National Curriculum of Pakistan
2022-23

TECHNICAL EDUCATION

TELECOMMUNICATIONS TECHNOLOGY

Grades 9-10

NATIONAL CURRICULUM COUNCIL SECRETARIAT
MINISTRY OF FEDERAL EDUCATION AND
PROFESSIONAL TRAINING, ISLAMABAD
GOVERNMENT OF PAKISTAN

بسم الله الرحمن الرحيم

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It is with great pride that we, at the National Curriculum Council Secretariat, present the first core curriculum in Pakistan's 75-year history. Consistent with the right to education guaranteed by Article 25-A of our Constitution, the National Curriculum of Pakistan (2022-23) aspires to equip every child with the necessary tools required to thrive in and adapt to an ever-evolving globalized world.

The National Curriculum is in line with international benchmarks, yet sensitive to the economic, religious, and social needs of young scholars across Pakistan. As such, the National Curriculum aims to shift classroom instruction from rote learning to concept-based learning.

Concept-based learning permeates all aspects of the National Curriculum, aligning textbooks, teaching, classroom practice, and assessments to ensure compliance with contemplated student learning outcomes. Drawing on a rich tapestry of critical thinking exercises, students will acquire the confidence to embark on a journey of lifelong learning. They will further be able to acknowledge their weaknesses and develop an eagerness to build upon their strengths.

The National Curriculum was developed through a nationwide consultative process involving a wide range of stakeholders, including curriculum experts from the public, private, and non-governmental sectors. Representatives from provincial education departments, textbook boards, assessment departments, teacher training departments, *deeni madaris*, public and private publishers, private schools, and private school associations all contributed their expertise to ensure that the National Curriculum could meet the needs of all Pakistani students.

The experiences and collective wisdom of these diverse stakeholders enrich the National Curriculum, fostering the core, nation-building values of inclusion, harmony, and peace, making the National Curriculum truly representative of our nation's educational aspirations and diversity.

I take this opportunity to thank all stakeholders, including students, teachers, and parents who contributed to developing the National Curriculum of Pakistan (2022-23)

Dr. Mariam Chughtai
Director
National Curriculum Council Secretariat
Ministry of Federal Education and Professional Training

Telecommunications and Technology Grade
Grades 9-10
Progression Grid

Domain A: Telecommunication Engineering Fundamentals

Standard A: Demonstrate understanding of basic concepts, terminology, and components of telecommunication systems.

Grade 9	**Grade 10**
Benchmark I: Students will be able to define key concepts of telecommunication systems and their components	N/A
Student Learning Outcomes	
[SLO:Tel-9-A-01]: Identify the basic components of a telecommunication system (signals, inputs/outputs, transmitter, receiver, transmission medium, etc.)	N/A
[SLO:Tel-9-A-02]: Describe the function of each component in telecommunication communication system	N/A
[SLO:Tel-9-A-03]:	N/A

Define key terms related to telecommunication systems	
Benchmark II: Students will be able to explain the functions of different components in a telecommunication system	
Student Learning Outcomes	
[SLO:Tel-9-A-04]: Classify telecommunication components based on their role in the system	N/A
[SLO:Tel-9-A-05]: Draw a block diagram showing connections between components of a telecommunication system	N/A
[SLO:Tel-9-A-06:] Compare the functions of different components in a telecommunication system	N/A

Domain B: Analog Electronics

Standard B: Apply knowledge of analog electronic components and circuits

Grade 9	**Grade 10**

Benchmark I: Students will be able to describe the characteristics of analog electronic components such as resistors, inductors, and capacitors and measure their values using a multimeter.	**Benchmark I**: Students will be able to analyze the working of analog circuits comprising resistors, inductors, and capacitors.
Student Learning Outcomes	
[SLO:Tel-9-B-01]: Recognize basic analog components like resistors, capacitors, and inductors	[SLO:Tel-10-B-01]: Draw circuit diagrams using symbols for analog components
[SLO:Tel-9-B-02]: List the characteristics of common analog components	[SLO:Tel-10-B-02]: Calculate current, voltage, and power in simple resistive circuits using Ohm's and Kirchhoff's laws
[SLO:Tel-9-B-03]: Measure resistance, capacitance, and inductance values using a multimeter	[SLO:Tel-10-B-03]: Compare the working of series and parallel combination of components
	[SLO:Tel-10-B-04]: Analyze resistor-capacitor (RC) and resistor-inductor (RL) circuits to determine output characteristics (optional)

Domain C: Digital Electronics

Standard C: Design simple digital logic circuits using basic gates and techniques.

Grade 9	Grade 10
Benchmark I: Students will be able to construct truth tables for logic expressions based on digital logic gates	**Benchmark I**: Students will be able to use logic gates and Boolean algebra techniques to analyze and design combinational digital logic circuits
Student Learning Outcomes	
[SLO:Tel-9-C-01]: Identify symbols and truth tables for basic logic gates like AND, OR, NOT	[SLO:Tel-10-C-01]: Design simple combinational logic circuits using AND, OR, NOT gates
[SLO:Tel-9-C-02]: Construct truth tables for logic expressions	[SLO:Tel-10-C-02]: Convert logic expressions into logic gate circuits
	[SLO:Tel-10-C-03]: Analyze and debug circuits to verify expected outputs
	[SLO:Tel-10-C-04]: Simplify logic expressions using Boolean algebra laws

Domain D: Signals and Noise

Standard D: Analyze characteristics and properties of different types of signals.

