Model Curriculum for

B.Voc/ D.Voc

in

Mobile Communication

All India Council for Technical Education
Nelson Mandela Marg, New Delhi

1. Introduction

All India Council for Technical Education (AICTE) Ministry of HRD, Government of India has introduced Entrepreneurship Oriented Skill development courses of B. Voc/D. Voc/Skill Diploma. These courses will be run by AICTE approved institutes by using available infrastructure and facilities. In these courses the institute will conduct general education content and sector specific skills will be imparted by Skill Knowledge Providers/ Training Providers/ Industries.

1.1 Key Features:

Objectives

- To provide judicious mix of skills relating to a profession and appropriate content of General Education.
- To ensure that the students have adequate knowledge and skills, so that they are work ready at each exit point of the program.
- To provide flexibility to the students by means of pre-defined entry and multiple exit points.
- To integrate NSQF within the Diploma, undergraduate level of higher education to enhance employability of the students and meet industry requirements. Such student apart from meeting the needs of local and national industry are also expected to be equipped to become part of the global workforce.
- To provide vertical mobility to students admitted in such vocational courses.
- The certification levels will lead to B. Voc. Degree in Mobile Communications and will be offered by respective affiliating University/Board of Technical Education.
- Students may be awarded Level Certificate/Diploma/Advance Diploma /Degree as outlined in the Table below:

Award	Duration after class X	Corresponding NSQF level
Level 3 Certificate	1 Year	3
Level 4 Certificate	2Years	4
Diploma	3 Year	5
Advance Diploma	4 Years	6
B.Voc Degree	5 Years	7

2. Course Objectives

After successfully completing the vocational course, the student would have acquired relevant appropriate and adequate technical knowledge together with the professional skills and competencies in the field of Mobile communication that he/she is properly equipped to take up gainful employment in this Vocation. Thus he/she should have acquired: -

A. Understanding of Principles

(a) Relevant concepts in science subjects (Physics, Chemistry and Mathematics)
(b) Working with electronic devices & circuits and testing instruments
(c) Procedure of Assembling components and PCB making
(d) Making and maintaining of Radio/Audio/Video Systems and Communication devices.

B. Adequate Professional Skills and Competencies in

(a) Testing and analyzing the performance of electronic circuits.
(b) Troubleshooting the fault at card/component level.
(c) Optimizing and analyzing procedures of mobile communication systems & networks.

C. A Healthy and Professional Attitude so that He / She has

(a) An analytical approach while working on a job.
(b) An open mind while locating/rectifying faults.
(c) Respect for working with his/her own hands.
(d) Respect for honesty, punctuality and truthfulness.

D. NSQF compliant skills in Qualification developed by sector skill council in IT/ITeS/Telecom sectors

3. Course Structure

The course will consist of combination of practice, theory and hands on skills in the IT/ITeS/Telecom sector.

Curriculum
The curriculum in each of the years of the programme would be a suitable mix of general education and skill components.

Skill Components:

- The focus of skill components shall equip students with appropriate knowledge, practice and attitude, to become a skilled professional. The skill components will be relevant to the industry as per its requirements.
- The curriculum will necessarily embed within itself, National Occupational Standards (NOSs) of specific job roles within the industry. This would enable the students to meet the learning outcomes specified in the NOSs.
- The overall design of the skill development component along with the job roles selected will be such that it leads to a comprehensive specialization in specific domains.
- The curriculum will focus on work-readiness skills in each of the year of training.
- Adequate attention will be given in curriculum design to practical work, on the job training, development of student portfolios.

General Education Component:

- The general education component adheres to the normal senior secondary and university standards. It will emphasize and offer courses which provide holistic development. However, it will not exceed 40% of the total curriculum.
- Adequate emphasis is given to language and communication skills.

The curriculum is designed in a manner that at the end of each year after class-XIIth students can meet below mentioned level descriptors of NSQF:

Level	Process required	Professional Knowledge	Professional skill	Core skill	Responsibility
Level 5	Job that requires well developed skill, with clear choice of procedures in familiar context	Knowledge of facts, principles, processes and general concepts, in a field of work or study	A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools materials and information	Desired mathematical skill, understanding of social, political and some skill of collecting and organizing information, communication.	Responsibility for own work and learning and some responsibility for other's works and learning
Level 6	Demands wide range of specialized technical skill, clarity of knowledge and practice in broad range of activity involving standard/ non-standard practices	Factual and theoretical knowledge in broad contexts within a field of work or study	A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study	Reasonably good in mathematical calculation, understanding of social, political and reasonably good in data collecting organizing information, and logical communication	Responsibility for own work and learning and full responsibility for other's works and learning
Level 7	Requires a command of wide ranging specialized theoretical and practical skill, involving variable routine and non-routine context	Wide ranging, factual and theoretical knowledge in broad contexts within a field of work or study	Wide range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study	Good logical and mathematical skill understanding of social political and natural environment good in collecting and organizing information, communication and presentation skill	Full responsibility for output of group and development

Curriculum for Mobile Communication

Level	Code	Educational Component		Credit	Marks
5 Semester I	**Theory**				
	5.GV.01	Basics of Electrical engineering		3	50
	5.GV.02	Analog & Digital Electronics		3	50
	5.GV.03	Signals & Systems		3	50
	5.GV.04	Communication skills(common to all discipline)		3	50
	Lab/Practical				
	5.VP.01	Electrical Engineering lab		1.5	50
	5.VP.02	Analog & Digital Electronics Lab		1.5	50
	On-Job-Training (OJT)/Qualification Packs				
	Line Assembler- Telecom Product (TEL/Q2502) Installation Engineer SDH& DWDM (TEL/Q6300) Tower Technician (TEL/Q4100)		(Any one)	15	200
5 Semester II	**Theory**				
	5.GV.05	Programming using Python & R through lab		3	50
	5.GV.06	Linear Integrated Circuits		3	50
	5.GV.07	Analog and digital communication		3	50
	5.GV.08	Microprocessors and micro controllers		3	50
	Lab/Practical				
	5.VP.03	Microprocessors and micro controllers lab		1.5	50
	5.VP.04	Analog & Digital Communication Lab		1.5	50
	On-Job-Training (OJT)/Qualification Packs				
	SMT Technician (TEL/Q2501) Installation Engineer L2 & L3 (TEL/Q6301) RF Site Survey (TEL/Q4103)		(Any one)	15	200
6 Semester I	**Theory**				
	6.GV.01	Telecom Infrastructure and grounding		3	50
	6.GV.02	Electromagnetics & Transmission Lines		3	50
	6.GV.03	Electronic Measurements & Instrumentation		3	50
	6.GV.04	Data Communication & Networks		3	50
	Lab/Practical				
	6.VP.01	Telecom Infrastructure and grounding Lab		1.5	50
	6.VP.02	Data Communication & Networks Lab		1.5	50
	On-Job-Training (OJT)/Qualification Packs				
	Infrastructure Engineer (TEL/Q6100) Drive Test Engineer (TEL/Q6211) Cluster Incharge (TEL/Q4101)		(Any one)	15	200
6	**Theory**				
	6.GV.05	Android Application Development		3	50

