classes required to complete UNIT-I		**08**	No. of classes taken			

UNIT-III: Optical Sources, Power Launching and Coupling

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.	Requirements of Optical Sources, LED Structures, Light Source Materials	1	06.10.2020			
2.	Quantum Efficiency and LED Power, Modulation of LED	1	07.10.2020			
3.	LASER Diodes, Laser Diode Modes and Threshold Conditions	1	09.10.2020			
4.	Semiconductor Laser Diodes, Fabry Perot Lasers	1	13.10.2020			
5.	Distributed Feedback (DFB) Lasers, Laser diode rate equations, External quantum efficiency and resonant frequencies	1	14.10.2020			
6.	Source to fiber launching, Source output pattern, power coupling calculation	1	16.10.2020			
7.	Lensing Schemes for coupling improvement, Laser Diode-to-Fiber Coupling	1	20.10.2020			
No. of classes required to complete UNIT-III		**07**	No. of classes taken			

UNIT-IV: Optical detectors and receivers

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 unit-IV	1	21.10.2020			
2.	Photo Detectors, Physical Principles of Photodiodes	1	23.10.2020			
3.	PIN Photo Detector, Avalanche Photo Diodes	1	27.10.2020			
4.	Detector Response Time, Temperature Effect on Avalanche Gain, Comparison of Photo Detectors	1	28.10.2020			
5.	Fundamental Receiver Operation, Digital Signal Transmission, Error Sources	1	30.10.2020			
6.	Receiver Configuration, Digital Receiver Performance: Probabiliy of Error, The Quantum Limit, Analog Receivers	1	31.10.2020			
No. of classes required to complete UNIT-IV		**06**	No. of classes taken			

UNIT-V: Digital Transmission Systems and Measurements, WDM and SONET/SDH

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 Unit-V, Point to Point Links, System Considerations	1	03.11.2020			
2.	Link Power Budget, Rie Time Budget	1	04.11.2020			
3.	Line Coding- NRZ codes, RZ Codes,	1	06.11.2020			
4.	Measurement of Attenuation and Dispersion	1	10.11.2020			
5.	WDM Features, Operation Principles of WDM	1	11.11.2020			
6.	Types of WDM, SONET/SDH Networks	1	13.11.2020			
No. of classes required to complete UNIT-V		**06**	No. of classes taken			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Fabrication of Fibers	**1**	11.11.2020			

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	17-08-2020	03-10-2020	7 W
I Mid Examinations	28-09-2020	03-10-2020	
II Phase of Instructions	05-10-2020	21-11-2020	7 W
II Mid Examinations	16-11-2020	21-11-2020	
Preparation and Practical's	23-11-2020	28-11-2020	1 W
Semester End Examinations	30-11-2020	12-12-2020	2 W

PART-C

EVALUATION PROCESS:

Evaluation Task	Marks
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	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)	Q=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:	**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. Ravi Kumar	Dr. M.Venkata Sudhakar	Dr. M.Venkata Sudhakar	Dr. Y. Amar Babu

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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 : Mr. M K Linga Murthy

Course Name & Code : Digital Image Processing – 17EC33

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

Program/Sem/Sec : B.Tech., ECE., VII-Sem., Section- A A.Y : 2020-21

PRE-REQUISITE: Signals and Systems, Digital Signal Processing, Transform Techniques.

COURSE OBJECTIVE: This course provides the fundamental concepts of Image Processing. Image enhancement which is the most prominent preprocessing step will be learnt in both time and spectral domain. The course also gives the basics of color images and their processing. Knowledge about compression as well as segmentation will also be given

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

CO1	Summarize the fundamentals of Digital Image Processing. (L2)
CO2	Apply the concepts of filtering, Fourier transforms for image enhancement and restoration.(L3)
CO3	Illustrate the compression of an image using loss less and lossy models. (L3)
CO4	Analyze the segmentation and color image processing techniques.(L4)

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

TEXT BOOKS:

T1	R. C. Gonzalez and R. E. Woods, "Digital Image Processing", Addison Wesley/ Pearson education, 3rd Edition, 2002

REFERENCE BOOKS:

R1	William J Pratt, "Digital Image Processing", John Wiley & Sons
R2	S.Jayaraman, E.Esakkirajan, T.Veerakumar, "Digital Image Processing", TMH edition, 2011
R3	Anil K. Jain, "Fundamentals of Digital Image Processing", PHI Publications.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

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 the course, Course Objective and Course outcomes	1	19.08.2020			
2.	2D function & Basic definitions & Digital image definition	1	21.08.2020			
3.	Fundamental steps in image processing	1	26.08.2020			
4.	Components of Image processing system	1	28.08.2020			
5.	Applications of Image Processing	1	29.08.2020			
6.	Structure of Human Eye & Image formation in the eye	1	02.09.2020			
7.	Sampling & Quantization, Digital image representation, Spatial Resolution, Intensity Resolution.	1	04.09.2020			
8.	Relationships between Pixels, Adjacency, Connectivity, Regions, Boundaries & Distance measures	1	05.09.2020			
No. of classes required to complete UNIT-I		**08**	No. of classes taken			

UNIT-II: Image Enhancement in Spatial and Frequency Domain

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 Image Enhancement, Spatial Domain Enhancement - Introduction	1	09.09.2020			
2.	Gray Level Transformation functions & Piecewise linear Transformation functions	1	11.09.2020			
3.	Histogram Processing, Histogram Equalization	1	12.09.2020			
4.	Histogram Specification & Examples	1	16.09.2020			
5.	Smoothing spatial filters & Sharpening spatial filters	1	18.09.2020			
6.	Introduction to Filtering in frequency domain , Image smoothing in frequency domain	1	19.09.2020			
7.	Image sharpening in frequency domain , Laplacian in the frequency domain	1	23.09.2020			
8.	Unsharp masking & High boost filtering	1	25.09.2020			
No. of classes required to complete UNIT-I		**08**	No. of classes taken			

UNIT-III: Image Restoration and Image Compression

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.	Image restoration & degradation model, Noise Models	1	26.09.2020			
2.	Restoration in the presence of noise using spatial filtering	1	07.10.2020			
3.	Inverse Filtering, MMSE filtering & Constrained least square filtering	1	09.10.2020			
4.	Introduction, Coding, Inter pixel , Psychovisual Redundancy , Fidelity Criteria	1	11.10.2020			
5.	Image compression model & Huffman & Arithmetic coding	1	14.10.2020			
6.	LZW , Bit plane and run length coding	1	16.10.2020			
7.	Lossless & Lossy predictive coding, JPEG	1	17.10.2020			
No. of classes required to complete UNIT-III			**07**	No. of classes taken		

UNIT-IV: Image Segmentation

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.	Detection of discontinuities : Point, Line & Edge Detection	1	21.10.2020			
2.	Edge Linking , Boundary Detection: Local processing , Global Processing via Hough transformation	1	28.10.2020			
3.	Global Processing via Graph theoretic techniques	1	30.10.2020			
4.	Thresholding	1	31.10.2020			
5.	Region Growing, Region splitting & merging	1	04.11.2020			
No. of classes required to complete UNIT-IV			**05**	No. of classes taken		

UNIT-V: Color Image Processing

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.	Color fundamentals	1	06.11.2020			
2.	Color Models	1	07.11.2020			
3.	Pseudo Color Image processing	1	11.11.2020			
4.	Full color image processing & Histogram Processing	1	13.11.2020			
No. of classes required to complete UNIT-V		**04**	No. of classes taken			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to video processing	**1**	13.11.2020			

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	17-08-2020	03-10-2020	7 W
I Mid Examinations	28-09-2020	03-10-2020	
II Phase of Instructions	05-10-2020	21-11-2020	7 W
II Mid Examinations	16-11-2020	21-11-2020	
Preparation and Practical's	23-11-2020	28-11-2020	1 W
Semester End Examinations	30-11-2020	12-12-2020	2 W

PART-C

EVALUATION PROCESS:

Evaluation Task	Marks
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	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)	Q=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:	**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 K Linga Murthy	Mr. M K Linga Murthy	Dr. G L N Murthy	Dr. Y. Amar Babu

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION

COURSE HANDOUT

PART-A

Name of Course Instructor : Mrs. B.Rajeswari
Course Name & Code : DSP PROCESSORS - 17EC37
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., ECE., VII-Sem., Sections- A A.Y : 2020-21

PRE-REQUISITE: Digital Signal Processing, Microprocessor

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course provides the knowledge on digital computational accuracy of systems and Architecture of various digital signal processors. . The course will give an idea how memory and I/O devices can be interfaced to digital signal processors.

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

CO 1	Remembering basic concepts of Digital signal processing techniques in both time and frequency domain
CO 2	Apply different parameters of computational accuracy in DSP implementation.
CO 3	Analysebasic architectural requirements of programmable digital signal processors.
CO 4	Design architectural aspects of TMS320C54XX and Analog devices family DSPs

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	1	1	-	-	-	-	-	-	-	-	1	-	-	1
CO 2	3	2	2	-	-	-	-	-	-	-	-	2	-	-	2
CO 3	2	3	2	1	-		-	-	-	-	-	2	-	-	3
CO 4	2	2	3	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 Digital Signal Processing Implementations. Avatar Singh and S. Srinivasan, Thomson Publications

REFERENCE BOOKS:

R1 Digital Signal Processors, Architecture, Programming and Applications, B.Venkataramani and M. Bhaskar, 2002, TMH.

R2 Digital Signal Processing – Jonatham Stein, 2005, John Wiley.

R3 DSP Processor Fundamentals, Architecture & Features- Lapsley et al. 2000, S. Chand & Co.Press

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction To Digital Signal Processing

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.	Course Objectives	1	17-08-2020		TLM2	
2.	Introduction	1	18-08-2020		TLM2	
3.	A Digital signal-processing system	1	22-08-2020		TLM2	
4.	The sampling process	1	24-08-2020		TLM2	
5.	Discrete time sequences	1	25-08-2020		TLM2	
6.	Discrete Fourier Transform (DFT)	1	29-08-2020		TLM2	
7.	Fast Fourier Transform	1	31-08-2020		TLM2	
8.	linear time-invariant systems	1	01-09-2020		TLM2	
9.	Digital filters- FIR	1	05-09-2020		TLM2	
10.	Digital filters- IIR	1	07-09-2020		TLM2	
11.	Decimation, interpolation	1	08-09-2020		TLM2	
No. of classes required to complete UNIT-I: 11				No. of classes taken:		

UNIT-II: Computational Accuracy in DSP Implementations

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.	Number formats for signals and coefficients in DSP systems	1	12-09-2020		TLM2	
2.	Number formats for signals and coefficients in DSP systems	1	14-09-2020		TLM2	
3.	Dynamic Range and Precision	1	15-09-2020		TLM2	
4.	Sources of error in DSP implementations	1	19-09-2020		TLM2	
5.	A/D Conversion errors	1	21-09-2020		TLM2	
6.	D/A Conversion Errors	1	22-09-2020		TLM2	
7.	DSP Computational errors, Compensating filter	1	26-09-2020		TLM2	
No. of classes required to complete UNIT-II: 7				No. of classes taken:		

UNIT-III: Architectures for Programmable DSP Devices

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

1.	Basic Architectural features	1	05-10-2020		TLM2	
2.	DSP Computational Building Blocks, Bus Architecture and Memory	1	06-10-2020		TLM2	
3.	Data Addressing Capabilities	1	10-10-2020		TLM2	
4.	Address Generation Unit	1	12-10-2020		TLM2	
5.	Programmability and Program Execution	1	13-10-2020		TLM2	
6.	Speed Issues, Features for External interfacing	1	17-10-2020		TLM2	
No. of classes required to complete UNIT-III: 6				No. of classes taken:		

UNIT-IV : Programmable Digital Signal Processors

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.	Commercial Digital signal-processing Devices	1	19-10-2020		TLM2	
2.	Data Addressing modes of TMS320C54XX DSPs	1	20-10-2020		TLM2	
3.	Memory space of TMS320C54XX Processors, Program Control	1	24-10-2020		TLM2	
4.	TMS320C54XX instructions and Programming	1	26-10-2020		TLM2	
5.	On-Chip Peripherals, Interrupts of TMS320C54XX processors	1	27-10-2020		TLM2	
6.	Pipeline Operation of TMS320C54XX Processors	1	31-10-2020		TLM2	
No. of classes required to complete UNIT-IV: 6				No. of classes taken:		

UNIT-V : Analog Devices Family of DSP Devices

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.	Analog Devices Family of DSP Devices, ALU and MAC block diagram, Shifter Instruction	1	02-11-2020		TLM2	

2.	Base Architecture of ADSP2100	1	03-11-2020		TLM2	
3.	ADSP-2181 high performance Processor	1	07-11-2020		TLM2	
4.	Introduction to Blackfin Processor – The Blackfin Processor	1	09-11-2020		TLM2	
5.	Introduction to Micro Signal Architecture	1	10-11-2020		TLM2	
6.	Overview of Hardware Processing Units and Register files, Address Arithmetic Unit	1	14-11-2020		TLM2	
7.	Control Unit, Bus Architecture and Memory, Basic Peripherals	1	14-11-2020		TLM2	
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)
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 (Unit-I)	A1=5
Assignment-II (Unit-II)	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	**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
B.Rajeswari	V.V.Rama Krishna	Dr.G.L.N.Murthy	Dr.Y.Amar Babu

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
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DEPARTMENT OF ELECTRONICS & COMMUNICATIONS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr.G.Venkata Rao
Course Name & Code : Embedded System Design, 17EC29
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., ECE., VII-Sem., Sec-A A.Y : 2020-21

PRE-REQUISITE:

COURSE EDUCATIONAL OBJECTIVES (CEOs):

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

CO 1	Outline the functionality of standard single purpose processors commonly used in embedded systems
CO 2	Apply top-down and bottom-up methodologies for embedded system design
CO 3	Analyze state machine and concurrent process models.
CO 4	Design Control unit and data path using computational models, and develop embedded systems using IC design technologies.

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2		-	-	-	-	-	-	-	-	1	-	1	-
CO2	3	2	1	-	-	-	-	-	-	-	-	2	-	2	
CO3	2	3	2	-	-	-	-	-	-	-	-	2	-	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 Frank Vahid/Tony Givargis, "Embedded Sytem Design A Unified Hardware/Software Introduction" Jhon Wiley & Sons,Inc.

REFERENCE BOOKS:

R1 James K Peckol," Embedded Systems- A Cntemporary Design Tool" Jhon Wiley, 2008.

