SEMESTER - IV						
Sl. No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**C**
1	PH 304	Statistical Physics	2	1	0	6
2	EE 229	Electronic Devices (Post mid-sem)	3	0	0	3
3	EE 204	Digital Systems	2	1	0	6
4	CS 301	Computer Architecture	2	1	0	6
5	ME 201	Engineering Mechanics	2	1	0	6
6	PH 212	General Physics Laboratory	0	0	3	3
7	EE 214	Digital Circuits Laboratory	0	0	3	3
8	CS 311	Computer Architecture Lab	0	0	3	3
	Fourth Semester Total Credits					39
	Total Cumulative Credits after 2nd Year					149

1	**Title of the course (L-T-P-C)**	**Statistical Physics** **(2-1-0-6)**
2	**Pre-requisite courses(s)**	**None**
3	**Course content**	Thermodynamics: Thermal equilibrium, the laws of thermodynamics; temperature, energy, entropy, and other functions of state. Probability Theory: Probability densities, cumulants and correlations; central limit theorem; laws of large numbers. Kinetic Theory: Phase space densities; Liouville's theorem, the Boltzmann equation; transport phenomena. Classical Statistical Mechanics: Postulates; microcanonical, canonical and grand canonical ensembles; Gibb's paradox, non-interacting examples. Maxwell Boltzmann distribution, ideal gas. Quantum Statistical Mechanics: Indistinguishability, Bose-Einstein and Fermi- Dirac distributions and Applications Interacting Systems: Virial and cluster expansions; van der Waals theory; liquid- vapor condensation. Quantization effects in molecular gases; phonons, photons; density matrix formulation. Identical Particles: Degenerate quantum gases; Fermi liquids; Bose condensation; superfluidity. .
4	**Texts/References**	**1.** Huang, Kerson. Statistical Mechanics. 2nd ed. Wiley, 1987. **2.** Baierlein, Thermal Physics (Cambridge University Press, 1999). **3.** Pathria, R. K. Statistical Mechanics. Pergamon Press, 1972. **4.** Ma, Shang-keng. Statistical Mechanics. Translated by M. K. Fung. World Scientific Publishing Company, 1985. **5.** J. K. Bhattacharjee, Statistical Physics: Equilibrium and Non-Equilibrium Aspects, Allied Publishes, 2000 **6.** F. Reif, Fundamentals of Statistical and Thermal Physics Statistical Physics: Amit and Verbin, Word Scientific, 1999

1	**Title of the course (L-T-P-C)**	**Electronic Devices (3-0-0-3)**
2	**Pre-requisite courses(s)**	EE 102
3	**Course content**	• Introduction of Semiconductor Equations: Fermi-Dirac Distribution, Boltzmann's approximation • Semiconductor Diodes: Barrier formation in metal- semiconductor junctions, PN homo- and hetero- junctions; CV characteristics and dopant profiling; IV characteristics; Small signal models of diodes; Some Applications of diodes. • Field Effect Devices: JFET/HFET, MIS structures and MOSFET operation; JFET characteristics and small signal models; MOS capacitor CV and concept of accumulation, depletion, and inversion; MOSFET characteristics and small signal models. Bipolar transistors: IV characteristics and Elers-Moll model; small signal models; Charge storage and transient response
4	**Texts/References**	**1.** D. A. Neamen, Semiconductor Physics and Devices, 4e Edition, McgrawHill, 13th reprint, 2016. **2.** E.S. Yang, Microelectronic Devices, McGraw Hill, Singapore, 1988. **3.** B.G. Streetman, Solid State Electronic Devices, 7th Edition, Pearson, 2016. **4.** J. Millman and A. Grabel, Microelectronics, II edition 34th reprint McGraw Hill, International, 2017. **5.** A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder's College Publishing, 1991. **6.** R.T. Howe and C.G. Sodini, Microelectronics: An integrated Approach, Prentice Hall International, 1997.

1	**Title of the course** (L-T-P-C)	**Digital Systems** **(2-1-0-6)**
2	**Pre-requisite courses(s)**	None
3	**Course content**	• Introduction to Digital Systems • Number systems and Logic: Number Systems, Different Codes, Boolean logic, basic gates, truth tables • Introduction to Logic families: TTL, CMOS etc. • Boolean Algebra: Laws of Boolean Algebra, logic minimization using K maps • Combinational Logic Circuits: Adders, Subtractors, Multipliers, MSI components like Comparators, Decoders, Encoders, MUXs, DEMUXs • Sequential circuits: Latches, Flipflops, Analysis of clocked sequential circuits, Registers and Counters (Synchronous and Asynchronous), State Machines • Introduction to Hardware Description Languages • Array based logic elements: Memory, PLA, PLD, FPGA Special Topics: Asynchronous State machines, Testing and Verification of Digital Systems
4	**Texts/References**	1. J. F. Wakerly: Digital Design, Principles and Practices,4th Edition,Pearson Education, 2005 2. M. Moris Mano; Digital Design, 4th Edition, Pearson,2009 3. Ronald J. Tocci; Digital System, Principles and Applications, 10th Edition, Pearson, 2009 4. H.Taub and D. Schilling; Digital Integrated Electronics, McGraw Hill, 1977 Charles H Roth; Digital Systems Design using VHDL, Thomson Learning, 1998.

1	**Title of the course (L-T-P-C)**	**Computer Architecture (3-0-0-6)**
2	**Pre-requisite courses(s)**	--
3	**Course content**	The Language of Bits, Assembly Language, Logic Gates, Registers, and Memories, Processor Design, Principles of Pipelining, The Memory System, Multiprocessor Systems, I/O and Storage Devices. Each concept will be first taught on the basis of the fundamental driving principles. Following this, real world examples (e.g., ARM processors) will be used to emphasize the content. .
4	**Texts/References**	**1.** Computer Organization and Architecture, by SmrutiRanjan Sarangi, McGraw Higher Ed, 2017. **2.** Computer Architecture A Quantitative Approach, Sixth edition, by David Patterson and John L. Hennesy,Morgan Kaufmann, 2017.

1	**Title of the course (L-T-P-C)**	**Computer Architecture Laboratory (0-0-3-3)**
2	**Pre-requisite courses(s)**	--
3	**Course content**	The lab will closely follow the theory course. The idea isto have the students develop a software model of a simple processor, capturing both functionality and timing aspects. They will implement modules as the concepts aretaught in class.
4	**Texts/References**	Nil