



**KALINGA
UNIVERSITY**

SCHEME & SYLLABUS FOR

**Bachelor of Vocational
Studies (B.Voc.)**

Mobile Communication



Kalinga University, Naya Raipur, Chhattisgarh

B.VOC FOR MOBILE COMMUNICATION

Semester-01								
Course Code	Course Title	Credits	L	T	P	Internal Marks	End Semester Exam Marks	Total Marks
BVMC101	Communication Skills	3	3	0	0	30	70	100
BVMC102	Fundamentals of Information Technology	3	3	0	0	30	70	100
BVMC103	Analog Electronics	3	3	0	0	30	70	100
BVMC104	Digital Electronics	3	3	0	0	30	70	100
BVMC105P	On Job Training/ Internship/Workshop	18	0	0	36	50	150	200
Total		30	12	0	36	170	430	600

Semester-02								
Course Code	Course Title	Credits	L	T	P	Internal Marks	End Semester Exam Marks	Total Marks
BVMC201	Linear Integrated Circuits	3	3	0	0	30	70	100
BVMC202	Environmental Studies	3	3	0	0	30	70	100
BVMC203	Analog and Digital Communication	3	3	0	0	30	70	100
BVMC204	Electronics Measurements and Instrumentation	3	3	0	0	30	70	100
BVMC205P	On Job Training/ Internship/Workshop	18	0	0	36	50	150	200
Total		30	12	0	36	170	430	600

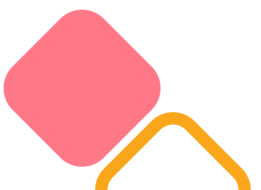
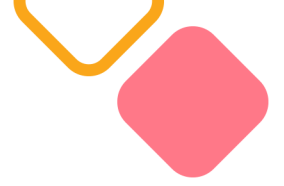
Semester-03								
Course Code	Course Title	Credits	L	T	P	Internal Marks	End Semester Exam Marks	Total Marks
BVMC301	Telecom Infrastructure and Grounding	3	3	0	0	30	70	100
BVMC302	Electromagnetics & Transmission Lines	3	3	0	0	30	70	100
BVMC303	Database Management Systems	3	3	0	0	30	70	100
BVMC304	Data Communication & Networks	3	3	0	0	30	70	100
BVMC305P	On Job Training/ Internship/Workshop	18	0	0	36	50	150	200
Total		30	12	0	36	170	430	600

Semester-04								
Course Code	Course Title	Credits	L	T	P	Internal Marks	End Semester Exam Marks	Total Marks
BVMC401	Microprocessors and Microcontrollers	3	3	0	0	30	70	100
BVMC402	Mobile Computing	3	3	0	0	30	70	100
BVMC403	Antenna Theory and Wave Propagation	3	3	0	0	30	70	100
BVMC404	Introduction to Open Source Software	3	3	0	0	30	70	100
BVMC405P	On Job Training/ Internship/Workshop	18	0	0	36	50	150	200
Total		30	12	0	36	170	430	600

Semester-05								
Course Code	Course Title	Credits	L	T	P	Internal Marks	End Semester Exam Marks	Total Marks
BVMC501	Wireless Communication	3	3	0	0	30	70	100
BVMC502	Signals and Systems	3	3	0	0	30	70	100
BVMC503	Web Application and Development	3	3	0	0	30	70	100
BVMC504	Satellite Communication	3	3	0	0	30	70	100
BVMC505P	On Job Training/ Internship/Workshop	18	0	0	36	50	150	200
Total		30	12	0	36	170	430	600

Semester-06								
Course Code	Course Title	Credits	L	T	P	Internal Marks	End Semester Exam Marks	Total Marks
BVMC601	Embedded Systems	3	3	0	0	30	70	100
BVMC602	Network Security	3	3	0	0	30	70	100
BVMC603	Ad hoc and Sensor Networks	3	3	0	0	30	70	100
BVMC604	Digital Signal Processing	3	3	0	0	30	70	100
BVMC605P	On Job Training/ Internship/Workshop	18	0	0	36	50	150	200
Total		30	12	0	36	170	430	600

SEMESTER-01





COMMUNICATION SKILLS

BVMC101

Course Objective:

- The purpose of this course is to introduce students to the theory, fundamentals and tools of communication and to develop in them vital communication skills which should be integral to personal, social and professional interactions. One of the critical links among human beings and an important thread that binds society together is the ability to share thoughts, emotions and ideas through various means of communication: both verbal and non-verbal. In the context of rapid globalization and increasing recognition of social and cultural pluralities, the significance of clear and effective communication has substantially enhanced.

Course outcomes:

- The purpose of this course is to introduce students to the theory, fundamentals and tools of communication
- To develop vital communication skills which should be integral to personal, social and professional interactions.
- One of the critical links between human beings.
- An important thread that binds society together is the ability to share thoughts, emotions and ideas through various means of communication: both verbal and non-verbal.
- In the context of rapid globalization and increasing recognition of social and cultural pluralities, the significance of clear and effective communication has substantially enhanced.

Unit 1:

06

- **Introduction:** Theory of communication, types and modes of communication, mediums and channels of communication, barriers to communication, English as a global language, the lingua franca, social influences on English

Unit 2:

06

- **Language of Communication:** Verbal and non-verbal (spoken and written) personal, social and business barriers and strategies intra-personal, inter-personal and group communication, varieties of English, language, accent, dialect, colloquialism, historical influences on English

Unit 3:

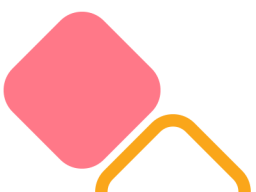
06

- **Speaking Skills:** Monologue, dialogue, group discussion, effective communication/mis-communication, interview, public speech, regional influences on English, convergence and divergence, linguistic imperialism

Unit 4:

06

- **Reading and Understanding** Close reading, reading analysis of a text - audience and purpose, content and theme, tone and mood, stylistic devices, structure comprehension- analysis and interpretation, translation (from Indian language to English and vice-versa) literary/knowledge texts





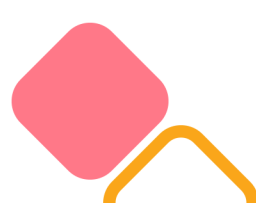
Unit 5:


06

- **Writing Skills:** Documenting report writing making notes letter writing, writing tabloids, diary entry, open letters, essays, newsletter and magazine articles, skits, short stories, impersonating characters it will enhance language of communication, various speaking skills such as personal communication, social interactions and communication in professional situations such as interviews, group discussions and office environments, important reading skills as well as writing skills such as report writing, note taking etc. while, to an extent, the art of communication is natural to all living beings, in today's world of complexities, it has also acquired some elements of science. it is hoped that after studying this course, students will find a difference in their personal and professional interactions.

References:

- Fluency in English - Part II, Oxford University Press, 2006.
- Business English, Pearson, 2008.
- Language, Literature and Creativity, Orient Blackswan, 2013.
- Language through Literature (forthcoming) ed. Dr. Gauri Mishra, Dr. Ranjana Kaul, Dr. Brati Biswas





FUNDAMENTALS OF INFORMATION TECHNOLOGY

BVMC102

Course objective:

- This is a basic course for commerce students to familiarize with computer and its applications in the relevant fields and exposes them to other related courses of IT.

Course Outcomes:

- Gain a foundational understanding of key IT concepts, including hardware, software, and networks.
- Develop proficiency in using common computer applications, such as word processing and spreadsheet software.
- Explore the ethical and security considerations in IT, emphasizing responsible digital behavior.
- Acquire problem-solving skills by applying IT knowledge to real world scenarios.
- Prepare for further studies in IT or related fields by establishing a strong IT knowledge base.

Unit-1:

06

- **Computer characteristics:** Speed, storage, accuracy, diligence; digital signals, binary system, ASCII; historic evolution of computers;
- **Classification of computers:** microcomputer, minicomputer, mainframes, supercomputers;
- **Personal computers:** desktop, laptops, palmtop, tablet; hardware & software; von Neumann model.

