

Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title: DIGITAL COMMUNICATION & NETWORKING LAB	Course Code : 15EC47P
Semester : Fourth	Credits : 4
Teaching Scheme in Hr. (L:T:P) : 0:2:4	Course Group : Core
Type of course : Tutorial + Practical	Total Contact Hours : 78
CIE : 25 Marks	SEE : 50 Marks

Prerequisites

Basic Knowledge of analog communication, digital electronics, digital communication and data communication networks.

Course Objectives

Understand, analyze and evaluate the working/operation of digital communication and networking elements and applications.

Course Outcomes

On successful completion of the course, the students will be able to attain the following COs

Course Outcome		CL	Experiments linked	Linked PO	Teaching Hrs
CO1	Understand and analyze sampling, multiplexing.	<i>U/A</i>	Unit-1: E1-2	1,2,3,4,	06
CO2	Analyze digital modulation and demodulation techniques.	<i>R/U/A</i>	Unit-1: E3-7	1,2,3,4	21
CO3	Demonstrate OFC characteristics & applications.	<i>R/U/A</i>	Unit-1: E8-9	1,2,3,4,6,7,9,10	06
CO4	Install and test computer networking and sharing of resources.	<i>U/A</i>	Unit-1: E10-15	1,2,3,4,7,8,9,10	24
CO5	Setup Internet using modem, PSTN	<i>U/A</i>	Unit -1: E16	1,2,3,4,8,9,10	06
CO6	Student Project Activities	<i>U/A</i>	Unit -2	1,2,3,4,5,6,7,8,9,10	09
Two IA/CIE Tests					06
Total					78

Course-PO Attainment Matrix

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Digital Communication & Networking Lab	3	3	3	3	1	1	3	3	3	3
<p>Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.</p> <p>Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.</p> <p>If $\geq 40\%$ of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3</p> <p>If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2</p> <p>If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1</p> <p>If $< 5\%$ of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.</p>										

Course Contents

Unit-1: Tutorials and Graded Exercises

69 Hours

Sl. No.	Topic/Exercises	Duration (Hr)
Part-A: Digital Communication Experiments		
1	Prove sampling theorem for low-pass signals.	3
2	Conduct an experiment to study the effect of aliasing	3
3	Perform an experiment to study Pulse Code Modulation and Demodulation.	3
4	Generation of Delta modulated signal and adaptive delta modulation signal	6
5	Generation and detect of BASK signal.	3
6	Generation and detect of BFSK signal	3
7	Perform an experiment to generate and detect BPSK signal using trainer kit.	6
8	Demonstrate TDM using Fiber Communication System.	3
9	Demonstrate PC to PC communication using Fiber Optic Digital Link.	3

Part-B: Data Communication and Networking experiments		
10	Exercise on crimping Network Cable & Testing using Cable Tester	6
11	Configuration of TCP/IP Protocols settings in Windows or Linux.	3
12	Install a peer to peer network and test with Net meeting.	3
13	Install a network between 3 or more computers using network switch and test for sharing resources	3
14	Establish LAN between Linux & Windows Systems & Share Printer	3
15	Install a Wireless network using Access Point and Wireless Network card between 3 or more computers and Test by Sharing a Printer	6
16	Setup Internet using modem, PSTN Line/WLL/Broad Band and Internet account share internet through LAN	6
Two Internal Assessment Tests		6
Total		69

Unit – 2: Project /Student Activities [CIE- 05 Marks]

9 Hours

Sl. No.	Activity	Duration (Hrs)
1	Design and implement a digital communication link employing ASK or FSK.	09
2	Demonstration and report on functioning of remote PC access through Internet.	

