Department of Electronics

Revised Syllabus of Advanced Diploma Programme (PG)

Internet of Things

Preamble:

The digital space has witnessed major transformations in the last couple of years and as per industry experts would continue to evolve itself. The latest entrant to the digital space is the Internet of Things (IoT). IoT can also be defined as interplay for software, telecom and electronic hardware industry and promises to offer tremendous opportunities for many industries.

With the advent of the Internet of Things (IoT), fed by sensors soon to number in the trillions, working with intelligent systems in the billions, and involving millions of applications, the Internet of Things will drive new consumer and business behavior that will demand increasingly intelligent industry solutions, which, in turn, will drive trillions of dollars in opportunity for IT industry and even more for the companies that take advantage of the IoT.

To better compete in the global market, successful companies are finding that investments in hardware and software are no longer enough. Human elements with specialized engineering and design skills have become the essential part of the equation.

Embedded systems are normally built around Microcontrollers, Sensor networks, and IT & Networking. This IoT course focuses on Embedded Programming with C on ARM Microcontrollers, Embedded Operating Systems, Wireless Sensor Networks along with IoT protocols , Networking and data analytic basics.

Program Objectives of the Course:

1. To develop hands-on skills of students

2. To promote enterplanership among the students

3. To enhance technical knowledge

4. To increase employment opportunities of students

Program Outcomes:

At the end of this course, the students should be able to

1. Create, design and develop problem solving ability

2. Understand state of the art, technology and development

3. Develop soft skills needed.

4. Get knowledge of self employability

Course Specific Outcomes:

At the end of this course, the students should be able to

1. Explored to the interconnection and integration of the physical world and the cyber space. They are also able to design & develop IOT Devices.

2. Work as Electronic Engineer in Industry.

3. Establish Self Business.

I Year Advanced Diploma Course
1. Title: **Introduction to Programming Technologies and Operating System**

2. Year of Implementation: 2020
3. Duration: One Year
4. Pattern: Semester
5. Medium of Instruction: English
6. Contact hours: 7 hours/week
8. Structure of Course:

Syllabus Structure (PG)

Year	Semester	Course No.	Course Code	Contact Hours	Credits (1Credit=15 H)	Total Marks
1	I	CT I	AD ET 101	30	2	75
		CL I	ADE L101	60	2	150
	II	CT II	AD ET 202	30	2	75
		CL II	ADE L202	60	2	150
	Annual	CP I	AD EP101	60	2	150
			Total	240	10	600
2	III	CT III	AD E T 303	30	2	75
		CL III	AD E L303	60	2	150
	IV	CT IV	AD ET 404	30	2	75
		CL IV	AD E L404	60	2	150
	Annual	CP II	AD E P202	60	2	150
	Industrial and or Incubation and or Research and or Field Training			60	2	-
			Total	270	12	600
			Total	510	22	1200

Total No. of Papers: Theory:4, Practical:4, Project:2
Number of Lectures per week: 08
Theory: Semester, Practical and Project: Annual
PT: Paper Theory, PL: Paper Lab, PP: Paper Project, AD: Advance Diploma, E :Electronics

Rayat Shikshan Sanstha's
Yashavantrao Chavan Institute of Science, Satara (Autonomous)
Restructure Syllabus from June, 2020

Semester I

ADET 101: Introduction to Programming Technologies
(Contact Hrs: 30 Credits: 2)

Learning Objectives:

1. To Provide Conceptual knowledge of computational mathematics, algorithms and flowcharts.

2. To Comprehension with advance C programming.

Unit I:Computational Mathematics, Algorithms and Flowcharts (15)

Computational Mathematics Importance of computers in Electronics, paradigm for solving Electronics problems for solution. Usage of Linux for Computation.

Algorithm: Definition, properties and development.

Flowchart: Concept of flowchart, symbols, guidelines, types.

Examples: Cartesian to Spherical Polar Coordinates, Roots of Quadratic Equation, Sum oftwo matrices, Sum and Product of a finite series, calculation of sin(x) as a series, algorithm for plotting (1) lissajous figures and (2) trajectory of a projectile thrown at an angle with the horizontal.

Unit II: Advanced C Programming (15)

Programming Language C - Overview of C in view of IOT Devices, Pointers, Functions Arrays, Strings Structures & Unions. Memory Allocation, Pre-processor, Linked Lists, Stacks & Queues, Sorting & Searching Techniques

Learning Outcomes:

After completion of the unit, Student is able to

1. Describe any critical problems using computational mathematics, algorithms and flowcharts.

2. Develop C programming for IOT applications.

Reference Books:

1) M. Morris Mano Digital System Design, Pearson Education Asia,(Fourth Edition)

2) Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia (1994)

3) W. H. Gothmann, Digital Electronics: An Introduction To Theory And Practice, Prentice Hall of India(2000)

4) YashavantKanetkar and AsangDani,C Programming

ADEL101: **(Practical): Introduction to Programming Technologies Lab**

(Contact Hrs: 60 Credits: 02)

Learning Objectives:

1. Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems.

2. To study advance C programming concepts

3. To study the concept of Internet of Things

4. To study fundamentals of Linux operating systems

List of Practical's (15)

1. Generate the Fibonacci series up to the given limit N and also print the number of elements in the series.

2. Find minimum and maximum of N numbers.

3. Calculate factorial of a given number.

4. Calculate the value of sin (x) and cos (x) using the series. Also print sin (x) and cos (x) value using library function.

