

B. Tech. II (CSE), Semester - III	L	T	P	C
CS 301 : Computer Architecture & Organisation	3	0	2	4

INTRODUCTION	(02 Hours)
Number System and Representation of information, Arithmetic and Logical Operation and Hardware Implementation, Software Implementation of Some Complex Operation.	(03 Hours)
Arithmetic and Logic Unit, Introduction to Memory Unit, Control Unit and Instruction Set, Working with an ALU.	(03 Hours)
Concepts of Machine Level Programming, Assembly Level Programming and High Level Programming.	(03 Hours)
Various Addressing Modes and Designing of an Instruction Set.	(03 Hours)
Concepts of Subroutine and Subroutine call and return.	(03 Hours)
Introduction to CPU design, Instruction Interpretation and Execution.	(03 Hours)
MEMORY	(06 Hours)
Concepts of Semiconductor Memory, CPU-memory Interaction, Organization of Memory modules, Cache Memory and Related Mapping and Replacement Policies, Virtual Memory.	
INPUT- OUTPUT	(08 Hours)
Introduction to Input/Output Processing, Working with Video Display Unit and Keyboard and routine to control them, Programmed Controlled I/O transfer, Interrupt Controlled I/O transfer, DMA Controller, Secondary Storage and type of storage devices, Introduction to buses and connecting I/O devices to CPU and memory.	
INTRODUCTION TO ASIC, FPGA, VHDL, HDL CONCEPTS	(08 Hours)
Practicals will be based on the coverage of the above topics separately.	(28 Hours)
(Total Contact Hours: 42 + 28 = 70)	

BOOKS RECOMMENDED
<ol style="list-style-type: none"> 1. John L. Hannessy, David A. Patterson, "Computer Organization and Design", 2nd Edition, Morgan Kaufmaan, reprint-2003. 2. A. S. Tanenbaum, "Structured Computer Organization", 6th Edition, PHI, reprint 1995. 3. W. Stallings, "Computer Organization & Architecture : Designing For Performance", 6th Edition, PHI, 2002. 4. C. Hamacher, Z. Vranesic and S. Zaky, "Computer Organization", 5th Edition, McGraw-Hill, 2001. 5. M. Mano, "Computer Systems Architecture", 3rd Edition, PHI, reprint 1997.

B. Tech. II (CSE), Semester - III	L	T	P	C
EC 302 : MICROPROCESSOR AND INTERFACING	3	0	2	4

OVERVIEW OF 8-BIT 8085 MICROPROCESSOR	(07 Hours)
Introduction to 8-Bit 8085 Microprocessor Architecture, Operation, Memory Interfacing, Interfacing I/O Devices.	
INTRODUCTION TO 16-BIT 8086 MICROPROCESSOR	(07 Hours)
Architecture of 8086 Microprocessors, Software models of 8086 Microprocessors, Memory address space & Data organization, Segment registers & Segmentation.	
ASSEMBLY LANGUAGE PROGRAMMING OF 8086	(14 Hours)
8086 Programming- Integer instructions, Flag-Control instructions, Compare instructions, Control Flow instructions, Jump instructions, Subroutines & Subroutines handling instructions, Loops & Loop handling instructions, String Handling Instructions.	
INTERFACING WITH 8086 MICROPROCESSOR	(14 Hours)
Minimum mode and Maximum mode systems, Hardware organization of the memory address space, Memory Interface circuits: Interfacing with RAMs, ROMs along with the explanation of timing diagrams. Interfacing with peripheral ICs like 8255, 8254, 8279, 8259, 8259 etc. Interfacing with key boards, LEDs, LCDs, ADCs, and DACs etc.	
Practicals will be based on the coverage of the above topics separately.	(28 Hours)
(Total Contact Hours: 42 + 28 = 70)	

BOOKS RECOMMENDED
<ol style="list-style-type: none"> 1. Gaonkar R. S., "Microprocessor Architecture, Programming and Applications with 8085", Penram International, Indian 5th Edition, 2002. 2. Douglas Hall , "Microprocessors Interfacing ",Tata McGraw Hill, 2nd Edition, 1991. 3. Walter A. Triebel, Avtar Singh, "The 8088 and 8086 Microprocessors, Programming, Interfacing, Hardware and Applications", PHI Pvt. Ptd, 4th Edition, 2002. 4. Ram B., "Fundamental of Microprocessor & Microcomputers", Dhanpat Rai Publications, 6th Edition, 2003. 5. Kenneth Ayala, "The 8086 Microprocessor: Programming & Interfacing the PC", 2007.

