Vishnu Waman Thakur Charitable Trust's
VIVA Institute of Technology
Approved by AICTE New Delhi, Recognized by DTE, Govt. of Maharashtra
And Affiliated to University of Mumbai
NAAC "B++" Grade

Department of Electronics and Telecommunication Engineering

Course Name:	**Bridge Course on 5G Wireless Standard Design**
Name of the Faculty:	Mrs. Meena Perla
Designation:	**Assistant Professor**
Organization/Institution:	VIVA Institute of Technology
Duration:	08th July 2024 to 11th October 2024
Time:	**30 hours**
Number of Students:	16

Course Objectives:

1. To design practical wireless systems
2. To design standards-based practical wireless systems for current jobs in the wireless communication industry
3. To bridge the gap between the theory and practise of 5G wireless communication systems, and consequently also the gap between academia and industry.

Course Outcomes:

After successful completion of the course, the students are able to

1. Understand concept of 5G transceivers
2. Understand transceiver specifications
3. Design and implement a 5G compliant wireless system in MATLAB.

Programme Summary:

Duration: 30 Hours

Venue: VIVA Institute of Technology, Shirgaon.

Electronics & Telecommunication Engineering Department of VIVA Institute of Technology or ganized a 30 hours' certificate course on **"5G Wireless Standard Design"** during **8th July 2024 to 11th October 2024.**

The students normally have strong theoretical background in wireless communications systems, but negligible exposure on the use of this theory to design practical wireless systems. And current jobs in the wireless communication industry require design of standards-based practical wireless systems. The objective of this course is to bridge the gap between the theory and practice of 5G wireless communication systems, and consequently also the gap between academia and industry.

To achieve the objective, underlying concepts of 5G transceivers was taught in the class, and the students were expected to read the 5G standard documents to understand the transceiver specifications. The students then designed and implemented in MATLAB a 5G compliant wireless system. The course involved a MATLAB coding component, which was considered for evaluation. Lastly students discussed possible evolutionary paths for the 5G standard.

Topics covered in course:

Sr.no	Contents	Hrs.
1	Course Introduction Key 5G Technologies - Adaptive Modulation and Coding (AMC) Key 5G Technologies - Hybrid automatic repeat request (HARQ) Key 5G Technologies - Orthogonal frequency division multiplexing (OFDM) 5G Numerology	3
2	5G frame structure 5G physical downlink shared channel (PDSCH) transmit chain– CRC generation 5G PDSCH transmit chain – code block segmentation 5G PDSCH transmit chain – LDPC coding	3
3	5G PDSCH transmit chain – rate matching 5G PDSCH transmit chain – interleaving and concatenation PDSCH transmit chain – scrambling and modulation	3
4	5G PDSCH receive chain 5G PDSCH – map receiver design 5G baseband – RF conversion	3
5	Indigenous 5G network architecture 5G physical downlink control channel (PDCCH) transmit chain- introduction 5G PDCCH transmit chain – CRC and segmentation 5G PDCCH transmit chain – Polar encoding	3
6	5G PDCCH transmit chain – sub-block interleaver 5G PDCCH transmit chain – control resource set (CORESET) design	2
7	5G physical uplink control channel (PUCCH) Multiple input multiple output (MIMO) transceiver chain	2
8	MIMO transceiver chain	2
9	5G demodulation reference signal (DM-RS) design 5G sounding reference signal (SRS) design	3
10	5G SRS design 5G channel state estimation reference signal (CSI-RS)	2
11	5G CSI-RS 5G MIMO transceiver chain	2
12	5G FR1/FR2 design 5G initial access	2

CO-PO MAPPING:

Course Outcome	Program Outcome												
	PO 1	PO 2	PO 3	PO 4	P0 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	CO Target level
CO1	3	3	3	3	-	-	3	-	-	3	-	3	3
CO2	2	3	3	3	-	-	3	-	-	3	-	3	2.86
CO3	3	3	3	3	-	-	3	-	-	3	-	3	3
PO Target	2.66	3	3	3	-	-	3	-	-	3	-	3	-

Student Certificate format:

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Shirgaon, VirarE.), Dist: Palghar-401305, Maharashtra
NAAC "B++" GRADE

Certificate of Appreciation

This is to certify that

DUBEY BISHAL BRIJESH

Student of Electronics and Telecommunication Engineering department has successfully completed bridge course on "5G Wireless Standard Design" conducted during 8th July 2024 to 11th October, 2024 at

VIVA Institute of Technology, Shirgaon.

His / Her contribution is highly appreciated.

(Mrs. Archana Ingle)
HEAD OF DEPARTMENT

(Dr. Arun Kumar)
Principal