BACHELOR OF ELECTRONIC ENGINEERING TECHNOLOGY (HONS) ELECTRONIC SYSTEM

PROGRAMME OBJECTIVES (PEO)

PEO 01
Electronic System Technology graduates who are competent in both technology theory and practice.

PEO 02
Electronic System Technology graduates who are able to demonstrate leadership and contribute to team success and manage projects in a multi-disciplinary environment.

PEO 03
Electronic System Technology graduates who are able to make contributions to knowledge.

PEO 04
Electronic System Technology graduates who are able to demonstrate an ethical commitment to the community.

PROGRAMME OUTCOMES (PO)

PO 01
Apply knowledge of mathematics, science, engineering fundamentals and engineering specialization principles to defined and applied engineering procedures, processes, systems or methodologies;

PO 02
Solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to their discipline or area of specialization;

PO 03
Design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns;

PO 04
Plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources;

PO 05
Select and apply appropriate techniques, resources and modern engineering tools, with an understanding of their limitations;

PO 06
Function effectively as individuals, and as members or leaders in diverse technical teams;

PO 07
Communicate effectively with the engineering community and society at large;

PO 08
Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities;
PO 09
Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices;

PO 10
Demonstrate an understanding of the impact of engineering practices, taking into account the need for sustainable development;

PO 11
Demonstrate an awareness of management, business practices and entrepreneurship and Engineering Management;

PO 12
Recognize the need for professional development and to engage in independent and lifelong learning.
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**Elective I**: PGT 334/3-Nanosystem Design OR PGT 323/3-Verification on Chip

**Elective II**: PGT 430/3-Micro-Electro-Mechanical System OR PGT 421/3-Artificial Intelligent System

**Elective III**: PGT 310/3-Digital Signal Processing OR PGT 431/3-Optoelectronic System

**TOTAL UNITS FOR GRADUATION = 142**
LIST OF COURSES FOR BACHELOR OF ELECTRONIC ENGINEERING TECHNOLOGY (HONOURS) [ELECTRONIC SYSTEM]:

PGT 101/3
Electric Circuit Principles

PGT 102/3
Engineering Science

PGT 103/3
Computer Technology

PGT 120/3
Material Engineering

PGT 105/3
Electrical Engineering Technology

PGT 104/3
Digital Electronics

PGT 106/3
C Programming

PGT 107/2
Writing in Engineering Technology

PGT 211/3
Electromagnetic Theory

PGT 201/3
Microprocessor

PGT 202/3
Analog Electronics I

PGT 207/3
Object-Oriented Programming

PGT 213/3
Analog Electronics II

PGT 206/3
Computer Architecture

PGT 220/3
VLSI Design
PGT 205/3
Signals and Systems

PGT 301/3
Communication Systems

PGT 320/3
Power Electronics

PGT 330/3
Microelectronic Fabrication Technology

PGT 331/3
Nanoelectronic Fundamental

PGT 312/3
Modern Control Systems

PGT 332/3
Semiconductor Packaging

PGT 333/3
Reliability & Failure Analysis

PGT 334/3
Nanosystem Design

PGT 323/3
Verification on Chip

PGT 420/3
Instrumentation

PGT 430/3
Micro-Electro-Mechanical System

PGT 421/3
Artificial Intelligence System

PGT 310/3
Digital Signal Processing

PGT 431/3
Optoelectronic System
PGT 300/4
Final Year Project I

PGT 400/4
Final Year Project II
COURSE SYLLABUS

DISCIPLINE CORE

PGT 101/3
Electric Circuit Principles

Course Synopsis:
This course covers introduction to the basic of electrical measurements, Ohm’s Law, Series and Parallel Circuits, Circuit Theorems and Conversions and RLC circuits. This course will expose the students to the elements and principles of electrical circuit theory with appropriate to any RLC circuit applications. The laboratory sessions will complement the theories given in a class.

