F-TLP-13/RO

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SAPTHAGIRI COLLEGE OF ENGINEERING

(Affiliated to Visvesvaraya Technological University, Belagavi and Approved by AICTE, New Delhi)

(Accredited by NAAC with "A" grade)

(An ISO 9001:2015 & ISO 14001:2015 Certified)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ACADEMIC AUDIT: 2020-21

COURSE FILE

Name of the Faculty: Dr. Prakash Jadhav Designation: Associate professor

Sl. No	Documents	Status	Remarks
1	Vision and Mission of the Institute		
2	Vision and Mission of the Department		
3	Subject Allotment Letter		
4	Copies of Syllabus-List of text books, reference books, Course Objectives and outcomes		
5	Lecture Notes		
6	University question papers		
7	Calendar of events		
8	Personal Time Table & Class Time Table		
9	Lesson Plan & Teaching Dairy		
10	Student list and Batch list(for lab)		
11	Attendance Register		
12	Assignment bank/questions		
13	Test question papers with Scheme & Solution		
14	Test Absentee list- B Form		
15	I A Marks: T_1, T_2, T_3, T_{avg} ,Assignment and Final IA		
16	Feedback/Assessment by students		
17	IA Marks sent to VTU		
18	VTU Exam result analysis		

Overall Remarks:

Date: Signature of the Faculty: Auditor:

Vision and Mission of the college

Vision of the Institution:

To be a best Institution imparting quality engineering education to deal with community needs through learning and performance

Mission of the Institution:

- To implement path breaking student centric education methods.
- To augment talent, nurture teamwork to transform to develop individual as responsible citizen
- To educate the students and faculties about entrepreneurship to meet vibrant requirements of the society.
- To strengthen Industry-Institute Interaction for knowledge sharing

Head of the Department
Electronics & Communication
Sapthagiri College of Engineering
Bangalore-560 057

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14/5, Chikkasandra, Hesaraghatta main road Bengaluru - 560 057

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Vision ,Mission and PEOs of the Department

Department Vision

To be an endeavoring Department for providing globally relevant learning experience to the students.

Department Mission

M1 To Enrich learning experience of students with creative and innovative teaching methods.

M2 To Inculcate societal responsibility in students.

M3 To Develop entrepreneurial skills of students to make them entrepreneurs rather than employees.

M4 To Partner with Industry for focusing on real-life problems and make learning more practical.

Program Educational Objectives(PEOs)

PEO1 Lead a successful career by providing solutions to the problems in the field of Electronics & Communication Engineering and for sustainable environmental development.

PEO2 Exhibit professional and team building attitude along with effective communication.

PEO3 Pursue higher education for continuous learning.

Head of the Department
Electronics & Communication
Sapthagiri College of Engineering
Bangalore - 560 057

Subject Allotment

(For the Academic Year 2020-2021 Even Semester)

Name of the Faculty: **Dr. PRAKASH JADHAV**

Designation: Associate Professor

Sl.No.	Subject	Subject Code	Sem /Sec	Batch
1	Wireless Cellular and LTE 4G Broadband	17EC81	8 A	-
2	Wireless Cellular and LTE 4G Broadband	17EC81	8 B	-
3	Project Work	17ECP85	8A / 8B	-

Signature of Faculty

Head of the Department

Head of the Department
Electronics & Communication
Sapthagiri College of Engineering
Bangalore-560 057.

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ACADEMIC YEAR: 2020-21 EVEN Semester

Course	Wireless Cellular and LTE 4G Broadband				**Course code**		**17EC81**
Faculty	Dr. Prakash Jadhav				**Semester**		8
Core/Elective	**Contact Hours /week**			**Total Hours**	**Assessment**		**Credits**
Core	**L**	**T**	**P**	50	**CIE**	**SEE**	4
	4	-	-		40	60	
Prerequisite	**1. Basics of wireless communication** **2.Signal processing techniques** **3.Engineering Mathematics**						

COURSE OBJECTIVES

1	Understand the basics of LTE standardization phases and specifications.
2	Explain the system architecture of LTE and E-UTRAN, the layer of LTE, based on the use of OFDMA and SC-FDMA principles.
3	Analyze the role of LTE radio interface protocols to set up, reconfigure and release the Radio Bearer, for transferring the EPS bearer.
4	Analyze the main factors affecting LTE performance including mobile speed and transmission bandwidth.

SYLLABUS

MODULE 1	RBT Level
Key Enablers for LTE features: OFDM, Single carrier FDMA, Single carrier FDE, Channel Dependent Multiuser Resource Scheduling, Multiantenna Techniques, IP based Flat network Architecture, LTE Network Architecture. (Sec 1.4- 1.5 of Text). **Wireless Fundamentals:** Cellular concept, Broadband wireless channel (BWC), Fading in BWC, Modeling BWC – Empirical and Statistical models, Mitigation of Narrow band and Broadband Fading(Sec 2.2 – 2.7 of Text).	L1, L2
MODULE 2	
Multicarrier Modulation: OFDM basics, OFDM in LTE, Timing and Frequency Synchronization, PAR, SC-FDE (Sec 3.2 – 3.6 of Text). **OFDMA and SC-FDMA:**OFDM with FDMA,TDMA,CDMA, OFDMA, SC-FDMA, OFDMA and SC-FDMA in LTE (Sec 4.1 – 4.3, 4.5 of Text). **Multiple Antenna Transmission and Reception:** Spatial Diversity overview, Receive Diversity, Transmit Diversity, Interference cancellation and signal enhancement, Spatial Multiplexing, Choice between Diversity, Interference suppression and Spatial Multiplexing (Sec 5.1 – 5.6 of Text).	L1, L2
MODULE 3	

Overview and Channel Structure of LTE: Introduction to LTE, Channel Structure of LTE, Downlink OFDMA Radio Resource, Uplink SC-FDMA Radio Resource(Sec 6.1 – 6.4 of Text). **Downlink Transport Channel Processing:** Overview, Downlink shared channels, Downlink Control Channels, Broadcast channels, Multicast channels, Downlink physical channels, H-ARQ on Downlink(Sec 7.1 – 7.7 of Text).	L1, L2
MODULE 4	
Uplink Channel Transport Processing: Overview, Uplink shared channels, Uplink Control Information, Uplink Reference signals, Random Access Channels, H-ARQ on uplink (Sec 8.1 – 8.6 of Text). **Physical Layer Procedures:** Hybrid – ARQ procedures, Channel Quality Indicator CQI feedback, Precoder for closed loop MIMO Operations, Uplink channel sounding, Buffer status Reporting in uplink, Scheduling and Resource Allocation, Cell Search, Random Access Procedures, Power Control in uplink(Sec 9.1- 9.6, 9.8, 9.9, 9.10 Text).	L1, L2
MODULE 5	
Radio Resource Management and Mobility Management: PDCP overview, MAC/RLC overview, RRC overview, Mobility Management, Inter-cell Interference Coordination (Sec 10.1 – 10.5 of Text).	L1, L2

Text Books:

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

Reference Books:

1. 'LTE for UMTS Evolution to LTE-Advanced' Harri Holma and Antti Toskala, Second Edition - 2011, John Wiley & Sons, Ltd. Print ISBN: 9780470660003.
2. 'EVOLVED PACKET SYSTEM (EPS) ; THE LTE AND SAE EVOLUTION OF 3G UMTS' by Pierre Lescuyer and Thierry Lucidarme, 2008, John Wiley & Sons, Ltd. Print ISBN:978-0-470-05976-0.
3. 'LTE – The UMTS Long Term Evolution ; From Theory to Practice' by Stefania Sesia, Issam Toufik, and Matthew Baker, 2009 John Wiley & Sons Ltd, ISBN 978-0-470-69716-0.

COURSE OUTCOMES

At the end of this course the students will be	
CO1	Understand the system architecture and the functional standard specified in LTE 4G.
CO2	Analyze the role of LTE radio interface protocols and EPS Data convergence protocols to set up, reconfigure and release data and voice from users.
CO3	Demonstrate the UTRAN and EPS handling processes from set up to release including mobility management for a variety of data call scenarios.
CO4	Test and Evaluate the Performance of resource management and packet data processing and transport algorithms.

CBCS SCHEME

USN | 1 | S | G | 1 | 7 | E | C | 1 | 0 | 8 |

17EC81

Eighth Semester B.E. Degree Examination, July/August 2021
Wireless Cellular and LTE 4G Broadband

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. Explain the advantages of OFDM leading to its selection for LTE. **(08 Marks)**
b. Explain adaptive modulating and coding with neat block diagram. **(08 Marks)**
c. Explain briefly path loss. **(04 Marks)**

2 a. Explain with neat block diagram flat LTE SAE architecture. **(08 Marks)**
b. Explain delay spread and coherence bandwidth. **(08 Marks)**
c. Mention advantages and disadvantages of cell sectoring in cellular wireless communications. **(04 Marks)**

3 a. Explain the basic multicarries transmitter and receiver with neat block diagram. **(08 Marks)**
b. Explain the principle of operation of OFDM downlink transmitter with neat sketch. **(08 Marks)**
c. Mention the differences between V-BLAST and D-BLAST encoding techniques. **(04 Marks)**

4 a. Explain peak to average power ratio (RAR). **(08 Marks)**
b. Explain SC-FDMA uplink transmitter and receiver with neat block diagram. **(08 Marks)**
c. Compare OFDM and SCFDE. **(04 Marks)**

5 a. Explain uplink and downlink transport channels. **(08 Marks)**
b. Explain frame structures used in LTE. **(08 Marks)**
c. Explain Broadcast channel used in LTE. **(04 Marks)**

6 a. Explain LTE end to end network architecture with neat block diagram. **(08 Marks)**
b. With neat block diagram explain radio interface protocols stack. **(08 Marks)**
c. Explain uplink transport channels. **(04 Marks)**

