

<b>Devi Ahilya University, Indore, India</b> <b>Institute of Engineering &amp; Technology</b>			<b>IV Year B.E. (Electronics &amp; Instrumentation Engg.)</b>				
<b>Subject Code &amp; Name</b>	<b>Instructions Hours per Week</b>			<b>Credits</b>			
<b>EIR6E5</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>
<b>Telecom and Switching Networks</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>5</b>
<b>Duration of Theory Paper: 3 Hours</b>							

**Rationale:** This subject aims at introducing to the students the knowledge about the telecommunication industry: its services and market, the theoretical basis about performance (queuing theory) and operation (multiplexing, switching, routing, and signaling) in telecom networks.

**Prerequisites:** Familiarity with signals, signal processing and communication, networks.

### Course Contents

#### Unit-I

Introduction to telephone communication, manual switching system, Automatic strowger switching system, crossbar switching system, Signaling in Automatic Strowger Switching System, Elements of a Switching System, Design parameters of Switching System.

#### Unit-II

Network traffic Load and parameters, grade of service, Trunking Efficiency and blocking probability, modeling switching systems, incoming traffic and service time characterization, blocking models and loss estimates, delay systems.

#### Unit-III

Electronic space division switching: Stored program control; centralized and distributed, software architecture, application software, enhanced services, single and multistage networks. Time division switching; Basic time division space switching, basic time division time switching, time multiplexed space switching, time multiplexed space switching, combination switching, multistage combination switching.

#### Unit-IV

Analog termination requirements, BORSCHT configuration, digital termination requirements, signaling tones, touch tone dial generation, design consideration, touch tone detection, switching hierarchy and routing, transmission plan, Signaling systems.

## **Unit-V**

Data transmission in PSTN's switching, techniques for data transmission, data communication architecture, link to link layers, end to end layers, PABX, data network standards, Metropolitan Area Network (MAN), Satellite based data networks, fibre optic networks.. Network Hierarchy: Network hierarchy in the telephone network, Network hierarchy in other networks.

### **Learning Outcomes:**

At the end of the module the student will be able to:

1. Describe and apply fundamentals of telecommunication systems and associated technologies.
2. Apply the principles of queuing theory in evaluating the performance of congested telecommunication networks.
3. Solve problems and design simple systems related to tele-traffic and trunking efficiency.
4. Understand and explain the reasons for switching, and the relative merits of the possible switching modes, e.g. packet and circuit switching.
5. Understand the principles of the internal design and operation of telecommunication switches, and the essence of the key signaling systems that are used in telecommunication networks .

### **Books Recommended:**

1. ThiagarajanVishwanathan, Telecommunication Switching Systems and Networks, PHI
2. Joseph Y. Hui, Switching and Traffic Theory for Integrated Broad Band Networks, Kluwer Academic publishers, 1990
3. V.E. Benes, Mathematical Theory of connecting Networks & Telephone Traffic, Academic Press, 1965.
4. G. Hebuterve ,Traffic Flow in Switching Systems , Artech House, 1987.
5. J.C. Bellamy, Digital Telephony, John Wiley 2nd Ed., 1992