5. Generate and print prime numbers up to an integer N.

6. Find the sum of principle and secondary diagonal elements of the given MxN matrix.

7. Maintain an account of a customer using classes.

8. Implement linear and circular linked lists using single and double pointers.

9. Create a stack and perform Pop, Push, Traverse operations on the stack

10. Create circular linked list having information about a college and perform Insertion at front, Deletion at end.

11. Create a Linear Queue using Linked List and implement operations Insert and Display the queue elements.

12. Create a Linear Queue using Linked List and implement different operations Delete, and Display the queue elements.

13. Create a Binary Tree to perform Tree traversals (Preorder) using the concept of recursion.

14. Create a Binary Tree to perform Tree traversals (Postorder) using the concept of recursion.

15. Create a Binary Tree to perform Tree traversals (Inorder) using the concept of recursion

Learning Outcomes:

Students will be able to

1. Analyze and solve any critical problems

2. Design algorithms and flowchart for any problem

3. Develop advance C programs

4. Understand concepts of IoT and Linux operating System for IoT development

Reference Books:

1) M. Morris Mano Digital System Design, Pearson Education Asia,(Fourth Edition)

2) Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia (1994)

3) W. H. Gothmann, Digital Electronics: An Introduction To Theory And Practice, Prentice Hall of India(2000)

4) R. L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw- Hill (1994)

5) David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, Published Jun 13, 2017 by Cisco Press.

6) W. David Stephenson, SmartStuff: an introduction to the Internet of Things

7) Mathew Neil and Richard Stones, Beginning Linux Programming, 4th Edition. Published by. Wiley Publishing

8) The design of UNIX operating system – Maurice J. Bach.

9) Linux commands – Instant reference by Bryan PF affenberge

10) Unix concept and application – Sumitabha Das

Semester II

ADET 202: Introduction to Operating Systems

(Contact Hrs: 30 Credits: 2)

Learning Objectives:

1. To study the concept of Internet of Things
2. To study fundamentals of Linux operating systems

Unit I: Introduction to IoT   (15)

Introduction to IoT-Concepts and Terminology of The Internet of Things (IoT), History of IoT, Applications, Requirements of IoT, M2M/IoT standards, Components of IoT, IoT Enabling, Technologies - Sensors, Actuators, Gateways, Local & Global Connectivity, IOT Platforms,

Business Inferences IoT Building blocks – Architecture, Sensing, Connectivity, Gateways, Processing, Software, Power, IOT Reference Architectures, Business Models, and Challenges in IOT, Introduction to Node Red

Unit II: Introduction to Linux Operating System   (15)

Introduction to Linux, Working with Commands Line, File System Hierarchy, vi Editor, Package Management, Administrative & Networking Essentials, Linux Internals (Process Management, Threads, File Handling, IPC)

Learning Outcomes: After completion of the unit, Student is able to

1) Understand concepts of IoT

2) Learn basic concepts of operating systems

Reference Books:

1) M. Morris Mano Digital System Design, Pearson Education Asia,(Fourth Edition)

2) Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia (1994)

3) W. H. Gothmann, Digital Electronics: An Introduction To Theory And Practice, Prentice Hall of India(2000)

4) R. L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw- Hill (1994).

5) David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, Publish.

ADEL202: (Practical): Introduction to Operating Systems Lab

(Contact Hrs: 60 Credits: 02)

Learning Objectives:

Students will be able to

To learn basic computational mathematics, algorithms and flowcharts.

To study advance C programming concepts

To study the concept of Internet of Things

To study fundamentals of Linux operating systems

List of Practical's (15)

1. Study of Linux terminal

2. Study of Linux terminal and root

3. Use of Linux 'man' command

4. Fundamental Linux Commands (Internal Commands)

5. Fundamental Linux Commands (External commands)

6. clear, script, cal, who, bc, wc, head, tail commands

7. Login, logout procedure (user/ login name and password)

8. Copy, move, delete files form different directories.

9. Linux chmod command and applications

10. Change file access permissions using chmod and confirm using ls –l command

11. Creating text files using VI editor.

12. File operations using VI editor I

13. File operations using VI editor II

14. Using vi Handling multiple file, copy paste, cut paste and filtering the text

15. Linux Process Commands

Learning Outcomes: Students will be able to

1. Analyse and solve any critical problems

2. Design algorithms and flowchart for any problem

3. Develop advance C programs

4. Understand concepts of IoT and Linux operating System for IoT development

Reference Books:

1) M. Morris Mano Digital System Design, Pearson Education Asia,(Fourth Edition)

2) Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia (1994)

3) W. H. Gothmann, Digital Electronics: An Introduction To Theory And Practice, Prentice Hall of India(2000)

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8) The design of UNIX operating system – Maurice J. Bach.

9) Linux commands – Instant reference by Bryan PF affenberge

10) Unix concept and application – Sumitabha Das

11) Unix shell programming – Yashwantkanetkar

ADEP202 (Project):
(Contact Hrs.60, Credits: 2)

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

BOS Sub-Committee	**Expert Committee**
1. Mr. S.R.. Pol Chairman Asst. Prof. YCIS, Satara (Autonomous)	1. Mr. D.S.Kumbhar Member Asst. Prof. Modern College, (Autonomous), Pune
2 Mr. S.D. Jadhav Member Asst. Prof. YCIS, Satara (Autonomous)	2. Mr. Dattatreya Jadhav Member Electronic Engineer, Vodafone, Pune