7 a. Explain the types of uplink reference signals. **(08 Marks)**
b. With neat block diagram, explain the uplink transport channel processing. **(08 Marks)**
c. Explain buffer status reporting in uplink. **(04 Marks)**

8 a. Explain with neat sketch cell search procedure used in LTE. **(08 Marks)**
b. Explain random access procedure used in LTE. **(08 Marks)**
c. What is meant by periodic and aperiodic reporting in CQI feedback? **(04 Marks)**

9 a. Explain RRC states and function with neat sketch. **(08 Marks)**
b. Explain mobility management over X2 mobility with neat sketch. **(04 Marks)**
c. Explain data transfer modes. **(08 Marks)**

10 a. Explain RAN procedure for mobility. **(08 Marks)**
b. Explain the main services and function of RLC and MAC layers. **(08 Marks)**
c. Explain paging used in RRC protocol. **(04 Marks)**

* * * * *

For More Question Papers Visit - www.pediawikiblog.com

Eighth Semester B.E. Degree Examination, June/July 2019
Wireless Cellular and LTE 4G Broadband

Time: 3 hrs. Max. Marks: 80

Note: *Answer FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Explain the advantages of OFDM for LTE. (08 Marks)
b. Explain flat LTE SAE architecture. (08 Marks)

OR

2 a. Explain the following in brief,
(i) Pathloss and Shadowing.
(ii) Angular Spread and coherence distance.
(iii) Doppler spread and coherence time. (09 Marks)
b. Explain with a neat diagram, adaptive modulation and coding. (07 Marks)

Module-2

3 a. With a neat block diagram, explain OFDM communication system. Also mention the need of timing and frequency synchronization. (09 Marks)
b. Explain SC-FDMA uplink transmitter with a neat figure. (07 Marks)

OR

4 a. Explain spatial diversity of multiple antenna techniques. (08 Marks)
b. Explain open-loop MIMO in spatial multiplexing. (08 Marks)

Module-3

5 a. Explain the LTE Radio Interference protocols. (08 Marks)
b. Explain the transport channels in LTE. (08 Marks)

OR

6 a. Explain the hierarchical channel structure of LTE. (08 Marks)
b. Explain briefly layer mapping and precoding in modulation mapping. (08 Marks)

Module-4

7 a. Explain uplink control information. (08 Marks)
b. Explain the types of uplink reference signals. (08 Marks)

OR

8 a. Briefly explain the function of H-ARQ feedback in Downlink and Uplink transmission. (08 Marks)
b. Explain in brief types of Random Access procedure in LTE. (08 Marks)

Module-5

9 a. Explain the main services and functions of PDCP sublayer for the user plane. (08 Marks)
b. Explain RRC states and its functions. (08 Marks)

OR

10 a. Explain mobility management over the S1 transfer. (08 Marks)
b. Explain three basic approaches to mitigate ICI in downlink. (08 Marks)

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USN | | | | | | | | | | |

15EC8

Eighth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Wireless Cellular and LTE 4G Broadband

Time: 3 hrs. Max. Marks: 80

Note: *Answer FIVE full questions, choosing ONE full question from each module.*

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. List the advantages of OFDM leading to its selection for LTE and explain. (08 Marks)
b. Discuss the delay spread and coherence bandwidth with relevant expressions. (08 Marks)

OR

2 a. Write the block diagram of end to end architecture of EPC supporting current and legacy Radio access networks and discuss the elements of EPC. (08 Marks)
b. Consider a user in downlink of a cellular system where the desired base station is at a distance 0.5 KM and the interfering base stations (i) B_1 and B_2 located at a distance of 1.0 KM, (ii) B3, B4 and B5 located at a distance of 2 KM (iii) B6 to B11 treated at a distance of 2.66 KM. Each of the stations transmitted power at the same level. Find the SIR when the path loss exponent $\alpha = 3$ and also when $\alpha = 5$. (08 Marks)

Module-2

3 a. With the help of neat diagrams explain how the timing and frequency synchronization is performed by the receiver to demodulate an OFDM signal. (08 Marks)
b. Write the block diagrams of receive diversity and explain the principle of operation. (08 Marks)

OR

4 a. Write the block diagram of OFDMA down link transmitter and explain the principle of operation. (08 Marks)
b. Explain the spatial multiplexing MIMD system and the key points of single user MIMD system model. (08 Marks)

Module-3

5 a. Discuss the radio interface protocol stock of LTE. (08 Marks)
b. Write the structure of downlink resource grid and explain the types of resource allocation. (08 Marks)

OR

6 a. Write the Frame structure Type 2 and explain the various fields applicable to TDD mode. (08 Marks)
b. Discuss the Broadcast channels and multicast channels. (08 Marks)

Module-4

7 a. With the help of a neat block diagram, explain the SC-FDMA base band signal generation. (08 Marks)
b. Discuss the random access procedures in detail. (08 Marks)

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DEPARTMENT OF ECE

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F-ADN-03/R0

Calendar of Events for AY: 2020-21 (8th semester)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Events
April-2021				1	2	3	4	2: A Seminar on "Career Options and Opportunities for Electronics Graduates" 19 : Commencement of EVEN semester 26&27: 2 days workshop on "Electronic System Design and IOT" 28:An industrial visit to "GTTC, Bengaluru" 3rd/4thweek: An industrial visit to "BEL, Bengaluru" 29&30:2days workshop on "AI & ML" Note: Online classes from 19th April-2021 till further orders
	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			
May-2021						1	2	01 : May Day 04: Debate Competition 04-08: Workshop under IETE 1st/2nd week: Industrial Visit to ALS 17-21: FDP on "Electronic system design and manufacturing (ESDM)"Signal Processing 20: Seminar on Signal Processing 21 - 22: IA Test-I 26 : Proctor report-I
	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							
June-2021		1	2	3	4	5	6	08-12: 5 days workshop on " PLC, and IOT" 10: Essay Writing 18: A Seminar on" Entrepreneurship" 18 - 19: IA Test-II 18 & 19: State level student paper presentation on Recent Trends in Electronics, Computer science and Mechanical " 21-25: 5 days FDP on "Cyberspace and Cyber Security" 23: Proctor report-II
	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-2021				1	2	3	4	1: Guest Lecture 16 - 17: IA Test-III 19 : Proctor report-III 20 : Last working day 21 : Bakrid VTU Theory Exams : 22/07/2021 to 30/07/2021
	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		
August-2021							1	Internship viva-Voce: 02/08/2021 to 06/08/021 07 : Graduation Day 20 : Varamahalakshmi Vratha
	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						

All the Best

2/7/2021

Head of the Department
Electronics & Communication
Sapthagiri College of Engineering
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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

ACADEMIC YEAR: 2020-21 EVEN SEMESTER

INDIVIDUAL TIME TABLE

Name of the Faculty: **Dr. Prakash Jadhav**

Designation: **Associate Professor**

Subject: **Wireless Cellular & LTE 4G Broadband (17EC81)**

Semester/Section : **VIII A & B**

Time / Day	8:30 am – 9:30 am	9:30 am – 10:30 am	10:30 am – 10:50 am	10:50 am – 11:50 am	11:50 am – 12:50 pm	12:50 pm – 1:45 pm	1:45 pm – 2:40 pm	2:40 pm – 3:35 pm	3:35 pm – 4:30 pm
MON			BREAK	17EC81		LUNCH BREAK			
TUE	17EC81				17EC81				
WED				17EC81			18ECL48		
THU									
FRI									
SAT									

Time-Table Coordinator

HOD

F-TLP-02/R0

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DEPARTMENT OF ELECTRONICS &COMMUNICATION ENGINEERING

Time-table for the academic year 2020-21 (EVEN Semester)

Semester & Section: **VIII A/B**

Class Teacher Name: **Prof. Prathibha P/Prof. Padmavathi C**

PERIOD	1	2		3	4		5	6	7
TIME	8:30am – 9:30am	9:30am – 10:30am	10:30am - 10:50am	10:50am - 11:50am	11:50am - 12:50pm	12:50 pm - 01:45 pm	01:45 pm - 02:40 pm	02:40 pm - 03:35 pm	03:35 pm - 04:30 pm
DAY									
MON	**18EC82**	**18EC834**	SHORT BREAK	**18EC81**	**18EC82**	LUNCH BREAK	PROJECT WORK/TECHNICAL SEMINAR/INTERNSHIP		
TUE	**18EC81**	**18EC82**		**18EC834**	**18EC81**		PROJECT WORK/TECHNICAL SEMINAR/INTERNSHIP		
WED	**18EC834**	**18EC82**		**18EC81**	**18EC834**		PROJECT WORK/TECHNICAL SEMINAR/INTERNSHIP		
THU	PROJECT WORK/TECHNICAL SEMINAR/INTERNSHIP						PROJECT WORK/TECHNICAL SEMINAR/INTERNSHIP		
FRI	PROJECT WORK/TECHNICAL SEMINAR/INTERNSHIP						PROJECT WORK/TECHNICAL SEMINAR/INTERNSHIP		
SAT	PROJECT WORK/TECHNICAL SEMINAR/INTERNSHIP								

Subjects Allocation

Subject Code	Subject Title	Faculty Name	Faculty Code
17EC81	Wireless Cellular and LTE 4G Broadband	DR. PRAKASH JADHAV/ PROF. PADMAVATHI C	PCJ/PC
17EC82	Fiber Optics and Networks	PROF. PRATHIBHA P/ PROF. SUMA V SHETTY	PP/SVS
17EC834	Machine Learning	PROF. SHOBHA S	SS
17EC84	Internship/ Professional Practice	-	-
17ECP85	Project Work	-	-
17ECS86	Seminar	-	-

Time-Table Coordinator

HOD
Head of the Department
Electronics & Communication
Sapthagiri College of Engineering
Bangalore-560 057

