

BVI - 01
2019-20

Dr.G R DAMODARAN COLLEGE OF SCIENCE(AUTONOMOUS), COIMBATORE-14
SCHOOL OF INFORMATION TECHNOLOGY & SCIENCE
Scheme of Examination (under CBCS)
PG Diploma in Robotics (Part Time)
For the candidates admitted from the academic year 2019-2020

SEM	COURSE	COURSE TITLE	Credits	Marks			Hrs/week	Exam Duration(Hrs)
				CA	TEE	Total		
I	Core	Fundamentals of Robotics	5	25	75	100	4	3
II	Core	Microcontrollers and Embedded Systems	5	25	75	100	4	3
	Core	Embedded and Robotics Lab	4	40	60	100	2	3
III	Core	Case Study - Robotics*	6	100	NA	100	2	
	Core	Applications and Prototype Development in Robotics	5	25	75	100	5	3
IV	Core	Project and Viva-Voce	20	25	75	100		
TOTAL			45	240	360	600	17	

* - 100% Internal Evaluation

Case Study - Robotics* Split up	
Total (100 Marks)	
Document	50 Marks
Presentation	50 Marks

Project and Viva Voce Split up	
CA (25 marks)	
Review I	10 Marks
Review II	15 Marks
TEE (75 Marks)	
Viva	50 Marks
Documentation	25 Marks

G. Radhika

BVI - 02
2019 - 20

Dr G R DAMODARAN COLLEGE OF SCIENCE (Autonomous), COIMBATORE - 14

PG Diploma in Robotics (Part-Time)
Effective from the academic year: 2019-2020

FIRST SEMESTER

CORE: FUNDAMENTALS OF ROBOTICS

Objective of the course: The objective of the course is to introduce the basic components of embedded systems and robotics. This course also introduce some of the interfacing IDEs with Robot.

Unit I

8 Hrs

Fundamentals of robot Technology: Robotics and programmable automation – Laws of robotics – Robotics Systems and Robot anatomy: Robot Manipulator and Wrist – Robot Reference frame and Coordinate system – Work envelopes – Robot Wrists – Robot End effectors - Accuracy and repeatability, Types of controls.

Unit II

8 Hrs

Sensors & Motors: Analog I/O and Digital I/Os - Sensors: Types of sensors, LM35 Temperature sensor, IR Sensors, Range Finders, LDR - Motors: DC Motors, AC Motors, Servo Motors & - Working with Servo Motors-Working with DC Motors - Assignment: DC Motor Control.

Unit III

8 Hrs

Interfacing with Stepper motor - Assignment: Interfacing IR Proximity Sensors. Port Manipulation -7- segment LED -Working with the LCD Displays - Working with Storage-Internal EEPROM - Working with Interrupts - Assignment: Interfacing with 7 segment display.

Unit IV

8 Hrs

Bioid, Humanoid robot introduction – components – Mobile robots: Introduction- working principle – working with RoboPlus – Motion Controller.

Unit V

8 Hrs

Robot Languages and Programming: Introduction to robot languages, Classification of robot languages, ROBOTC programming -AVR studio - Microcontroller programming using C – IDE – Introduction to Simulators – VSE.

Introduction to Building a Line Follower using Various Logics - Assignment: Design of Line Follower Robot.

Reference Books:

1. Saeed B. Niku, "Introduction to Robotics analysis, Systems & Applications", Pearson Education Singapore Pvt. Ltd., 2011.
2. S. R. Deb, "Robotic Technology and Flexible Automation", Tata McGraw Hill Publishing Co. Ltd., 2010.
3. Bajd.T, Mihelj M, Lenarcic J, Stanovnik A, Munih M, "Robotics", Springer, 2010

9

BVI -03
2019-20

Dr G R DAMODARAN COLLEGE OF SCIENCE (Autonomous), COIMBATORE - 14

PG Diploma in Robotics (Part-Time)

Effective from the academic year: 2019-2020

SECOND SEMESTER

CORE: MICROCONTROLLERS AND EMBEDDED SYSTEMS

Objective of the Course: The objective of this course is to introduce embedded system design environment. The course covers microcontrollers, third programming & interfacing techniques.

Unit I

8 Hrs

Microprocessors, Microcontrollers - Basic differences between Microprocessors and Microcontroller –Atmega 2560 Micro controller - Introduction to Atmega 2560 Microcontroller, Architecture, Registers, Internal and External Memory. Instruction Set. On Chip Counters / Timers, Serial I/O, Interrupts and their use.