B. Tech. II (CSE), Semester - III	L	T	P	C
EC 303 : COMMUNICATION ENGINEERING	3	0	2	4

ANALYSIS AND TRANSMISSION OF SIGNALS	(06 Hours)
Aperiodic signal representation by Fourier integral, Transmission of some useful functions and its Fourier Series, Some properties of the Fourier Transform used in communication, Signal transmission through a linear system, Ideal versus practical filter, Signal distortion over a communication channel, Signal energy and energy spectral density, Signal power and power spectral density.	
NOISE AND CHANNEL	(06 Hours)
Various types of noise: Internal(Shot, Thermal, Agitation, Transit time) Noise and External(Atmospheric, Extra-Terrestrial, Industrial) Noise, Available power, White noise and Filtered noise, AWGN Properties, Noise Equivalent Bandwidth concept, Signal to Noise Ratio, Wired and Wireless Channel, Cables, Properties and behaviour.	
AMPLITUDE MODULATION AND DEMODULATION	(08 Hours)
Baseband vs Carrier communications, DSB-C and DSB-SC Amplitude Modulation, Bandwidth efficient AM: SSB, Vestigial Sideband(VSB) Transmission, Local Carrier Synchronization, Frequency Division Multiplexing, Phase Locked Loop and some applications. Amplitude Modulators and Demodulators.	
ANGLE MODULATION AND DEMODULATION	(08 Hours)
Nonlinear Modulation, Bandwidth of Angle Modulated waves, Generating FM waves, Demodulation of FM signals, Effects Of Nonlinear Distortion and Interferences, FM Modulators and Demodulators, Super-Heterodyne Analog AM/FM Receivers, FM broadcasting system.	
PULSE MODULATION TECHNIQUES	(04 Hours)
Pulse Amplitude Modulation, Pulse Position Modulation, Pulse Width Modulation.	
RANDOM PROCESS AND SPECTRAL ANALYSIS	(10 Hours)
From Random Variables to Random Process, Classification of Random Process, Wide Sense Stationary processes, Power Spectral Density, Multiple Random Process, Transmission of Random Process through linear system, Application of optimum filtering, Application of performance analysis of baseband analog systems in presence of noise, Applications of optimum preemphasis - Deemphasis systems.	
Practicals will be based on the coverage of the above topics separately.	(28 Hours)
(Total Contact Hours: 42 + 28 = 70)	

BOOKS RECOMMENDED
<ol style="list-style-type: none"> 1. Lathi B. P., and Ding Zhi, "Modern Digital And Analog Communication Systems", Oxford University Press, 4th Edition, 2010. 2. Proakis J. and Salehi M., "Fundamental Of Communication Systems", PHI/Pearson Education-LPE, 2nd Edition, 2006. 3. Sharma Sanjay, "Communication System - Analog and Digital", S. K. Kataria& Sons, 3rd Edition, 2005. 4. Carlson Bruce A., "Communication Systems- An Introduction To Signal And Noise In Electrical Communication", McGraw-Hill, 5th Edition, 2009. 5. Leon W. Couch, "Digital And Analog Communication Systems", Pearson Education-LPE, 6th Edition, 2004. 6. Taub Herbert and Donald Schilling, "PrinciplesOf Communication Systems", Tata McGraw-Hill, 2nd Edition, 2005.

B. Tech. II (CSE), Semester - III	L	T	P	C
CS 304: Automata and Formal Languages	3	1	0	4

INTRODUCTION	(02 Hours)
Basic Mathematical Objects: Sets, Logic, Functions, Relations, Strings, Alphabets, Languages; Mathematical Induction: Inductive proofs, Principles; Recursive Definitions; Set Notation.	
FINITE AUTOMATA AND REGULAR EXPRESSIONS	(12 Hours)
Finite State systems, Regular Languages & Regular Expressions, Deterministic Finite Automata; Nondeterministic Finite Automata, Kleene' Theorem; Two-way Finite Automata, Finite Automata with output, Properties of Regular Sets: The Pumping Lemma for Regular sets, Closure properties, Decision properties of regular languages, Equivalence and minimization of Automata.	
CONTEXT FREE GRAMMARS	(14 Hours)
Definition, Derivation trees & Ambiguity, Inherent ambiguity, Parse tree, Application of CFG, Simplification of CFG, Normal form of CFG, Chomsky Normal form and Chomsky Hierarchy, Unrestricted grammars, Context-sensitive languages, Relations between classes of languages, Properties of Context Free Languages: The Pumping Lemma, Closure properties, Decision properties of CFL.	
PUSHDOWN AUTOMATA	(04 Hours)
Definitions, Languages of PDA, Equivalence of PDA and CFG , Deterministic PDA.	
TURING MACHINES	(07 Hours)
Turing Machine Model, Language of a Turing Machine, Programming techniques of the TM, Variations of TM (Multiple TM, One-tape and Multi-tape TM etc.), Deterministic and Non Deterministic TM, Universal TM, Church thesis, Recursively Enumerable Languages.	

