ELECTRONIC CIRCUITS

	L	T	P
CODE EF 301			
EL 301	2	--	2

RATIONALE

Electronics equipments in these days mostly uses semiconductor devices. In industries power controlling is also achieved by semiconductor devices, knowledge of each component and different circuit is very essential for operation and maintenance. The subject provides the basic knowledge of principles of electronic circuit.

CONTENTS

1. JFET and MOSFET Amplifiers :

1.1 The common source CS amplifier its A.C. equivalent circuits and voltage gain calculation at low and high frequency
1.2 The common drain CD amplifier its A.C. equivalent circuits and voltage gain calculation at low and high frequency

2. Multistage Amplifier :

2.1 Different types of coupling

2.1.1 Direct coupling
2.1.2 R.C. coupling
2.1.3 Transformer coupling

2.2 Distortion in amplifiers
2.3 Frequency response of an amplifier
2.4 Effect of cascading on gain and bandwidth
2.5 Simple calculation for gain and bandwidth for RC coupled amplifier
2.6 Measurement of input and output impedance of an amplifier
2.7 Square wave testing of an amplifier
2.8 Comparison and application of coupled amplifiers
2.9 Design analysis of a RC coupled amplifier for given parameters

3. Power Amplifier :

3.1 Classification of power amplifier
3.2 Class A large signal amplifier and its analysis for output power
3.3 Second harmonic distortion
3.4 Transformer coupled audio power amplifiers
3.5 Efficiency and conversion efficiency
3.6 Push pull amplifiers
3.7 Class B power amplifier and its efficiency
3.8 Class AB operation and cross over distortion
3.9 Complementary symmetry push-pull amplifier
3.10 Idea of phase inverter

4. Feedback Amplifier :

4.1 Basic concept of feedback
4.2 Classification of feedback amplifier
4.3 Advantages of negative feedback on gain stability, distortion, frequency response, noise reduction, input impedance and output impedance
4.4 Analysis of various Negative feedback amplifier circuits.
4.5 Comparison of negative voltage feedback and negative current feedback

5. Oscillators :

5.1 Positive feedback concept
5.2 Barkhausen criterion
5.3 Working and calculation of frequency (no formula derivation) for Hartley (series and shunt) , Colpitt's, Clapp, tuned collector, R-C phase shift, Wein bridge, Crystal and beat frequency oscillator

6. Transistor at High Frequency and Special Circuit :

6.1 High frequency small signal π model of transistor
6.2 Current gain, alpha cut off frequency (f_α)
6.3 f_T , f_β and their relationship
6.4 Darlington pair and bootstrapping
6.5 Cascode amplifier

7. Multivibrator :

7.1 Transistor as a switch and Switching times.
7.2 Bistable Multivibrator (BMV)

7.2.1 Fixed bias and self bias BMV and their working
7.2.2 Symmetrical and unsymmetrical triggering
7.2.3 Working of Schmitt trigger
7.2.4 Hysterisis elimination

7.3 Monostable Multivibrator (MMV)

7.3.1 Working of MMV (collector coupled)
7.3.2 Working of emitter coupled MMV
7.3.3 Comparison of collector coupled MMV with emitter coupled MMV

7.4 Astable Multivibrator (AMV)

7.4.1 Working of collector coupled AMV
7.4.2 Working of emitter coupled AMV
7.4.3 Comparison of collector coupled with emitter coupled AMV

7.5 Application of Multivibrators

8. Blocking Oscillator and Time Base Generators

8.1 Need of blocking oscillator
8.2 Working of Mono stable and Astable Blocking oscillator
8.3 Need of time base general
8.4 General features of time base signal.

PRACTICALS

1. Study of JFET amplifier and plot its frequency response
2. Study of depletion and enhancement MOSFET amplifier and plot its frequency response
3. Plot the frequence response of two stage R-C coupled amplifier and measure its bandwidth
4. Plot the frequence response of transformer coupled amplifier
5. Plot the frequency response of direct coupled amplifier
6. Study of transistor push-pull amplifier
7. Study of complimentary transistor power amplifier
8. Study of phase inverter
9. Study of Dartington pair

10. Plot the frequency response of negative feedback amplifier and observe the effect of negative feed back
11. Study of Hartley oscillator and calculate frequency of oscillation
12. Study of Colpitt's oscillator and calculate frequency of oscillation
13. Study of RC phase shift oscillator
14. Study of a Wein bridge oscillator and calculate frequency of oscillation.
15. Study of crystal oscillator
16. Study of clapp oscillator
17. Study of monostable multivibrator
18. Study of bistable multivibrator
19. Study of astable multivibrator