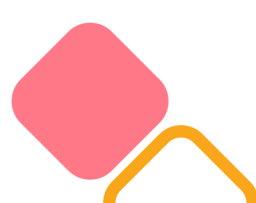
Unit-2:

06

- **Hardware:** CPU, memory, input devices, output devices.
- **Memory units:** RAM (SDRAM, DDR RAM, RDRAM etc. feature wise comparison only); ROM-different types: Flash memory;
- **Auxiliary storage:** Magnetic devices, optical devices; floppy, hard disk, memory stick, CD, DVD, CD/DVD-Writer;
- **Input devices** - keyboard, mouse, scanner, speech input devices, digital camera, touch screen voice input, joystick, optical readers, bar code reader;
- **Output devices:** Display device, size and resolution; CRT, LCD, LED;
- **Printers:** Dot-matrix, inkjet, laser; plotters, sound cards & speaker.

Unit-3:

06

- **Software:** System software, application software; concepts of files and folders, introduction to operating systems, different types of operating systems: single user, multitasking, time-sharing multi-user; booting, POST;
 - **Basic features of two GUI operating systems:** Windows & Linux (Basic desk top management); Programming Languages, Compiler, Interpreter, Databases;
 - **Application software:** Generic features of word processors, spread sheets and presentation software; generic introduction to latex for scientific typesetting; utilities and their use; computer viruses & protection, free software, open source.
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Unit-4:

06

- **Computer Networks and Internet:** Connecting computers, requirements for a network: server, workstation, switch, router, network operating systems; internet: brief history, world wide web, websites, URL, browsers, search engines, search tips; internet connections: isp, dial-up, cable modem, well, dsl, leased line wireless and Wi-Fi connectivity ; email, email software features (send receive, filter, attach, forward, copy, blind copy); characteristics of web-based systems, web pages, web programming languages.

Unit-5:

06

- **Information Technology and Society:** Indian IT Act, intellectual property rights, issues. application of information technology in railways, airlines, banking, insurance, inventory control, financial systems, hotel management, education, video games, telephone exchanges, mobile phones, information kiosks, special effects in movies.
- **Programming Concepts & Techniques:** Program concept, characteristics of programme, stages in program development, tips for program designing, programming aids, algorithms, pseudo code, notations, design, flowcharts, symbols, rules, compiler & interpreter. introduction to programming techniques, top-down & bottom-up approach, unstructured, & modular programming, cohesion, coupling, debugging, syntax & logical errors, linking and loading, testing and debugging, documentation.

References:

- Programming in C, R.S. Salaria, Khanna Publishing House
- Computer Concepts and Programming in C, R.S. Salaria, Khanna Publishing House
- Handbook of Computer Fundamentals, N.S. Gill, Khanna Publishing House



ANALOG ELECTRONICS

BVMC103

Course Objective:

- The objective of teaching this subject is to impart in depth understanding of the concepts of biasing in active circuits and employing simple models to represent nonlinear and active elements in circuits. It also includes the operation of the circuits at high frequencies and effects of feedback. The analysis of power amplifier & tuned amplifiers is also dealt with. The student is expected to have a basic understanding of active and passive circuit elements.

Course Outcomes:

- The student is expected to develop a basic knowledge of basic semiconductor devices and their operation in different configurations

Unit 1:

08

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 & β Stabilization factors, thermal stability.

Unit 2:

08

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 3:

07

Oscillators:

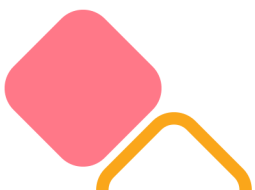
- Barkhausen criteria for oscillations, Study of phase shift oscillator, Colpitts oscillator and Hartley oscillator. MOSFET Circuits: Review of JFET, Depletion and Enhancement MOSFET, Biasing of MOSFETs, Small Signal Parameters, Common Source amplifier circuit analysis, CMOS circuits.

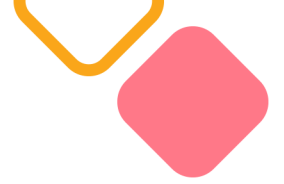
Unit 4:

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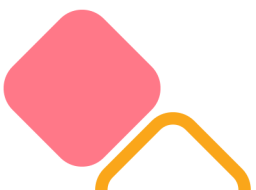
Power Amplifiers:

- Power dissipations in transistors, Amplifiers Classification, (Class-A, Class-B, Class-C, Class-AB) Efficiency analysis, Push-pull amplifiers. Single tuned amplifiers: Circuit diagram, Working and Frequency Response, Limitations of single tuned amplifier, Applications of tuned amplifiers in communication circuits.



**References:**

- Boylestad & Nashelsky, "Electronic Devices & Circuit Theory" PEARSON PUBLICATION
- Salivahanan, Suresh Kumar, Vallavaraj, "Electronic devices and circuits" TMH, 1999
- J. Millman and Halkias, "Integrated Electronics, Analog & Digital Circuits & Systems" TMH–2000.
- N N Bhargava, "Basic Electronics & Linear Circuits", 2nd Ed., TMH.
- Sedra & Smith, "Micro Electronic Circuits", Oxford University Press, 2000
- David A Bell, "Electronic Devices and Circuits", Oxford University Press, 2000.
- Albert Malvino, David J. Bates, "Problems and Solutions in Basic Electronics", TMH.



DIGITAL ELECTRONICS

BVMC104

Course Objective:

- The objective of the paper is to facilitate the student with the knowledge of Logic Systems and Circuits, thereby enabling the student to obtain the platform for studying Digital Systems and Computer Architecture. Knowledge of basic mathematics is sufficient for this course.

Course Outcome:

- The student is expected to develop an understanding of simple digital systems and develop the logic behind the organization of various computer components.

Unit 1:

08

Number Systems and Codes:

- Decimal, Binary, Hexadecimal and Octal number systems, base conversions, Binary, octal and hexadecimal arithmetic (addition, subtraction by complement methods, multiplication), representation of signed and unsigned numbers, Codes- BCD, Gray Code, Excess-3 Code, ASCII, EBCDIC, Conversion between various Codes.

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.

Unit 2:

08

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 Demultiplexers, Implementing logic functions with multiplexer & Decoder, binary Adder, binary subtractor, 4 bit adder/ subtractor using 2's complement.

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.

Unit 3:

07

Synchronous Sequential Circuits:

- State Tables, State Equations and State Diagrams, State Reduction and State Assignment, Design of Clocked Sequential Circuits using State Equations.

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.

Unit 4:**Programmable Logic Devices:**

- Brief introduction to RAM and ROM; Basic concepts- ROM, PLA, PAL, FPGA.

Integrated circuits:

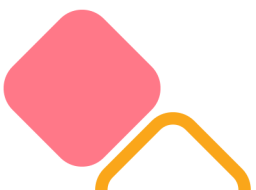
- TTL and CMOS logic families and their characteristics. Fan-in, Fan out, Noise Margin, Power Dissipation, Propagation delay, Voltage and current levels, Figure of merit and Speed power product.

References:

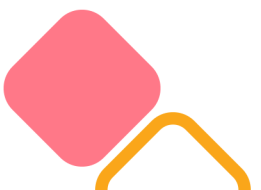
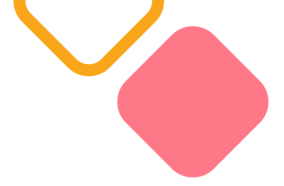
- Thomas L. Floyd, Digital Fundamentals, Pearson Education Asia (1994)
- Morris Mano, Digital Logic and Computer Design”, Pearson
- A Anand Kumar, “Fundamentals of Digital Logic Circuits”, PHI
- R.P. Jain, “Modern Digital Electronics”, TMH, 2/e.
- Zyi Kohavi, “Switching & Finite Automata Theory”, TMH, 2 Edition
- Taub, Helbert and Schilling, “Digital Integrated Electronics”, TMH
- W. H. Gothmann, Digital Electronics: An Introduction to Theory And Practice, PHI (2000)



ON JOB TRAINING/INTERNSHIP/WORKSHOP
BVMC105P



SEMESTER-02





LINEAR INTEGRATED CIRCUITS

BVMC201

Course Objective:

- The objective of teaching this subject is to give students in depth knowledge of design and analysis of analog IC (OP-AMP, OTA), The internal details of OP-AMP and measurement of its parameters is elaborated. The linear and nonlinear applications, useful for practical circuits, are detailed. Some important and widely used ICs such as 555 timer IC, PLL & VCO, Voltage Regulator IC etc., are also included. The student will need the knowledge of basic analog semiconductor devices.