R2 Joseph Yiu,"The Definitive Guide to the ARM Cortex-M3", Newnes, Elsevier, 2008.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Embedded System 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 Unit-1	1	18.08.2020			
2.	Embedded System overview	1	20.08.2020			
3.	Design Challenge	1	25.08.2020			
4.	Processor Technology	1	27.08.2020			
5.	IC Technology	1	29.08.2020			
6.	Design Technology, Trade-offs	1	31.08.2020			
7.	Single Purpose Processors	1	01.09.2020			
8.	RT Level Combinational Logic	1	03.09.2020			
9.	RT Level Sequential Logic	1	05.09.2020			
10.	Custom Single Purpose processor design	1	08.09.2020			
11.	Optimizing custom single Purpose processors	1	10.09.2020			
12.	Assignment-1	1	12.09.2020			
No. of classes required to complete UNIT-I: 12				No. of classes taken:		

UNIT-II: State Machine and Concurrent Process Models

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 Unit-II: Models vs Languages	1	15.09.2020			
2.	Finite State machines with data path models (FSMD)	1	17.09.2020			
3.	Program State machine model	1	18.09.2020			
4.	Concurrent Process Model, Concurrent Processes	1	22.09.2020			
5.	Communication among processes	1	24.09.2020			
6.	Synchronization among processes	1	25.09.2020			
7.	Implementation, Data flow models	1	26.09.2020			
8.	Real-time Systems	1	06.10.2020			
9.	Assignment-2	1	08.10.2020			
No. of classes required to complete UNIT-II:09				No. of classes taken:		

UNIT-III: Standard Single-purpose Processors

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 Unit-III	1	09.10.2020			
2.	Timers, Counters,	1	10.10.2020			

	Watchdog Timers, UART, LCD Controllers					
3.	Stepper Motor Controllers	1	13.10.2020			
4.	Analog to digital Converters, Real Time Clocks	1	15.10.2020			
5.	Common memory types, Memory hierarchy and cache	1	16.10.2020			
6.	Advanced RAM	1	17.10.2020			
7.	Assignment-3	1	20.10.2020			
No. of classes required to complete UNIT-III: 07				No. of classes taken:		

UNIT-IV: Interfacing

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 Unit-IV	1	27.10.2020			
2.	Communication Basics, Microprocessor Interfacing	1	30.10.2020			
3.	I/O Addressing, Interrupts, Direct Memory Access	1	31.10.2020			
4.	Arbitration, Multi level bus architectures, Advanced Communication principles	1	03.11.2020			
5.	Serial Protocols, Parallel Protocols, Wireless Protocols	1	05.11.2020			
6.	Assignment-4	1	06.11.2020			
No. of classes required to complete UNIT-IV: 06				No. of classes taken:		

UNIT-V : IC and Design Technology

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 Unit-V: IC Technology	1	06.11.2020			
2.	Full- Custom(VLSI) IC technology	1	07.11.2020			
3.	Programmable logic devices(PLD) IC technology	1	10.11.2020			
4.	Design technology: Automation, Systhesis , Verification	1	12.11.2020			
5.	Hardware/Software Co-simulation	1	12.11.2020			
6.	Reuse: Intellectual	1	13.11.2020			

	Property cores, Design Process Models					
7.	Assignment-5	1	13.11.2020			
No. of classes required to complete UNIT-V: 07				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 (R14 Regulations):

Evaluation Task	**Marks**
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	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	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

Academic Calendar: B.Tech., VII-Sem., 2020-21			
Description	**From**	**To**	**Weeks**
Commencement of Class work: 17.08.2020			
I Phase of Instructions	17-08-2020	03-10-2020	7W
I MID Examinations	28-09-2020	03-10-2020	
II Phase of Instructions	05-10-2020	21-11-2020	7W
II MID Examinations	16-11-2020	21-11-2020	
Preparation and Practicals	23-11-2020	28-11-2020	1W
Semester End Examinations	30-11-2020	14-12-2020	2W

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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Course Instructor	Course Coordinator	Module Coordinator	HOD
(Mr.G.Venkata Rao)	(Mr.G.Venkata Rao)	(Dr.P.Lachi Reddy)	(Dr.Y.Amar Babu)

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DEPARTMENT OF ELECTRONICS & COMMUNICATIONS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Michael Sadgun Rao Kona
Course Name & Code : Introduction to Database & 17IT80
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., ECE., VII-Sem.,A A.Y : 2020-21

PRE-REQUISITE: 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, Data base Design, Normalization process and Transaction processing and Indexing.

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

CO 1	**Understand** DBMS concepts, architecture
CO 2	**Design** Entity Relational Model and make them to data model.
CO 3	**Understand** the usage of keys and constraints for relational data.
CO 4	**Apply** the normalization process for data base design.
CO 5	**Analyze** the issues in transaction processing and different recovery strategies.

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
CO4	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.
T2	RamezElmasri, Shamkanth B. Navathe, "Fundamentals Of Database Systems", Addision Wesley, 6th edition, 2010.

REFERENCE BOOKS:

R1	Raghu Ramakrishna, Johannese 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	1	17.08.2020		TLM2	
2.	Introduction, An overview of database management system, Database system Vs file system	1	19.08.2020		TLM2	
3.	Database system Vs file system	1	21.08.2020		TLM2	
4.	Database system concepts and architecture	1	24.08.2020		TLM2	
5.	Data models schema and instances	1	26.08.2020		TLM2	
6.	Data independence and data base language and interfaces	1	28.08.2020		TLM2	
7.	Data definitions language, DML	1	31.08.2020		TLM2	
8.	Overall Database Structure	1	2.09.2020		TLM2	
9.	**Revision on Unit-1& Assignment-I**	1	4.09.2020		TLM2	
No. of classes required to complete UNIT-I: 9				No. of classes taken:		

UNIT-II: Data Modelling using the 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	1	07/09/20, 09/09/20		TLM2	
2.	notation for ER diagram	1	11/09/20		TLM2	
3.	Mapping constraints	1	14/09/20		TLM2	
4.	keys -Concepts of Super Key, and identity key, primary key, Generalization	1	16/09/20		TLM2	
5.	Aggregation	1	18/09/20		TLM2	
6.	Reduction of an ER diagrams to tables,	1	21/09/20		TLM2	
7.	Relationships of higher degree	1	23/09/20		TLM2	
8.	**Revision on Unit - II & Assignment-II**	1	25/09/20		TLM2	
No. of classes required to complete UNIT-II: 09				No. of classes taken:09		
I MID EXAMINATIONS			**28/09/20 TO 03/10/20**			

UNIT-III: Relational Data Model and Language

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	1	05/10/20		TLM2	
2.	Integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints	1	07/10/20		TLM2	
3.	Relational algebra	1	09/10/20		TLM2	
4.	Characteristics of SQL, Advantage of SQL SQL data types and literals, Types of SQL commands SQL operators and their procedure	1	12/10/20		TLM2	
5.	Tables, views and indexes, Queries and sub queries, Aggregate functions Insert, update and delete operations	1	14/10/20		TLM2	
6.	Unions, Intersection, Minus, Cursors in SQL, Revision of UNIT-3&Assignment-III	1	16/10/20		TLM2	
No. of classes required to complete UNIT-III: 6				No. of classes taken:		

UNIT-IV: 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	1	19/10/20		TLM2	
2.	Normal Forms: First, Second, Third Normal Forms	1	21/10/20		TLM2	
3.	BCNF, Inclusion Dependences Loss Less Join Decompositions	1	23/10/20		TLM2	
4.	Normalization Using FD,MVD Normalization Using JD	1	26/10/20		TLM2	
5.	Normalization Using FD,MVD Normalization Using JD		28/10/20		TLM2	
6.	Alternative Approaches to Database Design Revision of Unit-4&Assignment-IV	1	30/10/20		TLM2	
No. of classes required to complete UNIT-IV: 6				No. of classes taken:		

UNIT-V: Transaction Processing Concepts

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.	Transaction System	1	02/11/20		TLM2	
2.	Testing Of Serializability , Serializability of Schedules Conflict & View Serializable Schedule	1	04/11/20		TLM2	
3.	Recoverability, Log Based Recovery, Checkpoints, ARIES Algorithm, Deadlock Handling	1	06/11/20		TLM2	
4.	Concurrency Control Techniques For Concurrency Control	1	09/11/20		TLM2	
5.	Time Stamping Protocols for Concurrency Control	1	11/11/20		TLM2	
6.	Locking, Validation Based Protocol, Multiple Granularity	1	13/11/20		TLM2	
7.	Recovery With Concurrent Transactions ,**Revision of UNIT-5&Assignment-V**	1	16/11/20		TLM2	
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)
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 (Unit-I)	A1=5
Assignment-II (Unit-II)	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.
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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	Module Coordinator	HOD
(Mr.Michael Sadgun Rao Kona)	(Dr .S. Naganjaneyulu)	(Dr.B.Srinivasa Rao)

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DEPARTMENT OF Electronics & Communication Engineering

COURSE HANDOUT

PART-A

PROGRAM : B.Tech., VII-Sem., ECE – A Section

ACADEMIC YEAR : 2020 - 21

COURSE NAME & CODE : Embedded System Design Lab–17EC72

L-T-P STRUCTURE : 0-0-2

COURSE CREDITS : 2

COURSE INSTRUCTOR : **Mr. K.V.Ashok**

COURSE COORDINATOR : **Mr. K. Ravi Kumar**

COURSE OBJECTIVE:
This course provides practical exposure on

Course Outcomes: At the end of the course, student will be able to:

CO1	Evaluate Inter Process Communication applications using ARM based processors
CO2	Develop the Hardware platform using soft processors and applications using C on Xilinx FPGA Zynq 7000 series
CO3	Adapt effective communication, presentation and report writing skills.

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

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

PART-B

LAB SCHEDULE (LESSON PLAN): Section-C

LIST OF EXPERIMENTS (Minimum 12 Experiments to be conducted)

S.No.	Experiments to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
	CYCLE-1					
1.	Introduction to Lab	2	20/08/2020		**TLM2**	
2.	ARM Assembly Language Programming-I	2	27/08/2020		**TLM8**	
3.	ARM Assembly Language Programming-II	2	03/09/2020		**TLM8**	
4.	Program to Interface 8-bit LED	2	10/09/2020		**TLM8**	
5.	Program to demonstrate Time Delay Program using built in Timer/Counter feature	2	17/09/2020		**TLM8**	
6.	Program to displaying a message in a 2line x 16 Characters LCD display and verify the result in debug terminal	2	24/09/2020		**TLM8**	
7.	Program to implement Generation of PWM signal on IDE environment	2	01/10/2020		**TLM8**	
8.	Program to demonstrate serial communication on IDE environment	2	08/10/2020		**TLM8**	
	CYCLE-2					
9.	Program to implement Traffic light controller on IDE environment	2	15/10/2020		**TLM8**	
10.	Program to implement Stepper motor controller on IDE environment	2	22/10/2020		**TLM8**	
11.	Basic Audio Processing on IDE environment	2	29/10/2020		**TLM8**	
12.	Program to demonstrate I2C Interface on IDE environment	2	05/11/2020		**TLM8**	
13.	Program to implement Buzzer Interface on IDE environment	2	12/11/2020		**TLM8**	
14.	Design of System on Chip platform using Xilinx FPGAs and Embedded Development Kit Tools	2	19/11/2020		**TLM8**	
15.	Design dual processor based System on Chip using Xilinx EDK Tools and Zynq 7000 series FPGA	2	26/11/2020		**TLM8**	

16.	Hardware Software Co-design using Xilinx EDK Tools	2	26/11/2020		**TLM8**	
No. of classes required to complete:		32	No. of classes conducted:			

PART-C

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:

Academic Calendar: B.Tech., VII-Sem., 2020-21			
Description	**From**	**To**	**Weeks**
Commencement of Class work: 17.08.2020			
I Phase of Instructions	17-08-2020	03-10-2020	7W
I MID Examinations	28-09-2020	03-10-2020	
II Phase of Instructions	05-10-2020	21-11-2020	7W
II MID Examinations	16-11-2020	21-11-2020	
Preparation and Practicals	23-11-2020	28-11-2020	1W
Semester End Examinations	30-11-2020	14-12-2020	2W

EVALUATION PROCESS:

Evaluation Task	**COs**	**Marks**
Day to Day work	1,2,3	A1=20
Attendance (>95%=5, 90-95%=4,85-90%=3,80-85%=2,75-80%=1)		A2=5
Viva-Voce	1,2,3	A3=5
Internal Lab Examination	1,2,3	B=10
Total Internal Marks(A1+A2+A3+B)		**C=40**
Semester End Examinations	1,2,3	**D=60**
Total Marks: C+D	1,2,3	**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
(K.V.Ashok)	(Mr.K.Ravi Kumar)	(Dr.P.Lachi Reddy)	(Dr.Y.Amar Babu)

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Smt. K.RANI RUDRAMA, Smt. M.RAMYA HARIKA
Course Name & Code : MICROWAVE AND OPTICAL COMMUNICATIONS LAB-17EC71
L-T-P Structure : 0-0-2 Credit: 1
Program/Sem/Sec : B.Tech., ECE., VII-Sem., Section- A A.Y : 2020-21

Course Educational Objective :This Lab deals with the micro measurements of the signals at micro frequency range. It involves measurement of frequency, wave length, VSWR, Impedance and scattering parameters of various micro wave devices like Circulator, Direction Coupler, and Magic-Tee. Even the latest trend of communication technology i.e. fiber optics is also introduced and propagation conditions will be verified by evaluating the losses.

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

CO 1	Understand the various blocks of microwave bench setup
CO 2	Evaluate the frequency, wave length, VSWR, impedance and scattering parameters of various microwave devices
CO 3	Analyze the losses to verify the propagating conditions in the optical fiber.
CO 4	Adapt effective communication, presentation and report writing skills.

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

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
CYCLE I						
1.	Demonstration	1	17.08.2020		TLM 4	
2.	Reflex Klystron Characteristics	1	24.08.2020		TLM4	
3.	Gunn Diode Characteristics	1	31.08.2020		TLM4	
4.	Attenuation Measurement	1	07.09.2020		TLM4	
5.	Directional Coupler Characteristics.	1	14.09.2020		TLM4	
6.	VSWR Measurement	1	21.09.2020		TLM4	
7.	Impedance ,Frequency Measurement.	1	28.09.2020		TLM4	
CYCLE 2						
8	Scattering Parameters of Circulator.	1	05.10.2020		TLM4	
9	Scattering Parameters of Magic Tee.	1	12.10.2020		TLM4	
10	Characterization of LED,Laser Diode	1	19.10.2020		TLM4	
11	Measurement of Data rate for Digital Optical link.	1	26.10.2020		TLM4	
12	Measurement of Numerical Aperture	1	02.11.2020		TLM4	
13	Measurement of losses for Analog optical link	1	09.11.2020		TLM4	
14	Lab exam	1	16.11.2020			

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**
Day to Day work	A=20
Internal Lab Examination	B=10
Attendance	C=5
Viva voce	D=5
Cumulative Internal Examination : A+B+C	**A+B+C+D=40**
Semester End Examinations	**E=60**
Total Marks: A+B+C+D+E	**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.
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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
(K.RANI RUDRAMA)	((K.RANI RUDRAMA)	(Dr. Y.S.V.RAMAN)	(Dr. Y. Amar Babu)

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DEPARTMENT OF OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : K.RANI RUDRAMA
Course Name & Code : MICROWAVE ENGINEERING-17EC27
L-T-P Structure : 2-2-0 Credits: 3
Program/Sem/Sec : B.Tech., ECE., VII-Sem., Section- B A.Y : 2020-21

PRE-REQUISITE: Electromagnetics, waveguides

Course Educational Objective: This course provides the knowledge on microwave communications in terms of various bands, advantages, applications. The course will give an idea about microwave active and passive devices. The course also gives the complete information regarding microwave bench setup and microwave measurements

Course Outcomes (COs):

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

CO 1	Understand the operation and use of Microwave solid state devices
CO 2	Analyze the characteristics of Microwave tubes.
CO 3	Apply the properties of S-parameters to waveguide components.
CO4	Evaluate the various microwave parameters using microwave bench setup

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	-	-	-	-	-	-	-	-	1	2	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	1	3	-	-
CO3	3	3	1	-	-	-	-	-	-	-	-	2	3	-	-
CO4	2	3	1	-	-	-	-	-	-	-	-	2	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 Samuel Y. Liao, "Microwave Devices and Circuits", PHI Publishers, 3rdEdition, 2003.
T2 David M.Pozar, "Microwave Engineering", John Wiley Publishers, 4thEdition.

