

**Syllabus of Semester III, B.Tech
Department of Electronics and Computer Science**

Course Code	ECSTM301				
Category	Engineering Science Course				
Course Title	IoT fundamentals				
Scheme & Credits	L	T	P	Credits	Semester III
	3	0	0	3	

Course Outcomes

After learning the course, the student will be able to:

1. Understand the basics of networking
2. Gain the knowledge about iot standards
3. Realize the basic applications using arduino and raspberry pi
4. Illustrate different real world applications syllabus

Syllabus

Module - I: (7Hrs)

Basics of Networks, TCP/IP model, IP Addresses, application layer protocols, HTTP, MQTT, WWW, constraint application protocol, stacks.

Module - II: (7Hrs)

Introduction to IoT, evolution of IoT, IoT and SCADA, Big Data, IoT Standards, requirement, Platforms, relevance of IoT, security

Module - III: (7Hrs)

Interoperability in IoT, Machine-to-Machine Communications, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino, Sensing, Actuation, Sensor Networks

Module - IV: (7Hrs)

Introduction to Python programming, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi.

Module - V: (7Hrs)

Introduction to SDN, Fog Computing, IoT application case studies: Smart Cities and Smart Homes, Connected Vehicles, Smart Grid, Industrial IoT, Agriculture, Healthcare, Activity Monitoring, IoT in India: Smart India projects, Challenges in IoT

Text Books

1. Computer Networks: A Top-Down Approach; Behrouz A Forouzan, Firouz Mosharraf, McGraw Hill Education. Special Indian Edition 2012
2. Arduino Cookbook by Michael Margolis, O'Reilly Media, Inc., 1st edition
3. Raspberry pi Cookbook by Simon Monk, O'Reilly Media, Inc., 3rd edition.

**Syllabus of Semester III B.Tech
Department of Electronics and Computer Science**

Course Code	ECSTH301				
Category	Engineering Science Course				
Course Title	Edge for AI Fundamentals				
Scheme & Credits	L	T	P	Credits	Semester III
	3	0	0	3	

Course Outcomes

Upon successful completion of the course, students will be able to:

1. Understand the fundamentals of Artificial intelligence and edge computing
2. Apply techniques in edge computing architecture to achieve the best performance of AI training and inference
3. Analyze AI applications on edge under the multiple constraints of networking, communication, computing power, and energy consumption
4. Summarise the principles of Problem solving, quantitative and/or qualitative decision making in complex situations on AI/edge integration applications Syllabus

Syllabus

Module - I: (5 Hours)

Fundamentals of edge computing :

Introduction to edge computing, Trends, Industrial applications, Edge intelligence and intelligent edge

Module - II: (7 Hours)

Paradigms of Edge Computing : Cloudlet and Micro Data Centers, Fog Computing, Mobile and Multi-Access Edge Computing, Edge Computing Terminologies, AI Hardware for Edge Computing, Edge Computing Frameworks, **Virtualizing the Edge**

Module - III: (7 Hours)

AI applications on Edge : Fundamentals of Artificial Intelligence, hybrid hierarchical architecture at three levels: end, edge and cloud; Case studies of Real time video analytics, Autonomous Internet of Vehicles, Intelligent Manufacturing, Smart Home and City.

Module - IV: (7 Hours)

Artificial Intelligence Inference in Edge : Optimization of AI Models in Edge: General methods, Segmentations of AI models, Early Exit of Inference (EEoI) , Sharing of AI Computation

Module - V : (7 Hours)

Artificial Intelligence Training at Edge : Distributed Training at Edge, Vanilla Federated Learning(FL) at Edge, Communication-Efficient FL, Resource-Optimized FL, Security-Enhanced FL Case studies based on training at edge 15

Module - VI: (7 Hours)

Edge Computing for Artificial Intelligence : Edge Hardware for AI, Mobile CPUs and GPUs, TPU(Tensor processing unit) -Based Solutions, Edge Data Analysis for Edge AI Communication and Computation Modes for Edge AI, Tailoring Edge Frameworks for AI, Challenges and Applications

Text Book

1. Edge AI: Convergence of Edge Computing and AI, Xiaofei Wang, Yiwen Han , Victor C. M. Leung, Dusit Niyato , Xueqiang Yan Xu Chen

Reference Book

1. Recent Research Papers from Reputed Journals and Conferences such as DATE, TEST, CVPR, ICLR, NIPS, ICML etc.