


MODIFIED M-TECH

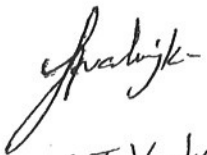
SYLLABUS

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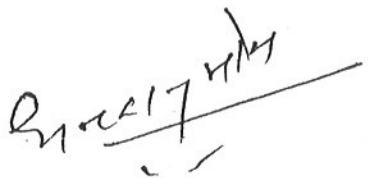
NATIONAL INSTITUTE OF ELECTRONICS AND INFORMATION TECHNOLOGY (NIELIT)

(Formerly DOEACC Centre, Aurangabad)


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Aurangabad

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OFFICE OF THE
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Semester I (Autumn - July to Dec)

Sr.No.	Code No.	Subject	Credit
1.	M1001	Industrial Design of Electronic Equipments	3
2.	M1002	Microcomputer System Design	3
3.	M1003	Analog & Digital Systems	3
4.	---	Elective - 1	3
5.	---	Elective - 2	3
6.	---	Elective - 3	3

Electives

1. M1004 Power Electronics -I
2. M1005 Instrumentation & Process Control
3. M1006 Software Engineering -I
4. M1008 Optical Fibre Communication-I

INDUSTRIAL DESIGN OF ELECTRONIC EQUIPMENTS (CODE: M1001)

Theory

2 hrs/wk

Introduction to Industrial Design: General introduction in the course, role of ID in the domain of industry, product innovation, Designer's philosophy and role in product design. Product development tools and methods.

Product Design Methodology : Electronic product design and development, Methodology, creativity techniques, brain storming, documentation.

Product Planning : Defining the task, scheduling the task, estimation of labor cost and amount of documentation.

Ergonomics: Ergonomics of electronics electronic use of ergonomics at work places and plant layouts, ergonomics of panel design, case study.

Aesthetics : Elements of aesthetics, aesthetics of control (ane) design.

Visual Communication Techniques: Perspective, band sketching and rendering technique, elements of Engineering drawing, assembly drawing part drawing, exploded views.

Product Anatomy: Layout Design, Structure design, Standard and non standard structures, Industrials standards.

Product Detailing: Product detailing in sheet metal and plastics for ease of assembly, maintenance and aesthetics.

Product Manufacturing: Different manufacturing processes in sheet metal and plastics, product finishing, finishing methods like plating, anodization, spray painting, powder coating etc.

Value Engineering: Introduction to marketing, graphics & packing.

Lab Session:

3hrs/wk

Mini Project: An exercise in product design and development: Designs, Drawings, models, prototype of simple product

MICROCOMPUTER SYSTEM DESIGN (CODE : M 1002)

Theory-

2 hrs/wk

Processor architecture- von-Neumann and hardware architectures, RISC and CISC

8086 processor architecture- Register model and Architecture of 8086/8088, 8086/8088 hardware pin signals, bus buffering and latching, processor read and write cycles, ready and wait state generators.

Memory and i/o interfacing to 8086/8088- Address decoding and interfacing of memory (RAM & ROM), to 8086/8088 processor, memory mapped i/o and i/o mapped i/o , i/o port address decoding and interfacing 8255A-programable peripheral interface.

Interrupts in 8086-polling and interrupt driven input./output, mask able and non-mask able interrupts ,software and hardware interrupts, interrupt vectors and vector table, interrupt processing in 8086/8088.

Instruction set and programming of 8086/8088-addressing modes of 8086/8088, instruction set of 8086/8088, assembler directives, operators and programming with an assembler, assembly language programming.

AVR architecture and programming – Architecture of AVR microcontroller, general purpose registers, i/o registers and memories in AVR, addressing modes and instruction set, programming in assembly and C language.

AVR peripherals-Study and programming of avr i/o ports, timer, serial port, spi port and i2c port.

Interfacing of i/o devices to avr- interfacing of matrix keyboard, LCD module, seven segment displays and PC (through serial port).

Lab Session:

3hrs/wk

Programming exercises on AVR microcontrollers in assembly and C language covering data processing, data transfer ,program control instructions, interrupts, different peripherals ie i/o ports, timer, serial port, spi port etc.

Exercises on Interfacing of i/o devices ie LCD module seven segment displays, matrix keyboar etc.

