Internet of Things

EG3202CT

Year: III **Total: 7 hours /week**

Part: II **Lecture: 3 hours/week**

Tutorial: 1 hours/week

Practical: hours/week

Lab: 3 hours/week

Course description:

This course provides theoretical as well as practical knowledge of fundamentals of Internet of Things (IoT) to make students capable of designing, implementing and managing the issues of IoT in their personal as well professional life.

Course objectives:

After completion of this course students will be able to:

1. Design and implement fundamentals of IoT.
2. Manage privacy and security issues related to IoT.

Course Contents:

Theory

Unit 1. Introduction **[6 Hrs.]**

1.1. Definition
1.2. History of IoT
1.3. IoT Architecture
1.4. IoT Frameworks
1.5. Benefits of IoT
1.6. Applications of IoT

Unit 2. Fundamental Mechanisms and Key Technologies **[8 Hrs.]**

2.1. Identification of IoT Objects and Services
2.2. Structural Aspects of the IoT
2.3. Environment Characteristics
2.4. Traffic Characteristics
2.5. Scalability
2.6. Interoperability
2.7. Security and Privacy
2.8. Open Architecture
2.9. Key IoT Technologies
2.10. Device Intelligence
2.11. Communication Capabilities
2.12. Mobility Support
2.13. Device Power
2.14. Sensor Technology
2.15. RFID Technology
2.16. Satellite Technology

Unit 3. IoT Protocols **[6 Hrs.]**

3.1. Protocol Standardization for IoT
3.2. Efforts
3.3. M2M and WSN Protocols
3.4. SCADA and RFID Protocols
3.5. Unified Data Standards – Protocols

3.6. IEEE 802.15.4
3.7. BACNet Protocol
3.8. Modbus
3.9. Zigbee Architecture
3.10. Network layer
3.11. LowPAN
3.12. CoAP
3.13. Security

Unit 4. IoT with RASPBERRY PI [9 Hrs.]

4.1. Building IOT with RASPERRY PI
4.2. IoT Systems
4.3. Logical Design using Python
4.4. IoT Physical Devices & Endpoints
4.5. IoT Device
4.6. Building blocks
4.7. Raspberry Pi -Board
4.8. Linux on Raspberry Pi
4.9. Raspberry Pi Interfaces
4.10. Programming Raspberry Pi with Python

Unit 5. IoT Privacy, Security and Governance [6 Hrs.]

5.1. Vulnerabilities of IoT
5.2. Security requirements
5.3. Threat analysis
5.4. Use cases and misuse cases
5.5. IoT security tomography and layered attacker model
5.6. Identity establishment
5.7. Access control
5.8. Message integrity
5.9. Non-repudiation and availability
5.10. Security model for IoT

Unit 6. REAL-WORLD APPLICATIONS and CASE STUDIES [10 Hrs.]

6.1. Real world design constraints and challenges
6.2. Applications and Asset management
6.3. Industrial automation
6.4. Smart Metering Advanced Metering Infrastructure
6.5. Smart grid
6.6. e-Health Body Area Networks
6.7. Commercial building automation
6.8. Smart cities - participatory sensing
6.9. Data Analytics for IoT
6.10. Software & Management Tools for IoT
6.11. Cloud Storage Models & Communication
6.12. APIs
6.13. Cloud for IoT
6.14. Amazon Web Services for IoT

Practical: [45 Hrs.]

1. To Implement the IoT Frameworks

2. To Implement Cloud Storage Models & Communication
3. Interfacing sensors to Raspberry
4. Interfacing Arduino to Bluetooth Module
5. Communicate between Arduino and Raspberry PI using any wireless medium
6. To Design an IOT based system

Final written exam evaluation scheme			
Unit	**Title**	**Hours**	**Marks Distribution***
1	Introduction	6	11
2	Fundamental Mechanisms and Key Technologies	8	14
3	IoT Protocols	6	11
4	IoT with RASPBERRY PI	9	15
5	IoT Privacy, Security and Governance	6	11
6	REAL-WORLD APPLICATIONS and CASE STUDIES	10	18
	Total	**45**	**80**

* There may be minor deviation in marks distribution.

References:

1. Daniel Minoli, “Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications”, ISBN: 978-1-118-47347-4, Willy Publications
2. ArshdeepBahga, Vijay Madisetti, “Internet of Things – A hands-on approach”, Universities Press, 2015
3. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), “Architecting the Internet of Things”, Springer, 2011. 3.
4. Honbo Zhou, “The Internet of Things in the Cloud: A Middleware Perspective”, CRC Press, 2012.
5. Jan Ho¨ ller, VlasiosTsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.
6. Olivier Hersent, David Boswarthick, Omar Elloumi , “The Internet of Things – Key applications and Protocols”, Wiley, 2012
7. HakimaChaouchi, “ The Internet of Things Connecting Objects to the Web” ISBN : 978-1- 84821-140-7, Willy Publications
8. Daniel Kellmereit, Daniel Obodovski, “The Silent Intelligence: The Internet of Things”,. Publisher: Lightning Source Inc; 1 edition (15 April 2014). ISBN-10: 0989973700, ISBN-13: 978- 0989973700. 4. Fang Zhaho, Leonidas Guibas, “Wireless Sensor Network: An information processing approach”, Elsevier, ISBN: 978-81-8147-642-5.