Course Outcome:

- The student is expected to have an understanding of various types of integrated circuits and their applications in making different kinds of circuits. Design and construct waveform generation circuits.

Unit 1:

08

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 2:

08

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 3:

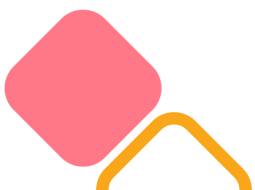
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Waveform generators using Op-Amp:

- 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, BRN), Butter worth & Chebyshev approximation filter functions.





Unit 4:

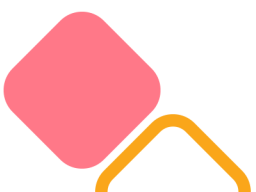
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Introduction to 555 Timer IC:

- Functional and block diagram of 555 timer, Application of 555 timer as astable and monostable multivibrator. Operational trans conductance amplifier (OTA)-C filters, OTA integrator & differentiator.
- Introduction to IC phase locked loops, IC voltage regulators and IC VCO.

References:

- D. Roy Choudhary, Shail B Jain, "Linear Integrated Circuits" New Age Publisher, 1999
- M. Rashid, "Microelectronic Circuit", Cengage Learning Publication.
- Sedra & Smith, "Micro Electronic Circuits"
- Oxford University Press, 2000
- David A Bell, "Operational Amplifiers and Linear IC's", PHI.
- S Salivahanan, V.S. Kanchana Bhaskaran, "Linear Integrated Circuits" TMH.
- Ramakant A Gayakwad "Op - Amps and Linear Integrated Circuits", PHI.





ENVIRONMENTAL STUDIES

BVMC202

Course Outcomes:

- Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
- Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
- Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
- Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
- Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.

Unit 1:

06

Introduction to Environmental Studies:

- Multidisciplinary nature of environmental studies, Scope and importance; concept of sustainability and sustainable development.

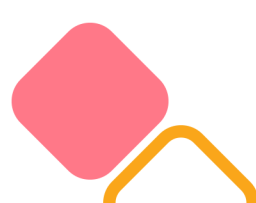
Ecosystems:

- What is an ecosystem? Structure and function of the ecosystem;
- **Energy flow in an ecosystem:** food chains, food webs and ecological succession.
- **Case studies of the following ecosystems:** Forest ecosystem, grassland ecosystem, desert ecosystem, aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit-2:

06

Natural Resources:

- **Renewable and Non--renewable Resources:** Land resources and land use change; Land degradation, soil erosion and desertification.
 - **Deforestation:** Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.
 - **Water:** Use and over--exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter--state).
 - **Energy resources:** Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.
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Unit-3: 06

Biodiversity and Conservation:

- **Levels of biological diversity:** genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots, India as a mega-biodiversity nation; Endangered and endemic species of India
- **Threats to biodiversity:** Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions;
- **Conservation of biodiversity:** In-situ and Ex-situ conservation of biodiversity.
- **Ecosystem and biodiversity services:** Ecological, economic, social, ethical, aesthetic and Informational value.

Unit-4: 06

Environmental Pollution:

- Types, causes, effects and controls; Air, water, soil and noise pollution, Nuclear hazards and human health risks
- **Solid waste management:** Control measures of urban and industrial waste. Pollution case studies.

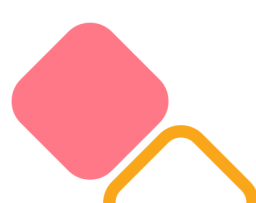
Environmental Policies & Practices:

- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
- **Environment Laws:** Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD).
- Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

Unit-5: 06

Human Communities and the Environment:

- **Human population growth:** Impacts on environment, human health and welfare. Resettlement and rehabilitation of project affected persons; case studies.
- **Disaster management:** floods, earthquake, cyclones and landslides.
- **Environmental movements:** Chipko, Silent valley, Bishnois of Rajasthan.
- **Environmental ethics:** Role of Indian and other religions and cultures in environmental conservation. Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).



References:

- Carson, R. 2002. *Silent Spring*. Houghton Mifflin Harcourt.
- Gadgil, M., & Guha, R. 1993. *This Fissured Land: An Ecological History of India*. Univ. of California Press.
- Gleeson, B. and Low, N. (eds.) 1999. *Global Ethics and Environment*, London, Routledge.
- Gleick, P. H. 1993. *Water in Crisis*. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
- Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. *Principles of Conservation Biology*. Sunderland: Sinauer Associates, 2006.
- Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. *Science*, 339: 36--37.
- McCully, P. 1996. *Rivers no more: the environmental effects of dams*(pp. 29--64). Zed Books.
- McNeill, John R. 2000. *Something New Under the Sun: An Environmental History of the Twentieth Century*.
- Odum, E.P., Odum, H.T. & Andrews, J. 1971. *Fundamentals of Ecology*. Philadelphia: Saunders.
- Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. *Environmental and Pollution Science*. Academic Press.
- Rao, M.N. & Datta, A.K. 1987. *Waste Water Treatment*. Oxford and IBH Publishing Co. Pvt. Ltd.
- Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. *Environment*. 8th edition. John Wiley & Sons.
- Rosencranz, A., Divan, S., & Noble, M. L. 2001. *Environmental law and policy in India*. Tripathi 1992.
- Sengupta, R. 2003. *Ecology and economics: An approach to sustainable development*. OUP.
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- Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. *Conservation Biology: Voices from the Tropics*. John Wiley & Sons.
- Thapar, V. 1998. *Land of the Tiger: A Natural History of the Indian Subcontinent*.
- Warren, C. E. 1971. *Biology and Water Pollution Control*. WB Saunders.
- Wilson, E. O. 2006. *The Creation: An appeal to save life on earth*. New York: Norton.
- World Commission on Environment and Development. 1987. *Our Common Future*. Oxford University Press.

ANALOG AND DIGITAL COMMUNICATION

BVMC203

Course Objective:

- The objective of teaching this subject is to introduce the students to working of different communication systems and modulation techniques. The student is expected to have a basic understanding of different active and passive circuit elements.

Course Outcome:

- The student is expected to develop a basic understanding of the advantages and limitations of various analog and digital modulation systems on a comparative scale and relate to them while studying practical communication systems.

Unit 1:

08

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 2:

08

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 3:

07

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 4:

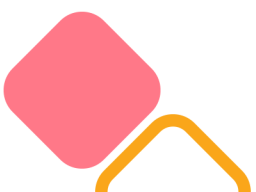
07

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 de-emphasis, 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.

References:

- Louis E. Frenzel Jr., "Principles of Electronic Communication Systems", 3/e MGH, 2008.
- Wayne Tomasi, "Advanced Electronic Communications Systems" Pearson, 2013.
- Kennedy and Davis, "Electronic Communication Systems" TMH, 1999.
- Simon S. Haykin, Michael Moher, "An Introduction to Analog and Digital Communications" John Wiley, 2006.
- B P Lathi, "Modern Digital and Analog Communication Systems", 3/e Oxford press.





ELECTRONICS MEASUREMENTS AND INSTRUMENTATION

BVMC204

Course Objective:

- The Objective of the course is to introduce fundamentals of Electronics instruments and measurement providing an in-depth understanding of Measurement errors, bridge measurement, basics of transducers, analyzer and multimeter.

Course Outcome:

- Trouble shooting of electronic equipment is an essential requirement of Service sector industry. This course will help to develop skills to become professional technician with capability to measure electrical parameters using various instruments.

Unit 1:

08

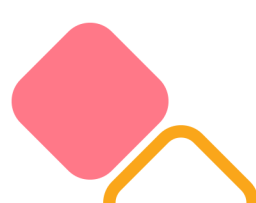
Basics of Measurement:

- **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 2:

08

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 3:

07

Cathode Ray Oscilloscope:

- Basic Principle, CRT features, Block diagram of oscilloscope, single/dual beam CRO, dual trace oscilloscope. Measurement of phase and frequency by Lissajous 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 4:

07

Electronic Instruments:

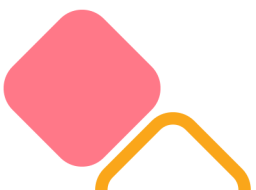
- Fixed / Variable Frequency AF Oscillator, Function Generator, (sine, square and triangular wave generator). Digital Data Recording, Digital Memory Waveform Recorder (DWR). Introduction to transducers; Data Acquisition System: Introduction and Objective of a DAS.

