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 out-lined 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)		(Any one)	15	200
	Installation Engineer SDH& DWDM (TEL/Q6300)				
	Tower Technician (TEL/Q4100)				
5 Semester II	**Theory**				
	5.GV.05	Electronic Measurements & Instrumentation		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)		(Any one)	15	200
	Installation Engineer L2 & L3 (TEL/Q6301)				
	RF Site Survey (TEL/Q4103)				
6 Semester I	**Theory**				
	6.GV.01	Telecom Infrastructure and grounding		3	50
	6.GV.02	Electromagnetics & Transmission Lines		3	50
	6.GV.03	Programming using Python & R through lab		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)		(Any one)	15	200
	Drive Test Engineer (TEL/Q6211)				
	Cluster Incharge (TEL/Q4101)				

Level	Code	Educational Component		Credit	Marks
6 Semester II	**Theory**				
	6.GV.05	Android Application Development		3	50
	6.GV.06	Wireless & Mobile Communication		3	50
	6.GV.07	Antenna theory and wave propagation		3	50
	6.GV.08	Database Management Systems		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 components used in Electrical engineering and the methods used for circuit analysis

UNIT-I

Basic Circuit Components and concepts: Voltage and Current Sources, Resistors: Fixed and Variable resistors, Construction and Characteristics, Color coding of resistors, resistors in series and parallel Testing of resistance using multi meter.

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 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.

Combination of Resistors, inductors and capacitors

UNIT-II

Circuit Analysis: Kirchhoff's Current Law (KCL), Kirchhoff's Voltage Law (KVL), Nodal 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, hybrid (h) 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.

Oscillators: Barkhausen Criteria, RC phase shift Oscillators, LC Oscillators, Crystal Oscillators, equivalent circuit of a crystal.
Power Amplifiers: Concept of power amplifiers, Tuned amplifiers, Harmonics, Operation of Power Amplifiers

UNIT- III

Review of 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) SIGNALS AND SYSTEMS

Objective:
The student should be able to understand the various signals and the systems 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**,** analog and digital 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. Systems 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 method

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 Transforms: Properties of the Continuous time and discrete time Fourier Transforms. 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 Transforms: Properties of Laplace transforms, 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 transforms**.**

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.
14. Develop a small project and illustrate the concepts learned.

(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. To study the Amplifier characteristics of a transistor in CE configuration.
7. Study of TTL gates – AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.
8. Realization of basic gates using Universal logic gates.
9. Implementation of the given Boolean function using logic gates in both SOP and POS forms.
10. Design & realize a given function using K-maps and verify its performance.
11. To verify the truth tables of S-R, J-K, T & D type flip flops.
12. Design a 4-bit shift-register and verify its operation.
13. Design, and verify the 4-bit synchronous counter.
14. Design, and verify the 4-bit asynchronous counter.
15. To develop a small project with above combinational and sequential circuits.

(5.GV.05) 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 Measurements: Performance Characteristics of Instruments: Static Characteristics, Dynamic Characteristics.

Errors in Measurements: 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.GV.06) LINEAR INTEGRATED CIRCUITS

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, Concept of Virtual Ground, Op-Amp ac and dc parameters. Building blocks of Analog ICs: Differential amplifier using single and two op-amp, 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 and demodulation techniques in analog and digital domains 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), phase discriminators.

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) MICROPROCESSORS AND MICROCONTROLLERS

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. Introduction to 8086 concepts, memory and pipe lining concepts

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.

(5.VP.03) MICROPROCESSOR AND MICROCONTROLLERS LAB

List of 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.
12. 8 Bit Addition Using Arithmetic Operation 8051 Microcontroller.
13. 8 Bit Subtraction Using Arithmetic Operation 8051 Microcontroller.
14. 8 Bit Multiplication Using Arithmetic Operation 8051 Microcontroller.
15. 8 Bit Division Using Arithmetic Operation 8051 Microcontroller.
16. Logical Operations Using 8051 Microcontroller.
17. Find 2's Complement of a Number Using 8051 Micro Controller.
18. Conversion of BCD to ASCII using 8051 Microcontroller.

(5.VP.04) ANALOG AND DIGITAL COMMUNICATION LAB

List of Experiments:

1. Generation of noise and observations of its effect on a sinusoidal signal.
2. Generation of AM signals.
3. Demodulation of AM signals.
4. Frequency modulation
5. Introduction to phase locked loop.