Grade 9	Grade 10
Benchmark I: Students will be able to describe the characteristics of sinusoidal signals	N/A
Student Learning Outcomes	
[SLO:Tel-09-D-01]: State properties of sinusoidal signals such as amplitude, frequency, phase	N/A
[SLO:Tel-09-D-02]: Describe the relationship between wavelength, frequency, and period for sinusoidal signals	N/A
[SLO:Tel-09-D-03]: Perform basic operations on sinusoidal signals like time shift, amplitude scaling	N/A
[SLO:Tel-09-D-04]: Sketch sinusoidal signals in time-domain	N/A

Benchmark II: Students will be able to describe the effect of noise on sinusoidal signals	
Student Learning Outcomes	
[SLO:Tel-09-D-05]: Explain the concept of noise and common noise sources	N/A
[SLO:Tel-09-D-06]: Demonstrate the addition of noise to a sinusoidal signal and describe its impact by sketching a graph	N/A

Domain E: Fundamentals of Communication Systems

Standard E: Explain working of basic communication system building blocks through diagrams

Grade 9	**Grade 10**
Benchmark I: Students will be able to draw the block diagram of a communication system and describe the purpose of each part of the block diagram	N/A
Student Learning Outcomes	
[SLO: Tel-09-E-01]:	N/A

Draw a block diagram for a basic communication system showing transmitter, transmission medium, and receiver sections	
[SLO: Tel-09-E-02]: Describe the purpose of each block in a simple communication system	N/A
[SLO: Tel-09-E-03]: List various types of transducers, transmitters, transmission media, and receivers that can be used in wireline (copper, optical fiber) and wireless communication systems	N/A

Domain F: Wireless Communication

Standard F: Compare various wireless communication technologies and standards.

Grade 9	**Grade 10**
Benchmark I: Students will be able to explain key characteristics of wireless communications	**Benchmark I**: Students will be able to compare and categorize various types wireless communication standards
Student Learning Outcomes	
[SLO: Tel-09-F-01]:	[SLO: Tel-10-F-01]:

Identify key characteristics of wireless communication systems that differentiate it from wireline communication systems	Compare key parameters of wireless standards like 2G, 3G, 4G, 5G, and WiFi (frequency band, data rate, modulation type, etc.)
[SLO: Tel-09-F-02]: List common wireless communication technologies such as AM and FM radio, cellular, WiFi, and Bluetooth	[SLO: Tel-10-F-02]: Classify wireless communication technologies based on coverage area and data rate
[SLO: Tel-09-F-03]: Recognize that wireless systems use modulation to efficiently transmit information	
[SLO: Tel-09-F-04]: Identify parts of the electromagnetic spectrum used for wireless communication	

Domain G: Optical Communication

Standard G: Understand basic principles and components of fiber optic communication.

Grade 9	**Grade 10**
N/A	**Benchmark I**: Students will be able to recognize basic components of fiber optic communication

Student Learning Outcomes	
N/A	[SLO: Tel-10-G-01]: Identify basic components of a fiber optic communication system like transmitter, optical fiber, receiver
N/A	[SLO: Tel-10-G-02]: Recognize different types of optical fibers
N/A	[SLO: Tel-10-G-03]: List merits and demerits of fiber optic communication over copper cables
N/A	**Benchmark II**: Students will be able to explain the propagation of light in an optical fiber
Student Learning Outcomes	
N/A	[SLO: Tel-10-G-04]: Explain the total internal reflection principle in an optical fiber
N/A	[SLO: Tel-10-G-05]: Discuss propagation modes in single-mode and multi-mode optical fibers

N/A	[SLO: Tel-10-G-06]: Calculate the numerical aperture, and acceptance angle for an optical fiber
N/A	[SLO: Tel-10-G-07]: Discuss loss mechanisms like absorption, scattering in optical fibers

Domain H: Telecommunication Applications for Social Good

Standard H: Discuss role and societal impacts of telecommunication technologies.

Grade 9	**Grade 10**
N/A	**Benchmark I**: Students will be able to list common telecom applications
Student Learning Outcomes	
N/A	[SLO: Tel-10-H-01]: List examples of telecommunication applications such as telephony, radio, television, and internet
N/A	[SLO: Tel-10-H-02]:

	Recognize the use of telecommunication in education, business, entertainment, etc.
N/A	[SLO: Tel-10-H-03]: Identify the role of telecommunication in weather forecasting, disaster management
N/A	**Benchmark II**: Students will be able to discuss emerging telecom applications
Student Learning Outcomes	
N/A	[SLO: Tel-10-H-04]: Discuss emerging applications like Internet of Things (IoT), smart cities, self-driving vehicles
N/A	[SLO: Tel-10-H-05]: Explain the use of telecom in e-governance, telemedicine, agriculture
N/A	[SLO: Tel-10-H-06]: Analyze the role of 5G in enhancing applications like augmented reality, robotics
N/A	[SLO: Tel-10-H-07]:

	Evaluate societal impacts of telecommunication technologies
N/A	[SLO: Tel-10-H-08]: Propose telecom innovations for improving quality of life, environment, education

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