

POST-GRADUATE DIPLOMA COURSE IN EMBEDDED SYSTEM DESIGN

PREAMBLE :

This course is designed for engineering graduate students and post-graduate students of science faculty with specialization in Electronics and Instrumentation Sciences, and who wish to pursue a career in the domain of applied electronics. This course enables students to develop skills required in the ever-growing electronic industries, and prepare them to keep pace with changes in the technology and requirements of ever-growing industrial sector. The scope of the course is unique and includes a wide spectrum of requirements of industries.

COURSE OBJECTIVES :

The main objective of this value-added course is to impart hands-on training to the students who wish to develop their career in the domain of core electronics.

COURSE DURATION :

Two Semesters (900 hours of teaching, practical and project)

COURSE STRUCTURE:

Module No.	Subject/Topic	Credits	Number of lectures (hours)
PGDESD101	Programming Languages for Embedded Systems	11	255
PGDESD102	Real Time Operating Systems	2	45
PGDESD103	Embedded System Programming C++	4	90
PGDESD104	Linux Basics + Operating Systems + Device Drivers	9	210
PGDESD105	Microcontrollers and Interfacing	5	120
PGDESD106	Embedded System Hardware Design	2	45
PGDESD107	Embedded System Protocols	2	45
	PROJECT WORK	5	120
TOTAL		40	930

ADDITIONAL CREDITS

PGDESD108	Internet Of Things (IOT)	1	30
PGDESD109	Automotive Domain Basics	1	15
PGDESD110	Case Studies for Standard Chips	1	30

PGDESD111	Soft and Communication Skills	1	15
TOTAL		4	90

ELIGIBILITY FOR ADMISSION :

Graduate degree in Engineering (B. E. / B. Tech.) with specialization in Electronics or Instrumentation

Or Electrical and Telecommunication or M. Sc. With Physics or Electronics as specialization

Or a Degree equivalent to above degrees from statutory University.

ADMISSION PROCESS :

Admission to this course is given on basis of merit obtained in Common Entrance Test (CET)

conducted online.

(Reservation policy of SPPU shall be applicable)

COURSE FEES :

Rs. 85000/- to be paid in two installments, (Rs 50000/- at the time of admission) and remaining
Fee Rs. 35000/- shall be paid within 30 days from the date of admission failing to which admission
shall be cancelled.

SYLLABUS FOR THE COURSE:

Code	Subject Title	Total Credits	Theory Credits	Practical Credits
PGDESD101	<p>Programming Languages for Embedded Systems and Concepts Object oriented design: Object orientation design methodology.ADT and object orientation. Study of Advanced C Concepts: Basic C concepts, arrays, pointers, structure, union, Enumerations command line arguments, searching and sorting algorithm,Self referential structure, stack, queue link list. Object oriented concepts: ADT, Class, object, Constructor ,Destructor Encapsulation, Inheritance, Polymorphism, Function overloading, Function overriding, Exception handling, Templates, Operator overloading, Virtual functions, Abstract class Embedded Systems: Embedded System programming ,Function like macros, super loop concept, delay functions, code optimization, memory saving techniques. SDLC Basics: Waterfall Model, V model, Agile model) STLC Basics: Software testing techniques.</p>	11	5	6
PGDESD102	<p>Real Time Operating Systems RTOS Concepts: What is Real time?, Difference between process and task, multitasking, Scheduling, Memory management, Synchronization, Semaphore ,Mutex, Critical Section, Deadlock, Priority inversion, PriorityInheritance, Interrupts , RTOS configuration. 8051 Microcontroller based RTOS Configuration: Learning RTOS Application programming Interface(API) and design Microcontroller basedRTOS concepts application. PIC(16F877A) Microcontroller based RTOS Configuration: Learning RTOS Application programming Interface(API) and design Microcontrollerbased RTOS concepts application. ARM(LPC2148) Microcontroller based RTOS Configuration: Learning RTOS Application programming Interface(API) and design Microcontrollerbased RTOS concepts application.</p>	2	1	1

PGDESD103	Embedded System Programming C++ Application development : Code optimization, Memory Savingtechnique.	4	2	2
PGDESD104	Linux Basics + Operating System + Device Drivers Processor Architecture, Process management, Scheduling, Memory management Inter process communication, Linux internals, System programming in Linux, Shell scripting, File API, Process API, Multithreading, driver development	9	4	5
PGDESD105	8/16/32 bit microcontroller and interfacing Study of 8 bit Microcontroller architectures, Interfacing concepts of new devices like LCD, Motors, Relay, Digital and Analog Sensors, Wireless and Wi-Fi devices. Assembly language Programming, Embedded C programming, study of sensor analog as well as digital. ADC, DAC. Study of 32 bit ARM architecture, ARM assembly language programming and Embedded C programming and Application development.	5	2	3
PGDESD106	Embedded System Hardware Design Study of data sheets: Hardware device interface with Microcontroller will require to study data sheets of the device, Selection of components, Power supply design. Microcontroller based application hardware design as per specification will be done.	2	1	1
PGDESD107	Embedded System Protocols -RS-232,I2C,SPI,CAN RS232:Communication between PC and Microcontroller (UART/USART) will be performed using RS232 Protocol. I2C,SPI:RTC chips, EEPROM chips, Digital sensors interfacing will bedone using I2C and SPI protocol. CAN: Electronic control unit communication (ECU) will done using CAN.	2	1	1
	Project Work 5 months duration project	5	2	3
	Sub total (Credits)	40	18	22
Code	Subject Title	Total Credits	Theory Credits	Practical Credits
	Extra Credits			
Code	Subject Title	Total Credits	Theory Credits	Practical Credits

PGDESD108	Internet of Things (IoT) Sensors Fundamentals, Basic concept of internet of things, wireless communication protocols like Bluetooth, Zigbee. study of Wi-Fi and chipslike ESP8266 interfacing with microcontroller.	1	0	1
PGDESD109	Automotive Domain Basics Study of Automotive Protocols (CAN, LIN) in detail and implementation. Introduction to MATLAB model development, SIMULINK.	1	1	0
PGDESD110	Case studies For Standard Chips, used in industry for above Protocols. Case study of standard chips like RTC chip DS1307,EEPROM, 24LC256, Temperature Sensor TC74 which are based on I2C,SPI protocols	1	0	1
PGDESD111	Soft Skills Communication Skills Personality development Interpersonal Skills Business Etiquettes Preparation for Placement Time management Confidence Building	1	1	0
	Sub total (Extra Credits)	4	2	2
	Grand Total (Credits + Extra Credits)	44	20	24
Code	Subject Title	Total Credits	Theory Credits	Practical Credits