

About the institution:

MODEL ENGINEERING COLLEGE, Thrikkakara is a premier institute of engineering that has carved a niche for itself in the field of technical education in a very short span of time. Ever since its inception in 1989, by the Government of Kerala under the aegis of the Institute of Human Resource Development for Electronics, IHRDE (now IHRD), the college has made its presence felt in the technical horizon of the state.

The college is a pioneering institute of its kind in the state. It is unique in that it has chosen to venture boldly into the ever-changing and fast paced biomedical, computer and electronics fields, in step with the trends world over. The college offers specialized courses in Biomedical Engineering, Computer Engineering and Electronics Engineering. Unique in its structure, methods and goals, the college is strongly rooted in a philosophy of training and research that emphasizes the intimate relationships between knowledge and its application and seeks to promote the creation of an ideal society.

The college is situated at Thrikkakara, an idyllic spot in the fringes of Kochi. The location offers an inherent advantage in that it is just a stone's throw away from Aluva, the industrial capital of the state, yet sufficiently distanced from the hustle of Kochi city, providing a congenial atmosphere for diligent academic pursuit.

The college is affiliated to the Cochin University of Science and Technology which confers the degree of Bachelor of Technology (B.Tech) in various disciplines.

The college, having close rapport with reputed organizations like National Physical and Oceanographic Laboratory (Govt. of India), Electronics Research and Development centre, Thiruvananthapuram, Vikram Sarabhai Space Centre, Thiruvananthapuram and Sree Chithra Thirunal Institute of Medical Science and Technology, Thiruvananthapuram, has already made significant

contributions to the R & D activities in the state.

Nature of admission:

Admissions to this institution are on the basis of an All Kerala Engineering Entrance Examination conducted by Commissioner of Entrance Examination, Government of Kerala. Of the half-lakh aspirants, only the elite make it to this institution.

Courses offered by the Institution:

Four year B-Tech programme in

- ◆ Biomedical Engineering with emphasis on Medical Instrumentation, Medical Imaging and Medical Informatics.
- ◆ Computer Engineering with emphasis on Data Structures, Formal Automata Theory, Networking, Hardware interface and Systems Design.
- ◆ Electronics Engineering with emphasis on Communication, Instrumentation and ASIC.

The Model Engineering College also offers Part Time B-Tech Electronics Engineering course for the benefit of enthusiasts who are already employed.

Structure of B.Tech programme:

The B.Tech programme offered by this institution consists of eight semesters spanning four year. Each semester consists of five theory papers and two lab sessions. The Cochin University of Science and Technology (CUSAT) conduct examinations at the end of each semester accompanied by continuous internal evaluation. Students have to present a mini project in the sixth semester, a seminar in the seventh semester and a main project is to be completed during the final year.

PROJECTS

◆ **Mini project**

A mini project, to be executed in the sixth semester, is intended to provide the students with experience in various areas such as project planning, project design, development and maintenance. Many of the mini projects by the students of the college have won wide acclaim in

national level science and technology meets.

♦ **Seminar**

A seminar, to be presented in the seventh semester on current cutting edge technologies helps the students to keep pace with the changing technologies and to face challenges.

♦ **Main project**

The duration of the main project is one year, where, in the seventh semester the design of the project is to be presented. In the final semester, the project at hand is to be completed as per the project design. The projects done by the students of the college have been often applauded by the technical society of the country.

Address of Correspondence:

The Principal,
Model Engineering College,
Thrikkakara
Kochi
Kerala.
PIN: 682021

Placement Committee:

Head : Principal
Placement Officer : Mr. Ahammad Siraj. K. K

INFRASTRUCTURAL FACILITIES:

Computer Centre

Digital Equipment Corporation (DEC): Alpha 21064 based workstations, Silicon Graphics workstation based on R4600 RISC Processor with CCD Camera, Microphones and High Color monitor.

Apple Power Macintosh (Based on Power PC601): running on MacOS with CCD camera, and Apple Quick take still camera
"SRISTI": High Performance Cluster – and indigenously developed dedicated and scalable distributed computing platform.

