INSTITUTE VISION

"To be a preferred institution in Engineering Education by achieving excellence in teaching and research and to remain as a source of pride for its commitment to holistic development of individual and society"

INSTITUTE MISSION

"To continuously strive for the overall development of students, educating them in a state of the art infrastructure, by retaining the best practices, people and inspire them to imbibe real time problem solving skills, leadership qualities, human values and societal commitments, so that they emerge as competent professionals"

DEPARTMENTAL VISION

“To be the centre of excellence in providing education in the field of Electronics and Communication Engineering to produce technically competent and socially responsible engineering graduates.”

DEPARTMENTAL MISSION

“Educating students to prepare them for professional competencies in the broader areas of the Electronics and Communication Engineering field by inculcating analytical skills, research abilities and encouraging culture of continuous learning for solving real time problems using modern tool”.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

PEO1:

Acquire core competence in Applied Science, Mathematics, and Electronics and Communication Engineering fundamentals to excel in professional carrier and higher study.

PEO2:

Design, Demonstrate and Analyze the Electronic Systems which are useful to society.

PEO3:

Maintain Professional and Ethical values, Employability skills, Multidisciplinary approach and an Ability to realize Engineering issues to broader social contest by engaging in lifelong learning.

PROGRAM SPECIFIC OUTCOMES(PSOS)

The graduates will be able to:

PSO1:

An ability to understand the concepts of Basic Electronics and Communication Engineering and to apply them to various areas like Signal Processing, VLSI, Embedded Systems, Communication Systems and Digital & Analog Devices

PSO2:

An ability to solve complex Electronics and Communication Engineering problems, using latest hardware and software tools, along with analytical skills to arrive at cost effective and appropriate solutions

PROGRAM OUTCOMES (POs):

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainble development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and mangement principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

STUDENT HELP DESK

Sr.No.	Name of the Faculty	Activities
1	Dr. S. B. Akkole	GATE / Preplacement Coaching
		ED Lab Incharge
		Students Mentor
		Dept. NAAC Criteria Sub Coordinator
		NBA Criteria Coordinator
		Participation in Funded Projects
2	Dr. R. R. Maggavi	GATE / Preplacement Coaching
		CN Lab Incharge
		Students Mentor
		Module Coordinator
		Research Center Coordinator
		Dept. NAAC Criteria Sub COordinator
		NBA Criteria Coordinator
		Innovations Club Coordinator
3	Prof. S. S. Malaj	GATE / Preplacement Coaching
		Adv.Comm. Lab Incharge
		Students Mentor
		Dept. NAAC Criteria Sub COordinator
		NBA Criteria Coordinator
		NIRF Coordinator
		Conference Coordinator
04	Prof. S. S. Kamate	GATE / Preplacement Coaching
		VLSI Lab Incharge
		Students Mentor
		Module Coordinator
		IEEE Coordinator
		Dept. NAAC Criteria Sub Coordinator
		NBA Criteria Coordinator
		Project Coordinator
05	Porf. D. M. Kumbhar	GATE / Preplacement Coaching
		AC Lab Incharge
		Students Mentor
		Dept. Association Coordinator
		Class Teacher
		IIIC Coordinator
		Dept. NAAC Criteria Sub Coordinator
		NBA Criteria Coordinator
		AICTE Activity Coordinator
		Dept. ED Cell Coordinator

Sr.No.	Name of the Faculty	Activities
06	Prof. S. S. Patil	GATE / Preplacement Coaching
		ARM & ES Lab Incharge
		Students Mentor
		Class Teacher
		NBA Criteria Coordinator
		AICTE Activity Coordinator
		Admission Coordinator
		Module Coordinator
07	Prof. D. B. Madihalli	GATE / Preplacement Coaching
		DSD Lab Incharge
		Students Mentor
		NBA Coordinator
		News & Publicity Coordinator
		NBA Criteria Coordinator
		Website Coordinator
		VTU LIC Coordinator
08	Prof. P. V. Patil	GATE / Preplacement Coaching
		HDL Lab Incharge
		Students Mentor
		NBA Criteria Coordinator
		T&P Cell Coordinator
		Alumni Coordinator
09	Prof. S. S. Ittannavar	GATE / Preplacement Coaching
		DSP Lab Incharge
		Students Mentor
		EMS/ IA Coordinator
		News Letter / Technical Magazine
		ISTE Coordinator
		AICTE Coordinator
10	Prof. B. P. Khot	GATE / Preplacement Coaching
		MC Lab Incharge
		Students Mentor
		Dept. Time Table Coordinator & Meeting Coordinator
		Class Teacher
		NBA Criteria Coordinator
		AICTE Activity Coordinator

