

**Course Title: Digital Switching and Tele-Traffic Engineering**

**Course Code: ETEG 417**

**Credit Hours: 3**

**Course Description:**

This course intends to provide a grasp of the hardware and services of modern digital switching technology and tele-traffic engineering.

**Course Contents:**

**Unit 1: Introduction to Switching System**

History and basics of switching systems, Function of switching system, Electronic and digital switching systems, Time and space division switching, Multi-rate switching system, Fast switching system and its evolution.

**Unit 2: Switching System Architecture and Networks**

Subscriber and line interface, control unit timing and synchronization, Switching hierarchy, Operation and maintenance, Routing, Switching network, Stage Networks; Blocking and non blocking networks; circuit switched fall back (CSFB) network; Switching technique for data transmission; Exchange, Stored Program Control (SPC)- Centralized and distributed, Number plan and billing.

**Unit 3: Signaling Systems**

Introduction of signaling mechanism, Signaling function, Types of signaling- In channel signaling, Out channel signaling; Common channel signaling- Channel associated and non associated mode; Trunk signaling system, Line signaling, Voice frequency signaling, Digital line signaling, Multi-frequency system, International signaling system.

**Unit 4: Introduction to Tele-traffic Engineering**

The concept of traffic and "erlang", Traffic variation and concept of busy hour, Statistical properties of traffic, The blocking concept, Lost call and Grade of Service (GOS), Quality of service(QOS), Special feature of QOS, Subscriber behavior, Network Performance and ITU-T recommendation. Video and data traffic characteristic.

**Unit 5: Loss Systems**

Introduction to various distributions, Exponential distribution, Binomial distribution, Erlang-k distribution, Poisson's distribution; State transition diagrams; Truncated Poisson's Distribution; Erlang's B formula

**Unit 6: Delay Systems**

Traffic characteristics of delay systems; Erlang delay system M/M/n; Erlang's C formula; Mean queue lengths; Mean waiting times- for all and delayed user; Queuing systems with constant holding times; Priority queuing systems; Fair queuing- Round robin, Processor sharing.

### **Unit 7: Traffic measurements**

Measuring principle and methods- Continuous and discrete measurement; Continuous measurements in an unlimited period; Scanning method in an unlimited period.

#### **References:**

1. B.E. Briley, *An Introduction to Telephone Switching*, Addison-Wesley 1983.
2. J.C. McDonald, *Fundamentals of Digital Switching*, Plenum Publishing 1983.
3. Thiagarajan Viswanathan, *Telecommunication Switching Systems and Networks*, Prentice Hall, 1998.
4. J.E. Flood, *Telecommunications Switching, Traffic and Networks*, Pearson Education Ltd., 1999.

#### **Evaluation:**

In-Semester Evaluation: 50%

End-Semester Evaluation: 50%