Indian Institute of Information Technology Bhagalpur

Computer Science and Engineering (CSE)

B.Tech. Course Curricula and Syllabus

Semester-IV

Curricula:

Course Code	Course name	L	T	P	C
CS206	Operating Systems	3	0	0	3
CS205	Formal Language and Automata Theory	3	1	0	4
EC208	**Microprocessor and Interfacing**	**3**	**0**	**0**	**3**
CS204	Database Management Systems	3	0	0	3
MA203	**Probability and Statistics**	**3**	**1**	**0**	**4**
CS212	Database Management Systems LAB	0	0	3	2
CS213	Operating Systems LAB	0	0	3	2
EC218	**Microprocessor and Interfacing LAB**	**0**	**0**	**3**	**2**

Syllabus:

Course Code	**Course Name**	**L**	**T**	**P**	**C**	**Year**	**Semester**
CS206	Operating Systems	3	0	0	3	2nd	4th
Objective: The objective of this course is to teach the fundamentals of computer Operating Systems. This course allows the students to understand the service provided by the operating system, what a process is and how processes are synchronized and scheduled and different approaches to memory management. It also explains the structure and organization of the file system and different security issues in modern operating systems.							
Topic							Hour
Module I	Introduction: Introduction to operating systems, operating system operations.						5
Module II	Process management: Process concept, multithreaded programming, Process scheduling, Inter process communication and synchronization, Deadlocks; deadlock detection, prevention and avoidance.						10
Module III	Memory Management: Memory management strategies; paging, segmentation, virtual memory management; demand paging, TLB, frame allocation and page replacement algorithms.						8
Module IV	Storage Management: File system, file operation and their implementation, allocation, free space management, directory management, mounting.						6

Module V	I/O Management: disk drives and disk scheduling, basics of security.	5
	Total	34
Text	1. Silberschatz, A., Galvin, P. B., and Gagne G., Operating System Concepts. 8/e. Wiley, 2008. 2. Tanenbaum, A. S. Modern Operating System. 3/e. Pearson, 2007.	
Reference	1. Stalling, W. Operating Systems: Internals and Design Principles. 6/e. Pearson, 2008. 2. Dhamdhere, D. M. Operating SystemsA Concept Based Approach, McGrawHill, 2008.	

Course Code	**Course Name**	**L**	**T**	**P**	**C**	**Year**	**Semester**
CS205	Formal Language and Automata	3	1	0	4	2nd	4th

Course Objective: The objective of this course is to provide students with an understanding of basic concepts in the theory of computation. The course explains and explores various concepts in automata theory and formal languages such as formal proofs, (non-)deterministic automata, regular expressions, regular languages, context-free grammars, context-free languages, Turing machines. It also aims to explain the power and the limitations of regular languages and context-free languages.

Topic		Hour
Module I	Basics and Finite Automata: Alphabets, Language, Grammars, NFA, DFA, NFA-DFA, Equivalence of NFA and DFA, Minimization of FA, Myhill-Nerode Theorem.	8
Module II	Finite State Models, Regular Grammar and Language: Basic Definition, Mathematical Representation, Moore versus Mealy M/C, Capability and Limitations of FSM, State Equivalence & Minimization, Machine Equivalence. Regular Expression; Regular Grammar, Regular Language, Pumping Lemma for Regular Languages, Properties of Regular Languages.	10
Module III	Context Free Grammars and Language, Push Down Automata: CFG, CFL, Derivations, Parse Tree, Parsing and Ambiguity, CFG and Programming Languages, Transformation of CFGS, Normal Forms, Membership Algorithms, Pumping Lemma for CFLs, Properties of CFLs. Non-Deterministic PDA, Instantaneous Descriptions, Language Recognized by PDA, PDA and CFL, Deterministic PDA, and Deterministic CFL.	10
Module IV	Turing Machines: Standard Turing Machine, Design of Turing Machine, Universal Turing Machine, Halting Problem, Non-Deterministic Turing Machine.	7
Module V	Hierarchy of Formal Language and Automata: Operations on Formal Language and Their Properties, Chomsky Hierarchy, Context Sensitive Grammars, Linear Bounded Automata, Recursive and Recursively Enumerated Language.	7
	Total	42

Text	1. Introduction to Automata Theory, Languages and Computation; John E Hopcroft, Rajeev Motwani, Jeffrey D Ullman; 3rd, Pearson India Education Services Pvt.Ltd; 2018. 2. An Introduction to Formal Languages and Automata; Peter Linz, ; 6th, Jones and Bartlett India Pvt.Ltd; 2017.
Reference	1. Elements of the Theory of Computation; H R Lewis, C H papadimitrou; 2nd Edition, Prentice Hall India; 2010. 2. Introduction to the Theory of Computation; Michael Sipser, ; 3rd, Cengage; 2017.

Course Code	**Course name**	**L**	**T**	**P**	**C**	**Year**	**Semester**
EC208	Microprocessor and Interfacings	3	0	0	3	2nd	4th

Course objective: The main objective of the course is to familiarize students about hardware design including logic design, basic structure and behaviour of the various functional modules of the computer and how they interact to provide the processing needs of the user.

