



# PANIMALAR ENGINEERING COLLEGE

An Autonomous Institution

## [JAISAKTHI EDUCATIONAL TRUST]

Approved by AICTE | Affiliated to Anna University | Recognized by UGC

All Eligible UG Programs are Accredited by NBA

Bangalore Trunk Road, Varadharajapuram, Poonamallee, Chennai- 600 123

## TECHDIVATHON

**Empower, Innovate, Elevate: Code the Future Together**

**Domain: 5G**

**Problem Statements:**

Sno	Title	Problem Statement	Description
1	Designing Efficient mmWave Antennas for 5G Connectivity	Design directional mmWave antennas for enhanced 5G signal strength and coverage in urban settings.	mmWave frequencies support high-speed 5G data transmission but face challenges like limited range and signal scattering. Creating compact, cost-effective antennas can help maintain stable connectivity in urban areas.
2	Compact 5G Small Cells for Dense Urban Areas	Develop compact small cells for consistent 5G coverage in high-density areas.	Small cells address coverage gaps caused by obstructions like buildings, enhancing network capacity and reducing interference for reliable connectivity in urban spaces.
3	Portable 5G Emergency Communication Nodes	Create battery-operated portable 5G nodes for disaster communication.	Portable 5G nodes provide real-time connectivity in disaster scenarios, enabling first responders to coordinate effectively and deliver timely aid.
4	High-Efficiency Power Amplifiers for 5G Transmitters	Build energy-efficient power amplifiers for 5G high-frequency bands.	Optimizing power amplifiers reduces energy waste, supports sustainability, and improves the cost-efficiency of 5G operations.
5	Wearable 5G Devices for Health Monitoring	Design wearable health monitors leveraging 5G technology for real-time alerts.	5G-connected wearables transmit health data to healthcare providers, offering continuous monitoring and instant alerts for improved preventive care and emergency response.
6	5G IoT Sensors for Precision Agriculture	Build IoT sensors using 5G for real-time agricultural data monitoring.	5G-enabled IoT sensors monitor environmental factors like soil moisture and weather, providing farmers with actionable insights for better resource optimization and crop yield.
7	Thermal Management Systems for 5G Hardware	Design cooling systems for 5G devices to handle high heat output.	Efficient thermal management solutions prevent overheating in 5G hardware, ensuring reliable performance and longevity.
8	Resilient 5G Hardware for Harsh Environments	Create 5G devices capable of withstanding extreme environmental conditions.	Rugged 5G hardware ensures uninterrupted connectivity and reliable performance in challenging conditions like deserts or industrial environments.

9	Dynamic Beamforming Modules for Enhanced Coverage	Build modules for dynamic beamforming to optimize 5G signal quality.	Dynamic beamforming directs signals to specific devices, improving coverage and signal strength, particularly in geographically diverse areas.
10	Energy Harvesting Hardware for Sustainable 5G Operations	Design energy-harvesting devices to power 5G networks sustainably.	Energy-harvesting solutions convert ambient energy (solar, RF) into usable power, reducing reliance on conventional energy sources and supporting eco-friendly 5G operations.
11	AI-Driven Network Optimization for 5G	Create AI-powered software to optimize 5G network performance dynamically.	AI can predict network congestion and adjust resource allocation in real-time, improving speed, reliability, and user experience in high-traffic areas.
12	5G-Based Edge Computing for Low Latency Applications	Develop platforms using 5G for latency-critical edge computing.	5G enables edge computing, reducing latency and processing data closer to the user for faster response times in applications like IoT and autonomous systems.
13	AR/VR Integration Using 5G Networks	Build AR/VR platforms using 5G for real-time immersive experiences.	Leveraging 5G provides high bandwidth and low latency, enabling seamless AR/VR applications for industries like virtual learning and telemedicine.
14	5G-Powered Real-Time Translation Services	Create software for real-time multilingual communication via 5G.	5G enables instant language processing, facilitating smooth global interactions in virtual meetings, international trade, and travel assistance.
15	Cybersecurity Framework for 5G Networks	Develop a cybersecurity framework to protect 5G networks from threats.	With 5G's vast network, real-time monitoring and AI-driven defenses safeguard data and infrastructure against evolving security threats.
16	Smart City Applications Using 5G Data Analytics	Use 5G to analyze and manage smart city systems effectively.	5G data from sensors optimizes urban systems like traffic flow, energy consumption, and waste management, contributing to sustainable city development and improved quality of life.
17	5G Cloud Gaming Optimization Platform	Build platforms to enhance cloud gaming using 5G's low latency.	5G's minimal lag supports high-quality cloud gaming, providing smooth gameplay even on low-end devices by reducing latency.
18	AI-Powered Predictive Maintenance for 5G Hardware	Develop predictive maintenance tools for 5G hardware using AI.	AI analyzes hardware data to predict failures, allowing for proactive maintenance, reducing downtime, and improving network reliability.
19	Energy Efficiency Management for 5G Networks	Create software to monitor and optimize 5G network energy usage.	Tools to monitor 5G energy consumption and suggest optimizations reduce costs and environmental impact.
20	5G IoT Integration for Disaster Management	Build IoT platforms using 5G for real-time disaster response.	5G-connected IoT devices provide real-time data during disasters, enabling faster response times and more efficient resource allocation.
21	5G-Enabled Autonomous Drone Communication System	Develop hybrid systems for seamless drone communication via 5G.	Autonomous drones equipped with 5G can transmit real-time data for surveillance and disaster assessment, ensuring efficient communication.

22	Smart Transportation System Using 5G and IoT	Build 5G-enabled systems for smarter transportation and safety.	IoT devices in vehicles and infrastructure communicate over 5G, supporting autonomous driving and traffic optimization, reducing accidents, and improving mobility.
23	Telemedicine Ecosystem Powered by 5G and AI	Design hybrid telemedicine systems using 5G and AI for remote care.	AI diagnostics combined with 5G's speed enable real-time remote consultations, improving healthcare access in remote areas.
24	5G-Driven Factory Automation Platform	Create hybrid platforms for factory automation using 5G.	Integrating 5G with robotics improves real-time communication, resource allocation, and flexibility in manufacturing processes.
25	Disaster Recovery Using 5G and Mixed Reality	Build systems combining 5G and mixed reality for disaster recovery.	Mixed reality overlays, powered by 5G, guide search and rescue teams, providing live data to accelerate recovery efforts in disaster-stricken areas.