MITS Kochi
Muthoot Institute of Technology and Science (Autonomous)

B. TECH
COMPUTER SCIENCE & ENGINEERING (CYBER SECURITY)
CURRICULUM & SYLLABUS

2025 REGULATION

B.Tech

COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY)

2025 REGULATION

CURRICULUM & SYLLABUS

SEMESTER III

CURRICULUM

SLOT	COURSE CATEGORY	COURSE CODE	COURSE NAME	L	T	J	P	S	C
A	BST	B250904/MA300A	Mathematics for Information Science - 3	3	1	0	0	2	3
B	PCE	B250008/CY310B	Principles of Data Structures and Algorithms	3	1	0	3	5	6
C	PCE	B250008/CY310C	Java Programming	3	1	0	3	5	6
D	PCB	B250008/CY320D	Computer Networks with Linux Administration	2	1	1	0	4	4
E	EST	B250008/CY300E	Digital System and Computer Architecture	3	0	0	0	5	4
F	HMT	B250908/HU900F	Engineering Economics	3	0	0	0	1	2
		B250908/CN900F	Management for Engineers	3	0	0	0	1	2
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work, C- Credit)									

COURSE DESCRIPTION							
REGULATION	**2025**	**L-T-J-P-S**	**3-1-0-0-2**	**VERSION**	**25/0**	**CREDITS**	**3**
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	COURSE NAME	COURSE CATEGORY
B250904/MA300A	Mathematics For Information Science -3	BST
PRE-REQUISITE		
Basic knowledge in probability.		

TEACHING AND ASSESSMENT SCHEME

Teaching Scheme / Week					Hours / Semester	Credit	Examination Scheme						
							Theory			Practical			Total
L	**T**	**J**	**P**	**S**	**90**	**C**	**CIA**	**ESE**	**Total**	**CIA**	**ESE**	**Total**	
3	1	0	0	2		3	40	60	100	-	-	-	100

***L**: Lecture (One unit is of one-hour duration), **T**: Tutorial (One unit is of one-hour duration), **P**: Practical (One unit is of one-hour duration), **J**: Project (One unit is of one-hour duration), **S**: Self-Learning & Team Work (One unit is of one-hour duration), **CIA**: Continuous Internal Assessment, **ESE**: End Semester Examination*

SYLLABUS (Major Topics)

Module	Title	Major Topics	Hrs
1	**Discrete Probability Distributions**	Random variables, Discrete random variables and their probability distributions, Cumulative distribution function, Expectation, Mean and variance, the Biomial probability distribution, the Poisson probability distribution, Poisson distribution as a limit of the binomial distribution, Joint pmf of two discrete random variables, Marginal pmf, Independent random variables, Expected value of a function of two discrete variables. **[Text 1: Relevant topics from sections 3.1 to 3.4, 3.6, 5.1, 5.2]**	11
2	**Continuous Probability distribution and the Central Limit Theorem**	Continuous random variables and their probability distributions, Cumulative distribution function, Expectation, Mean and variance, Uniform, Normal and Exponential distribution, Joint pdf of two Continuous random variables, Marginal pdf, Independent random variables, Expectation value of a function of two continuous variables, Central limit theorem(without proof). **[Text 1: Relevant topics from sections 3.1, 4.1, 4.2, 4.3, 4.4, 5.1, 5.2, 5.4]**	13
3	**Statistical Inference and Hypothesis Testing**	Confidence Intervals, Confidence Level, Confidence Intervals and One-side confidence intervals for a Population Mean for large and small samples (normal distribution and t-distribution), Hypotheses and Test Procedures, Type I and Type II error, z Tests for Hypotheses about a Population Mean (for large sample), t Test for Hypotheses about a Population Mean (for small sample), Tests concerning a population proportion for large and small samples. **[Text 1: Relevant topics from sections 7.1, 7.2, 7.3, 8.1, 8.2, 8.3, 8.4]**	11
4	**Stochastic Processes and Markov Chains**	Stochastic process concept, classification of stochastic process, Markov Chains, Random Walk Model, Transition probability matrix, Chapman–Kolmogorov Equations, Classification of States, Irreducible Markov chain, Recurrent state, Transient state. **[Text 2: Relevant topics from sections 2.9, 4.1, 4.2, 4.3,4.4]**	10

