SEMESTER - IV						
Sl. No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**C**
1	PH 202	Classical Mechanics	2	1	0	6
2	PH 212	General Physics Laboratory	0	0	3	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	EE 212	Devices and Circuits Laboratory	0	0	3	3
7	EE 214	Digital Circuits Laboratory	0	0	3	3
8	CS 311	Computer Architecture Laboratory	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)	Classical Mechanics **(2-1-0-6)**
2	**Pre-requisite courses(s)**	Nil
3	**Course content**	Review of Newtonian Mechanics - Newton's Laws of Motion and Conservation Laws. Principles of Canonical Mechanics - Constraints and generalized coordinates, Alembert's principle, Lagrange's equation, Hamilton's variational principle, canonical systems, symmetries and conservation laws, Noether's theorem, Liouville's Theorem. Central Force: Equations of motion Virial Theorem, Kepler's Laws, Scattering in a Central Force Field. Rigid Body: Euler angles, Coriolis Effect, Euler equations, moment of inertia tensor, motion of asymmetric top. Small Oscillations: Eigen value problem, frequencies of free vibrations and normal modes, forced vibration, dissipation. Special Theory of Relativity: Newtonian relativity, Michelson-Morley experiment, Special theory of relativity, Lorentz transformations and its consequences, addition of velocities, variation of mass with velocity, mass-energy relation, Minkowski four-dimensional continuum, four vectors. Hamiltonian Equation, Gauge transformation, canonical transformation, Infinitesimal transformation, Poisson brackets, Hamilton-Jacobi equations, Separation of variables. Lagrangian and Hamiltonian formulation of continuous systems.
4	**Texts/References**	1. Classical Mechanics: H. Goldstein, C. P. Poole, and J. Safko, Pearson 2011. 2. Classical Mechanics: N. C. Rana and P. S. Joag, Tata McGraw Hill, 2017. 3. Introduction to Classical Mechanics: David Morin, Cambridge University Press, 2008. 4. Mechanics: L.D. Landau and E. M. Lifshitz, Butterworth- Heinemann, 3rd edition, 1982. 5. Mechanics: From Newton's Laws to Deterministic Chaos, F. Scheck, Springer, 5th edition, 2010. 6. Introduction to Classical Mechanics, R G Takwale and P S Puranik, Tata McGraw Hill, 2008.

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