Principal
Principal
Sapthagiri College of Engine
Chikkasandra, Hesaraghatta R

Revised-Academic Calendar of EVEN semesters of UG Programmes for 2020-2021

Semesters / EVENTS	IV semester B.E./B.Tech.	IV semester B.Arch./ B.Plan.	VI semester B.E./B.Tech.	VI semester B.Plan./B.Arch	VIII semester B.E./B.Tech.	VIII semester B.Plan.	VIII semester B.Arch
Commencement of EVEN Semester	19.04.2021	19.04.2021	19.04.2021	19.04.2021	19.04.2021	19.04.2021	19.04.2021
Last Working day of EVEN Semester	07.08.2021	07.08.2021	07.08.2021	07.08.2021	#20.07.2021	#20.07.2021	07.08.2021
Practical Examinations	09.08.2021 To 19.08.2021	09.08.2021 To 19.08.2021	09.08.2021 To 19.08.2021	---	---	---	---
Theory Examinations	23.08.2021 To 09.09.2021	23.08.2021 To 09.09.2021	23.08.2021 To 09.09.2021	10.08.2021 To 31.08.2021	22.07.2021 To 30.07.2021	22.07.2021 To 30.07.2021	10.08.2021 To 17.08.2021
Internship	---	---	---	---	---	---	---
Internship Viva-Voce/ Project Viva-Voce	---	---	---	---	02.08.2021 To 06.08.2021	---	---
Professional training / Organization study	---	---	---	---	---	---	---
Commencement of ODD Semester	13.09.2021	13.09.2021	13.09.2021	13.09.2021	---	---	23.08.2021

- The classroom sessions for even the semester should commence from the dates mentioned above.
- The Institute needs to function for **six days** a week with additional hours **(Saturday is a full working day).** #if required the college can plan to have extra classes even on Sundays also.
- If any of the above dates are declared to be a holiday then the corresponding event will come into effect on the next working day.
- Notification regarding the Calendar of Events relating to the conduct of **University Examinations** will be issued by the Registrar (Evaluation) from time to time.
- The faculty/staff shall be available to undertake any work assigned by the university.
- Academic Calendar may be modified based on guidelines/directions issued in the future by MHRD/UGC/AICTE/State Government.
- Revised Academic Calendar is also applicable for **Autonomous Colleges.** In case if any changes are to be affected by Autonomous Colleges in the academic terms and examination schedule, they could do so with the approval of the University.

21.04.2021

REGISTRAR

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ACADEMIC YEAR: 2020-21 EVEN Semester

LESSON PLAN

Wireless cellular 4G LTE Broadband 17EC81. A&B

Period	Planned Date	Topic Planned	Actual Date	Topic covered	Remarks
1	19.04.21	Key Enablers for LTE features	19-4/21	Key enable for LTE	
2	20.04.21	OFDM, Single carrier FDMA	20-4-21	OFDM. SCFDMA	
3	20.04.21	Single carrier FDE, Channel Dependent Multiuser Resource Scheduling	20-4-21	SCFDE	
4	21.04.21	Multi antenna Techniques, IP based Flat network	21-04-21	multi antenna techniq	
5	26.04.21	LTE Network Architecture	26-04-21	LTE NA	
6	26.04.21	Wireless Fundamentals: Cellular concept	27-04-21	Wireless Fundamentals	
7	27-04-21	Broadband wireless channel (BWC)	27-04-21	BWC	
8	27-04-21	Fading in BWC	27-04-21	Fading	
9	28-04-21	Modelling BWC – Empirical and Statistical models	28-04-21	modeling BWC	
10	03-05-21	Mitigation of Narrow band and Broadband Fading	03-5-21	mitigation of narrow band & Broad band	
At the end of this topic students able to basics of LTE standardization					
11	04-05-21	**Multicarrier Modulation:** OFDM basics, OFDM in LTE	04-05-21	multicarrier modula OFDM in LTE	
12	04-05-21	Timing and Frequency Synchronization	04-05-21	Timing & frequency synchronization	
13	05-05-21	PAR and analysis, SC-FDE	05-05-21	PAR & analysis	
14	10-05-21	**OFDMA and SC-FDMA:**OFDM with FDMA,TDMA,CDMA	10-05-21	OFDMA & SCFDMA	
15	11-05-21	OFDMA, SC-FDMA	11-05-21	OFDMA. SC-FDMA	
16	11-05-21	OFDMA and SC-FDMA in LTE	11-05-21	SCFDMA LTE	
17	12-05-21	**Multiple Antenna Transmission and Reception:** Spatial Diversity overview, Receive Diversity, Transmit Diversity	12-05-21	Spatial diversity Transmit diversity	
18	17-05-21	Interference cancellation and signal enhancement	17-05-21	Interference cancellation.	

19	18-05-21	Spatial Multiplexing, Choice between Diversity	18-05-21	Spatial multiplexing	
20	18-05-21	Interference suppression and Spatial Multiplexing	18-05-21	Interference Suppression	
At the end of this topic students able to LTE modulation techniques and multiplexing					
21	19-05-21	**Overview and Channel Structure of LTE:** Introduction to LTE	19-05-21	Overview & channel structure of LTE	
22	24-05-21	Channel Structure of LTE	24-05-21	channel structure of LTE	
23	24-05-21	Downlink OFDMA Radio Resource	24-05-21	Down link OFDMA Radio resources	
24	25-05-21	Uplink SC-FDMA Radio Resource	25-05-21	uplink SCFDMA	
25	25-05-21	**Downlink Transport Channel Processing:** Overview	25-05-21	Downlink Transport channel Processing	
26	26-05-21	Downlink shared channels	26-05-21	Down link shared channel	
27	31-05-21	Downlink Control Channels, Broadcast channels,	31-05-21	Down link control channel	
28	01-06-21	Multicast channels	01-06-21	multicast channels	
29	01-06-21	Downlink physical channels	01-06-21	Down link physical channel	
30	02-06-21	H-ARQ on Downlink	02-06-21	H-ARQ on down link	
At the end of this topic students able to understand the LTE channel and processing					
31	07-06-21	**Uplink Channel Transport Processing:** Overview	07-06-21	uplink channel Transport Processing	
32	08-06-21	Uplink shared channels, Uplink Control Information	08-06-21	uplink shared channel	
33	08-06-21	Uplink Reference signals, Random Access Channels	08-06-21	uplink Reference signal	
34	09-06-21	H-ARQ on uplink **Physical Layer Procedures**	09-06-21	H-ARQ on uplink	
35	14-06-21	Hybrid – ARQ procedures, Channel Quality Indicator CQI	14-06-21	Hybrid-ARQ Procedure	
36	15-06-21	feedback, Precoder for closed loop MIMO Operations	15-06-21	Feedback precoder	
37	15-06-21	Uplink channel sounding	15-06-21	uplink channel sounding	
38	16-06-21	Buffer status Reporting in uplink	16-06-21	Buffer status reporting	
39	21-06-21	Scheduling and Resource Allocation, Cell Search	21-06-21	Scheduling & Resource	
40	22-06-21	Random Access Procedures, Power Control in uplink	22-06-21	Random Access Procedures	
At the end of this topic students able to understand the uplink channel processing and physical layer					

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ACADEMIC YEAR: 2020-21 EVEN Semester

		procedures			
41	22-06-21	**Radio Resource Management and Mobility Management:**	22-06-21	Radio Resource management	
42	23-06-21	PDCP overview	23-06-21	PDCP overview	
43	28-06-21	MAC/RLC overview	28-06-21	MAC/RLC overview	
44	29-06-21	RRC overview	29-06-21	RRC overview	
45	29-06-21	Mobility Management	29-06-21	Mobility management	
46	30-06-21	Inter-cell Interference Coordination	30-06-21	Mobility management	
47	05-07-21	Revision of previous question paper	5-7-21		
49	06-07-21	Revision of previous question paper			
50	06-07-21	Revision of previous question paper			
51	07-07-21	Revision of previous question paper			
At the end of this topic students able to manage the resources and then be prepared to face the forthcoming challenges					

PROGRAMME OUTCOMES

Program outcomes are narrower statements that describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge and behavior. Graduation students of Bachelor of Electronics and Communication Engineering program at Sapthagiri College of Engineering will attain the following program outcomes in the field of Electronics and Communication Engineering.

	PROGRAM OUTCOME
PO1.	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2.	**Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3.	**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.
PO4.	**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.
PO5.	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6.	**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.
PO7.	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8.	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9.	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10.	**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.
PO11.	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a

	member and leader in a team, to manage projects and in multidisciplinary environments.
PO12.	**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.

PROGRAMME SPECIFIC OUTCOMES

The graduates of Electronics and communication engineering program of Sapthagiri College of Engineering should be able to attain the following at the time of graduation.

	PROGRAM SPECIFIC OUTCOMES
PSO1	Specify, design, build and test analog, digital and embedded systems for signal processing.
PSO2	Understand and architect wired and wireless analog and digital communication systems as per specifications, and determine their performance.