Entrepreneurship Development
EG 3201 MG

Year: III **Total: 5 Hrs. /week**
Semester: II **Lecture: 3 Hrs./week**
Tutorial: Hr./week
Practical: 2 Hrs./week
Lab: Hrs./week

Course Description:
This course is designed to provide the knowledge and skills on formulating business plan and managing small business. The entire course deals with assessing, acquiring, and developing entrepreneurial attitude; skills and tools that are necessary to start and run a small enterprise.

Course Objectives:
After completion of this course students will be able to:
1. Understand the concept of business and entrepreneurship;
2. Explore entrepreneurial competencies;
3. Analyze business ideas and viability;
4. Learn to formulate business plan with its integral components and
5. Manage small business.

Course Contents:

Theory

Unit 1: Introduction to Business & Entrepreneurship: [9 Hrs.]
- 1.1 Overview of entrepreneur and entrepreneurship
- 1.2 Wage employment, self- employment and business
- 1.3 Synopsis of types and forms of enterprises
- 1.4 Attitudes, characteristics & skills required to be an entrepreneur
- 1.5 Myths about entrepreneurs
- 1.6 Overview of MSMEs (Micro, Small and Medium Enterprises) in Nepal

Unit 2: Exploring and Developing Entrepreneurial Competencies: [9 Hrs.]
- 2.1 Assessing individual entrepreneurial inclination
- 2.2 Assessment of decision-making attitudes
- 2.3 Risk taking behavior and risk minimization
- 2.4 Creativity and innovation in business
- 2.5 Enterprise management competencies

Unit 3: Business identification and Selection: [4 Hrs.]
- 3.1 Sources and method of finding business idea(s)
- 3.2 Selection of viable business ideas
- 3.3 Legal provisions for MSMEs in Nepal

Unit 4: Business plan Formulation: **[18 Hrs.]**

4.1 Needs and importance of business plan

4.2 Marketing plan

- Description of product or service
- Targeted market and customers
- Location of business establishment
- Estimation of market demand
- Competitors analysis
- Estimation of market share
- Measures for business promotion

4.3 Business operation plan

- Process of product or service creation
- Required fix assets
- Level of capacity utilization
- Depreciation & amortization
- Estimation office overhead and utilities

4.4 Organizational and human resource plan

- Legal status of business
- Management structure
- Required human resource and cost
- Roles and responsibility of staff

4.5 Financial plan

- Working capital estimation
- Pre-operating expenses
- Source of investment and financial costs
- Per unit cost of service or product
- Unit price and profit/loss estimation of first year

4.6 Business plan appraisal

- Return on investment
- Breakeven analysis
- Risk factors

Unit 5: Small Business Management: **[5 Hrs.]**

5.1 Concept of small business management

5.2 Market and marketing mix

5.3 Basic account keeping

Practical

Unit 1: Overview of Business & Entrepreneurship [2 Hrs.]

1. Collect business information through interaction with successful entrepreneur

Unit 2: Exploring and Developing Entrepreneurial Competencies [2 Hrs.]

- Generate innovative business ideas

Unit 3: Product or service Identification and Selection [2 Hrs.]

1. Analyze business ideas using SWOT method

Unit 4: Business Plan Formulation [22 Hrs.]

1. Prepare marketing plan
2. Prepare operation plan
3. Prepare organizational and human resource plan
4. Prepare financial plan
5. Appraise business plan
6. Prepare action plan for business startup

Unit 5: Small Business Management [2 Hrs.]

1. Prepare receipt and payment account
2. Perform costing and pricing of product and service

Cyber Security

EG3201IT

Year: III **Total: 5 hours /week**

Part: II **Lecture: 3 hours/week**

Tutorial: hour/week

Practical: hours/week

Lab: 2 hours/week

Course Description:

This course is designed to provide the knowledge of fundamental aspects of Cyber Security and professional ethics in cyber world. Security is also an essential part of e-Enable Services, in the enterprise and over networks has become the primary concern. The course will provide knowledge to the students about how information can be protected throughout application, organization and computer networks and will help them to understand the social and professional cultural, social, legal, and ethical issues as well. The student will discuss on different types of cyber security issues, secure techniques, security and cryptography, legal issues in cybercrime, incidents and cyber forensic, ethical issues in cyber world, Professional ethics and Risk and liability in the computer-based System.

Course objectives:

After completion of this course students will be able to:

1. Gain the knowledge of different types of cyber threats and issues in computer application, organization and networks.
2. Gain familiarity with prevalent application, network and distributed system attacks, defenses against them, and forensics to investigate.
3. Develop a basic understanding of cryptography
4. Develop an understanding of security policies such as authentication, integrity and confidentiality as well as protocols to implement.