Unit II

8 Hrs

PIC Microcontrollers: Introduction to PIC C6X microcontrollers, types, architecture, registers, Internal and External Memory, Instruction Set, On Chip Counters / Timers, Serial I/O, Interrupts and their use.

Unit III

8 Hrs

ARM7TDMI(Advanced RISC Machines): Introduction to ARM7TDMI Microcontroller, types, architecture, registers, Internal and External Memory, Instruction Set, On Chip Counters/Timers, Serial I/O, Interrupts and their use.

Unit IV

8 Hrs

Definition and Classification – Overview of Processors and hardware units in an embedded system – Software embedded into the system – Exemplary Embedded Systems – Embedded Systems on a Chip (SoC) and the use of VLSI designed circuits – Embedded Programming – an Overview.

Unit V

8 Hrs

Serial I/O Devices: RS232 Specifications, RS422/RS423/RS435 & other communication protocols, Introduction to Universal Robot Body Interface(URBI) and VPL. CASE STUDIES: Industrial Applications

Reference Books:

1. M.A. Mazadi & J.G. Mazidi, "The 8051 Micro Controller & Embedded Systems", Pearson Education. Asia -2013.
2. M. Mahalakshmi, "8051 Microcontroller Architecture, Programming and Application", University Science press, 2012.
3. <http://www.sunrom.com/files/P89V51RD2.pdf>
4. http://www.eecs.umich.edu/~panalyzer/pdfs/ARM_doc.pdf
5. Raj Kamal, "Microcontrollers: Architecture, Programming, Interfacing and System Design", Pearson edition, 2011.
6. David E. Simon, "An Embedded Software Primer", Pearson Education, First Edition, 2002

37

BVI - 04
2019-20

Dr G R DAMODARAN COLLEGE OF SCIENCE (Autonomous), COIMBATORE - 14

**PG Diploma in Robotics (Part-Time)
Effective from the academic year: 2019-2020
SECOND SEMESTER**

CORE: EMBEDDED AND ROBOTICS LAB

Objective: To introduce and work on microcontrollers and sensors.

To experiment embedded applications with various interfacing methods.

1. Basics/Digital I/O's

- Microcontroller IDE & Driver Installation
- Board Overview
- Toggling of LED

2. Analog I/O's, Sensors & Motors

- Working with Analog Outputs
- Working with Analog Inputs-Sensors
- Working with Servo Motors
- Working with DC Motors
- Stepper motor interfacing

3. Sensor Construction & IO Expansion

- Sensor Construction-IR Proximity Sensor

4. Advanced IO, Displays, Storage & Interrupts

- Advanced IO Operations-Port Manipulation -7- segment LED
- Working with the LCD Displays

5. Robotics:

- Robotics Building a Line Follower using Various Logics

3

BVI - 05
2019-20

Dr G R DAMODARAN COLLEGE OF SCIENCE (Autonomous), COIMBATORE - 14

PG Diploma in Robotics (Part-Time)
Effective from the academic year: 2019-2020

THIRD SEMESTER

CORE: APPLICATIONS AND PROTOTYPE DEVELOPMENT IN ROBOTICS

Objective: To impart knowledge on various applications to facilitate the robotics applications. Every unit is intended to discuss with case studies of the different application domains using Robotics.

Unit I: 8 hrs
Smart home environment – enabling robot based security and tracking system – smart electrical system of a house

Unit II: 8 hrs
Industrial Robots – Pick and Place Robots - Transport and Logistics - design of an autonomous vehicle - control of a vehicle from remote location - GPS tracking of vehicles.

Unit III: 8 hrs
Features of robots in Bioscience experiments - Ant Robotics – Swarm Robots – Nano robotics in Medical Fields – Surgical Robots.

Unit IV: 8 hrs
Robots in Natural Language Processing – Computer Vision Robots – Robots in Pattern Recognition.

Unit V: 8 hrs
Robots in National Security System – Robots for Army – Land based systems – Robots in Air based Systems – Robots for Waterways.

Reference Books:

1. Jacob Rosen et al, "Surgical Robotics: Systems applications and vision", Springer LLC, 2011.
2. Mavroidis, Constantinos, Ferreira, Antoine (Eds.), "Nanorobotics – Current Approaches and Techniques", Springer, 2012.

CP.