References:

PGT 102/3
Engineering Science

Course Synopsis:
This course covers introduction to physic and science which are force and motion, circular motion, work, power and energy, electrostatic, magnetism and electric current and resistance. Fundamental physics is combined with problem solving and engineering skills through suitable experiments. This course will expose the students to the elements and principles of basic concepts of physics and its application.

References:

PGT 103/3
Computer Technology

Course Synopsis:
This course prepares the student to be familiar with computer hardware and software available in the market. The hardware includes CPU, memories and I/O such as monitor, keyboard and mouse. Computer software contains various Operating Systems (OS) such as Android, GNU/Linux, Microsoft and Apple based OS. Introduction to Free Open Source Software (FOSS) concept and philosophy, various applications such as Office Suite (word
processor and spread sheet) will be explained.

References:


**PGT 120/3**
**Material Engineering**

**Course Synopsis:**

The course is tailored to give students a broad introduction to material properties and limitations. The subject will cover class of material properties, measurement of the properties, and fundamental knowledge to make material selection with better properties. The common micro-structural features of different material classes will be outlined in order to relate material with its process as well as performance.

References:


**PGT 105/3**
**Electrical Engineering Technology**

**Course Synopsis:**

This course focuses on the fundamental of electrical engineering and power electronics which consists of two parts; electrical machinery and instrumentation. This course will provide the basic knowledge in power transmission, machinery, power processing devices and metering. The topics covered in this course are transformers, AC and DC machines, AC and DC meters, AC and DC bridges, AC and DC converters, and sensors & transducers.

References:

### PGT 104/3

**Digital Electronics**

**Course Synopsis:**

Introduction and discussion of fundamental of digital circuit design and analysis. The lecture and tutorial exercise covers the following topics: Boolean Algebra, Numbering System, Basic Logic Gates, Combinational Circuit Design, Timing Diagram, Bi-Stable Memory Device and Sequential Circuit Design.

**References:**


### PGT 106/3

**C Programming**

**Course Synopsis:**

This course introduces basic programming using high-level language (C language). The main objective of this course is to prepare the students with the ability of problem solving with programming, to be able to do analysis with programming tools such as flowcharts and pseudo code and then to implement them by developing C programmes.

**References:**


### PGT 107/2

**Writing in Engineering Technology**

**Course Synopsis:**

To expose the students to the common requirements and expectations of writing as an
engineering technologist; as well as to the format and techniques of writing various types of engineering technology documents.

References:


### PGT 211/3
**Electromagnetic Theory**

**Course Synopsis:**

This is the first course in Electromagnetic Field Theory at the undergraduate level. It provides basic concepts and understanding of fundamental laws of electrostatics and magnetostatics. Applications of these laws for different field configurations are also introduced. The course also introduces transmission line theory and the use of transmission lines as circuit elements. Calculation of transmission line parameters like VSWR, reflection coefficient and impedance matching using Smith’s chart is also included in this course.

References:


### PGT 201/3
**Microprocessor**

**Course Synopsis:**

The aim of this course is to study the Intel 8085 microprocessor architecture and relate that knowledge to the design of microprocessor based systems. This includes the design technique for designing memory, input and output for the systems. The study of 8085 instruction set and various software development tools are also emphasized as the knowledge are needed in the design of the microprocessor-based systems.

### PGT 202/3
**Analog Electronics I**

**Course Synopsis:**

This course exposes the student the basic knowledge in analog electronic. The exposure encompasses amplifier design based on bipolar and field effect transistors, for single and multi stage, power amplifier, frequency response analysis of amplifiers. Emphasis is placed on basic design aspects and applications. The course has been designed to provide basic analog
electronic skills covering theories and practices.

**PGT 207/3**  
**Object-Oriented Programming**

**Course Synopsis:**

This course discuss object-oriented problem solving in Java, with attention to general as well as language-specific issues including applications, event-driven programming; elements of graphical user interfaces (GUIs); inheritance and polymorphism; exception handling; packages; applets; swing.

