Professional Skills & Competencies (2140703)
(Activity Based Learning)

Course Objectives

- To equip students with essential professional competencies.
- To develop analytical and technical skills.

Module 1: Communication Skills

Verbal Communication: Public speaking, Group discussions, and Interview handling. Non-verbal Communication: Body language, Gestures, Listening skills. Written Communication: Résumé writing, Email etiquette, Cover letters, Report Writing. Presentation Skills: Visual aids, Audience engagement, Delivery techniques.

English (Verbal Ability): Passage/Sentence Rearrangement, Error Detection and Correction, fill in the Blanks, Reading Comprehension Passages, Sentence Completion, Synonyms and Antonyms, Words Completion, Para jumbles etc.

Activities: Mock interviews and GDs, Email & résumé writing workshops, Peer review and instructor feedback.

Module 2: General Aptitude

Quantitative Aptitude: Number systems, Ratios, Percentages, Averages, Time & Work, Probability. Logical Reasoning: Series, Puzzles, Syllogisms, Direction sense, Blood relations. Data Interpretation: Tables, Pie charts, Graphs.

Activities: Weekly quizzes, Group problem-solving sessions, Timed mock aptitude tests.

Module 3: Basic Coding Skills

Basic Programming Concepts, Syntax and semantics, Input/output handling, Variables, data types, Loops. Functions and recursion. Arrays, strings. Sorting and searching, Pointers (C/C++) / References (Java/Python). Exception handling (Java, Python).

Activities: Technical round based Weekly coding exercises, Mini hands-on projects, Error debugging practice, Mock technical tests.

Module 4: Competitive Coding Skills

Introduction to Data Structures: Linked Lists (Singly, Doubly), Problem solving using linked lists. Stacks, Queues, Trees (Binary, BST, basic traversals), Heaps (Min/Max heap concepts), Graphs (Adjacency list/matrix, BFS, DFS), Sets (HashSet, TreeSet). OOPS concepts: Encapsulation, Abstraction, Inheritance and Polymorphism. Introduction to Databases, ER-model, basics of SQL. Version Control: Git, GitHub.

Activities: Weekly coding contests, Problem solving on competitive coding platforms like Leetcode, Codeforces, Hackerrank etc., Peer-to-peer code review, Mock technical interviews.

Module 5: Discipline Specific Tools*

CSE/ CSD / IT: Git & GitHub, Docker, Postman, MySQL, VS Code, Linux Shell.
Electronics / Electrical: MATLAB, Simulink, Multisim, Proteus, LTspice, Arduino IDE.
Mechanical Engineering: AutoCAD, SolidWorks, ANSYS, MATLAB, Fusion 360.
Civil Engineering: AutoCAD Civil 3D, STAAD Pro, Revit, Primavera, GIS tools.
AI&DS/ AI&ML / IT(AIR): Jupyter Notebook, Pandas, Scikit-learn, TensorFlow, Tableau.
IoT: Arduino IDE, Raspberry Pi, ESP-32, LoRaWAN, ESP-IDF, PlatformIO, LTspice.

Activities: Tool-based lab exercises, Branch-specific mini projects, Short presentations on use-cases of tools in industry.

**Respective departments may include discipline specific tools which are essential for students.*

COURSE OUTCOMES

After completion of the course students will be able to:

CO1 Demonstrate effective communication strategies in professional scenarios including interviews and group discussions.

CO2 Solve real-world quantitative and logical reasoning problems with time-bound accuracy.

CO3 Implement basic algorithms using standard programming languages.

CO4 Design efficient algorithmic solutions to solve coding problems.

CO5 Apply discipline-specific tools to simulate, model, or develop solutions relevant to core engineering problems.

CO-PO Mapping Matrix												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1								1	3	3		2
CO2	2	3				2		1				2
CO3	3	2			2							2
CO4	3	3	3	2	2							2
CO5	2	2	2	2	3	3	1				1	2

B.Tech. VII Semester (Electronics Engineering/Electronics and Telecommunication Engineering)

Subject Code	Category Code	Subject Name	Practical Slot			Total Marks	Contact Hr/week			Total Credits
			End Sem Mark	Lab work & Sessional Marks	Skill based mini project		L	T	P	
2140705	DLC	Creative Problem Solving	25	25	-	50	-	-	6	3

Creative Problem Solving (2140705)

Lab Objective:

The lab comprises two modules each of which students need to finish passing this course. These 02 modules are named as

1. Communication Systems
2. Antenna Design

Tools Required:

Network Simulator, QualNet, CST Design Studio

List of Experiments

Communication Module:

1. Program in NS(network simulator)/QualNet to implement different topology
2. Program in NS(network simulator)/QualNet for connecting multiple routers and nodes and building a hybrid topology
3. Program in NS(network simulator)/QualNet to implement FTP using TCP bulk transfer
4. Program in NS(network simulator)/QualNet for connecting multiple routers and nodes and building a hybrid topology and then calculating network performance
5. To analyse network traces using Wireshark software.

Antenna Module

1. Study and overview of CST simulation tool.
2. Design and Simulation of Microstrip Antenna Using CST Tool.
3. Design and Simulation of Microstrip Transmission Line Using CST Tool.
4. Design and Simulation of Waveguide Using CST Tool.
5. Design and Simulation of Half Wave Dipole Antenna Using CST Tool.

Course Outcomes:

After the successful completion of this course students will be able to:

CO1. **Write** a program in Network Simulator for various topologies.
CO2. **Design** a network using NS2 or QualNet.
CO3. **Design** an antenna of given specification.

B.Tech. VII Semester (Electronics Engineering/Electronics and Telecommunication Engineering)

Subject Code	Category Code	Subject Name	Practical Slot			Total Marks	Contact Hr/week			Total Credits
			End Sem Mark	Lab work & Sessional Mark	Skill based mini project		L	T	P	
2140704	DLC	5G Communication Lab	60	20	20	100	-	-	6	3

5G Communication Lab (2140704)

Course Objective: This course aims to equip students with the knowledge and hands-on skills to configure and deploy 5G Core, IMS, and gNodeB systems.

List of Experiments

1. Configure and bring up the 5G Core, IMS, and gNodeB. Register a commercial UE to the 5G network.
2. Capture and analyze NGAP packets between gNodeB and Core Network during UE attachment.
3. Measure the downlink and uplink throughput performance using iPerf3.
4. Configure APN settings on the UE for internet and IMS services.
5. Evaluate MIMO 2T2R under various conditions.
6. Configure and register IMS subscribers, then establish VoNR calls.
7. Use VS Code and GNU Debugger to debug gNodeB software and analyze execution flow.
8. Monitor and analyze key radio parameters such as RSRP, SINR, and PCI using NetMonster or similar signal monitoring apps.

Course outcome

CO1. Demonstrate the setup of 5G Core and gNodeB.
CO2. Analyze signaling protocols using Wireshark to interpret message exchanges, authentication processes, and session setup.
CO3. Compute network KPIs such as throughput, latency, and signal quality.
CO4. Analyze 5G network components to identify and debug errors.