References Books:

- 1) Microprocessors & interfacing Programming and Hardware : Douglas V.Hall.Tata Mc Graw Hill
- 2) Microprocessor & Principals Hand Book Vol. I & II. : Intel Corporation
- 3) Microcomputer System Component Hand Book Vol. I & II : Intel Corporation.
- 4) Advanced MSDOS Hand Book : Ray Duncan's
- 5) CP/M Hand book

ANALOG AND DIGITAL ELECTRONICS (CODE : M 1003)

Theory

2hrs/wk

Analog Electronics:

Operational amplifiers : Fundamentals, Ideal Op. Amp. Negative feedback in Op. Amps. Various op amp configurations. Current to voltage and voltage to current converters. Current amplifiers. Difference amplifier. Instrumentation amplifier. Transducer bridge amplifier. Active filters. Static op amp limitations. Non linear circuits; noise in op. Amps.

Digital electronics:

Introduction:- logic families and their applications ,.TTL logic family etc

Number system:- Various types of number systems and codes.

Logic simplification:- Boolean methods and karnaugh map minimization method combinational and sequential logic, fuzzy logic, quine Mc-Clusky methods of simplification of logic.

Lab Session:

3hrs/wk

Measurements of op amp parameters, measurement of TTL circuit parameter, various practical's based on above theory topics of analog and digital electronics.

Text book:-

"Design with operational amplifiers and analog integrated circuits." By Sergio Franco. Tata McGrawHill publisher.

Digital electronics by Charls H Roth

Reference books:- Analog Electronics by Ramakanth Gaikwad

Digital electronics by P.C. Jain

POWER ELECTRONICS I (CODE-M1004)

Theory-

2Hrs/Week

Power Devices: Power Diode. Switching characteristics. Power Transistor. Switching Characteristics. Thyristor. Switching characteristics, Triggering methods, turn off methods, Protections. Heat sink and cooling of power devices. Devices in series & Parallel.

SCR Converters: Single phase SCR semiconverter with R, R-L & DC motor load. Single phase SCR full converter with R, R-L and DC motor load. Three phase SCR Semiconverter with R, & R-L load. Three phase SCR full converter with R, & R-L load. SCR Dual converters. 4 Quadrant operation. Closed loop DC Drives. Synchronization, feedbacks and regulation. Regenerative Braking in DC drives.

AC Controllers: Stabilizer using relays, Triac based AC phase controller, Integral cycle control.

DC Choppers: Buck Chopper, Boost chopper, Buck-Boost chopper, Equivalent Circuits and waveforms. SCR Jones chopper. Chopper based 1 & 2 Quadrant servo drive.

Inverters: Single phase half bridge and full bridge inverter. Single phase SCR current Source inverter. Variable DC link inverter. SCR series resonant inverter. McMurray Inverter, Murray-Bedford inverter.

Cycloconverters : Single phase SCR cycloconverter. Principle, Waveforms.

UPS-Power circuits of On line and Off line UPS. Principle of operation.

Lab Session: (Code-M1004)

3Hrs/Week

- 1) Characteristics of Mosfet.
- 2) Transfer characteristics of Mosfet (Transconductance)
- 3) R & RC triggering of thyristor.
- 4) UJT triggering of thyristor.
- 3) R & RC triggering of triac.
- 5) UJT triggering of triac.
- 6) SCR parallel capacitor turn off.
- 7) SCR resonant cathode pulse turn off
- 7) SCR series capacitor turn off.
- 8) Study of series operation of power devices.
- 9) Study of parallel operation of power devices.
- 10) Study of Triac based AC phase controller.
- 11) Study of single phase SCR semiconverter R load.

12) Study of single phase SCR fullconverter R-L load.

13) Study of Buck chopper.

14) Study of Boost chopper

15) Study of SCR resonant inverter.

Reference books-

Power Electronics

M. Rashid

Power Electronics

R. Ramshaw

Thyristor DC Drives

Dr .P.C.Sen

Fundamentals and Applications of Power Electronics

S. T. Valunekar

Power Semiconductor Circuits

Dewan & Straughen

SCR Manual

General Electric.

INSTRUMENTATION & PROCESS CONTROL: (Code: M1005)

Theory:

2Hrs/Week

Introductions sensors and measurement systems

General concepts and terminology of measurement systems, static and dynamic characteristics, errors, standards and calibration.