REFERENCES:

1. G. S. N. Raju," Microwave Engineering", IK International Publishers, New Delhi
2. Robert E. Collin "Foundations for microwave engineering" Tata McGraw Hill,2nd edition
3. M. Kulakarni, "Microwave and Radar Engineering",Umesh Publications,New Delhi 5 thEdition,
4.Peter A. Rizzi, "Microwave Engineering Passive Circuits", Prentice-Hall Publishers.
5. G. Sasibhushana Rao, "Microwave and Radar Engineering", Pearson Education India.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I : Microwave Tubes

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 microwave Engineering, Course Outcomes	1	19.08.2020		**TLM2**	
2.	Introduction, Microwave Spectrum and Bands	1	20.08.2020		**TLM2**	
3.	Advantages and Applications of Microwaves.	1	26.08.2020		**TLM2**	
4.	Limitations and Losses of conventional tubes at microwave frequencies	1	27.08.2020		**TLM2**	
5.	Microwave tubes-O type and M type classifications	1	29.08.2019		**TLM2**	
6.	Two Cavity Klystron – Structure, Velocity Modulation Process	1	02.09.2020		**TLM2**	
7.	Applegate Diagram, Bunching Process	1	03.09.2020		**TLM2**	
8.	Expressions for o/p Power and Efficiency	1	05.09.2020		**TLM2**	
9.	Reflex Klystron-Structure, Applegate Diagram and Principle of working	1	09.09.2020		**TLM2**	
10.	Mathematical Theory of Bunching, Power Output, Efficiency, o/p Characteristics	1	10.09.2020		**TLM2**	
11.	TUTORIAL-1	1	12.09.2020		**TLM2**	
No. of classes required to complete UNIT-I :		11	No. of classes taken:			

UNIT-II : Helix TWT

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.	Helix TWT Significance, Types and Characteristics of Slow Wave Structures	1	16.09.2020		**TLM2**	
13.	Structure of TWT and Amplification Process	1	17.09.2020		**TLM2**	
14.	Axial Electric Field ,Convection Current	1	19.09.2020		**TLM2**	
15.	Propagation Constants, Gain Considerations	1	23.09.2020		**TLM2**	
16.	M-type tubes : Introduction, Cross-field effects ,Different Types of Magnetrons	1	24.09.2020		**TLM2**	
17.	8-Cavity Cylindrical Travelling Wave Magnetron	1	25.09.2020		**TLM2**	
18.	Hull Cut-off and Hartee Conditions	1	26.09.2020		**TLM2**	
19.	Modes of Resonance and PI-Mode Operation	1	30.09.2020		**TLM2**	
20.	o/p characteristics, Frequency Pulling and pushing, Strapping	1	01.10.2020		**TLM2**	
21.	TUTORIAL-2	1	03.10.2020		**TLM2**	
No. of classes required to complete UNIT-II :		10	No. of classes taken:			

UNIT-III : Microwave Solid State Devices

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
22	Introduction, Classification, Applications	1	07.10.2020		**TLM2**	
23	Transferred Electron Devices: Introduction, Gunn Diode –Principle	1	08.10.2020		**TLM2**	
24	Two Valley Model Theory, Characteristics	1	09.10.2020		**TLM2**	
25	RWH Theory Characteristics, Modes of Operation	1	10.10.2020		**TLM2**	
26	Avalanche Transit Time Devices: Introduction	1	14.10.2020		**TLM2**	
27	IMPATT Diodes Principle of Operation	1	15.10.2020		**TLM2**	
28	Characteristics, related expressions	1	16.10.2020		**TLM2**	
29	TRAPATT Diodes Principle of Operation	1	17.10.2020		**TLM2**	
30	Characteristics related expressions TUTORIAL-3	1	21.10.2020		**TLM2**	
No. of classes required to complete UNIT-III :		9	No. of classes taken:			

UNIT-IV : Waveguide Components-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
31	Waveguide Multiport Junctions	1	22.10.2020		**TLM2**	
32	Working principle of E plane Tee and H plane Tee,	1	23.10.2020		**TLM2**	
33	Working principle of Magic Tee	1	28.10.2020		**TLM2**	
34	Working principle of Hybrid Ring 2 Hole-Directional Couplers	1	29.10.2020		**TLM2**	
35	Working principle of Bethe Hole Directional Couplers	1	30.10.2020		**TLM2**	
36	Scattering Matrix- S-parameters Formulation	1	31.10.2020		**TLM2**	
37	Properties of S Matrix	1	04.11.2020		**TLM2**	
38	S Matrix Calculations for E plane Tee and H plane Tee	1	05.11..2020		**TLM2**	
39	S -Matrix Calculations for Magic Tee, Directional Coupler	1	06.11.2020		**TLM2**	
No. of classes required to complete UNIT-IV		9	No. of classes taken:			

UNIT-V : Waveguide Components-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
40	Waveguide Discontinuities, Waveguide irises	1	07.11.2020		**TLM2**	
41	TuningScrewsandPostsMatched Loads	1	11.11.2020		**TLM2**	
42	Waveguide Attenuators , Resistive Card, Rotary Vane types	1	12.11.2020		**TLM2**	
43	Waveguide Phase Shifters :Dielectric, Rotary Vane types	1	13.11.2020		**TLM2**	
44	Ferrites–Composition and Characteristics, Faraday Rotation	1	14.11.2020		**TLM2**	
45	Ferrite Components :Gyrator, Isolator, Circulator	1	17.11.2020		**TLM2**	
46	Description of Microwave Bench Different Blocks and their Features ,Precautions	1	18.11.2020		**TLM2**	
47	Measurement of Attenuation, Frequency VSWR.	1	19.11.2020		**TLM2**	
48	Measurement of Cavity Q, Impedance, Power	1	20.11.2020		**TLM2**	
No. of classes required to complete UNIT-V		9	No. of classes taken			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	RADAR, RF Microstrip Passive Devices	1	21.11.2020			

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 (Unit-I)	A1=5
Assignment-II (Unit-II)	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.
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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
(K.RANI RUDRAMA)	(K.RANI RUDRAMA)	(Dr. Y.S.V.RAMAN)	(Dr.Y.Amar Babu)

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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. M. V.Sudhakar

Course Name & Code : Optical Communications – 17EC28

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

Program/Sem/Sec : B.Tech., ECE., VII-Sem., Section- B A.Y : 2020-21

PRE-REQUISITE: Electromagnetic Theory, Analog Communications, Digital Communications.

COURSE OBJECTIVE: This course gives knowledge on optical communication fundamentals, fiber types, and fiber materials. This course also describe about transmission losses in the fiber, optical sources, source to fiber coupling scheme, and optical receivers. This course also provides understanding of digital optical link, analog optical systems, wavelength division multiplexing and optical networks.

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

CO1	**Understand** the concepts of optical communication systems, WDM systems, and optical networks.
CO2	**Apply** knowledge of signal transmission characteristics on fibers, optical sources and detectors.
CO3	**Analyze** the optical device characteristics and their signal degradation mechanisms in analog and digital signal transmission.
CO4	**Evaluate** the performance of optical fiber communication systems

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	1	-	-	-	-	-	-	-	-	-	1	1	-	-
CO2	3	3	1	-	-	-	-	-	-	-	-	2	3	-	-
CO3	2	3	1	-	-	-	-	-	-	-	-	2	2	-	-
CO4	2	2	1	-	-	-	-	-	-	-	-	2	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	Gerd Keiser, Optical Fiber Communications, Mc Graw-Hill International edition,4th Edition, 2008.
T2	Joseph C. Palais, Fiber Optic Communications, Pearson Education, 4th Edition, 2004.

REFERENCE BOOKS:

R1	John M. Senior, Optical Fiber Communications, PHI, 2nd Edition, 2002.
R3	Govind P. Agarwal,Fiber Optic Communication Systems, John Wiley, 3rd Edition, 2004
R3	S. C. Gupta,Text Book on Optical Fiber Communication and its Applications, PHI,2005.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

UNIT-I: Overview of Optical Fiber Communications

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, COs, POs	1	17.08.2020			
2.	The General System, The Evolution of Fiber Optic Systems	1	18.08.2020			
3.	Elements of Optical Fiber Link, Merits and Demerits of Optical Fiber Communications	1	22.08.2020			
4.	Applications of Optical Fiber Communications, Basic Optical Laws: Refractive Index, Refraction, Reflection	1	24.08.2020			
5.	Critical Angle, Total Internal Reflection,	1	25.08.2020			
6.	Optical Fiber Structure, Step Index Fiber Structure, Graded Index Fiber Structure	1	29.08.2020			
7.	Ray Optic Representation, Acceptance Angle, Numerical Aperture,	1	31.08,2020			
8.	Meridional and Skew Rays, Overview of Modes, Summary of Key Modal Concepts	1	01.09.2020			
9.	Cut-off Wavelength, Mode Field Diameter	1	05.09.2020			
10.	Revision of Unit-I	1	07.09.2020			
No. of classes required to complete UNIT-I		**10**	No. of classes taken			

UNIT-II: Fiber Materials and Signal Degradation in Optical Fibers

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 Unit-II	1	08.09.2020			
2.	Fiber Materials, Glass Fibers, Active Glass Fibers, Plastic Glass Fibers,	1	12.09.2020			
3.	Attenuation , Attenuation Units, Absorption, Scattering Losses	1	14.09.2020			
4.	Bending Losses, Core-Cladding Losses	1	15.09.2020			
5.	Signal Distortion in Optical Waveguides, Information Capacity Determination, Group delay	1	19.09.2020			
6.	Material Dispersion, Polarization-Mode Dispersion, Intermodal Dispersion, Pulse Broadening in Graded-Index Waveguides	1	21.09.2020			
7.	Mode Coupling, Design Optimization of Single-Mode Fibers, Refractive Index Profiles	1	22.09.2020			
8.	Revision of Unit-II	1	26.09.2020			
No. of classes required to complete UNIT-I		**08**	No. of classes taken			

UNIT-III: Optical Sources, Power Launching and Coupling

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.	Requirements of Optical Sources, LED Structures, Light Source Materials	1	05.10.2020			
2.	Quantum Efficiency and LED Power, Modulation of LED	1	06.10.2020			
3.	LASER Diodes, Laser Diode Modes and Threshold Conditions	1	10.10.2020			
4.	Semiconductor Laser Diodes, Fabry Perot Lasers	1	12.10.2020			
5.	Distributed Feedback (DFB) Lasers, Laser diode rate equations, External quantum efficiency and resonant frequencies	1	13.10.2020			
6.	Source to fiber launching, Source output pattern, power coupling calculation	1	17.10.2020			
7.	Lensing Schemes for coupling improvement, Laser Diode-to-Fiber Coupling	1	19.10.2020			
No. of classes required to complete UNIT-III		**07**	No. of classes taken			

UNIT-IV: Optical detectors and receivers

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 unit-IV	1	20.10.2020			
2.	Photo Detectors, Physical Principles of Photodiodes	1	24.10.2020			
3.	PIN Photo Detector, Avalanche Photo Diodes	1	26.10.2020			
4.	Detector Response Time, Temperature Effect on Avalanche Gain, Comparison of Photo Detectors	1	27.10.2020			
5.	Fundamental Receiver Operation, Digital Signal Transmission, Error Sources	1	31.10.2020			
6.	Receiver Configuration, Digital Receiver Performance: Probabiliy of Error, The Quantum Limit, Analog Receivers	1	02.11.2020			
No. of classes required to complete UNIT-IV		**06**	No. of classes taken			

UNIT-V: Digital Transmission Systems and Measurements, WDM and SONET/SDH

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 Unit-V, Point to Point Links, System Considerations	1	03.11.2020			
2.	Link Power Budget, Rise Time Budget	1	07.11.2020			
3.	Line Coding- NRZ codes, RZ Codes, Measurement of Attenuation and Dispersion	1	09.11.2020			
4.	WDM Features, Operation Principles of WDM	1	10.11.2020			
5.	Types of WDM, SONET/SDH Networks	1	11.11.2020			

No. of classes required to complete UNIT-V	**05**	No. of classes taken	

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Fabrication of Fibers	1	11.11.2020			

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	17-08-2020	03-10-2020	7 W
I Mid Examinations	28-09-2020	03-10-2020	
II Phase of Instructions	05-10-2020	21-11-2020	7 W
II Mid Examinations	16-11-2020	21-11-2020	
Preparation and Practical's	23-11-2020	28-11-2020	1 W
Semester End Examinations	30-11-2020	12-12-2020	2 W

PART-C

EVALUATION PROCESS:

Evaluation Task	Marks
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	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)	Q=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:	**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. M.V.Sudhakar	Dr. M.V.Sudhakar	Dr. M.V.Sudhakar	Dr. Y. Amar Babu

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DEPARTMENT OF ELECTRONICS & COMMUNICATIONS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr.M.Sambasiva Reddy
Course Name & Code : Embedded System Design, 17EC29
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., ECE., VII-Sem. A.Y : 2020-21

PRE-REQUISITE:

COURSE EDUCATIONAL OBJECTIVES (CEOs):

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

CO 1	Outline the functionality of standard single purpose processors commonly used in embedded systems
CO 2	Apply top-down and bottom-up methodologies for embedded system design
CO 3	Analyze state machine and concurrent process models.
CO 4	Design Control unit and data path using computational models, and develop embedded systems using IC design technologies.

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2		-	-	-	-	-	-	-	-	1	-	1	-
CO2	3	2	1	-	-	-	-	-	-	-	-	2	-	2	
CO3	2	3	2	-	-	-	-	-	-	-	-	2	-	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 Frank Vahid/Tony Givargis, "Embedded Sytem Design A Unified Hardware/Software Introduction" Jhon Wiley & Sons,Inc.

REFERENCE BOOKS:

R1 James K Peckol," Embedded Systems- A Cntemporary Design Tool" Jhon Wiley, 2008.

