

4. Academic Course Description

SRM University
Faculty of Engineering and Technology
Department of Electronics and Communication Engineering
EC1114 COMMUNICATION SWITCHING TECHNIQUES
Sixth Semester, 2015-16 (Even Semester)

Course (catalog) description

This is a first course in Electronics and Communication Engineering, teaching the fundamentals of Switching techniques. The initial part of the course introduce the basic concepts related to switching systems for telecommunications and networks.

Compulsory/Elective course: Elective course for ECE students

Credit hours : 3 credits

Course coordinator(s) : Mr.S.Praveen kumar Asst. Professor (O.G), Dept of ECE

Instructor(s)

Name of the instructor	Class handling	Office location	Office phone	Email	Consultation Hours
Mr.S.Praveen kumar	Batch X	TP10S4	2070	Praveenkumar.se@ktr.srmuniv.ac.in	Day-3 1.30 to 2.30pm
Mrs. R. Vinolee	Batch Y	TP1103A		vinooole.r@ktr.srmuniv.ac.in	Day-3 1.30 to 2.30pm

Relationship to other courses

Pre-requisites : Nil

Assumed knowledge : Basic mathematical knowledge and Communication theory

Following courses : Nil

Syllabus Contents

UNIT I-BASIC SWITCHING SYSTEMS FOR TELECOMMUNICATION (9 hours)

Crossbar switching – Electronic space division switching – Time division switching – Time multiplexed switching – n-stage combination switching - hybrid time and space division multiplexes.

UNIT II-TRAFFIC ENGINEERING (9 hours)

Congestion – Network traffic load and Parameters – Traffic measurement – Lost-call system – Grade of Service and Blocking probability – Modeling switching systems – Incoming traffic and service time characterization – Blocking models and loss estimates – Queuing systems – Simulation models.

UNIT III-SWITCHING NETWORKS (9 hours)

Single-stage networks – Gradings – Link systems – Grades of service of link systems – Application of graph theory to link systems – Use of expansion – Call packing – Rearrangeable networks – Strict-sense non-blocking networks – Sectionalized switching networks.

UNIT IV-TIME-DIVISION SWITCHING AND CONTROL OF SWITCHING SYSTEMS (9 hours)

Space and time switching – Time-division switching networks – Grades of service of time-division switching networks – Non-blocking networks – Synchronization – Call-processing functions – Common control – Reliability, availability and security – Stored program control.

UNIT V-SIGNALING AND PACKET SWITCHING (9 hours)

Customer line signaling – FDM carrier systems – PCM signaling – Inter-register signaling – Common-channel signaling principles – CCITT signaling – Digital customer line signaling – Statistical multiplexing – Local area and wide area networks – Large scale and Broadband networks.

Text book(s) and/or required materials

[T1]. Flood.J.E, “Telecommunications Switching, Traffic and Networks”, Pearson Education Ltd., 1999.

[T2].Thiagarajan Viswanathan, “Telecommunication Switching Systems and Network”s, Prentice Hall of India Pvt.Ltd, 1992.

References

- 1.Bellamy John, "Digital Telephony", John Wily & Sons, Inc. 3rd end. 2000
- 2.Freeman R.L., Telecommunication System Engineering, Wiley Inter Science Publications
- 3.Das J., Review of Digital Communication, New Age Internal (P) Ltd., Publishers

Computer usage: Nil

Class schedule: Three 50 minutes lecture sessions per week

Section	Schedule
X	Day-1: 5,Day-3: 5, Day-4: 7
Y	Day-1: 5,Day-3: 8, Day-4: 2

Professional component

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	100%

Broad area : Communication | Signal Processing | Electronics | VLSI| Embedded

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	24-02-2016	Session 1 to 15	2 Periods
2	Cycle Test-2	23-03-2016	Session 16 to 30	2 Periods
3	Model Test	25-04-2016	All session / units	3 Hours
4	University Exam	TBA	All sessions / units	-

Mapping of Instructional Objectives with Program Outcome

This course provides the foundation education in network security. Through lecture and out-of-class assignments, students are provided learning experiences that enable them to:	Correlates to program outcome		
	H	M	L
1.To study the concepts of message switching, circuit switching, strowger switching, crossbar switching, electronic switching, and digital switching.	a	e	
2. To understand the problems of congestion, queuing, and to study methods like Grade of Service, and Blocking Probability to provide an estimate of the amount of traffic present in various systems.	e		a
3.T To solve problems in single-stage networks, strict-sense non-blocking networks, and sectionalized switching networks.	c,e	a	
4.To study concepts like Reliability, Availability, and Security in various types of switching systems. To learn the different kinds of signaling, circuit and packet switching techniques.	a,c,e		
H: high correlation, M: medium correlation, L: low correlation			

