RAAK
COLLEGE OF ENGINEERING AND TECHNOLOGY
(Approved by AICTE, New Delhi, Affiliated to Pondicherry University)
(A Unit of Farouk Educational Trust)

Date: 03.05.2019

To

The Registrar
Academic Section
Pondicherry University
Puducherry – 605014.

Respected Sir,

Warm greetings from RAAKCET

Sub: Review of feedback from Student, Teachers, Employers & Alumni about curriculum as per regulation 2013 - 2014 - reg.

As per the feedback received from various stakeholders like Student, Teachers, Employers & Alumni, the following Topics / Subject may be included in the new regulation.

- Cyber security subject may be included in Computer Science and Engineering.
- Sensors for industrial applications subject may be included in Electronics and Communication Engineering.
- Nano electronics and embedded system subject may be included in Electrical and Electronics Engineering.

Kindly request you to consider the same and that can be included in the forthcoming regulations.

RAAK College of Engineering & Technology

PRINCIPAL

Dr. S. SEENUVASAMURTHI, M.E., Ph.D.
PRINCIPAL
RAAK College of Engineering & Technology
No.1, Muthupillai Palayam Road,
Sulthanpet Post,
Puducherry - 605 110

No.1, Muthupillai Palayam Road, G.N. Palayam, Sulthanpet Post, Puducherry - 605 110.
0413 - 266 7042 +91 99434 66786 +91 91591 19966 raakengg@gmail.com www.raakengg.edu.in

CSPC701 CYBER SECURITY

L	T	P	C
3	0	0	3

Course Pre-requisite:

- Basic Programming Language, Computer Networks

Course Objective:

- To learn the importance of cyber security and various attacks on digital systems.To explore various vulnerabilities in web applications, networks and Internet Infrastructure.

Course Outcomes:

- To understand the importance of cyber security.
- To understand the concepts of authentication, authorization and privileges of Cyber security.
- To acquire knowledge about security in application layer and its mitigation techniques.
- To understand perimeter protection and Intrusion detection system.
- To explore various malware and its analysis.

UNIT I (9 Hrs)

INTRODUCTION TO CYBER SECURITY: Introduction and basic Terminology Cyber Security and CIA Triad, Cyber Threats to CIA, Cyber-Attack surfaces, Recent Cyber- Security incidents and high-level analysis - Basic Cryptography - Role of Cryptography in ensuring confidentiality for data at rest, data in motion, and data in process - Symmetric and Asymmetric Cryptography, Needs, Symmetric and Asymmetric algorithm outlines (RSA, DH, DES, AES) - Role of cryptography in Data Integrity, non-repudiation Hashing and Digital Signature - hash function (MD5, SHA-256), Understanding digital signature and its role, Digital Certificate and PKI - Importance of the role of a proper Pseudo Random Number Generator.

UNIT II (5 Hrs)

AUTHENTICATION, AUTHORIZATION AND PRIVILEGE: Importance of strong Authentication – distinction between authorization and authorization - importance of authorization-access control – Mandatory and Discretionary Access control - role based authorization – privilege and privilege escalation.

UNIT III (13 Hrs)

APPLICATION SECURITY: Application Security- Basic application vulnerabilities (Buffer overflow, Integer Overflow, format string vulnerability) – Basic mitigations of buffer overflow – platform bases – compiler based, secure programming practice - Web Client Security, Same Origin Principle – DOM, Java Script Vulnerability – Cookies and Cookie Attributes Secure, http only–Concept of session and session ID– Session hijacking vulnerability–http vs. https and SSL/TLS and version issue - Web Server Security – XSS, CSRF, SQL Injection, Command Injection concepts.

UNIT IV (9 Hrs)

PERIMETER PROTECTION AND INTRUSION DETECTION: Vulnerabilities in DNS, Routing and IP protocols especially in IPv4 and suggested remedies with DNSSEC, S-BGP, and IPSec - Perimeter Protection And Intrusion Detection- Host Intrusion Detection techniques, To look for and how an SIEM tool can consolidate such indicators into a management console- Network Intrusion Detection – signature based vs. behavior based, Snort, Intrusion Detection System.

