Course Outcomes, CO-PO

&

CO-PSO MAPPING

For JNTUA

REGULATION – R21

M.TECH

-

EMBEDDED SYSTEM

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ANANTHAPURAMU – 515 002 (A.P) INDIA

M.TECH. IN EMBEDDED SYSTEMS

COURSE STRUCTURE & SYLLABI

SEMESTER – I

S. No.	Course codes	Course Name	Category	Hours per			Credits
				L	T	P	
1.	21D06102	Microcontrollers and Programmable Digital Signal Processors	PC	3	0	0	3
2.	21D06101	Digital System Design with PLDs	PC	3	0	0	3
3.	21D55101a 21D57102 21D06103a	**Program Elective – 1** Advanced Microcontrollers CMOS Digital IC Design Advanced Computer Architectures	PE	3	0	0	3
4.	21D06203c 21D55102a 21D06203a	**Program Elective – 1** Embedded Real Time Operating Systems Advanced Computer Networks SoC Architecture	PE	3	0	0	3
5.	21D06105	Digital System Design Lab	PC	0	0	4	2
6.	21D06106	Microcontroller and Programmable Digital Signal Processors Lab	PC	0	0	4	2
7.	21DRM101	Research Methodology and IPR	MC	2	0	0	2
8.	21DAC101a 21DAC101b 21DAC101c	**Audit Course – I** English for Research paper writing Disaster Management Sanskrit for Technical Knowledge	AC	2	0	0	0
Total							**18**

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SEMESTER – II

S.No.	Course codes	Course Name	Category	Hours per week			Credits
				L	T	P	
1.	21D06201	Embedded System Design	PC	3	0	0	3
2.	21D55201	Embedded Programming	PC	3	0	0	3
3.	21D55202a 21D55202b	**Program Elective – III** Sensors and Actuators Modern Control Theory Artificial Intelligence and Machine Learning	PE	3	0	0	3
4.	21D06301b 21D06103b 21D06204a	**Program Elective – IV** Soft Computing Techniques Design of Fault Tolerant Systems Hardware and Software Co-design	PE	3	0	0	3
5.	21D06205	Embedded System Design Lab	PC	0	0	4	2
6.	21D55202	Embedded Programming Lab	PC	0	0	4	2
7.	21D55203	Technical seminar	PR	0	0	4	2
8.	21DAC201a 21DAC201b 21DAC201c	**Audit Course – II** Pedagogy Studies Stress Management for Yoga Personality Development through Life Enlightenment Skills	AC	2	0	0	0
Total							18

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SEMSTER - III

S.No.	Course codes	Course Name	Category	Hours per	T	P	Credits
1.	21D06301a 21D06301c 21D55301a	**Program Elective – V** Embedded Systems Protocols Communication Buses and Interfaces Robotics	PE	3	0	0	3
2.	21DOE301b 21DOE301c 21DOE301e	**Open Elective** Industrial Safety Business Analytics Waste to Energy	OE	3	0	0	3
3.	21D55302	Dissertation Phase – I	PR	0	0	20	10
4.	21D553013	Co-curricular Activities					2
		Total					**18**

SEMESTER - IV

S.No.	Course codes	Course Name	Category	L	T	P	Credits
1.	21D55401	Dissertation Phase – II	PR	0	0	32	16
		Total					**16**

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COURSE OUTCOMES, CO-PO AND CO-PSO MAPPING

Regulation: R21
Year & Sem: I-I

Subject Code: 21D06102
Subject Name: MICROCONTROLLERS PROGRAMMABLE AND DIGITAL SIGNAL PROCESSORS

Course Outcomes:

1. Learn about ARM Microcontroller architectural features

2. Understand the ARM 'C' Programming for various applications

3. Study the DSP processor fundamentals and its development tools

CO_ PO and PSO mapping correlation

CO	PO1	PO2	PO3	PSO1	PSO2
CO1	3	2	3	3	2
CO2	3	2	3	3	
CO3	3	3	3	3	
Average	3	2.4	3	3	2

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COURSE OUTCOMES, CO-PO AND CO-PSO MAPPING

Regulation: R21
Year & Sem: I-I

Subject Code: 21D06101
Subject Name: DIGITAL SYSTEM DESIGN WITH PLDS

Course Outcomes:

1. Understand an overview of system design approach using programmable logic devices.
2. Get exposed to the various architectural features of CPLDS and FPGAS.
3. Learn the methods and techniques of CPLD & FPGA design with EDA tools.
4. Learn software tools used for design process with the help of case studies.

