Course Code	EC506
Course Title	**Advanced Microcontrollers & Applications** (Theory)
Type of Course	**Core**
L T P	**3 0 2**
Credits	**3**
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional, Assignments, Quiz)	 **50** **50**
Course Prerequisites	**Microprocessor**
Course Objectives (CO)	
Course Outcome	

Note for Examiner- Examiner will set 7 questions of equal marks. First question will cover whole syllabus, having 10 conceptual questions of 1 mark each or 5 questions of 2 mark each and is compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt any two questions from each part.

Section A

Introduction to Embedded System:
Define basic concept of embedded system, Explain Characteristics of embedded system, Operating System (OS): Types of OS, Types of Mobile OS, Characteristics of Real Time Operating System, Compare different Operating Systems used for embedded system designing.

8-bit Microcontrollers Architecture (Atmega 8, AVR):
Microcontroller Types: PIC, AVR, ARM: features and applications, Compare different micro controllers used for embedded system designing, AVR microcontroller: Types , Architecture and functional diagram, Internal Architectural, Block diagram of controller (Atmega 8), pin diagram, Configuration of Two 8-bit and One 16-bit Timers and Counters, channel ADC Working, Essential Peripheral circuits: Crystal Circuit, Power supply, Oscillator Circuit, Initial programming configurations of Atmega8: port, counter, timer, Bootloader Circuit, ISP of Atmega 8 and Tmega8 and ATmea328

Section B

Open Source Embedded Development Board (Arduino):
Overview of open source embedded development board (Arduino), Explain working of open source embedded development board using block diagram, Identify pins of embedded development board, circuit diagram of open source embedded Hardware, features of open source tool used for programming a development board, programming of embedded

development board, Interface Serial Port with embedded development board, Basic Circuit of embedded development Board

Interface Digital and Analog I/O Devices (Arduino Interfacing): Concept of input and output port of embedded development board (Arduino Interfacing Concept), Interfacing of Digital I/O devices with program (Digital I/O Interfacing), Interfacing of Analog I/O devices program (Analog I/O Interfacing), Interfacing of Keypad with programming (Keypad Interfacing). Interfacing of Serial port with programming (Serial Port Interfacing), Interfacing of DC motor with programming, Interfacing of 16x2 LCD with programming

Embedded system Applications (Arduino): functional blocks of Line follower Robot using Arduino, functional blocks of accelerometer based gesture control robot, functional blocks of home automation using RF control.

TEXT BOOKS			
S. No.	Title	Author(s)	Publisher
1.	Exploring Arduino	Jeremy Blum.	Wiley
2.	30 Arduino Projects for Evil Genius	Simon Monk	McGraw-Hill Professional
3	AVR Microcontroller and Embedded Systems using Assembly and C	Muhammad Ali Mazidi, Sarmad Naimi, Sepehr Naimi	Pearson Education
RECOMMENDED BOOKS			
4	Make: Arduino Bots and Gadgets	Kimmo and Tero Karvine	O'REILLY
5	Arduino Cookbook	Michael Margolis	O'REILLY
6	Arduino Internas	Dale Wheat	Technology in Action

Course Title	**Advanced Microcontrollers & Applications** (Practical)
Type of Course	**Core**
Credits	**1**
Course Assessment Methods Continuous Assessment	50

List of Experiments:

1. Test AVR Micro-Controller Architecture.
2. Identify each block of ATmega8 with Pins.
3. Use Arduino Architectural diagram .
4. Test the different Arduino Boards, Open-Source and Arduino Shields.
5. Install Arduino IDE and its development tool.
6. Design an embedded development Board.(arduino)

7. Develop a program to Blink LED for 1second.
8. Develop a program to interface Input Switches and output LEDs with development board (arduino).
9. Interface 7 seg display with development board(arduino) and Write a program to count and display 0 to 9 on it.
10. Develop a program to generate led pattern using computer serial control.
11. Interface potentiometer with development board (arduino) and write a program to generate Led pattern on it.
12. Interface LM35 temperature sensor with arduino and monitor temp. on serial monitor.
13. Interface DC motor using L293D Motor Driver.
14. Interface RF Tx/RF Rx with Arduino
15. Interface 16x2 LCD and Display “HELLO WORLD”.
16. Make Line-Follower Robot using Arduino.
17. Build Digital thermometer using LM35 and LCD 16x2.
18. Build Gesture Control Robot using Accelerometer.