Level	Code	Educational Component		Credit	Marks
Semester II	6.GV.06	Wireless & Mobile Communication		3	50
	6.GV.07	Antenna theory and wave propagation		3	50
	6.GV.08	Database Management System		3	50
	Lab/Practical				
	6.VP.03	DBMS Lab		1.5	50
	6.VP.04	Wireless & Mobile Communication Lab		1.5	50
	On-Job-Training (OJT)/Qualification Packs				
	Field Maintenance Engineer (TEL/Q6202)		(Any one)	15	200
	Network Management Engineer (TEL/Q6302)				
	Cluster Manager (TEL/Q4101)				
7 Semester I	**Theory**				
	7.GV.01	Embedded System		3	50
	7.GV.02	Satellite and Radar Communication		3	50
	7.GV.03	Computer Network Security		3	50
	7.GV.04	Telecom service Management		3	50
	Lab/Practical				
	7.VP.01	Embedded system Lab		1.5	50
	7.VP.01	Computer Network Security Lab		1.5	50
	On-Job-Training (OJT)/Qualification Packs				
	Security Analyst (SSC/Q0901)		(Any one)	15	200
	Test Engineer Software (SSC/Q4901)				
	ICT Engineer (TEL/Q6205)				
7 Semester II	**Theory**				
	7.GV.05	Internet of Things		3	50
	7.GV.06	Artificial Intelligence		3	50
	7.GV.07	Cloud Computing		3	50
	7.GV.08	Web Application Development		3	50
	Lab/Practical				
	7.VP.03	Web Application Development Lab		1.5	50
	7.VP.04	Artificial Intelligence Lab		1.5	50
	On-Job-Training (OJT)/Qualification Packs				
	Web developer (SSC/Q0503)		(Any one)	15	200
	Cloud Application Developer (SSC/Q8303)				
	IOT Device /System (Installation & M2M Communication Setup (TEL/Q6210)				

Level 5 (Semester I)

(5.GV.01) BASICS OF ELECTRICAL ENGINEERING

Objective:
The student should be able to understand the various component used in Electrical engineering the methods used for circuit analysis

UNIT-I

Basic Circuit Concepts: Voltage and Current Sources, Resistors: Fixed and Variable resistors, Construction and Characteristics, Color coding of resistors, resistors in series and parallel.

Inductors: Fixed and Variable inductors, Self and mutual inductance, Faraday's law and Lenz's law of electromagnetic induction, Energy stored in an inductor, Inductance in series and parallel, Testing of resistance and inductance using multi meter.

Capacitors: Principles of capacitance, Parallel plate capacitor, Permittivity, Definition of Dielectric Constant, Dielectric strength, Energy stored in a capacitor, Air, Paper, Mica, Teflon, Ceramic, Plastic and Electrolytic capacitor, Construction and application, capacitors in series and parallel, factors governing the value of capacitors, testing of capacitors using multi meter.

UNIT-II

Circuit Analysis: Kirchhoff's Current Law (KCL), Kirchhoff's Voltage Law (KVL), Node Analysis, Mesh Analysis.

DC Transient Analysis: Initially Charged RC Circuit, RL Circuit with Initial Current, Time Constant, RL and RC Circuits with Sources, DC Response of Series RLC Circuits.

UNIT-III

AC Circuit Analysis: Sinusoidal Voltage and Current, Definition of Instantaneous, Peak, Peak to Peak, Root Mean Square and Average Values. Voltage-Current relationship in Resistor, Inductor and Capacitor, Phasor, Complex Impedance, Power in AC Circuits: Instantaneous Power, Average Power, Reactive Power, Power Factor. Sinusoidal Circuit Analysis for RL, RC and RLC Circuits. Mesh Analysis, Node Analysis and Network Theorems for AC Circuits. Passive Filters: Low Pass, High Pass, Band Pass and Band Stop.

UNIT – IV

Network Theorems: Principal of Duality, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Reciprocity Theorem, and Maximum Power Transfer Theorem.
Two Port Networks: Impedance (Z) Parameters, Admittance (Y) Parameters, Transmission (ABCD) Parameters.

(5.GV.02) ANALOG & DIGITAL ELECTRONICS

Objective:
The student should be able to understand the various devices used in Electronics engineering and to understand the working of amplifiers and digital circuits.

UNIT – I

Review of diode and BJT: Review of diode and BJT, CB, CE, CC configurations, comparisons of different configurations, BJT amplifier (CE), dc and ac load line analysis

Bias stabilization: Need for stabilization, fixed Bias, voltage divider bias & ß Stabilization factors, thermal stability.

UNIT – II

Small signal amplifiers: Quantitative study of the frequency response of a CE amplifier, coupling schemes, RC coupled amplifiers, Emitter follower.

Multistage Amplifiers: Cascade and Cascode amplifiers, Effect on gain and bandwidth for Cascaded CE amplifiers (RC coupled).

Feedback Amplifiers: Concept of feedback, negative and positive feedback, advantages and disadvantages of negative feedback, voltage (series and shunt), current (series and shunt) feedback amplifiers, gain, input and output impedances.

UNIT- III

Logic Gates and Boolean algebra: Truth Tables of OR, AND, NOT, XOR, XNOR, Universal (NOR and NAND) Gates, Basic postulates and fundamental theorems of Boolean algebra.

Combinational Logic Analysis and Design: Standard representation of logic functions (SOP and POS), Minimization Techniques (K-Map, Boolean Algebra & Quine Mc-Cluskey), Encoder and Decoder, Multiplexers and DE-multiplexers, implementing logic functions with multiplexer & Decoder, binary Adder, binary subtractor, 4 bit adder/ subtractor using 2's complement.

UNIT- IV

Counters and Shift Registers: - Design of Synchronous and Asynchronous Counters: - Binary, BCD/Decade and Up/Down Counters, Ring Counter and Johnson Counter. Shift Registers, Types of Shift Registers (SIPO, PISO, SISO, PIPO), Universal Shift Register.

Sequential Logic Circuits: - Latches and Flip Flops- SR, D, T and J.K F.F (Master Slave-JK and Edge Triggered JK Flip Flops), Asynchronous Inputs. Clocked and edge triggered Flip flops.

(5.GV.03) SIGNAL AND SYSTEM

Objective:
The student should be able to understand the various signals used in Electronics & Communication engineering.

UNIT-I

Continuous and Discrete Time Signals: Definition of signal**,** Classification of Signals: Periodic and

Aperiodic, Even and Odd, Energy and Power signals**,** Deterministic and Random signals**.**

Singular Functions: Unit impulse, unit step, unit ramp, complex and exponential, parabolic, Signum, Sinc etc.

Properties of unit impulse in continuous and discrete domain, properties of basic functions w.r.t., orthogonality.

Transformation in independent variable of signals: Time scaling, Time shifting, Amplitude scaling.

Representation of signals in terms of singular function and orthogonal functions.

Systems: Definition of system, types of systems: Linear and nonlinear, static and dynamic, causal and noncausal, time variant and invariant, invertible and non-invertible, stable and non-stable. System described by differential equation and difference equation.

LTI System: Properties of LTI System, impulse response, convolution and its properties in continuous and discrete domain with proof. Linear convolution in continuous and discrete domain using graphical method, using general formula and matrix met

UNIT-II

Fourier series: Need and application of Fourier series. Fourier series representation of continuous time and discrete time signals using exponential method and trigonometric method. Magnitude and Phase spectrum of signals.