Strain gauge ,Load cell, Torque Measurement, Thermistor Thermocouples , Resistance Temperature Detector ,LVDT ,Capacitance Transducers , Flow meter , Pressure Sensors ,Low Pressure Measurement , pH and Viscosity Measurement , Signal Conditioning Circuits , Piezoelectric Sensors , Ultrasonic Sensors , Optoelectronic Sensor , Dissolved Oxygen Sensors , Smart Sensors , Chromatography ,Pollution Measurement, Measurement of level, humidity, Moisture Measurement of acceleration, vibration

Climatologically Instrumentation:

Instrumentation related to measurement of climatically variables like wind velocity, rain fall, humidity Temperature, radiation and atmospheric pressure.

Introduction to Process Control.

P- I - D Control , Controller Tuning, Implementation of PID Controllers
Special Control Structures : Feed forward and Ratio Control, Predictive Control, : Cascade Control, Overriding Control, selective Control, Split Range Control

Introduction to Actuators : Flow Control Valves ,Hydraulic Actuator Systems, Principles, Components and Symbols, Pumps and Motors, Pneumatic Control Systems

Piping and Instrumentation : P & I D objectives, guide rules, Symbols, Line numbering

Lab Session:

3Hrs/Week

Characteristics of RTD
 Characteristics of Thermistor
 Study of IC Solid State Sensors
 Measurement of displacement using LVDT
 Measurement of Load using Load cell
 Study of Pressure Sensors
 Study of Thermopile
 Measurement of Conductivity of a solution
 Study of PID Controller
 Mini Project using Temperature Sensors

Text Books:

1. D. Patranabis, Principles of Industrial Instrumentation Tata McGraw Hill Publishing Co., New Delhi, 1999
2. R. K. Jain, Mechanical and Industrial Measurements, Khanna Publishers, New Delhi 1999.
3. Curtis D. Johnson, Process Control Instrumentation Technology, Prentice Hall of India, New Delhi, 1999.
4. John P. Bentley, Principles of Measurement Systems, Third edition, Addison Wesley Longman Ltd., UK, 2000.

References

1. Ernest O. Doebelin, Measurement systems application and design international student Edition, Tata McGraw Hill Publishing Co., New Delhi, 1999.
2. A. K. Sawhney, A course in Electrical and Electronic Measurement and Instrumentation – Dhanpat Rai and Sons, New Delhi, 1999.
3. Eckman D.P. Industrial Instrumentation – Wiley Eastern Limited, 1990.
4. Liptak B.G. Instrument Engineers Handbook (Measurement), Chilton Book Co., 1994.
5. A.N. Westerberg, et al., "Process Flow sheeting", Cambridge University Press, 1979.
6. .M. Sze, "Semiconductor sensors", John Wiley & Sons Inc., Singapore, 1994
7. Noltingk B.E., "Instrumentation Reference Book", 2nd Edition, Butterworth Heinemann, 1995.
8. L.D. Goettsche, "Maintenance of Instruments and Systems – Practical guides for measurements and control", ISA, 1995.

SOFTWARE ENGINEERING (CODE: M 1006)

Theory :

2 Hrs/wk

Software And Software Engineering: The importance of software, its Components, Characteristics, application. Software crises myths and paradigms. A generic view of software engineering.

Computer System Engineering: Computer based systems, computer system engineering, hardware considerations, software considerations, human considerations, Data base considerations, system analysis, System specifications.

Software Project Planning: Observation on estimation, project planning objectives, software scope, resources, metrics for software productivity and quality, software project estimation, Decomposition techniques, empirical estimation models, software project plan.

Requirement Analysis Fundamentals: Requirement analysis, problem areas, analysis principles, object-oriented analysis, software prototyping, specification and review.

Requirement Analysis Methods: Requirement analysis method lines, Data flow- oriented methods, Data-structures oriented methods, Data structured systems developments, Jackson system development.

Software Design Fundamentals: Development phase and software design, design process, design fundamentals, Effective modular design, Data design, Architectural design, Procedural design documentation.

Real -Time Design : System consideration, real-time systems, analysis of real- time system, Software design methods other real-time design methods.

Other Aspects: Software quality assurance, software testing techniques and strategies, software maintenances and management.

Lab Session:

3hrs/wk

Real – Word problem identification.

Coding and design of above conceptualized problem using various stages of software engineering

Design of automated requirements analysis tools in c language.

