

B.TECH. II Semester-3	L	T	P	C
CS 301: Computer Architecture & Organization	3	0	2	4

Instruction Set Architecture, Basic Input/Output, Software	10 Hours
<p><u>Instruction Set Architecture</u>: Memory Locations and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Assembly Language, Stacks, Subroutines, Additional Instructions, Dealing with 32-Bit Immediate Values, CISC Instruction Sets, RISC and CISC Styles, Example Programs, Encoding of Machine Instructions, Concluding Remarks</p> <p><u>Accessing I/O Devices</u>: I/O Device Interface, Program-Controlled I/O, An Example of a RISC-Style I/O Program, An Example of a CISC-Style I/O Program</p> <p><u>Interrupts</u>: Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling I/O Device Behavior, Processor Control Register, Example of Interrupt Programs, Exceptions. Concluding Remarks</p> <p><u>Software</u>: The Assembly Process, Loading and Executing Object Programs, The Linker, The Compiler, The Debugger, Using a High-Level Language for I/O Tasks, Interaction between Assembly Language and C Language, The Operating System, Concluding Remarks</p>	
Basic Processing Unit, Pipelining	10 Hours
<p><u>Basic Processing Unit</u>: Some Fundamental Concepts, Instruction Execution, Hardware Components, Instruction Fetch and Execution Steps, Control Signals, Hardwired Control, CISC-Style Processors, Concluding Remarks</p> <p><u>Pipelining</u>: Basic Concept - The Ideal Case, Pipeline Organization, Pipelining Issues, Data Dependencies, Memory Delays, Branch Delays, Resource Limitations, Performance Evaluation, Superscalar Operation, Pipelining in CISC Processors, Concluding Remarks</p>	
Input/Output Organization, The Memory System	10 Hours
<p><u>Input/Output Organization</u>: Bus Structure. Bus Operation: Synchronous Bus, Asynchronous Bus, Electrical Considerations. Arbitration. Interface Circuits: Parallel Interface, Serial Interface</p> <p><u>Interconnection Standards</u>: USB, FireWire, PCI Bus, SCSI Bus, SATA, SAS, PCI Express. Concluding Remarks</p> <p><u>The Memory System</u>: Basic Concepts, Semiconductor RAM Memories, Read-only Memories, Direct Memory Access, Memory Hierarchy, Cache Memories, Performance Considerations, Virtual Memory, Memory Management Requirements, Secondary Storage, Concluding Remarks</p>	
Arithmetic, Parallel Processing and Performance	12 Hours
<p><u>Arithmetic</u>: Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Unsigned Numbers, Multiplication of Signed Numbers, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations, Decimal-to-Binary Conversion, Concluding Remarks</p> <p><u>Parallel Processing and Performance</u>: Hardware Multithreading, Vector (SIMD) Processing, Shared-Memory Multiprocessors, Cache Coherence, Message-Passing Multicomputers, Parallel Programming for Multiprocessors, Performance Modeling, Concluding Remarks</p>	
Total Contact Time: 42 Hours	

Recommended Books
<ol style="list-style-type: none"> 1. C. Hamacher, Z. Vranesic and S. Zaky, "Computer Organization and Embedded Systems", 6th Edition, McGraw-Hill, 2001. 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. "Digital Logic and Computer Design", Mano Morris, 3rd Edition, Pearson Education, 2005. 5. M. Mano, "Computer Systems Architecture", 3rd Edition, PHI, reprint 1997. 6. John L. Hannessy, David A. Patterson, "Computer Organization and Design", 2nd Edition, Morgan Kaufmaan, reprint-2003.