CO_ PO and PSO mapping correlation

CO	PO1	PO2	PO3	PSO1	PSO2
CO1	3	3			
CO2	3	3	3	2	1
CO3	3	3	2	2	1
CO4	3	3	3	1	1
Average	3	3	2.7	1.7	1

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COURSE OUTCOMES, CO-PO AND CO-PSO MAPPING

Regulation: R21
Year & Sem: I-I

Subject Code: 21D57102
Subject Name: CMOS DIGITAL IC DESIGN

Course Outcomes:

1. Demonstrate advanced knowledge in Static and dynamic characteristics of CMOS,

2. Estimate Delay and Power of Adders circuits.

3. Classify different semiconductor memories.

4. Analyze, design and implement combinational and sequential MOS logic circuits.

5. Analyze complex engineering problems critically in the domain of digital IC design for conducting research.

6. Solve engineering problems for feasible and optimal solutions in the core area of digital ICs

CO_ PO and PSO mapping correlation

CO	PO1	PO2	PO3	PSO1	PSO2
CO1	3	3	2		
CO2	3	3	2	2	2
CO3	3	3	2	2	2
CO4	3	3	2	1	2
CO5	3	3	2	2	3
CO6	2	2	2		3
Average	3	3	2	2	2

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COURSE OUTCOMES, CO-PO AND CO-PSO MAPPING

Regulation: R21　　　**Subject Code: 21D06203c**

Year & Sem: I-I　　　**Subject Name: EMBEDDED REAL TIME OPERATING SYSTEMS**

Course Outcomes:

1. Acquire knowledge on Real Time features of UNIX and LINUX.

2. Understand the basic building blocks of Real Time Operating Systems in terms of scheduling, context switching and ISR.

3. Understand on Real Time applications using Real Time Linux, ucos2, VX works, EmbeddedLinux.

CO_ PO and PSO mapping correlation

CO	PO1	PO2	PO3	PSO1	PSO2
CO1	3		2		
CO2	3	1	2		2
CO3	2		2	2	2
Average	3	1	2	2	2

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COURSE OUTCOMES, CO-PO AND CO-PSO MAPPING

Regulation: R21
Year & Sem: I-I

Subject Code: 21D06105
Subject Name: DIGITAL SYSTEM DESIGN LAB

Course Outcomes:

1. Familiarize the HDL simulator / synthesis tool

2. Design and implement given combinational circuit on FPGA device

3. Design and implement given sequential circuit on FPGA device

CO_ PO and PSO mapping correlation

CO	PO1	PO2	PO3	PSO1	PSO2
CO1	3	2	1		2
CO2	3	2	3	2	2
CO3	3	3	3		2
Average	3	2.4	2.4	2	2

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COURSE OUTCOMES, CO-PO AND CO-PSO MAPPING

Regulation: R21 **Subject Code: 21D06106**

Year & Sem: I-I **Subject Name: MICROCONTROLLER AND PROGRAMMABLE DIGITAL SIGNAL PROCESSOR LABORATORY**

Course Outcomes:

1. Install, configure and utilize tool sets for developing applications based on ARM processorcore.
2. Design and developtheARM7 based embedded systems for various applications.
3. Develop application programs on ARM and DSP development boards both in assembly andC.
4. Design and Implement the digital filters on DSP6713 processor.
5. Analyze the hardware and software interaction and integration.

CO_ PO and PSO mapping correlation

CO	PO1	PO2	PO3	PSO1	PSO2
CO1	2	3	2	3	2
CO2	3	3	3	3	3
CO3	2	3	2	3	2
CO4	3	2	3	3	3
CO5	3	2			3
Average	2.6	2.6	2.5	3	2.6

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COURSE OUTCOMES, CO-PO AND CO-PSO MAPPING

Regulation: R21
Year & Sem: I-I

Subject Code: 21DRM101
Subject Name: RESEARCH METHODOLOGY AND IPR

Course Outcomes:

1. Analyze research related information

2. Follow research ethics

3. Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.

4. Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.

5. Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

CO_ PO and PSO mapping correlation

CO	PO1	PO2	PO3	PSO1	PSO2
CO1	2	2	3		2
CO2	2	2	2		2
CO3	3	3	3		3
CO4	3	2	2	3	3
CO5	3	2			
Average	2.6	2.2	2.5	3	2.5

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COURSE OUTCOMES, CO-PO AND CO-PSO MAPPING

Regulation: R21

Year & Sem: I-I

Subject Code: 21DAC101a

Subject Name: ENGLISH FOR RESEARCH WRITING

Course Outcomes:

1. Understand the significance of writing skills and the level of readability

2. Analyze and write title, abstract, different sections in research paper

3. Develop the skills needed while writing a research paper

CO_ PO and PSO mapping correlation

CO	PO1	PO2	PO3	PSO1	PSO2
CO1	2	3	2	3	2
CO2	3	3	3	3	3
CO3	2	3	2	3	2
Average	2.4	3	2.4	3	2.4

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COURSE OUTCOMES, CO-PO AND CO-PSO MAPPING

Regulation: R21   **Subject Code: 21D06201**
Year & Sem: I-II   **Subject Name: EMBEDDED SYSTEM   DESIGN**

Course Outcomes:

1. Expected to differentiate the design requirements between General Purpose and Embedded Systems.

2. Expected to acquire the knowledge of firmware design principles.

3. Expected to understand the role of Real Time Operating System in Embedded Design.

4. To acquire the knowledge and experience of task level Communication in any EmbeddedSystem.

CO_ PO and PSO mapping correlation

CO	PO1	PO2	PO3	PSO1	PSO2
CO1	3	2	2	3	3
CO2	3	2	3	3	2
CO3	3	3	3	3	1
CO4	3	2		2	2
Average	3	2.3	2.7	2.8	2

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COURSE OUTCOMES, CO-PO AND CO-PSO MAPPING

Regulation: R21
Year & Sem: I-II

Subject Code: 21D55201
Subject Name: EMBEDDED PROGRAMMING

Course Outcomes:

1. Learn the basics of Embedded C with reference to 8051.

2. Understand how to handle control and data pins at hardware level.

3. Introduce objective nature of Embedded C.

4. Understand the specifications of real time embedded programming with case studies..

CO_ PO and PSO mapping correlation

CO	PO1	PO2	PO3	PSO1	PSO2
CO1	3	2	3		3
CO2	3	2	3	2	2
CO3	3	2	3	3	2
CO4	3	3	3	3	3
Average	3	2.3	3	2.7	2.3

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COURSE OUTCOMES, CO-PO AND CO-PSO MAPPING

Regulation: R21　　　　　　**Subject Code: 21D55202a**

Year & Sem: I-II　　　　　　**Subject Name: SENSORS AND ACTUATORS**

Course Outcomes:

1. Learn about Electro mechanical sensors.
2. Learn the use of the thermal sensors and magnetic sensors for embedded system.
3. Learn the basics of radiation sensors, smart sensors and actuators.

CO_ PO and PSO mapping correlation

CO	PO1	PO2	PO3	PSO1	PSO2
CO1	3	3	3	3	3
CO2	3	3	3	2	2
CO3	3		3	1	3
Average	3	3	3	2	2.7

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COURSE OUTCOMES, CO-PO AND CO-PSO MAPPING

Regulation: R21
Year & Sem: I-II

Subject Code: 21D06204a
Subject Name: HARDWARE AND SOFTWARE CO-DESIGN

Course Outcomes:

1. Acquire the knowledge on various models of Co-design.
2. Explore the interrelationship between Hardware and software in a embedded system
3. Acquire the knowledge of firmware development process and tools during Co-design.
4. Understand validation methods and adaptability

CO_ PO and PSO mapping correlation

CO	PO1	PO2	PO3	PSO1	PSO2
CO1	3		3	3	
CO2	3	1	3	2	3
CO3	2	2	2	2	2
Average	2.8	1.7	2.5	2.4	2.5

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COURSE OUTCOMES, CO-PO AND CO-PSO MAPPING

Regulation: R21
Year & Sem: I-II

Subject Code: 21D06205
Subject Name: EMBEDDED SYSTEM DESIGN LAB

Course Outcomes:

1. Familiarize with embedded systems programming concepts
2. Implement different embedded communication and interfacing protocols

CO_ PO and PSO mapping correlation

CO	PO1	PO2	PO3	PSO1	PSO2
CO1	3	2	3	3	3
CO2	3	2	3		3
Average	3	2	2	3	3

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COURSE OUTCOMES, CO-PO AND CO-PSO MAPPING