CONTENTS

FACULTY POSITION

S.N.	Category	No. in position	Average experience
1	Teaching faculty.	10	16.15Y
2	Technical supporting staff.	03	16.25Y
3	Helper staff	02	21.08Y

MAJOR LABORATORIES

S. N.	Name of the laboratory	Area in Sq. Mtrs	Amount Invested in Lakhs	S. N.	Name of the laboratory	Area in Sq. Mtrs	Amount Invested in Lakhs
1	Digital Electronics Lab	71	1.54	5	VLSI Lab	71	35.51
2	Analog Electronics Lab	92	8.24	6	Project Lab	95	--
3	Advanced Commn & Commn + LIC Lab	92	20.50	7	Research/E-Yantra/DSP & C.N.Lab	71	16.49
4	HDL/MC / EMD Lab	71	19.57	8	Power Electronics Lab	--	4.86
Total Investment In The Department					**Rs. 95.31 Lacs**		

FACULTY DETAILS

TEACHING FACULTY

S.N.	Name and Designation	Qualification	Specialization	Professional Membership	Teaching Exp.	Contact No.
1	Dr. S. B. Akkole	Ph.D	Communication	LMISTE	27Y.07M	9480422508
2	Dr. R. R. Maggavi	Ph.D	E&C	LMISTE	17Y.09M	9480275583
3	Smt. S. S. Kamate	M.Tech	Digital Electronics	LMISTE	19Y.04M	9008696825
4	Smt. S. S. Malaj	M.E.	E & TC	LMISTE	24Y.11M	9731795803
5	Sri. D. M. Kumbhar	M.Tech	Electronics	LMISTE	18Y.02M	09373609880
6	Sri. Sachin .S. Patil	M.Tech	VLSI & Embedded	LMISTE	18Y.00M	9448102010
7	Sri .D. B. Madihalli	M.Tech	Industrial Electronics	LMISTE	14Y.11M	9902854324
8	Sri. P. V. Patil	M.Tech	VLSI & Embedded	LMISTE	9Y.08M	9731104059
9	Sri. S. S. Ittannavar	M.Tech	DSP	LMISTE	9Y.03M	9964299498
10	Smt. B. P. Khot	M.Tech	Microelectronics & Control Systems	LMISTE	6Y.03M	9964019501

TECHNICAL SUPPORTING STAFF

S.N.	Name	Qualification	Experience (in years)
1.	Sri. P. S. Desai	DEC	22Y-.00M
2.	Sri. V. V. Guruwodeyar	DEC	30Y-09 M
3.	Sri. A. K. Talawar	DEC, M.Sc (Ph.D)	12Y-03M
4	Sri. M. A. Attar	DEC	12Y-02M

SCHEME OF TEACHING AND EXAMINATION

VIII SEM ECE

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI
Scheme of Teaching and Examination 2018 – 19
Outcome Based Education(OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2018 – 19)

VIII SEMESTER

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	PCC	18EC81	Wireless and Cellular Communication		3	--	--	03	40	60	100	3
2	PEC	18XX82X	Professional Elective - 4		3	--	--	03	40	60	100	3
3	Project	18ECP83	Project Work Phase - 2		--	--	2	03	40	60	100	8
4	Seminar	18ECS84	Technical Seminar		--	--	2	03	100	--	100	1
5	Internship	18ECI85	Internship	Completed during the vacation/s of VI and VII semesters and /or VII and VIII semesters.)				03	40	60	100	3
				TOTAL	**06**	--	**4**	**15**	**260**	**240**	**500**	**18**

Note: PCC: Professional Core, PEC: Professional Elective.