COMPUTATIONAL COMPLEXITY	(08 Hours)
Time and Space Complexity, Growth Rate, Complexity classes, Tractable and Non tractable Problems: P and NP, Cooks's theorem.	
Tutorials will be based on the coverage of the above topics separately.	(14 Hours)
(Total Contact Hours: 42 + 14 = 56)	

BOOKS RECOMMENDED
<ol style="list-style-type: none"> 1. John E. Hopcroft, Rajeev Motwani, Jeffrey Ullman: "Introduction to Automata theory, languages computation, 3rd Edition, Pearson India, 2008. 2. John C Martin, "Introduction to Languages & the Theory of Computation", 3rd Edition, Tata McGraw-Hill, 2011. 3. Daniel I.A. Cohen, "Introduction to Computer Theory", John Wiley & Sons, 2nd Edition, Reprint 2008. 4. A. M. Natarajan, A. Tamilarasi, "Theory of Computation", New Age Publication, 1st Edition, 2003. 5. Sushil Kumar Azad, "Theory of Computation, An introduction to Automata, Formal Languages and Computability", Dhanpat Ray & Co., New Delhi, 2005. 6. Andrew Ilachinski, "Cellular Automata", World Scientific, 2001. 7. Michael Sipser, "Introduction to the Theory of Computation", Cengage Learning, 3rd Edition, 2013.

B. Tech. II (CSE), Semester - III	L	T	P	C
AS 305 : PROBABILITY AND STATISTICAL ANALYSIS	3	1	0	4

PROBABILITY	
Axiomatic definition, Properties, Conditional probability, Bayes rule and independence of events.	(03 Hours)
Random Variable: Random Variables, Distribution function, Discrete and Continuous random variables, Probability mass and density functions, Expectation, Function of random variable, Moments, Moment generating function, Chebyshev's inequality.	(06 Hours)

Special Discrete Distributions: Bernoulli, Binomial, Geometric, Negative binomial, Hypergeometric, Poisson, Uniform. Special continuous distributions: Uniform, Exponential, Gamma, Normal, Weibull, Reyleigh. Random vector: Joint distributions, Marginal and conditional distributions, Moments, Independence of random variables, Covariance, Correlation, Functions of random variables. Law of Large Numbers: Weak law of large numbers, Levy's Central limit theorem (i.i.d. finite variance case), Normal and Poisson approximations to Binomial.	(16 Hours)
STATISTICS	
Introduction: Population, Sample, Parameters.	(03 Hours)
Point Estimation: Method of moments, Maximum likelihood estimation, Unbiasedness, Consistency.	(04 Hours)
Interval Estimation: Confidence interval.	(02 Hours)
Tests of Hypotheses: Null and Alternative hypothesis, Type-I and Type-II errors, Level of significance, p-value, Likelihood ratio test, Chi-square goodness of fit tests. Regression Problem: Scatter diagram, Simple linear regression, Least square estimation, Tests for slope, prediction problem, Graphical residual analysis, Q-Q plot to test for normality of residuals.	(08 Hours)
Tutorials will be based on the coverage of the above topics separately.	(14 Hours)
(Total Contact Hours: 42 + 14 = 56)	

BOOKS RECOMMENDED
<ol style="list-style-type: none"> 1. Sheldon Ross, "A First Course in Probability", 8th edition, Pearson Prentice Hall, 2009. 2. V. K. Rohatgi and A. K. Saleh, "An Introduction to Probability and Statistics", 2nd Edition, Wiley-interscience, 2000. 3. R. Hogg, J. McKen and A. Craig, "Introduction to Mathematical Statistics", Pearson, 2012. 4. S. M. Ross, "Introduction to Probability and Statistics for Engineers and Scientists", 5th Edition, Academic Press, 2014. 5. K. S. Trivedi, "Probability and Statistics with Reliability, Queuing and Computer Science Applications", 2nd Edition, Wiley India Private Limited, 2008. 6. A. M. Mood, F. A. Grabill and D. C. Boes, "Introduction to the Theory of Statistics", 3rd Edition, McGraw Hill, 1974. 7. D. P. Bertsekas and J. N. Tsitsiklis, "Introduction to Probability", 2nd Edition, Athena Scientific, 2008.

B. Tech. II (CSE), Semester - III	L	T	P	C
CS 306: ICT WORKSHOP - II	0	0	4	2

ADVANCED SERVER PROGRAMMING	(28 Hours)
HTML, CSS, Java Script, PHP, MySQL	
ADVANCED SCIENTIFIC PROGRAMMING	(28 Hours)
Numerical toolbox, Symbolic Toolbox, DSP Toolbox, Simulink	
(Lab Practice/Assignments of 56 Hours)	

BOOKS RECOMMENDED
<ol style="list-style-type: none"> 1. I. Bayross, "Web enabled commercial application development using HTML, DHTML, JavaScript, PERL CGI", BPB Publications, 2009. 2. D. W. Mercer, A. Kent, S. D. Nowicki, D. Mercer, D. Squier and W. Choi, "Beginning PHP5", 1st Edition, Wrox, 2004. 3. S. Holzner, "Complete Reference PHP", McGraw Hill Education, 2017. 4. M. Glass, Y. Scouarnec, E. Naramore, G. Mailer, J. Stolz and J. G. Gerner, "Beginning PHP, Apache, MySql Web Development", Wrox, 2004. 5. Reference websites suggested by Subject Coordinator.