Topic	**Contents**	**No. of Lectures**
Module I	8086 Processor**:** Historical background, 8086 CPU Architecture. Addressing modes, Machine language instruction formats, Machine coding the program. Instruction Set of 8086**:** Data transfer and arithmetic instructions. Control/Branch Instructions, Illustration of these instructions with example programs.	**08**
Module II	Logical Instructions, String manipulation instructions, Flag manipulation and Processor control instructions, Illustration of these instructions with example programs. Assembler Directives and Operators, Assembly Language Programming and example programs.	**09**
Module III	Stack and Interrupts: Introduction to stack, Stack structure of 8086, Programming for Stack. Interrupts and Interrupt Service routines, Interrupt cycle of 8086, NMI, INTR, Interrupt programming, Passing parameters to procedures, Macros, Timing and Delays.	**08**
Module IV	8086 Bus Configuration and Timings: Physical memory Organization, General Bus operation cycle, I/O addressing capability, Special processor activities, Minimum mode 8086 system and Timing diagrams, Maximum Mode 8086 system and Timing diagrams. Basic Peripherals and their Interfacing with 8086 (Part 1): Static RAM Interfacing with 8086, Interfacing I/O ports, PIO 8255, Modes of operation – Mode-0 and BSR Mode, Interfacing Keyboard and 7-Segment digits using 8255.	**09**
Module V	Basic Peripherals and their Interfacing with 8086 (Part 2): Interfacing ADC-0808/0809, DAC-0800, Stepper Motor using 8255. Timer 8254 – Mode 0, 1, 2 & 3 and Interfacing programmes for these modes. INT	**08**

	21H DOS Function calls - for handling Keyboard and Display. Other Architectures: Architecture of 8088 and Architecture of NDP 8087.	
	Total	**42**
Text	1. Hall D.V., *Microprocessor and Interfacing-Programming and Hardware*", Tata McGraw-Hill, 2nd edition, 2008. 2. R.S. Gaonkar, *Microprocessor Architecture, Programming and Applications*, Penram International, 5th edition, 2007.	
References	1. W. Stallings, *Computer Organization and Architecture: Designing for Performance*, Prentice Hall, 6th edition, 2005. 2. David A. Patterson, John L. Hennessy, *Computer Architecture: A Quantitative Approach*, Morgan Kaufmann,3rd edition, 2002.	

Course Code	**Course Name**	**L**	**T**	**P**	**C**	**Year**	**Semester**
CS204	Database Management System	3	0	0	3	2nd	4th

Course Objective: This course provides fundamental knowledge of, and practical experience with, database concepts. In this course, you will create relational databases, write SQL statements to extract information to satisfy business reporting requests, create entity relationship diagrams (ERDs) to design databases, and analyse table designs for excessive redundancy. The course also provides an introductory level understanding of advanced topics such as data mining, information retrieval etc.

Topic		Hour
Module I	Introduction to database management, data abstraction and system structure. Entity relational model, entity set, relationship sets, mapping cardinalities, keys, E-R diagrams.	6
Module II	Relational model, database schema, relational algebra, outer join and manipulation of databases.	5
Module III	Tuple relational calculus: Example queries, formal definitions and safety of expressions; SQL: Query processing and optimization, set operations, aggregate functions, data definition language and views, comparison of queries in relational algebra, SQL, tuple relation calculus and domain relation calculus.	6
Module IV	Relational database design, various normal forms, functional dependencies, canonical cover, lossless join, dependency preservation, multi value dependency and higher normal forms, transaction management, ACID property.	10
Module V	Serializability and testing for serializability, concurrency control schemes, lock-based protocols, two-phase locking protocols, graph-based protocols, time stamp-based protocols, deadlocks. Recovery systems, log-based recovery, deferred and immediate database modification, object oriented database design.	10
	Total	37
Text	1. Database System Concepts; Abraham Silberschatz, Henry F Korth; 6th, McGraw Hill Education (India) Pvt. Limited; 2013. 2. An Introduction to Database Systems; C J Date, A Kannan, S Swamynathan; 8th,	

	Dorling Kindersley (India) Pvt. Ltd.; 2013.
Reference	1. Abraham, H. and Sudershan, S., "Database System Concepts", 4th Ed., McGraw-Hill, 2002 2. Elmasi, R. and Navathe, S.B., "Fundamentals of Database Systems", 4thEd., Pearson Education., 2005

Course Code	**Course name**	**L**	**T**	**P**	**C**	**Year**	**Semester**
MA203	Probability and Statistics	3	1	0	4	2nd	4th
Topic	**Contents**						**No. of Lectures**
Module-I	Basic Probability: Sample Space and Events. The notion and axiom of Probability, equally likely events, independent events; Conditional Probability, Expectations; Random Variables: Discrete and Continuous Probability Distributions. Moments, Moment Generating Functions.						**08**
Module-II	Distributions:Binomial-Poisson-Geometric-Uniform-Normal-exponential-Gamma; Two Dimensional Random Variables: Joint Distribution, Marguinal and Conditional Distribution, Covariance, Correlation Coefficient, Linear Regression.						**10**
Module-III	Transformation of random variables, Sampling Distributions: The Central Limit Theorem, distributions of the sample mean and the sample variance for a normal population, Chi-square, t- and F distributions. Descriptive Statistics: Graphical representation, measures of locations and variability.						**09**
Module-IV	Estimation: Unbiasedness, Consistency, the method of moments and the method of maximum likelihood estimation, confidence intervals for parameters in one sample and two sample problems of normal populations, confidence intervals for proportions.						**07**
Module-V	Testing of hypotheses: Null and alternative hypotheses, the critical and acceptance regions, two types of error, power of the test, the most powerful test and Neyman-Pearson Fundamental Lemma, tests for one sample and two sample problems for normal populations, tests for proportions, Chi-square goodness of fit test and its applications.						**09**
						Total	**43**
Text	1. P G Hoel, S C Port, C J Stone, *Introduction to Probability Theory*, Universal Book Stall; 2000. 2. J. Medhi, *Stochastic Processes*, New Age International, 4th edition, 2017.						
Reference	1. R. D. Yates and D. J. Goodman, *Probability and Stochastic Processes*, Wiley India, 2nd edition, 2012.						