Professional Electives - 4

Course code under 18XX82X	Course Title
18EC821	Network Security
18EC822	Micro Electro Mechanical Systems
18EC823	Radar Engineering
18EC824	Optical Communication Networks
18EC825	Biomedical Signal Processing

Project Work
CIE procedure for Project Work Phase - 2:
(i) Single discipline: The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two senior faculty members of the Department, one of whom shall be the Guide.
The CIE marks awarded for the project work phase -2, shall be based on the evaluation of project work phase -2 Report, project presentation skill and question and answer session in the ratio 50:25:25.The marks awarded for the project report shall be the same for all the batch mates.
(ii) Interdisciplinary: Continuous Internal Evaluation shall be group wise at the college level with the participation of all guides of the college. Participation of external guide/s, if any, is desirable.
The CIE marks awarded for the project work phase -2, shall be based on the evaluation of project work phase -2 Report, project presentation skill and question and answer session in the ratio 50:25:25.The marks awarded for the project report shall be the same for all the batch mates.
SEE for Project Work Phase - 2:
(i) Single discipline: Contribution to the project and the performance of each group member shall be assessed individually in semester end examination (SEE) conducted at the department.
(ii) Interdisciplinary: Contribution to the project and the performance of each group member shall be assessed individually in semester end examination (SEE) conducted separately at the departments to which the student/s belong to.
Internship: Those, who have not pursued /completed the internship shall be declared as fail and have to complete during subsequent University examination after satisfying the internship requirements.

AICTE activity Points: In case students fail to earn the prescribed activity Points, Eighth semester Grade Card shall be issued only after earning the required activity Points. Students shall be admitted for the award of degree only after the release of the Eighth semester Grade Card.
Activity points of the students who have earned the prescribed AICTE activity Points shall be sent the University along with the CIE marks of 8th semester. In case of students who have not satisfied the AICTE activity Points at the end of eighth semester, the column under activity Points shall be marked NSAP (Not Satisfied Activity Points).

ACADEMIC CALENDER

	S J P N Trust's **Hirasugar Institute of Technology, Nidasoshi.** *Inculcating Values, Promoting Prosperity* Approved by AICTE, Recognized by Govt. of Karnataka and Affiliated to VTU Belagavi. Recognized Under Section 2(f) of UGC Act, 1956. Accredited at ' A' Grade by NAAC, Programmes Accredited by NBA: CSE, ECE, EEE & ME.	IQAC File I-11 2021-22 (Even) Rev: 00

CALENDAR OF EVENTS FOR THE ACADEMIC YEAR 2021-22 OF VI & VIII SEMESTER (EVEN)

Date	Events
04-04-2022	Commencement of VI/VIII Semester Classes
07-04-2022	World Health Day
22-04-2022	World Earth Day
26-04-2022	World Intellectual Property Day
09-05-2022 to 11-05-2022	First Internal Assessment for VI Semester
09-05-2022 to 10-05-2022	First Internal Assessment for VIII Semester
12-05-2022	Feedback-I on Teaching-Learning
16-05-2022	Display of I[st] I.A. Marks and submission of Feedback-I to office
30-05-2022 to 31-05-2022	Second Internal Assessment for VIII Semester
31-05-2022	Anti-Tobacco Day
02-06-2022	Feedback-II on Teaching-Learning of VIII Semester
05-06-2022	World Environment Day
06-06-2022	Display of 2[nd] I.A. Marks and submission of Feedback-II to office of VIII Semester
09-06-2022 to 11-06-2022	Second Internal Assessment for VI Semester
13-06-2022	Feedback-II on Teaching-Learning of VI Semester
14-06-2022	World Blood Donor Day
15-06-2022	Display of 2[nd] I.A. Marks and submission of Feedback-II to office of VI Semester
21-06-2022	International Yoga Day
27-06-2022 to 28-06-2022	Third Internal Assessment for VIII Semester
30-06-2022	Display of Final IA Marks of VIII Semester
30-06-2022	Last working day of VIII Semester
11-07-2022 to 13-07-2022	Third Internal Assessment for VI Semester
14-07-2022 to 15-07-2022	Lab Internal Assessment for VI Semester
16-07-2022	Display of Final IA Marks of VI Semester
16-07-2022	Last working day of VI Semester
21-07-2022	Project Exhibition
27-07-2022	Graduation Day
18-07-2022 to 29-07-2022	Practical Examination of VI Semester
01-08-2022 to 20-08-2022	Theory Examination of VI Semester
04-07-2022 to 20-07-2022	Theory Examination of VIII Semester
22-07-2022 to 30-07-2022	Internship Viva Voce/Project Viva for VIII Semester

April- 2022

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

02-Ugadi Festival,
14- Dr. B. R. Ambedkar Jayanthi
15-Good Friday

May-2022

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

03-Basav Jayanthi, Akshay Tritiya,
Khutub-E-Ramazan

June-2022

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

July-2022

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

Dr. B. V. Madiggond
Dean (Acad)