Text Book			
Sl. No.	Title of Book	Author	Publication
1	Probability and Statistics for Engineering and the Sciences	Devore J. L	9 th edition, 2016
2	Introduction to Probability Models	Sheldon M. Ross	Academic Press, 13th edition, 2024

Reference			
Sl. No.	Title of Book	Author	Publication
1	Probability Models for Computer Science	Sheldon M. Ross	Academic Press, 1st edition, 2001.
2	Probability, Random Variables and Stochastic Processes	Papoulis, A. & Pillai, S.U.	Tata McGraw-Hill, 4th edition, 2002.
3	Introduction to Probability and Statistics for Engineers and Scientists	Ross S. M	Academic Press, 6th edition, 2020.
4	Probability Statistics and Random Process	Kousalya Pappu	Pearson, 2013

COURSE DESCRIPTION							
REGULATION	**2025**	**L-T-J-P-S**	**3-1-0-3-5**	**VERSION**	**25/0**	**CREDITS**	**6**
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	COURSE NAME	COURSE CATEGORY
B250008/CY310B	Principles of Data Structures and Algorithms	PCE
PRE-REQUISITE		
Algorithmic Thinking with Python, Discrete Mathematics		

TEACHING AND ASSESSMENT SCHEME

Teaching Scheme / Week					Hours / Semester	Credit	Examination Scheme						
							Theory			Practical			Total
L	**T**	**J**	**P**	**S**		**C**	**CIA**	**ESE**	**Total**	**CIA**	**ESE**	**Total**	
3	1	0	3	5		6	25	40	65	15	20	35	100

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SYLLABUS (Major Topics)

Module	Title	Major Topics	Hrs
1	Introduction to Data Structures and Algorithmic Analysis	Introduction to Data Structures: Need and Relevance – Abstract Data Types (ADT). Basic complexity analysis – Best, Worst, and Average Cases – Asymptotic Analysis - Frequency Count Method. Array as ADT – Memory representation of 1D and 2D arrays – Array operations – insertion, deletion, traversal. Applications of Arrays. Searching and Sorting - Linear Search, Binary Search, Linear Sorting –Selection Sort, Insertion Sort, Divide and Conquer based sorting - Merge Sort, Quick Sort.	10
2	Linear Data Structures: Linked Lists, Stacks, and Queues	Linked Lists ADT – Singly Linked List – Doubly Linked List – Circular Linked List. Applications of linked lists Stacks and Queues: Stack ADT – Array based Stacks, Linked Stacks, Recursion using Stacks, Stack Applications. Queues – ADT, Array based Queue, Linked Queue, Double-ended queue, Circular queue, Applications.	12
3	Non-linear Data Structures: Tree	Trees: Tree Definition and Properties – Tree ADT –Ordered Tree– Binary tree – Tree traversals – Linked Structure for Binary Tree – Array based implementation. Search trees – Binary search tree, AVL tree. Heap as ADT. Priority Queues.	13
4	Non-linear Data Structures: Graph	Graphs as ADT: Graph representation: Adjacency Matrix, Adjacency List, Incidence Matrix - Graph traversal: BFS and DFS - Directed Acyclic graphs – Weighted graphs Shortest Paths – Minimum spanning tree - Greedy Methods for MST: Prim's Algorithm and Kruskal's Algorithm	10

Text Book

Sl. No.	Title of Book	Author	Publication
1	Fundamentals of Data Structures in C	Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed	Universities press, 2/e, 2007
2	Data Structures and Algorithms in Python	Goodrich MT, Tamassia R, Goldwasser MH	John Wiley & Sons. 5/e, 2013

Reference

Sl. No.	Title of Book	Author	Publication
1	Classic Data Structures	Samanta D.	Prentice Hall India. 2/e, 2018
2	Introduction to Data Structures with Applications	Tremblay J. P. and P. G. Sorenson	Tata McGraw Hill. 2/e, 2017
3	Data structures and algorithms in Java	Goodrich MT, Tamassia R, Goldwasser MH	John Wiley & Sons. 5/e, 2010

COURSE DESCRIPTION							
REGULATION	**2025**	**L-T-J-P-S**	**3-1-0-3-5**	**VERSION**	**25/0**	**CREDITS**	**6**
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	**COURSE NAME**	**COURSE CATEGORY**
B250008/CY310C	Java Programming	PCE
PRE-REQUISITE		
Algorithmic Thinking with Python, Programming in C		