Fourier Transform: Properties of the Continuous time and discrete time Fourier Transform. Magnitude and Phase representations of frequency response of LTI systems Analysis and characterization of LTI systems using Differential Equations and Difference equation.

UNIT-III

Magnitude- Phase Representation of Frequency Response of LTI System: Linear phase, concept of phase delay and group delay. All pass system.

Laplace Transform: Properties of Laplace transform, concept of ROC and its properties. Computation of impulse response & transfer function using Laplace transform. Inverse-Laplace transforms. Computation of impulse response, total response (zero state and zero input response) & transfer function using Laplace transform**.**

UNIT-IV

Sampling: Sampling of low pass signals, ideal sampling, Aliasing effect, Nyquist rate, reconstruction of signal.

Sampling of discrete time signals**.**

Z Transform: Region of convergence – properties of ROC, Properties of Z-transform.
Inverse Z-transform using contour integration - Residue theorem, Power series expansion and partial fraction expansion. Relationship between Z-transform, Fourier transform and Laplace transform. Computation of impulse response, total response (Zero state and Zero input response) & Transfer function using Z-Transform.
Stability of discrete-time LTI System.

COMMUNICATION SKILLS
(5.GV.04) (COMMON TO ALL DISCIPLINE)

Objective:
The student should be able to communicate effectively for Business & Organization needs .

UNIT-I

Recognizing and Understanding Communication Styles: What is Communication? Passive Communication, Aggressive Communication, Passive-Aggressive Communication, Assertive Communication, Verbal and Non Verbal Communication, Barriers and Gateways to Communication.

UNIT-II

Listening Skills: Types of Listening (theory /definition), Tips for Effective Listening Academic Listening- (lecturing), Listening to Talks and Presentations, Basics of Telephone communication

Writing Skills: Standard Business letter, Report writing, Email drafting and Etiquettes, Preparing Agenda and writing minutes for meetings, Making notes on Business conversations, Effective use of SMS, Case writing and Documentation.

UNIT-III

Soft Skills: Empathy (Understanding of someone else point of view), Intrapersonal skills, Interpersonal skills, Negotiation skills, Cultural Aspects of Communication.

UNIT-IV

Group Communication: The Basics of Group Dynamics, Group Interaction and Communication, how to be Effective in Groups, Handling Miscommunication, Handling Disagreements and Conflicts, Constructive Criticism.

(5.VP.01) BASICS OF ELECTRICAL ENGINEERING LAB

List of Experiments:

1. a) Color coding of resistances
   b) Resistance in series, parallel and series – Parallel.
2. Capacitors & Inductors in series & Parallel.
3. Study of Multimeter – Checking of components.
4. Voltage sources in series, parallel and series – Parallel
5. Voltage and Current dividers
6. Measurement of Amplitude, Frequency & Phase difference using CRO.
7. Verification of Kirchoff's Law.
8. Verification of Norton's theorem.
9. Verification of Thevenin's Theorem.
10. Verification of Superposition Theorem.
11. Verification of the Maximum Power Transfer Theorem.
12. Designing of a Low Pass RC Filter and study of its Frequency Response.
13. Designing of a High Pass RC Filter and study of its Frequency Response.

(5.VP.02) ANALOG & Digital ELECTRONICS LAB

List of Experiments:

1. To plot VI characteristics of PN Junction diode in forward bias and Zener diode in reverse bias region.
2. Study of Zener diode as a voltage regulator.
3. To study the working of a half wave and a full wave centre tapped rectifier.
4. To study full wave Bridge rectifier with different filters and calculate ripple factor.
5. Input and output characteristics and calculation of parameters of a transistor in common emitter configuration
6. Study of TTL gates – AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.
7. Realization of basic gates using Universal logic gates.
8. Implementation of the given Boolean function using logic gates in both SOP and POS forms.
9. Design & realize a given function using K-maps and verify its performance.
10. To verify the truth tables of S-R, J-K, T & D type flip flops.
11. Design a 4-bit shift-register and verify its operation.
12. Design, and verify the 4-bit synchronous counter.
13. Design, and verify the 4-bit asynchronous counter

(5.GV.05) PROGRAMMING SKILLS using R & Python

5.GV.06) LINEAR INTEGRATED CIRCUIT

Objective:
The student should be able to understand the various devices used in Electronics engineering and to understand the working of wave shaping circuits and regulators.

UNIT-I

Introduction to Op-Amp: Differential amplifier using BJT, Block diagram of op-amp, pin diagram of 741 IC, characteristics of ideal Op-Amp, equivalent circuit of Op-Amp, Op-Amp ac and dc parameters. Building blocks of Analog ICs: Differential amplifier using single and two op-amp, virtual ground, circuit for improving
CMRR.

UNIT-II

Linear & Non Linear Wave shaping: Inverting and non-inverting amplifiers, voltage follower, difference amp, adders, Voltage to current with floating & grounded load, current to voltage converter, practical integrator & differentiator, Clipping & Clamping circuits, Comparators, log/antilog circuits using Op-Amps, precision rectifiers (half & full wave), peak detector, Schmitt trigger circuit.

UNIT-III

Waveform generators using Op-Amp: Square and triangular waveform generators (determine period and frequency), saw tooth wave generator, Astable multi-vibrator, Monostable and Bistable Multivibrator.

Active RC Filters: Idealistic & Realistic response of filters (LPF, BPF, HPF, BRF), Butter worth & Chebyshev approximation filter functions.

UNIT-IV

Introduction to 555 Timer IC: Functional and block diagram of 555 timer, Application of 555 timer as astable and monostable multivibrator. Operational transconductance amplifier (OTA)-C filters, OTA integrator & differentiator.

Introduction to IC phase locked loops, IC voltage regulators and IC VCO.

(5.GV.07) ANALOG AND DIGITAL COMMUNICATION

Objective:
The student should be able to understand the various modulation techniques & systems for communications

UNIT-I

Introduction: Need for modulation and demodulation in communication systems, Basic scheme of modern communication system, Frequency spectrum of RF and Microwaves and their applications.

Amplitude Modulation: Derivation of mathematical expression for an amplitude modulated wave showing Carrier and side band components; Significance of Modulation index, spectrum and bandwidth of AM wave, relative power distribution in carrier and sidebands; Elementary idea of DSB-FC, DSB-SC, SSB-SC, ISB and VSB modulations, their comparison and areas of applications; Generation of AM using: Collector Modulator, Balanced Modulator. Principles of demodulation of AM wave using diode detector circuit and synchronous detector.

UNIT-II

Angle Modulation: Derivation of expression for frequency modulated wave and its frequency spectrum (without proof and analysis of Bessel function), modulation index, maximum frequency deviation and deviation ratio, BW of FM signals, Carlson's rule; Derivation of expression for phase modulated wave, comparison with frequency modulation. Principles of FM Modulators: Armstrong phase modulator, Armstrong FM transmitters. Basic principles of FM detection using Phase Locked Loop (PLL).

UNIT-III

Pulse Modulation: Statement of sampling theorem & elementary idea of sampling frequency for pulse modulation.