References:

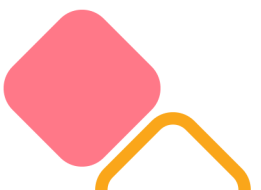
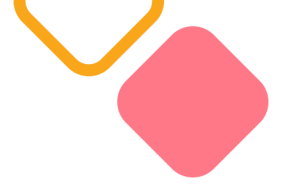
- A.K.Sawhney, A course in Elect. & Electronic Measurement and Instrumentation, Dhapat Rai & Co.
- Golding & Widis, Electrical Measurement and Measurement instrument, Wheeler Book(s)
- H.S. Kalsi, Electronic Instruments, Tata Mc-Graw hill.
- A.D. Heltric & W.C. Copper, Modern Electronic instrumentation & Measuring instruments, Wheeler Publication. 8.
- H.K.P. Neubert, Instrument transducers, Oxford University press.
- Carr, Elements of Electronic Instrumentation and Measurement, Pearson Education.
- D. Patranabis, Sensors & Transducers, PHI.
- A.J. Bouwens, Digital Instrumentation, Tata Mc-Graw hill.



ON JOB TRAINING/INTERNSHIP/WORKSHOP
BVMC205P



SEMESTER-03



TELECOM INFRASTRUCTURE AND GROUNDING

BVMC301

Course Objective:

- The students should have studied the concept of grounding, aware of different type of tools like Allen key, crimping tools etc. Identify different components of telecom support infrastructure and their role. To train a student in the various aspects of grounding of electrical systems. Starting from the basics of grounding itself, the course attempts to develop an understanding of need grounding in various equipment and telecommunications systems

Course Outcome:

- The student should be well verse with different type of BTS, their installation, safety precautions and the concept of grounding.

Unit 1:

08

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 2:

08

- 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 3:

07

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 4:**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 arrester, practical view of surge protection for sensitive equipment.

References:

- “Practical Grounding, Bonding, Shielding and Surge Protection”, G Vijayaraghavan, Mark Brown, Malcolm Barnes, 1st edition, 2004, Newnes, Elsevier
- Hans Gumhalter, Power Supply in Telecommunications, 3rd Edition, Springer-Verlag Berlin Heidelberg, (1995).
- Fraidoon Mazda, Telecommunications Engineer’s Reference Book, 2E, Elsevier, (1998)
- Electrical Safety: Safety and health for Electrical Trades, Student Manual, DHHS (NIOSH) Publication, (2009) www.cdc.gov/niosh/docs/2009-113/pdfs/2009-113.pdf
- White Paper By Wissam Balshe, Power system considerations for cell tower applications: <https://www.cumminspower.com/www/literature/technicalpapers/PT-9019-Cell-Tower-Applications-en.pdf>
- Political Economy Research Institute (PERI), Handbook of International Electrical Safety Practices, (Wiley-Scrivener) [1 ed.], (2010)
- EETP/BSNL, Telecom Support Infrastructure, course material. (Telecom Infrastructure power plant, battery, ups and earthing, etc.)



ELECTROMAGNETICS & TRANSMISSION LINES

BVMC302

Course Objective:

- To list Maxwell's equations and solve them for specific regular geometries, understand general electromagnetic wave propagation and how the plane wave solution can be used to approximate real situation, describe the boundary conditions for electric and magnetic fields at dielectric interfaces, interpret the effects of lossy and low loss dielectrics upon the propagation of electromagnetic waves, and predict this process in specific applications and solve the performance of specific transmission lines.

Unit 1:

08

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 2:

08

Magnetostatics:

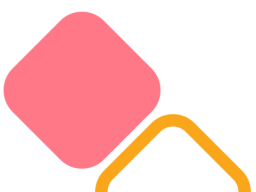
- Magnetic Induction and Faraday's Law, Magnetic Flux Density, Magnetic Field Strength H, Ampere, Gauss Law in the Differential Vector Form, Permeability, Energy Stored in a Magnetic Field, Ampere's Law for a Current Element, Volume Distribution of Current, Ampere's Law Force Law, Magnetic Vector Potential.

Unit 3:

07

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 4:

07

Transmission Lines:

- Transmission line equations, Characteristic impedance, Distortion-less lines, Input impedance of a lossless 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.

References:

- Matthew N. O. Sadiku, "Elements of Electromagnetics", Oxford University Press
- E. C. Jordan, K. G. Balmain, "Electromagnetic Waves & Radiation System", PHI – 2nd Edition
- William H. Hayt, "Engineering Electromagnetics", TMH
- J.D. Kraus, "Electromagnetics", TMH
- David K. Cheng, "Field and Wave Electromagnetic", 2nd Edition, Pearson Education Asia, 2001

DATABASE MANAGEMENT SYSTEMS

BVMC303

Course Objective:

- The concepts related to database, database techniques, SQL and database operations are introduced in this subject. This creates strong foundation for application data design.

Unit 1:

08

Introductory Concepts of DBMS:

- Introduction and application of DBMS, Data Independence, Database System Architecture – levels, Mapping, Database users and DBA, Entity – Relationship model, constraints, keys, Design issues, E-R Diagram, Extended E-R features- Generalization, Specialization, Aggregation, Translating E-R model into Relational model.

Unit 2:

08

Relational Model:

- The relational Model, The catalog, Types, Keys, Relational Algebra, Fundamental operations, Additional Operations-, SQL fundamentals, DDL,DML,DCL PL/SQL Concepts, Cursors, Stored Procedures, Stored Functions, Database Integrity – Triggers.

Unit 3:

07

- Functional Dependencies, Non-loss Decomposition, First, Second, Third Normal Forms, Dependency Preservation, Boyce/Codd Normal Form, Multi-valued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form.

Unit 4:

07

Implementation Techniques:

- Overview of Physical Storage Media, File Organization, Indexing and Hashing, B+ tree Index Files, Query Processing Overview, Catalogue Information for Cost Estimation, Selection Operation, Sorting, Join Operation, Materialized views, Database Tuning.

References:

- Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 5th Edition, Tata McGraw Hill, 2006
- Elmsari and Navathe, "Fundamentals of Database Systems", 6th Ed., Pearson, 2013
- C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", 8th Edition, Pearson Education, 2006.
- J. D. Ullman, "Principles of Database Systems", 2nd Ed., Galgotia Publications, 1999.
- Vipin C. Desai, "An Introduction to Database Systems", West Publishing Co.,

DATA COMMUNICATION & NETWORKS

BVMC304

Course Objective:

- The objective of the paper is to provide an introduction to the fundamental concepts on data communication and the design, deployment, and management of computer networks.

Unit 1:

08

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 2:

08

Data Link Layer:

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

Unit 3:

07

Network Layer:

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

Unit 4:

07

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.

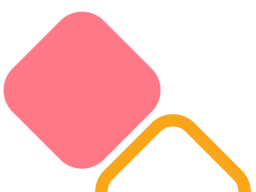
References:

- S. Tannenbum, D. Wetherall, "Computer Networks", Prentice Hall, Pearson, 5 th Ed [T2]
- Behrouz A. Forouzan, "Data Communications and Networking", Tata McGraw-Hill, 4th Ed
- Fred Halsall, "Computer Networks", Addison – Wesley Pub. Co. 1996.
- Larry L, Peterson and Bruce S. Davie, "Computer Networks: A system Approach", Elsevier, 4 th Ed
- Tomasi, "Introduction to Data Communications & Networking", Pearson 7th impression 2011
- William Stallings, "Data and Computer Communications", Prentice Hall, Imprint of Pearson, 9 th Ed.
- Zheng , "Network for Computer Scientists & Engineers", Oxford University Press
- Data Communications and Networking: White, Cengage Learning

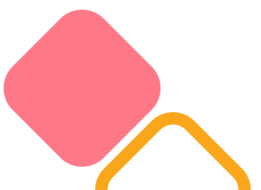


ON JOB TRAINING/INTERNSHIP/WORKSHOP

BVMC305P



SEMESTER-04





MICROPROCESSORS AND MICROCONTROLLERS

BVMC401

Course Objective:

- To get an overview of microprocessors and microcontrollers.