OPTICAL FIBER COMMUNICATION – I (CODE: M 1008)

Theory

2 hrs/wk

Introduction :

Light theory, propagation of light in anisotropic media, light propagation in wave guides. Fiber optics – types of fibers, characteristics, fabrication and testing of optical fibers.

Laser Devices:

Historical introduction, emission and absorption of radiation, spontaneous and stimulated emission, population inversion optical feedback, the laser resonator. Various gas, solid state semiconductor lasers and their properties, application in brief.

Opto Electronics Sources And Detections:

Light emitting diodes – LED for different colours, behaviour at high frequencies, Injection laser diodes, Basic homojunction laser, Double hetero junction laser, optical gain in semiconductor, laser thresholds, laser characterisation. General characteristics of semiconductor detectors, photoconductors, photo diodes, quantum efficiency, P.I.N. diode, frequency response, pulse response, APO, Materials and wavelength selection, band width and noise consideration, PINFET

Opto Electronics Instructions:

Laser interferometry and application to metrology and testing, Holography and holographic interferometry, speckle techniques. Digital speckle pattern interferometer, Laser gyro and Doppler velocimetry, OTDR, LIDAR applications. Optoelectronic Devices in Medicine, Industry, and agriculture brief.

Lab Session:

3 hrs/wk

Measurements on Optical sources LED, Laser Diode and photo detectors

He Ne Laser beam characteristics study

Optical fiber characteristics.

Holographic and speckle experiments

Semester II (Spring Jan - June)

Sr. No.	Code	Subject	Credit
1.	M2001	Advanced Microcomputer System Design	3
2.	M2002	Physical Design of Electronic Equipments	3
3.	---	Elective - 4	3
4.	---	Elective - 5	3
5.	---	Elective - 6	3
6.	M3001	Project Feasibility Seminar 1	1

Electives

1. M2003 Agri-Instrumentation & Process Control
2. M2004 Power Electronics - II
3. M2006 Software Engineering - II
4. M2008 Optical Fiber Communication-I

ADVANCED MICROCOMPUTER SYSTEM DESIGN (CODE:M 2001)

Theory-

3hrs/wk

Introduction to operating system- operating system objectives , operating system structure and services.

The 80386 processor Architecture- General features of advanced Microprocessors, the architecture and features of the 80386 processor, protected virtual address mode. segmentation and segment descriptor tables, segment selectors and descriptors, protection model, data access and control transfer, Memory management, address translation.

I/O and interrupts in 80386 protected mode- I/O level protection, protected mode interrupts and exceptions, their properties and interrupts/ exceptions transfer methods.

Multitasking- task state segment and task switching.

Architecture of ARM processor- ARM processor modes, register organization, exceptions and its handling, memory and memory mapped i/o, addressing modes, arm & thumb instruction sets, arm and thumb inter working, programming in assembly and C language.

Architectural support for higher level language and operating system- support in architecture for higher level language and operating system, memory protection unit and memory management unit ,cache memory concepts.

Lab Session:

3hrs/wk

Programming exercises on 80386 and ARM processors in assembly language covering data processing, data transfer, program control instructions.

References Books:

- 1) 80286 Hardware Reference Manual : Intel Corporation
- 2) Microprocessor & Principal Hand book Vol. I & II : Intel Corporation
- 3) 80286 Software Reference Manual : Intel Corporation.

PHYSICAL DESIGN OF ELECTRONIC EQUIPMENTS (CODE:M 2002)

Theory

2 hrs/wk

Mechanical Design:

Product development Cycle. Role of Physical Design in Product Development Process. Various Design Considerations like Static Strength, Dynamic Stability, Manufacturing, Assembly, Maintenance, Safety, Reliability, Heat Dissipation, EMI/ RFI Shielding, Standardization & Commonness, Various enclosure standards like DTN 41494, IEC 297 & N.S. 5954. Selection of Materials and processes. Manufacturing Tolerances and is 919 : 1962. Introduction to Value Engineering.

PCB Design:

Design rules for analog circuits, digital Circuits, Power circuits with Connectors. Design rules high Frequency Circuits, Matching of conductors, Line defects, rise time limitations, dielectric losses, radiation losses.. Introduction to Design rules for microwave applications.

A) Drawing : Limitations of manual design, PCB Design using CAD Packages.

B) Production: Fabrication of SSB, DSB, MLB and PTH plating, copper clad limitations stress and strain analysis for assembled PCBs. SMD Techniques.