SUN Netra Java Server:

High Performance Workstations based on the Intel family of x86 processors and other IBM PC Compatibles including Pentium III, AMD K6 & 80486 based machines, running on Microsoft Windows 98SE and GNU Linux (Red Hat Distribution & Debian).

Library:

A fully computerized library caters to the needs of the students and faculty members. The library has a rich collection of books and periodicals, which mainly focus on Biomedical, Computer and Electronics Engineering. The library has a collection of over 35000 books and 1500 bound volumes of periodicals. A separate section has been arranged for IEEE publications.

Core Laboratories and Workshops:

- Electronics Circuits Lab
- Digital Electronics Lab
- Communication Lab
- Instrumentation Lab
- Digital Communication Lab
- Microprocessor Lab
- Test Lab
- Computer Hardware Lab
- Electrical Lab
- Computer Lab
- Advanced Computing Lab
- Digital Signal Processing Lab
- Catheterisation Lab
- Biomedical Lab I & II
- Mechanical Workshop
- Electrical Workshop

EXTRACURRICULAR ACTIVITIES

The extracurricular activity scenario in the College is testimony to the principle we all believe in – that an MECian is not just an academician but a complete

all-rounder.

Clubs And Associations

The college is home to an array of energetic clubs and associations.

- Association of Model Electronics Students (AMES)
- Association of Computer Engineering Students (ACES)
- Biomedical Association (BMA)

IEEE Student Chapter has an active student involvement and is one of the most dynamic associations in the college. The student chapter organizes seminars, exhibitions and All India level events like EXCEL.

The National Service Society (NSS) of the college cultivates in the students a spirit of social service. The society conducts regular Blood Donation Camps and has been appreciated by the IMA. Its activities also include social service camps.

ECOFRIENDS, the MECian Nature Club strongly believes in the motto of "Green MEC, Clean MEC". Camps are organized regularly at places of ecological interest.

Events:

VARNAM, a mega cultural festival where students from all over India participate, presents a forum for students to exhibit and develop their talents. IEEE Students branch of Model Engineering College organizes EXCEL, an All India level Tech-fest annually.

ACCESS-IT is an annual seminar on emerging computing technologies where eminent personalities conduct talks on their areas of research.

MARC DAY, organized by the Model Amateur Radio Club is a popular event where HAM enthusiasts from all over the country participate.

Sports:

SPIKE BOOM an annual event where teams from all over Kerala match their skills in the game of volleyball.

SLAM DUNK, from the basketball crazy, represents the ultimate of all basketball tournaments held in Kerala.

Visits:

Top experts regularly visit the College from a wide gamut of areas spanning almost the entire technological horizon.

The talk on "The Danger of Software Patents" by ace geek guru and the President of the Free Software Foundation, Mr. Richard Mathew Stallman on 24th July 2001 at the college is a memorable one.

DEPARTMENT OF BIOMEDICAL ENGINEERING

In a relatively short period of time, technology has influenced every facet of our lives. It has particularly moulded medical care and in due course the disciplines of engineering and medicine have become intimately involved. This process has given birth to the field of BIOMEDICAL ENGINEERING.

Biomedical Engineering can be defined as a discipline where the engineering skills and technological know-how are employed to solve various problems confronting the medical professionals and catering to the needs of the healthcare industry right from research to patient care.

This course is called Electronics and Biomedical Engineering henceforth as this course is often mistaken for Biotechnology. A well structured syllabus with emphasis on Instrumentation, faculty par excellence and ultra modern lab facilities are coupled together to mould the students into the better than the best of Biomedical Engineers.

Salient Features:

- Emphasis in Electronics, Computing, Signal Processing Applications, Medical Instrumentation, Medical Imaging and Medical Informatics.

The course also offers specialization in Advanced Imaging Techniques, Laser Instrumentation, Digital Image Processing and Neural Networks.

- Course also offers computing subjects such as Microprocessor Systems Design & Principles of Programming in C++ including practical

sessions.