6. FM Demodulators
7. Digital Modulation: FSK
8. Pre-emphasis & De-emphasis
9. Pulse Amplitude Modulation
10. Pulse Time Modulation
11. Pulse code modulation
12. MATLAB basic for communication system design
13. Communication Signals : Generation and Interpretation
14. Communication Signals: Operations
15. Introduction to amplitude modulation (SIMULINK implementation)
16. Introduction to amplitude modulation (MATLAB implementation)

(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; Valve Regulated 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) ELECTROMAGNETICS & TRANSMISSION LINES

Objective:
The student should be able to understand the physics behind Electromagnetics & structure of 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 and 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.03) PROGRAMMING SKILLS using R & Python

Objective:

The student should be able to understand to develop python as a useful scripting language for different applications.

UNIT I

Introduction to Python: Installation and Working with Python. Understanding Python variables Python basic Operators Understanding python blocks.
Python Data Types: Declaring and using Numeric data types: int, float, complex Using string data type and string operations Defining list and list slicing Use of Tuple data type.
Python Program Flow Control: Conditional blocks using if, else and Simple for loops in python For loop using ranges, string, list and dictionaries Use of while loops in python Loop manipulation using pass, continue, break and else Programming using Python conditional and loops block.
Python Functions, Modules and Packages: Organizing python codes using functions Organizing python projects into modules Importing own module as well as external modules Understanding Packages Powerful Lamda function in python Programming using functions, modules and external packages. Python String, List.

UNIT II

Python File Operation: Reading config files in python Writing log files in python Understanding read functions, read(), readline() and readlines() Understanding write functions, write() and writelines() Manipulating file pointer using seek Programming using file operations.
Python Object Oriented Programming (Oops): Concept of class, object and instances Constructor, class attributes and destructors Real time use of class in live projects Inheritance, overlapping and overloading operators Adding and retrieving dynamic attributes of classes Programming using Oops support.
Python Exception Handling: Avoiding code break using exception handling Safe guarding file operation using exception handling Handling and helping developer with error code Programming using Exception handling.
Python Database Interaction: SQL Database connection using python Creating and searching tables Reading and storing config information on database Programming using database connections.
Python Multithreading: Understanding threads Forking threads Synchronizing the threads Programming using multithreading
Python CGI: Introduction Writing python program for CGI applications Creating menus and accessing files Server client program.

UNIT III

R basics: Math, Variables, and Strings. Vectors and Factors. Vector operations.
Data structures in R: Arrays & Matrices. Lists, Data frames.

R programming fundamentals: Conditions and loops, for loop, while Loop, repeat Loop, Break Statement, Next Statement, Functions in R, Objects and Classes, Debugging, Decision Making, if statement, if..else statement, switch statement, if.. else ladder,

UNIT IV

Matrices in R Language: Matrix Introduction, Matrix Construction, Addition & Subtraction, Multiplication & Division.
Working with data in R: Reading CSV and Excel Files, Reading text files, Writing and saving data objects to file in R.
Strings and Dates in R: String operations in R, Regular Expressions, Dates in R

(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) DATA COMMUNICATION AND NETWORK LAB

List of Experiments:

1. Introduction About Discrete Events Simulation And Its Tools
2. Installation Of Ns3 In Linux
3. Program In Ns3 To Connect Two Nodes
4. Program In Ns3 For Connecting Three Nodes Considering One Node As A Central Node.
5. Program In Ns3 To Implement Star Topology
6. Program In Ns3 To Implement A Bus Topology.
7. Program In Ns3 For Connecting Multiple Routers And Nodes And Building A Hybrid Topology.
8. Installation And Configuration Of Netanim
9. Program In Ns3 To Implement Ftp Using Tcp Bulk Transfer.
10. Program In Ns3 For Connecting Multiple Routers And Nodes And Building A Hybrid Topology And Then Calculating Network Performance
11. To Analyse Network Traces Using Wireshark Software.

(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.

UNIT-III

N element linear array, Pattern multiplication, Broadside and End fire array – Concept of Phased arrays, Adaptive array, Basic principle of antenna Synthesis-Binomial array. Principle of frequency independent antennas –Spiral antenna, Helical antenna, Log periodic. Modern antennas- Reconfigurable antenna, Active antenna, Dielectric antennas, Electronic band gap structure and applications, Antenna Measurements-Test Ranges, Measurement of Gain, Radiation pattern, Polarization, VSWR

UNIT IV

Modes of propagation , Structure of atmosphere , Ground wave propagation , Tropospheric propagation , Duct propagation, Troposcatter propagation , Flat earth and Curved earth concept Sky wave propagation – Virtual height, critical frequency , Maximum usable frequency – Skip distance, Fading , Multi hop propagation

(6.GV.08) Database Management Systems

Objective:

The student should be able to understand the concepts of Databases , Web Application & JAVA programming.