Course Contents:

Theory

Unit 1. Introduction **[6 Hrs.]**

1.1. Information System
1.2. Cyber Threats and it types
1.3. Cyber Crimes
1.4. Cyber Security and its categories
1.5. Types of Attacks in cyber

Unit 2. Security Technologies **[7 Hrs.]**

2.1. Virtual Private Network
2.2. Encryptions/Decryption
2.3. Intrusion Detection and protection system
2.4. Anti-Malicious Software
2.5. Security Software and Browser Security
2.6. Firewalls

Unit 3. Information Security and Cryptography **[7 Hrs.]**

3.1. Cryptography basics
3.2. Classical Encryption/Decryption Method

3.3. Types of cryptography (RSA, DES and AES)
3.4. Asymmetric Key Cryptography
3.5. Digital Signature

Unit 4. Legal Issues in Cyber Crime **[5 Hrs.]**

4.1. Legal Issues in Information Security
4.2. Cyber Law
4.3. Security Policy
4.4. Managing Risk
4.5. Information Security Process

Unit 5. Forensics and Incident Analysis **[8 Hrs.]**

5.1. Forensic Technologies
5.2. Digital Evidence Collection
5.3. Evidentiary Reporting
5.4. Incident Preparation
5.5. Incident Detection and Analysis
5.6. Containment, Eradication, and Recovery
5.7. Proactive and Post Incident Cyber Services

Unit 6. Application Security **[3 Hrs.]**

6.1. Types
6.2. Security in cloud
6.3. Mobile application security
6.4. Web application security

Unit 7. Professional and Ethical Responsibilities **[9 Hrs.]**

7.1. Privacy
7.2. Ethical issues in cyber security
7.3. Ethical challenges for cyber security professionals
7.4. Intellectual Property
7.5. Professional Ethics
7.6. Freedom of Speech
7.7. Fair User and Ethical Hacking
7.8. Trademarks
7.9. Internet Fraud
7.10. Electronic Evidence
7.11. Community values and the laws by which we live
7.12. The nature of professionalism in IT
7.13. Various forms of professional credentialing
7.14. The role of the professional in public policy
7.15. Maintaining awareness of consequences
7.16. Ethical dissent and whistle-blowing
7.17. Codes of ethics, conduct, and practice (IEEE, ACM, SE, AITP, and so forth)
7.18. Electronic Transaction Act of Nepal

Practical: **[30 Hrs.]**

1. Installation of Firewall
2. Blocking and unblocking of websites using Firewall
3. Implement different cryptographic algorithm (RSA, DES, AES)

4. Implement Access control
5. Implement Digital Signature
6. Installation of VPN and use VPN server.
7. Use of cypher text for encryption.

Final written exam evaluation scheme			
Unit	**Title**	**Hours**	**Marks Distribution***
1	Introduction	6	11
2	Security Technologies	7	12
3	Information Security and Cryptography	7	12
4	Legal Issues in Cyber Crime	5	9
5	Forensics and Incident Analysis	8	14
6	Application Security	3	6
7	Professional and ethical responsibilities	9	16
	Total	**45**	**80**

* There may be minor deviation in marks distribution.

References:

1. Eric Maiwald, Fundamentals of Network Security, McGraw-Hill Education
2. Patel, D. R. (2008). *Information security: theory and practices*. New Delhi: Prentice-Hall of India.
3. Social, Legal and Ethical Issues for Computers and the Internet by Sara Baase.
4. Ethics of Computing: Codes, spaces for discussion and law by Jacques Berleur and Klaus Brunnstein Chapman & Hall.
5. Joseph Migga Kizza, Ethical and Social Issues in the Information Age

E-commerce
(Elective II)
EG3202IT.1

Year: III **Total: 7 hours /week**
Part: II **Lecture: 3 hours/week**
Tutorial: 1 hour/week
Practical: 0 hours/week
Lab: 3 hours/week

Course Description:
This course aims to guide the students in both the theoretical and practical aspects of developing computer solutions for real-world problems. This course deals with the introduction, different business models for e-Commerce, concept of mobile computing, different types of on-line business systems, techniques and implementation for electronics payment system, and legal considerations in e-Commerce.

Course Objectives:
After completing this course, the students will be able to

1. Explain the steps required to set-up your E-commerce website for advertising purposes
2. Introduce the e-commerce.
3. Identify security issues of e-Commerce and e-commerce related Public Policy.
4. Explain the types of payment system and payment gateway.
5. Describe the legal and ethical issues of e-commerce and cyber law.
6. Familiarize with online marketing.

Course Contents:

Theory

Unit 1. Fundamental concept of e-Commerce [6 Hrs.]

1.1. Definition of Electronic Commerce
1.2. Scope of Electronic Commerce
1.3. Electronic E-commerce and the Trade Cycle
1.4. Emergence of Internet and commercial use of Internet
1.5. E-commerce Models, Personal web server, Internet information server, ASP page Contain scripts, Contain objects and components, Database access
1.6. Application of E-Commerce

Unit 2. Business Models of e-Commerce [6 Hrs.]

2.1. Business to Business (B2B)
2.2. Business to Consumer (B2C)
2.3. Consumer to Consumer (C2C)
2.4. Development of B2B e-commerce
2.5. Difference between B2C and B2B e-Commerce
2.6. e-Procurement
2.7. Just in Time Delivery
2.8. Integration with Back-end Information System
2.9. Electronic marketing in Business-to-Business
2.10. Electronic Data Interchange (EDI)
2.11. EDI: The Nuts and Bolts, EDI & Business
2.12. Auctions and Services from Traditional to Internet Based EDI

Unit 3. E-marketing and Advertising Concepts [5 Hrs.]