The graduates from the department are well recognized for their academic excellence, hard work and dedication. They are part of the diligent workforce of companies like **Siemens India Ltd., Bell labs, Philips, Toshiba, Wipro GE, Birla Imaging Technos, CDR, Marquette, Gainwell etc., and of hospitals like Kasturba Medical College, Madras Medical Mission, Amrita Institute of Medical Science and of research facilities like Sree Chithira Thirunna Institute of Medical Science and Technology and Defence Bio-Engineering Lab.**

Practicals / Lab Sessions

- Workshops: Electronics, mechanical and electrical workshop practices.

Electrical Engineering Lab

Circuits (analog) Lab

Circuits (digital) Lab

Computer Applications Lab

Microprocessor Lab (8085)

Medical Electronics Lab

Bioengineering Lab

Medical Systems Lab

Projects

The projects undertaken by the students covers areas of Digital Signal Processing, Embedded Systems, WAP based tools, Modern Monitoring Systems, Image Processing, Laser Instrumentation, Power Electronics, Principles of Radio-diagnosis, Modeling of Physiological Systems, Medical Instrumentation, Analytical and Diagnostic Equipments, Gait Analysis.

Resources in Biomedical Engineering Department

The main facilities include:

- Analog and Digital Circuits Lab
- Computer Applications Lab
- Medical Electronics Lab
- Catheterization Lab
- Microprocessor Lab

Besides basic equipments like the versatile CROs, high frequency signal generators, SMPS, etc., the labs are facilitated with

- Biplane Catheterization Lab Facility

Image Processing Systems including a Frame Grabber Unit with CCD Camera and its software

Blood Gas Analyzer, Calorimeter, Hb meter, pH meter, Flame photometer

Therapeutic Equipments such as EEG, ECG, Student Physiograph, Electronic BP meter, pulse oximeter etc

Computerized Cardiac Stress Testing Unit

Foetal Heart Monitor

FEM Software Package NISA III

DEPARTMENT OF COMPUTER ENGINEERING

The undergraduate Computer Engineering programme of Model Engineering College is ranked among the best technical education programmes in the country. The department offers a four-year undergraduate course in computer engineering leading to the award of the Bachelor of Technology Degree from Cochin University of Science and Technology. The programme imparts an outstanding educational opportunity for those planning to pursue a career or to gain in –depth knowledge in computing technology and research.

Salient Features

- The curriculum of the college is upgraded on a regular basis to expose students tot the new trends in industry.
- The four-year programme offered by the department equips every student with skills and know-how that can be applied immediately to their work place an provides conceptual knowledge valuable throughout their career.
- The up-to-date syllabus coupled with state-of-the-art lab facilities make the programme a much-aspired one.
- Includes papers of Computer Organisation, Data Structures, Principles of Programming Languages, Software Engineering, Automata Theory,

Artificial Intelligence, Operating Systems, Computer Networks, Database Management Systems, Advanced Computer Architecture, Digital Imaging, Multimedia Systems, Object Oriented Design and Modelling, Distributed Computing, Simulation and Modelling etc.

- ACES (Association of Computer Engineering Students) active in conducting several talks and seminars relating to the trends in the field.

Practical / Lab Sessions

- Workshops: Electronics, mechanical and electrical workshop practices
- Circuits Lab
- Digital Circuits Lab
- Microprocessor Lab
- Data Structures Lab
- Hardware Lab
- Compiler Design Lab
- Network & Operating Systems Lab

Hardware Lab

Compiler Design Lab

Network * Operating Systems Lab

Graphics Lab

Projects

Student projects are based on various fields like supercomputing, high performance cluster computing, operating systems, voice/speech recognition, AI and Artificial Neural Networks, Networking protocols, multitasking system design on single tasking, virtual private networks, databases, image processing, distributed computing etc.

Resources at the Computer Engineering Department

Platforms: Various versions of Microsoft Windows, MS DOS, GNU/Linux, Sun Solaris, Mac OS, SCO UNIX, and OSF/Motif.

Irix OS for silicongraphics workstation.

Programming Exposure: During the four-year programme, students have the

opportunity to learn a number of programming languages, notably C, C++, Java, MS Visual C++, Visual Basic, Perl, Python, PHP, The UNIX shell programming, assembly level programming of Intel x86 processors etc. as well as SQL/Oracle/Sybase databases.