CO-PO Mapping (Goal)

Mapping of Course outcomes, Program Objectives and Program specific outcomes
Note: 1 = Slight 2 = Moderate 3 = Strong

Course outcomes	Program Outcomes												PSOs		Total
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	
CO-1	3	2	2										1	3	11
CO-2	3	2	2										1	3	11
CO-3	3	2	2										1	3	11
CO-4	3	2	2										1	3	11
Average	3	2	2										1	3	11

Staff HOD Principal

F-TLP-04/R0

Sapthagiri College of Engineering
Department of Electronics and Communication Engineering
Students Name List

Semester: 8th 'A'

Academic Year: 2020–21

Sl. No.	USN	Name of the student
1.	1SG17EC001	A K PAVEEN POONACHA
2.	1SG17EC002	ABHAY GAGAN B S
3.	1SG17EC003	ABHISHEK A HIPPARGI
4.	1SG17EC004	ABHISHEK BASAWANNI KONNUR
5.	1SG17EC007	AISHWARYA C
6.	1SG17EC009	AMEETH ASHOK PATTANA SHETTI
7.	1SG17EC011	ANISH M
8.	1SG17EC012	ANUSHASV
9.	1SG17EC013	ASHOK L
10.	1SG17EC015	AVANIPUROHITH
11.	1SG17EC017	B K HARSHIT
12.	1SG17EC019	BHUMIKA K S
13.	1SG17EC022	CHANDRA KUMAR U
14.	1SG17EC023	DARSHAN BANGALORE
15.	1SG17EC024	DARSHAN S K
16.	1SG17EC025	DEEPIKA SHARMA R
17.	1SG17EC026	DHANUSH BHARADWAJ H P
18.	1SG17EC028	DIVYASHREE R A
19.	1SG17EC029	EISHA SHARMA
20.	1SG17EC030	GANAVI D
21.	1SG17EC032	GEETHA M
22.	1SG17EC033	GEETHANJALI M C
23.	1SG17EC034	HARISH S
24.	1SG17EC035	HEMANTH M R
25.	1SG17EC036	HEMANTH R
26.	1SG17EC037	JAGADISH M
27.	1SG17EC038	JANAKI S
28.	1SG17EC039	JEEVITHA A
29.	1SG17EC040	JIPHIL P JOSE
30.	1SG17EC042	KASTURI NANDAGAON
31.	1SG17EC043	KESHAVA B R
32.	1SG17EC046	LAVANYA P
33.	1SG17EC047	LOHITH D T
34.	1SG17EC048	LOKESH S
35.	1SG17EC049	MALLIKA R BABU
36.	1SG17EC050	MANJUNATH R
37.	1SG17EC051	MANOJ KUMAR N
38.	1SG17EC052	MAYUR R
39.	1SG17EC054	N SHUSHANTH
40.	1SG17EC055	NAINISHA K KUMAR
41.	1SG17EC056	NANDINI S
42.	1SG17EC057	NAVNEET SINGH
43.	1SG17EC058	NETHRAVATHI K G
44.	1SG17EC060	NITIN B S
45.	1SG17EC062	PAVITHRA V
46.	1SG18EC403	DEEPA BASANGOUDA PATIL
47.	1SG18EC405	DIVYA K
48.	1SG18EC407	HANUMANTHA N
49.	1SG18EC408	INCHARA K C

PARALLEL COURSE

Sl. No.	USN	Name of the student
1.	1SG16EC016	BHRUNGESH M R
2.	1SG16EC422	SAMITHA M
3.	1SG17EC419	RACHANA M

HOD

Head of the Departm
Electronics & Commun
Sapthagiri College of Engi
Bangalore 560 057

F-TLP-04/R0

Sapthagiri College of Engineering
Department of Electronics and Communication Engineering
Students Name List

Semester: 8th 'B' **Academic Year: 2020–21**

Sl. No.	USN	Name of the student
1.	1SG16EC083	RAKSHA N K
2.	1SG17EC021	CHANDAN H C
3.	1SG17EC064	PRAJWAL R
4.	1SG17EC066	PRATHIKA V M
5.	1SG17EC067	PRIYANKA G
6.	1SG17EC069	PRIYANKA R
7.	1SG17EC071	RAKSHITHA RAJU R
8.	1SG17EC072	RANJEETA DAS
9.	1SG17EC073	RIYA ESTHER
10.	1SG17EC075	RUCHITA R SHAH
11.	1SG17EC076	SACHIN G D
12.	1SG17EC077	SACHIN T S
13.	1SG17EC078	SAGAR S
14.	1SG17EC080	SAMATA GAJANAN MUNAGEKAR
15.	1SG17EC081	SAMPRITHA H S
16.	1SG17EC083	SANTRUPTI P
17.	1SG17EC084	SHALINI H
18.	1SG17EC085	SHIRIN M THOMAS
19.	1SG17EC086	SHRADDHA S GOWDA
20.	1SG17EC087	SHREE VIDYA
21.	1SG17EC088	SHREYAS S
22.	1SG17EC089	SINDHU SHREE G P
23.	1SG17EC090	SNEHA V
24.	1SG17EC091	SONICAM.NAIK
25.	1SG17EC092	SOPHIA A
26.	1SG17EC094	SUMAN KUMAR S
27.	1SG17EC095	SUSHMA G
28.	1SG17EC096	SUSHMA N
29.	1SG17EC098	SWETA PRAKASH RASTAPUR
30.	1SG17EC100	TEJAS S
31.	1SG17EC102	THIMMARAJU R
32.	1SG17EC103	UMA MAHESHWARI R
33.	1SG17EC104	VAISHNAVI K S
34.	1SG17EC105	VARSHA V V
35.	1SG17EC106	VASANTH KUMAR G V
36.	1SG17EC107	VIDHYA J H
37.	1SG17EC108	VIDYA V
38.	1SG17EC109	VIDYA SHREE K H
39.	1SG17EC110	VIKYATH KAMALESH
40.	1SG17EC111	VISHWAS M
41.	1SG17EC112	VIVEK H M
42.	1SG17EC113	YATHIN B S
43.	1SG17EC114	YESHWANTH A
44.	1SG17EC115	CHANDANA S
45.	1SG17EC116	SAMEENA N NADAF
46.	1SG17EC417	PURUSHOTTAM R
47.	1SG18EC416	VANITHA R

PARALLEL COURSE

Sl. No.	USN	Name of the student
1.	1SG15EC031	DILIP V
2.	1SG15EC040	HIMANSHU SHEKHAR
3.	1SG15EC088	RANJAN S
4.	1SG15EC100	SHASHIKANT KUMAR
5.	1SG16EC032	HAFEEZUR RAHMAN
6.	1SG16EC061	NAYANA C S
7.	1SG16EC069	PATEL SRI KARTHIK
8.	1SG16EC086	RAKSHITHA SONU
9.	1SG17EC423	SHASHI KUMAR S

Head of the Department
HOD
Electronics & Communication
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Bangalore-560 057

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

17EC81-WIRELESS CELLULAR AND 4G LTE BROADBAND

ASSIGNMENT - 1

1. Briefly explain key enabling technologies in OFDM?
2. Briefly explain IP-Based flat network architecture?
3. Draw and explain LTE network architecture?
4. Derive path loss? Or Friss transmission formula?
5. Briefly explain cellular concept?
6. What is sectoring, with neat diagram?
7. Derive statistical channel models
   (i) Rayleigh fading
   (ii) The Ricean Distribution
   (iii) Nakagami-m fading
8. Briefly explain OFDM in LTE?
9. With neat sketch, Explain PAR problem and Quantifying with IFFT equation?
10. Explain multiple access for OFDM systems?

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

17EC81-WIRELESS CELLULAR AND 4G LTE BROADBAND

ASSIGNMENT - 2

1. Explain OFDMA and SC-FDMA in LTE.
2. With neat sketch, Explain PAR problem and Quantifying with IFFT equation.
3. Explain timing synchronization with neat diagram.
4. Derive frequency synchronization with relative frequency offset.
5. Briefly explain spatial multiplexing with open loop MIMO?
6. Explain in brief types of random access procedure in LTE
7. Explain uplink control information
8. Briefly explain the procedure of H-ARQ procedure in downlink and uplink transmission

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F-IAT-04/R0

Internal Assessment Test-I

Subject: **Wireless Cellular & 4G LTE Broadband**
Semester/Section: **8 A & B**
Duration: **60 minutes**

Sub Code: **17EC81**
Max Marks: **30**
Date: **18/05/2021**

Note: Answer any two full questions

Q No.	Questions	Marks	RBTL	CO's
1 a.	Explain briefly key enabling technologies in OFDM.	7	L2	CO1
b.	Explain briefly explain cellular concept.	8	L2	
	OR			
2 a.	Explain (i) Frequency correlation (ii) Time correlation.	7	L2	CO1
b.	With the help of a neat sketch to explain LTE network architecture.	8	L3	
3 a.	With the help of a neat sketch to explain PAR problem and Quantify with IFFT equation.	7	L3	CO2
b.	Explain OFDMA and SC-FDMA in LTE?	8	L2	
	OR			
4 a.	What is the need of time and frequency synchronization?	7	L1	CO2
b.	Explain with neat diagram of structure of LTE Time –Frequency Grid .	8	L2	

CO1: Understand the system architecture and the functional standard specified in LTE 4G.
CO2: Analyze the role of LTE radio interface protocols and EPS Data convergence protocols to set up, reconfigure and release data and voice from users.

Revised Blooms Taxonomy Levels (RBTL): L1-Remembering, L2-Understand, L3-Apply, L4- Analyzing, L5-Evaluating, L6- Creating

SAPTHAGIRI COLLEGE OF ENGINEERING, BENGALURU.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGG.