**PGT 213/3**  
**Analog Electronics II**

**Course Synopsis:**

This course offers the students an exposure to the Operational Amplifier: Operation, differential amplifier, common-mode, parameters, basic op-amp, practical op-amp circuits, op-amp datasheet; Applications of op-amp and frequency response: Summing amplifier, Voltage follower, Comparator, Integrator, Differentiator, frequency response and compensation; Feedback Circuits: Concepts of feedback, types of feedback connection, practical feedback circuit, feedback amplifier; oscillator: Basic operating principles of an oscillator, phase shift, Wien Bridge, Crystal oscillator, uni-junction.  
Active Analog Filters: Basic filter, filter response characteristics, low-pass filter, high-pass filter, band-pass filter, band-stop filter, frequency response measurement, design of filter, Butterworth, Chebychev and Elliptic

**References:**


**PGT 206/3**  
**Computer Architecture**

**Course Synopsis:**

This course covers both the architectural and organizational aspects of computer systems. Architectural aspects of a system are defined as the features that are available to the operating system kernel such as the instruction set, data representations and peripheral interfaces. On the other hand, organizational aspects of a system are defined as the physical implementations that realize the features given for a system. These include the design of basic building blocks such as the ALU and the control unit, as well as the logic level interface of both internal and external units. This course expects the students to have a good fundamental on digital logic design (both combinatorial and sequential logic).
### VLSI Design

**Course Synopsis:**

The course provides the students an exposure on basic logic circuits design, layout design, layout simulation of integrated circuits, as well as basic integrated circuits design techniques.

**References:**


### PGT 205/3

**Signals and Systems**

**Course Synopsis:**

This course introduce student to mathematical foundation and computational tools for processing continuous-time and discrete-time signals in both time and frequency domains. Key concepts and tools introduced and discussed in this class include linear time-invariant systems, impulse response, frequency response, convolution, filtering, sampling, and Fourier transform, Laplace Transform and z-Transform. This course serves as entry and prerequisite for any higher level course in the fields of signal processing, communications, and control.

### PGT 301/3

**Communication Systems**

**Course Synopsis:**

This course will cover all the basic principles and concepts of communication system including the basic elements of communications, signal analysis, amplitude modulation, angle modulations and digital modulations, as well as transmission channels and medium. In addition, introductions to signal propagations and calculations of signal to noise ratio are also introduced to relate the students with real world applications.

### PGT 320/3

**Power Electronics**

**Course Synopsis:**

Topics covered are:
- Fundamental Concepts of Power Electronics
- Power Semiconductor Devices
- Power Electronic Circuits
- AC-DC Conversion
- AC-AC Conversion
- DC-DC Conversion
- DC-AC Conversion
References:


PGT 330/3
Microelectronic Fabrication Technology

Course Synopsis:

This course on advance fabrication technology focuses on the concept and the basics of semiconductor materials, process technology and the fabrication processes of Integrated Circuits (ICs). The students will also be exposed to the fabrication process from oxidation, photolithography, etching, e-beam lithography, diffusion, implantation, metallization and characterization.

References:


PGT 331/3
Nanoelectronic Fundamental

Course Synopsis:

Fundamentals of nanotechnology and its application to engineering systems, emphasizing basic principles, materials, measurement tools, fabrication techniques, and applications

References:


PGT 312/3
Modern Control Systems
**Course Synopsis:**

The course aims to give the student a thorough but practical understanding on the concept of control systems theory, classical control and modern control methods.

**References:**


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**PGT 332/3**

**Semiconductor Packaging**

**Course Synopsis:**

Students will be exposed to Microsystems packaging, the role of packaging in microelectronics, fundamental of IC assembly, general semiconductor process flow, advance material for nanopackaging design for reliability, thermal management, sealing and encapsulation, packaging material and processes, and latest packaging technology trend via latest scientific papers. The students will also be exposed to identifying critical packaging parameters and interpreting data of their own designed experiment. Mathematical modelings in packaging are also introduced.