References

1. *Electronics laboratory primer*, S. Poorna Chandra, B.Sasikala, S. Chand Technical Publication. ISBN 81-219-2459-6
2. *Digital Communications*, Dr. K.N.Hari Bhat and Dr.D.Ganesh Rao, III Edition, Sanguine Technical Publishers.
3. <https://www.youtube.com/watch?v=Wh9knsYSodI>
4. <https://www.youtube.com/watch?v=pIIlBINW7sOo>
5. <https://www.youtube.com/watch?v=YmPziPfaByw>
6. <https://www.youtube.com/watch?v=Q3tpT1aMZKY>
7. <https://www.youtube.com/watch?v=jXGo4hIZWAY>
8. *Computer Networks- 5th Edition- Andrew S Tanenbaum- Pearson-Prentice Hall*
9. www.windowsnetworking.com
10. www.networktutorials.info

Course Delivery

The course will be normally delivered through two-hour tutorials and four-hour hands-on practice per week. Normally, one-hour tutorial followed by two-hour hands-on practice is recommended in each class. Tutorial shall be imparted before the conduction of the experiment. However, activities are carried-out off class and demonstration/presentation can be in lab sessions.

Course Assessment and Evaluation Scheme

Master Scheme

Assessment Method	What		To Whom	Assessment mode /Frequency /timing	Max. Marks	Evidence Collected	Course Outcomes
Direct assessment	CIE	IA	Students	Two tests ⁺	10	Blue Books	1 to 6
				Record [@]	10	Record Book	1 to 6
				Activity [*]	05	Report/Sheets	1 to 6
	SEE	End exam		End of the course	50	Answer Scripts at BTE	1 to 6
				Total	75		
Indirect assessment	Student feedback on course		Students	Middle of the Course	Nil	Feedback Forms	1 to 3 Delivery of course
	End of course survey			End of the Course	Nil	Questionnaires	1 to 6 Effectiveness of delivery instructions & assessment methods

Legends: CIE-Continuous Internal Evaluation, SEE- Semester End-exam Evaluation

⁺ Every I.A. test shall be conducted as per SEE scheme of valuation. However, scored marks shall be scaled down to 10. Average of two tests, by rounding off any fractional part thereof to next higher integer, shall be considered for CIE/ IA.

^{*}Students should do activity as per the list of suggested activities/ similar activities with prior approval of the teacher. Activity process must be initiated well in advance so that it can be completed well before the end of the term.

[@] Record Writing: average of marks allotted for all experiments shall be considered; fractional part of the average shall be rounded-off to next higher integer.

Composition of CLs

Sl. No.	Cognitive Levels (CL)	Weightage (%)
1	Remembering	20
2	Understanding	30
3	Applying	50
Total		100

Continuous Internal Evaluation (CIE) pattern

(i) Project/Student Activity (5 marks)

The student activities in Unit-2 or similar activities of can be assigned

Execution Mode:

- Maximum of 2 students in each batch for project activity.
- Either one of the project activity or any similar activity is mandatory for every batch.

3. Project activities shall be carried out throughout the semester and present the project report and demonstration at the end of the semester.
4. Report shall be qualitative and not to exceed 8 pages; one report per batch shall be submitted.
5. Each of the activity can be carried out off-class; however, demonstration/presentation should be done during laboratory sessions.
6. Assessment shall be made based on quality of activity in accordance with the following **rubrics** table.

(ii) Model of rubrics for assessing student activity (for every student)

Dimension	Scale					Marks (Example)
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	
1. Research and gathering information	Does not collect information relate to topic	Collects very limited information, some relate to topic	Collects basic information, most refer to the topic	Collects more information, most refer to the topic	Collects a great deals of information, all refer to the topic	3
2. Full-fills team roles and duties	Does not perform any duties assigned to the team role	Performs very little duties	Performs nearly all duties	Performs almost all duties	Performs all duties of assigned team roles	2
3. Shares work equality	Always relies on others to do the work	Rarely does the assigned work, often needs reminding	Usually does the assigned work, rarely needs reminding	Always does the assigned work, rarely needs reminding.	Always does the assigned work, without needing reminding	5
4. Listen to other team mates	Is always talking, never allows anyone to else to speak	Usually does most of the talking, rarely allows others to speak	Listens, but sometimes talk too much,	Listens and talks a little more than needed.	Listens and talks a fare amount	3
Total marks						ceil(13/4)= 4

(iii) CIE/IA Tests (10 Marks)

Two tests shall be conducted in accordance with SEE pattern and the marks shall be scaled down to 10. Average of two tests, rounding-off any fractional part thereof to next higher integer, shall be considered for CIE/IA.