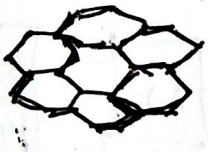
SCHEME & SOLUTION

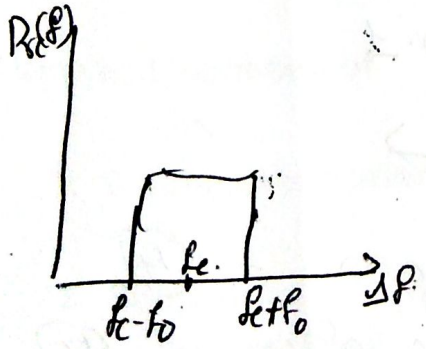
Sem. & Sec.: 8 A & B | Academic Year: 20-21 | Date: 18/05/21

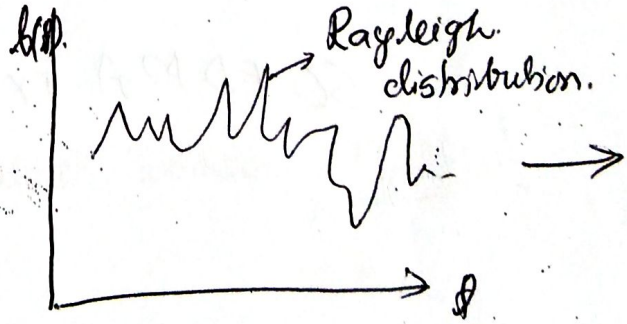
Subject: Wireless Cellular & 4G LTE Broadband. | Subject Code: 17EC81

Duration: 60 minutes. | Max. Marks: 30

INTERNAL ASSESSMENT TEST - I

Q. No.	Solutions	Marks Allocated
1 (a)	Key Enabling technologies in OFDM → Orthogonal Frequency Division Multiplexing → SC FDE & SC-FDMA → Channel Dependent multiuser resource scheduling → Multi-antenna Techniques.	7
(b)	Cellular Concepts Cellular systems, the service area subdivided into smaller geographic areas called cells.  hexagonal cellular system with $f = \frac{1}{7}$	8
2 (a)	(i) Frequency correlation → 3 (ii) Time correlation → 4	7

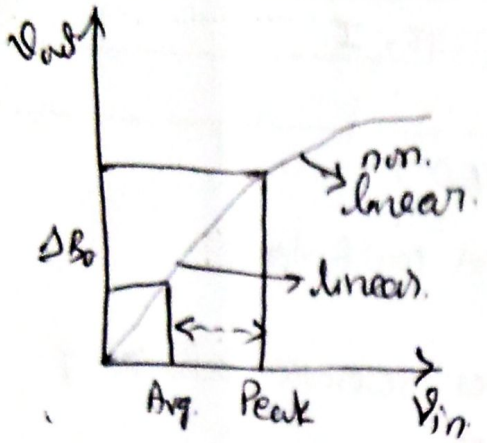




Explanation. →

Q. No.	Solutions	Marks Allocation
3 (a)	PAR Problem and quality with IFFT equation	

PAR Problem (7)



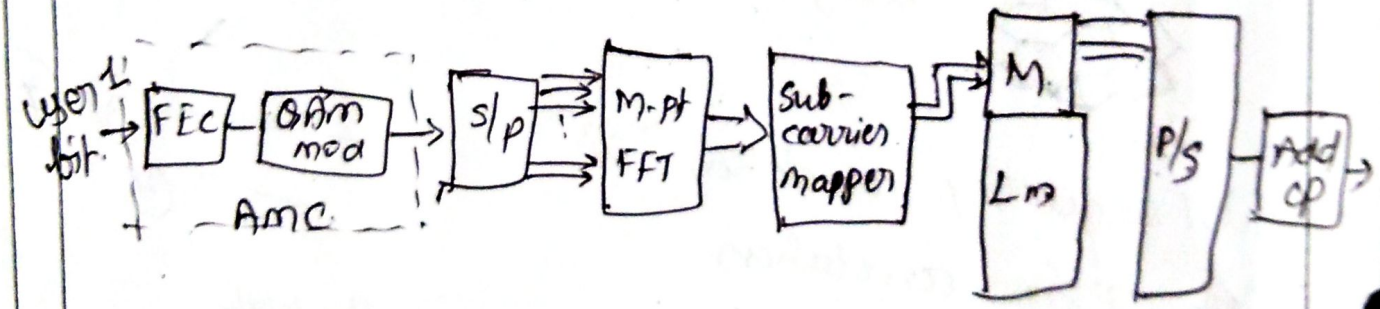
Explanation → (5)

→ (2)

(b) OFDMA and SC-FDMA in LTE

→ LTE time frequency grid

SC-FDMA uplink transmitter



SC-FDMA Tx for user-1

↳ (8)

Diagram → (4)

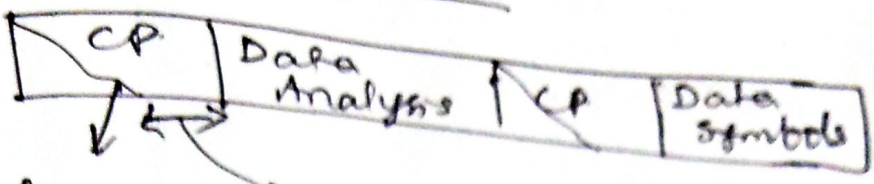
Explanation → (4)

Allocated

4 (a). Need of time & frequency synchronization.

Timing Synchronization

→



Delay spread

Synchronization margin.

↳ Diagram → (2)

→ Exploration → (2)

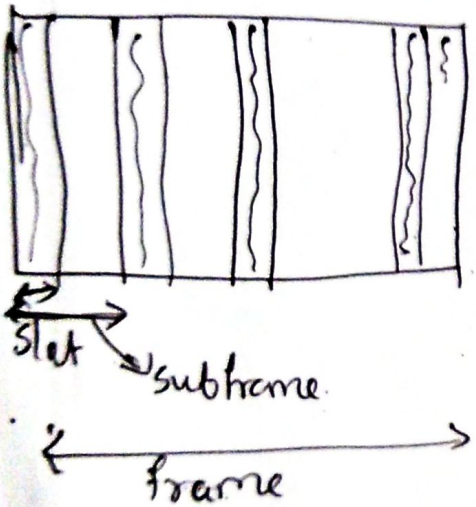
(7)

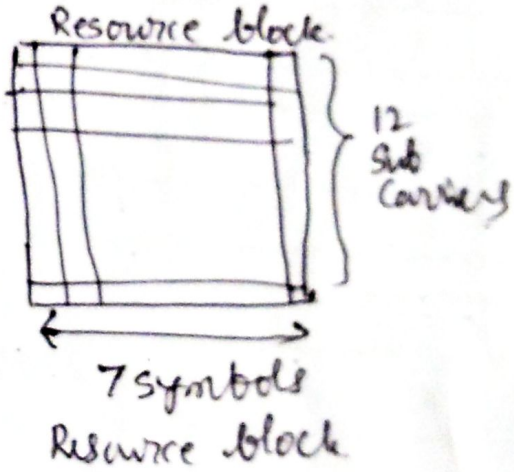
Frequency Synchronization

→ Exploration.

↳ (3)

(b) Structure of Time frequency grid





Name and Signature of

1. Course coordinator: Dr. Prakash Jadhav. Prakash

2. Scrutinizer:

Approved

HOD, ECE

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F-IAT-04/R0

Internal Assessment Test-II

Subject: **Wireless Cellular & 4G LTE Broadband**
Semester/Section: **8 A & B**
Duration: **60 minutes**

Sub Code: **17EC81**
Max Marks: **30**
Date: **18/06/2021**

Note: Answer any two full questions

Q No.	Questions	Marks	RBTL	CO's
1 a.	Explain Spatial diversity of Multiple Antenna Technique.	7	L2	CO2
b.	Explain open loop MIMO in Spatial Multiplexing	8	L2	
	OR			
2 a.	Write the block diagram of OFDMA downlink transmitter and explain the principle of operation	7	L2	CO2
b.	Explain the radio interface protocol.	8	L2	
3 a.	Explain hierarchical channel structure of LTE.	7	L2	CO3
b.	Explain the transport channels in LTE.	8	L2	
	OR			
4 a.	Explain multiantenna techniques.	7	L1	CO3
b.	Explain downlink transport channel processing.	8	L2	

CO2: Analyze the role of LTE radio interface protocols and EPS Dataconvergence protocols to set up reconfigure and release data and voicefrom users.
CO3: Demonstrate the UTRAN and EPS handling processes from set up to release including mobility management for a variety of data call scenarios.

Revised Blooms Taxonomy Levels (RBTL): L1-Remembering, L2-Understand, L3-Apply, L4- Analyzing, L5-Evaluating, L6- Creating

SAPTHAGIRI COLLEGE OF ENGINEERING, BENGALURU.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGG.

SCHEME & SOLUTION

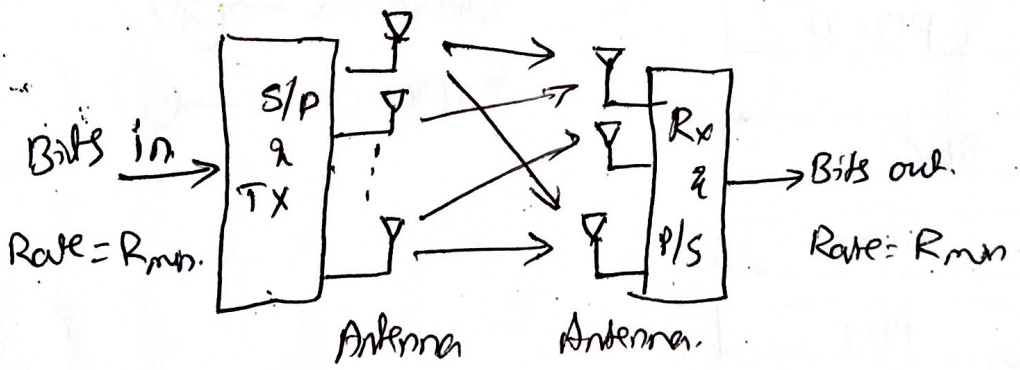
Sem. & Sec.: 8 A & B Academic Year: 20-21 Date: 18/06/21

Subject: Wireless Cellular & 4G LTE Broadband Subject Code: 17EC81

Duration: 60 minutes Max. Marks: 30

INTERNAL ASSESSMENT TEST - II

Q. No.	Solutions	Marks Allocated
1 (a)	Spatial Diversity multiple antenna technique.	
	Array gain Diversity gain (2) Increasing the data rate with spatial diversity. Increased coverage or Reduced transmit power. Explanation → (5)	7
(b)	Open loop MIMO in Spatial multiplexing.	



