

P.R. GOVERNMENT COLLEGE (A), KAKINADA

B.Sc. III Year - Electronics – Semester – VI

w.e.f. 2017-18 ADMITTED BATCH

PAPER – 8 A 3 [Cluster Elective A 3]

EMBEDDED SYSTEMS DESIGN

3 Hours/Week [Total: 45 hrs]

Credits: 3

Course Learning Outcomes

The subject aims:

- Design embedded computer system hardware.
- Design, implement, and debug multi-threaded application software that operates under real-time constraints on embedded computer systems.
- Use and describe the implementation of a real-time operating system on an embedded computer system.
- Formulate an embedded computer system design problem including multiple constraints, create a design that satisfies the constraints, implement the design in hardware and software, and measure performance against the design constraints.
- Create computer software and hardware implementations that operate according to well-known standards.
- Organize and write design documents and project reports.
- Organize and make technical presentations that describe a design.

Learning Outcomes:

Students will be able to:

- The student can gain good knowledge on Embedded Systems and implement in practical applications.
- An ability effectively as a member or leader on a technical team
- A commitment to quality, timeliness and continuous improvement

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SYLLABUS

UNIT - 1: (7 Hrs)

Introduction to Embedded Systems:

Embedded systems overview, Design Challenge, Processor Technology, IC Technology, and Design Technology.

UNIT - 2: (11 Hrs)

Custom Single Purpose Processor – Hardware Development:

Introduction, Combinational logic, Sequential logic, Custom Single Purpose Processor Design, RT-Level Custom Single-Purpose Processor.

UNIT - 3: (11 Hrs)

General Purpose Processor – Software Development:

Introduction, Basic Architecture, Operation, Programmer's View, ASIPs, and Development Environment: Host and Target Machines, Linker / Locators for Embedded Software, Getting Embedded Software into the target system.

UNIT - 4: (8 Hrs)

RTWA for Embedded Systems:

Introduction, Pulse Width Modulators, LCD Controllers, Keypad Controllers, Stepper Motor Controllers, Analog – to – Digital Converters, and Real Time Clocks.

UNIT -5: (8 Hrs)

Advanced Communication Principles:

Parallel Communication, Serial Communication, Wireless Communication, **Serial Protocols:** CAN and USB. **Parallel Protocols:** PCI BUS and ARM BUS. **Wireless Protocols:** Bluetooth, and IEEE 802.11.

TEXT BOOKS:

1. Embedded System Design – A Unified Hardware / Software Introduction By **Frank Vahid / Tony Givargis** – WILEY EDITION.
2. Embedded Systems Architecture, Programming and Design – 2nd Edition By **Raj Kamal** – Tata McGraw-Hill Education.

REFERENCES:

1. An Embedded Software Premier - **David E- Siman**, PEARSON Education
2. Embedded / real - time systems - **DR. K.V.K.K. Prasad**, dreamtech
3. The art of programming Embedded systems, **Jack G. Ganssle**, academic press
4. Intelligent Embedded systems, **Louis L. Odette, Adison Wesly**, 1991

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Model Question Paper

Note: - Set the question paper as per the blue print given at the end of this model paper.

TIME: 2 1/2 Hrs

Max Marks: 60

Section	Questions to be given	Questions to be answered	Marks
A	5	3	3 x 10M = 30M
B	9	6	6 x 5 M = 30M
Total	14	9	60M

Blue Print

Chapter Name	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
Introduction to Embedded Systems	1	2	20
Custom Single Purpose Processor – Hardware Development	1	2	20
General Purpose Processor – Software Development	1	2	20
RTWA for Embedded Systems	1	2	20
Advanced Communication Principles	1	1	15
Total marks			95

**PAPER – 8 A 3 [Cluster Elective A 3]
EMBEDDED SYSTEMS DESIGN**

ESSAY QUESTIONS

UNIT- I: - Introduction to Embedded Systems:

1. Explain Embedded systems overview and Design Challenge, Processor Technology,
2. Explain IC Technology, and Design Technology.

UNIT- II: - Custom Single Purpose Processor – Hardware Development:

1. Explain Custom Single Purpose Processor Design
2. Explain RT-Level Custom Single-Purpose Processor.

UNIT- III: - General Purpose Processor – Software Development:

1. Explain Host and Target Machines.
2. Explain Linker / Locators for Embedded Software.
3. Explain Getting Embedded Software into the target system.

UNIT- IV: - RTWA for Embedded Systems:

1. Explain Analog – to – Digital Converters.
2. Explain and Real Time Clocks.

UNIT -5: Advanced Communication Principles:

1. What is communication? Explain Parallel Communication.
2. What is communication? Explain Serial Communication.
3. Describe communication and write about Wireless

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EMBEDDED SYSTEMS DESIGN**

SHORT ANSWER TYPE QUESTIONS

UNIT- I: - Introduction to Embedded Systems:

1. Explain Processor Technology,
2. Explain IC Technology, and Design Technology.

UNIT- II: - Custom Single Purpose Processor – Hardware Development:

1. Explain Combinational logic.
2. Explain Sequential logic.

UNIT- III: - General Purpose Processor – Software Development:

1. Explain Basic Architecture and Operation.
2. Explain Programmer's View.
3. Explain ASIPs.

UNIT- IV: - RTWA for Embedded Systems:

1. Explain Pulse Width Modulators.
2. Explain LCD Controllers.
3. Explain Keypad Controllers
4. Explain Stepper Motor Controllers,

UNIT -V: Advanced Communication Principles:

1. Give brief explanation of Protocol and about Serial protocol of CAN.
2. Give brief explanation of Protocol and about Serial protocol of USB.
3. Give brief explanation of Protocol and about Parallel protocol PCI BUS.
4. Give brief explanation of Protocol and about Parallel protocol ARM BUS.
5. What is wireless protocol and explain any one of them.
6. Explain Bluetooth.
7. Explain IEEE 802.11.