Types of Pulse modulation: PAM (Single polarity, double polarity), PWM (Generation & demodulation of PWM), PPM (Generation of PPM); PCM (Generation & demodulation of PCM); Digital to Digital Modulation: RZ, NRZ, AMI, HDB3; Manchester, Differential Manchester, CMI; Digital to Analog Modulation: ASK, FSK, PSK, QPSK, QAM, and GMSK.

UNIT-IV

Noise and Multiple Access Techniques: Bit rate & Baud rate Noise; Noise in Analog communication System: Noise in AM System, Noise in DSB& SSB System, Noise in Angle Modulation Systems: Threshold effect in Angle Modulation System, Effect of noise on FM carrier, noise triangle, need for pre-emphasis and deemphasis, capture effect; Comparison of FM and AM communication systems. Distortion, Attenuation, Transmission Units (db, Neper, dbm, dbmO, dbmi); S/N Ratio and Noise Figure. Multiplexing & Multiple Access Technique, Need of Multiplexing, Time & Frequency Division Multiplexing, Multiple Access Types, Comparisons between Multiple Access Techniques.

(5.GV.08) MICROPROCESSOR AND MICROCONTROLLER

Objective:
The student should be able to understand the microprocessor & micro controllers & their Programming.

UNIT-I

Microcomputer Organization: Input/ Output Devices. Data storage (idea of RAM and ROM). Computer memory. Memory organization & addressing. Memory Interfacing. Memory Map.

8085 Microprocessor Architecture: Main features of 8085. Block diagram. Pin-out diagram of 8085. Data and address buses. Registers. ALU. Stack memory. Program counter.

UNIT-II

8085 Programming: Instruction classification, Instructions set (Data transfer including stacks. Arithmetic, logical, branch, and control instructions). Subroutines, delay loops. Timing & Control circuitry. Timing states. Instruction cycle, Timing diagram of MOV and MVI. Hardware and software interrupts.

UNIT-III

8051 microcontrollers: Introduction and block diagram of 8051 microcontrollers, architecture of 8051, overview of 8051 family, Program Counter and ROM memory map, Data types and directives, Flag bits and Program Status Word (PSW) register, Jump, loop and call instructions.

8051 I/O port programming: Introduction of I/O port programming, pin out diagram of 8051 microcontrollers, I/O port pins description & their functions, I/O port programming in 8051 (using assembly language), I/O programming: Bit manipulation.

UNIT-IV

8051 Programming: 8051 addressing modes and accessing memory locations using various addressing modes, assembly language instructions using each addressing mode, arithmetic and logic instructions, 8051 programming in C: for time delay & I/O operations.

Support for Mobility: Data bases, data hoarding, Data dissemination, UA Prof and Caching, Service discovery, Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, Mobile devices and File systems, Data Synchronization, Sync ML.
Introduction to Wireless Devices and Operating systems: Windows CE, Android, Mobile Agents. Introduction to Mobile application languages and tool kits.

(6.GV.03) ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Objective:

The student should be able to understand the various measurement techniques used in Electronics engineering and to understand the working of various measuring instruments.

UNIT-I

Basics of Measurement: Performance Characteristics of Instruments: Static Characteristics, Dynamic Characteristics.

Errors in Measurement: Types of Static Errors, Gross Errors, Systematic Errors, Random Errors, Sources of Errors and minimization of error. Basic block diagram of an Electronic Measurement system.

Basic Meter Movement: Moving Coil and Moving Iron type of instruments. Electrical Standards & Calibration.

UNIT-II

Basic Instruments: Block diagram of a Multimeter; DC Ammeter, Multi range ammeters, Extending of ammeter ranges, Effect of frequency on calibration. DC Voltmeter, Multi range voltmeter, extending Voltmeter ranges, Transistor Voltmeter, Chopper type DC amplifier Voltmeter (Micro-voltmeter), True RMS Voltmeter. **Digital Metering:** Ramp type DVM, Dual slope integrating type DVM (Voltage to Time conversion), Integrating type DVM (Voltage to Frequency Conversion), Resolution and sensitivity of digital meters, General specifications of a DVM, Digital frequency meter, Universal counter and Electronic counter.

UNIT-III

Cathode Ray Oscilloscope: Basic Principle, CRT features, Block diagram of oscilloscope, single/dual beam CRO, dual trace oscilloscope. Measurement of phase and frequency by Lissajious figures method. Explanation of time base operation and need for blanking during fly back; synchronization; standard specifications of a CRO, Special features of dual trace, delayed sweep, probes for CRO, Digital storage Oscilloscope: Block diagram and principle of working.

UNIT-IV Electronic Instruments

Fixed / Variable Frequency AF Oscillator, Function Generator, (sine, square and triangular wave generator). Digital Data Recording, Digital Memory Waveform Recorder (DWR). Introduction to transducers; Data Acquisition System: Introduction and Objective of a DAS.

5.VP.03	Microprocessors and micro controllers lab
5.VP.04	Analog & Digital Communication Lab

6.GV.01) TELECOM INFRASTRUCTURE AND GROUNDING

Objective:

The student should be able to understand the various telecom infrastructure and grounding techniques of towers.

UNIT– I

Components of telecom support infrastructure**:** Identification and their role. Identification of various components of BTS, Method of site selection for BTS, Government norms for BTS. Different type of towers. Methods of installation of ground base and roof top tower.

Fire safety and fire protection system. Safety while working on towers and antenna installation, fall protection system, hand and arm protection, fall prevention and anchorage. Personal protection equipment. Safety precaution while working on high voltage, electrical safety parameters, Device sensitive to static, Safety to RF and Microwave radiation, SAR limit, Ionizing & Non- Ionizing radiation, Biological effect caused by RF radiation.

UNIT – II

Introduction to different types of feeder cables used in telecom, optical connectors and components used in Optical Fibre systems, splitters and their applications. Installing NEC Pasolink microwave Transmitter/Receiver, MUX configuring at cell sites, Concept of measuring VSWR using site master. Major subsystems of a power plant; functions of different components of power plant and their function; ValveRegulated Lead-Acid Batteries, Determination of State of Charge of VRLA Batteries, Battery Monitoring, Do's and Don'ts for VRLA battery. Working and maintenance of UPS, Inverter, PIU.

UNIT – III

Grounding: Basics of grounding, Bonding, Static charges and the need for bonding, , Noise in signalling circuits and shielding. Equipment grounding: Shock hazard, grounding of equipment, Operation of protective devices, Touch Potential during ground faults, Induced voltage problem and its mitigation, EMI suppression, Sensing of ground faults, equi-potential bonding.

Ground electrode system: Grounding electrodes and factors affecting their efficacy, Soil resistance, Measurement of soil resistivity, Resistance of a single rod electrode, Current-carrying capacity of an electrode, Use of multiple ground rods in parallel, Measurement of ground resistance of an electrode, Concrete-encased electrodes, Maintenance of grounding system, Chemical electrodes.

UNIT-IV

Lightning: Method of lightning protection (Light Arrestor, HRC Fuses), Effect of lightning strike on electrical lines.