Advanced Computing Lab: The advanced computing lab features very good infrastructure, which includes a DEC Alpha 3000 workstation, SGI workstation based on R4600 RISC processor, a Power Macintosh based on Power PC 601 running MacOS with CCD camera, and Apple quick take still camera, a Sun SPARC workstation running Solaris with diskless clients and a number of x86 –based PCs.

Computer Network of the Advanced Computing Lab supports IPv4 as well as IPv6.

Students developed “Srishti”, the award-winning High Performance Cluster Computing nodes in-house.

The college connects to the Internet through fourteen leased lines.

Microprocessor Lab: consisting of 8085 & 8086 based system design kits.

Computer Hardware Lab: Equipped with 80386/486/Pentium/PII based systems, Add-on Cards, PC Diagnostic aids, serial cards, sound blaster cards, DSP kits, PC trainers, IDE & SCSI cards and several prototype mother boards.

Centre for development of GIS: Model Engineering College hosts a Centre for Development of Geo Information Systems, which offers consultancy and development projects. The GIS lab has Pentium-III based servers and clients, MapInfo and MAPEX Development Kits, as well as a Global Positioning System.

Department of Electronics Engineering

Model Engineering College offers premier professional training in the field of electronics with an eye on the modern trends in information technology industry. Teamed with an excellent infrastructure and competitive faculty, the Electronics Engineering Department has proved to be unsurpassed within the state.

Salient Features

- Syllabus encompassing the latest technologies, papers including

Communication Engineering, Instrumentation, Signal Processing, Process Control & Industrial Management.

The vast library and high-speed access to internet makes the new technologies to be readily available.

Through technical associations such as the student chapter of IEEE, Association of Model Electronics Students (AMES) and the Model Amateur Radio Club (MARC) the department offers ample opportunity for development.

Practical / Lab Sessions:

- Workshops: Electronics, mechanical and electrical workshop practices
- Circuits (Analog) Lab
- Circuits (Digital) Lab
- Industrial and Power Electronics Lab

Microprocessor Lab (8085 & 8086)

Communication Systems Lab

Computer Applications Lab

Projects

All students projects are based on cutting edge technologies covering fields like micro controller based systems, digital communication, optoelectronics, robotics, advanced networking, embedded systems, power electronics, and signal processing.

Resources at the Electronics Engineering Department

The main facilities include:

- Analog and Digital Circuits Lab
- Communications System Lab
- Power Electronics Lab
- Instrumentation Lab
- Digital Communication Lab
- Microprocessor Lab

Also including:

- Spectrum analyzer
- DSP evaluation board with filter design software
- Logic analyser

- Various speed drives both AC & DC
- Programmable logic controller
- Computerized multiprocessor control stations
- High speed modems
- Image scanner
- 350 Megahertz analog CROs, 200 MHz DSO
- Arbitrary wave generators
- Electronic CAD package
- Digitizer
- FPGA development system with related hardware & software
- PIC evaluation board and evaluation kit

Several sophisticated computational facilities like the Pentium are freely available for the students providing hands on training in software & hardware. Students have access to the facilities of premier institutions like the Naval Physical & Oceanographic Laboratory (NPOL), Electronics Research & Development Centre (ER&DC), Vikram Sarabhai Space Centre (VSSC), etc.

Syllabus:

Electronics and Biomedical Engineering:

Highlights of the syllabus:

Basic Engineering: Basic electronics, Basic electrical engineering (2 papers), Basic Mechanical Engineering, Basic Civil Engineering, Engineering mechanics, Engg. Graphics, Engg Maths (4 papers), Electrical technology, Physics, Chemistry.

Electronics: Electronic Circuits 1&2, Power Electronics, Microelectronic Integrated Circuits.

Digital Electronics: Digital Electronics – Number Systems and codes, Sequential Circuits, Counters, Arithmetic Circuits, Memories – ROM, RAM, EEPROM, PLA, PAL, Logic Families – RTL, DTL, DCTL, TTL, ECL, CMOS Interfacing.