Course Outcome:

- Able to program 8085 and 8051 for basic applications.

Unit 1:

08

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 2:

08

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 3:

07

Microcontroller:

- Introduction and block diagram of 8051 microcontroller, architecture of 8051, and 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.

I/O port programming:

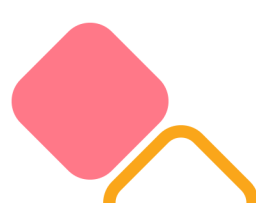
- Introduction of I/O port programming, pin out diagram of 8051 microcontroller, I/O port pins description & their functions, I/O port programming in 8051 (using assembly language), I/O programming: Bit manipulation.

Unit 4:

07

Programming:

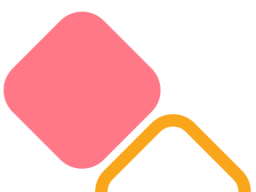
- addressing modes and accessing memory locations using various addressing modes, assembly language instructions using each addressing mode, arithmetic and logic instructions, 8051 programming in C: for time delay & I/O operations.





References:

- Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. MCKinlay “The 8051 Microcontroller and Embedded Systems Using Assembly and C”, 2nd Edition, Pearson Education 2008.
- Kenneth J. Ayala, “The 8086 Microprocessor: Programming & Interfacing The PC”, Delmar Publishers, 2007.
- A K Ray, K M Bhurchandi, “Advanced Microprocessors and Peripherals”, Tata McGraw Hill, 2007.
- 8051 microcontrollers, Satish Shah, 2010, Oxford University Press.
- Ramesh Gaonkar, “MicroProcessor Architecture, Programming and Applications with the 8085”, PHI
- Douglas V Hall, “Microprocessors and Interfacing, Programming and Hardware” Tata McGraw Hill, 2006.
- Muhammad Ali Mazidi, “Microprocessors and Microcontrollers”, Pearson, 2006





MOBILE COMPUTING

BVMC402

Course Objectives:

- Should have studied papers such as Communication systems, Data communications and networking and wireless networks. To learn the basic concepts, aware of the GSM, SMS, GPRS Architecture.
- To have an exposure about wireless protocols – WAP, Zig Bee issues.
- To Know the Network, Transport Functionalities of Mobile communication.
- To understand the concepts of Adhoc and wireless sensor networks. Introduce Mobile Application Development environment.

Unit 1:

08

Mobile Physical Layer:

- Review of generation of mobile services, overview of wireless telephony, cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.
- **Mobile Computing Architecture:** Issues in mobile computing, three tier architecture for mobile computing, design considerations. WAP: Architecture, protocol stack, Data gram protocol, application environment, and applications.

Unit 2:

08

Mobile Data Link Layer:

- Motivation for a specialized MAC, Near & far terminals, Multiple access techniques for wireless LANs such as collision avoidance, polling, inhibit sense, spread spectrum, CDMA.
- **Local Area Wireless systems:** ZigBee, RFID and Wi-Max.

Unit 3:

07

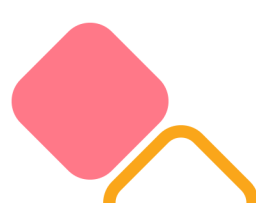
MOBILE IP Network Layer:

- IP and Mobile IP Network Layer- Packet delivery and Handover Management- Location Management- Registration- Tunnelling and Encapsulation-Route Optimization- Dynamic Host Configuration Protocol, Ad Hoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), VoIP –IPSec.
- **Mobile Transport Layer:** Transport Layer Protocols-Indirect, Snooping, Mobile TCP.

Unit 4:

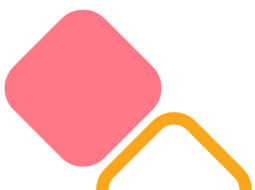
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Support for Mobility:

- 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.
- 

**References:**

- J. Schiller, “Mobile Communications”, 2nd edition, Pearson, 2011.
- Raj Kamal “Mobile Computing” Oxford Higher Education, Second Edition, 2012.
- Dharam prakash Agrawal and Qing-An Zeng, “Introduction to Wireless and Mobile Systems” 3rd edition, Cengage learning 2013.
- Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal “Mobile Computing”, Tata McGraw Hill Pub ,Aug – 2010
- Pei Zheng, Larry L. Peterson, Bruce S. Davie, Adrian Farrell “Wireless Networking Complete” Morgan Kaufmann Series in Networking , 2009 (introduction, WLAN MAC)
- Vijay K Garg “Wireless Communications & Networking” Morgan Kaufmann Series, 2010
- M. V. D. Heijden, M. Taylor, Understanding WAP, Artech House.
- Charles Perkins, Mobile IP, Addison Wesley.
- Charles Perkins, Ad hoc Networks, Addison Wesley.
- Uwe Hansmann, Lothar Merk, Martin S. Nicklous, Thomas Stober, “Principles of Mobile Computing”, Springer.
- Evaggelia Pitoura and George Samarus, “Data Management for Mobile Computing”, Kluwer Academic Press, 1998



ANTENNA THEORY AND WAVE PROPAGATION

BVMC403

Course Objective:

- To study the antenna fundamentals, various types of antennas and wave propagation.

Unit 1:

08

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 2:

08

- 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.
- **Linear wire Antenna:** infinitesimal dipole, radiation field (with derivation), directivity, near field, intermediate field, far field, power density, small/short dipole, half wavelength dipole, folded dipole.
- **Antenna Array:** Two element arrays, N-element linear array, broadside array, ordinary end fire array, phased array.

Unit 3:

07

Types of Antenna:

- Introduction.
- **Travelling wave Antenna:** Long wire, V antenna, Rhombic antenna. Broadband Antenna: Helical antenna, Yagi-Uda antenna. Frequency independent Antenna: Log periodic antenna.
- Introduction of Micro strip patch antenna (MPA), basic characteristics, feeding method, micro strip rectangular patch antenna and its design using transmission line model, smart antennas.

Unit 4:

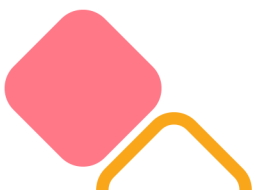
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Wave propagation:

- Ground wave, sky wave, space wave, ionosphere, reflection and refraction by ionosphere, critical frequency, virtual height, MUF (max. usable frequency), skip distance, troposphere and duct propagation.
- **Antenna measurements:** Measurement of reflection coefficient and radiation pattern, Introduction of Anechoic chamber and Vector Network Analyzer.

**References:**

- Edward Conrad Jordan, Keith George Balmain, Electromagnetic waves and radiating systems, Prentice Hall, 1968
- J.D. Kraus, R.J. Marhefka and Ahmad S. Khan, "Antennas and Wave Propagation" Tata McGraw Hill Publications, New Delhi, 4th ed., (Special Indian Edition), 2010.
- Constantine A. Balanis, " Antenna Theory Analysis and Design", 3rd Edition, Wiley Publications.
- S. Das and A. Das, "Antennas and Wave Propagation", Tata McGraw Hill publications.
- A.R. Harish and M. Sachidananda, "Antenna and wave Propagation", Oxford Publications.
- G.S.N. Raju, Antenna Wave Propagation, Pearson Education, 2004





INTRODUCTION TO OPEN SOURCE SOFTWARE

BVMC404

Course Objective:

- The objective of the paper is to make the students familiar with the Open Source software. This course focuses on the various common and mostly used free software and languages. By the end of this course the students shall be able to understand OSS, use and operate free operating systems, learn programming in Python.

Unit 1:

08

Introduction:

- The philosophy of OSS, Applications, usage, FLOSS vs FOSS, commercial software vs OSS, free software vs freeware. Open source development models. Examples of open source projects and software, selecting the right OSS software, OSS Web Design Template, Pros and cons of Open Source Solutions.
- **History:** Free Software Movement, BSD, The Free Software Foundation and the GNU Project, Commercial aspects of Open Source movement. Certification courses issues - global and Indian.