TEACHING AND ASSESSMENT SCHEME

Teaching Scheme / Week					**Credit**	**Hours / Semester**	**Examination Scheme**						
							Theory			**Practical**			**Total**
L	**T**	**J**	**P**	**S**	**C**		**CIA**	**ESE**	**Total**	**CIA**	**ESE**	**Total**	
3	1	0	3	5	6	120	25	40	65	15	20	35	100

***L**: Lecture (One unit is of one-hour duration), **T**: Tutorial (One unit is of one-hour duration), **P**: Practical (One unit is of one-hour duration), **J**: Project (One unit is of one-hour duration), **S**: Self-Learning & Team Work (One unit is of one-hour duration), **CIA**: Continuous Internal Assessment, **ESE**: End Semester Examination*

SYLLABUS (Major Topics)

Module	**Title**	**Major Topics**	**Hrs**
1	**Java Fundamentals**	Java features, JVM architecture, program structure, data types, operators, control statements, input/output, arrays (1D & 2D), string handling, methods and recursion	13
2	**Object Oriented Programming in Java**	Classes and objects, constructors, inheritance, polymorphism, abstract classes	15
3	**Advanced Java Concepts**	Interfaces, Exception handling, packages, Java Collections Framework-ArrayList, Thread concepts, synchronization basics	17
4	**GUI Programming & Database Connectivity**	AWT and Swing basics, event handling, layout managers, JDBC architecture, connecting Java to SQL, CRUD operations, Security in Java Applications: Input validation and prevention of SQL injection using PreparedStatement.	15

Text Book

Sl. No.	**Title of Book**	**Author**	**Publication**
1	Java: The Complete Reference	Herbert Schildt	9th Edition, McGraw-Hill Education
2	Core Java Volume I – Fundamentals	Cay S. Horstmann	12th Edition, Pearson
3	Java - How to Program	Paul Deitel Harvey Deitel	10th Edition, Pearson

Reference

Sl. No.	**Title of Book**	**Author**	**Publication**
1	Head First Java	Kathy Sierra, Bert Bates	2nd Edition, O'Reilly,
2	Programming with Java	E. Balagurusamy	6th Edition McGraw-Hill

COURSE DESCRIPTION							
REGULATION	**2025**	**L-T-J-P-S**	**2-1-1-0-4**	**VERSION**	**25/0**	**CREDITS**	**4**
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	COURSE NAME	COURSE CATEGORY
B250008/CY320D	Computer Networks with Linux Administration	PCB
PRE-REQUISITE		
Basic knowledge of programming (C or Python)		

TEACHING AND ASSESSMENT SCHEME

Teaching Scheme / Week					Hours / Semester	Credit	Examination Scheme						
							Theory			Practical			Total
L	**T**	**J**	**P**	**S**	**120**	**C**	**CIA**	**ESE**	**Total**	**CIA**	**ESE**	**Total**	
2	1	1	0	4		4	60	40	100				100

***L**: Lecture (One unit is of one-hour duration), **T**: Tutorial (One unit is of one-hour duration), **P**: Practical (One unit is of one-hour duration), **J**: Project (One unit is of one-hour duration), **S**: Self-Learning & Team Work (One unit is of one-hour duration), **CIA**: Continuous Internal Assessment, **ESE**: End Semester Examination*

SYLLABUS (Major Topics)

Module	Title	Major Topics	Hrs
1	Fundamentals of Computer Networks & Linux Networking	Introduction to computer networks - components, types, topologies, and layered architectures. OSI and TCP/IP models – encapsulation, protocol functions. Basics of transmission media, Ethernet, and MAC addressing. Network layer concepts- IPv4/IPv6 addressing, subnetting, ARP, ICMP, and routing. Transport layer services- TCP/UDP comparison, ports and connection establishment. Application layer protocols- HTTP/HTTPS, FTP, and DNS. Wireless Networking fundamentals. Introduction to Linux operating system and Linux networking architecture, networking stack, network interfaces, and basic configuration and connectivity tools. **(Text 1 – Relevant topics from sections 1.1, 1.2, 1.3, 1.5, 2.1, 2.2, 2.5)** **(Text 2 – Relevant topics from chapters 1, 2, 3)**	14
2	Design & Configuration of Linux Networks	Introduction to Shell Scripting and Familiarisation of commands. Design and implementation of Linux-based networked systems - configuration of network interfaces using modern Linux tools, static and dynamic IP addressing with DHCP, DNS resolution mechanisms, routing and gateway configuration, network address translation concepts, Introduction to virtual networking using namespaces, Network topology design, configuration of Linux hosts and services, analysis of exposed ports and services, basic version control for network configuration files. **(Text 2 - Relevant topics from chapters 6, 7, 8, 9, 14)** **(Reference Text 1 - Relevant topics from chapters 2, 3, 5, 6)**	10
3	Network Monitoring, Performance Analysis & Troubleshooting	Analysis and troubleshooting of Linux-based networks using diagnostic and monitoring tools- connectivity testing, routing and service verification, packet capture and traffic inspection, and log analysis. Network performance metrics - latency, throughput, and packet loss, traffic flow analysis and fault isolation techniques, simulated network failures, systematic troubleshooting, performance evaluation. **(Text 1 - Relevant topics from sections 3.1, 3.2, 3.4, 3.5, 4.4)** **(Reference Text 2 - Relevant topics from chapters 1, 2, 7, 18)**	8
4	Linux Network Security	Linux security mechanisms - user and file permission management, access control, firewall configuration, secure remote access, and basic intrusion detection concepts. Firewall rules, system and service	8

