Applications various semiconductor devices in science and technology will be discussed.

10.Details of Course:

S.No.	Contents	Contact Hours
1.	**Introduction to the Quantum theory of solids:** Allowed and forbidden Energy bands, Electrical conduction in solids, density of state function, Semiconductor in Equilibrium: Equilibrium carrier concentration, Intrinsic semiconductor, Extrinsic semiconductor, Position of Fermi energy level.	10
2.	**Carrier transport phenomenon:** Random motion, Drift and diffusion, Graded Impurity distribution, Excess carriers: Injection level, Lifetime, Direct and indirect semiconductors, P-N Junction: Device structure and fabrication, Equilibrium picture, DC forward and reverse characteristics, Small-signal equivalent circuit, Generation – Recombination currents, Junction Breakdown, Tunnel diode.	12
3.	**Bipolar Junction Transistor:** History, Device structures and fabrication, Transistor action and amplification, low frequency, common- base current gain, Small-signal Equivalent circuit, Ebers-Moll model MOS Junction: C-V characteristics, threshold voltage, body effect Metal Oxide Field Effect Transistor: History, Device structures and fabrication, Common source DC characteristics.	10
4.	Small-signal equivalent circuit, Differences between a MOSFET and a BJT Junction FET and MESFET: Basic pn JEFT & MESFET operation, Device characteristics, Recent Developments: Hetero-junction FET, Hetro-junction bipolar transistor Optical Devices: Solar Cells, Photodectectors, LEDs.	10
	Total	**42**

11.Suggested Books

S.No.	Name of Books/ Authors	Year of Publication/ Reprint
1.	Solid State Electronic Devices by Ben G. Streetman , Wiley Eastern	1970
2.	Physics of Semiconductor Devices by Michael Shur, Prentice Hall	1980
3.	Introduction to Solid State Physics by Kittel, Wiley	1986
4.	Integrated Electronics by Millman and Halkias, Wiley	1987
5.	Semiconductor Physics and Devices by Donald A.Neamen, Mc Graw Hill	1985

1. Subject Code: EP 303 Course Title: Electromagnetic Theory, antennas and Propagation
2. Contact Hours: L: 3 T: 0 P: 2
3. Examination Duration (Hrs.) Theory: 3 Practical: 0
4. Relative Weight: CWS: 15 PRS:15 MTE: 30 ETE: 40 PRE: 0
5. Credits: 4
6. Semester: ODD

7. Subject Area: DCC
8. Pre-requisite: NIL
9. Objective: To familiarize the student with the concept of propagation electromagnetic wave in a transmission line, Maxwell's equations, Antennas and wave propagation.
10. Details of Course:
5th Semester

Sl. No.	Contents	Contact Hours
1.	Maxwell's equations, constitutive relations, wave equation, plane wave functions	04
2.	Rectangular waveguide, circular waveguide, dielectric slab waveguide	03
3.	Surface guided waves, characteristics of TM and TE modes, Impossibility of TEM waves in waveguides, wave impedances	04
4.	Characteristic impedance, excitation of modes, cutoff wavelength and phase velocity	02
5.	Cavities and power losses	02
6.	Transmission lines: transmission line equation in time and frequency domain, losses and dispersion, reflection from an unknown load; quarter wavelength, single stub and double stub matching; Smith Chart and its applications.	04
7.	distortion – distortion less transmission line – The telephone cable – Inductance loading of telephone cables. Input impedance of lossless lines – reflection on a line not terminated by Zo - Transfer impedance – reflection factor and reflection loss.	02
8.	Introduction to Antennas, Antenna parameters: Radiation intensity. Directive gain. Directivity. Power gain. Beam Width. Band Width. Gain and .radiation from simple dipole and aperture, horn antenna, microstrip antenna, parabolic disc antenna.	04
9..	Concept of antenna arrays, end fire and broadside arrays, Expression for electric field from two and three element arrays. Uniform linear array. Method of pattern multiplication. Binomial array.	03
10.	Use of method of images for antennas above ground.	02
11.	Basic types of propagation; ground wave, space wave and sky wave propagation. Sky wave propagation: Structure of the ionosphere	02
12.	Effective dielectric constant of ionized region. Mechanism of refraction. Refractive index. Critical frequency. Skip distance. Maximum usable frequency. Fading and Diversity reception.	03
13.	Space wave propagation: Reflection from ground for vertically and horizontally polarized waves. Reflection characteristics of earth. Resultant of direct and reflected ray at the receiver.	04
14.	Duct propagation. Ground wave propagation: Attenuation characteristics for ground wave propagation. Calculation of field strength at a distance.	03
	Total	42

11.Suggested Books:

S.No.	Name of Books/ Authors	Year of Publication/ Reprint
1.	Advanced Engineering and Electromagnetics By C.A.Balanis.	2012
2.	Antennas and Wave Propagation by J.D.Kraus, R.J.Marhefka and A.S.Khan	2014
3.	Electromagnetics for Engineers by S.E.Schwarz	1990
4.	Introduction to Electrodynamics by David J.Griffiths	2012
5.	Electromagnetic Waves and Radiating Systems by E.C. Jordan & K.G. Balmain	1964