R2 Joseph Yiu,"The Definitive Guide to the ARM Cortex-M3", Newnes, Elsevier, 2008.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Embedded System 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 Unit-1	1	17.08.2020			
2.	Embedded System overview	1	17.08.2020			
3.	Design Challenge	1	18.08.2020			
4.	Processor Technology	1	24.08.2020			
5.	IC Technology	1	24.08.2020			
6.	Design Technology	1	25.08.2020			
7.	Trade-offs	1	29.08.2020			
8.	Single Purpose Proccessors	1	31.08.2020			
9.	RT Level Cmbinational Logic, Sequential Logic	1	31.08.2020			
10.	Custom Single Purpose processor design	1	01.09.2020			
11.	Optimizing custom single Purpose processors	1	05.09.2020			
12.	Assignment-1	1	07.09.2020			
No. of classes required to complete UNIT-I: 12				No. of classes taken:		

UNIT-II: State Machine and Concurrent Process Models

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 Unit-II	1	07.09.2020			
2.	Models vs Languages	1	08.09.2020			
3.	Finite State machines with data path models(FSMD)	1	12.09.2020			
4.	**FSMD using state machines**	2	14.09.2020			
5.	Program State machine model	2	14.09.2020			
6.	Concurrent Process Model, **Concurrent Processes**	1	15.09.2020			
7.	**Communication among processes,** Synchronization among processes	2	19.09.2020			
8.	Implementation, Data flow models	1	21.09.2020			
9.	**Real-time Systems**	1	22.09.2020			
10.	**Assignment-2**	**1**	26.09.2020			
No. of classes required to complete UNIT-II:10				No. of classes taken:		

UNIT-III: Standard Single-purpose Processors

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 Unit-III	1	05.10.2020			
2.	Timers, **Counters,** Watchdog Timers	1	05.10.2020			
3.	UART, LCD Controllers	1	06.10.2020			
4.	**Stepper Motor Controllers**	1	**10.10.2020**			
5.	**Analog to digital Converters,** Real Time Clocks	1	12.10.2020			
6.	Common memory types, **Memory hierarchy and cache**	**1**	12.10.2020			
7.	Advanced RAM	1	13.10.2020			
8.	Assignment-3	1	17.10.2020			
No. of classes required to complete UNIT-III: 08				No. of classes taken:		

UNIT-IV: Interfacing

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.	Introductin to Unit-IV	1	19.10.2020			
2.	Communication Basics, **Microprocessor Interfacing**	1	19.10.2020			
3.	I/O Addressing,Interrupts, Direct Memory Access	1	20.09.2020			
4.	Arbitration, **Multilevelbus architectures**	1	26.10.2020			
5.	Advanced Communication principles, Serial Protocols, **Parallel Protocols**	1	26.10.2020			
6.	Wireless Protocols	1	27.10.2020			
7.	Assignment-4	1	27.10.2020			
No. of classes required to complete UNIT-IV: 07				No. of classes taken:		

UNIT-V : IC and Design Technology

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 Unit-V	1	31.10.2020			
2.	IC Technology, **Full-Custom(VLSI) IC technology**	1	02.11.2020			
3.	Programmable logic devices(PLD) IC technology	1	02.11.2020			
4.	Design technology: Automation, **Systhesis , Verification**	1	03.11.2020			
5.	Hardware/Software Co-simulation	1	07.11.2020			
6.	Reuse:Intellectual Property cores	1	09.11.2020			
7.	**Design Process Models**	1	09.11.2020			
8.	Assignment-5	1	10.11.2020			
No. of classes required to complete UNIT-V: 08				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 (R14 Regulations):

Evaluation Task	**Marks**
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	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	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

Academic Calendar: B.Tech., VII-Sem., 2020-21			
Description	**From**	**To**	**Weeks**
Commencement of Class work: 17.08.2020			
I Phase of Instructions	17-08-2020	03-10-2020	7W
I MID Examinations	28-09-2020	03-10-2020	
II Phase of Instructions	05-10-2020	21-11-2020	7W
II MID Examinations	16-11-2020	21-11-2020	
Preparation and Practicals	23-11-2020	28-11-2020	1W
Semester End Examinations	30-11-2020	14-12-2020	2W

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
(M.Sambasiva Reddy)	(Mr.G.Venkata Rao)	(Dr.P.Lachi Reddy)	(Dr.Y.Amar Babu)

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mrs. B.Rajeswari

Course Name & Code : Digital Image Processing – 17EC33

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

Program/Sem/Sec : B.Tech., ECE., VII-Sem., Section- B A.Y : 2020-21

PRE-REQUISITE: Signals and Systems, Digital Signal Processing, Transform Techniques.

COURSE OBJECTIVE: This course provides the fundamental concepts of Image Processing. Image enhancement which is the most prominent preprocessing step will be learnt in both time and spectral domain. The course also gives the basics of color images and their processing. Knowledge about compression as well as segmentation will also be given

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

CO1	**Summarize** the fundamentals of Digital Image Processing. (L2)
CO2	**Apply** the concepts of filtering, Fourier transforms for image enhancement and restoration.(L3)
CO3	**Illustrate** the compression of an image using loss less and lossy models. (L3)
CO4	**Analyze** the segmentation and color image processing techniques.(L4)

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

TEXT BOOKS:

T1	R. C. Gonzalez and R. E. Woods, "Digital Image Processing", Addison Wesley/ Pearson education, 3rd Edition, 2002

REFERENCE BOOKS:

R1	William J Pratt, "Digital Image Processing", John Wiley & Sons
R2	S.Jayaraman, E.Esakkirajan, T.Veerakumar, "Digital Image Processing", TMH edition, 2011
R3	Anil K. Jain, "Fundamentals of Digital Image Processing", PHI Publications.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

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 the course, Course Objective and Course outcomes	1	19.08.2020			
2.	2D function & Basic definitions & Digital image definition	1	20.08.2020			
3.	Fundamental steps in image processing	1	21.08.2020			
4.	Components of Image processing system	1	26.08.2020			
5.	Applications of Image Processing	1	27.08.2020			
6.	Structure of Human Eye & Image formation in the eye	1	28.08.2020			
7.	Sampling & Quantization, Digital image representation, Spatial Resolution, Intensity Resolution.	1	02.09.2020			
8.	Relationships between Pixels, Adjacency, Connectivity, Regions, Boundaries & Distance measures	1	03.09.2020			
No. of classes required to complete UNIT-I		**08**	No. of classes taken			

UNIT-II: Image Enhancement in Spatial and Frequency Domain

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 Image Enhancement, Spatial Domain Enhancement - Introduction	1	04.09.2020			
2.	Gray Level Transformation functions & Piecewise linear Transformation functions	1	09.09.2020			
3.	Histogram Processing, Histogram Equalization	1	10.09.2020			
4.	Histogram Specification & Examples	1	11.09.2020			
5.	Smoothing spatial filters & Sharpening spatial filters	1	16.09.2020			
6.	Introduction to Filtering in frequency domain , Image smoothing in frequency domain	1	17.09.2020			
7.	Image sharpening in frequency domain , Laplacian in the frequency domain	1	18.09.2020			
8.	Unsharp masking & High boost filtering	1	23.09.2020			
No. of classes required to complete UNIT-I		**08**	No. of classes taken			

UNIT-III: Image Restoration and Image Compression

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.	Image restoration & degradation model, Noise Models	1	24.09.2020			
2.	Restoration in the presence of noise using spatial filtering	1	25.09.2020			
3.	Inverse Filtering, MMSE filtering & Constrained least square filtering	1	07.10.2020			
4.	Introduction, Coding, Inter pixel , Psychovisual Redundancy , Fidelity Criteria	1	08.10.2020			
5.	Image compression model	1	09.10.2020			
6.	Huffman & Arithmetic coding	1	14.10.2020			
7.	LZW , Bit plane and run length coding	1	15.10.2020			
8.	Lossless & Lossy predictive coding, JPEG	1	16.10.2020			
No. of classes required to complete UNIT-III			**08**	No. of classes taken		

UNIT-IV: Image Segmentation

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.	Detection of discontinuities : Point, Line & Edge Detection	1	21.10.2020			
2.	Edge Linking , Boundary Detection: Local processing	1	22.10.2020			
3.	Global Processing via Hough transformation	1	23.10.2020			
4.	Global Processing via Graph theoretic techniques	1	28.10.2020			
5.	Thresholding	1	29.10.2020			
6.	Region Growing, Region splitting & merging	1	30.10.2020			
No. of classes required to complete UNIT-IV			**06**	No. of classes taken		

UNIT-V: Color Image Processing

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.	Color fundamentals	1	04.11.2020			
2.	Color Models	1	05.11.2020			
3.	Pseudo Color Image processing	1	06.11.2020			
4.	Full color image processing	1	11.11.2020			
5.	Histogram Processing	1	12.11.2020			
No. of classes required to complete UNIT-V		**05**	No. of classes taken			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Multirate Signal Processing	**1**	13.11.2020			

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 (Unit-I)	A1=5
Assignment-II (Unit-II)	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)	Q=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:	**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. B Rajeswari	Mr. M K Linga Murthy	Dr. G L N Murthy	Dr. Y. Amar Babu

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION

COURSE HANDOUT

PART-A

Name of Course Instructor : V.V.Rama Krishna
Course Name & Code : DSP PROCESSORS - 17EC37
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., ECE., VII-Sem., Sections- B A.Y : 2020-21

PRE-REQUISITE: Digital Signal Processing, Microprocessor

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course provides the knowledge on digital computational accuracy of systems and Architecture of various digital signal processors. . The course will give an idea how memory and I/O devices can be interfaced to digital signal processors.

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

CO 1	Remembering basic concepts of Digital signal processing techniques in both time and frequency domain
CO 2	Apply different parameters of computational accuracy in DSP implementation.
CO 3	Analysebasic architectural requirements of programmable digital signal processors.
CO 4	Design architectural aspects of TMS320C54XX and Analog devices family DSPs

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	-	-	-	-	-	-	-	-	1	-	-	1
CO2	3	2	2	-	-	-	-	-	-	-	-	2	-	-	2
CO3	2	3	2	1	-		-	-	-	-	-	2	-	-	3
CO4	2	2	3	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 Digital Signal Processing Implementations. Avatar Singh and S. Srinivasan, Thomson Publications

REFERENCE BOOKS:

R1 Digital Signal Processors, Architecture, Programming and Applications, B.Venkataramani and M. Bhaskar, 2002, TMH.

R2 Digital Signal Processing – Jonatham Stein, 2005, John Wiley.

R3 DSP Processor Fundamentals, Architecture & Features- Lapsley et al. 2000, S. Chand & Co.Press

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction To Digital Signal Processing

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.	Course Objectives	1	17-08-2020		TLM2	
2.	Introduction	1	18-08-2020		TLM2	
3.	A Digital signal-processing system	1	20-08-2020		TLM2	
4.	The sampling process	1	24-08-2020		TLM2	
5.	Discrete time sequences	1	25-08-2020		TLM2	
6.	Discrete Fourier Transform (DFT)	1	27-08-2020		TLM2	
7.	Fast Fourier Transform	1	31-08-2020		TLM2	
8.	linear time-invariant systems	1	01-09-2020		TLM2	
9.	Digital filters- FIR	1	03-09-2020		TLM2	
10.	Digital filters- IIR	1	07-09-2020		TLM2	
11.	Decimation, interpolation	1	08-09-2020		TLM2	
No. of classes required to complete UNIT-I:11				No. of classes taken:		

UNIT-II: Computational Accuracy in DSP Implementations

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.	Number formats for signals and coefficients in DSP systems	1	10-09-2020		TLM2	
2.	Number formats for signals and coefficients in DSP systems	1	14-09-2020		TLM2	
3.	Dynamic Range and Precision	1	15-09-2020		TLM2	
4.	Sources of error in DSP implementations	1	17-09-2020		TLM2	
5.	A/D Conversion errors	1	21-09-2020		TLM2	
6.	D/A Conversion Errors	1	22-09-2020		TLM2	
7.	DSP Computational errors	1	24-09-2020		TLM2	
8.	Compensating filter	1	28-09-2020		TLM2	
No. of classes required to complete UNIT-II:8				No. of classes taken:		

UNIT-III: Architectures for Programmable DSP Devices

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Basic Architectural features	1	05-10-2020		TLM2	
2.	DSP Computational Building Blocks, Bus Architecture and Memory	1	06-10-2020		TLM2	
3.	Data Addressing Capabilities	1	08-10-2020		TLM2	
4.	Address Generation Unit	1	12-10-2020		TLM2	
5.	Programmability and Program Execution	1	13-10-2020		TLM2	
6.	Speed Issues, Features for External interfacing	1	15-10-2020		TLM2	
No. of classes required to complete UNIT-III:6				No. of classes taken:		

UNIT-IV : Programmable Digital Signal Processors

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.	Commercial Digital signal-processing Devices	1	19-10-2020		TLM2	
2.	Data Addressing modes of TMS320C54XX DSPs	1	20-10-2020		TLM2	
3.	Memory space of TMS320C54XX Processors, Program Control	1	22-10-2020		TLM2	
4.	TMS320C54XX instructions and Programming	1	26-10-2020		TLM2	
5.	On-Chip Peripherals, Interrupts of TMS320C54XX processors	1	27-10-2020		TLM2	
6.	Pipeline Operation of TMS320C54XX Processors	1	29-10-2020		TLM2	
No. of classes required to complete UNIT-IV:6				No. of classes taken:		

UNIT-V : Analog Devices Family of DSP Devices

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.	Analog Devices Family of DSP Devices, ALU and MAC block diagram, Shifter Instruction	1	02-11-2020		TLM2	
2.	Base Architecture of ADSP2100	1	03-11-2020		TLM2	
3.	ADSP-2181 high performance Processor	1	05-11-2020		TLM2	
4.	Introduction to Blackfin Processor – The Blackfin Processor	1	09-11-2020		TLM2	
5.	Introduction to Micro Signal Architecture	1	10-11-2020		TLM2	
6.	Overview of Hardware Processing Units and Register files, Address Arithmetic Unit	1	12-11-2020		TLM2	
7.	Control Unit, Bus Architecture and Memory, Basic Peripherals	1	14-11-2020		TLM2	
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)
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 (Unit-I)	A1=5
Assignment-II (Unit-II)	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.
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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.
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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
(Name)	(Name)	(Name)	(Name)

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DEPARTMENT OF Electronics & Communication Engineering

COURSE HANDOUT

PART-A

PROGRAM : B. Tech. ECE – B, VII Sem.

ACADEMIC YEAR : 2020-21

COURSE NAME & CODE : Communication Networks - 17EC92

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

COURSE CREDITS : 3

COURSE INSTRUCTOR : Dr. P. Lachi Reddy, Professor

COURSE COORDINATOR : Dr. A. Narendra Babu, Professor

PRE-REQUISITE: Telecommunication Switching Systems and Networks

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

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

CO 1	**Understand** the layered architecture of OSI and TCP/IP Reference models.
CO 2	**Analyze** the Protocols of OSI and TCP/IP Reference models
CO 3	**Evaluate** routing algorithms, congestion control Algorithms, IP addressing used in Network layer.
CO 4	**Apply** the knowledge of protocols in networking applications.