Surge protection of electronic equipment: Introduction, bonding of different ground systems as a means of surge proofing, Principle of surge protection, Achieving graded surge protection, Positioning and selection of lightning/surge arrestor, practical view of surge protection for sensitive equipment.

(6.GV.02) ELECTROMAGNETISM & TRANSMISSION LINES

Objective:
The student should be able to understand the physics behind Electromagnetic & Transmission systems.

UNIT I

Introduction: Vector representation of surface, Physical interpretation of gradient, divergence and curl, Transformation of vectors in different co-ordinate systems, dirac-delta function.

Electrostatics: Electric field due to point-charges, line charges and surface charges, Electrostatic potential,

Solution of Laplace and Poisson's equation in one dimension, Electric flux density, Boundary conditions.

UNIT II

Magneto statics: Magnetic Induction and Faraday's Law, Magnetic Flux Density, Magnetic Field Strength H, Ampere, Gauss Law in the Differential Vector Form, Permeability, Energy Stored in a Magnetic Field,

Ampere's Law for a Current Element, Volume Distribution of Current, Ampere's Law Force Law, Magnetic

Vector Potential.

UNIT III

Electromagnetic Waves: Maxwell's Equations: The Equation of Continuity for Time Varying Fields,

Inconsistency of Ampere's Law, Displacement current, Maxwell's Equations in differential and integral form, Conditions at a Boundary Surface.

Plane wave equation and its solution in conducting and non-conducting media, Phasor notation, Phase velocity, Group velocity, Depth of penetration, skin depth, Impedance of conducting medium. Polarization, Reflection and refraction of plane waves at plane boundaries, Poynting vectors, and Poynting theorem.

UNIT IV

Transmission Lines: Transmission line equations, Characteristic impendence, Distortion-less lines, input impendence of a loss less line, Open and Short circuited lines, Standing wave and reflection losses, Impedance matching, loading of lines, Input impedance of transmission lines, RF lines, Relation between reflection
coefficient and voltage standing wave ratio (VSWR), Lines of different lengths – $\lambda/2$, $\lambda/4$, $\lambda/8$ lines, Losses in transmission lines.

6.GV.08) Database Management System

Objective:
The student should be able to understand the Database concept , Web Application & JAVA programming.

I. Database Concepts – RDBMS Tool.
- Basics of RDBMS.
- SQL – Creating and Opening Database.
- Creating and populating tables.
- Modifying the content and structure of table.
- Ordering and Grouping.
- Operating with multiple tables.

II. Operating Web Based Applications.
- Online Reservation Systems.
- E-Governance.
- Online Shopping and Bill payments.
- Online Tutorials and Tests.
- Project Management – Web Based Application development.
- Project essentials and tips.
- Case Study - Online Game.
- Case Study - Online Quiz.
- Case Study – Online Bill Calculator.

III. Fundamentals of Java programming, Introduction to Java, Object Oriented Programming, Java Language Elements, Operators, Control Flow, Array, Class Design, Exception Handling, Assertions, Threads, Wrapper Classes, String Manipulation.

IV. Work Integrated Learning IT – DMA.
- Identification of Work Areas.
- Work Experience.

(6.GV.04) DATA COMMUNICATION & NETWORKS

Objective:
The student should be able to understand the various OSI layers and infrastructure used for communication.

UNIT- I

Data Communications: Components, standards and organizations, Network Classification, Network Topologies; network protocol; layered network architecture; overview of OSI reference model; overview of TCP/IP protocol suite.

Physical Layer: Cabling, Network Interface Card, Transmission Media Devices- Repeater, Hub, Bridge, Switch, Router, Gateway.

UNIT- II

Data Link Layer: Framing techniques; Error Control; Flow Control Protocols; Shared media protocols - CSMA/CD and CSMA/CA.

UNIT- III

Network Layer: Virtual Circuits and Datagram approach, IP addressing methods – Subnetting; Routing Algorithms (adaptive and non-adaptive); Network Layer Protocols: IPV4 and IPV6.

UNIT- IV

Transport Layer: Process to Process Delivery: UDP; TCP, congestion control and Quality of service. **Application Layer:** Client Server Model, Socket Interface, Domain Name System (DNS): Electronic Mail (SMTP), file transfer (FTP), HTTP and WWW.

(6.VP.01) TELECOM INFRASTRUCTURE AND GROUNDING LAB

List of Experiments:

1. Demonstration of different basic installation tools.
2. Identification and understanding the use of different optical components.
3. Demonstration of fire detection and use of fire extinguisher.
4. Installation of sector antenna
5. Installation of microwave antenna
6. Methods of feeder cable routing
7. Study of Installation procedure of internal and external grounding board 8. Tower climbing activity and use of safety kit.
9. Measurement of VSWR using site master.
10. To find the distance to fault in feeder cable using site master.
11. To splice the Optical Fibre using Fusion Arc Splicer.
12. To find the cable loss and cable break in optical fibre using OTDR(Optical Time Domain Reflectometer).
13. Study of Valve Regulated Lead Acid battery (VRLA) and take different measurements.
14. Practical study of uninterrupted power supply.
15. Study of Installation procedure of Power Interface Unit.
16. Concept of series and parallel battery bank, Rating and capacity of cells in battery bank and its connection in power plant.
17. Maintenance procedure in battery bank system.
18. Determining height of the GSM and the MW antenna
19. Measurement of Antenna Height using Altimeter.

(6.VP.02) DATABASE MANAGEMENT SYSTEM LAB

LAB BASED ON DBMS

Lab includes implementation of DDL, DCL, DML i.e SQL in Oracle.

List of Experiments:

1. Design a Database and create required tables. For e.g. Bank, College Database
2. Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables.
3. Write a SQL statement for implementing ALTER, UPDATE and DELETE
4. Write the queries to implement the joins
5. Write the queries for implementing the following functions: MAX (), MIN (), AVG (), COUNT ()
6. Write the queries to implement the concept of Integrity constrains
7. Write the queries to create the views

8. Perform the queries for triggers
9. Perform the following operation for demonstrating the insertion, updation and deletion using the referential integrity constraints

(6 .GV.05) ANDROID APPLICATION DEVELOPMENT

Objective:
The student should be able to understand the android application development methodology.

UNIT-I

Android Introduction, Smartphones future, Preparing the Environment, Installing the SDK, Creating Android Emulator, Installing and Using Eclipse, Installing Android Development Tools, choosing which Android version to use Android Architecture, Android Stack, Android applications structure
Creating a project, working with the AndroidManifest.xml, Using the log system Activities

Introduction to UI – Layouts, Fragments, Adapters, Action bar, Dialogs, Notifications, UI best practices UI Architecture, Application context, Intents, Activity life cycle, Supporting multiple screen sizes.

UNIT – II

Designing User Interface Using Views – Basic Views- Text View, Button, Image Button, Check Box, Toggle Button, Radio Button etc., Progress Bar View and Auto Complete Text View, Time Picker and Date Picker View, List View, Image View, Image Switcher and Grid View, Digital Clock & Analog Clock View Notification and Toast, Parameters , on Intents, Pending intents, Status bar notifications Toast notifications.