		hardening, simulation of common network attacks, and a mini project that integrates networking and Linux administration to address a real-world cyber security problem. **(Text 2 - Relevant topics from chapters 14, 15)** **(Reference Text 3 - Relevant topics from chapters 12, 13, 26)**	

Text Book			
Sl. No.	Title of Book	Author	Publication
1.	Computer Networking: A Top-Down Approach	James F. Kurose & Keith W. Ross	8th Edition, Pearson Education, 2021
2.	How Linux Works	Brian Ward	3rd Edition, No Starch Press, 2021

Reference			
Sl. No.	Title of Book	Author	Publication
1.	Linux Network Administrator's Guide	Olaf Kirch and Terry Dawson	2nd Edition, O'Reilly Media, 2000
2.	TCP/IP Illustrated Volume 1	W. Richard Stevens	2nd Edition, Addison-Wesley Professional, 2011
3.	UNIX and Linux System Administration Handbook	Evi Nemeth et al.	5th Edition, Pearson, 2017

COURSE DESCRIPTION							
REGULATION	**2025**	**L-T-J-P-S**	**3-0-0-0-5**	**VERSION**	**25/0**	**CREDITS**	**4**
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	COURSE NAME	COURSE CATEGORY
B250008/CY300E	Digital System and Computer Architecture	EST
PRE-REQUISITE		
Basic knowledge of mathematics and fundamentals of computer systems.		

TEACHING AND ASSESSMENT SCHEME

Teaching Scheme / Week					Hours / Semester	Credit	Examination Scheme						
							Theory			Practical			Total
L	**T**	**J**	**P**	**S**		**C**	**CIA**	**ESE**	**Total**	**CIA**	**ESE**	**Total**	
3	0	0	0	5		4	40	60	100				100

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SYLLABUS (Major Topics)

Module	Title	Major Topics	Hrs
1	Introduction to Digital Systems	Introduction to digital Systems:- Digital abstraction Number Systems – Binary, Hexadecimal, grouping bits, Base conversion; Binary Arithmetic – Addition and subtraction, Unsigned and Signed numbers; Introduction to logic circuits – Variables and functions, inversion – Truth tables – Basic gates- Operation of a Logic circuit; Buffer; Gates - Inverter, AND gate, OR gate, NOR gate, NAND gate, XOR gate, XNOR gate; Boolean algebra: Operations, Axioms, Theorems – Synthesis using gates.	10
2	Optimized Logic Design	Optimized implementation of logic functions:– Karnaugh map – Strategy for minimization- Canonical SOP and POS, Minterm and Maxterm equivalence; Logic minimization - Algebraic minimization, K-map minimization, Don't cares. MSI logic - Decoders (One-Hot decoder, 7 segment display decoder), Encoders, Multiplexers, Demultiplexers.	10
3	Digital Building Blocks	Digital Building Blocks - Arithmetic Circuits - Half adder, Full adder, half subtractor, full subtractor; Comparators. Sequential circuit building blocks:- Basic Latches:- SR latch, D latch, SR latch with enable, Flip-flops: JK flip-flop, D flip-flop, Register Enabled Flip-Flop, Resettable FlipFlop. Asynchronous Counters, Synchronous Counters.	10
4	Computer Architecture	Introduction to Instruction Set Architecture, Processor Architecture with example as ARM & Instruction Set, Single Cycle Datapath Design. Introduction to multicycle at a path: Pipelined Processor - Pipelined Data Path, Pipelined Control: Hazards. Storage systems, introduction to memory hierarchy: main memory organization, cache memory: address mapping, block size, replacement, and store policies; virtual memory system: page table and TLB.	15