**References:**


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**PGT 333/3**

**Reliability & Failure Analysis**

**Course Synopsis:**

This course is basically divided into two areas: Reliability & Failure Analysis. In the first section of reliability, students will learn the concept of reliability, its terms & definitions, the different types of reliability distributions and also the different types of reliability prediction techniques such as FMEA & FTA. In the second section of failure analysis, students will be exposed to the different types of FA techniques commonly conducted on a failed semiconductor device and the test instrumentation associated with each technique.

**References:**


**PGT 334/3**

**Nanosystem Design**

**Course Synopsis:**

Nanosystem design is an advanced nanosystem course and divided into three parts which are nanosystems design, parallel architecture and complex integrated nanosystems and nanoelectronics and nanowire. Nanosystem design part will cover the topics on basis of nanomaterials, nanoelectronic and nanoarchitectures and application of nanodevices in integrated system. In parallel architecture and complex integrated nanosystems the topics that covered are architecture principles and nanosystems as information-processing machines. Otherwise, in nanoelectronics and nanowire the topics that covered are nanoelectronics with tunneling devices, nanoelectronics with superconducting devices and basic of nanowire development and characterization.

**References:**


**PGT 323/3**

**Verification on Chip**

**Course Synopsis:**

The aim of this course is to provide the introduction of system verilog language that will be used for verification to describe a basic coverage driven, constrained random layered testbench using Object Oriented Programming (OOP).

**References:**

### Instrumentation

**Course Synopsis:**

This course covers the fundamental of electronic instrumentation. This includes the working principle and transduction properties of sensors and transducers. Importance and techniques of signal conditioning is emphasized. Element and principle of data acquisition and their applications are discussed. Modern stand-alone and computer-based measurement instruments are covered.

**References:**


### Micro-Electro-Mechanical System

**Course Synopsis:**

This course will focus on design and simulation of N/MEMS devices. The design will include several of analysis types such as structural, electrical and mechanical while the fabrication technology will focus on bulk and surface micromachining. This course will also discuss the application and technology of N/MEMS packaging in various fields.

**References:**

3. Foundations of MEMS by Chang Liu

### Artificial Intelligence System

**Course Synopsis:**

The course covers MOS characteristics, Second order effects, Basic Cells, Single stage Amplifier, Differential amplifier, MOS Op amp and Op-amp Application.

**References:**

PGT 310/3
Digital Signal Processing

Course Synopsis:

Digital Signal Processing (DSP) has continued to have a major and increasing impact in many key areas of technology including telecommunication, digital television and media, biomedicine, VLSI design etc. DSP is now at the core of many new and emerging digital products and applications in the information society and is a core subject in most electronic/computer/communication engineering curricula. This course is designed to give the students the necessary mathematical tools to analyze discrete time signals and systems. The course also includes various techniques for the design of digital filters and their implementations using DSP processors.

References:


PGT 431/3
Optoelectronic System

Course Synopsis:

The students studying this course will develop a basic understanding of the principles and practices of modern optoelectronic device includes fiber optic, semiconductor laser, photodiode and LED. The important functions for applications for these optoelectronic devices will acquire in optoelectronic system such as optical communication and display technology. Practical skills by using software in optical fiber systems and measurement will also be acquired.

References:

3. Amnon Yariv, Pochi Yeh, Photonics: Optical electronics in Modern Communications, 2007.

PGT 300/4
Final Year Project I

PGT 400/4
Final Year Project II
Course Synopsis:

This is a research project in connection with engineering technology problem and under the guidance of a faculty member. The project undertaken may fall under one of the following areas: mathematical analysis, experimental tests, computer simulation, hardware and/or software development, device fabrication. For both FYP I and II, each student prepares a comprehensive engineering report, present and demonstrate findings and results of the project work.