Communication: Communication Techniques, Bio Signal Processing

Computer Science & Engineering: Microprocessors (8085), Microprocessor System Design (8086), Medical Informatics and Expert Systems (MYCIN) detailed study, ONCOCIN, Basics of DENDRAL project, Computer networks, Computer fundamentals, Object Oriented Programming (JAVA)

Computer Organization: Introduction to Computer Organization and Architecture, Design Of Control Units, Memory Units, Issues In Input/Output Parallel Processing.

Microprocessor System Design: Detailed study of the architecture of 8085, 8086/8088, Instruction set, Advanced features of 80286, 80386, Pentium & Pentium Pro microprocessors etc.

Control Systems Engineering: Model Of Physical Events, Signal Flow Graphs, Time Domain Analysis, Transient Response Of Second Order Systems, Concept Of Stability, Frequency Domain Analysis, Design And Compensation Of Feedback Control Systems, Control System Components, Error Detectors, Tacho Generators, Servo-Amplifiers etc.

Management Studies: Reliability and Quality Control. Industrial Organization Management.

Digital Signal Processing: Discrete Fourier and z transforms, Algorithms For General Computational Considerations, Finite Word Length In Digital Filters, Special Purpose Hardware For Digital Filtering And FFT, Filter Design IIR And FIR Filters, Software Implementation Of Digital Filters, Architecture of a Typical DSP Processor.

Biomedical Papers:

Life Science: Anatomy, Physiology, Microbiology, Bio Chemistry and Hematology

Hospital Engineering: Modern hospital architecture, electrical power systems, air conditioning and refrigeration systems, gas supply and theatre lights in hospitals, costing and financial planning of hospital systems.

Biophysics: Molecular Biophysics, Electrical activity of the heart and brain, Radioactivity, Detection and Measurement of Radiation.

Biomechanics: Principles of mechanics, Bone mechanics, Orthodontal Electromechanical properties, Muscle Mechanics, Monitory Devices And Implants, Prosthetic Devices.

Biomaterials: Overview, Structural Properties, Biocompatibility And System Response, Implant Materials And Bio Polymers.

Biosensors and Transducers: Receptors for smell, sound, vision, touch, osmolarity and taste. Various corpuscles like pacinian, meisseners, herbst etc. Various transducers for temperature, displacement, pressure and flow. Ultrasonic transducers for measurement and therapy.

Analytic and Diagnostic Equipments: Flame photometry, ph meters, Blood cell counters, UV & IR spectroscopy, NMR spectroscopes, ECG, EEG, EMG, Fundamentals of CT, MRI

Therapeutic Equipments: Cardiac pacemakers and defibrillators, ventilators – electro mechanic, fluidic, pneumatic and electronic. Ultrasonic Therapy systems, Electrical stimulators, nerve and muscle stimulators, surgical diathermy, lasers – CO₂, He – Ne, Nd –Yag, applications in surgery, angioplasty and endoscopy.

Modern Medical Equipments: Microprocessor based ECG, patient monitoring systems, evoked potentials processing, compute aided graphics, frame grabbers and graphics interface cards.

Medical Imaging Techniques: Ultrasonic, radiographic and fluoroscopic systems, advanced data acquisition and processing techniques in later generation CT, MRI and ultrasound scanner, algorithms in CT image formation, principles of 3D imaging, PET scanner principles.

Principles of radio diagnosis and radiotherapy: Various components of radiography systems, digital angiography – image processors, processing techniques, DSA technologies, Radio therapy – isodose charts, teletherapy sources, linear accelerators and radiation therapy planning.

Modeling Of Physiology Systems: Modeling of human regulatory systems, respiratory systems, ultra filtration systems, modeling of body dynamics, current trends - pharmaco kinetic modeling, computer aided modeling.

Medical Informatics and Expert Systems: Data structures, Databases, basics of personal computers, mini, super mini and super computers. Computer aided data analysis, ECG and EEG, HIS and PACS, AI techniques, detailed study MYCIN, ONCOSIN, DENDRAL.