Thermal Design : Conduction, Convection, thermal design of electronics equipments and case studies.

Lab Session:**3 hrs/wk**

Preparation of various product documents like Assembly Drawing, Part Details in Accordance with ISBNBL- 7001-091-2.

Total Design and fabrication of SSB and DSB.

AGRI-INSTRUMENTATION & PROCESS CONTROL (CODE: M2003)**Theory****2Hrs/Week**

Review of computers in process control: Data loggers, Data Acquisition Systems (DAS), Direct Digital Control (DDC). Supervisory Control and Data Acquisition Systems (SCADA), sampling considerations. Functional block diagram of computer control systems. alarms, interrupts.

Programmable logic controller (PLC) basics: Definition, overview of PLC systems, input/output modules, power supplies, isolators. General PLC programming procedures, programming on-off inputs/ outputs. Auxiliary commands and functions: PLC Basic Functions: Register basics, timer functions, counter functions.

Virtual Instrumentation: Historical perspective, advantages, block diagram and architecture of a virtual instrument, data-flow techniques, graphical programming in data flow, comparison with conventional programming. Development of Virtual Instrument using GUI, Real-time systems.

Industrial Communication Systems

Interface: Introduction, Principles of interface, serial interface and its standards. Parallel interfaces and buses.

Field bus: Use of field buses in industrial plants, functions, international standards, performance, use of Ethernet networks, field bus advantages and disadvantages. Field bus design, installation, economics and documentation.

Instrumentation network design and upgrade: Instrumentation design goals, cost optimal and accurate sensor networks. Global system architectures, advantages and limitations of open networks, HART network and Foundation field bus network.

PROFIBUS-PA: Basics, architecture, model, network design and system configuration. Designing PROFIBUS-PA and Foundation Field bus segments: general considerations, network design.

Application of PC based instrumentation and control systems for:

Green House: History of modeling and control of green house, Importance mathematical modeling of green house, identification of control and manipulation variables for green house, Development of mathematical model based on identified variables for green house, control systems for green house climate and soil nutrients control.

Crop Preservation: Importance of Preservation of various commodities and parts of the plants. Drying processes for preservation. Mathematical relations governing drying, process. Applicability of mathematical relations in electronic control systems for drying process. Variable identification for drying process, Generalized drying system concepts. Importance of grape drying systems in Indian context, Electronic control systems for grape drying process.

Dairy, Sugar and Paper Industry: Study of overall processing concepts of individual industry and process steps study, study of variables characterizing various process steps and their identification, electronic automatic control systems for various process steps related to these industries.

Lab Session:

3Hrs/Week

Modeling of green house and controller design using model developed, controlling green house parameters using online measurement and control system. Complete design, analysis and control of temperature of closed chamber using PID controller and to study the effects of K_i , K_p , K_c , T_i , T_d sampling rate

Learning Lab view : Introduction to Lab VIEW ,Front panel ,Block diagram, Menus, Palettes, VI & sub VI, Editing & Debugging VI, Structures, Arrays, Clusters, Charts & Graphs, Data acquisition, Signal Generation & Processing Examples

Text Books:

1. John. W. Webb Ronald A Reis , Programmable Logic Controllers - Principles and Applications, Third edition, Prentice Hall Inc., New Jersey, 1995.
2. Lukcas M.P Distributed Control Systems, Van No strand Reinhold Co., New York, 1986.
4. Gary Johnson, Lab VIEW Graphical Programming, Second edition, McGraw Hill, New York, 1997.
5. Lisa K. wells & Jeffrey Travis, Lab VIEW for everyone, Prentice Hall, New Jersey, 1997.
- 6 Romilly Bowden , 'HART Communications Protocol', (Fisher-Rosemount).
- 7 User Manuals of Foundation Field bus, Profibus, Modbus, Ethernet, Device net, Control net.

References:

1. Deshpande P.B and Ash R.H, Elements of Process Control Applications, ISA Press, New York, 1995.
2. Noltingk B.E., "Instrumentation Reference Book", 2nd Edition, Butterworth Heinemann, 1995.

POWER ELECTRONICS II (CODE-M2004)**Theory-****2Hrs/Week**

Power Devices: Power Mosfet ,construction and characteristics. IGBT construction & Characteristics. GTO construction& characteristics, Turn off action.

SCR Converters: Methods of power factor improvement in converters. Series connected converters. Identical and sequence control.

