

Rayat Shikshan Sanstha's
Yashavantrao Chavan Institute of Science, Satara
Syllabus for Certificate Course (UG)
(B. Sc. III)

1. TITLE: **Advanced Diploma in Embedded System design**

STRUCTURE OF COURSE:

Year	Paper No and Name	Contact hours	Credits	Marks
1	CET101: Introduction to EDA tools	48	4	100
	CEL102: Introduction to EDA tools Lab	96	4	100
	CEP103: Project Work	24	2	50
	Total	168	10	250
2	DET201: C Programming and Basics of Embedded System Design	48	4	100
	DEL202: C Programming and Basics of Embedded System Design Lab	24	2	50
	DEP203: Project Work	168	10	250
	Total	168	10	250
3	ADET301: Embedded System Design	48	4	100
	ADEL302: Embedded System Design Lab	96	4	100
	ADEP303: Project Work	24	2	50
	Total	168	10	250
Total		504	30	750

C: Certificate Course, D: Diploma, AD: Advance Diploma, T: Theory, L: Lab work, P: Project work

ADET301: Embedded System Design

- **Learning Objectives:**

1. To learn the principles of Embedded System programming
2. To learn ALP for I/O port, timer, counter and interrupt operations
3. To learn the fundamentals of C programming Development
4. To learn the advanced architectures for advanced Embedded systems
5. To study Interfacing Peripherals with Arduino
6. To study Interfacing with Smart Module and IoT

Unit I: Development Tools for Embedded System Design

10L

Assembly Language Programming Concepts, Introduction to Instruction set General Programs on Proteus Simulator, LED

Keil IDE- Tools under IDE, Introduction to – Assembly and Embedded C Compiler, Brief description to Editor, Debugger, Assembler, Simulator, Emulator, Demo of Project Making & sample programs

Programming Tools- Flash Magic, Universal Programmer

General Programs on Proteus Simulator, LEDs- LEDs basic concept and Interfacing with controller, Basic LED patterns

Unit II: Interfacing Techniques for Embedded System Design

12L

Switches and Keys- Keys basic concept and Interfacing with controller, Pull Up Mode / Pull Down Mode, Relay, Buzzer, Opto-Isolator, 4X4 matrix Keyboard, Seven segment display, 16X2 LCD interfacing, DC Motors, Gearing and Efficiency, Servo Motors, Stepper motors, Motor Control and its implementations,

Unit III: Interfacing Peripherals with Arduino

12L

Arduino Board description, Pin Diagram, Memory Organisation, SFR description, Description & Practice of Developments Tools, GPIO's Interfacing, On Board Peripherals interfacing, Introduction of WiFi Module ESP8266, Introduction to Temperature Sensor

Interfacing with sensors Temperature, Pressure, Gas etc., Setup Internet connectivity using ESP8266 WiFi Module, Interface Temperature Sensor with Arduino

Unit IV: Interfacing with Smart Module and IoT

14L

Internet of Things (IoT) Introduction, IoT Application, Scope of IoT, Introduction to mobile apps, mobile App Programming Logic, Setting up mobile App, Design of IoT based Weather Monitoring, Introduction to Android platform, Working with Developments Tools and environment, Creating Android Applications, Introduction to Software techniques, Firmware designing.

- **Learning Outcomes:**

Students should demonstrate their ability of development to:

- 1) should avail Assembly Language Programming skills to perform I/O port, timer, counter, serial communication and interrupt operations using MCS-51
- 2) Design and test advanced Embedded systems

- 3) Perform interfacing of various real world devices
- 4) Design and test advanced electronics systems

- **Recommended Books:**

1. Kenneth J Ayala, The 8051 Microcontroller & Embedded Systems Using Assembly and C (With CD) 1st Edition, Delmar Cengage Learning (2010).
2. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, The 8051
3. Microcontroller and Embedded Systems Using Assembly and C, Pearson (2007)
4. Michel Margolis, Arduino Cookbook, 2nd Edition
5. Massimo Banzi, Getting Started with Arduino
6. John Boxall, Arduino Workshop: A Hands-On Introduction with 65 Projects

**ADEL302: Embedded System Design Lab
(Hardware and Circuit Simulation Software)**

• **Learning Objectives:**

1. To learn the principles of Embedded System programming
2. To learn ALP for I/O port, timer, counter and interrupt operations
3. To learn the fundamentals of C programming Development
4. To learn the advanced architectures for advanced Embedded systems
5. To study Interfacing Peripherals with Arduino
6. To study Interfacing with Smart Module and IoT

GROUP A

1. Study of Keil simulator
2. Study of Pinnacle simulator
3. Study of addressing modes in 8051 microcontroller
4. Interfacing of LEDs with 8051 microcontroller
5. Study of types of switches and interfacing switch with 8051 microcontroller
6. Interfacing of relay, optocoupler and buzzer with 8051 microcontroller
7. Interfacing of seven segment display with 8051 microcontroller
8. Interfacing of Liquid crystal display with 8051 microcontroller.
9. Interfacing of 4X4 matrix keyboard with 8051 microcontroller.
10. Interfacing of DC motor with 8051 microcontroller.
11. Interfacing of Stepper Motor with 8051 microcontroller.
12. Interfacing of Servo Motor with 8051 microcontroller.

GROUP B

1. Study of Arduino IDE and Arduino Boards
2. Programming Arduino to blink LED
3. PIR sensor module interfacing with Arduino
4. RF transceiver module interfacing with Arduino
5. Temperature sensor module interfacing with Arduino
6. Pressure sensor module interfacing with Arduino
7. Gas sensor module interfacing with Arduino
8. Bluetooth module interfacing with Arduino
9. GSM module interfacing with Arduino
10. WiFi module interfacing with Arduino
11. Development and Testing of Android App
12. Device control through android app

- **Learning Outcomes:**

Students should demonstrate their ability of development to:

- 1 Student should avail Assembly Language Programming skills to perform I/O port, timer, counter, serial communication and interrupt operations using MCS-51
- 2 Design and test C programs for applications.
- 3 Design and test advanced Embedded systems
- 4 Perform interfacings of various real world devices

- **Recommended Books:**

1. Kenneth J Ayala, The 8051 Microcontroller & Embedded Systems Using Assembly and C (With CD) 1st Edition, Delmar Cengage Learning (2010).
2. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, The 8051
3. Microcontroller and Embedded Systems Using Assembly and C, Pearson (2007)
4. Michel Margolis, Arduino Cookbook, 2nd Edition
5. Massimo Banzi, Getting Started with Arduino
6. John Boxall, Arduino Workshop: A Hands-On Introduction with 65 Projects

ADEP303: Project Work

Every student should take up a project & submit in the report the work he/she has carried out. The project work will be assessed independently at the time of practical examination.

Mr. J. A. Wagh
Chairman
B.O.S. (Electronics)