REFERENCE BOOKS :

1.	Electronic Devices & Circuits	Millman Halkias
2.	Integrated Electronics	Millman Halkias
3.	Electronic Devices & Circuits	Allen Mottershed.
4.	Electronic Principles	Malvino
5.	Electronic Devices & Circuits	Sanjeev Gupta
6.	Applied Electronics	G.K. Mithal
7.	Electronic Devices & Circuits	Mathur, Kulshrestha & Chadda
8.	Pulse & Wave Shaping Circuits.	Millman & Taub.
9.	Pulse Circuits	Rajul Singhal
10.	Wave Shaping & Digital Circuits	Agarwal & Rai

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ADVANCE MICROPROCESSOR & MICROCONTROLLER

CODE EF 302	L	T	P
EB 302/ EL 302	2	--	2

RATIONALE

The students of electronics should be well acquainted with the details of various microprocessors, & Microcontrollers as this would help them in making a comparative study and selection of microprocessor & microcontroller for a particular task.

CONTENTS

1. 8086 Microprocessor :

1.1 Internal architecture – Bus interface unit, execution unit, internal registers and flags.
1.2 Instruction execution sequence
1.3 Addressing modes
1.4 Modes of operation
1.5 Comparison with 8088

2. 8086 Instructions and Programming :

2.1 Data transfer instructions
2.2 Arithmetic instructions
2.3 Logic, shift and rotate instructions
2.4 Processor control instructions
2.5 String operation instructions
2.6 Writing simple assembly language programs
2.7 System bus timing

3. I/O Data Transfer Schemes :

3.1 Classification of IO schemes
3.2 Programmed data transfer - IO mapped and memory mapped IO
3.3 Asynchronous data transfer and synchronous data transfer
3.4 Interrupt driven data transfer

3.4.1 Interrupt process
3.4.2 Multiple interrupts and priorities
3.4.3 Enabling, disabling and masking of interrupts

3.5 DMA data transfer scheme
3.6 Serial data transfer scheme

4. Peripheral Devices and their Interfacing with 8085 :

4.1 Programmable peripheral interfaces - 8255 and its applications.
4.2 DMA controller - 8257
4.3 Programmable interrupt controller - 8259
4.4 Programmable communication interface - 8251
4.5 Programmable TIMER - 8253.
4.6 Programmable keyboard and display interface 8279
4.7 Brief idea of CRT controller, dot-matrix printer controller and floppy disk controller

5. Bus Standards :

5.1 RS 232 C
5.2 IEEE 488

6. **Introduction to 8051 Microcontroller :**

6.1 General Features.
6.2 Internal Architecture
6.3 Signals and pin description

6.4 Comparison of microprocessors and microcontrollers
6.5 Brief idea of embedded controller

PRACTICALS

1. Study of 8086 trainer kit
2. Assembly language programming in 8086

   2.1 Storing an immediate operand in a register/memory
   2.2 Copying contents of a register to memory location and vice-versa
   2.3 Exchanging controls of two memory locations
   2.4 Addition/subtraction of two numbers
   2.5 Sorting of odd/even no.
   2.6 Arrange data arrays in ascending and descending.
   2.7 Programs using stack subroutine.
   2.8 Convert ASCII code into packed BCD
   2.9 Program for case conversion of letters

3. Interfacing 8255 with 8085
4. Interfacing ADC with 8085
5. Interfacing DAC with 8085
6. Interfacing stepper motor with 8085.
7. Temperature monitoring system using 8085 microprocessor

REFERENCE BOOKS :

1.	The 8086 Microprocessor Architecture	Walter A. Triebel
2.	Software & Interfacing Techniques	Avtar Singh
3.	Micro Computer Systems The 8086/8088 Family	Liu & Gibson
4.	An Introduction to Microprocessors	A.P. Mathur
5.	Microprocessor Architecture & Organization	Gaonkar
6.	Introduction to 8086/8088 Microprocessor	Douglus V. Hall
7.	The 8051 microcontroller	Ayala Kenneth
8.	Microcontrollers: Fatures & Application	D. S. Yadav, A.K. Singh

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FIBER OPTICS ENGINEERING

CODE EF 303

L	T	P
2	--	2/2

RATIONALE

Study of fiber optical engineering is essential for understanding basic phenomenon occurring in fiber optics. By this subject students will be adequately equipped with light propagation and distribution phenomenon before they go into the existing field of fiber optics.