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

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

TEXT BOOKS

1. Tanenbaum and Wetherall, "Computer Networks", Pearson Education, Fifth Edition.
2. Behrouz. A. Forouzan, "Data Communication and Networking", Fourth Edition, Tata McGraw-hill, New Delhi, 2006

REFERENCES

1. S.Keshav," An Engineering Approach to Computer Networks", Pearson Education, 2nd Edition,
2. W.A.Shay,"Understanding communications and Networks", Cengage Learning, 3rd Edition

3. Chwan-Hwa (John) Wu, J. David Irwin," Introduction to Computer Networks and Cyber Security", CRC Press.
4. L.L.Peterson and B.S.Davie," Computer Networks", ELSE VIER, 4th edition.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction, Cross bar Switching, Electronic Space Division Switching

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	19-08-20			
2.	Introduction to Communication Networks	1	21-08-20			
3.	Network Hardware , Network software	1	26-08-20			
4.	Network models LAN, WAN, MAN, Network software-protocols, layer issues	1	28-08-20			
5.	connection oriented and connection less services, Reference models-OSI	1	29-08-20			
6.	TCP/IP, Comparison between OSI and TCP/IP	1	02-09-20			
7.	Critics of OSI and TCP/IP model	1	04-09-20			
8.	Physical Layer- Guided Transmission Medium	1	05-09-20			
9.	Wireless Transmission Media, EM Spectrum, Radio, Light, Infrared and Microwave Transmission	1	09-09-20			
10.	Digital Modulation and Multiplexing, Bassband and Passband, FDM, TDM and Code Division Multiplexing	1	11-09-20			
No. of classes required to complete UNIT-I:10				No. of classes taken:		

UNIT-II: Data Link 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.	Introduction of DLL, Design Issues	1	12-09-20			
2.	Services provided to Network Layer Farming Methods, Error control and Flow Control	1	16-09-20			
3.	Error Detection and Correction, , Hamming codes, CRC, Checksum	1	18-09-20			
4.	Stop & wait , Sliding window, one bit, go-back -n, Selective repeat protocols	1	19-09-20			
5.	Medium Access control sub layer, channel allocation problem	1	22-09-20			
6.	Multiple Access protocols- ALOHA, CSMA protocols, CSMA with collision detection, Collision free protocols	1	23-09-20			
7.	Ethernet	1	25-09-20			
8.	Wireless Lans-Infrastructure, Protocol stack, MAC frame , 802.11 services	1	26-09-20			
9.	Bluetooth-Architecture, Protocol stack, Frame structure	1	29-09-20			
No. of classes required to complete UNIT-II:9						

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
1.	Network Layer Design Issues- store and forward, datagrams and virtual circuits	1	30-09-20			
2.	Routing algorithms- Optimality Principle, Shortest Path	1	03-10-20			
3.	Flooding, Distance vector routing ,	1	06-10-20			
4.	Link state routing	1	07-10-20			
5.	Hierarchical routing		09-10-20			
6.	Board cast routing & Multicast Routing	1	10-10-20			
7.	Congestion control in data subnets, warning bits	1	13-10-20			
8.	Load shedding, choke packets	1	14-10-20			
9.	Jitter control, RED	1	16-10-20			
No. of classes required to complete UNIT-III: 09				No. of classes taken:		

UNIT-IV : Transport Layer

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Internetworking	1	17-10-20			
2.	Tunneling, Packet Fragmentation	1	20-10-20			
3.	IPV4	1	21-10-20			
4.	IPV6, comparision between IPV4 and IPV6	1	23-10-20			
5.	Internet control protocols	1	27-10-20			
6.	OSPF BGP	1	28-10-20			
7.	Transport layer services to the upward Layers	1	30-10-20			
8.	Addressing Address connection establishment	1	31-10-20			
9.	Connection release, Crash Recvoery	1	03-11-20			
No. of classes required to complete UNIT-IV: 09				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
1.	Internet transport protocols: UDP- RPC,	1	04-11-20			
2.	Real Time Transport Protocols	1	06-11-20			
3.	Internet transport protocols: TCP-I,	1	07-11-20			
4.	TCP service model	1	10-11-20			
5.	TCP Segment Header	1	11-11-20			
6.	Domain Name system	1	13-11-20			
7.	Email Architecture and services	1	17-11-20			
8.	SMTP	1	18-11-20			
9.	WWW and its architecture	1	20-11-20			
No. of classes required to complete UNIT-V: 09				No. of classes taken:		

Content beyond the syllabus

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Encryption		21-11-20			
2.						
No. of classes required to complete UNIT-V:5				No. of classes taken:		

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	**17-08-2020**	**03-10-2020**	**7 W**
I Mid Examinations	**28-10-2020**	**03-10-2020**	**1W**
II Phase of Instructions	**05-10-2020**	**21-11-2020**	**7 W**
II Mid Examinations	**16-11-2020**	**21-11-2020**	**1W**
Preparation and Practical examinations	**23-11-2020**	**28-11-2020**	**1W**
Semester End Examinations	**30-11-2020**	**14-12-2020**	**2 W**

PART-C

EVALUATION PROCESS (R17 Regulations):

Evaluation Task	Marks
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	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	**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. P. Lachi Reddy)	(Dr. A. Narendra Babu)	(Dr. M. Venkata Sudhakar)	(Dr. Y. Amar Babu)

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DEPARTMENT OF ELECTRONICS & COMMUNICATIONS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Michael Sadgun Rao Kona
Course Name & Code : Introduction to Database & 17IT80
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., ECE., VII-Sem.,A,B,C A.Y : 2020-21

PRE-REQUISITE: 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, Data base Design, Normalization process and Transaction processing and Indexing.

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

CO 1	**Understand** DBMS concepts, architecture
CO 2	**Design** Entity Relational Model and make them to data model.
CO 3	**Understand** the usage of keys and constraints for relational data.
CO 4	**Apply** the normalization process for data base design.
CO 5	**Analyze** the issues in transaction processing and different recovery strategies.

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
CO4	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.

T2 RamezElmasri, Shamkanth B. Navathe, "Fundamentals Of Database Systems", Addision Wesley, 6th edition, 2010.

REFERENCE BOOKS:

R1 Raghu Ramakrishna, Johannese 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	1	17.08.2020		TLM2	
2.	Introduction, An overview of database management system, Database system Vs file system	1	19.08.2020		TLM2	
3.	Database system Vs file system	1	21.08.2020		TLM2	
4.	Database system concepts and architecture	1	24.08.2020		TLM2	
5.	Data models schema and instances	1	26.08.2020		TLM2	
6.	Data independence and data base language and interfaces	1	28.08.2020		TLM2	
7.	Data definitions language, DML	1	31.08.2020		TLM2	
8.	Overall Database Structure	1	2.09.2020		TLM2	
9.	**Revision on Unit-1& Assignment-I**	1	4.09.2020		TLM2	
No. of classes required to complete UNIT-I: 9				No. of classes taken:		

UNIT-II: Data Modelling using the 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	1	07/09/20, 09/09/20		TLM2	
2.	notation for ER diagram	1	11/09/20		TLM2	
3.	Mapping constraints	1	14/09/20		TLM2	
4.	keys -Concepts of Super Key, and identity key, primary key, Generalization	1	16/09/20		TLM2	
5.	Aggregation	1	18/09/20		TLM2	
6.	Reduction of an ER diagrams to tables,	1	21/09/20		TLM2	
7.	Relationships of higher degree	1	23/09/20		TLM2	
8.	**Revision on Unit - II & Assignment-II**	1	25/09/20		TLM2	
No. of classes required to complete UNIT-II: 09				No. of classes taken:09		

I MID EXAMINATIONS	28/09/20 TO 03/10/20

UNIT-III: Relational Data Model and Language

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	1	05/10/20		TLM2	
2.	Integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints	1	07/10/20		TLM2	
3.	Relational algebra	1	09/10/20		TLM2	
4.	Characteristics of SQL, Advantage of SQL SQL data types and literals, Types of SQL commands SQL operators and their procedure	1	12/10/20		TLM2	
5.	Tables, views and indexes, Queries and sub queries, Aggregate functions Insert, update and delete operations	1	14/10/20		TLM2	
6.	Unions, Intersection, Minus, Cursors in SQL, Revision of UNIT-3&Assignment-III	1	16/10/20		TLM2	
No. of classes required to complete UNIT-III: 6				No. of classes taken:		

UNIT-IV: 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	1	19/10/20		TLM2	
2.	Normal Forms: First, Second, Third Normal Forms	1	21/10/20		TLM2	
3.	BCNF, Inclusion Dependences Loss Less Join Decompositions	1	23/10/20		TLM2	
4.	Normalization Using FD,MVD Normalization Using JD	1	26/10/20		TLM2	
5.	Normalization Using FD,MVD Normalization Using JD		28/10/20		TLM2	
6.	Alternative Approaches to Database Design Revision of Unit-4&Assignment-IV	1	30/10/20		TLM2	
No. of classes required to complete UNIT-IV: 6				No. of classes taken:		

UNIT-V: Transaction Processing Concepts

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.	Transaction System	1	02/11/20		TLM2	
2.	Testing Of Serializability , Serializability of Schedules Conflict & View Serializable Schedule	1	04/11/20		TLM2	
3.	Recoverability, Log Based Recovery, Checkpoints, ARIES Algorithm, Deadlock Handling	1	06/11/20		TLM2	
4.	Concurrency Control Techniques For Concurrency Control	1	09/11/20		TLM2	
5.	Time Stamping Protocols for Concurrency Control	1	11/11/20		TLM2	
6.	Locking, Validation Based Protocol, Multiple Granularity	1	13/11/20		TLM2	
7.	Recovery With Concurrent Transactions ,**Revision of UNIT-5&Assignment-V**	1	16/11/20		TLM2	
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)
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 (Unit-I)	A1=5
Assignment-II (Unit-II)	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.
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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	Module Coordinator	HOD
(Mr.Michael Sadgun Rao Kona)	(Dr .S. Naganjaneyulu)	(Dr.B.Srinivasa Rao)

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor :, Mr. V.RAVI SEKHAR REDDY ,Smt. K.RANI RUDRAMA
Course Name & Code : MICROWAVE AND OPTICAL COMMUNICATIONS LAB-17EC71
L-T-P Structure : 0-0-2 Credit: 1
Program/Sem/Sec : B.Tech., ECE., VII-Sem., Section- B A.Y : 2020-21

Course Educational Objective :This Lab deals with the micro measurements of the signals at micro frequency range. It involves measurement of frequency, wave length, VSWR, Impedance and scattering parameters of various micro wave devices like Circulator, Direction Coupler, and Magic-Tee. Even the latest trend of communication technology i.e. fiber optics is also introduced and propagation conditions will be verified by evaluating the losses.

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

CO 1	Understand the various blocks of microwave bench setup
CO 2	Evaluate the frequency, wave length, VSWR, impedance and scattering parameters of various microwave devices
CO 3	Analyze the losses to verify the propagating conditions in the optical fiber.
CO 4	Adapt effective communication, presentation and report writing skills.

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

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
CYCLE I						
1.	Demonstration	1	18.08.2020		TLM 4	
2.	Reflex Klystron Characteristics	1	25.08.2020		TLM4	
3.	Gunn Diode Characteristics	1	01.09.2020		TLM4	
4.	Attenuation Measurement	1	08.09.2020		TLM4	
5.	Directional Coupler Characteristics.	1	15.09.2020		TLM4	
6.	VSWR Measurement	1	22.09.2020		TLM4	
7.	Impedance ,Frequency Measurement.	1	29.09.2020		TLM4	
CYCLE 2						
8	Scattering Parameters of Circulator.	1	06.10.2020		TLM4	
9	Scattering Parameters of Magic Tee.	1	13.10.2020		TLM4	
10	Characterization of LED,Laser Diode	1	20.10.2020		TLM4	
11	Measurement of Data rate for Digital Optical link.	1	27.10.2020		TLM4	
12	Measurement of Numerical Aperture	1	03.11.2020		TLM4	
13	Measurement of losses for Analog optical link	1	10.11.2020		TLM4	
14	Lab exam	1	17.11.2020			

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**
Day to Day work	A=20
Internal Lab Examination	B=10
Attendance	C=5
Viva voce	D=5
Cumulative Internal Examination : A+B+C	**A+B+C+D=40**
Semester End Examinations	**E=60**
Total Marks: A+B+C+D+E	**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.
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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.
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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. V.RAVI SEKHAR REDDY)	(K.RANI RUDRAMA)	(Dr. Y.S.V.RAMAN)	(Dr. Y. Amar Babu)

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION

COURSE HANDOUT

PART-A

PROGRAM : B.Tech., VII-Sem., ECE – B Section

ACADEMIC YEAR : 2020 - 21

COURSE NAME & CODE : Embedded System Design Lab – 17EC72

L-T-P STRUCTURE : 0-0-2

COURSE CREDITS : 2

COURSE INSTRUCTOR : **Mr. K. Ravi Kumar**

COURSE COORDINATOR :

COURSE OBJECTIVE:
This course provides practical exposure on

Course Outcomes: At the end of the course, student will be able to:

CO1	Evaluate Inter Process Communication applications using ARM based processors
CO2	Develop the Hardware platform using soft processors and applications using C on Xilinx FPGA Zynq 7000 series
CO3	Adapt effective communication, presentation and report writing skills.

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

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

PART-B

LAB SCHEDULE (LESSON PLAN): Section-B

LIST OF EXPERIMENTS (Minimum 12 Experiments to be conducted)

S.No.	Experiments to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
	CYCLE-1					
1.	Introduction to Lab	2	21.08.2020		**TLM2**	
2.	ARM Assembly Language Programming-I	2	28.08.2020		**TLM8**	
3.	ARM Assembly Language Programming-II	2	04.09.2020		**TLM8**	
4.	Program to Interface 8-bit LED	2	11.09.2020		**TLM8**	
5.	Program to demonstrate Time Delay Program using built in Timer/Counter feature	2	18.09.2020		**TLM8**	
6.	Program to displaying a message in a 2line x 16 Characters LCD display and verify the result in debug terminal	2	18.09.2020		**TLM8**	
7.	Program to implement Generation of PWM signal on IDE environment	2	25.09.2020		**TLM8**	
8.	Program to demonstrate serial communication on IDE environment	2	25.09.2020		**TLM8**	
	CYCLE-2					
9.	Program to implement Traffic light controller on IDE environment	2	02.10.2020		**TLM8**	
10.	Program to implement Stepper motor controller on IDE environment	2	09.10.2020		**TLM8**	
11.	Basic Audio Processing on IDE environment	2	16.10.2020		**TLM8**	
12.	Program to demonstrate I2C Interface on IDE environment	2	16.10.2020		**TLM8**	
13.	Program to implement Buzzer Interface on IDE environment	2	23.10.2020		**TLM8**	
14.	Design of System on Chip platform using Xilinx FPGAs and Embedded Development Kit Tools	2	30.10.2020		**TLM8**	
15.	Design dual processor based System on Chip using Xilinx EDK Tools and Zynq 7000 series FPGA	2	06.11.2020		**TLM8**	
16.	Hardware Software Co- design using Xilinx EDK Tools	2	13.11.2020		**TLM8**	

17.	Internal Exam	2	20.11.2020			
No. of classes required to complete:		32	No. of classes conducted:			

PART-C

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:

Academic Calendar: B.Tech., VII-Sem., 2020-21			
Description	**From**	**To**	**Weeks**
Commencement of Class work: 17.08.2020			
I Phase of Instructions	17-08-2020	03-10-2020	7W
I MID Examinations	28-09-2020	03-10-2020	
II Phase of Instructions	05-10-2020	21-11-2020	7W
II MID Examinations	16-11-2020	21-11-2020	
Preparation and Practicals	23-11-2020	28-11-2020	1W
Semester End Examinations	30-11-2020	14-12-2020	2W

EVALUATION PROCESS:

Evaluation Task	**COs**	**Marks**
Day to Day work	1,2,3	A1=20
Attendance (>95%=5, 90-95%=4,85-90%=3,80-85%=2,75-80%=1)		A2=5
Viva-Voce	1,2,3	A3=5
Internal Lab Examination	1,2,3	B=10
Total Internal Marks(A1+A2+A3+B)		**C=40**
Semester End Examinations	1,2,3	**D=60**
Total Marks: C+D	1,2,3	**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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	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. Ravi Kumar)		(Dr.P.Lachi Reddy)	(Dr.Y.Amar Babu)

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

DEPARTMENT OF ELECTRONICS AND COMMUNICATION

COURSE HANDOUT

PART-A

Name of Course Instructor : M.Ramya Harika
Course Name & Code : Microwave Engineering- 17EC27
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., ECE., VII-Sem., Sections- C A.Y : 2020-21

PRE-REQUISITE: Electromagnetics , Waveguides

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course provides the knowledge on microwave communication in terms of various bands, advantages, applications. The course will give an idea about microwave active and passive devices. The course also gives the complete information regarding microwave bench setup and microwave measurements

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

CO 1	Understand the operation and use of Microwave solid state devices
CO 2	Analyze the characteristics of Microwave tubes
CO 3	Apply the properties of S-parameters to waveguide components
CO 4	Evaluate the various microwave parameters using microwave bench setup.