Unit 2:

08

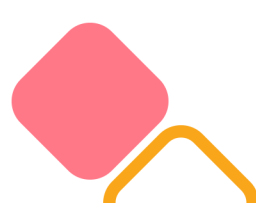
Community Building:

- Importance of Communities in Open Source Movement. JBoss Community. Developing blog, group, forum, social network for social purpose.

Unit 3:

07

Open Source Operating Systems:

- **LINUX:** Introduction, General Overview, Kernel mode and User mode process. The Shell Basic Commands, Shell Programming: Shell Variables, Branching Control, Structures, Loop- Control Structure, Continue and break Statements, Sleep Command, Debugging Script.
 - **Linux Advanced Concepts:** Scheduling, Time Accounting, Personalities, Cloning and Backup your Linux System, Linux Signals, Development with Linux.
 - **Linux Networking:** Configuration Files, Red Hat Linux network GUI configuration tools, assigning an IP address, Subnets, Route, Tunneling, Useful Linux network commands, Enable Forwarding.
- 

Unit 4:

07

- **Basic features of Python:** Overview, Installing, Running in windows/Linux.
- **Variables and Strings:** Data types, Operators, Decision Control, Conditional Statements, Loops, Example
- Programs.
- **Sequences:** Lists: Introduction, Fixed size lists and arrays, Lists and Loops, Assignment and references, Identity and equality, Sorted lists, Tuples: Tuples and string formatting, String functions.
- **Sets:** Unordered Collections, Simple programs Dictionaries, File Handling, Exception, Handling exception. Dictionaries: Introduction, combining two dictionaries with UPDATE, Making copies, Persistent variables, Internal dictionaries.
- **Functions and Files:** Functions, File Handling, Exception, Handling Exception. Python v2.7 vs Python v3.x.

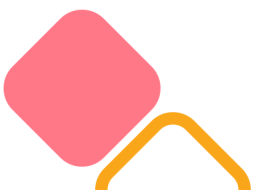
References:

- Neil Matthew and Richard Stones “Beginning Linux Programming, 4th Ed”, John Wiley & Sons.
- How to Think Like a Computer Scientist: Learning with Python, Allen Downey, Jeffrey Elkner, Chris Meyers, Dreamtech Press, 2015
- https://tavaana.org/sites/default/files/introduction_to_opensource.pdf
- The Linux Kernel Book, Rem Card, Eric Dumas and Frank Mevel, Wiley Publications sons, 2003
- Learning to Program Using Python, by Cody Jackson (e-book)
- http://www.gov.pe.ca/photos/original/IPEI_ebiz_oss.pdf
- http://www.providersedge.com/docs/km_articles/An_Introduction_to_Online_Communities.pdf
- http://www.ijcim.th.org/past_editions/2005V13N1/IJCIM-V131-pp7.pdf
- JBoss Application Server Official Documentation webpage.
- Introduction To Computation And Programming Using Python, John V Guttag, PHI (2014).

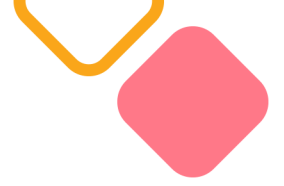


ON JOB TRAINING/INTERNSHIP/WORKSHOP

BVMC405P



SEMESTER-05





WIRELESS COMMUNICATION

BVMC501

Course Objective:

- The objective of the course is to introduce various wireless networks, mobile networks and their basic architecture starting from 2G through to 3G and 4G.

Unit 1:

08

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 Modeling, Rayleigh/Ricean Fading Channels, BER Performance in Fading Channels, Introduction to Diversity modeling for Wireless Communications.
- **Tele-traffic engineering basics:** Traffic, traffic units, routing, grade of service. Loss Systems, Delay systems, queuing systems.

Unit 2:

08

2G Networks:

- Second generation, digital, wireless systems: GSM, IS-95 CDMA. Global system for Mobile Communication (GSM) system overview: GSM Architecture, Mobility Management, Network signaling, 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 3:

07

3G Mobile Data Networks:

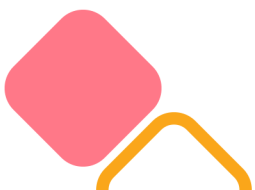
- Introduction to Mobile Data Networks, General Packet Radio Services (GPRS): GPRS architecture, GPRS Network nodes, EDGE, Wireless LANs, (IEEE 802.11), Mobile IP.
- **Third Generation (3G) Mobile Services:** Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G and 4G, Introduction to 5G.

Unit 4:

07

Wireless personal area networks (WPAN):

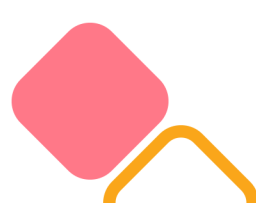
- Blue tooth, IEEE 802.15, architecture, protocol stack. Wi-Max, introduction to Mobile Adhoc Networks. Broadband access Networks, Intelligent Networks, Next Generation Networks (NGN), Physical and Virtual Networks, Number Portability, Corporate Networks.





References:

- T. L. Singhal "Wireless Communication", Tata McGraw Hill Publication.
- Jochen Schiller, "Mobile communications", Pearson Education Pvt. Ltd., 2002.
- YiBing Lin & Imrich Chlamatac, "Wireless and Mobile Networks Architecture," John Wiley, 2001
- Lee, W.C.Y., "Mobile Cellular Telecommunication", 2nd Edition, McGraw Hill,1998.
- Smith & Collins, "3G Wireless Networks," TMH, 2007
- Schiller, Jochen, "Mobile Communications", 2nd Edition, Addison Wesley
- Vijay Garg & Elsevier, "Wireless Communications and Networking",
- Kamilo Feher, "Wireless Digital Communication", PHI
- William C. Y. Lee, "Mobile Communications Engineering", Tata Mc-Graw Hill Publications
- C. K. Toh, "Adhoc Mobile Wireless Network", Pearson.
- Raj Pandya, "Mobile & Personnel Communication Systems and Services", Prentice Hall India, 2001.
- Theodore S. Rappaport, "Wireless Communication- Principles and Practices", Pearson Education Pvt. Ltd, 5th Edition, 2008.
- Theodore S. Rappaport, Wireless Communication, Prentice hall.





SIGNALS AND SYSTEMS

BVMC502

Course Objective:

- This is the first course for representation of various types of electronic signals and LTI systems. Applications of Fourier series, understanding of Fourier transforms and sampling of various signals. Analysis of various systems using the Z transforms, Laplace transforms.

Unit 1:

08

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 non-causal, 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 method.

Unit 2:

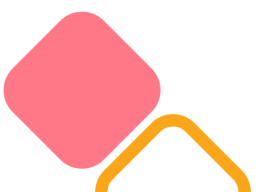
08

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 3:

07

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 4:

07

Sampling:

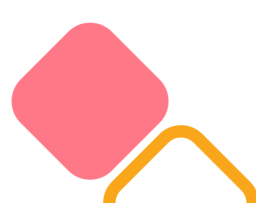
- Sampling of low pass signals, ideal sampling, Aliasing effect, Nyquist rate, reconstruction of signal. Sampling of discrete time signals.

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.

References:

- Alan V. Oppenheim, Alan S. Willsky, S. Hamid Nawab, "Signals & Systems", 2nd Edition, Pearson Education, 2007
- Simon Haykin and Barry Van Veen, "Signals and Systems", John Wiley, 2004.





WEB APPLICATION AND DEVELOPMENT

BVMC503

Course Objective:

- Programming through Java script is taught in this course to enable secure Web development.