UNIT V (9 Hrs)

BASIC MALWARE ANALYSIS: Firewall vs. Intrusion detection tool – Firewall rules and customization techniques. Basic Malware Analysis- Various malware classes and their characteristics - Difference between static analysis and dynamic analysis - Signature vs. behavioral detection techniques.

Text Books:

1. Debtoru Chatterjee, "Cyber Crime and its Prevention in Easy Steps", Khanna Publishing House, 2022.
2. Debtoru Chatterjee, "Cyber Attacks and Counter-Measures Made Simple", Khanna Publishing House, 2022.
3. Ross J. Anderson, "Security Engineering", Wiley, 3rd Edition, 2020.
4. William Stallings, "Cryptography and Network Security", Pearson Education, 7th Edition, 2017.

References:

1. D Stuttard and M Pinto, "The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws", Wiley publisher, 2011.
2. Peter Kim, "The Hacker Playbook: Practical Guide to Penetration Testing (vol. 1 and 2)", Createspace Independent Pub, 2015.
3. Jeeva Jose, "Introduction to Security of Cyber-Physical Systems", Khanna Publishing, 1st Edition, 2022.
4. Er.Harsh Bothra, "Mastering Hacking The Art of Information Gathering & Scanning", Khanna Book Publishing House, 1st Edition, 2019.

RAAK College of Engineering & Technology

Dr. S. SEENUVASAMURTHI, M.E., Ph.D.
PRINCIPAL
RAAK College of Engineering & Technology
No.1, Muthupillai Palayam Road,
Sulthanpet Post,
Puducherry - 605 110

EEPECT-115	Nano Electronics	3L:0T:0P	3 Credits

Course objectives:

To impart knowledge about the following topics of Nano electronics and molecular electronics.

MODULE I - INTRODUCTION TO NANOTECHNOLOGY **9 Hours**

Background to nanotechnology: Types of nanotechnology and nanomachines – periodic table – atomic structure – molecules and phases – energy – molecular and atomic size – surface and dimensional space – top down and bottom up; Molecular Nanotechnology: Electron microscope – scanning electron microscope – atomic force microscope – scanning tunnelling microscope – nanomanipulator– atom manipulation – nanodots – self-assembly – dip pen nanolithography. Nanomaterials: preparation – plasma arcing – chemical vapor deposition – sol-gels – electrodeposition – ball milling.

MODULE II – NANODEVICES **9 Hours**

Fundamentals of logic devices:- Requirements – dynamic properties – threshold gates; physical limits to computations; concepts of logic devices:- classifications – two terminal devices – field effect devices – coulomb blockade devices – spintronics – quantum cellular automata – quantum computing – DNA computer; performance of information processing systems.

MODULE III - SILICON MOSFETs & QUANTUM TRANSPORT DEVICES 9 Hours

Silicon MOSFETS - Novel materials and alternate concepts:- fundamentals of MOSFET Devices- scaling rules – silicon-dioxide based gate dielectrics – metal gates – junctions & contacts – advanced MOSFET concepts. Quantum transport devices based on resonant tunneling, Electron tunneling – resonant tunneling diodes – resonant tunneling devices; Single electron devices for logic applications, Single electron devices – applications of single electron devices to logic circuits.

MODULE IV- CARBON NANOTUBES **9 Hours**

Carbon Nanotube: Fullerenes - types of nanotubes – formation of nanotubes – assemblies – purification of carbon nanotubes – electronic properties – synthesis of carbon nanotubes – carbon nanotube interconnects – carbon nanotube FETs – Nanotube for memory applications – prospects of an all carbon nanotube nanoelectronics.

MODULE V - MOLECULAR ELECTRONICS **9 Hours**

Electrodes & contacts – functions – molecular electronic devices – first test systems – simulation and circuit design – fabrication; Future applications: MEMS – robots – random access memory – mass storage devices.

Total No of Hours: 45

Text books:

1. Michael Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons and Burkhard Raguse, Nanotechnology: Basic Science and Emerging Technologies, Chapman & Hall / CRC, 2002
2. T. Pradeep, NANO: The Essentials – Understanding Nanoscience and Nanotechnology, TMH, 2007
3. Rainer Waser (Ed.), Nanoelectronics and Information Technology: Advanced Electronic Materials and Novel Devices, Wiley-VCH, 2003

Reference books:

1. W. Ranfer, —Nano Electronics and Information Technologyl, Wiley, (2003).
2. K.E. Drexler, —Nano systemsl, Wiley, (1992). 3. M.C. Petty, —Introduction to Molecular Electronicsll1995.