Dr. S. C. Kamate
Principal

Subject Title	**WIRELESSand CELLULAR COMMUNICTION**		
Subject Code	18EC81	**IA Marks**	40
Number of Lecture Hrs / Week	03	**Exam Marks**	60
Total Number of Lecture Hrs	40	**Exam Hours**	03

FACULTY DETAILS:		
Name: Dr. S. B. Akkole	**Designation:** Associate. Professor	**Experience:**27.06yrs
No. of times course taught:01	**Specialization:** Communication System	

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	ECE	VI	DC, AWP,
02	ECE	VII	CCN

2.0 Course Objectives

This course will enable students to:

- Understand the concepts of propagation over wireless channels from a physics standpoint
- Application of Communication theory both Physical and networking to understand GSM systems that handle mobile telephony
- Application of Communication theory both Physical and networking to understand CDMA systems that handle mobile telephony.
- Application of Communication theory both Physical and networking to understand LTE-4G systems.

3.0 Course Outcomes

At the end of the course, students will be able to:

CO	Description
C401. 1	Explain concepts of propagation mechanisms like Reflection, Diffraction, Scattering in wireless channels.
C402. 2	Develop a scheme for idle mode, call set up, call progress handling and call tear down in a GSM cellular network.
C402. 3	Develop a scheme for idle mode, call set up, call progress handling and call tear down in a CDMA cellular network.
C402. 4	Understand the basic operations and architecture of air interface in a LTE 4G system.
C402. 5	Understandthe concepts of OFDMA and SC-FDMA used in 4G LTE systems.

4.0 Course Content

Module – 1
Mobile Radio Propagation – Large Scale Path Loss - Free Space Propagation Model, Relating Power to Electric Field, Three Basic Propagation Mechanisms – Reflection (Ground Reflection) , Diffraction, Scattering, Practical Link Budget, (Text 1 - 2.2 and Ref1 - Chapter 4). Fading and Multipath – Broadband wireless channel, Delay Spread and Coherence Bandwidth, Doppler Spread and Coherence Time, Angular spread and Coherence Distance (Text 1 – 2.4) , Statistical Channel Model of a Broadband Fading Channel (Text 1 – 2.5.1) The Cellular Concept – Cellular Concept , Analysis of Cellular Systems, Sectoring (Text 1- 2.3)

Module – 2
GSM and TDMA Technology: GSM System overview – Introduction, GSM Network and System Architecture, GSM Channel Concept. GSM System Operations – GSM Identities, System Operations –Traffic cases, GSM Infrastructure Communications (Um Interface) (Text 2, Part1 and Part 2 of Chapter 5)

Module – 3
CDMA Technology: CDMA System Overview – Introduction, CDMA Network and System Architecture CDMA Basics – CDMA Channel Concepts, CDMA System (Layer 3) operations, 3G CDMA (Text 2-Part 1, Part2 and Part 3 of Chapter 6)

Module – 4
LTE – 4G: Key Enablers for LTE 4G – OFDM, SC-FDE, SC-FDMA, Channel Dependant Multiuser Resource Scheduling, Multi-Antenna Techniques, Flat IP Architecture, LTE Network Architecture. (Text 1, Sec 1.4) Multi-Carrier Modulation – Multicarrier concepts, OFDM Basics, OFDM in LTE, Timing and Frequency Synchronization, Peak to Average Ration, SC-Frequency Domain Equalization, Computational Complexity Advantage of OFDM and SC-FDE. (Text 1, Sec 3.1 – 3.7)

Module – 5
LTE - 4G: OFDMA and SC-FDMA – Multiple Access for OFDM Systems, OFDMA, SCFDMA, Multiuser Diversity and Opportunistic Scheduling, OFDMA and SC-FDMA in LTE, OFDMA system Design Considerations. (Text 1, Sec 4.1 – 4.6) The LTE Standard – Introduction to LTE and Hierarchical Channel Structure of LTE, Downlink OFDMA Radio Resources, Uplink SC-FDMA Radio Resources. (Text 1, Sec 6.1 – 6.4)

5.0 Relevance to future subjects

Sl. No	Semester	Subject	Topics
01	VIII	Project work	Wireless transmission of data, Mobile communication, GSM. GPS, GPRS and LTE

6.0 Relevance to Real World

Sl.No	Real World Mapping
01	Understand 2G,3G and 4G LTE systems.
02	IOT based project development.

7.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
01	Tutorial	Topic: GSM and LTE 4G architectures
02	NPTEL Videos	Applications of LTE.