Electives:

Biomedical Laser Instrumentation: Types of laser devices, tissue laser interaction, laser flow cytometry, laser fluorescent micro irradiation, laser eye instrumentation, safety with biomedical lasers.

Advanced medical imaging techniques: Data compression methods, image enhancement restoration, advanced processing techniques in digital radiography, signal processing in cardiac Doppler color flow imaging. Digital encoding and decoding of TV signals, digital filtering, MR spectroscopy and MR angiography.

Artificial Neural Networks: Fundamentals of artificial neural networks – back propagation, counter propagation networks, Boltzmann training, Hopfield – nets associative memory, bidirectional associative memory.

Digital Image Processing: Image representation and modeling. Mathematical techniques – Fourier transforms z-transforms, image transforms and image enhancement. Image analysis and computer vision.

System programming: Operating systems – machine dependant operating systems features.

Graphics and Volume Visualization: Overview of graphics systems, 2D transformations, 3D object representations, volume visualization, volume shading techniques.

Computer Science and Engineering:

Highlights of the Syllabus:

Basic Engineering: Basic electronics, Basic electrical engineering (2 papers), Basic Mechanical Engineering, Basic Civil Engineering, Engineering mechanics, Engg. Graphics, Engg Maths (4 papers), Electrical technology, Physics, Chemistry.

Microprocessor System Design: Detailed study of the Architecture of 8085, 8086/8088, Instruction set, Advanced features of 80286, 80386, Pentium & Pentium Pro Microprocessors etc.

Control Systems Engineering: Model of Physical events, Signal flow graphs, Time domain analysis, Transient Response of Second order systems, Concept of stability, Frequency Domain Analysis, Design And Compensation Of Feedback Control Systems, Control System Components, Error Detectors, Tacho Generators, Servo-Amplifiers etc.

Management Studies: Reliability and Quality Control. Industrial Organization Management.

Electronics: Basic Electronics, Electronics Circuits, Digital Electronics.

Communications: Data Communication

Digital Signal Processing: Discrete Fourier and z transforms, algorithms for general computational considerations, Finite word length in digital filters, Special purpose hardware for digital filtering and FFT, Filter Design IIR and FIR filters, Software Implementation of Digital Filters, Architecture of a Typical DSP Processor.

Computer Science and Engineering Papers:

Computer fundamentals: Introduction, Computer Networks, Programming in BASIC – Data Types, Functions, Subroutines, Graphics, Database Management – FoxPro.

Discrete Mathematical Structures: Set theory, Relations and Digraphs, Graph Theory, Algebraic Systems and Partially ordered sets.

Computer Organization: Introduction to Computer organization and Architecture, Design of Control units, Memory Units, Issues in Input/Output Parallel Processing.

Data Structures & Algorithms: Linear and Non linear Data Structures – Implementation and Analysis, Algorithm Analysis techniques, Sorting, Searching Algorithms, Implementation in JAVA.

System Programming: System Software – Assemblers, Linkers, Loaders etc. Run-Time Environment, Principles of Compiler Design – Study of the Phases - Lexical Analysis, Parsing, Semantic analysis, Code Generation, Code Optimization.

Formal languages and Automata theory: Introduction, Finite Automata, Regular Expressions, Context Free and Context Sensitive Languages, Turing Machines, Linear Bounded Automata, Undecidability.

Database management systems: DBMS Concepts and Terminology – Data Models and File Organizations – Issues in ER, Network, Hierarchical and Relational Database Designs. Study of query languages, Design Issues in Relational Databases – Normalization – Query Processing and Optimization –

Distributed Databases.

Operating Systems: Evolution, Information, Processor, Memory, Device Management, Concurrency, Concurrent Languages Inter – Process Communication, Threads, Deadlock Handling etc.

Software Engineering: Introduction, System life cycle, Project planning, Design and implementation issues, Software design fundamentals, s/w verification, Validation, Documentation. Data oriented design methods, Software Reliability and Testing strategies.

Compiler construction: Introduction, Different Phases of Compilation, Compile Time Layout, Parameter Passing Mechanisms, Symbol Tables, Code Optimization.