B.TECH. II Semester-3	L	T	P	C
EC 302: Microprocessor & Interfacing	3	0	2	4

Microprocessor - Based Systems: Hardware and Interfacing	10 Hours
<p>Microprocessors, Microprocessor Instruction Set and Computer Languages, From Large Computers to Single Chip Microcontrollers, Application: Microprocessor-Controlled Temperature System (MCTS)</p> <p>The 8085 Programming Model, Instruction Classification, Instruction, Data Format, and Storage, How to Write, Assemble, and Execute a Simple Program, Overview of the 8085 Instruction Set, Writing and Hand Assembling a Program</p> <p>Microprocessor Architecture and Its Operations, Memory, Input and Output (I/O) Devices, Example of a Microcomputer System, Microprocessor-Based System Application (MCTS)</p> <p>The 8085 MPU, Example of an 8085-Based Microcomputer, Memory Interfacing</p> <p>Basic Interfacing Concepts, Interfacing Output Displays, Interfacing Input Devices, Memory-Mapped I/O</p>	
Programming the 8085	8 Hours
<p>Data Transfer (Copy) Operations, Arithmetic Operations, Logic Operations, Branch Operations, Writing Assembly Language Programs, Debugging a Program</p> <p>Programming Techniques: Looping, Counting, and Indexing, Additional Data Transfer and 16-Bit Arithmetic Instructions, Arithmetic Operations Related to Memory, Logic Operations: Rotate, Logic Operations: Compare, Dynamic Debugging</p> <p>Counters and Time Delays, Illustrative Programs: Hexadecimal Counter, Zero-to-Nine (Modulo Ten) Counter, Generating Pulse Waveforms, Debugging Counter and Time-Delay Programs</p> <p>Stack, Subroutine, Restart, Conditional Call, and Return Instructions, Advanced Subroutine Concepts</p> <p>Code Conversion, BCD Arithmetic, and 16-Bit Data Operations</p>	
Interfacing Peripherals (I/Os) with 8085 and Applications	12 Hours
<p>The 8085 Interrupt, 8085 Vectored Interrupts, Restart as Software Instructions, Additional I/O Concepts and Processes</p> <p>Digital-to-Analog (D/A) Converters, Analog-to-Digital (A/D) Converters</p> <p>Basic Concepts in Programmable Devices, The 8155: Multipurpose Programmable Device, The 8279 Programmable Keyboard/Display Interface</p> <p>The 8255A Programmable Peripheral Interface, Interfacing Keyboard and Seven-Segment Display, The 8254 (8253) Programmable Interval Timer, The 8259A Programmable Interrupt Controller, Direct Memory Access (DMA) and the 8237 DMA Controller</p> <p>Basic Concepts in Serial I/O, Software-Controlled Asynchronous Serial I/O, The 8085-Serial I/ Lines: SOD and SID, Hardware-Controlled Serial I/O using Programmable Chips</p> <p>Interfacing Scanned Multiplexed Displays and Liquid Crystal Displays, Interfacing a Matrix Keyboard</p>	
INTEL 8086 - 16-Bit Microprocessor	12 Hours
<p>Introduction, Architecture of 8086 (EU, BIU, Min & Max mode operations), Accessing Memory Locations, Pin Details of 8086</p> <p>Addressing Modes in 8086, Segment Override Prefix, Instruction Set of 8086(Data Transfer, Arithmetic, Logical, Flag Manipulation, Control Transfer, Shift/Rotate, String, Machine or Processor Control), 8086 Assembly Language Programming (Line assembler, Time Delay, Assembler directives, TASM/MASM), Program Development Process, Modular Programming</p> <p>Physical Memory Organisation in 8086, Formation of System Bus, Interfacing RAM and EPROM Chips using only logic gates, Interfacing RAM/EPROM chips using decoder IC and logic gates, I/O</p>	

Interfacing (I/O instructions in 8086, I/O-mapped and memory-mapped I/O), Interfacing 8-bit Input device with 8086 (8-bit address using logic gates, 8-bit address using 74LS318, 16-bit address using logic gates), Interfacing 8-bit Output Device with 8086, Interfacing 8-bit and 16-bit I/O devices or ports with 8086

8086-based systems: 8086 in Minimum Mode configuration, 8086 in Maximum Mode configuration, 8086 System Bus timings, Design of Minimum Mode 8086-based system

Total Contact Time: 42 Hours

Recommended Books

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. Ltd, 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.
6. N. Senthil Kumar, "Microprocessor and Interfacing: 8086, 8051, 8096, and advanced processors", Oxford University Press.