Unit 1:

08

Introduction to HTML & CSS:

- **HTML:** HTML Basics, HTML Responsive, HTML Entities, HTML Forms, HTML5 Canvas, HTML5 SVG, HTML5 Data Storage, HTML5 Audio and Video
- **CSS:** CSS Introduction, CSS Syntax, CSS Text, CSS Backgrounds, CSS Fonts, CSS Links, CSS Lists, CSS Tables, CSS Box Model, CSS Margins, Dimensions, Display, CSS Navigation Bar, CSS Attribute Selectors, CSS Rounded Corners, CSS Border Images, CSS Backgrounds, CSS Colors, CSS Animations

Unit 2:

08

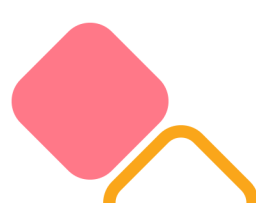
Introduction to JavaScript and JQuery:

- **Introduction to JavaScript:** JavaScript Introduction, JavaScript Output, JavaScript Variables, JavaScript Operators, JavaScript Arithmetic, JavaScript DataTypes, JavaScript Assignment, JavaScript Functions, JavaScript Objects, JavaScript Scope, JavaScript Events, JavaScript Strings and String Methods, JavaScript Numbers and Number Methods, JavaScript Math, JavaScript Dates: Formats and Methods, JavaScript Booleans, JavaScript Comparisons, JavaScript Conditions, JavaScript Switch, JavaScript Loops, JavaScript Break, JavaScript Type, JavaScript Forms (API and Validation), JavaScript Objects, JavaScript Functions, JavaScript DOM, JavaScript Browser BOM, JavaScript Frameworks
- **Introduction to JQuery:** JQuery Introduction, JQuery Syntax, JQuery Selectors, JQuery Events, JQuery Effects- JQuery Hide/Show, JQuery Fade, JQuery Slide(), JQuery Animate, JQuery Stop(), JQuery Callback, JQuery Chaining, JQuery AJAX- JQuery AJAX Introduction, JQuery Load, JQuery Get/Post, JQuery HTML, JQuery Get, JQuery Set, JQuery Add, JQuery Remove, JQuery CSS Classes, JQuery css().

Unit 3:

07

Bootstrap and PHP:

- **Introduction to Bootstrap:** Bootstrap Introduction, Bootstrap Components, Bootstrap Plugins, Bootstrap Grids, Bootstrap JS
 - **PHP:** PHP Introduction-Installing PHP, PHP Syntax, PHP Variables, PHP Data Types, PHP Strings, PHP Constants, PHP Operators, PHP Programming Loops, PHP Functions, PHP Arrays, PHP Superglobals,
 - **PHP Forms and XML-** PHP Form Handling, PHP Form Validation (Server side), PHP Required, PHP XML Parsers, PHP Simple XML Parser, PHP Simple XML Get, PHP XML DOM, PHP XML Expat
 - **PHP with MySQL:** PHP MySQL Database, PHP Connecting to Database, PHP Creating Records, PHP Selecting Records, PHP Deleting Records, PHP Updating Records, PHP Limit Data, PHP Insert Multiple.
 - **AJAX with PHP:** AJAX Introduction, AJAX PHP, AJAX Database, AJAX XML, AJAX Live Search
- 



Unit 4:

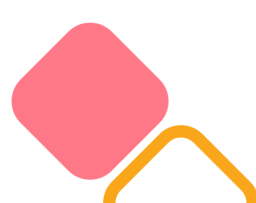
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Introduction of advance concepts:

- **Brief Introduction of concepts:** Async and Parallel execution in JavaScript, JavaScript Design Pattern, SPA or Web App's, Data binding, MVC or MVVM Frameworks, Introduction- Backbone and angular Js, GitHub, Node JS, Express & Meteor framework.

References:

- Jason N. Gaylord, Christian Wenz, Pranav Rastogi, Todd Miranda, Scott
- Hanselman, Scott Hunter, "Professional ASP.NET using C Sharp", Wrox
- Semmy Purewal, "Learning Web Application Development", O'Reilly Media
- Jeffrey Winesett, "Web Application Development with Yii and PHP", Second Edition, Amazon.com
- Pawel Kozlowski and Peter Bacon Darwin, "Mastering Web Application Development with Angular J.S.", Goodreads 2013





SATELLITE COMMUNICATION

BVMC504

Course Objective:

- To study the most relevant aspects of satellite communication with emphasis on the most recent application & developments. It covers orbital mechanics, launching techniques, satellite link design, earth & space segment, error control coding and different multiple access techniques.

Unit 1:

08

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 2:

08

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 3:

07

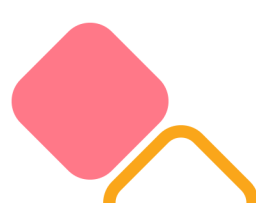
Multiple Access Techniques:

- 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).

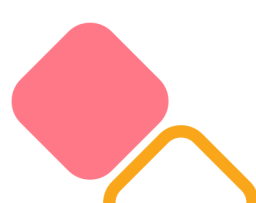
Unit 4:

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Interconnection of Satellite Networks:

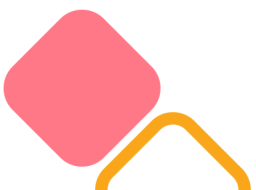
- Interconnection with ISDN, Interconnection of television networks.
 - **Satellite Applications:** Satellite mobile services, VSAT, GPS, Radarsat, INMARSAT, Satellite navigational system. Direct broadcast satellites (DBS) - Direct to home Broadcast (DTH), World Space Services, Business TV (BTV).
- 

**References:**

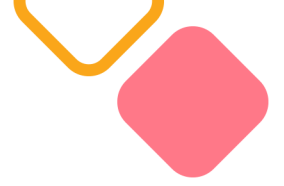
- Dennis Roddy, "Satellite Communication", McGraw Hill International.
 - T. Pratt, "Satellite Communication", John Willy and Sons (Asia) Pvt. Ltd.
 - T. Ha, "Digital Satellite Communication", McGraw Hill.
 - Bruce R. Elbert, "The Satellite Communication Applications Handbook", Artech House Boston.
 - Mark R. Chartrend, "Satellite Communication" Cengage Learning
 - Handbook of Satellite Communication, Wiley.
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ON JOB TRAINING/INTERNSHIP/WORKSHOP
BVMC505P



SEMESTER-06





EMBEDDED SYSTEMS

BVMC601

Course Objective:

- The objective of the paper is to enable a student to design an embedded system for specific tasks.

Unit 1:

08

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 2:

08

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 3:

07

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

Unit 4:

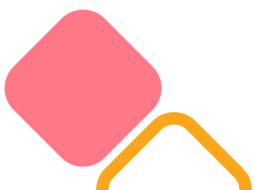
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RTOS:

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

References:

- John B. Peatman, "Design with PIC Microcontrollers", Pearson Education
- Andrew N. Sloss, Dominic Symes, Chris Wright, "ARM System Developer's Guide: Designing and Optimizing System Software", Morgan Kaufman Publication.
- Wayne Wolf, "Computers as Components: Principles of Embedded Computing System Design", Morgan Kaufman Publication.
- Tim Wilmshurst, "The Design of Small-Scale Embedded Systems", Palgrave.





NETWORK SECURITY

BVMC602

Course Objective:

- The objective of the paper is to make the students familiar with the basics of security concepts aspects, of networking. This course focuses on the networking security concepts, cryptography, algorithm, IDS. This is the introductory course on Security. So it requires Computer Network knowledge.

Unit 1:

08

- Introduction to Network Security, Computer Security and Cyber Security. Security Terminologies and Principle, Security Threats, Types of attacks (Operating System, application level, Shrink Wrapcode, Misconfiguration attacks etc.). Introduction to Intrusion, Terminologies, Intrusion Detection System (IDS), Types of Intrusion Detection Systems.

Unit 2:

08

- Cryptography, Classical Cryptographic Techniques, Encryption, Decryption, Code Breaking: Methodologies, Cryptanalysis, Cryptography Attacks, Brute-Force Attack, Use of Cryptography. Public key cryptography, Principles of Public key Crypto systems, Cryptographic Algorithms RSA, Data Encryption Standard (DES), RC4, RC5, RC6, Blowfish, Key Management, Diffie-Hellman key exchange, elliptic curve cryptography.

Unit 3:

07

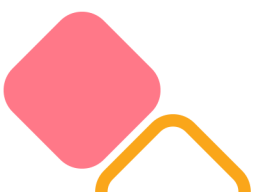
- Hash Functions, One-way Hash Functions, SHA (Secure Hash Algorithm) Authentication Requirements, Authentication Functions, Kerberos. Message Authentication codes, Message Digest Functions, MD5, SSL (Secure Sockets Layer), SSH (Secure Shell), Algorithms and Security.
- **Digital Signature:** Analysis, Components, Method, Applications, Standard, Algorithm: Signature Generation/ Verification, Digital Certificates.