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	-	-	-	-	-	-	-	-	1	-	-	1
CO2	3	2	2	-	-	-	-	-	-	-	-	2	-	-	2
CO3	2	3	2	1	-		-	-	-	-	-	2	-	-	3
CO4	2	2	3	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 Samuel Y. Liao, "Microwave Devices and Circuits", PHI Publishers, 3rdEdition, 2003.

T2 David M.Pozar, "Microwave Engineering", John Wiley Publishers, 4thEdition.

REFERENCE BOOKS:

R1 G. S. N. Raju, "Microwave Engineering", IK International Publishers, New Delhi.

R2 Robert E. Collin "Foundations for microwave engineering" Tata McGraw Hill,2nd edition.

R3 M Kulakarni, "Microwave and Radar Engineering", Umesh Publications, New Delhi 5 thEdition.

R4 Peter A. Rizzi, "Microwave Engineering Passive Circuits", Prentice-Hall Publishers.

R5 G. Sasibhushana Rao, "Microwave and Radar Engineering", Pearson Education India

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Course Objectives and Introduction to Unit- 1	1	18-08-2020		TLM2	
2.	Microwave Spectrum and Bands, Advantages of Microwaves.	1	20-08-2020		TLM2	
3.	Applications of Microwaves and Limitations of Conventional tubes	1	25-08-2020		TLM2	
4.	Microwave Tubes: Limitations and Losses of conventional tubes at microwave frequencies. O type and M type classifications	1	27-08-2020		TLM2	
5.	Two Cavity Klystron Structure and velocity modulation process	1	29-08-2020		TLM2	
6.	Two Cavity Klystron : Applegate Diagram, Bunching Process	1	01-09-2020		TLM2	
7.	Two Cavity Klystron: Expressions for o/p Power and Efficiency	1	03-09-2020		TLM2	
8.	Reflex Klystrons – Structure, Applegate Diagram and Principle of working	1	05-09-2020		TLM2	
9.	Reflex Klystron - Mathematical Theory of Bunching	1	08-09-2020		TLM2	
10.	Reflex Klystron - Power Output, Efficiency, o/p Characteristics.	1	10-09-2020		TLM2	
No. of classes required to complete UNIT-I:11				No. of classes taken:		

UNIT-II:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Helix TWT: Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT	1	16-09-2020		TLM2	
2.	Amplification Process, Axial Electric Field, Convection Current	1	18-09-2020		TLM2	
3.	Propagation Constants, Gain Considerations.	1	19-09-2020		TLM2	
4.	M-Type Tubes : Introduction, Cross-field effects, Magnetrons – Different Types	1	23-09-2020		TLM2	
5.	8-Cavity Cylindrical Travelling Wave Magnetron	1	24-09-2020		TLM2	
6.	Hull Cut-off and Hartee Conditions	1	25-09-2020		TLM2	
7.	Modes of Resonance and PI-Mode Operation	1	26-09-2020		TLM2	
8.	O/p characteristics, Frequency Pulling and Frequency Pushing, Strapping.	1	26-09-2020		TLM2	
No. of classes required to complete UNIT-II:8				No. of classes taken:		

UNIT-III:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Microwave Solid State Devices: Introduction, Classification, Applications.	1	29-09-2020		TLM2	
2.	Transferred Electron Devices: Introduction, Gunn Diode – Principle	1	29-09-2020		TLM2	
3.	Two Valley Model Theory	1	01-10-2020		TLM2	
4.	Transferred Electron Devices: RWH Theory, Characteristics, Modes of Operation	1	03-10-2020		TLM2	
5.	Avalanche Transit Time Devices: Introduction	1	06-10-2020		TLM2	
6.	IMPATT Diode - Principle of Operation	1	06-10-2020		TLM2	
7.	TRAPATT Diode - Principle of Operation	1	08-10-2020		TLM2	
8.	Characteristics of Diodes	1	10-10-2020		TLM2	
9.	Related expressions of IMPATT and TRAPATT Diodes	1	13-10-2020		TLM2	
No. of classes required to complete UNIT-III : 09				No. of classes taken:		

UNIT-IV :

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Waveguide Components-I: Waveguide Multiport Junctions	1	13-10-2020		TLM2	
2.	E plane and H plane Tees	1	15-10-2020		TLM2	
3.	Magic Tee, Hybrid Ring	1	17-10-2020		TLM2	
4.	Directional Couplers – 2 Hole, Bethe Hole types.	1	20-10-2020		TLM2	
5.	Scattering Matrix– Significance,	1	20-10-2020		TLM2	
6.	Scattering Matrix– Formulation and Properties.	1	22-10-2020		TLM2	
7.	S Matrix Calculations for E plane	1	27-10-2020		TLM2	
8.	S Matrix Calculations for H plane Tees	1	27-10-2020		TLM2	
9.	Magic Tee, Directional Coupler.	1	29-10-2020		TLM2	
No. of classes required to complete UNIT-IV : 09				No. of classes taken:		

UNIT-V :

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Waveguide Discontinuities – Waveguide irises	1	31-10-2020		TLM2	
2.	Tuning Screws and Posts, Matched Loads	1	03-11-2020		TLM2	
3.	Waveguide Attenuators – Resistive Card, Rotary Vane types	1	03-11-2020		TLM2	
4.	Waveguide Phase Shifters –	1	05-11-2020		TLM2	

	Dielectric, Rotary Vane types;					
5.	Ferrites– Composition and Characteristics	1	07-11-2020		TLM2	
6.	Faraday Rotation	1	10-11-2020		TLM2	
7.	Ferrite Components – Gyrator, Isolator	1	10-11-2020		TLM2	
8.	Circulator.	1	12-11-2020		TLM2	
9.	Microwave Measurements: Description of Microwave Bench	1	17-11-2020		TLM2	
10.	Different Blocks and their Features	1	17-11-2020		TLM2	
11.	Precautions; Measurement of Attenuation, Frequency, VSWR	1	19-11-2020		TLM2	
12.	Cavity Q, Impedance, Power.	1	21-11-2020		TLM2	
No. of classes required to complete UNIT-V: 12				No. of classes taken:		

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

PART-C

EVALUATION PROCESS (R17 Regulations):

Evaluation Task	**Marks**
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	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
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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.
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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

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. M. V.Sudhakar

Course Name & Code : Optical Communications – 17EC28

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

Program/Sem/Sec : B.Tech., ECE., VII-Sem., Section- C A.Y : 2020-21

PRE-REQUISITE: Electromagnetic Theory, Analog Communications, Digital Communications.

COURSE OBJECTIVE: This course gives knowledge on optical communication fundamentals, fiber types, and fiber materials. This course also describe about transmission losses in the fiber, optical sources, source to fiber coupling scheme, and optical receivers. This course also provides understanding of digital optical link, analog optical systems, wavelength division multiplexing and optical networks.

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

CO1	**Understand** the concepts of optical communication systems, WDM systems, and optical networks.
CO2	**Apply** knowledge of signal transmission characteristics on fibers, optical sources and detectors.
CO3	**Analyze** the optical device characteristics and their signal degradation mechanisms in analog and digital signal transmission.
CO4	**Evaluate** the performance of optical fiber communication systems

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	1	-	-	-	-	-	-	-	-	-	1	1	-	-
CO2	3	3	1	-	-	-	-	-	-	-	-	2	3	-	-
CO3	2	3	1	-	-	-	-	-	-	-	-	2	2	-	-
CO4	2	2	1	-	-	-	-	-	-	-	-	2	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	Gerd Keiser, Optical Fiber Communications, Mc Graw-Hill International edition,4th Edition, 2008.
T2	Joseph C. Palais, Fiber Optic Communications, Pearson Education, 4th Edition, 2004.

REFERENCE BOOKS:

R1	John M. Senior, Optical Fiber Communications, PHI, 2nd Edition, 2002.
R3	Govind P. Agarwal,Fiber Optic Communication Systems, John Wiley, 3rd Edition, 2004
R3	S. C. Gupta,Text Book on Optical Fiber Communication and its Applications, PHI,2005.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-C

UNIT-I: Overview of Optical Fiber Communications

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, COs, POs	1	17.08.2020			
2.	The General System, The Evolution of Fiber Optic Systems	1	21.08.2020			
3.	Elements of Optical Fiber Link, Merits and Demerits of Optical Fiber Communications	1	22.08.2020			
4.	Applications of Optical Fiber Communications, Basic Optical Laws: Refractive Index, Refraction, Reflection	1	24.08.2020			
5.	Critical Angle, Total Internal Reflection,	1	28.08.2020			
6.	Optical Fiber Structure, Step Index Fiber Structure, Graded Index Fiber Structure	1	29.08.2020			
7.	Ray Optic Representation, Acceptance Angle, Numerical Aperture,	1	31.08,2020			
8.	Meridional and Skew Rays, Overview of Modes, Summary of Key Modal Concepts	1	04.09.2020			
9.	Cut-off Wavelength, Mode Field Diameter	1	05.09.2020			
10.	Revision of Unit-I	1	07.09.2020			
No. of classes required to complete UNIT-I		**10**	No. of classes taken			

UNIT-II: Fiber Materials and Signal Degradation in Optical Fibers

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 Unit-II	1	11.09.2020			
2.	Fiber Materials, Glass Fibers, Active Glass Fibers, Plastic Glass Fibers,	1	12.09.2020			
3.	Attenuation , Attenuation Units, Absorption, Scattering Losses	1	14.09.2020			
4.	Bending Losses, Core-Cladding Losses	1	18.09.2020			
5.	Signal Distortion in Optical Waveguides, Information Capacity Determination, Group delay	1	19.09.2020			
6.	Material Dispersion, Polarization-Mode Dispersion, Intermodal Dispersion, Pulse Broadening in Graded-Index Waveguides	1	21.09.2020			
7.	Mode Coupling, Design Optimization of Single-Mode Fibers, Refractive Index Profiles	1	25.09.2020			
8.	Revision of Unit-II	1	26.09.2020			
No. of classes required to complete UNIT-I		**08**	No. of classes taken			

UNIT-III: Optical Sources, Power Launching and Coupling

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.	Requirements of Optical Sources, LED Structures, Light Source Materials	1	05.10.2020			
2.	Quantum Efficiency and LED Power, Modulation of LED	1	09.10.2020			
3.	LASER Diodes, Laser Diode Modes and Threshold Conditions	1	10.10.2020			
4.	Semiconductor Laser Diodes, Fabry Perot Lasers	1	12.10.2020			
5.	Distributed Feedback (DFB) Lasers, Laser diode rate equations, External quantum efficiency and resonant frequencies	1	16.10.2020			
6.	Source to fiber launching, Source output pattern, power coupling calculation	1	17.10.2020			
7.	Lensing Schemes for coupling improvement, Laser Diode-to-Fiber Coupling	1	19.10.2020			
No. of classes required to complete UNIT-III		**07**	No. of classes taken			

UNIT-IV: Optical detectors and receivers

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 unit-IV	1	23.10.2020			
2.	Photo Detectors, Physical Principles of Photodiodes	1	24.10.2020			
3.	PIN Photo Detector, Avalanche Photo Diodes	1	26.10.2020			
4.	Detector Response Time, Temperature Effect on Avalanche Gain, Comparison of Photo Detectors	1	30.10.2020			
5.	Fundamental Receiver Operation, Digital Signal Transmission, Error Sources	1	31.10.2020			
6.	Receiver Configuration, Digital Receiver Performance: Probabiliy of Error, The Quantum Limit, Analog Receivers	1	02.11.2020			
No. of classes required to complete UNIT-IV		**06**	No. of classes taken			

UNIT-V: Digital Transmission Systems and Measurements, WDM and SONET/SDH

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 Unit-V, Point to Point Links, System Considerations	1	06.11.2020			
2.	Link Power Budget, Rise Time Budget	1	07.11.2020			
3.	Line Coding- NRZ codes, RZ Codes, Measurement of Attenuation and Dispersion	1	09.11.2020			
4.	WDM Features, Operation Principles of WDM	1	12.11.2020			
5.	Types of WDM, SONET/SDH Networks	1	13.11.2020			

No. of classes required to complete UNIT-V	**05**	No. of classes taken	

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Fabrication of Fibers	1	13.11.2020			

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	17-08-2020	03-10-2020	7 W
I Mid Examinations	28-09-2020	03-10-2020	
II Phase of Instructions	05-10-2020	21-11-2020	7 W
II Mid Examinations	16-11-2020	21-11-2020	
Preparation and Practical's	23-11-2020	28-11-2020	1 W
Semester End Examinations	30-11-2020	12-12-2020	2 W

PART-C

EVALUATION PROCESS:

Evaluation Task	Marks
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	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)	Q=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.
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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**
Dr. M.V.Sudhakar	Dr. M.V.Sudhakar	Dr. M.V.Sudhakar	Dr. Y. Amar Babu

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DEPARTMENT OF ELECTRONICS & COMMUNICATIONS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr.M.Sambasiva Reddy
Course Name & Code : Embedded System Design, 17EC29
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., ECE., VII-Sem., Sec-C A.Y : 2020-21

PRE-REQUISITE:

COURSE EDUCATIONAL OBJECTIVES (CEOs):

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

CO 1	Outline the functionality of standard single purpose processors commonly used in embedded systems
CO 2	Apply top-down and bottom-up methodologies for embedded system design
CO 3	Analyze state machine and concurrent process models.
CO 4	Design Control unit and data path using computational models, and develop embedded systems using IC design technologies.

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2		-	-	-	-	-	-	-	-	1	-	1	-
CO2	3	2	1	-	-	-	-	-	-	-	-	2	-	2	
CO3	2	3	2	-	-	-	-	-	-	-	-	2	-	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 Frank Vahid/Tony Givargis, "Embedded Sytem Design A Unified Hardware/Software Introduction" Jhon Wiley & Sons,Inc.

REFERENCE BOOKS:

R1 James K Peckol," Embedded Systems- A Cntemporary Design Tool" Jhon Wiley, 2008.