B.TECH. II Semester-3	L	T	P	C
EC 303: Communication Engineering	3	0	2	4

Prerequisite
Signals & Systems

Unit - 1	14 Hours
<p><u>Introduction</u>: Historical Background, Applications, Primary Resources and Operational Requirements, Underpinning theories of Communication Systems</p> <p><u>Fourier Representation of Signals and Systems</u>: The Fourier Transform, Properties of the Fourier Transform, The Inverse Relationship Between Time and Frequency, Dirac Delta Function, Fourier Transform of Periodic Signals.</p> <p>Transmission of Signals through Linear Systems: Convolution Revisited, Ideal Low-Pass Filters, Correlation and Spectral Density: Energy Signals, Power Spectral Density, Numerical Computation of the Fourier Transform, Theme Example: Twisted Pairs for Telephony</p> <p><u>Amplitude Modulation</u>: Amplitude Modulation, <i>Virtues, Limitations, and Modifications of Amplitude Modulation</i>, Double Sideband-Suppressed Carrier Modulation, Costas Receiver, Quadrature-Carrier Multiplexing, Single-Sideband Modulation, Vestigial Sideband Modulation, Baseband Representation of Modulated Waves and Band-Pass Filters, Theme Examples</p>	
Unit - 2	10 Hours
<p><u>Angle Modulation</u>: Basic Definitions, Properties of Angle-Modulated Waves, Relationship between PM and FM waves, Narrow-Band Frequency Modulation, Wide-Band Frequency Modulation, Transmission Bandwidth of FM Waves, Generation of FM waves, Demodulation of FM signals, Theme Example: FM Stereo Multiplexing</p>	
Unit - 3	10 Hours
<p><u>Pulse Modulation</u>: Sampling Process, Pulse-Amplitude Modulation, Pulse-Position Modulation, Completing the Transition from Analog to Digital, Quantization Process, Pulse-Code Modulation, Delta Modulation, Differential Pulse-Code Modulation, Line Codes, Theme Examples</p>	
Unit - 4	8 Hours
<p><u>Baseband Data Transmission</u>: Baseband Transmission of Digital Data, The Intersymbol Interference Problem, The Nyquist Channel, Raised-Cosine Pulse Spectrum, Baseband Transmission of M-ary Data, The Eye Pattern, Computer Experiment: Eye Diagrams for Binary and Quaternary Systems, Theme Example: Equalization</p>	
Total Contact Time: 42 Hours	

Recommended Books
<p><u>Text-Book</u></p> <ol style="list-style-type: none"> 1. Simon Haykin, and Michael Moher, "Introduction to Analog and Digital Communication", John Wiley & Sons, 2nd Edition. <p><u>Reference Books</u></p> <ol style="list-style-type: none"> 2. Lathi B. P., and Ding Zhi, "Modern Digital & Analog Communication Systems", Oxford University Press, 4th Edition, 2010. 3. Proakis J., and Salehi M., "Fundamental of Communication Systems", PHI/Pearson Education-LPE, 2nd Edition, 2006. 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 & Analog Communication Systems", Pearson Education-LPE, 6th Edition, 2004.

