Techno India NJR Institute of Technology

Course File

Embedded System (5EC5-12)

Vivek Jain
(Associate Professor)
Department of ECE

For Techno India NJR Institute of Technology
पंकज पोरवाल
Dr. Pankaj Kumar Porwal
(Principal)

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

III Year - V Semester: B.Tech. (Electronics & Communication Engineering)

5EC5-12: Embedded Systems

Credit: 2 **Max. Marks: 100(IA:20, ETE:80)**

2L+0T+0P **End Term Exam: 2 Hours**

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	The concept of embedded systems design, Embedded microcontroller cores, embedded memories.	5
3	Examples of embedded systems, Technological aspects of embedded systems: interfacing between analog and digital blocks, signal conditioning, digital signal processing. Sub system interfacing, interfacing with external systems, user interfacing.	10
4	Design tradeoffs due to process compatibility, thermal considerations, etc., Software aspects of embedded systems: real time programming languages and operating systems for embedded systems.	12
	Total	28

Course Overview:

Course Objectives: On completion of this course, successful participants will be able to: Perform effectively as entry level Embedded Systems professionals. Develop and maintain applications written using Embedded C. Independently design and develop a hardware platform encompassing a microcontroller and peripherals.

Course Outcomes:

CO.NO.	Cognitive Level	Course Outcome
1	**Comprehension**	Discuss the evolution of MP technology
2	**Application**	Learn the depth knowledge of applying the concepts of real time applications. Demand of energy in India in various sectors.
3	**Analysis**	Identify, formulate, and solve engineering problems in MP based and to analyze their outcomes.
4	**Synthesis**	Design and Develop Embedded system and Programmed, debug and test it.

Prerequisites:

1. Fundamentals knowledge of binary number system.
2. Fundamentals knowledge of digital electronics.

Course Outcome Mapping with Program Outcome:

Course Outcome	Program Outcomes (PO's)											
CO. NO.	Domain Specific					Domain Independent						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	1	2	2	2	1	0	0	1	1
CO2	0	0	3	0	0	0	0	0	0	0	0	0
CO3	1	2	2	1	1	1	0	0	0	0	0	0
CO4	0	3	0	0	0	0	1	0	0	0	0	0
CO5	0	0	0	2	3	0	0	0	0	0	0	0
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

For Techno India NJR Institute of Technology
पंकज पोरवाल
Dr. Pankaj Kumar Porwal
(Principal)

Course Coverage Module Wise:

Lecture No.	Unit	Topic
1	**1**	**ZERO LECTURE.**
2	**2**	**THE CONCEPT OF EMBEDDED SYSTEMS DESIGN**
3	2	Embedded microcontroller cores
4	2	Embedded microcontroller cores
5	2	Embedded memories
6	2	Embedded memories
7	**3**	**EXAMPLES OF EMBEDDED SYSTEMS**
8	3	Examples of embedded systems
9	3	Technological aspects of embeddedsystems
10	3	Technological aspects of embeddedsystems
11	3	Interfacing between analog and digital blocks
12	3	Signal conditioning
13	3	Digital signal processing
14	3	Sub system interfacing
15	3	Interfacing with external systems
16	3	User interfacing
17	**4**	**DESIGN TRADEOFFS DUE TO PROCESS COMPATIBILITY**
18	4	Design tradeoffs due to process compatibility
19	4	Thermal considerations
20	4	Thermal considerations
21	4	Software aspects of embedded systems
22	4	Software aspects of embedded systems
23	4	Real time programming languages
24	4	Real time programming languages
25	4	Real time programming languages
26	4	Operating systems for embedded systems
27	4	Operating systems for embedded systems
28	4	Operating systems for embedded systems

For Techno India NJR Institute of Technology
पंकज पोरवाल
Dr. Pankaj Kumar Porwal
(Principal)

TEXT/REFERENCE BOOKS

1. Microprocessor Architecture: Programming and Applications with the 8085/8080A, R. S. Gaonkar, Penram International Publishing, 1996.
2. Embedded System Design, A Unified Hardware/Software Introduction, Frank Vahid/Tony Givaris, Jhon, Wiely Student Edition,2006.
3. The 8051 Microcontroller & Embedded System , Muhammad Ali Mazidi,Pearsons.
4. The 8051 Microcontroller, Kenneth J. Ayala, Penram International Publishing, 1996.

NPTEL COUSES LINK

1. https://nptel.ac.in/courses/106/103/106103182/

QUIZ Link

1. https://www.javatpoint.com/embedded-systems-mcq
2. https://www.sanfoundry.com/embedded-systems-questions-answers-mcqs/
3. https://www.eguardian.co.in/embedded-systems-multiple-choice-questions-with-answers/

Faculty Notes Link

1. https://drive.google.com/drive/folders/10TWNEoIxLBCZE9KEGEMLhYPSD9dBHrCX?usp=sharing

Assessment Methodology:

1. Practical exam using Keil Compiler.
2. Two Midterm exams where student have to showcase subjective learning.
3. Final Exam (subjective paper) at the end of the semester.

For Techno India NJR Institute of Technology
पंकज पोरवाल
Dr. Pankaj Kumar Porwal
(Principal)

5E1397

5E1397

B. Tech. V - Sem. (Main / Back) Exam., Feb.-March - 2021
PCC/PEC Electronics & Communication Engineering
5EC 5–12 Embedded Systems

Time: 2 Hours **[To be converted as per scheme]**

Max. Marks: 65

Min. Marks: 23

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and one questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 Write the name of tools for designing embedded software.

Q.2 What are the factors on which memory selection of embedded system depends?

Q.3 What is Zigbee? Explain it.

Q.4 What is small scale embedded system? Explain with example.

Q.5 Differentiate between embedded systems and general purpose computing system.

PART – B

(Analytical/Problem solving questions) **[4×10=40]**

Attempt any four questions

Q.1 Explain the characteristics of embedded system.

Q.2 Explain briefly embedded firmware development languages.

Q.3 Discuss fundamental issues in Hardware- Software Co-Design.

Q.4 Explain the concept of error handling in real time operating system.

Q.5 Explain how the Product Level Communication Interface (External Communication Interface) is essential for communicating with various subsystems of embedded system.

Q.6 Classify the embedded system based on generation with example.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[1×15=15]**

Attempt any one questions

Q.1 What are Embedded Systems? Explain embedded system design process and briefly discuss application areas for embedded systems.

Q.2 Write a short note on real time programming languages and operating system for embedded systems?

Q.3 In the operating system context for embedded system explain the following –

(a) Task scheduling

(b) Interrupt handling

(c) Memory management