UNIT-III

Menus, Localization, Options menu, Context menu Dialogs-Alert dialog, Custom dialog, Dialog as Activity Orientation and Movement- Pitch, roll and yaw, Natural device orientation, Reference frame remapping SMS - Sending and Receiving Working with Media –Playing audio and video, Recording audio and video

UNIT-IV

Location and Maps - Google maps, Using GPS to find current location Working with data storage - Shared preferences, Preferences activity, Files access, Using External storage, SQLite database Animation-View animation, Drawable animation Working with Sensors- Finding sensors, Accelerometers, Gyroscopes, Other types Working with Camera – Controlling the camera, Preview and overlays, Taking pictures

(6.GV.06) Wireless & Mobile Communication

Objective:
The student should be able to understand the technologies used in wireless and mobile communication.

UNIT-I

Introduction: History of wireless communication, Evolution of Mobile Communication, Mobile and Wireless devices. A market for mobile communications. A simplified reference model for mobile communications, Large scale path loss: propagation models, reflection, diffraction, scattering, practical link budget design using path loss model. Wireless-transmission: A brief introduction of frequencies for radio transmission, signals propagation, Multiplexing, Modulation, spread spectrum, cellular system, Frequency reuse, channel assignment strategies, handoff strategies, interference and system capacity, improving coverage and capacity in cellular systems, Small scale fading & multipath propagation and measurements, impulse response model and parameters of multipath channels, types of fading, theory of multi-path shape factor for fading wireless channels.

UNIT-II

Spread spectrum modulation techniques: Pseudo-noise sequence, direct sequence spread spectrum (DS-SS), frequency hopped spread spectrum(FHSS), performance of DS-SS, performance of FH-SS, modulation performance in fading and multipath channels, fundamentals of equalisation, equaliser in communication receiver, survey of equalisation techniques, linear equaliser, linear equaliser, non-linear equalisation, diversity techniques, RAKE receiver. Medium Access Control: Introduction to MAC, Telecommunication systems, GSM, DECT, TETRA, UMTS & IMT-2000

UNIT-III

Satellite System: Review of the System, Broadcast System-Review. Wireless LAN: IEEE 802-11 Protocol, System Architecture, Protocol Architecture, Physical Layer & MAC Layer, Newer developments, Hiper LAN, Bluetooth Technology, Introduction to wireless networks, 2G, 3G wireless systems, wireless standards.

UNIT-IV

Mobile Network Layer: Mobile IP, Mobile host configuration Network, Mobile adhoc networks Mobile Transport Layer: Traditional TCP, classical TCP improvement TCP over wireless network, performance Enhancing, proxies Support for Mobility: File systems, World Wide Web, wireless application protocol,

(6.GV.07) ANTENNA THEORY AND WAVE PROPAGATION

Objective:
The student should be able to understand the theory behind antenna operation & Wave propagation.

UNIT –I

Introduction of Antenna: Radiation mechanism, single wire, two wire, dipole, current distribution of thin wire antenna.

Fundamental parameters of Antenna: radiation pattern, isotropic, directional and Omni directional pattern, principal patterns, radiation patterns lobes, field regions, radian and steradian, Radiation

power density, radiation intensity, directivity, gain, antenna efficiency, half power beam width, beam efficiency, bandwidth efficiency, input impedance, antenna radiation efficiency, antenna aperture, effective height.

UNIT-II

Vector potential for an electric and magnetic current source, electric and magnetic fields for electric and magnetic current source, far field radiation, Duality theorem, reciprocity theorem.

(6.VP.03) MICROPROCESSOR LAB

Course Details:

8085/8086 Based Experiments:

1. Signed and unsigned binary addition.
2. Signed Multiplication.
3. Signed and unsigned binary division.
4. BCD Addition and subtraction
5. Look up table method for finding the ASCII of an alpha-numeric code.
6. Interfacing with 8255 in I/O mode/BSR mode.
7. Interfacing with seven segment display.
8. Interfacing with 8253.
9. Verification of Interrupts.
10. Interfacing with ADC/DAC.
11. Mini Project on some interfacing applications.

(6.VP.04) WIRELESS & MOBILE COMMUNICATION LAB

List of Experiments:

1. Selection and study of various PN code (MLS, GOLD, BARKER).
2. Generate (spreading) DS-SS modulated signal.
3. To demodulate (dispreading) DS-SS modulated signal.
4. Selection & comparative study of various code modulation techniques: BPSK/ QPSK/ OQPSK.
5. Modulation and Demodulation using internal generation of 2047 bit PN sequence as modulator Input and Unmodulated carrier.
6. Spreading and Dispreading using Additive white Gaussian Noise Generator and frequency offset.
7. Voice communication using DSSS.
8. To set up Active Satellite link.
9. Study satellite transponder.
10. Generation & Detection of VSB signal.
11. Measurement of VSWR
12. Study of Characteristics of Reflex Klystron and Gunn Oscillator.
13. Measurement of coupling Coefficient and directivity of a directional coupler
14. Study of insertion and coupling Coefficient of Magic Tee
15. Directional pattern of different antennas.

(7.GV.01) WIRELESS COMMUNICATION

Objective:

The student should be able to understand the android application development methodology.

UNIT-I

Introduction to Wireless Communication Systems: Evolution of mobile radio communications; examples of wireless comm. systems; overview of generations of cellular systems, comparison of various wireless systems.

Introduction to Personal Communication Services (PCS): PCS architecture, Mobility management, Networks signalling. A basic cellular system, multiple access techniques: FDMA, TDMA, CDMA.

Introduction to Wireless Channels and Diversity: Fast Fading Wireless Channel Modelling, Rayleigh/ Ricean Fading Channels, BER Performance in Fading Channels, Introduction to Diversity modelling for Wireless Communications.

Tele-traffic Engineering basics: Traffic, traffic units, routing, grade of service. Loss Systems, Delay systems, queuing systems.

UNIT-II

2G Networks: Second generation, digital, wireless systems: GSM, IS-95 CDMA. Global system for Mobile Communication (GSM) system overview: GSM Architecture, Mobility Management, Network signalling, mobile management, voice signal processing and coding. **Spread Spectrum Systems-** Cellular code Division Access Systems-Principle, Power Control, effects of multipath propagation on code division multiple access.

UNIT-III

2.5G Mobile Data Networks: Introduction to Mobile Data Networks, General Packet Radio Services (GPRS): GPRS architecture, GPRS Network nodes, EDGE, Wireless LANs, (IEEE 802.11), Mobile IP.

Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G and 4G, Introduction to 5G.

UNIT-IV

Wireless personal area networks (WPAN): Blue tooth, IEEE 802.15, architecture, protocol stack.
Wi-Max, introduction to Mobile Adhoc Networks. Broadband access Networks, Intelligent Networks, Next Generation Networks (NGN), Physical and Virtual Networks, Number Portability, Corporate Networks.

(7.GV.02) WINDOW MOBILE APPLICATION DEVELOPMENT

UNIT-I

Introduction: What is mobile Application Programming, Different Platforms, Architecture and working of Android, iOS and Windows phone 8operating system, Comparison of Android, iOS and Windows phone 8

Android Development Environment: What is Android, Advantages and Future of Android, Tools and about Android SDK, Installing Java, Eclipse, and Android, Android Software Development Kit for Eclipse, Android Development Tool: Android Tools for Eclipse, AVDs: Smartphone Emulators, Image Editing.