Text Book

Sl. No.	Title of Book	Author	Publication
1	Digital Design with Introduction to the Verilog HDL	M Morris Mano and Michael D Ciletti	Pearson 6/e, 2015
2	Digital Design	M. Morris Mano	Pearson 5/e 2-13
3	Digital Design and Computer Architecture - RISC-V Edition	Sarah L. Harris, David Harris	Morgan Kaufmann 1/e, 2022
4	Computer Organization and Architecture Designing for Performance	William Stallings	Pearson 9/e, 2013

Reference			
Sl. No.	Title of Book	Author	Publication
1	Digital Fundamentals	Thomas Floyd	Pearson 11/e, 2015
2	Introduction to Logic Circuits & Logic Design with Verilog	Brock J. LaMeres	Springer International Publishing 2/e, 2017
3	Computer Organization and Design	Patterson & Hennessy	Morgan Kaufmann 4/e
4	Modern Computer Architecture and Organization	Jim Ledin	Packt Publishing 1/e, 2020

COURSE DESCRIPTION							
REGULATION	**2025**	**L-T-J-P-S**	**3-0-0-0-1**	**VERSION**	**25/0**	**CREDITS**	**2**
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	**COURSE NAME**	**COURSE CATEGORY**
B250908/HU900F	Engineering Economics	HMT
PRE-REQUISITE		
There are no prerequisites for taking this course.		

TEACHING AND ASSESSMENT SCHEME

Teaching Scheme / Week					**Hours / Semester**	**Credit**	**Examination Scheme**						
							Theory			**Practical**			**Total**
L	**T**	**J**	**P**	**S**	**60**	**C**	**CIA**	**ESE**	**Total**	**CIA**	**ESE**	**Total**	
3				1		2	60	40	100	-	-	-	100

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SYLLABUS (Major Topics)

Module	Title	Major Topics	Hrs
1	Economic Foundations for Engineering Decision-Making	Introduction to Economics, Demand and Supply Analysis, Elasticity of Demand, Market Structures **Relevant topics from Text 1,2 & 3**	6
2	Production Economics	Cost and Revenue Analysis, Break Even and Decision Analysis, Equipment Replacement Analysis **Relevant topics from Text 4,5 & 6**	8
3	Investment Decision Techniques	Introduction to Capital Budgeting, Non-Discounted Techniques, Discounted Techniques - Evaluation Methods and Economic Comparison Methods **Relevant topics from Text 7 & 8**	8
4	Project Economics, Sustainability & Contemporary Engineering Decisions	Project Economic Analysis & Public Sector Decisions, Life Cycle Cost Analysis **Relevant topics from Text 6,7, 9 & 10.**	8

Text Book

Sl. No.	Title of Book	Author	Publication
1	Macro-Economic Theory and Policy	D. N. Dwivedi	McGraw Hill
2	Principles of Macroeconomics	N. Gregory Mankiw	Cengage
3	Principles of Economics	N. Gregory Mankiw	Cengage
4	Managerial Economics	D. N. Dwivedi	Vikas Publishing House
5	Engineering Economics	R. Panneerselvam	PHI Learning
6	Engineering Economy	William G. Sullivan, Elin M. Wicks & C. Patrick Koelling	Pearson
7	Engineering Economy	Leland Blank & Anthony Tarquin	McGraw Hill
8	Financial Management	Prasanna Chandra	Tata McGraw Hill
9	Macroeconomic Theory	M. L. Jhingan	Vrinda Publications
10	Sustainable Engineering: Concepts, Design and Case Studies	David T. Allen & David R. Shonnard	Pearson-Prentice Hall

Reference

Sl. No.	Title of Book	Author	Publication
1	Contemporary Engineering Economics	Chan S. Park	Pearson-Prentice Hall
2	Principles of Engineering Economy	Eugene L. Grant,W.Grant Ireson & Richard S. Leavenworth	Wiley
3	Economic Analysis of Investment Projects	World Bank Group	World Bank Publications
4	LCOE and Renewable Energy Economics in India	NITI Aayog or MNRE	NITI Aayog or MNRE Publications