Computer Networks: Introduction, Layered Networks, Communication Protocols, Physical Layer Issues, Data Link layer, Network Layer, Transport Layer, Session and Application Layers.

Object Oriented Modeling and design: Advanced Object Modeling, Concepts, Designs and Methodology, Object Oriented Analysis, Distributed Databases And Client Server Computing – RMI, ACTIVEX, COM/DCOM and CORBA.

Analysis and Design of Algorithms: Algorithm Analysis Techniques, Design Techniques, Dynamic Programming, Complexity Theory.

Computer Graphics: Application of Computer Graphics- Graphic Systems, Processors etc. Study Of Basic Algorithms – 2D and 3D Representations And Transformations – Introduction To Virtual Reality – VRML.

Advanced Architecture and Parallel Processing: Multi processors and Array processors, Super Scaling, Linear, Non Linear and Super Pipelining, Operating Systems, Programming Models And Software Tools, Threading Model, Implementation In JAVA.

Artificial Intelligence: Introduction to problem solving – production systems – methodologies – reasoning. Introduction to symbolic logic. Formal theory of learning, fuzzy logic and artificial neural networks.

Inter Networking: TCP/IP layering, structure if TCP/IP software in an operating system. Network interface layer – IP, ARP and ICMP. TCP segment format. Client – server model – algorithms and issues.

Distributed Computing: Distributed systems – architecture, synchronization primitives, IPC in UNIX, Sun RPC and JAVA RMI. Distributed Operating Systems. Synchronization. Fundamental algorithms, brief review of communication protocols and routing algorithms. Security and authentication – digital signatures.

Electives:

Artificial Neural Networks: Fundamentals of artificial neural networks – back propagation, counter propagation networks, Boltzmann training, Hopfield – nets associative memory, bidirectional associative memory.

Digital Image Processing: Image representation and modeling. Mathematical techniques – Fourier transforms z-transforms, image transforms and image enhancement. Image analysis and computer vision.

Simulation and Modeling: Digital simulation of continuous systems like queuing systems, stochastic networks and inventory systems. Verification and Validation of simulation experiments. Visualization – vector and multiple processor architectures.

Electronic Commerce: Banking and investment on the internet, security, web clients – JavaScript, VBScript and HTML. Web Server – ASP, Perl, Java servlets, cookies and database objects. Secure channels, e-cash, firewalls, certifying components for security.

Software Architecture: Software architecture levels- subroutine and program organization. Shared information systems – applications. Design guidance and design space for GUIs. Tools for architectural design.

Algorithms and Complexity: Models of computation, Dynamic programming matrices and FFTs. Integer and polynomial arithmetic, Chinese remaindering, Euclid's algorithm, Polynomial GCDs, sparse polynomial, Parallel algorithms.

Electronics & Communication Engineering:

Highlights of the Syllabus:

Basic Engineering: Basic electronics, Basic electrical engineering (2 papers), Basic Mechanical engineering, Basic Civil engineering, Engineering mechanics, Engg. Graphics, Engg Maths (4 papers), Electrical technology, physics, chemistry.

Microprocessor System Design: Detailed study of the architecture of 8085, 8086/8088, Instruction set, Advanced features of 80286, 80386, Pentium & Pentium Pro microprocessors etc.

Control Systems Engineering: Model of physical events, Signal flow graphs, Time domain analysis, transient response of second order systems, concept of stability, frequency domain analysis, design and compensation of

feedback control systems, control system components, error detectors, tachogenerators, servo-amplifiers etc.

Management Studies: Reliability and quality control. Industrial organization management.

Computer Organization: Introduction to Computer organization and architecture, design of control units, memory units, issues in input/output parallel processing.

Computer Science & Engineering: Basic structure of memory organization, I/O organization, circuit and packet switching, introduction to system software and parallel processing, computer networks, embedded system design, high level languages like BASIC, JAVA.

Electronics Engineering Papers:

Electronics Circuits: Basic Electronics (1 paper) – semiconductor devices (diodes, transistors, FETs, MOSFETs), Solid State Electronics and Circuits. Electronic Circuits (1 paper) – Circuit theory and design, small signal amplifiers – single stage and multistage, power amplifiers, pulse circuits, multi-vibrators, high frequency amplifiers.