Regulation: R21
Year & Sem: I-II

Subject Code: 21D55202
Subject Name: EMBEDDED PROGRAMMING LABORATORY

Course Outcomes:

1. Understand the concepts of Embedded 'C' programming

2. Implement given program on 8051 microcontroller

3. Implement given program on LPC2148 microcontroller

CO_ PO and PSO mapping correlation

CO	PO1	PO2	PO3	PSO1	PSO2
CO1	2	3	2	3	2
CO2	3	3	3	2	3
CO3	2	3	2	2	2
Average	2.4	3	2.4	2.4	2.4

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COURSE OUTCOMES, CO-PO AND CO-PSO MAPPING

Regulation: R21
Year & Sem: I-II

Subject Code: 21DAC201C
Subject Name: PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTMENT SKILLS WRITING

Course Outcomes:

1. Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achievethe highest goal in

2. The person who has studied Geeta will lead the life nation and mankind to peace and prosperity

3. Study of Neetishatakam will help in developing versatile personality of students

CO_ PO and PSO mapping correlation

CO	PO1	PO2	PO3	PSO1	PSO2
CO1	2	3	2	3	2
CO2	3	3	3	3	3
CO3	2	3	2	3	2
CO4	3	2	3	3	3
Average	2.5	2.8	2.5	3	2.5

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COURSE OUTCOMES, CO-PO AND CO-PSO MAPPING

Regulation: R21
Year & Sem: II-III

Subject Code: 21D06301a
Subject Name: EMBEDDED SYSTEM PROTOCOLS

Course Outcomes:

1. Acquire knowledge on communication protocols of connecting Embedded Systems.

2. Understand the design parameters of USB and CAN bus protocols.

3. Understand the design issues of Ethernet in Embedded networks.

4. Acquire the knowledge of wireless protocols in Embedded domain.

CO_ PO and PSO mapping correlation

CO	PO1	PO2	PO3	PSO1	PSO2
CO1	3	2	3	3	3
CO2	3	2	3	3	3
CO3	3	3	3	3	
CO4	2	3	3	3	2
Average	2.8	2.5	3	3	2.7

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COURSE OUTCOMES, CO-PO AND CO-PSO MAPPING

Regulation: R21
Year & Sem: II-III

Subject Code: 21DOE301C
Subject Name: BUISNESS ANALYTICS

Course Outcomes:

1. Students will demonstrate knowledge of data analytics.

2. Students will demonstrate the ability of think critically in making decisions based on data and deep analytics.

3. Students will demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.

4. Students will demonstrate the ability to translate data into clear, actionable insights.

CO_ PO and PSO mapping correlation

CO	PO1	PO2	PO3	PSO1	PSO2
CO1	3	3	3		
CO2	3	3	3	2	1
CO3	3	3	2	2	1
CO4	3	3	3	1	1
Average	3	3	2.8	1.7	1

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COURSE OUTCOMES, CO-PO AND CO-PSO MAPPING

Regulation: R21
Year & Sem: II-III

Subject Code: 21D55302
Subject Name: DISSERATION PHASE-I

Course Outcomes:

1. Identify problems that have relevance to societal / industrial needs

2. Exhibit independent thinking and analysis skills

3. Demonstrate the application of relevant science / engineering principles

CO_ PO and PSO mapping correlation

CO	PO1	PO2	PO3	PSO1	PSO2
CO1	3	3	3		1
CO2	3	3	3	2	2
CO3	3		3	2	
CO4	3	3	3	2	1
Average	3	3	3	2	1.4

Program Coordinator

HOD
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ELECTRONICS & COMMUNICATION ENGG
KUPPAM ENGINEERING COLLEGE
KUPPAM - 517 425

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(Approved by AICTE, Affiliated to JNTUA, Accredited by NAAC, NBA & ISO 9001 : 2008 Certified)
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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE OUTCOMES, CO-PO AND CO-PSO MAPPING

Regulation: R21
Year & Sem: II-IV

Subject Code: 21D57105
Subject Name: DISSERATION PHASE-II

Course Outcomes:

1. Identify problems that have relevance to societal / industrial needs

2. Exhibit independent thinking and analysis skills

3. Demonstrate the application of relevant science / engineering principles

CO_ PO and PSO mapping correlation

CO	PO1	PO2	PO3	PSO1	PSO2
CO1	3	3	3		1
CO2	3	3	3	2	2
CO3	3		3	2	
CO4	3	3	3	2	1
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