UNIT-II

Android Software Development Platform: Understanding Java SE and the Dalvik Virtual Machine, Directory

Structure of an Android Project, Common Default Resources Folders, The Values Folder, Leveraging Android XML, Screen Sizes, Launching Your Application: The AndroidManifest.xml File, Creating Your

First Android Application.

Android Framework Overview: The Foundation of OOP, The APK File, Android Application Components,

Android Activities: Defining the User Interface, Android Services: Processing in the Background, Broadcast Receivers: Announcements and Notifications, Content Providers: Data Management, Android Intent Objects: Messaging for Components, Android Manifest XML: Declaring Your Components.

UNIT-III

Views and Layouts, Buttons, Menus, and Dialogs, Graphics Resources in Android: Introducing the Drawables, Implementing Images, Core Drawable Subclasses, Using Bitmap, PNG, JPEG and GIF Images in Android, Creating Animation in Android.

Handling User Interface(UI) Events: An Overview of UI Events in Android, Listening for and Handling Events,

Handling UI Events via the View Class, Event Call-back Methods, Handling Click Events, Touchscreen Events,

Keyboard Events, Context Menus, Controlling the Focus. Content Providers: An Overview of Android Content Providers, defining a Content Provider, Working with a Database. Intents and Intent Filters: Intent, Implicit Intents and Explicit Intents, Intents with Activities, Intents with Broadcast Receivers.

UNIT-IV

Advanced Android: New Features in Android 4.4. iOS Development Environment: Overview of iOS, iOS Layers, Introduction to iOS application development. Windows phone Environment: Overview of windows phone and its platform, Building windows phone application.

(7.GV.04) WEB APPLICATION DEVELOPMENT

UNIT-I

Introduction to HTTP, HTML, Basic HTML Tags, Body Tags, Coding Style, Modifying & formatting Text, Lists – Unordered, Ordered, Definition, Insert Links -Linking to another Document, Internal Links, Email Links, Relative and Absolute Links, Insert Images - Referencing Images, Clickable Images, Image Placement and Alignment, Image Size, Image Margins, Image Formats, Image Maps- Defining an Image Map, Advanced Coloring Body Content, Working with tables - Basic Tables, Table Attributes, Table Cell Attributes, Table Row Attributes, Tables Inside of Tables, Invisible Spacers, Working with Frame-Based Pages- Creating Windows, Single Window Frames, Creating Column Frames, Creating Row Frames, Creating Complex Frames.

UNIT-II

Cascading Style Sheet (CSS) – Introduction, creating style, using inline and external CSS, Creating Divs with ID style, Creating Tag& Class style, creating borders, Navigation links, creating effects with CSS.

JavaScript – Introduction, use of JavaScript in webpages. Understand JavaScript event model, use some basic event and control webpage behaviour.

UNIT-III

DESIGNING WEBSITES WITH DREAMWEAVER/EXPRESSION Web/AMAYA/COFEE CUP WYSIWYG

HTML Editor - Introduction to WYSIWYG HTML editor, advantages of using HTML editors, creating a New Site, creating a New Page, Adding Images with Alternate Text, Inserting & Formatting Text, Aligning Images, creating an Email Link, linking to Other Websites, Testing & Targeting Links, Organizing Files & Folders

CREATING & INSERTING IMAGES - Optimizing Images for the Web, Saving GIFs & PNGs in Photoshop, Inserting GIFs, Adjusting Transparency Settings, Saving JPGs for the Web

UNIT-IV

DESIGNING ACCESSIBLE TABLES - Understanding Tables & Accessibility, Using Tables for Tabular Data, styling a Table, Editing Table Layouts, Adding Style to a Table Using CSS

CREATING WEBSITES WITH FRAMES - Introducing Frames, creating a Frameset, Opening Pages into Frames, Controlling Scrollbars & Borders, Targeting Links in Frames

CUSTOMIZING THE INTERFACE - Opening an Existing Site, Reviewing Menu Options & Preferences, Comparing the Macintosh & PC Interfaces, Previewing in Browsers & Device Central

Introduction to Responsive Web Designing – Introduction, advantages, creating and using responsive web pages.

UNIT-V

Web Hosting - What is Domain? Introduction to DNS, how to register a Domain? What is web hosting? How to get a web hosting? Host your website on web Server. FTP - FTP Introduction, FTP Commands Viewing Files and Directories, FTP Commands Transfer and Rename files, FTP with WS FTP/ CuteFTP, Filezilla on Windows.

(7.VP.01) WINDOW MOBILE APPLICATION DEVELOPMENT LAB

List of Experiments:

1. Develop an application that uses GUI components, Font and Colours.
2. Develop an application that uses Layout Managers and event Listeners.
3. Develop a native calculators application.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that use of Database.
6. Develop an application that makes use of RSS Feed
7. Implement an application that implements multi-threading.
8. Develop an native application that uses GPS location information.
9. Implement an application that uses data to the SD card.
10. Implement an application that creates an alert upon receiving a message.
11. Write a mobile application that creates alarm clock.

(7.VP.01) WIRELESS COMMUNICATION LAB

Write a MATLAB/ SCILAB Program/s based on

1. Free space Propagation Model & Frequency Selective Fading Model
2. Ground Reflection (Two-ray) Model
3. Diffraction (Knife-Edge) Model
4. Large-scale Empirical models

5. Small-scale Empirical models
6. Cellular Systems
7. Wireless LANs
8. Wireless Path loss Computations - Study of Propagation Path loss Models : Indoor & Outdoor (Using Matlab Programming)
    a. Free Space Propagation – Path Loss Model
    b. Link Budget Equation for Satellite Communication
    c. Carrier to Noise Ratio in Satellite Communication
    d. Outdoor Propagation – Okumura Model
    e. Outdoor Propagation – Hata Model
9. Experiments based on GSM (Using Wireless Communication Trainer)
    a. Study the implementation of –GMSK modulation, OQPSK detection.
    b. Observe phase response of Tx and Rx and Spectrum of Tx and Rx.
    c. Measure the BER value
    d. GSM AT Commands
10. Experiments based on CDMA (Using Wireless Communication Trainer)
    a. Study the performance of DS-CDMA system under multi-path condition for single user case
    b. Using RAKE receiver with MRC method and EGC method
    c. Observation of SNR vs BER curve for two different combining techniques.

(7.GV.01) EMBEDDED SYSTEM

Objective:
The student should be able to understand the design & development of embedded system.

UNIT-I

Overview of Embedded Systems: Characteristics of Embedded Systems. Comparison of Embedded Systems with general purpose processors. General architecture and functioning of micro controllers. 8051 micro controllers.

PIC Microcontrollers: Architecture, Registers, memory interfacing, interrupts, instructions, programming and peripherals.

UNIT-II

ARM Processors: Comparison of ARM architecture with PIC micro controller, ARM 7 Data Path, Registers, Memory Organization, Instruction set, Programming, Exception programming, Interrupt Handling, Thumb mode Architecture.

Bus Structure: Time multiplexing, serial, parallel communication bus structure. Bus arbitration, DMA, PCI, AMBA, I2C and SPI Buses.

UNIT-III

Embedded Software, Concept of Real Time Systems, Software Quality Measurement, Compilers for Embedded System.