3.1. Define E-marketing
3.2. Explain Traditional Marketing
3.3. Online Marketing vs offline marketing
3.4. Tools for online and offline marketing
3.5. Issues with online marketing
3.6. Model of an online video store

Unit 4. Mobile and Wireless Application [5 Hrs.]

4.1. Define Mobile and wireless
4.2. Growth of Mobile Commerce
4.3. Wireless Application Protocol (WAP)
4.4. Use of technologies for mobile commerce
4.5. Architecture of Wireless Application Protocol
4.6. Generations in Wireless Communications
4.7. Security Issues related to Wireless Communication

Unit 5. The network infrastructure for e-commerce [8 Hrs.]

5.1. Network and internets
5.2. Network routers
5.3. Internet protocol suites
5.4. Internet naming convention, (URLs, TCP, FTP, ISP, Telnet, Search engine)
5.5. Broadband technologies (ADSL, Wi-Fi, LTE (4G), Bluetooth)
5.6. Web-based client/server
5.7. Software agents, Types of software agents,
5.8. Internet Security
5.9. Multimedia delivery
5.10. Managerial issues

Unit 6. Electronic Payment System (EPS) [4 Hrs.]

6.1. Define Electronic payment system
6.2. Types of electronic payment system
6.3. Digital token-based E-payment system
6.4. Smart Cards & E-payment systems
6.5. Credit card-based payment systems
6.6. Digital wallet (eSewa, Khalti, ConnectIPS)
6.7. Online banking facilities of banks (Nepali banks)
6.8. Risk factor in electronic payment system

Unit 7. Introduction to Entrepreneurship [6 Hrs.]

7.1. Entrepreneurship development
7.2. Entrepreneur Vs. Entrepreneurship, Entrepreneur Vs. Manager
7.3. Attributes and characteristics of a successful Entrepreneur
7.4. Entrepreneurial Culture
7.5. Legal and Ethical Issues

Unit 8. Public Policy [5 Hrs.]

8.1. From legal issues to privacy
8.2. E-commerce related legal incidents

8.3. Ethical and other public policy issues
8.4. Protecting privacy
8.5. Protecting intellectual property
8.6. Internet indecency and censorship
8.7. Taxation and encryption policies
8.8. E-commerce Law
8.9. Forms of Agreement
8.10. Government policies

Practical: **[45 Hrs.]**

1. Project should be done by students in any e-commerce site (the project should include: business model, payment mode, network infrastructure, marketing strategy, SWOT analysis and working process of site) (Refer Amazon, Alibaba, E-bay, Paypal etc.)
2. Study visit to fully developed E-Commerce management organization.

Final written exam evaluation scheme			
Unit	**Title**	**Hours**	**Marks Distribution***
1	Fundamental concept of E-Commerce	6	11
2	Business Models of e-Commerce	6	11
3	E-marketing and Advertising Concepts	5	9
4	Mobile and Wireless Application	5	9
5	The network Infrastructure for E-commerce	8	13
6	Electronic Payment System (EPS)	4	7
7	Introduction to Entrepreneurship	6	11
8	Public Policy	5	9
	Total	**45**	**80**

* There may be minor deviation in marks distribution.

References:

1. Noel Jerke, April 2012. E-Commerce Developer's Guide to Building Community and using Promotional Tools. Sybex Inc.
2. Kenneth C. Laudon and Carol Guercio Traver, (11th edition), 2015. E-commerce 2015 business, technology, society. Pearson
3. Janice Reynolds, (2nd edition, 2015. The Complete E-Commerce Book, Design, Build & Maintain a Successful Web-based Business. Focal Press
4. Amir Manzoor, (1st edition), 2015. E-commerce 2016. Printed in the United States of America.

Mobile Application Development
(Elective II)
EG3202IT.2

Year: III **Total: 7 hours /week**
Part: II **Lecture: 3 hours/week**
Tutorial: 1 hour/week
Practical: 0 hours/week
Lab: 3 hours/week

Course description:
This course is designed to develop the mobile application for the Android platform. The Android SDK provides the tools and APIs necessary to begin developing applications on the Android platform using the Java programming language. Students will learn skills for creating and deploying Android application with Create Application, design user Interface, Intents, Broadcast Receivers, Adapters, Data Storage, Retrieval, Sharing, Maps, Geo-coding, and Location-Based Services, Peer-to-Peer Communication, Hardware Interfacing and finally publish it on Google Play Store.

Course objectives:
After the completion of this course, the students should be able to: -
1. Gain a good understanding of the basic concept of mobile technology and mobile operating system.
2. Develop android based mobile apps using Android SDK tool kits.
3. Use various Layouts and Widgets in Android Applications.
4. Create interactive applications in android with multiple activities including audio, video and notifications.
5. Deploy applications to the Android marketplace for distribution.