(iv) Record Evaluation (10 Marks)

Every experiment shall be given marks, in the scale of 10, after its conduction based on student's performance and quality of write-up. Average of them, by rounding-off any fractional part thereof to next higher integer, shall be considered for CIE/IA.

Semester End-exam Evaluation (SEE) Scheme

Sl. No.	Scheme	Max. Marks
1	Write-up for two experiments (one each from Part-A and Part-B) with applicable circuit/block diagram/procedure/table/Ideal graph/formulae	15
2	Construction/Conduction of both the experiments.	20
3	Result	10
4	Viva-voce	05
TOTAL		50
Note: 1. Both parts have equal weightage in the examination; 6-hour experiments shall be trimmed/scaled down appropriately so that the student shall be able to perform in 3-hour exam. 2. Candidate is expected to submit record for the examination. 3. Student shall be allowed to execute the program even if she/he is unable to write the procedure/steps/algorithm.		

Laboratory Resource Requirements

Hardware Requirements: For a batch of 20 students.

Sl. No.	Equipments	Quantity
1	Kit to demonstrate Sampling theorem and aliasing effect	05
2	Kit to demonstrate PCM.	05
3	Delta Modulation and Detection Trainer kit	05
4	Adaptive Delta Modulation and Detection Trainer kit	05
5	Optical fiber communications trainer kit to cover all the experiments.	05
6	Dual Channel CRO (25 MHz)	10
7	Function generator (0-1 MHz)	10
8	Linear IC trainer	05
9	Power supply (+/- 5 Volts)	05
10	Computers (Core2duo/Dual core,1GB RAM,150HDD)	20
11	Crimping tool and Cable tester	10(each)
12	16 port switch	02
13	Web camera	06
14	Tool kit	01set
15	Digital multimeters	10
16	Network Interface Card	10

Model Questions for Practice and Semester End Examination

Note: The questions are indicative but not exhaustive.

Part A: Digital communication experiments

1. Conduct an experiment to prove the Sampling Theorem for low pass signals.
2. Conduct an experiment to study the effect of aliasing.
3. Perform an experiment to study Pulse Code Modulation and Demodulation.
4. Conduct an experiment to generate Delta modulated signal.
5. Conduct an experiment to study Adaptive delta modulation.
6. Perform an experiment to generate and detect BASK signal.
7. Perform an experiment to generate and detect BFSK signal.
8. Perform an experiment to generate and detect BPSK signal.
9. Perform an experiment to verify TDM with Fiber Communication System.
10. PC to PC communication using Fiber-optic Digital Link.

Part B: Data Communication and Networking experiments

11. Exercise on crimping Network Cable & Testing using Cable Tester.
12. Configuration of TCP/IP Protocols settings in Windows or Linux.
13. Install a peer to peer network and test with Net meeting.
14. Install a network between 3 or more computers using network switch and test for sharing resources.
15. Establish LAN between Linux & Windows Systems & Share Printer.
16. Install a Wireless network using Access Point and Wireless Network card between 3 or more computers and Test by Sharing a Printer.
17. Setup Internet using modem, PSTN Line/WLL/Broad Band and Internet account share internet through LAN.
18. Establish Video conference between 3 users using web camera & headphones
19. To Connect Computers in Star Topology using Wired Media and any Network Control Device.
20. To Install Network Interface Card to locate MAC address of Computer.

End