UNIT-IV

RTOS: Embedded Operating Systems, Multi-Tasking, Multi-Threading, Real-time Operating Systems, RT Linux introduction, RTOS kernel, Real-Time Scheduling.

(7.GV.06) SATELLITE COMMUNICATION

Objective:
The student should be able to understand the android application development methodology.

UNIT-I

Principles of Satellite Communication: Evolution & growth of communication satellite, Satellite frequency allocation & Band spectrum, Advantages of satellite communication, Active & Passive satellite, Applications of satellite communication. Synchronous satellite, Satellite Launch.

Satellite Orbits: Introduction, Kepler's Laws, Newton's law, orbital parameters, orbital perturbations, station keeping, geo stationary and non-Geo-stationary orbits, LEO, MEO, Look Angle Determination-Limits of visibility –Eclipse-Sub satellite point –Sun transit outage.

UNIT-II

Satellite Link Design: Basic transmission, System noise temperature, G/T ratio, design of down links, uplink design, Atmospheric Absorption, Rain induced attenuation.

Space Segment: Power Supply, Altitude Control, Station Keeping, Thermal Control, TT&C sub system, Transponders, Antenna Sub system.

Earth Segment: Subsystem of earth station, Transmit-Receive Earth Station, different types of earth stations, frequency coordination.

UNIT-III

Multiple Access Techniques: FDMA, FDMA down link analysis. TDMA, Satellite-switched TDMA, code division multiple access, DAMA, On board signal processing for FDMA/TDM Operation.

Error Control for Digital Satellite Links: Error detection and correction for digital satellite links, error control coding, Convolutional codes, satellite links concatenated coding and interleaving, Automatic Repeat Request (ARQ).

UNIT-IV

Interconnection of Satellite Networks: Interconnection with ISDN, Interconnection of television networks. **Satellite Applications:** Satellite mobile services, VSAT, GPS, Radarsat, INMARSAT, Satellite navigational system. Direct broadcast satellites (DBS) - Direct to home Broadcast (DTH), World Space Services, Business TV(BTV).

(7.GV.03) COMPUTER NETWORK SECURITY

UNIT-I

Network Concept, Benefits of Network, Network classification (PAN, LAN, MAN, WAN), Peer to Peer, Client Server architecture, Transmission media: Guided & Unguided, Network Topologies. Networking terms: DNS, URL, client server architecture, TCP/IP, FTP, HTTP, HTTPS, SMTP, Telnet OSI and TCP/IP Models: Layers and their basic functions and Protocols, Comparison of OSI and TCP/IP. Networking Devices: Hubs, Switches, Routers, Bridges, Repeaters, Gateways and Modems, ADSL.

UNIT-II

Ethernet Networking: Half and Full-Duplex Ethernet, Ethernet at the Data Link Layer, Ethernet at the Physical Layer. Switching Technologies: layer-2 switching, address learning in layer-2 switches, network loop problems in layer-2 switched networks, Spanning-Tree Protocol, LAN switch types and working with layer-2 switches, Wireless LAN

UNIT- III

Internet layer Protocol: Internet Protocol, ICMP, ARP, RARP. IP Addressing: Different classes of IP addresses, Sub-netting for an internet work, Classless Addressing. Comparative study of IPv4 & IPv6. Introduction to Router Configuration. Introduction to Virtual LAN.

UNIT- IV

Transport Layer: Functions of transport layer, Difference between working of TCP and UDP. Application Layer: Domain Name System (DNS), Remote logging, Telnet, FTP, HTTP, HTTPS. Introduction to Network Security.

CO

UNIT-I

Telecom Technologies: Global Trends in telecommunication developments and Technological obsolescence, Convergence of services and technologies.

Telecom Network Components: Switch/routers, Backbone links and Gateways, etc.

Telecom Services: Modern Trends, Type of services, Universal Service Obligation (USO) and Universal Access Obligation (UAO), Millennium Development Goals in Telecom Sector: Service Penetrations.

UNIT-II

Operation Management: Network availability, Network Performance Indicators, Development of Efficiency

Indicators for Operators, Divisions/Departments and Section/offices; Safety and Maintenance of Telecom Networks, Fault analysis, typical fault rates of network components, Spares dimensioning basis, Inventory Management. Management Information System (MIS): Objectives and Key indicators.

UNIT-III

Project Management: Concept of project planning and management and processes, Recent project planning approaches, Project cycle, Linkages between Plans/ Programs and projects, Project feasibility study – demand/need forecasting and analysis, technical analysis, financial analysis (NPV, ROI, IRR), economic analysis, social analysis, environmental analysis, Project planning matrix- logical framework, project appraisal and screening, Risk and uncertainty analysis and management, Project negotiation, Project organization, Project implementation plan (PERT, CPM, Network diagram, Gantt Chart).

UNIT- IV

Marketing Management: Role of marketing in service industries, marketing strategies – product/service strategies, pricing strategies, place strategies, promotion strategies. Demand /supply forecasting, market survey, pricing of NT, Marketing management issues and challenges of NT Ratios.

Box, Hidden Field and image), adding elements to a form, uploading files to the Web Server using PHP, building a challenge and response subsystem and understanding the functionality of the FORM attribute Method Regular Expressions: - Engine, types of Regular Expressions, symbols used in Regular Expressions. Error handling in PHP: - Displaying errors, warnings, types of errors, error levels in PHP, logging Errors and Ignoring errors.

UNIT V

Data base connectivity using PHP (MySQL, ODBC, ORACLE, SQL) Performing, executing Commands, different types of Data Base Operations like Insertion, deletion, update and query on data

(7.VP.03) EMBEDDED SYSTEM LAB

List of Experiments:

1. Introduction to microcontroller and interfacing modules.
2. To interface the seven segment, display with microcontroller 8051
3. To create a series of moving lights using PIC on LEDs.
4. To interface the stepper motor with microcontroller.
5. To display character „A" on 8*8 LED Matrix.
6. Write an ALP to add 16 bits using ARM 7 Processor
7. Write an ALP for multiplying two 32 bit numbers using ARM Processor
8. Write an ALP to multiply two matrices using ARM processor

(7.VP.04) COMPUTER NETWORK SECURITY LAB

1. Identification of Connectors and Cables:
    a. Connectors: BNC, RJ-45, I/O box
    b. Cables: Co-axial, twisted pair, Optical fibre.
2. Identification of various networks components
    a. NIC (network interface card)
    b. Hub, Switch, Router.
3. Execution of basic networking Commands: Netstat, IPConfig, IfConfig, Ping, Arp-a, Nbtstat-
    a. Netdiag, Nslookup, Traceroute, Pathping
4. Design Ethernet Cables: Cross Cable, Straight Cable, Rollover Cable.
5. Demonstration to connect two computers with/without connecting device.
6. Demonstration of File sharing & Printer sharing.
7. Study of various topologies using topology trainer
8. Detailed study of Network and Internet Settings on PC.
9. Trouble shooting of networks & Installation of network device drivers.
10. Study of Router Configuration.
11. Logging into a router, Editing and Help features and Saving Router configuration.
12. Setting the Hostname, Descriptions, IP Address, and Clock Rate on a Router.