UNIT I

Introductory concepts of DBMS : Introduction and applications of DBMS, Purpose of data base, Data, Independence, Database System architecture- levels, Mappings, Database, users and DBA. **Relational Model :** Structure of relational databases, Domains, Relations, Relational algebra – fundamental operators and syntax, relational algebra queries, tuple relational calculus.
Entity-Relationship model : Basic concepts, Design process, constraints, Keys, Design issues, E-R diagrams, weak entity sets, extended E-R features – generalization, specialization, aggregation, reduction to E-R database schema. **Relational Database design :** Functional Dependency – definition, trivial and non-trivial FD, closure of FD set, closure of attributes, irreducible set of FD, Normalization – 1Nf, 2NF, 3NF, Decomposition using FD- dependency preservation, BCNF, Multi- valued dependency, 4NF, Join dependency and 5NF.
Query Processing & Query Optimization : Overview, measures of query cost, selection operation, sorting, join, evaluation of expressions, transformation of relational expressions, estimating statistics of expression results, evaluation plans, materialized views.
Transaction Management : Transaction concepts, properties of transactions, serializability of transactions, testing for serializability, System recovery, Two- Phase Commit protocol, Recovery and Atomicity, Log-based recovery, concurrent executions of transactions and related problems, Locking mechanism, solution to concurrency related problems, deadlock, , two-phase locking protocol, Isolation, Intent locking.

UNIT II

SQL Concepts : Basics of SQL, DDL,DML,DCL, structure – creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, IN operator, Functions - aggregate functions, Built-in functions –numeric, date, string functions, set operations, sub-queries, correlated sub-queries, Use of group by, having, order by, join and its types, Exist, Any, All , view and its types. transaction control commands – Commit, Rollback, Savepoint.

UNIT III

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 Studies on: Online Game, Online Quiz and Online Bill Calculator.

UNIT IV

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, Work Integrated Learning IT – DMA, Identification of Work Areas, Work Experience.

(6.VP.03) DATABASE MANAGEMENT SYSTEMS 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.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) EMBEDDED SYSTEMS

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.02) SATELLITE AND RADAR COMMUNICATIONS

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 and Radar: 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). Doppler effect, CW radar, FM CW radar, multiple frequency CW radar. MTI radar, delay line canceller, range gated MTI radar, blind speeds, staggered PRF, limitations to the performance of MTI radar, non-coherent MTI radar. Tracking radar: sequential lobing, conical scan, monopulse: amplitude comparison and phase comparison methods, Radar antennas. Radar displays. Duplexer.

(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.

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-II

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.

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.

UNIT- III

Security Issues: Security Trends, OSI Security Architecture, Security attacks, Security Services and Security Mechanism, Model of Network Security. **Public Key Cryptosystems:** Public Key Cryptosystems with Applications, Requirements and Cryptanalysis, RSA algorithm, its computational aspects and security, Diffie-Hillman Key Exchange algorithm, Man-in-Middle attack.
Internet Security Protocols: Basic Concepts, Security Socket Layer(SSL), Secure Hyper Text Transfer Protocol(SHTTP), Time stamping Protocol(TSP), Secure Electronic Transaction(SET), SSL Versus SET, 3-D Secure Protocol, Electronic Money , Email Security, Wireless Application Protocol(WAP) Security, Security in GSM.

UNIT- IV

Network Security: Digital Signatures, Authentication Protocols, DSS, Kerberos, X.509 Authentication Services, Public Key Infrastructure. **Email Security and IP Security:** Introduction to PGP, Introduction to S/MIME, IP Security Overview, IP Security Architecture.

Web Security: Threats and Security Approaches, Secure Socket Layer. Secure Electronic Transaction, Intruders, Intrusion Detection, Password Management. **Malicious Software:** Viruses and Related Threats, Virus Countermeasures, Distributed Denial of Service attacks, Firewalls Design Principles, Trusted System.

(7.GV.03) TELECOM SERVICE MANAGEMENT

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.

(7.GV.05) INTERNET OF THINGS

UNIT-I
OVERVIEW
IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management.