8.0 Books Used and Recommended to Students

Text Books

1.ArunabhaGhosh, Jan Zhang, Jefferey Andrews, Riaz Mohammed, 'Fundamentals of LTE', Prentice Hall, Communications Engg. and Emerging Technologies.

2."Introduction to Wireless Telecommunications Systems and Networks", Gary Mullet, First Edition, Cengage Learning India Pvt Ltd., 2006, ISBN - 13: 978-81-315-0559-5.

Reference Books

1."Wireless Communications: Principles and Practice" Theodore Rappaport, 2nd Edition, Prentice Hall Communications Engineering and Emerging Technologies Series, 2002, ISBN 0- 13-042232-0

2.LTE for UMTS Evolution to LTE-Advanced' HarriHolma and AnttiToskala, Second Edition - 2011, John Wiley & Sons, Ltd. Print ISBN: 9780470660003. 2

Additional Study material & e-Books

1. NPTEL notes and Videos

9.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References

1) https://nptel.co.in
2) https://ieeexplore.ieee.org/document/8002586
3) http://eujournal.org/index.php/esj/article/view/1453
4) International Journal of Computer Science and Mobile Computing

10.0 Magazines/Journals Used and Recommended to Students

Sl.No	Magazines/Journals	website
1	IEEE Xplorer	http://ieee.com
2	European Scientific Journal	http://eujournal.org
3	International Journal of Computer Science and Mobile Computing	https://www.ijcsmc.com/
4	IJCSNS International Journal of Computer Science and Network Security	http://ijcsns.org/

11.0 Examination Note

Internal Assessment: 30 Marks
Three IA will be conducted and average of3 will be accounted.

Assignment (10 Marks)
- Internal Assessment test in the same pattern as the ofthe main examination. (30marks.)

SCHEME OF EXAMINATION:
Two questions to be set from the syllabus covered.
Student has to answer one part each from each question.
Question 1 1x15 =15Marks
Question 2 1x15 = 15Marks
Total = 30Marks
10 Marks for Assignment

INSTRUCTION FOR Wireless and Cellular Communication(18EC81) Examination
- Two full questions will be given which consists of a, b ,c, d sub sections.
- Student has to answer either a or b and c or d.

12.0 Course Delivery Plan

Course Delivery Plan:

UNIT	LECTURE NO.	CONTENT OF LECTURE	% OF PORTION
1	1	Free Space Propagation Model Path Loss	20
	2	Relating Power to Electric Field	
	3		
	4	Diffraction, Scattering, Practical Link Budget, Fading and Multipath	
	5	BWC: Delay Spread and Coherence BW Doppler Spread and Coherence Time, Angular spread and Coherence Distance	
	6	Statistical Channel Model of a Broadband Fading Channel	
	7	The Cellular Concept – Cellular Concept and Analysis of Cellular Systems	
	8	Cell splitting and Sectoring	
2	9	GSM and TDMA Technology: Introduction	40
	10	GSM System overview	
	11	GSM Network and System Architecture	
	12	GSM Channel Concept	
	13	GSM System Operations: GSM Identities,	
	14	System Operations	
	15	Traffic cases	
	16	GSM Infrastructure Communications	

3	17	CDMA Technology: CDMA System Overview	60
	18	Introduction to CDMA	
	19	CDMA Network	
	21	CDMA System Architecture	
	21	CDMA Basics	
	22	CDMA Channel Concepts	
	23	CDMA System (Layer 3) operations	
	24	3G CDMA	
4	25	LTE – 4G: Key Enablers for LTE 4G	80
	26	OFDM, SC-FDE, SC-FDMA	
	27	Channel Dependent Multiuser Resource Scheduling	
	28	Multi-Antenna Techniques	
	29	Flat IP Architecture and LTE Network Architecture	
	30	Multicarrier concepts: OFDM Basics and OFDM in LTE	
	31	Timing and Frequency Synchronization, Peak to Average Ratio	
	32	SC-Frequency Domain Equalization, Computational Complexity Advantage of OFDM and SC-FDE	
5	31	LTE - 4G: OFDMA and SC-FDMA	100
	32	Multiple Access for OFDM Systems	
	33	Multiuser Diversity	
	34	Opportunistic Scheduling	
	35	OFDMA and SCFDMA	
	36	OFDMA and SC-FDMA in LTE	
	37	OFDMA system Design Considerations	
	38	Introduction to LTE and Hierarchical Channel Structure of LTE	
	39	Downlink OFDMA Radio Resources	
	40	Uplink SC-FDMA Radio Resources	