Course Contents:

Theory

Unit 1. Introduction **[3 Hrs.]**
- 1.1. Mobile and Wireless
- 1.2. Mobile devices, Screen resolution and Touch interfaces
- 1.3. App Store, Google Play, Windows Store
- 1.4. Development environments
- 1.5. Mobile OS Architecture
- 1.6. History of Android
- 1.7. Versions and API levels of Android
- 1.8. Android Development Tools
- 1.9. Environments Set up

Unit 2. Application and User Interface **[6 Hrs.]**
- 2.1. Creating Applications and Activities
- 2.2. Introducing the Application Manifest
- 2.3. The Android Application Life Cycle
- 2.4. Runtime Configuration Changes
- 2.5. Fundamental Android UI Design and user interface
- 2.6. The Android Widget Toolbox
- 2.7. Introducing Layouts
- 2.8. Creating and modify Views

2.9. Creating Custom Widgets and Controls
2.10. Using Custom Controls
2.11. Creating and Using Menu
2.12. Submenus and Context Menus

Unit 3. Intents, Broadcast Receivers, Adapters, and the Internet [6 Hrs.]

3.1. Introducing Intents
3.2. Using Intents to Launch Activities
3.3. Using Intent Filters for Plug-ins and Extensibility
3.4. Using Intents to Broadcast Events
3.5. Introducing Adapters
3.6. Using Adapters for Data Binding
3.7. Using Internet Resources
3.8. Connecting to an Internet Resource
3.9. Introducing Dialogs
3.10. Using Activities as Dialogs

Unit 4. Data Storage, Retrieval, and Sharing [8 Hrs.]

4.1. Android Techniques for Saving Data
4.2. Saving Simple Application Data
4.3. Creating and Saving Preferences
4.4. Retrieving Shared Preferences
4.5. Saving the Activity State
4.6. Saving and Loading Files
4.7. File Management Tools
4.8. Databases in Android
4.9. Introducing SQLite
4.10. Cursors and Content Values
4.11. Working with Android Databases
4.12. Introducing Content Providers
4.13. Using Content Providers

Unit 5. Views, Animation and Fragments [4 Hrs.]

5.1. Views in Android
5.2. Types of views: List view and Grid view
5.3. Implementing list view and grid view
5.4. Android animations
5.5. Implementing various types of animations
5.6. Fragments in android

Unit 6. Maps, Geo-coding, and Location-Based Services [6 Hrs.]

6.1. Using Location-Based Services
6.2. Selecting a Location Provider
6.3. Finding the Available Providers
6.4. Finding Your Location
6.5. Tracking Movement
6.6. Using Proximity Alerts
6.7. Using the Geo-coder
6.8. Creating Map -Based Activities
6.9. Creating a Map-Based Activity

6.10. Using the Map Controller
6.11. Creating and Using Overlays

Unit 7. Working in the Background [6 Hrs.]

7.1. Introducing Services
7.2. Creating and Controlling Services
7.3. Binding Activities to Services
7.4. Customizing Toasts
7.5. Using Toasts in Worker Threads
7.6. Introducing Notifications
7.7. Creating Notifications
7.8. Triggering Notifications
7.9. Using Alarms

Unit 8. Peer-to-Peer Communication and Hardware Interfacing [4 Hrs.]

8.1. Introducing Android Instant Messaging
8.2. Managing Chat Sessions
8.3. Sending and Receiving Data Messages
8.4. Introducing SMS
8.5. Using the Media APIs
8.6. Playing Media Resources
8.7. Using the Camera
8.8. Introducing the Sensor Manager
8.9. Android Telephony
8.10. Using Bluetooth
8.11. Managing Network and Wi-Fi Connections

Unit 9. Publishing apps [2 Hrs.]

9.1. Preparing for publishing
9.2. Publishing to the Android Market

Practical: [45 Hrs.]

1. Learning the Basics [6 Hrs.]
   1.1. Setting up the Development Environment
   1.2. Create a "Hello World" Android Application
   1.3. Install and run the application on a physical device
   1.4. Create a simple user interface
2. Implementing layouts and views [8 Hrs.]
   2.1. Demonstrate different positions of relative layouts
   2.2. Demonstrate views and views group
   2.3. Use events and event listeners
3. Using Adapters [6 Hrs.]
   3.1. Declare layouts statically as an xml resource
   3.2. Create Options and Context Menus
   3.3. Use Adapters and Adapter Views to bind a View class to data
4. Saving data and using database [8 Hrs.]
   4.1. Save & restore data as Application Preferences
   4.2. Create an SQLite Database
   4.3. Manage database connections
   4.4. Insert, update, remove, and retrieve data from an SQLite Database

5. Using Animations [2 Hrs.]
   5.1. Demonstrate different types of animations
6. Implement Maps [8 Hrs.]
   6.1. Incorporate Google Maps into an application
   6.2. Register for and receive GPS location information
   6.3. Create Google Maps Overlays
7. Using Intents [3 Hrs.]
   7.1. Create and use Content Providers
   7.2. Create and use Services
   7.3. Broadcast Intents
8. Using Sensors and SMS [2 Hrs.]
   8.1. Send SMS text messages.
   8.2. Register to receive information from a device's available sensors.
   8.3. Monitor the motion of a physical device.
9. Publishing apps [2 Hrs.]
   9.1. Publish app to play store

Final written exam evaluation scheme			
Unit	**Title**	**Hours**	**Marks Distribution***
1	Introduction	3	5
2	Application and User Interface	6	10
3	Intents, Broadcast Receivers, Adapters, and the Internet	6	10
4	Data Storage, Retrieval, and Sharing	8	20
5	Views, Animation and Fragments	4	5
6	Maps, Geo-coding, and Location-Based Services	6	10
7	Working in the Background	6	10
8	Peer-to-Peer Communication and Hardware Interfacing	4	5
9	Publishing apps	2	5
	Total	**45**	**80**

* There may be minor deviation in marks distribution.