8

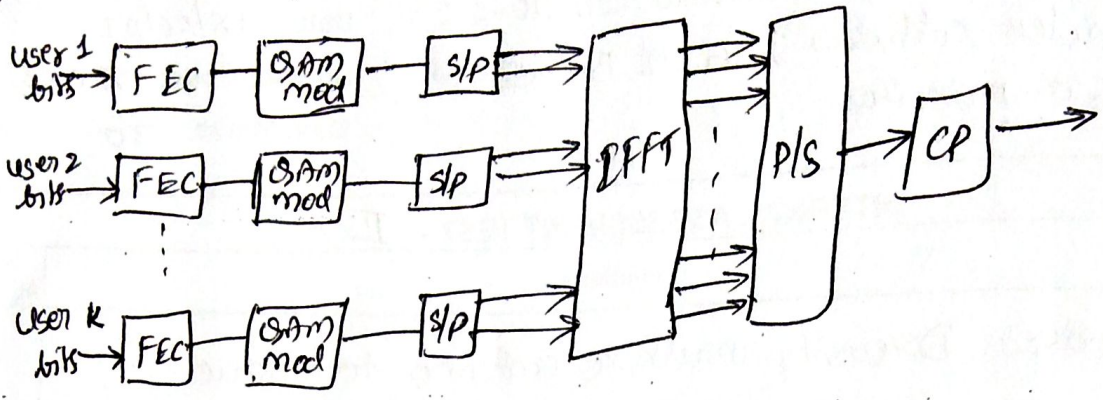
Diagram → (3)

Explanation → (5)

Solutions

Q. No.

2 (a) Block diagram of OFDMA downlink transmitter



OFDMA downlink transmitter.

diagram → (3)

Explanation → (4)

(7)

(b) Radio Interference Protocol

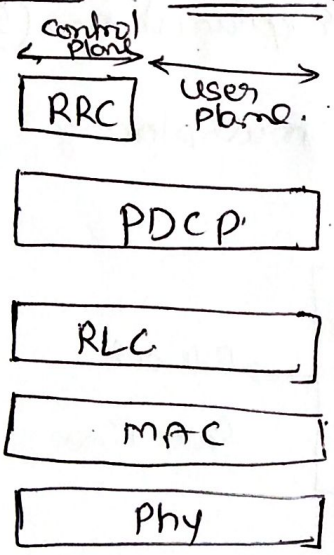
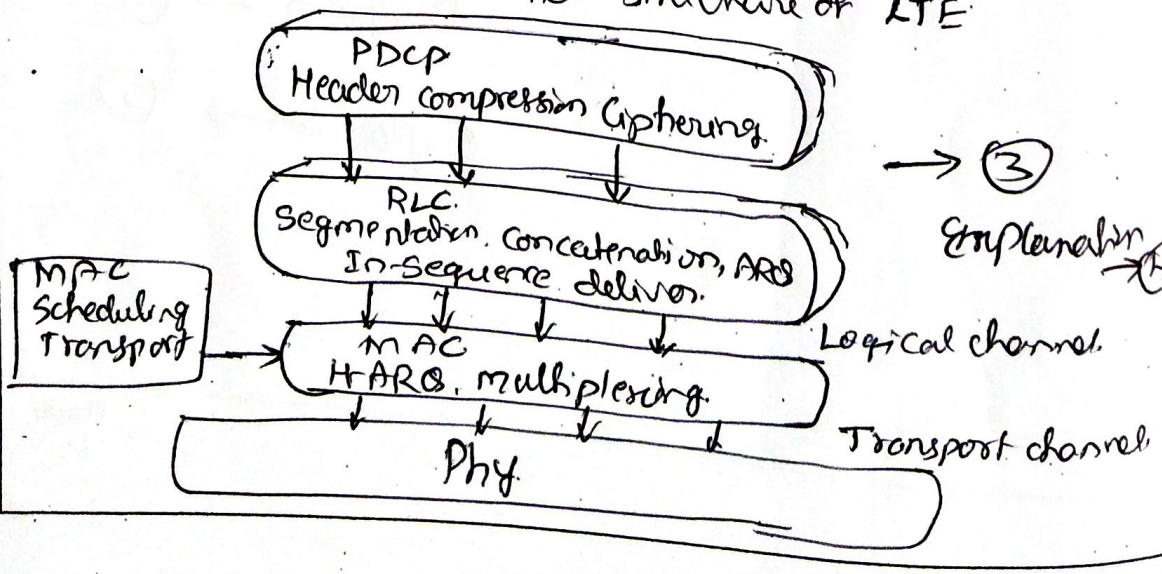


Diagram → (3)

Explanation → (5)

(8)

3 (a) Hierarchial channel structure of LTE



→ (3)

Explanation → (4)

(7)

Allocated

(b) Transport channels in LTE (8)

① Downlink transport channel → (4)
② uplink transport channel. → (4)

(a) Multiantenna technique. (7)

Seven transmission modes

1) Single antenna port
2) Transmit diversity.
3) Open loop spatial multiplexing.
4) Closed loop spatial multiplexing.
5) Multiuser MIMO
6) Closed - loop rank-1 precoding.
7) Single antenna port.

(7)

(b) Transport channel processing. (8)

Explanation → (4)
Diagram → → (4)

Name and Signature of

1. Course coordinator: Dr, Prakash Jadhav. Prakash

2. Scrutinizer:

Approved

HOD, ECE

Batch 20-21 Section : A & B

8_SEM_ IA ENTRY

IA MARKS

USN	NAME	17EC81					
		IA 1	IA 2	IA 3	Average	Assign ment	Total
1SG17EC001	A K PAVEEN POONACHA	29	29	29	29	10	39
1SG17EC002	ABHAY GAGAN B S	20	28	27	25	10	35
1SG17EC003	ABHISHEK A HIPPARGI	30	29	29	29	10	39
1SG17EC004	ABHISHEK BASAWANNI KONNU	28	29	28	28	10	38
1SG17EC007	AISHWARYA C	30	29	29	29	10	39
1SG17EC009	AMEETH ASHOK PATTANA SHE	29	28	28	28	10	38
1SG17EC011	ANISH M	29	29	29	29	10	39
1SG17EC012	ANUSHASV	30	29	28	29	10	39
1SG17EC013	ASHOK L	28	28	29	28	10	38
1SG17EC015	AVANIPUROHITH	29	30	30	30	10	40
1SG17EC017	B K HARSHIT	30	29	29	29	10	39
1SG17EC019	BHUMIKA K S	29	29	29	29	10	39
1SG17EC022	CHANDRA KUMAR U	30	29	30	30	10	40
1SG17EC023	DARSHAN BANGALORE	28	28	28	28	10	38
1SG17EC024	DARSHAN S K	29	29	29	29	10	39
1SG17EC025	DEEPIKA SHARMA R	30	30	29	30	10	40
1SG17EC026	DHANUSH BHARADWAJ H P	30	30	29	30	10	40
1SG17EC028	DIVYASHREE R A	30	30	29	30	10	40
1SG17EC029	EISHA SHARMA	29	29	29	29	10	40 39
1SG17EC030	GANAVI D	29	30	28	29	10	39
1SG17EC032	GEETHA M	29	30	28	29	10	39
1SG17EC033	GEETHANJALI M C	29	29	28	29	10	39
1SG17EC034	HARISH S	28	29	28	28	10	38
1SG17EC035	HEMANTH M R	29	29	28	29	10	39
1SG17EC036	HEMANTH R	29	30	29	29	10	39
1SG17EC037	JAGADISH M	29	30	29	29	10	39
1SG17EC038	JANAKI S	30	30	28	29	10	39
1SG17EC039	JEEVITHA A	30	30	29	30	10	40
1SG17EC040	JIPHIL P JOSE	30	30	29	30	10	40
1SG17EC042	KASTURI NANDAGAON	29	30	28	29	10	39
1SG17EC043	KESHAVA B R	29	29	28	29	10	39
1SG17EC046	LAVANYA P	30	30	29	30	10	40
1SG17EC047	LOHITH D T	30	30	29	30	10	40
1SG17EC048	LOKESH S	29	28	28	28	10	38
1SG17EC049	MALLIKA R BABU	28	28	28	28	10	38
1SG17EC050	MANJUNATH R	28	28	27	28	10	38
1SG17EC051	MANOJ KUMAR N	28	29	29	29	10	39
1SG17EC052	MAYUR R	29	29	28	29	10	39
1SG17EC054	N SHUSHANTH	29	29	27	28	10	38
1SG17EC055	NAINISHA K KUMAR	30	30	29	30	10	40
1SG17EC056	NANDINI S	30	30	28	29	10	39
1SG17EC057	NAVNEET SINGH	29	29	28	29	10	39
1SG17EC058	NETHRAVATHI K G	29	29	28	29	10	39
1SG17EC060	NITIN B S	29	30	28	29	10	39
1SG17EC062	PAVITHRA V	29	29	28	29	10	39
1SG18EC403	DEEPA BASANGOUDA PATIL	28	29	28	28	10	38