13.0 Assignments, Pop Quiz, Mini Project, Seminars

Sl.No.	Title	Outcome expected	Allied study	Week No.	Individual / Group activity	Reference: book/website /Paper
1	Assignment 1: Expected University Questions on Mobile Radio Propagation	Students study the Topics and write the Answers. Get practice to solve expected university questions.	Module-01 of the syllabus	2	Individual Activity. Printed solution expected.	Text Book 1as per the syllabus and Websites of the Reference list
2	Assignment 2: Expected University Questions on GSM and TDMA Technology	Students study the Topics and write the Answers. Get practice to solve expected university questions.	Module-02 of the syllabus	4	Individual Activity. Printed solution expected.	Text Book 1as per the syllabus and Websites of the Reference list

3	Assignment 3: Expected University Question CDMA Technology s on	Students study the Topics and write the Answers. Get practice to solve expected university questions.	Module-03 of the syllabus	6	Individual Activity. Printed solution expected.	Text Book 1as per the syllabus and Websites of the Reference list
4	Assignment 4: Expected University Questions on LTE 4G Key Enablers for LTE	Students study the Topics and write the Answers. Get practice to solve expected university questions.	Module-04 of the syllabus	8	Individual Activity. Printed solution expected.	Text Book 1as per the syllabus and Websites of the Reference list
5	Assignment 5: Expected University Questions on OFDMA and SCFDMA	Students study the Topics and write the Answers. Get practice to solve expected university questions.	Module-05 of the syllabus	12	Individual Activity. Printed solution expected.	Text Book 1as per the syllabus and Websites of the Reference list

14.0 Assignment Questions

Assignment No	Questions	Marks
I	1. Explain Cell spitting and Cell sectoring 2. Explain delay spread and coherence bandwidth with appropriate equations. 3. Explain the two ray model of ground reflection. 4. Explain in brief Statistical Channel Models. 5. If a transmitter produces 50 W of power, express the transmit power in units of (a) dBm, and (b) dBW. If 50 W is applied to a unity gain antenna with a 900 MHz carrier frequency, find the received power in dBm at a free space distance of 100m from the antenna. What is Pr(10 km)? Assume unity gain for the receiver antenna. 6. Explain path loss model for free space propagation.	5marks each
II	1. Explain GSM network architecture. 2. Explain GSM network interfaces and protocols 3. Explain the GSM channels 4. Explain call set up steps used in GSM 5. Explain call hand off in case of intra and inter BSC	5marks each
III	1. Explain initial CDMA (IS95) referencearchitecture. 2. Explain the network interfaces for CDM systems. 3. Explain generation of paging channel signals 4.Explain the soft CDMA hand off 5.Explain reverse channel structure of CDMA2000	5marks each

IV	1. With neat block diagram explain evolved packet core architecture 2. Explain the advantages of OFDMA which led to its selection for LTE. 3. Explain with block diagram flat IP network architecture. 4. Explain multi antenna techniques. 5.Explain Computational Complexity Advantage of OFDM and SC-FDE	5marks each
	1. Explain with block diagram explain OFDM 2.With block diagram explain OFDMA downlink transmitter 3.ExplainHierarchical Channel Structure of LTE 4.With block diagram explain SCFDMA uplink transmitter and receiver 5.Explain LTE frame structures.	5marks each

16.0 University Result

Examination	FCD	FC	SC	% Passing

Prepared by	Checked by		
Dr. S. B. Akkole	Prof. D. M.Kumbar	HOD	Principal

Subject Title	**NETWORK SECURITY**		
Subject Code	18EC821	**IA Marks**	40
Number of Lecture Hrs / Week	03	**Exam Marks**	60
Total Number of Lecture Hrs	40	**Exam Hours**	03

Faculty Details:		
Name: Prof. B. P. Khot	**Designation:** Asst. Professor	**Experience:** 6.04Yrs
No. of times course taught: 4	**Specialization:** Microelectronics and Control Systems	

1.0 Prerequisite Subjects:

Sr. No.	Branch	Semester	Subject
01	Electronics & Communication Engineering	VI	Operating Systems, Microprocessors
02	Electronics & Communication Engineering	VII	Embedded Systems, RTOS

2.0 Course Objectives

1. Describe network security services and mechanisms.
2. Know about Transport Level Security and Secure Socket Layer.
3. Know about Security concerns in Internet Protocol security.
4. Discuss about Intruders, Intrusion detection and Malicious Software.
5. Discuss about Firewalls, Firewall characteristics, Biasing and Configuration.