References:

1. Meier, R. (2009). Professional Android application development. Indianapolis, India: Wiley.
2. Kothari, Pradeep. (2014). Android Application Development, Black Book Paperback, Dreamtech Press, India
3. Barry Burd, (2015). Android Application Development All-in-One for Dummies. Wiley India Private Limited

Telecommunication
(Elective II)
EG3202IT.3

Year: III **Total: 7 hours /week**
Part: II **Lecture: 3 hours/week**
Tutorial: 1 hour/week
Practical: 0 hours/week
Lab: 3 hours/week

Course description:
This course covers introduction to basic communication and telephone system, EPABX system, long distance communication, soft switching access network & transmission network, mobile and wireless communication are also included.

Course Objectives:
After completing this course, the students will be able to
1. Familiarize telephony system and soft switching system.
2. Install PABX system.
3. Explain wireless / mobile communication system.

Course Contents:

Theory

Unit 1. Introduction [6 Hrs.]
- 1.1. History of communication system
- 1.2. Transmission Media
  - 1.2.1. Flexible cables
  - 1.2.2. PVC cables
  - 1.2.3. Communication Cable /LAN Cables (STP, UTP, Fiber Optics)
  - 1.2.4. Metallic & Non-metallic Sheathed Cable
- 1.3. Types of radio communication system:
  - 1.3.1. Telephony
  - 1.3.2. Broadcasting of audio and visual information
  - 1.3.3. Radio navigation
  - 1.3.4. Satellite communication
- 1.4. Switching system:
  - 1.4.1. Rotary dial Telephone
  - 1.4.2. Strowger switching system
  - 1.4.3. Principles of crossbar switching
  - 1.4.4. Crossbar switch configuration

Unit 2. Telephone Switching System [8 Hrs.]
- 2.1. Introduction
  - 2.1.1. Telephone channel
  - 2.1.2. Group, super group, master group, super master group
  - 2.1.3. Switching: Stored program control, Software architecture Application software, Centralized SPC and Distributed SPC
  - 2.1.4. Service Networks:
    - 2.1.4.1. Two stage Networks
    - 2.1.4.2. Three stage Networks
    - 2.1.4.3. N Stage Networks

2.2. Basic time division space switching and Time multiplexed space switching
2.3. Basic time division Time switching and Time multiplexed time switching
2.4. Combination switching

Unit 3. Data Networks and Operation [9 Hrs.]

3.1. Introduction
3.2. Initial Design Considerations
  3.2.1. Data Terminals, Workstations, PCs, and Servers
3.3. Network Topologies and Configurations
3.4. Overview of Data Switching
  3.4.1. Traffic Engineering- A Modified Meaning
  3.4.2. Packet Networks and Packet Switching
  3.4.3. Interior Gateway Routing Protocol (IGRP)
3.5. TCP/IP and Related Protocols
  3.5.1. TCP/IP and Data-Link Layers
  3.5.2. The IP Routing Function
  3.5.3. The Transmission Control Protocol (TCP)
  3.5.4. Brief Overview of Internet Protocol Version 6 (IPV6)
3.6. Virtual Private Networks (VPNs)
  3.6.1. Introduction to VPNs
  3.6.2. Two Major Requirements
  3.6.3. Specialized VPN Internet Protocols
  3.6.4. Principal Components of a VPN Based on the Internet

Unit 4. Mobile Telephone and Wireless Communication [6 Hrs.]

4.1. Basic cellular system
4.2. Mobile radio environment
  4.2.1. Trunking
  4.2.2. Efficiency
  4.2.3. Performance criteria
4.3. Operation of cellular systems
4.4. GSM/ LTE/UMTS evolution and architecture
4.5. CDMA architecture
4.6. WiFi, WiMax, & HOTSPOT Technology
4.7. 4G, 5G, & 6G Technology

Unit 5. Access network & Transmission Network [10 Hrs.]

5.1. Types of faults, Maintenance of network- Types of maintenance, MCC; FTTH Network- OLT, Level splitter, CPE, Fusion splicing techniques
5.2. Basic transmission network (Backbone, Spur link)
5.3. IP concept for transmission network
5.4. Introduction of IDU/ ODU of PDH/SPDH equipment
5.5. Recurrent faults in transmission systems- their causes and remedies
5.6. Lightening protection mechanism for transmission equipment
5.7. Earthing and shielding techniques for telecom equipment

Unit 6. Measuring Instruments & Tools [6 Hrs.]