UNIT-II
REFERENCE ARCHITECTURE
IoT Architecture-State of the Art – Introduction, State of the art, Reference Model and architecture, IoT reference Model - IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints- Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control.

UNIT-III
SECURING THE INTERNET OF THINGS
Security Requirements in IoT Architecture - Security in Enabling Technologies - Security Concerns in IoT Applications. Security Architecture in the Internet of Things - Security Requirements in IoT - Insufficient Authentication/Authorization - Insecure Access Control - Threats to Access Control, Privacy, and Availability - Attacks Specific to IoT. Vulnerabilities – Secrecy and Secret-Key Capacity - Authentication/Authorization for Smart Devices - Transport Encryption – Attack & Fault trees.

UNIT-IV
CRYPTOGRAPHIC FUNDAMENTALS FOR IOT

Cryptographic primitives and its role in IoT – Encryption and Decryption – Hashes – Digital Signatures – Random number generation – Cipher suites – key management fundamentals – cryptographic controls built into IoT messaging and communication protocols – IoT Node Authentication.

UNIT-V
PREPARING IOT PROJECTS
Creating the sensor project - Preparing Raspberry Pi - Clayster libraries - Hardware- Interacting with the hardware - Interfacing the hardware- Internal representation of sensor values - Persisting data - External representation of sensor values - Exporting sensor data - Creating the actuator project- Hardware - Interfacing the hardware - Creating a controller - Representing sensor values - Parsing sensor data - Calculating control states - Creating a camera - Hardware -Accessing the serial port on Raspberry Pi - Interfacing the hardware - Creating persistent default settings - Adding configurable properties - Persisting the settings - Working with the current settings -Initializing the camera

(7.GV.06) ARTIFICIAL INTELLIGENCE

UNIT-I
INTRODUCTION TO Al AND PRODUCTION SYSTEMS
Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics - Specialized production system- Problem solving methods - Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breath first, Constraints satisfaction - Related algorithms, Measure of performance and analysis of search algorithms.

UNIT-II
REPRESENTATION OF KNOWLEDGE
Game playing - Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge.

UNIT-III
KNOWLEDGE INFERENCE
Knowledge representation -Production based system, Frame based system. Inference - Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning - Certainty factors, Bayesian Theory Bayesian Network-Dempster - Shafer theory.

UNIT-IV
PLANNING AND MACHINE LEARNING
Basic plan generation systems - Strips -Advanced plan generation systems – K strips –Strategic explanations -Why, Why not and how explanations. Learning- Machine learning, adaptive Learning.

UNIT-V
EXPERT SYSTEMS
Expert systems - Architecture of expert systems, Roles of expert systems - Knowledge Acquisition –Meta knowledge, Heuristics. Typical expert systems - MYCIN, DART, XOON, Expert systems shells.

(7.GV.07) CLOUD COMPUTING

UNIT-I

CLOUD INTRODUCTION

Cloud Computing Fundamentals: Cloud Computing definition, Types of cloud, Cloud services: Benefits and challenges of cloud computing, Evolution of Cloud Computing , usage scenarios and Applications , Business models around Cloud – Major Players in Cloud Computing - Issues in Cloud - Eucalyptus - Nimbus – Open Nebula, CloudSim.

UNIT-II

CLOUD SERVICES AND FILE SYSTEM

Types of Cloud services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service - Monitoring as a Service – Communication as services. Service providers- Google App Engine, Amazon EC2, Microsoft Azure, Sales force. Introduction to MapReduce, GFS, HDFS, Hadoop Framework.

UNIY-III

COLLABORATING WITH CLOUD

Collaborating on Calendars, Schedules and Task Management – Collaborating on Event Management, Contact Management, Project Management – Collaborating on Word Processing , Databases – Storing and Sharing Files- Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Collaborating via Social Networks – Collaborating via Blogs and Wikis.

UNIT-IV

VIRTUALIZATION FOR CLOUD

Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization – System VM, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation and binary translation, HLL VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V.

UNIT-V

SECURITY, STANDARDS, AND APPLICATIONS

Security in Clouds: Cloud security challenges – Software as a Service Security, Common Standards: The Open Cloud Consortium – The Distributed management Task Force – Standards for application Developers – Standards for Messaging – Standards for Security, End user access to cloud computing, Mobile Internet devices and the cloud.

(7.GV.08) WEB APPLICATION DEVELOPMENT

UNIT-I

Introduction and Web Development Strategies

History of Web, Protocols governing Web, Creating Websites for individual and Corporate World, Cyber Laws, Web Applications, Writing Web Projects, Identification of Objects, Target Users, Web Team, Planning and Process Development.