3.0 Course Outcomes

Having successfully completed this course, the student will be able to

Sr. No.	Course Outcome
C410.1	Explain network security services and mechanisms and explain security concepts
C410.2	Understand the concept of Transport Level Security and Secure Socket Layer.
C410.3	Explain Security concerns in Internet Protocol security
C410.4	Explain Intruders, Intrusion detection and Malicious Software
C410.5	Explain Firewalls, Firewall Characteristics, Biasing and Configuration
Total Hours of instruction	**40**

4.0 Course Content

Module-1
Attacks on Computers and Computer Security: Need for Security, Security Approaches, Principles of Security Types of Attacks. (Chapter1 of Text2) **8 Hours**
Module-2
Transport Level Security: Web Security Considerations, Secure Sockets Layer, Transport Layer Security, HTTPS, Secure Shell (SSH) (Chapter15 of Text 1). **8 Hours**
Module-3
IP Security: Overview of IP Security (IPSec), IP Security Architecture, Modes of Operation, Security Associations (SA), Authentication Header (AH), Encapsulating Security Payload (ESP), Internet Key Exchange. (Chapter19 of Text1) **8 Hours**
Module-4
Intruders, Intrusion Detection. (Chapter20 of Text1) MALICIOUS SOFTWARE: Viruses and Related Threats, Virus Countermeasures, (Chapter21of Text1) **8 Hours**
Module-5
Firewalls: The Need for firewalls, Firewall Characteristics, Types of Firewalls, Firewall Biasing, Firewall location and configuration.(Chapter 22 of Text1) **8 Hours**

5.0 Relevance to future subjects

Sr. No.	Semester	Subject	Topics
01	VIII	Project work	Security based Projects
02	M. Tech (SE) 2nd SEM	Information and Network Security	Secured Communication system design

6.0 Relevance to Real World

Sr. No.	Real World Mapping
01	Secured internet banking and business
02	Secured communication required for military, Navy and Air force sectors.

7.0 Gap Analysis and Mitigation

Sr. No.	Delivery Type	Details
01	Tutorial	Topic: Encryption & Decryption Algorithms concepts & numerical
02	NPTEL	Encryption & Decryption Algorithms, SET, Malicious Software

8.0 Books Used and Recommended to Students

Text Books
1. **Cryptography and Network Security Principles and Practice!, Pearson Education Inc., William Stallings, 5th Edition, 2014, ISBN: 978-81-317- 6166-3**
2. **Cryptography and Network Security**, Atul Kahate, TMH, 2003.
Reference Books
1. **Cryptography and Network Security, Behrouz A. Forouzan, TMH, 2007.**

9.0 Relevant Websites (Reputed Universities and Others) for Notes /Animation / Videos Recommended

Website and Internet Contents References
1. https://nptel.ac.in/courses/106105031/
2. https://www.infosecurity-magazine.com/
3. https://www.securitymagazine.com/keywords/1944-network-security
4. https://www.coursera.org/learn/information-security-data

10.0 Magazines/Journals Used and Recommended to Students

Sr. No.	Magazines/Journals	Website
1	Cyber Security; Issue and Challenges in E-Commerce	https://www.worldwidejournals.com/paripex/recent_issues_pdf/2016/January/January_2016_1453357435__63.pdf
2	International cyber security challenges	https://bib.irb.hr/datoteka/878827.Duic_Cvrtila_Ivanjko_International_cyber_security_challenges_.pdf
3	International cyber security challenges	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7973625

11.0 Examination Note

Internal Assessment: 40 Marks (IA MARKS(30 Marks)+**Assignments (10 Marks))**

Three IA will be conducted for 50 marks and average of three will be accounted and that will be redused to 30 marks.

SCHEME OF EXAMINATION:
Two questions to be set from the syllabus covered.
Student has to answer one part each from each question.
Question 1 1x25 = 25Marks
Question 2 1x25 = 25Marks
Average of three IA will be accounted and reduced to 30 marks.
Total IA MARKS = 30 Marks
Assignments (10 Marks)
Assignments for each module are to be submitted and evaluated for 10 marks for each. Average of five modules is to be considered.