1SG18EC405	DIVYA K	28	28	29	28	10	38
1SG18EC407	HANUMANTHA N	28	29	29	29	10	39
1SG18EC408	INCHARA K C	28	30	28	29	10	39
1SG16EC083	RAKSHA N K	28	28	27	28	10	38
1SG17EC021	CHANDAN H C	28	28	27	28	10	38
1SG17EC064	PRAJWAL R	29	29	27	28	10	38
1SG17EC066	PRATHIKA V M	30	29	28	29	10	39
1SG17EC067	PRIYANKA G	30	30	29	30	10	40
1SG17EC069	PRIYANKA R	30	30	29	30	10	40
1SG17EC071	RAKSHITHA RAJU R	29	29	28	29	10	39
1SG17EC072	RANJEETA DAS	29	29	28	29	10	39
1SG17EC073	RIYA ESTHER	29	29	28	29	10	39
1SG17EC075	RUCHITA R SHAH	29	28	28	28	10	38
1SG17EC076	SACHIN G D	28	28	28	28	10	38
1SG17EC077	SACHIN T S	28	27	27	27	10	37
1SG17EC078	SAGAR S	28	28	28	28	10	38
1SG17EC080	SAMATA GAJANAN MUNAGEKA	29	29	29	29	10	39
1SG17EC081	SAMPRITHA H S	29	29	28	29	10	39
1SG17EC083	SANTRUPTI P	30	29	29	29	10	39
1SG17EC084	SHALINI H	29	29	28	29	10	39
1SG17EC085	SHIRIN M THOMAS	30	29	29	29	10	39
1SG17EC086	SHRADDHA S GOWDA	30	30	29	30	10	40
1SG17EC087	SHREE VIDYA	30	30	29	30	10	40
1SG17EC088	SHREYAS S	29	29	29	29	10	39
1SG17EC089	SINDHU SHREE G P	30	30	29	30	10	40
1SG17EC090	SNEHA V	29	29	29	29	10	39
1SG17EC091	SONICAM.NAIK	29	29	29	29	10	39
1SG17EC092	SOPHIA A	29	30	29	29	10	39
1SG17EC094	SUMAN KUMAR S	29	29	29	29	10	40 39
1SG17EC095	SUSHMA G	30	30	29	30	10	40
1SG17EC096	SUSHMA N	29	29	29	29	10	39
1SG17EC098	SWETA PRAKASH RASTAPUR	29	29	29	29	10	39
1SG17EC100	TEJAS S	28	28	28	28	10	38
1SG17EC102	THIMMARAJU R	28	28	29	28	10	38
1SG17EC103	UMA MAHESHWARI R	30	29	30	30	10	40
1SG17EC104	VAISHNAVI K S	30	29	30	30	10	40
1SG17EC105	VARSHA V V	30	29	30	30	10	40
1SG17EC106	VASANTH KUMAR G V	29	28	28	28	10	38
1SG17EC107	VIDHYA J H	29	28	29	29	10	39
1SG17EC108	VIDYA V	30	29	28	29	10	39
1SG17EC109	VIDYA SHREE K H	29	29	29	29	10	39
1SG17EC110	VIKYATH KAMALESH	30	30	29	30	10	40
1SG17EC111	VISHWAS M	29	29	29	29	10	39
1SG17EC112	VIVEK H M	29	29	29	29	10	39
1SG17EC113	YATHIN B S	29	28	28	28	10	38
1SG17EC114	YESHWANTH A	30	29	28	29	10	39
1SG17EC115	CHANDANA S	30	29	30	30	10	40
1SG17EC116	SAMEENA N NADAF	29	28	28	28	10	38
1SG17EC417	PURUSHOTTAM R	28	28	28	28	10	38
1SG18EC416	VANITHA R	29	28	28	28	10	38

SAPTHAGIRI
COLLEGE OF ENGINEERING
Recognised by AICTE, New Delhi & Affiliated to VTU, Belgaum

Individual Staff Appraisal

Staff Name:DR. PRAKASH JADHAV	Sub Code:17EC81	Sub Name:Wireless Cellular and LTE 4G Broadband
Section:8A	Department:ECE	Total Students given Feedback:40

Sl.No	Questions	Total Rating	Out of Max	Per(%)
1	Adequacy Of Learning Material Provided.	389	400.0	97.25
2	Audibility/Clarity of Lecture.	387	400.0	96.75
3	Availability Of the Faculty After the Class Hours.	388	400.0	97.00
4	Chalk-Talk/ICT Tools Usage.	384	400.0	96.00
5	Interaction with the students in the class.	387	400.0	96.75
6	Impartial assessment of Students.	386	400.0	96.50
7	Discipline & Control on the class.	388	400.0	97.00
8	Planning Of Effective Teaching.	386	400.0	96.50
9	Regular & Punctual to the Classes.	389	400.0	97.25
10	Syllabus Coverage as per the Lesson Plan.	387	400.0	96.75
	Total :	3871	4000	96.78

HOD Review:

Excellent, Keep it up!.

HOD SIGNATURE

SAPTHAGIRI
COLLEGE OF ENGINEERING
Recognised by AICTE, New Delhi & Affiliated to VTU, Belgaum

Individual Staff Appraisal

Staff Name:DR. PRAKASH JADHAV	Sub Code:17EC81	Sub Name:Wireless Cellular and LTE 4G Broadband
Section:8B	Department:ECE	Total Students given Feedback:29

Sl.No	Questions	Total Rating	Out of Max	Per(%)
1	Adequacy Of Learning Material Provided.	268	290.0	92.41
2	Audibility/Clarity of Lecture.	263	290.0	90.69
3	Availability Of the Faculty After the Class Hours.	278	290.0	95.86
4	Chalk-Talk/ICT Tools Usage.	272	290.0	93.79
5	Interaction with the students in the class.	267	290.0	92.07
6	Impartial assessment of Students.	279	290.0	96.21
7	Discipline & Control on the class.	279	290.0	96.21
8	Planning Of Effective Teaching.	258	290.0	88.97
9	Regular & Punctual to the Classes.	280	290.0	96.55
10	Syllabus Coverage as per the Lesson Plan.	281	290.0	96.90
	Total :	2725	2900	93.97

HOD Review:

Very Good

HOD SIGNATURE

Visvesvaraya Technological University

SAPTHAGIRI COLLEGE OF ENGINEERING, BANGALORE

Branch : EC Scheme : 2017 Semester : 8

Sl NO.	USN	17EC81	17EC82	17EC834	17EC84	17ECP85	17ECS86	STUDENT SIGNATURE
1	1SG16EC083	38	38	36	46	98	90	
2	1SG17EC001	39	38	38	46	99	91	
3	1SG17EC002	35	38	37	44	91	94	
4	1SG17EC003	39	37	38	49	98	95	
5	1SG17EC004	38	38	38	47	96	88	
6	1SG17EC007	39	39	39	47	93	93	
7	1SG17EC009	38	38	39	47	95	92	
8	1SG17EC011	39	38	39	46	98	91	
9	1SG17EC012	39	39	39	48	98	92	
10	1SG17EC013	38	37	37	43	90	88	
11	1SG17EC015	40	39	40	48	98	95	
12	1SG17EC017	39	39	40	48	99	94	
13	1SG17EC019	39	39	36	48	95	95	
14	1SG17EC021	38	38	38	44	95	85	
15	1SG17EC022	40	38	38	49	99	94	
16	1SG17EC023	38	37	38	44	99	96	
17	1SG17EC024	39	36	37	43	92	81	
18	1SG17EC025	40	39	39	49	96	98	
19	1SG17EC026	40	38	38	49	99	95	
20	1SG17EC028	40	39	40	48	93	97	
21	1SG17EC029	40	39	38	49	94	92	
22	1SG17EC030	39	39	39	47	98	92	
23	1SG17EC032	39	39	38	46	97	90	
24	1SG17EC033	39	39	39	46	91	91	
25	1SG17EC034	38	36	36	48	95	91	
26	1SG17EC035	39	38	39	49	97	97	
27	1SG17EC036	39	37	39	48	96	90	
28	1SG17EC037	39	37	38	48	98	91	
29	1SG17EC038	39	39	39	49	98	93	
30	1SG17EC039	40	38	38	45	95	94	
31	1SG17EC040	40	40	39	50	98	97	
32	1SG17EC042	39	39	39	45	92	91	
33	1SG17EC043	39	38	39	48	97	94	
34	1SG17EC046	40	39	38	48	98	93	
35	1SG17EC047	40	39	39	48	98	93	

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.NO.	USN	17EC81	17EC82	17EC834	17EC84	17ECP85	17ECS86	STUDENT SIGNATURE
36	1SG17EC048	38	36	39	43	92	92	
37	1SG17EC049	38	36	34	43	88	92	
38	1SG17EC050	38	39	39	46	97	94	
39	1SG17EC051	39	38	39	47	98	93	
40	1SG17EC052	39	38	38	47	98	93	
41	1SG17EC054	38	36	30	43	90	81	
42	1SG17EC055	40	39	40	48	99	93	
43	1SG17EC056	39	39	39	48	98	92	
44	1SG17EC057	39	38	39	48	98	91	
45	1SG17EC058	39	39	39	47	97	90	
46	1SG17EC060	39	38	40	48	99	94	
47	1SG17EC062	39	38	39	46	96	96	
48	1SG17EC064	38	38	37	46	98	96	
49	1SG17EC066	39	40	40	49	99	96	
50	1SG17EC067	40	40	39	46	97	87	
51	1SG17EC069	40	40	40	48	96	98	
52	1SG17EC071	39	38	39	47	93	94	
53	1SG17EC072	39	38	39	46	94	91	
54	1SG17EC073	39	40	40	49	99	96	
55	1SG17EC075	38	39	40	49	99	92	
56	1SG17EC076	38	38	36	43	95	88	
57	1SG17EC077	37	39	39	48	98	90	
58	1SG17EC078	38	38	38	47	97	91	
59	1SG17EC080	39	40	38	47	98	97	
60	1SG17EC081	39	38	39	46	97	91	
61	1SG17EC083	39	38	36	48	88	92	
62	1SG17EC084	39	39	40	47	98	92	
63	1SG17EC085	39	40	40	49	96	97	
64	1SG17EC086	40	39	38	47	94	91	
65	1SG17EC087	40	40	39	48	97	91	
66	1SG17EC088	39	38	38	46	92	85	
67	1SG17EC089	40	38	39	46	97	92	
68	1SG17EC090	39	39	39	49	96	91	
69	1SG17EC091	39	39	38	47	98	97	
70	1SG17EC092	39	39	40	48	95	97	
71	1SG17EC094	40	40	40	50	99	98	
72	1SG17EC095	40	40	39	48	97	87	
73	1SG17EC096	39	40	39	47	97	98	
74	1SG17EC098	39	38	40	46	92	90	
75	1SG17EC100	38	38	34	45	97	85	
76	1SG17EC102	38	38	39	48	99	93	
77	1SG17EC103	40	40	40	48	98	94	