Microelectronics and Integrated Circuits: Analog & digital circuits at discrete and integrated levels, monolithic and hybrid circuits, op-amps and op-amp circuits, Filters I and II order, ADCs and DACs, PLL.

Network Theory: Analysis of circuit networks, Network theorems, Node and Mesh Analysis, Study of transients in Linear Circuits, Signal Representation, Communication Networks, Network transmission criteria, design of filters – k and m derived filters.

Digital Electronics: Digital Electronics – Number Systems and codes, sequential circuits, counters, arithmetic circuits, memories – ROM, RAM, EEPROM, PLA, PAL, Logic families – RTL, DTL, DCTL, TTL, ECL, CMOS interfacing.

Microprocessors: Architecture and Instruction set of 8085, Memory design, programming peripheral devices and interfaces (Intel 8255, 8251, 8253, 8354 and 8257). Architecture of 16 bit microprocessors (Intel 8086, 80386, 80486). Study of IBM PC Architecture, peripherals and interface buses. Introduction to Pentium and Pentium Pro architectures. Introduction to RISC and CISC architectures. Introduction to Microcontrollers MCS 51 family.

Instrumentation: Basic Instrumentation techniques, Testing and Measuring instruments – transducers, measurement of impedance, pressure, signal generators, multimeters, power meters, oscilloscopes, recording instruments, analyzers.

Control Systems Engineering: Model of physical events, Signal flow graphs, Time domain analysis, transient response of second order systems, concept of stability, frequency domain analysis, design and compensation of feedback control systems, control system components, error detectors, tachogenerators, servo-amplifiers etc.

Communication: Communication Systems (4 papers) – Modulation – AM, FM. Modes of transmission – DSBFC, DSBSC, SSB, Vestigial, Pilot Carrier. Receivers – Super heterodyne, basics of acoustics, RF communication, Line communication, digital communication fundamentals – PSK,ASK,FSK,Digital Switching, ISDN Network and protocol, types of access control, paging systems, cellular telephony, GPS systems, Pulse code modulation, telephone, fax, antenna fundamentals, Radars, Shannon's theorem, Orthogonal Signal Transmission, Coding, Fourier Transform, Representation of filters, random signals.

Telemetry & Remote Sensing: Data Acquisition System, PCM Transmission and Reception, Compound Modulation.

Modern Communication Systems: Microwave communication systems – Optical communication and fiber optics – IR communication, Satellite communication systems, spread spectrum communication – CDMA cellular telephony, GSM Architecture.

Audio & Video Systems: Principles of sound recording and electro acoustic transducers, recording systems, Hi – Fi, Principle of TV, TV Camera, video transmission and CCTV, HDT, 3-D TV, Digital TV, Principles of NTSC, PAL, SECAM.

Digital Signal Processing: Discrete Fourier and z transforms, algorithms for general computational considerations, finite word length in digital filters, special purpose hardware for digital filtering and FFT, filter design IIR and FIR filters, software implementation of digital filters, architecture of a typical DSP processor.

Electromagnetism and Microwaves: Applied field theory, static and vector fields, magnetic fields and electromagnetic induction, radiation and propagation of electromagnetic waves. Microwave cavities, Microwave oscillators and devices – klystron, reflex klystron TWT, magnetron, microwave solid state devices, power measurement.

Electives

Digital Image Processing: Image representation and modeling. Mathematical techniques – Fourier transforms, z-transforms, image transforms and image enhancement. Image analysis and computer vision.

Artificial Neural Networks: Fundamentals of artificial neural networks – back propagation, counter propagation networks, Boltzmann training, Hopfield – nets associative memory, bidirectional associative memory.

Opto Electronics and Communication: Ray theory, optic fiber wave guides, principles of photo detection, optical transmission circuits, modulation formats, applications, integrated optical devices.

VLSI Technology: Crystal growth, Epitaxy, Optical Lithography, Diffusion, Ion Implantation, PVD, BIC, VLSI Assembly technologies, Electron Migration.