INSTRUCTION FOR NETWORK SECURITY (18EC821) EXAMINATION:

- Examination will be conducted for 100 marks with question paper containing 10 full questions, each of 20 marks.
- Each full question can have a maximum of 4 sub questions.
- There will be 2 full questions from each module covering all the topics of the module.
- Students will have to answer 5 full questions, selecting one full question from each module.

12.0 Course Delivery Plan

MODULE	LECTURE NO.	CONTENT OF LECTURE	% OF PORTION
1	1	**Attacks on Computers and Computer Security:** Introduction	20
	2	Need for Security,	
	3	Security Approaches	
	4	Security Approaches	
	5	Principles of Security	
	6	Principles of Security	
	7	Types of Attacks.	
	8	Types of Attacks.	
2	9	**Transport Level Security:** Introduction	40
	10	Web Security Considerations,	
	11	Secure Sockets Layer	
	12	Secure Sockets Layer	
	13	Transport Layer Security	
	14	Transport Layer Security	
	15	HTTPS	
	16	Secure Shell (SSH)	
3	17	**IP Security:** Overview of IP Security (IPSec)	60
	18	IP Security Architecture	
	19	Modes of Operation	
	20	Security Associations (SA)	
	21	Security Associations (SA)	
	22	Authentication Header (AH)	
	23	Encapsulating Security Payload (ESP)	
	24	Internet Key Exchange	

4	25	Intruders	80
	26	Intrusion Detection	
	27	Intrusion Detection	
	28	MALICIOUS SOFTWARE:	
	29	Viruses and Related Threats	
	30	Viruses and Related Threats	
	31	Virus Countermeasures	
	32	Virus Countermeasures	
5	33	**Firewalls:** The Need for firewalls	100
	34	Firewall Characteristics	
	35	Types of Firewalls	
	36	Types of Firewalls	
	37	Firewall Biasing	
	38	Firewall Biasing	
	39	Firewall location and configuration	
	40	Firewall location and configuration	

13.0 IMPORTANT QUESTIONS

MODULE 1

1. What is Computer Security? Explain Need for Computer Security
2. Discuss Security Approaches
3. Explain Principles of Security
4. Explain active Attacks
5. Explain passive Attacks
6. Explain Types of Criminal Attacks
7. What are the four phases of virus in its lifetime
8. Discuss worm and Trojan horse.
9. Explain Generations of anti-virus software.
10. Explain Steps in the execution of a Java program on the Internet.

MODULE 2

1. Web Security Threats Web Traffic Security Approaches
2. Explain Secure Socket Layer (SSL) Architecture
3. Explain SSL Record Protocol
4. Explain Handshake Protocol
5. Explain Change Cipher Spec Protocol Alert Protocol
6. Explain HTTPS Connection Initiation
7. Explain HTTPS Connection Closure
8. Explain Secure Shell (SSH)
9. Explain SSH Transport Layer Protocol
10. Explain SSH User Authentication Protocol and Connection Protocol

MODULE 3

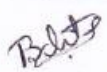
1. Explain Applications of IPsec
2. Explain Benefits of IPsec
3. Explain Transport and Tunnel Modes
4. Explain IP Security Policy
5. Explain Security Associations and Security Association
6. Explain Encapsulating Security Payload
7. Explain ESP Format Encryption and Authentication Algorithms
8. Explain Combining Security Associations Authentication Plus Confidentiality
9. Explain Basic Combinations of Security Associations
10. Explain Internet Key Exchange Key Determination Protocol Header and Payload Formats

MODULE 4

1. Explain Intruder Behavior Patterns
2. Explain Intrusion Detection
3. Explain Intrusion Detection Exchange Format
4. Explain Intrusion Techniques
5. Explain Intrusion Detection
6. Explain Detection Statistical Anomaly
7. Explain Rule-Based Intrusion Detection
8. Explain Distributed Intrusion Detection
9. Explain Password Protection
10. Explain Password Selection Strategies

MODULE 5

1. Explain Packet Filtering Firewall
2. Explain Stateful Inspection Firewalls
3. Explain Application-Level Gateway
4. Explain Circuit-Level Gateway
5. Explain Basing Bastion
6. Explain Host Host-Based Firewalls
7. Explain Personal Firewall
8. Explain DMZ Networks
9. Explain Virtual Private Networks
10. Explain Distributed Firewalls

Prepared by	Checked by		
			
Prof. B. P. Khot	Prof. S. S. Kamate	HOD	Principal