

Course Code	Course Name	Credits
26PH505	SPECIAL ELECTRONICS	04

### Course Objectives

- The student should be made to:
- Understand the structure of basic electronic devices.
- Be exposed to active and passive circuit elements.
- Familiarize the operation and applications of transistor like BJT and FET.
- Explore the characteristics of amplifier gain and frequency response.
- Learn the required functionality of positive and negative feedback systems.

### Learning Outcomes

After completion of the course, students will be able to:

- Explain the structure and working operation of basic electronic devices
- Able to identify and differentiate both active and passive elements
- Analyse the characteristics of different electronic devices such as diodes and transistors
- Choose and adapt the required components to construct an amplifier circuit.
- Employ the acquired knowledge in design and analysis of oscillators

### Unit 1 - Semiconductor Devices (12 Hrs.)

Semiconductor Diode: IMPATT – PNP diodes characteristics and applications - Gunn diode – construction, characteristics and applications of SCR and UJT. Optoelectronic devices: photo transistor– solar cells – photo detectors, OLED structure and working principle.

### Unit 2 – Operational Amplifiers & Applications (12 Hrs.)

Operational amplifiers – analog computation – design of Op- Amp active filters (first order only): low pass – high pass – band pass – comparators-sample and hold circuits-Instrumentation amplifier. Oscillators: Schmitt’s trigger - Wien bridge oscillator, V to I and I to V converter-DAC: design of Binary weighted –R-2R ladder- ADC: SAR method, timing circuits: 555 Timer and its applications.

### Unit 3 - Ic Fabrications And Combinational Logic Design (12 Hrs.)

Fabrications: Basic monolithic ICs - Epitaxial growth -Masking -Etching -Impurity diffusion-Fabricating monolithic resistors, diodes, transistors, inductors and capacitors - Circuit layout - Contacts and inter connections. Standard representation of logic functions (SOP and POS) - minimization Techniques - analysis of combinational logic circuits.

### Unit 4 – Microprocessor 8085 (12 Hrs.)

Microprocessor 8085 – Pin Configuration-architecture – Addressing modes - Instruction set of 8085 – Classification of instruction set based on their operations with examples – Data transfer operations – Arithmetic operations – Logical operations – Branching operations – Machine control operations - Assembly language programs: Transferring a block of data – 8 bit & 16 bit addition - 8 bit subtraction - 8 bit multiplication – 8 bit division – Square root of a number – Largest and smallest number in a array.

### Unit 5 - Microprocessor Timings (12 Hrs.)

Timing and control unit – Basic concept – The Fetch operation – The executive cycle – Machine cycle and state – Instruction and Data flow – Timing of Intel 8085, 8085 buses – Opcode fetch cycle – Memory and I/O read and write cycle – Interrupt timings – The Halt and Hold states – Register organization – General purpose register – The Stack.

### Reference Books:

1. Robert Boylestad and Louis Nashelsky. Electronic Devices and Circuit Theory, (7th edition) Prentice Hall New Jersey.
2. Jacob Millman and Christos C. Halkias. (2009). Microelectronics, (2nd edition), McGraw Hill, New Delhi.
3. Victor P. Nelson. (1995). Digital Logic Circuit Analysis and Design, Prentice Hall.
4. B.Ram, Fundamentals of Microprocessor and Microcomputers, Dhanpat Rai Publications, New Delhi, (2008).

### Websites and eLearning Sources:

1. [https://onlinecourses.nptel.ac.in/noc21\\_ee80/preview](https://onlinecourses.nptel.ac.in/noc21_ee80/preview)
2. <https://youtu.be/d2uSwLRlotY?si=V9IwASStS49Q7-uWF>
3. <https://youtu.be/xAMhX3Drq14?si=5HuvcJT08e8jw2UA>

**COs and Bloom's Taxonomy Mapping – 26PH505**

<b>Course Outcomes</b>	<b>On successful completion of this course, students will be able to</b>	<b>BTL</b>
<b>CO1</b>	Recall the structure and operation of semiconductor devices and circuits.	K1, K2
<b>CO2</b>	Apply electronic principles to analyze circuits using diodes, transistors, and op-amps.	K3
<b>CO3</b>	Analyze characteristics of electronic devices and logic circuits.	K4
<b>CO4</b>	Evaluate performance of amplifiers, oscillators, and microprocessor systems.	K5
<b>CO5</b>	Design and develop electronic circuits and embedded systems.	K6

BTL (Bloom's Taxonomy Level) - K1 – Remembering, K2 – Understanding, K3- Applying, K4 – Analyse, K5- Evaluate and K6 - Create

**Relationship Matrix – 26PH505**

<b>Course Outcomes</b>	<b>Programme Outcomes (POs)</b>						<b>Programme Specific Outcomes (PSOs)</b>						<b>Mean Score of Cos</b>
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>	<b>PSO6</b>	
<b>CO1</b>	2	2	1	1	2	1	2	2	1	1	2	1	1.67
<b>CO2</b>	3	3	2	2	2	1	2	3	2	2	2	1	2.08
<b>CO3</b>	3	3	3	2	2	1	2	3	3	2	2	2	2.33
<b>CO4</b>	3	3	3	2	2	2	2	3	3	2	3	2	2.50
<b>CO5</b>	3	3	3	3	3	2	3	3	3	3	3	2	2.75
<b>Total</b>													2.27

Mean Score: 3- High, 2- Medium/Moderate, 1-Low