R2 Joseph Yiu,"The Definitive Guide to the ARM Cortex-M3", Newnes, Elsevier, 2008.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Embedded System 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 Unit-1	1	18.08.2020			
2.	Embedded System overview	1	18.08.2020			
3.	Design Challenge	1	20.08.2020			
4.	Processor Technology	1	21.08.2020			
5.	IC Technology	1	25.08.2020			
6.	Design Technology	1	25.08.2020			
7.	Trade-offs	1	27.08.2020			
8.	Single Purpose Processors	1	28.08.2020			
9.	RT Level Combinational Logic	1	01.09.2020			
10.	RT Level Sequential Logic	1	01.09.2020			
11.	Custom Single Purpose processor design	1	03.10.2020			
12.	Optimizing custom single Purpose processors	1	04.10.2020			
13.	Assignment-1	1	08.10.2020			
No. of classes required to complete UNIT-I: 13				No. of classes taken:		

UNIT-II: State Machine and Concurrent Process Models

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 Unit-II	1	08.10.2020			
2.	Models vs Languages	1	10.09.2020			
3.	Finite State machines with data path models(FSMD)	1	11.09.2020			
4.	**FSMD using state machines**	1	15.09.2020			
5.	Program State machine model	1	15.09.2020			
6.	Concurrent Process Model, **Concurrent Processes**	1	17.09.2020			
7.	**Communication among processes**	1	18.09.2020			
8.	Synchronization among processes	1	22.09.2020			
9.	Implementation, Data flow models	1	22.09.2020			
10.	**Real-time Systems**	1	24.09.2020			
11.	**Assignment-2**	**1**	25.09.2020			
No. of classes required to complete UNIT-II:11				No. of classes taken:		

UNIT-III: Standard Single-purpose Processors

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 Unit-III	1	06.10.2020			
2.	Timers, Counters, Watchdog Timers	1	06.10.2020			
3.	UART, LCD Controllers	1	08.10.2020			
4.	Stepper Motor Controllers	1	09.10.2020			
5.	Analog to digital Converters, Real Time Clocks	1	13.10.2020			
6.	Common memory types, Memory hierarchy and cache	1	13.10.2020			
7.	Advanced RAM	1	15.10.2020			
8.	Assignment-3	1	16.10.2020			
No. of classes required to complete UNIT-III: 08				No. of classes taken:		

UNIT-IV: Interfacing

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.	Introductin to Unit-IV	1	20.10.2020			
2.	Communication Basics, Microprocessor Interfacing	1	20.10.2020			
3.	I/O Addressing,Interrupts, Direct Memory Access	1	22.10.2020			
4.	Arbitration, Multilevelbus architectures	1	23.10.2020			
5.	Advanced Communication principles, Serial Protocols, Parallel Protocols	1	27.09.2020			
6.	Wireless Protocols	1	27.10.2020			
7.	Assignment-4	1	29.10.2020			
No. of classes required to complete UNIT-IV: 07				No. of classes taken:		

UNIT-V : IC and Design Technology

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 Unit-V	1	03.11.2020			
2.	IC Technology, Full-Custom(VLSI) IC technology	1	03.11.2020			
3.	Programmable logic devices(PLD) IC technology	1	05.11.2020			
4.	Design technology: Automation, Systhesis , Verification	1	06.11.2020			
5.	Hardware/Software Co-simulation	1	10.11.2020			
6.	Reuse:Intellectual Property cores	1	10.11.2020			
7.	Design Process Models	1	12.11.2020			
8.	Assignment-5	1	13.11.2020			
No. of classes required to complete UNIT-V: 08				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 (R14 Regulations):

Evaluation Task	**Marks**
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	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	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

Academic Calendar: B.Tech., VII-Sem., 2020-21			
Description	**From**	**To**	**Weeks**
Commencement of Class work: 17.08.2020			
I Phase of Instructions	17-08-2020	03-10-2020	7W
I MID Examinations	28-09-2020	03-10-2020	
II Phase of Instructions	05-10-2020	21-11-2020	7W
II MID Examinations	16-11-2020	21-11-2020	
Preparation and Practicals	23-11-2020	28-11-2020	1W
Semester End Examinations	30-11-2020	14-12-2020	2W

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
(M.Sambasiva Reddy)	(Mr.G.Venkata Rao)	(Dr.P.Lachi Reddy)	(Dr.Y.Amar Babu)

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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 : Mr. M K Linga Murthy

Course Name & Code : Digital Image Processing – 17EC33

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

Program/Sem/Sec : B.Tech., ECE., VII-Sem., Section- C A.Y : 2020-21

PRE-REQUISITE: Signals and Systems, Digital Signal Processing, Transform Techniques.

COURSE OBJECTIVE: This course provides the fundamental concepts of Image Processing. Image enhancement which is the most prominent preprocessing step will be learnt in both time and spectral domain. The course also gives the basics of color images and their processing. Knowledge about compression as well as segmentation will also be given

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

CO1	**Summarize** the fundamentals of Digital Image Processing. (L2)
CO2	**Apply** the concepts of filtering, Fourier transforms for image enhancement and restoration.(L3)
CO3	**Illustrate** the compression of an image using loss less and lossy models. (L3)
CO4	**Analyze** the segmentation and color image processing techniques.(L4)

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

TEXT BOOKS:

T1	R. C. Gonzalez and R. E. Woods, "Digital Image Processing", Addison Wesley/ Pearson education, 3rd Edition, 2002

REFERENCE BOOKS:

R1	William J Pratt, "Digital Image Processing", John Wiley & Sons
R2	S.Jayaraman, E.Esakkirajan, T.Veerakumar, "Digital Image Processing", TMH edition, 2011
R3	Anil K. Jain, "Fundamentals of Digital Image Processing", PHI Publications.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-C

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 the course, Course Objective and Course outcomes	1	17.08.2020			
2.	2D function & Basic definitions & Digital image definition	1	18.08.2020			
3.	Fundamental steps in image processing	1	20.08.2020			
4.	Components of Image processing system	1	24.08.2020			
5.	Applications of Image Processing	1	25.08.2020			
6.	Structure of Human Eye & Image formation in the eye	1	27.08.2020			
7.	Sampling & Quantization, Digital image representation, Spatial Resolution, Intensity Resolution.	1	31.08.2020			
8.	Relationships between Pixels, Adjacency, Connectivity, Regions, Boundaries & Distance measures	1	01.09.2020			
No. of classes required to complete UNIT-I		**08**	No. of classes taken			

UNIT-II: Image Enhancement in Spatial and Frequency Domain

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 Image Enhancement, Spatial Domain Enhancement - Introduction	1	03.09.2020			
2.	Gray Level Transformation functions & Piecewise linear Transformation functions	1	07.09.2020			
3.	Histogram Processing, Histogram Equalization	1	08.09.2020			
4.	Histogram Specification & Examples	1	10.09.2020			
5.	Smoothing spatial filters & Sharpening spatial filters	1	14.09.2020			
6.	Introduction to Filtering in frequency domain , Image smoothing in frequency domain	1	15.09.2020			
7.	Image sharpening in frequency domain , Laplacian in the frequency domain	1	17.09.2020			
8.	Unsharp masking & High boost filtering	1	21.09.2020			
No. of classes required to complete UNIT-I		**08**	No. of classes taken			

UNIT-III: Image Restoration and Image Compression

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.	Image restoration & degradation model, Noise Models	1	22.09.2020			
2.	Restoration in the presence of noise using spatial filtering	1	24.09.2020			
3.	Inverse Filtering, MMSE filtering & Constrained least square filtering	1	05.10.2020			
4.	Introduction, Coding, Inter pixel , Psychovisual Redundancy , Fidelity Criteria	1	06.10.2020			
5.	Image compression model	1	08.10.2020			
6.	Huffman & Arithmetic coding	1	12.10.2020			
7.	LZW , Bit plane and run length coding	1	13.10.2020			
8.	Lossless & Lossy predictive coding, JPEG	1	15.10.2020			
No. of classes required to complete UNIT-III			**08**	No. of classes taken		

UNIT-IV: Image Segmentation

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.	Detection of discontinuities : Point, Line & Edge Detection	1	19.10.2020			
2.	Edge Linking , Boundary Detection: Local processing	1	20.10.2020			
3.	Global Processing via Hough transformation	1	22.10.2020			
4.	Global Processing via Graph theoretic techniques	1	26.10.2020			
5.	Thresholding	1	27.10.2020			
6.	Region Growing, Region splitting & merging	1	29.10.2020			
No. of classes required to complete UNIT-IV			**06**	No. of classes taken		

UNIT-V: Color Image Processing

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.	Color fundamentals	1	02.11.2020			
2.	Color Models	1	03.11.2020			
3.	Pseudo Color Image processing	1	05.11.2020			
4.	Full color image processing	1	09.11.2020			
5.	Histogram Processing	1	10.11.2020			
No. of classes required to complete UNIT-V		**05**	No. of classes taken			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to video processing	**1**	12.11.2020			

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	17-08-2020	03-10-2020	7 W
I Mid Examinations	28-09-2020	03-10-2020	
II Phase of Instructions	05-10-2020	21-11-2020	7 W
II Mid Examinations	16-11-2020	21-11-2020	
Preparation and Practical's	23-11-2020	28-11-2020	1 W
Semester End Examinations	30-11-2020	12-12-2020	2 W

PART-C

EVALUATION PROCESS:

Evaluation Task	Marks
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	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)	Q=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:	**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 K Linga Murthy	Mr. M K Linga Murthy	Dr. G L N Murthy	Dr. Y. Amar Babu

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION

COURSE HANDOUT

PART-A

Name of Course Instructor : V.V.Rama Krishna
Course Name & Code : DSP PROCESSORS - 17EC37
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., ECE., VII-Sem., Sections- C A.Y : 2020-21

PRE-REQUISITE: Digital Signal Processing, Microprocessor

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course provides the knowledge on digital computational accuracy of systems and Architecture of various digital signal processors. . The course will give an idea how memory and I/O devices can be interfaced to digital signal processors.

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

CO 1	Remembering basic concepts of Digital signal processing techniques in both time and frequency domain
CO 2	Apply different parameters of computational accuracy in DSP implementation.
CO 3	Analysebasic architectural requirements of programmable digital signal processors.
CO 4	Design architectural aspects of TMS320C54XX and Analog devices family DSPs

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	-	-	-	-	-	-	-	-	1	-	-	1
CO2	3	2	2	-	-	-	-	-	-	-	-	2	-	-	2
CO3	2	3	2	1	-		-	-	-	-	-	2	-	-	3
CO4	2	2	3	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 Digital Signal Processing Implementations. Avatar Singh and S. Srinivasan, Thomson Publications

REFERENCE BOOKS:

R1 Digital Signal Processors, Architecture, Programming and Applications, B.Venkataramani and M. Bhaskar, 2002, TMH.

R2 Digital Signal Processing – Jonatham Stein, 2005, John Wiley.

R3 DSP Processor Fundamentals, Architecture & Features- Lapsley et al. 2000, S. Chand & Co.Press

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction To Digital Signal Processing

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.	Course Objectives	1	19-08-2020		TLM2	
2.	Introduction	1	21-08-2020		TLM2	
3.	A Digital signal-processing system	1	26-08-2020		TLM2	
4.	The sampling process	1	28-08-2020		TLM2	
5.	Discrete time sequences	1	29-08-2020		TLM2	
6.	Discrete Fourier Transform (DFT)	1	02-09-2020		TLM2	
7.	Fast Fourier Transform	1	04-09-2020		TLM2	
8.	linear time-invariant systems	1	05-09-2020		TLM2	
9.	Digital filters- FIR	1	09-09-2020		TLM2	
10.	Digital filters- IIR	1	11-09-2020		TLM2	
11.	Decimation, interpolation	1	12-09-2020		TLM2	
No. of classes required to complete UNIT-I:11				No. of classes taken:		

UNIT-II: Computational Accuracy in DSP Implementations

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.	Number formats for signals and coefficients in DSP systems	1	16-09-2020		TLM2	
2.	Number formats for signals and coefficients in DSP systems	1	18-09-2020		TLM2	
3.	Dynamic Range and Precision	1	19-09-2020		TLM2	
4.	Sources of error in DSP implementations	1	23-09-2020		TLM2	
5.	A/D Conversion errors	1	24-09-2020		TLM2	
6.	D/A Conversion Errors	1	25-09-2020		TLM2	
7.	DSP Computational errors	1	26-09-2020		TLM2	
8.	Compensating filter	1	26-09-2020		TLM2	
No. of classes required to complete UNIT-II:8				No. of classes taken:		

UNIT-III: Architectures for Programmable DSP Devices

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Basic Architectural features	1	07-10-2020		TLM2	
2.	DSP Computational Building Blocks, Bus Architecture and Memory	1	09-10-2020		TLM2	
3.	Data Addressing Capabilities	1	10-10-2020		TLM2	
4.	Address Generation Unit	1	14-10-2020		TLM2	
5.	Programmability and Program Execution	1	16-10-2020		TLM2	
6.	Speed Issues, Features for External interfacing	1	17-10-2020		TLM2	
No. of classes required to complete UNIT-III:6				No. of classes taken:		

UNIT-IV : Programmable Digital Signal Processors

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.	Commercial Digital signal-processing Devices	1	21-10-2020		TLM2	
2.	Data Addressing modes of TMS320C54XX DSPs	1	23-10-2020		TLM2	
3.	Memory space of TMS320C54XX Processors, Program Control	1	24-10-2020		TLM2	
4.	TMS320C54XX instructions and Programming	1	28-10-2020		TLM2	
5.	On-Chip Peripherals, Interrupts of TMS320C54XX processors	1	30-10-2020		TLM2	
6.	Pipeline Operation of TMS320C54XX Processors	1	31-10-2020		TLM2	
No. of classes required to complete UNIT-IV:6				No. of classes taken:		

UNIT-V : Analog Devices Family of DSP Devices

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.	Analog Devices Family of DSP Devices, ALU and MAC block diagram, Shifter Instruction	1	04-11-2020		TLM2	
2.	Base Architecture of ADSP2100	1	06-11-2020		TLM2	
3.	ADSP-2181 high performance Processor	1	07-11-2020		TLM2	
4.	Introduction to Blackfin Processor – The Blackfin Processor	1	11-11-2020		TLM2	
5.	Introduction to Micro Signal Architecture	1	13-11-2020		TLM2	
6.	Overview of Hardware Processing Units and Register files, Address Arithmetic Unit	1	14-11-2020		TLM2	
7.	Control Unit, Bus Architecture and Memory, Basic Peripherals	1	14-11-2020		TLM2	
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)
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 (Unit-I)	A1=5
Assignment-II (Unit-II)	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	**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
(Name)	(Name)	(Name)	(Name)

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DEPARTMENT OF Electronics & Communication Engineering

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr.A.Narendra Babu
Course Name & Code : COMMUNICATION NETWORKS & 17EC92
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., ECE., VII-Sem., Section- C A.Y : 2019-20

PRE-REQUISITE: Telecommunication Switching Systems and Networks

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

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

CO 1	**Understand** the layered architecture of OSI and TCP/IP Reference models.
CO 2	**Analyze** the Protocols of OSI and TCP/IP Reference models
CO 3	**Evaluate** routing algorithms, congestion control Algorithms, IP addressing used in Network layer.
CO 4	**Apply** the knowledge of protocols in networking applications.