B.TECH. II Semester-3	L	T	P	C
EC 304: Electronic Circuits	3	0	2	4

Frequency Response	12 Hours
Low-Frequency Response of Discrete - Circuit CS and CE Amplifiers, Internal Capacitive Effects and the High-Frequency Model of the MOSFET and the BJT, High-Frequency Response of the CS and CE Amplifiers, Useful Tools for the Analysis of the High-Frequency Response of Amplifiers, High-Frequency Response of the CG amplifier, High-Frequency Response of the Source and Emitter Followers	
Operational Amplifier Basics, Output Stages and Power Amplifiers	8 Hours
<u>OP-AMPS</u> The Ideal Op Amp, The Inverting Configuration, The Noninverting Configuration, DC Imperfections, Effect of Finite Open-Loop Gain and Bandwidth on Circuit Performance, Large-Signal Operation of Op Amps <u>Power Amplifiers</u> Classification of Output Stages, Class A Output Stage, Class B Output Stage, Class AB Output Stage, Biasing the Class AB Circuit	
Feedback	10 Hours
The General Feedback Structure, Some Properties of Negative Feedback, The Feedback Voltage Amplifier, Systematic Analysis of Feedback Voltage Amplifiers, Other Feedback Amplifier Types, Summary of the Feedback Analysis Method, The Stability Problem	
Filters, Tuned Amplifiers, Oscillators and Integrated Circuit Timers	12 Hours
Filter Transmission, Types, & Specification, The Filter Transfer Function, Butterworth and Chebyshev Filters, The Second-Order LCR Resonator, Tuned Amplifiers Basic Principles of Sinusoidal Oscillators, <i>Phase-Shift Oscillator</i> , <i>Wien-Bridge Oscillator</i> , LC and Crystal Oscillators Integrated-Circuit Timers	
Total Contact Time: 42 Hours	

Recommended Books
<u>Text-Book</u> 1. A. S. Sedra and K. C. Smith, "Microelectronic Circuits", Oxford University Press, 7th Edition. <u>Recommended Books</u> 2. Boylestad Robert L. and Nashlesky Louis, "Electronics Device & Circuits and Theory", PHI, 10th Edition, 2009. 3. Millman Jacob, Halkias Christos C. and Parikh C., "Integrated Electronics", McGraw-Hill, 2nd Edition, 2009. 4. Schilling Donald L. and Belove E., "Electronics Circuits - Discrete and Integrated", McGraw-Hill, 3rd Edition, 1989, Reprint 2008. 5. "Electronic Principles", Malvin Albert & David J. Bates, Tata McGraw Hill, 7th edition, 2007. 6. "Pulse, Digital and Switching Waveforms", Millman J., Taub H. and Mothiki Suryaprakash, McGraw-Hill, 2nd Ed., 2007.

B.TECH. II Semester-3	L	T	P	C
AS 305: Probability and Statistical Analysis	3	1	0	4

Probability	
Unit - 1	9 Hours
<p><u>Introduction</u>: Axiomatic definition, Properties, Conditional probability, Bayes rule and independence of events.</p> <p><u>Random Variable</u>: 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.</p>	
Unit - 2	16 Hours
<p><u>Special Discrete Distributions</u>: Bernoulli, Binomial, Geometric, Negative binomial, Hypergeometric, Poisson, Uniform. Special continuous distributions: Uniform, Exponential, Gamma, Normal, Weibull, Rayleigh. 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.</p>	
Statistics	
Unit - 3	9 Hours
<p><u>Introduction</u>: Population, Sample, Parameters.</p> <p><u>Point Estimation</u>: Method of moments, Maximum likelihood estimation, Unbiasedness, Consistency.</p> <p><u>Interval Estimation</u>: Confidence interval.</p>	
Unit - 4	8 Hours
<p><u>Tests of Hypotheses</u>: Null and Alternative hypothesis, Type-I and Type-II errors, Level of significance, p-value, Likelihood ratio test, Chi-square goodness of fit tests.</p> <p><u>Regression Problem</u>: 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.</p>	
Total Contact Time: (42 + 14) Hours	

Recommended Books
<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. I Semester-3	L	T	P	C
CS 306: ICT Workshop - II	0	0	4	2

Programming Languages	28 Hours
Introduction to Website Development	
HTML CSS PHP Java Script, Node JS MySQL, NoSQL ASP.net	
Introduction to MATLAB	14 Hours
Numerical Toolbox Symbolic Toolbox DSP Toolbox Simulink	
Introduction to Android APP Development	14 Hours
Total Contact Time: 56 Hours	

Recommended Books
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.