6.1. Various types of mechanical tools
6.2. Pliers& wrenches

6.3. Cable cutter
6.4. Winch machine
6.5. Multi-meter, Voltmeter, Ammeter, Wattmeter, VSWR meter, Tong tester, Sequence tester, Frequency meter

Practical: **[45 Hrs.]**

1. PABX installation, communication, and complete solutions
2. Handle Measuring Instruments and Tools
3. Field Visit and Case Study:
   a) Prepare report after visit the Telephone Company.
   b) Prepare report after visit the Internet Service Provider

Final written exam evaluation scheme			
Unit	**Title**	**Hours**	**Marks Distribution***
1	Introduction	6	11
2	Telephone Switching System	8	14
3	Data Networks and Operation	9	15
4	Mobile Telephone and Wireless Communication	6	11
5	Access network & Transmission Network	10	18
6	Measuring Instruments & Tools	6	11
	Total	**45**	**80**

* There may be minor deviation in marks distribution.

References:

1. Roger L. Freeman, Telecommunication System Engineering Fourth Edition, Published by John Wiley & Sons, Inc., Hoboken, New Jersey, 2004
2. J.C. Bellamy, Digital Telephony, 3rd Edition, John Wiley & Sons, New York, 2002
3. Stallings, W., Data Communication and Computer Networks, Seventh Edition, New Delhi: Prentice-Hall of India Limited, 2004

Network and System Administration
(Elective II)
EG3202IT.4

Year: III **Total: 7 hours /week**
Part: II **Lecture: 3 hours/week**
Tutorial: 1 hour/week
Practical: … hours/week
Lab: 3 hours/week

Course description:
This course is designed to introduce the concept of network, server/client, protocols and its administration. It includes resource sharing, services management and infrastructure needed for a network.

Course objectives:
After completion of this course students will be able to:
1. Setup and administer the small home/office network.
2. Manage basic server services.
3. Administer network remotely.

Course Contents:

Theory

Unit 1. Computer Networking Basics **[4 Hrs.]**
- 1.1. Networking Fundamentals
- 1.2. OSI Reference Model
- 1.3. TCP/IP Model
- 1.4. Network protocols
- 1.5. Network Architecture

Unit 2. Server Administration **[8 Hrs.]**
- 2.1. Installing Server and Client (Linux)
- 2.2. Linux Operating System basic commands
- 2.3. Managing Users and Groups
- 2.4. File Systems
- 2.5. Process management
- 2.6. Administering Database Server

Unit 3. Services Management **[7 Hrs.]**
- 3.1. Managing Services
- 3.2. Mail Servers
- 3.3. File Servers
- 3.4. Web Servers

Unit 4. Shells **[4 Hrs.]**
- 4.1. Introduction
- 4.2. Working with files and directories
- 4.3. Shell Variables and Scripts
- 4.4. Shell Configuration

Unit 5. Shared Resources **[6 Hrs.]**
- 5.1. Introduction

5.2. Network File Systems
5.3. Print Services
5.4. Samba
5.5. Resource sharing using Cloud Computing

Unit 6. Network Support **[6 Hrs.]**

6.1. Proxy Severs: Squid
6.2. Domain Naming System
6.3. Dynamic Host Configuration Protocol
6.4. IPv4 and IPv6 Addressing
6.5. Autoconfiguration
  6.5.1. Stateful auto-configuration
  6.5.2. Stateless auto-configuration
6.6. Firewalls
6.7. Administering TCP/IP Networks

Unit 7. Network Infrastructure **[4 Hrs.]**

7.1. Concept of Switch
7.2. Static Routing and Dynamic Routing
7.3. VLAN configuration
7.4. Spanning Tree

Unit 8. Remote Administration **[6 Hrs.]**

8.1. Webmin/usermin
8.2. Telnet
8.3. SSH
8.4. scp, rsync commands

Practical: **[45 Hrs.]**

1. Install Server/Client over VMware Environment.
2. Perform the system administration activities: User/Group management, File System management.
3. Demonstrate static and dynamic routing using Packet Tracer.
4. Demonstrate DHCP and DNS configuration.
5. Demonstrate Web and Proxy Server Configuration.
6. Working on Webmin/SSH and Telnet

Final written exam evaluation scheme			
Unit	**Title**	**Hours**	**Marks Distribution***
1	Computer Networking Basics	4	7
2	Server Administration	8	14
3	Services Management	7	12
4	Shared Resources	6	11
5	Network Support	6	11
6	Shells	4	7
7	Network Infrastructure	4	7
8	Remote Administration	6	11
	Total	**45**	**80**

* There may be minor deviation in marks distribution.

References:

1. Larisa and Aleina (2015). Ubuntu 15.04 Server with system: Administration and Reference
2. Jonathan Hobson (2013). CentOS 6 Linux Server Cookbook. Packt Publishing
3. Stanek, William R. (2012). Windows Server 2012 Inside Out, Delhi, Phi Learning Private Limited.
4. Mitch Tulloch, (2012). Introducing Windows Server 2012. Microsoft Press
5. Orin Thomas (2013). Configuring Advanced Windows Server 2012 Services. O'Reilly Media

Major Project
EG3203IT

Year: III **Total: 8 hours /week**
Part: II **Lecture: … hours/week**
Tutorial: … hour/week
Practical: 8 hours/week
Lab: … hours/week

Course description:
The main aim of this course is to plan and complete project work, related with Information Technology under the supervision of an instructor or a supervisor.