Course outcomes:

Upon completion of the course, students will be able to

- Understand advanced concepts and operating principles of Nano electronic devices.
- Understand fabrication methods to fabricate Nano scale devices.
- Gain familiarity with the application of advanced techniques needed to characterize and study reliability of materials and Nano scale electronic devices.

*****

RAAK College of Engineering & Technology

Dr. S. SEENUVASAMURTHI, M.E., Ph.D.
PRINCIPAL
RAAK College of Engineering & Technology
No.1, Muthupillai Palayam Road,
Sulthanpet Post,
Puducherry - 605 110

EEPECT-108	EMBEDDED SYSTEM DESIGN	3L:0T:0P	3 Credits

Course objectives:

- *To gain knowledge about the fundamentals of embedded systems and its communication protocols.*
- *To understand the architectural features of ARM processor.*
- *To learn about the different programming techniques for ARM processor.*
- *To impart knowledge on ARM processor peripherals with device driver and its interface circuits.*
- *To provide a platform for the student to design, implement, integrate, and develop software and hardware applications with the real time system.*

MODULE I – INTRODUCTION **9 Hours**

Introduction to functional building blocks of embedded systems – Register, memory devices, ports, timer, interrupt controllers using circuit block diagram representation for each categories.

MODULE II - ARM ARCHITECTURE **9 Hours**

ARM Programmer's model - Registers – Processor modes - Pipeline - Interrupts – ARM organization - ARM processor families – Instruction sets – Thumb Instruction Set: Register Usage, Other Branch Instructions, Data Processing Instructions – ARM Memory Management.

MODULE III - ARM PROCESSOR PROGRAMMING **9 Hours**

Writing and optimizing the embedded C Code – Profiling and Cycle Counting – Instruction Scheduling –Register Allocation – Conditional Execution – Looping Constructs – Bit Manipulation - Timers and counters - Watchdog timer. Programming Tools: IDE and Programmer Interface.

MODULE IV - EMBEDDED NETWORKS **9 Hours**

Distributed Embedded Architecture – Hardware and Software Architectures, Networks for embedded systems– I2C, CAN Bus, Ethernet, Internet, Network-based design– Communication Analysis, system performance Analysis, Hardware platform design, Allocation and scheduling, Design Example: Elevator Controller.

MODULE V - REAL TIME OPERATING SYSTEM (RTOS) **9 Hours**

Introduction to basic concepts of RTOS, Basics of real time & embedded system operating systems, RTOS – Interrupt handling, task scheduling; embedded system design issues in system development process – Action plan, use of target system, emulator, use of software tools.

Total No of Hours: 45

Text books:

1. Rajkamal, 'Embedded System – Architecture, Programming, Design', Tata McGraw Hill, 2003.

2. Brian Amos, "Hands-On RTOS with Microcontrollers: Building Real-time Embedded Systems Using Free RTOS, STM32 MCUs, and SEGGER Debug Tools", Thomas Learning, 1st Edition, 2020.

Reference books:

1. Yifeng Zhu, "Embedded Systems with ARM Cortex-M Microcontrollers in Assembly Language", E-Man Press LLC, 2nd Edition, 2016.
2. Andrew N. Sloss, Dominic Symes, Chris Wright, "ARM Systems Developer's Guides - Designing and Optimizing System Software", Elsevier, 2008.
3. Frank Vahid, 'Embedded System Design – A Unified Hardware & Software Introduction', John Wiley, 2002.

Course outcomes:

Upon completion of this course, students will be able to

- Remember the concepts of process and controllers.
- Apply the concepts for real-time applications.
- Create a real-time system for particular applications

*****

RAAK College of Engineering & Technology

Dr. S. SEENUVASAMURTHI, M.E., Ph.D.
PRINCIPAL
RAAK College of Engineering & Technology
No.1, Muthupillai Palayam Road,
Sulthanpet Post,
Puducherry - 605 110