UNIT-II

HTML, XML and Scripting

List, Tables, Images, Forms, Frames, CSS Document type definition, XML schemes, Object Models, Presenting XML, Using XML Processors: DOM and SAX, Introduction to Java Script, Object in Java Script, Dynamic HTML with Java Script.

UNIT-III

Java Beans and Web Servers

Introduction to Java Beans, Advantage, Properties, BDK, Introduction to EJB, Java Beans API Introduction to Servelets, Lifecycle, JSDK, Servlet API, Servlet Packages: HTTP package, Working with Http request and response, Security Issues.

UNIT-IV

JSP

Introduction to JSP, JSP processing, JSP Application Design, Tomcat Server, Implicit JSP objects, Conditional Processing, Declaring variables and methods, Error Handling and Debugging, Sharing data between JSP pages- Sharing Session and Application Data.

UNIT-V

Database Connectivity

Database Programming using JDBC, Studying Javax.sql.*package, accessing a database from a JSP page, Application-specific Database Action, Developing Java Beans in a JSP page, introduction to Struts framework.

(7.VP.03) WEB APPLICATION LAB

List of Experiments:

1. Write an HTML page including any required JavaScript that takes a number from one text field in the range of 0 to 999 and shows it in another text field in words. If the number is out of range, it should show “out of range” and if it is not a number, it should show “not a number” message in the result box.
2. Write a HTML page that has one input, which can take multi-line text and a submit button. Once the user clicks the submit button, it should show the number of characters, words and lines in the text entered using an alert message. Words are separated with white spaces and lines are separated with new line character.
3. Write an HTML page that contains a selection box with a list of 5 countries. When the user selects a country, its capital should be printed next to the list. Add CSS to customize the properties of the font of the capital (color, bold and font size).
4. Create and save an XML document at the server, which contains 10 users information. Write a program which takes User Id as input and returns the user details by taking the user information from the XML document.
5. Implement the following web applications using (a) PHP, (b) Servlets and (c) JSP.
   i) A user validation web application, where the user submits the login name and password to the server. The name and password are checked against the data already available in Database and if the data matches, a successful login page is returned. Otherwise a failure message is shown to the user.
   ii) Modify the above program to use an XML file instead of database.
   iii) Modify the above program using AJAX to show the result on the same page below the submit button.
   iv) A simple calculator application that takes two numbers and an operator (+,-,*,/,%) from an HTML page and returns the result page with the operation performed on the operands.
   v) A web application takes a name as input and on submit it shows a hellopage where is taken from the request. It shows the start time at the right top corner of the page and provides the logout button. On clicking this button, it should show a logout page with Thank You message with the duration of usage.(Use session to store name and time).
   vi) A web application that takes name and age from an HTML page. If the age is less than 18, it should send a page with “Hello , you are not authorized to visit this site” message, where should be replaced with the entered name. Otherwise it should send “Welcome to this site” message.
   vii) A web application that takes name and age from an HTML page. If the age is less than

18, it should send a page with “Hello , you are not authorized to visit this site” message, where should be replaced with the entered name. Otherwise it should send “Welcome to this site” message.
viii) A web application for implementation: The user is first served a login page which takes user’s name and password. After submitting the details the server checks these values against the data from a database and takes the following decisions. If name and password matches serves a welcome page with user’s full name. If name and password doesn’t match, then serves “password mismatch” page. If name is not found in the database, serves a registration page, where user’s full name is asked and on submitting the full name, it stores, the login name, password and full name in the database (hint: use session for storing data, submitted login name and password).
ix) A web application that lists all cookies stored in the browser on clicking “List Cookies” button. Add cookies if necessary.

(7.VP.04) ARTIFICIAL INTELLIGENCE LAB EXPERIMENTS

List of Experiments:

1. Study of Prolog.
2. Write simple fact for the statements using PROLOG.
3. Write predicates One converts centigrade temperatures to Fahrenheit, the other checks if a temperature is below freezing.
4. Write a program to solve the Monkey Banana problem.
5. WAP in turbo prolog for medical diagnosis and show the advantage and disadvantage of green and red cuts.
6. WAP to implement factorial, fibonacci of a given number.
7. Write a program to solve 4-Queen problem.
8. Write a program to solve traveling salesman problem.
9. Write a program to solve water jug problem using LISP