Course objectives:
On completion of this course, the students will be able to:
1. Develop the ability to tackle individually a selected problem to a reasonable depth of understanding
2. Develop the ability to organize and produce a professional product using an engineering approach
3. Develop the ability to produce technical documentation to a high standard
4. Develop the ability to produce an analytical report which explains the work carried out by the students in the project and the final product they have developed

Project Overview:
1. Group formation (3-4 persons / group)
2. Project concept development
   a. Finding Project concept
   b. Scope of project
   c. Completion time
3. Proposal preparation and presentation-2 weeks
4. Mid-term defense (should complete literature review, methodology, project design and project progress report)-8 weeks after the proposal acceptance
5. Final defense (should deliver complete project and report)-4 weeks after mid-term defense
6. Project documentation (must follow project documentation guide line given by supervisor or the department)
7. Submission of hard cover project document to department-1 week after final defense

Description of the Project Work:
The work carried out must be a practical, problem-solving project. It should be a realistic project in the sense that the product should be useful practically as far as possible.

The project should:
- be intended to develop an IT solution to a practical problem
- be carried out using an engineering approach
- emphasize design
- be carried out in a group (3-4 person/group)
- normally result in the production of a piece of software
- include technical documentation based on documentation guideline.
- be fully described from inception to completion in a written report produced to a good level of professional competence

Procedure:

1. A detailed project proposal to be submitted to the project supervisor for the approval of project work.
2. A mid-term progress report to be submitted to the supervisor. The supervisor must hold an oral presentation of about 10 minutes (including progress preview) to evaluate the mid-term progress of the project work.
3. A final written report will be submitted at the end of project work. There will be a final oral group presentation of about 15 minutes (including demonstration). The project coordinator, the supervisor and the external examiner nominated by the project coordinator will evaluate the submitted report as well as the presentation.

Requirements for report writing:

Font Name: Times New Roman
Top Margin: 1 inch
Left Margin: 1 inch
Right Margin: 1 inch
Bottom Margin: 1 inch
Gutter: 0.25 inch (left)
Header and Footer: 0.5 inch
Line Spacing: Single
Paragraph Spacing: 8 pt.
Font Size: 12 pt. (for normal text)
Follow following standard for headings

2. Heading1 (16pt, Bold)

2.1. Heading2 (14pt, Bold)

2.1.1. Heading3 (13pt, Bold)

2.1.1.1. Heading4 (12pt, Bold)

Arrangement of Contents in a report:

The sequence of contents in a major project report is as follows

1. Cover Page
2. Title Page
3. Certificate of Approval
4. Acknowledgment
5. Executive Summary

- Executive Summary should be one-page synopsis of the project report and it must clearly give the overview of the project.

6. Table of Contents

- The table of contents should list all material following it as well as any material which precedes it.

7. List of Figures (if any)

- The list should use exactly the same captions as they appear below the figures in the text.

8. List of Tables (if any)

- The list should use exactly the same captions as they appear above the tables in the text.

9. List of Symbols (if any)

- The list should provide the detail of the symbols used in the report.

10. Abbreviations (if any)

- Abbreviation list should provide the details of the abbreviations used in the report in alphabetical order.

11. Main body
    - 11.1. Chapter 1: Project Overview (Introduction, Objectives and Scope, Project Features,
      Feasibility, System Requirement)
    - 11.2. Chapter 2: Literature Review
    - 11.3. Chapter 3: Design and Methodology (e.g., System Design, methods used, tools, data source)
    - 11.4. Chapter 4: Result and Analysis
    - 11.5. Chapter 5: Conclusion, Recommendation and Limitations
12. References

- The reference material should include the author's name, title, year. Do not mention the references of the websites in the report.

12. Appendices (if any)

- Appendices are provided to give supplementary information, which is included in the main text may serve as a distraction and cloud the central theme. Appendices should be numbered using Arabic numerals, e.g., Appendix 1, Appendix 2, etc. Tables and References appearing in appendices should be numbered and referred to appropriate places just as in the case of chapters.

Page numbering: The preliminary parts (Acknowledgement, Executive Summary, Table of Contents, List of symbols, List of figures, List of tables) are numbered in roman numerals (i, ii, etc.). The first page of the first chapter (Introduction) onwards will be numbered in Arabic numerals 1 2 3 etc. at the bottom.

Figure and Table numbering: It is useful and convenient to number the figures also chapter-wise. The figures in chapter 4 will be numbered as Figure 4.1: Figure Name. This helps you in assembling the figures and putting it in proper order. Similarly, the tables are also numbered as Table 4.1: Table Name. All figures and tables should have proper captions. Usually, the figure captions are written below the figure and table captions on top of the table.

Evaluation Scheme:

The project coordinator, the supervisor and the external examiner should evaluate the project work and presentation by the following criteria:

S.N.	Topic	Marks Distribution
1	Proposal Defense	20
2	Mid-term progress report/presentation	60
3	Final project report/presentation	120 (Project coordinator =10 supervisor =30 external examiner =80)
	Total	**200**

Detailed Evaluation Scheme

S.N.	Topic	Marks Distribution
1	Presentation skill	20%
2	Team work	10%
3	Understanding of project work and related	20%

	theory	
4	Project demonstration	20%
5	Project Applications	10%
6	Documentation	20%
	Total	**100%**