Drives: Brushless dc motor drives. Phase locked loop controlled drives.

DC Choppers: Voltage commutated, Current commutated & load commutated choppers, Equivalent circuits, formulae waveforms .Methods of harmonic reduction in

Choppers. Chopper based 3&4 Quadrant servo drive.

Inverters: Three phase half bridge and full bridge inverter. Methods of harmonic reduction in inverters.

Cycloconverters : Methods of harmonic reduction in cycloconverter. Three phase SCR cycloconverter. Principle, Waveforms.

Induction motor speed control: V, f , V/f, and Vector control methods.

UPS-Power circuits of On line and Off line UPS : Principle of operation. Batteries and Battery chargers. Induction heating, Switch mode power supply ,Resonant dc power supply.

Controllers: P,D,P-D,I,P-I,P-I-D controllers Various mathematical examples on above topics.

Lab Session: (Code-M2004)**3Hrs/Week**

- 1) Characteristics of IGBT.
- 2) Study of single phase SCR semi converter DC motor load.
- 3) Study of single phase SCR full converter DC motor load.
- 4) Study of three phase SCR full converter R motor load.
- 5)Study of three phase SCR full converter R-L motor load.
- 6) Study of Buck-Boost chopper.
- 7) Study of voltage commutated chopper.

- 8) Study of current commutated chopper.
- 9) Study of PWM controller.
- 10) Study of single phase full bridge inverter.
- 11) Study of SMPS
- 12) Study of UPS
- 13) Study of variable frequency inverter.
- 14) Study of P-I controller
- 15) Study of P-I-D controller

Reference books-

Power Electronics	M.Rashid
Power Electronics	R.Ramshaw
Thyristor DC Drives	Dr.P.C.Sen
Fundamentals and Applications of Power Electronics	S.T.Valunjkar
Power Semiconductor Circuits	Dewan & Straughen
SCR Manual	General Electric.
An introduction to thyristors and applications	M. Rammoorthy
Power electronic control of AC motors	JMD Murphy and Turnbull

SOFTWARE ENGINEERING- II (CODE : M2006)

Theory:

2hrs/wk

System Software : Overview of DOS, Unix and other operating systems. Introduction to windows, multitasking techniques, BIOS Services and interrupts, DOS interrupts Driver software, memory resident programs.

Multi operating System: inter process synchronization communication, process and memory management , Resoron schedulers, File management.

Application Software: Development and design of the application s/w for on-line and real time purpose , Graphics, Nueral networks, Artificial intelligence, CND, process control softwares, MIS, Data base management systems.

Lab session

3 hrs/wk

Writing of TSR programs.

Development of Driver software as both bootable and instable drivers.

Development of expert system for small heuristic application.

Design and development of multitasking shells on dos.

Porting of graphics using windows.

OPTICAL FIBER COMMUNICATION- II (Code : M 2008)

Theory:

2 hrs/wk

Laser System:

Design and fabrication of various Laser system- an over view, Fabrication of semiconductor laser system, power supplies for laser system and mechanical considerations.

Optical phenomena & System:

Electro optics and non liner optics effects; acousto Electro, Design of A.O. modulators and deflectors. Electro optic effects- pockel's and kerr effects; change in refractive index in KDP crystal. Design of electro optional modulators, switching, multiplexers and other devices. Integrated optical circuits, materials and design of specific I/O system, applications.

Optical communication systems and design

Optical fibres and other components for fiber optic communication, fiber optic communication system dosing power budget and rise time considerations. Transmitter & receiver circuits. Fiber optic system for voice, video and data communication – design examples. Optical amplification, coherent communication, photonic switching, solitons and other new development - brief discussion.

Optical Sensors and systems:

An over view of various optoelectronic sensing techniques used in Scientific, medical and industrial fields. Opto-electronic transducers, types and properties, design consideration of intensity and interferometric types of fiber optic sensors for pressure, strain, rotation, temperature, current and magnetic fields etc.

High speed communication(optical) & Optical Networks

Lab Session:

3hrs/wk

Fiber optic communication (transmitter & receiver design) fiber optic sensors design

Measurements on communication components.

Design and calibration of power meters.

Semester III (Autumn July - Dec)

Sr. No.	Code	Subject	Credit
1.	M3002	Project	14

Semester IV (Spring Jan - June)

Sr. No.	Code	Subject	Credit
1.	M3002	Project	14