NO.	USN	17EC81	17EC82	17EC834	17EC84	17ECP85	17ECS86	STUDENT SIGNATURE
78	1SG17EC104	40	40	39	49	94	93	
79	1SG17EC105	40	39	39	48	98	93	
80	1SG17EC106	38	38	39	48	98	94	
81	1SG17EC107	39	38	38	44	98	96	
82	1SG17EC108	39	39	39	46	97	93	
83	1SG17EC109	39	39	40	46	98	94	
84	1SG17EC110	40	38	36	47	98	90	
85	1SG17EC111	39	39	39	48	98	94	
86	1SG17EC112	39	39	39	48	98	94	
87	1SG17EC113	38	38	39	49	99	96	
88	1SG17EC114	39	38	36	46	98	87	
89	1SG17EC115	40	38	39	46	90	92	
90	1SG17EC116	38	37	39	45	95	94	
91	1SG17EC417	38	37	37	41	91	90	
92	1SG18EC403	38	37	38	46	85	92	
93	1SG18EC405	38	38	38	46	85	90	
94	1SG18EC407	39	38	39	46	91	96	
95	1SG18EC408	39	37	39	46	88	91	
96	1SG18EC416	38	39	39	46	90	91	
--x--	Faculty Signature							----XXXXXXX----

*. values are either optional subjects or the faculty has not yet entered the marks

HOD
Seal and Signature

Head of the Department
Electronics & Communication
Sapthagiri College of Engineering
Bangalore-560 057

PRINCIPAL
Seal and Signature

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore- 560 057

Visvesvaraya Technological University

SAPTHAGIRI COLLEGE OF ENGINEERING, BANGALORE

Branch : EC Scheme : 2015 Semester : 8

Sl NO.	USN	15EC81	15EC82	15EC834	15EC84	15ECP85	15ECS86	STUDENT SIGNATURE
1	1SG15EC031	17	15	17	42	95	84	
2	1SG15EC040	14	16	16	36	60	82	
3	1SG15EC088	17	14	15	40	87	82	
4	1SG15EC100	15	13	14	35	55	81	
5	1SG16EC016	16	13	14	36	89	80	
6	1SG16EC032	17	14	16	40	95	88	
7	1SG16EC061	17	17	20	46	97	87	
8	1SG16EC069	18	15	17	45	97	88	
9	1SG16EC086	17	17	16	44	91	89	
10	1SG16EC422	18	17	17	40	87	82	
11	1SG17EC419	17	13	17	41	97	86	
12	1SG17EC423	16	14	14	44	96	86	
--x--	Faculty Signature							----XXXXXXX----

*- values are either optional subjects or the faculty has not yet entered the marks

HOD
Seal and Signature
Head of the Department
Electronics & Communication
Sapthagiri College of Engineering
Bangalore 560 057

PRINCIPAL
Seal and Signature
Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore- 560 057

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Report ID : VTU61038594aIA6acSG

SAPTHAGIRI COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERIN
VTU Exam Result Analysis July-Aug 2021-ARV [EVEN Semester 2020-21] Date 20/10/2021

SEM: 8th **SECTION: 'A'** **PASS –98% (48/49)**

SL NO.	SUBJECT CODE	SUBJECT	FACULTY	STUDENTS [49]											% of Pass WR
				APPEARED	PASSED	FAILED	ABS	S+	S	A	B	C	D	E	
1	17EC81	Wireless Cellular and LTE 4G Brandbond	DR. PRAKASH JADHAV	49	48	1	0	2	9	19	16	1	1	0	98
2	17EC82	Fiber optics and networks	PRATHIBHA P	49	49	0	0	0	7	28	10	4	0	0	100
3	17EC834	Machine Learning	SHOBHA S	49	49	0	0	4	10	19	14	2	0	0	100
4	17EC84	Internship	KAVITHA RJ	49	49	0	0	45	4	0	0	0	0	0	100
5	17ECP85	Project work	DR. PRAKASH JADHAV/ KAVITHA RJ	49	49	0	0	49	0	0	0	0	0	0	100
6	17EC86	Seminar	RAVISHANKARA M N	49	49	0	0	45	4	0	0	0	0	0	100

SEM: 8th

SECTION: 'B'

PASS – 96% (45/47)

SL NO.	SUBJECT CODE	SUBJECT	FACULTY	STUDENTS [47]											% of Pass WR
				APPEARED	PASSED	FAILED	ABS	S+	S	A	B	C	D	E	
1	17EC81	Wireless Cellular and LTE 4G Brandbond	DR. PRAKASH JADHAV	47	45	2	0	0	8	11	23	3	0	0	96
2	17EC82	Fiber optics and networks	PRATHIBHA P	47	47	0	0	1	10	20	14	2	0	0	100
3	17EC834	Machine Learning	SHOBHA S	47	47	0	0	3	8	21	13	2	0	0	100
4	17EC84	Internship	KAVITHA RJ	47	47	0	0	40	7	0	0	0	0	0	100
5	17ECP85	Project work	DR. PRAKASH JADHAV/ KAVITHA RJ	47	47	0	0	47	0	0	0	0	0	0	100
6	17EC86	Seminar	RAVISHANKARA M N	47	47	0	0	40	7	0	0	0	0	0	100

SEM: 8th

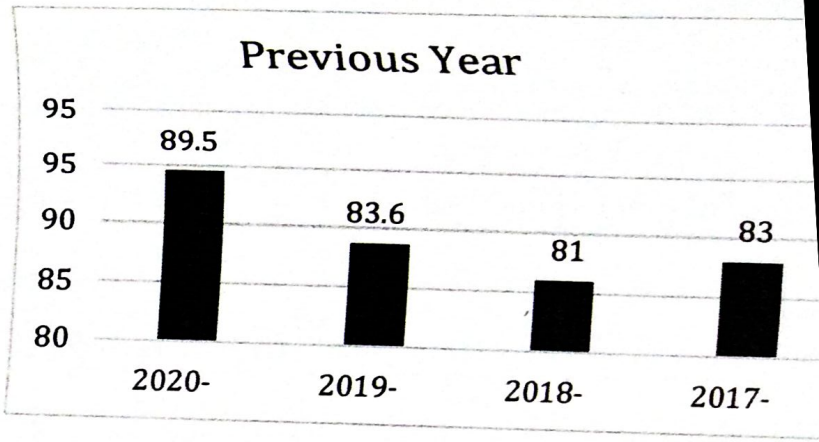
SECTION: 'A & B' (OVERALL)

PASS – 96.87% (93/96)

SL. No	Sub Code	Subject	Faculty	STUDENTS [96]											% of Pass WR
				APPEARED	PASSED	FAILED	ABS	S+	S	A	B	C	D	E	
1	17EC81	Wireless Cellular and LTE 4G Brandbond	DR. PRAKASH JADHAV	96	93	3	0	2	17	30	39	4	1	0	97
2	17EC82	Fiber optics and networks	PRATHIBHA P	96	96	0	0	1	17	48	24	6	0	0	100
3	17EC834	Machine Learning	SHOBHA S	96	96	0	0	7	18	40	27	4	0	0	100
4	17EC84	Internship	KAVITHA RJ	96	96	0	0	85	11	0	0	0	0	0	100
5	17ECP85	Project work	DR. PRAKASH JADHAV/ KAVITHA RJ	96	96	0	0	96	0	0	0	0	0	0	100
6	17EC86	Seminar	RAVISHANKARA M N	96	96	0	0	85	11	0	0	0	0	0	100

Comparison of previous results

ACADEEMIC YEAR	2020-21		2019-20		2018-19		2017-18	
STUDENT DETAILS	WR	WOR	WR	WOR	WR	WOR	WR	WOR
TUDENTS APPEARED	96	96	141	121	113	113	130	97
ASSED	93	93	136	117	106	106	120	93
AILED	3	3	5	4	07	07	10	3
BSENT	00	00	0	0	00	00	00	0
VERALL PASS %(BRV)	**96.87**	**96.87**	**96.453**	**96.69**	**93.80**	**93.80**	**92.30**	**95.87**
VERALL PASS %(ARV)	96.87	96.87	96.45	96.69	98.23	98.23	**95.31**	**96.00**



Fast Learners (Toppers)

Sl. No	USN	NAME	Total Marks (Percentage)
1	1SG17EC094	SUMAN KUMAR S	662
2	1SG17EC030	GANAVI D	652
3	1SG17EC113	YATHIN B S	652
4	1SG17EC073	RIYA ESTHER	648
5	1SG17EC040	JIPHIL P JOSE	644
6	1SG17EC069	PRIYANKA R	638
7	1SG17EC085	SHIRIN M THOMAS	634
8	1SG17EC026	DHANUSH BHARADWAJ H P	632
9	1SG17EC080	SAMATA GAJANAN MUNAGEKAR	631
10	1SG17EC103	UMA MAHESHWARI R	628

FCD=93
FC=0
SC=0
FAIL=3

Slow Learners

Sl. No	USN	NAME	Total Marks (Percentage)
1	1SG17EC054	N SHUSHANTH	502
2	1SG17EC049	MALLIKA R BABU	530
3	1SG17EC100	TEJAS S	536
4	1SG17EC024	DARSHAN S K	541
5	1SG17EC088	SHREYAS S	544
6	1SG16EC083	RAKSHA N K	546
7	1SG17EC417	PURUSHOTTAM R	547
8	1SG17EC076	SACHIN G D	556
9	1SG17EC114	YESHWANTH A	556
10	1SG18EC408	INCHARA K C	556