



# C.U. SHAH UNIVERSITY – WADHWANCITY

**FACULTY OF:** - Technology & Engineering

**DEPARTMENT OF:** - CE/IT/EC/MECH/EEE/AUTO/IC/EE/CIVIL

**SEMESTER:** - II                      **CODE:** - 4TE02APH1

**NAME – Applied Physics (APH)**

## Teaching & Evaluation Scheme:-

Subject Code	Subject Name	Teaching Schemes (Hours)				Credits	Evaluation Schemes							
		Th	Tu	Pr	To		Theory				Practical (Marks)		Total	
							Sessional Exam		University Exam		Pr	TW		Pr
							Marks	Hours	Marks	Hours				
4TE02APH1	Applied Physics (APH)	03	00	02	05	04	30	1.5	70	3.0	30	20	---	150

### Objectives: -

- This course provides information about the Semiconductor Physics, Junction Diode, Diode Circuits, Bipolar Junction Transistor, Field Effect Transistors, LASER and Optical Fiber Communication and Electronic Instruments.
- This can be used to develop the design of electronic circuit.

**Prerequisites:** Basic concepts of physics is essential

### Course Outlines: -

Sr. No.	Course Contents	Hrs
1	<b>Semiconductor Physics:</b> Crystalline material: mechanical properties, energy band theory, Fermi levels, Conductors, Semiconductors and Insulators: electrical properties, band diagrams. Semiconductors: intrinsic and extrinsic, energy band diagram, electrical conduction phenomenon, P-type and N-type semiconductors, drift and diffusion carriers, mass action law and continuity equation.	08
2	<b>Junction Diode:</b> Formation of P-N junction, Energy band diagram, Built-in-potential forward and reverse biased P-N junction, formation of depletion zone, V-I characteristics, Junction diode switching times, Zener breakdown, Avalanche breakdown and its reverse characteristics, junction capacitance and Varactor diode, Tunnel Diode, Photodiode and LED.	08
3	<b>Diode Circuits:</b> Simple diode circuits, load line, linear piecewise model; rectifiers: half wave, full wave and bridge, its PIV, DC voltage and current, ripple factor, efficiency, Clipper and Clamper circuits, Capacitor filters.	06
4	<b>Bipolar Junction Transistor:</b> Junction Transistor, Transistor Current Components, Transistor as an Amplifier, Transistor Construction, CB Configuration, CE Configuration, CE Cut-off region, CE Saturation Region, Typical Transistor, CE current Gain, CC Configuration, Analytical Expressions for Transistor Characteristics, Maximum Voltage Rating, Phototransistor, Operating Point, Bias Stability, Three types of biasing methods, Calculation of different stability factors.	08



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<b>5</b>	<b>Field Effect Transistors:</b> Junction FET, Pinch-Off Voltage, JFET Volt-Ampere Characteristics, MOSFET: enhancement and depletion type and their characteristics, CS configuration, CG configuration, CD configuration, Biasing the FET, The FET as a Voltage Variable Resistor.	<b>07</b>
<b>6</b>	<b>LASER and Optical Fiber Communication:</b> Introduction and properties of LASER, Stimulated and spontaneous emission, relation between Einstein's 'A' and 'B' coefficients, population inversion, optical pumping, Nd Yag LASER and CO2 LASER, Holography, application LASER, Introduction of optical fiber communication, Optics systems, Advantages of fiber optics, Basic principles, Acceptance angle Numerical Aperture, Types of optical fibers, application of OFC	<b>08</b>

### **Learning Outcomes: -**

This subject develops and applies the fundamentals of electronic technology in order to develop the understanding of electronic devices that are part of the technologies that surround us.

- Identify the applications and functions of electronics in Engineering.
- Recognized basic electronic components and devices used for different electronic functions.
- Be able to use basic techniques for analysing analogue and digital electronic circuits.
- Be able to design analogue and digital electronic circuits at block level.
- Be able to manage the tools in a basic electronics laboratory and use electronic simulation tools.

### **Books Recommended:-**

- 1 *Electronic Devices and Circuits, Allen Mottershead, PHI Publication.*
- 2 *"Principles of Electronics", Mehta V. K. & Mehta Rohit, S. Chand & Co. Ltd.*
- 3 *"Basic of Electronics", De Debashis, Pearson Education.*
- 4 *"Electronic Devices & Circuit Theory", Boylestad Robert L. & Nashlesky Louis, PHI Publication, 9th edition.*
- 5 *"Electronics Devices", Thomas L. Floyd, Pearson Education.*