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

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

TEXT BOOKS

1. Tanenbaum and Wetherall, "Computer Networks", Pearson Education, Fifth Edition.
2. Behrouz. A. Forouzan, "Data Communication and Networking", Fourth Edition, Tata McGraw-hill, New Delhi, 2006

REFERENCES

1. S.Keshav," An Engineering Approach to Computer Networks", Pearson Education, 2nd Edition,
2. W.A.Shay,"Understanding communications and Networks", Cengage Learning, 3rd Edition
3. Chwan-Hwa (John) Wu, J. David Irwin," Introduction to Computer Networks and Cyber Security", CRC Press.
4. L.L.Peterson and B.S.Davie," Computer Networks", ELSE VIER, 4th edition.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction, Cross bar Switching, Electronic Space Division Switching

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	17-08-20			
2.	Introduction to Communication Networks	1	18-08-20			
3.	Network Hardware , Network software	1	19-08-20			
4.	Network models LAN, WAN, MAN, Network software-protocols, layer issues	1	24-08-20			
5.	connection oriented and connection less services, Reference models-OSI	1	25-08-20			
6.	TCP/IP, Comparison between OSI and TCP/IP	1	26-08-20			
7.	Critics of OSI and TCP/IP model	1	31-08-20			
8.	Physical Layer- Guided Transmission Medium	1	01-09-20			
9.	Wireless Transmission Media, EM Spectrum, Radio, Light, Infrared and Microwave Transmission	1	02-09-20			
10.	Digital Modulation and Multiplexing, Bassband and Passband, FDM, TDM and Code Division Multiplexing	1	07-09-20			
No. of classes required to complete UNIT-I:10				No. of classes taken:		

UNIT-II: Data Link 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.	Introduction of DLL, Design Issues	1	08-09-20			
2.	Services provided to Network Layer Farming Methods, Error control and Flow Control	1	09-09-20			
3.	Error Detection and Correction, , Hamming codes, CRC, Checksum	1	14-09-20			
4.	Stop & wait , Sliding window, one bit, go-back -n, Selective repeat protocols	1	15-09-20			
5.	Medium Access control sub layer, channel allocation problem	1	16-09-20			
6.	Multiple Access protocols- ALOHA, CSMA protocols, CSMA with collision detection, Collision free protocols	1	21-09-20			
7.	Ethernet	1	22-09-20			
8.	Wireless Lans-Infrastructure, Protocol stack, MAC frame , 802.11 services	1	23-09-20			
9.	Bluetooth-Architecture, Protocol stack, Frame structure	1	25-09-20			
No. of classes required to complete UNIT-II:9						

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
1.	Network Layer Design Issues- store and forward, datagrams and virtual circuits	1	05-10-20			
2.	Routing algorithms- Optimality Principle, Shortest Path	1	06-10-20			
3.	Flooding, Distance vector routing ,	1	07-10-20			
4.	Link state routing , Hierarchical routing	1	09-10-20			
5.	Board cast routing & Multicast Routing	1	12-10-20			
6.	Congestion control in data subnets, warning bits	1	13-10-20			
7.	Load shedding, choke packets	1	14-10-20			
8.	Jitter control, RED	1	16-10-20			
No. of classes required to complete UNIT-III:08				No. of classes taken:		

UNIT-IV : Transport Layer

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Internetworking	1	19-10-20			
2.	Tunneling, Packet Fragmentation	1	20-10-20			
3.	IPV4	1	21-10-20			
4.	IPV6, comparision between IPV4 and IPV6	1	23-10-20			
5.	Internet control protocols, OSPF BGP	1	26-10-20			
6.	Transport layer services to the upward Layers	1	27-10-20			
7.	Addressing Address connection establishment	1	28-10-20			
8.	Connection release, Crash Recvoery	1	02-11-20			
No. of classes required to complete UNIT-IV:8				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
1.	Internet transport protocols: UDP- RPC, Real Time Transport Protocols	1	03-11-20			
2.	Internet transport protocols: TCP-I, TCP service model	1	04-11-20			
3.	TCP Segment Header	1	06-11-20			
4.	Domain Name system	1	09-11-20			
5.	Email Architecture and services	1	10-11-20			
6.	SMTP	1	11-11-20			
7.	WWW and its architectue	1	13-11-20			
No. of classes required to complete UNIT-V:7				No. of classes taken:		

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.						
2.						
No. of classes required to complete UNIT-V:5				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 (R17 Regulations):

Evaluation Task	Marks
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	A2=5
I-Mid Examination (Units-I & II)	M1=20
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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):

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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
(Dr.A.Narendra Babu)	(Dr.A.Narendra Babu)	(Dr.M.Venkata Sudhakar)	(Dr.Y.Amar Babu)

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DEPARTMENT OF ELECTRONICS & COMMUNICATIONS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Michael Sadgun Rao Kona
Course Name & Code : Introduction to Database & 17IT80
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., ECE., VII-Sem.,A,B,C A.Y : 2020-21

PRE-REQUISITE: 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, Data base Design, Normalization process and Transaction processing and Indexing.

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

CO 1	**Understand** DBMS concepts, architecture
CO 2	**Design** Entity Relational Model and make them to data model.
CO 3	**Understand** the usage of keys and constraints for relational data.
CO 4	**Apply** the normalization process for data base design.
CO 5	**Analyze** the issues in transaction processing and different recovery strategies.

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
CO4	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.

T2 RamezElmasri, Shamkanth B. Navathe, "Fundamentals Of Database Systems", Addision Wesley, 6th edition, 2010.

REFERENCE BOOKS:

R1 Raghu Ramakrishna, Johannese 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	1	17.08.2020		TLM2	
2.	Introduction, An overview of database management system, Database system Vs file system	1	19.08.2020		TLM2	
3.	Database system Vs file system	1	21.08.2020		TLM2	
4.	Database system concepts and architecture	1	24.08.2020		TLM2	
5.	Data models schema and instances	1	26.08.2020		TLM2	
6.	Data independence and data base language and interfaces	1	28.08.2020		TLM2	
7.	Data definitions language, DML	1	31.08.2020		TLM2	
8.	Overall Database Structure	1	2.09.2020		TLM2	
9.	**Revision on Unit-1& Assignment-I**	1	4.09.2020		TLM2	
No. of classes required to complete UNIT-I: 9				No. of classes taken:		

UNIT-II: Data Modelling using the 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	1	07/09/20, 09/09/20		TLM2	
2.	notation for ER diagram	1	11/09/20		TLM2	
3.	Mapping constraints	1	14/09/20		TLM2	
4.	keys -Concepts of Super Key, and identity key, primary key, Generalization	1	16/09/20		TLM2	
5.	Aggregation	1	18/09/20		TLM2	
6.	Reduction of an ER diagrams to tables,	1	21/09/20		TLM2	
7.	Relationships of higher degree	1	23/09/20		TLM2	
8.	**Revision on Unit - II & Assignment-II**	1	25/09/20		TLM2	
No. of classes required to complete UNIT-II: 09				No. of classes taken:09		

I MID EXAMINATIONS	28/09/20 TO 03/10/20

UNIT-III: Relational Data Model and Language

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	1	05/10/20		TLM2	
2.	Integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints	1	07/10/20		TLM2	
3.	Relational algebra	1	09/10/20		TLM2	
4.	Characteristics of SQL, Advantage of SQL SQL data types and literals, Types of SQL commands SQL operators and their procedure	1	12/10/20		TLM2	
5.	Tables, views and indexes, Queries and sub queries, Aggregate functions Insert, update and delete operations	1	14/10/20		TLM2	
6.	Unions, Intersection, Minus, Cursors in SQL, Revision of UNIT-3&Assignment-III	1	16/10/20		TLM2	
No. of classes required to complete UNIT-III: 6				No. of classes taken:		

UNIT-IV: 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	1	19/10/20		TLM2	
2.	Normal Forms: First, Second, Third Normal Forms	1	21/10/20		TLM2	
3.	BCNF, Inclusion Dependences Loss Less Join Decompositions	1	23/10/20		TLM2	
4.	Normalization Using FD,MVD Normalization Using JD	1	26/10/20		TLM2	
5.	Normalization Using FD,MVD Normalization Using JD		28/10/20		TLM2	
6.	Alternative Approaches to Database Design Revision of Unit-4&Assignment-IV	1	30/10/20		TLM2	
No. of classes required to complete UNIT-IV: 6				No. of classes taken:		

UNIT-V: Transaction Processing Concepts

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.	Transaction System	1	02/11/20		TLM2	
2.	Testing Of Serializability , Serializability of Schedules Conflict & View Serializable Schedule	1	04/11/20		TLM2	
3.	Recoverability, Log Based Recovery, Checkpoints, ARIES Algorithm, Deadlock Handling	1	06/11/20		TLM2	
4.	Concurrency Control Techniques For Concurrency Control	1	09/11/20		TLM2	
5.	Time Stamping Protocols for Concurrency Control	1	11/11/20		TLM2	
6.	Locking, Validation Based Protocol, Multiple Granularity	1	13/11/20		TLM2	
7.	Recovery With Concurrent Transactions ,**Revision of UNIT-5&Assignment-V**	1	16/11/20		TLM2	
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)
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 (Unit-I)	A1=5
Assignment-II (Unit-II)	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.
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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	Module Coordinator	HOD
(Mr.Michael Sadgun Rao Kona)	(Dr .S. Naganjaneyulu)	(Dr.B.Srinivasa Rao)

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
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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 :, Smt.M.Ramya Harika, Mr. V.Ravi Sekhar Reddy
Course Name & Code : Microwave And Optical Communications Lab-17EC71
L-T-P Structure : 0-0-2
Credit : 1
Program/Sem/Sec : B.Tech., ECE., VII-Sem., Section- C
Academic Year : 2020-21

Course Educational Objective: This Lab deals with the micro measurements of the signals at micro frequency range. It involves measurement of frequency, wave length, VSWR, Impedance and scattering parameters of various micro wave devices like Circulator, Direction Coupler, and Magic-Tee. Even the latest trend of communication technology i.e. fiber optics is also introduced and propagation conditions will be verified by evaluating the losses.

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

CO 1	Understand the various blocks of microwave bench setup
CO 2	Evaluate the frequency, wave length, VSWR, impedance and scattering parameters of various microwave devices
CO 3	Analyze the losses to verify the propagating conditions in the optical fiber.
CO 4	Adapt effective communication, presentation and report writing skills.

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

COURSE DELIVERY PLAN (LESSON PLAN): Section-C

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
CYCLE I						
1.	Demonstration	1	19.08.2020		TLM 4	
2.	Reflex Klystron Characteristics	1	26.08.2020		TLM4	
3.	Gunn Diode Characteristics	1	02.09.2020		TLM4	
4.	Attenuation Measurement	1	09.09.2020		TLM4	
5.	Directional Coupler Characteristics.	1	16.09.2020		TLM4	
6.	VSWR Measurement	1	23.09.2020		TLM4	
7.	Impedance ,Frequency Measurement.	1	30.09.2020		TLM4	
CYCLE 2						
8	Scattering Parameters of Circulator.	1	07.10.2020		TLM4	
9	Scattering Parameters of Magic Tee.	1	14.10.2020		TLM4	
10	Characterization of LED,Laser Diode	1	21.10.2020		TLM4	
11	Measurement of Data rate for Digital Optical link.	1	28.10.2020		TLM4	
12	Measurement of Numerical Aperture	1	04.11.2020		TLM4	
13	Measurement of losses for Analog optical link	1	11.11.2020		TLM4	
14	Lab exam	1	18.11.2020			

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
Day to Day work	A=20
Internal Lab Examination	B=10
Attendance	C=5
Viva voce	D=5

Cumulative Internal Examination : A+B+C	**A+B+C+D=40**
Semester End Examinations	**E=60**
Total Marks: A+B+C+D+E	**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.
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PROGRAMME SPECIFIC OUTCOMES (PSOs):

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Course Instructor Course Coordinator Module Coordinator HOD

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COURSE HANDOUT

PART-A

PROGRAM : B.Tech., VII-Sem., ECE – C Section

ACADEMIC YEAR : 2020 - 21

COURSE NAME & CODE : Embedded System Design Lab – 17EC72

L-T-P STRUCTURE : 0-0-2

COURSE CREDITS : 2

COURSE INSTRUCTOR : **Mr. M. Samba Siva Reddy**

COURSE COORDINATOR : **Mr. K. Ravi Kumar**

COURSE OBJECTIVE:
This course provides practical exposure on

Course Outcomes: At the end of the course, student will be able to:

CO1	Evaluate Inter Process Communication applications using ARM based processors
CO2	Develop the Hardware platform using soft processors and applications using C on Xilinx FPGA Zynq 7000 series
CO3	Adapt effective communication, presentation and report writing skills.

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

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

PART-B

LAB SCHEDULE (LESSON PLAN): Section-C

LIST OF EXPERIMENTS (Minimum 12 Experiments to be conducted)

S.No.	Experiments to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
	CYCLE-1					
1.	Introduction to Lab	2	29.08.2020		**TLM2**	
2.	ARM Assembly Language Programming-I	2	05.09.2020		**TLM8**	
3.	ARM Assembly Language Programming-II	2	05.09.2020		**TLM8**	
4.	Program to Interface 8-bit LED	2	12.09.2020		**TLM8**	
5.	Program to demonstrate Time Delay Program using built in Timer/Counter feature	2	19.09.2020		**TLM8**	
6.	Program to displaying a message in a 2line x 16 Characters LCD display and verify the result in debug terminal	2	19.09.2020		**TLM8**	
7.	Program to implement Generation of PWM signal on IDE environment	2	26.09.2020		**TLM8**	
8.	Program to demonstrate serial communication on IDE environment	2	26.09.2020		**TLM8**	
	CYCLE-2					
9.	Program to implement Traffic light controller on IDE environment	2	10.10.2020		**TLM8**	
10.	Program to implement Stepper motor controller on IDE environment	2	10.10.2020		**TLM8**	
11.	Basic Audio Processing on IDE environment	2	17.10.2020		**TLM8**	
12.	Program to demonstrate I2C Interface on IDE environment	2	17.10.2020		**TLM8**	
13.	Program to implement Buzzer Interface on IDE environment	2	31.10.2020		**TLM8**	
14.	Design of System on Chip platform using Xilinx FPGAs and Embedded Development Kit Tools	2	31.10.2020		**TLM8**	
15.	Design dual processor based System on Chip using Xilinx EDK Tools and Zynq 7000 series FPGA	2	07.11.2020		**TLM8**	
16.	Hardware Software Co- design using Xilinx EDK Tools	2	07.11.2020		**TLM8**	
No. of classes required to complete:		32	No. of classes conducted:			

PART-C

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:

Academic Calendar: B.Tech., VII-Sem., 2020-21			
Description	**From**	**To**	**Weeks**
Commencement of Class work: 17.08.2020			
I Phase of Instructions	17-08-2020	03-10-2020	7W
I MID Examinations	28-09-2020	03-10-2020	
II Phase of Instructions	05-10-2020	21-11-2020	7W
II MID Examinations	16-11-2020	21-11-2020	
Preparation and Practicals	23-11-2020	28-11-2020	1W
Semester End Examinations	30-11-2020	14-12-2020	2W

EVALUATION PROCESS:

Evaluation Task	**COs**	**Marks**
Day to Day work	1,2,3	A1=20
Attendance (>95%=5, 90-95%=4,85-90%=3,80-85%=2,75-80%=1)		A2=5
Viva-Voce	1,2,3	A3=5
Internal Lab Examination	1,2,3	B=10
Total Internal Marks(A1+A2+A3+B)		**C=40**
Semester End Examinations	1,2,3	**D=60**
Total Marks: C+D	1,2,3	**100**

PART-D

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Course Instructor	Course Coordinator	Module Coordinator	HOD
(M.Sambasiva Reddy)	(Mr.K.Ravi Kumar)	(Dr.P.Lachi Reddy)	(Dr.Y.Amar Babu)