Draft Lecture Schedule

Session	Topics	Problem Solving (Yes/ No)	Text / Chapter
UNIT-I Basic Switching Systems			
1.	Crossbar switching	No	[T1]Chapter 3
2.	Electronic space division switching	No	[T1]Chapter 3
3.	Time division switching	Yes	[T2]Chapter 6
4.	Time multiplexed switching	No	[T2]Chapter 6
5.	Time multiplexed switching	No	[T2]Chapter 6
6.	n-stage combination switching	Yes	[T2]Chapter 6
7.	n-stage combination switching	Yes	[T2]Chapter 6
8.	hybrid time and space division multiplexes	No	[T2]Chapter 6
9.	hybrid time and space division multiplexes	No	[T2]Chapter 6
UNIT-II TRAFFIC ENGINEERING			
10	Congestion – Network traffic load and Parameters	Yes	[T1]Chapter 4
11	Traffic measurement	No	[T1]Chapter 4
12	Lost-call system	Yes	[T1]Chapter 4
13	Grade of Service and Blocking probability	Yes	[T1]Chapter 4
14	Modeling switching systems	Yes	[T1]Chapter 4
15	Incoming traffic and service time characterization	No	[T1]Chapter 4
16	Blocking models and loss estimates	Yes	[T1]Chapter 4
17	Queuing systems	Yes	[T1]Chapter 4
18	Simulation models.	No	[T1]Chapter 4
UNIT-III SWITCHING NETWORKS			
19	Single-stage networks – Gradings	Yes	[T1]Chapter 5
20	Link systems	Yes	[T1]Chapter 5
21	Grades of service of link systems	Yes	[T1]Chapter 5
22	Application of graph theory to link systems	Yes	[T1]Chapter 5
23	Use of expansion	No	[T1]Chapter 5
24	Call packing	No	[T1]Chapter 5
25, 26	Rearrangeable networks – Strict-sense non-blocking networks	Yes	[T1]Chapter 5
27	Sectionalized switching networks.	No	[T1]Chapter 5
UNIT-IV TIME DIVISION SWITCHING AND CONTROL OF SWITCHING SYSTEMS			
28	Space and time switching	No	[T1]Chapter 6
29	Time-division switching networks	No	[T1]Chapter 6
30	Grades of service of time-division switching networks	Yes	[T1]Chapter 6
31	Non-blocking networks	Yes	[T1]Chapter 6
32	Synchronization	No	[T1]Chapter 6

33	Call-processing functions	No	[T1]Chapter 7
34	SS Common control – Reliability, availability and security	No	[T1]Chapter 7
35	SS Common control – Reliability, availability and security	No	[T1]Chapter 7
36	Stored program control.	No	[T1]Chapter 7
UNIT-V SIGNALING AND PACKET SWITCHING			
37	Customer line signaling	No	[T1]Chapter 8
38	FDM carrier systems – PCM signaling	Yes	[T1]Chapter 8
39	Inter-register signaling	No	[T1]Chapter 8
40	Common-channel signaling principles	No	[T1]Chapter 8
41	CCITT signaling	No	[T1]Chapter 8
42	Digital customer line signaling	No	[T1]Chapter 8
43	Statistical multiplexing	Yes	[T1]Chapter 9
44	Local area and wide area networks	No	[T1]Chapter 9
45	Large scale and Broadband networks.	No	[T1]Chapter 9

Teaching Strategies

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

- Formal face-to-face lectures
- Tutorials, which allow for exercises in problem solving and allow time for students to resolve problems in understanding of lecture material.
- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.
- Small periodic quizzes, to enable you to assess your understanding of the concepts.

Evaluation Strategies Internal assessment

Cycle Test – I	-	20% (10 marks)
Cycle Test – II	-	20% (10 marks)
Model Test	-	40% (20 marks)
Surprise Test	-	10% (5 marks)
Attendance	-	10% (5 marks)

Prepared by: , Mr.S.Praveen Kumar, Asst. Professor (O.G), Department of ECE .

Dated: 01-02-2016

Revised by: -

Revision No.: NA

Date of revision: --

Addendum

ABET Outcomes expected of graduates of B.Tech / ECE / program by the time that they graduate:

- a. an ability to apply knowledge of mathematics, science, and engineering
- b. an ability to design and conduct experiments, as well as to analyze and interpret data
- c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- d. an ability to function on multidisciplinary teams
- e. an ability to identify, formulate, and solve engineering problems
- f. an understanding of professional and ethical responsibility
- g. an ability to communicate effectively
- h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- i. a recognition of the need for, and an ability to engage in life-long learning
- j. a knowledge of contemporary issues
- k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Educational Objectives

1. Graduates will perform as a successful Professional engineer in related fields of Electronics and Communication Engineering.
2. Graduates will pursue higher education and/or engage themselves in continuous professional development to meet global standards.
3. Graduates will work as a team in diverse fields and gradually move into leadership positions.
4. Graduates will understand current professional issues, apply latest technologies and come out with innovative solutions for the betterment of the nation and society.

Course Teachers	Class	Signature
Mr. S. Praveen Kumar	X	
Mrs.A.Vinolee	Y	

Course Coordinator **Academic Coordinator** **Professor In-Charge** **HOD**
(Mr.S.Praveen Kumar) (Mrs.N.Saraswathi) (Dr.B.Ramachandran) (Dr.T. Rama Rao)