Unit 4:

07

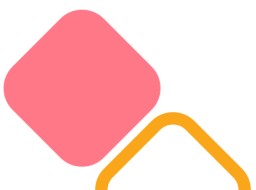
Trojans and Backdoors:

- Overt and Covert Channels, Working, Types (Remote Access Trojans, Data-Sending Trojans, Destructive Trojans, Trojans, Proxy Trojans, FTP Trojans, Security Software Disablers).
- **Viruses and Worms:** Characteristics, Working, Infection Phase, Attack Phase. Sniffers: Definition, Spoofing, Sniffing, Vulnerable Protocols, Types.
- **Phishing:** Methods, Process, Attacks Types (Man-in-the-Middle Attacks, URL Obfuscation Attacks, Hidden Attacks, Client-side Vulnerabilities, Deceptive Phishing, Malware-Based Phishing, DNS Based Phishing, Content-Injection Phishing, Search Engine Phishing).



**References:**

- William Stallings, "Cryptography and Network Security: Principles and Practice", Pearson
- Atul Kahate, "Cryptography and Network Security" Mc-Graw Hill
- Charlie Kaufman, Radia Perlman, Mike Speciner, Michael Speciner, "Network Security Private Communication in a Public World", TMH Fourozon, "Cryptography & Network Security", TMH
- Joseph Migga Kizza, "Computer Network Security", Springer International Edition
- Atul Kahate, "Cryptography and Network Security", McGraw Hill
- Carl Endorf, Eugene Schultz, Jim Mell, "Intrusion Detection & Prevention", TMH
- Neal, Krawetz, "Introduction to Network Security", Cengage Learning.



AD HOC AND SENSOR NETWORKS

BVMC603

Course Objective:

- The prerequisites are data communication networks, wireless communication and networks. The objective of the paper is to introduce infrastructure less wireless networking.

Unit 1:

08

Ad Hoc Wireless Networks:

- Introduction. Issues in Ad Hoc Wireless Networks. Ad Hoc Wireless Internet.
- **MAC Protocols for Ad Hoc Wireless Networks:** Introduction, Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks.
- Design Goals of a MAC Protocol for Ad Hoc Wireless Networks.
- Classifications of MAC Protocols.
- Contention-Based Protocols.
- Contention-Based Protocols with Reservation Mechanisms.
- Contention Based MAC Protocols with Scheduling Mechanisms.
- MAC Protocols in Directional Antennas. Other MAC Protocols.

Unit 2:

08

Routing Protocols for Ad Hoc Wireless Networks:

- Introduction to Routing algorithm, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks. Classifications of Routing Protocols. Table-Driven Routing Protocols. On-Demand Routing Protocols. Hybrid Routing Protocols. Routing Protocols with Efficient Flooding Mechanisms. Hierarchical Routing Protocols. Power-Aware Routing Protocols.

Transport Layer and Security Protocols for Ad Hoc Wireless Networks:

- Introduction. Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks. Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks. Classification of Transport Layer Solutions. TCP Over Ad Hoc Wireless Networks. Other Transport Layer Protocols for Ad Hoc Wireless Networks. Security in Ad Hoc Wireless Networks. Network Security Requirements. Issues and Challenges in Security Provisioning. Network Security Attacks. Key Management. Secure Routing in Ad Hoc Wireless Networks.

Unit 3:

07

Wireless Sensor Networks:

- Introduction. Sensor Network Architecture. Data Dissemination. Data Gathering. MAC Protocols for Sensor Networks. Location Discovery. Quality of a Sensor Network. Evolving Standards. Other Issues.

Hybrid Wireless Networks:

- Introduction. Next-Generation Hybrid Wireless Architectures. Routing in Hybrid Wireless Networks. Pricing in Multi-Hop Wireless Networks. Power Control Schemes in Hybrid Wireless Networks. Load Balancing in Hybrid Wireless Networks.

Unit 4:**Wireless Geolocation Systems:**

- Introduction. What is wireless Geolocation? Wireless Geolocation System Architecture. Technologies for Wireless Geolocation. Geolocation Standards for E-911 Services. Performance Measures for Geolocation Systems. Questions. Problems.

Recent Advances in Wireless Networks:

- Introduction. Ultra-Wide-Band Radio Communication. Wireless Fidelity Systems. Optical Wireless Networks. The Multimode 802.11 -IEEE 802.11a/b/g. The Meghadoot Architecture, introduction to vehicular sensor networks.

References:

- Siva Ram Murthy, C. and Manoj, B. S., Adhoc, "Wireless Networks Architectures and Protocols", 2nd Edition, Prentice Hall, PTR, 2004
- Perkins, Charles E., "Ad hoc Networking", 3rd Edition, Addison Wesley, 2000
- Toh, C. K., "Ad hoc Mobile Wireless Networks Protocols and Systems", 3rd Edition Prentice Hall, PTR, (2001)
- Pahlavan, Kaveh., Krishnamoorthy, Prashant., "Principles of Wireless Networks, - A United Approach", 2nd Edition, Pearson Education, 2002
- Wang X. and Poor H.V., "Wireless Communication Systems", 3rd Edition, Pearson Education, 2004.
- Schiller Jochen, "Mobile Communications", 2nd Edition, Pearson Education, 2003
- Carlos De Morais Cordeiro and Dharam P Agrawal, "Adhoc and Sensor Networks-Theory & Applications", 2nd Edition, Cambridge University Press India Ltd

DIGITAL SIGNAL PROCESSING

BVMC604

Course Objectives:

- The aim of this course is to provide in depth knowledge of various digital signal processing techniques and design of digital filters, learn the concept of DFT FFT algorithms, and design of digital filters using different approximations, DSP processor and architecture. The prerequisites of this subject are basic knowledge of signal and systems.

Unit 1:

08

Frequency Domain Sampling:

- The Discrete Fourier Transform, Properties of the DFT, Linear filtering methods based of the DFT.
- **Efficient computation of the DFT:** Principal of FFT, Fast Fourier Transform Algorithms, Applications of FFT Algorithms, A linear filtering approach to computation of the DFT. Application of DFT, Design of Notch filter.

Unit 2:

08

Design & Structure of IIR filters from Analog filters:

- Impulse Invariance; Bilinear transformation and its use in design of Butterworth and Chebyshev IIR Filters; Frequency transformation in Digital Domain, Direct, Cascade, Parallel & transposed structure

Unit 3:

07

Design & structure of FIR filters:

- Symmetric and anti-symmetric FIR filters; Design of Linear Phase FIR filters using windows, Frequency Sampling Method of FIR design, Direct, Cascade, Frequency Sampling, transposed structure

Implementation of Discrete Time Systems:

- Lattice structures, Lattice and Lattice-Ladder Structures, Schur - Cohn stability Test for IIR filters;

Unit 4:

07

Quantization Errors in Digital Signal Processing:

- Representation of numbers, Quantization of filter coefficients, Round-off Effects in digital filters.

Multirate Digital Signal Processing:

- Decimation, Interpolation, Sampling rate conversion by a rational factor; Frequency domain characterization of Interpolator and Decimator.

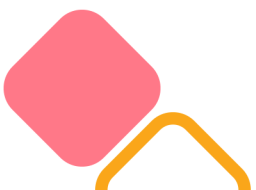
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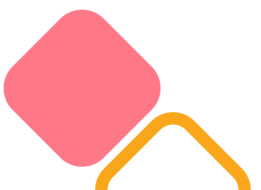
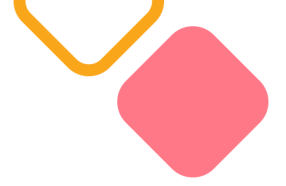
- Oppenheim & Schaffer, "Digital Signal Processing", PHI.
- Proakis and Manolakis, "Digital Signal Processing", PHI Publication
- S. K. Mitra, "Digital Signal Processing", TMH edition 2006
- Johnny R. Johnson, "Introduction to Digital Signal Processing", PHI.
- R. Babu, "Digital Signal Processing", Sci Tech Publication.

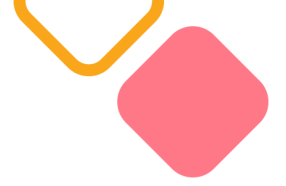


ON JOB TRAINING/INTERNSHIP/WORKSHOP

BVMC605P









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