CONTENTS

1. Nature of Light :

1.1 Electromagnetic nature of light
1.2 Poynting theorem
1.3 Principle of reflection, refraction and polarization
1.4 Basic principle of optical communication

2. Introduction to Optical Fibers :

2.1 Introduction
2.2 Classification of fibers
2.3 Physical structure
2.4 Ray theory transmission

2.4.1 Total internal reflection and critical angle
2.4.2 Acceptance angle
2.4.3 Numerical aperture
2.4.4 Skew rays

2.5 Electromagnetic mode theory for optical propagation

2.5.1 Electromagnetic waves
2.5.2 Modes in planar guide
2.5.3 Modes in cylindrical fiber
2.5.4 Phase and group velocity

2.6 Fiber band width
2.7 Block diagram of optical fiber communication system
2.7.1 Analog system
2.7.2 Digital system
2.8 Advantages and limitations of optical communication

3. Fiber Characteristics :

3.1 Step index fiber characteristics

3.1.1 Single mode and multimode fiber
3.1.2 Mode cut off condition
3.1.3 Delay distortion
3.1.4 Power law profile V number

3.2 Graded Index fiber characteristics

3.2.1 Profile analysis
3.2.2 Delay distortion
3.2.3 Power law profile, V number

4. Fiber Materials :

- 4.1 Introduction and material consideration
- 4.2 Lattice arrangement of different glass material
- 4.3 High silica and compound silicate glass
- 4.4 Core and cladding materials
- 4.5 Characteristics of fibers
  - 4.5.1 Mechanical
  - 4.5.2 Thermal

5. Fiber Fabrication :

- 5.1 Introduction
- 5.2 Fabrication steps
- 5.3 Liquid phase technique
- 5.4 Vapour phase deposition techniques
  - 5.4.1 Outside vapour phase oxidation process
  - 5.4.2 Vapour axial deposition process
  - 5.4.3 Modified chemical vapour deposition
  - 5.4.4 Plasma activated chemical vapour deposition
- 5.5 Fiber cooling, drawing, coating and drying

6. Fiber Losses :

- 6.1 Introduction
- 6.2 Attenuation
  - 6.2.1 Attenuation units
  - 6.2.2 Scattering losses
    - 6.2.2.1 Rayleigh and Mie losses
    - 6.2.2.2 Non-linear scattering losses
  - 6.2.3 Bending losses
  - 6.2.4 Core and cladding losses
- 6.3 Signal distortion in fibers
  - 6.3.1 Material and wave guide dispersion losses
  - 6.3.2 Group delay
  - 6.3.3 Inter mode model and Intra model distortions
- 6.4 Fiber alignment and coupling losses
  - 6.4.1 Single mode fiber joint
  - 6.4.2 Multimode fiber joint
- 6.5 Fiber splicing and losses
  - 6.5.1 Fusion splice
  - 6.5.2 Mechanical splice
  - 6.5.3 Multiple splice
- 6.6 Fiber connectors and losses
  - 6.6.1 Cylindrical connector
  - 6.6.2 Bi-conical connector
  - 6.6.3 Double eccentric connector
  - 6.6.4 Expanded beam connectors
  - 6.6.5 Fiber couplers

PRACTICALS

1. Study of refraction of light
2. Study of polarization of light by reflection
3. Study of different optical measuring instruments
4. Study of fiber couplers
5. Study of different type of connectors
6. Measurement of fiber bending loss
7. To determine optical bandwidth of fiber optic analog link
8. To determine optical bandwidth of fiber optic digital link
9. Measurement of Numerical aperture of fiber
10. To measure attenuation loss in optical fiber during transmission
11. To measure propagation loss in optical fiber during transmission of digital signal
12. Comparison of attenuation loss for digital and analog signal
13. Study of different fiber materials
14. Study of fiber fabrication techniques
15. Study of step index and graded index fibers characteristics
16. Study of fiber splicing techniques

REFERENCE BOOKS :

1.	Optics	Brijlal & Subraymanyam
2.	Engineering Physics	Gaur & Gupta
3.	Optics	A. Ghatak & Loknathan
4.	Understanding Fiber Optics	Jeff Hecht
5.	Fiber Optics in Telecommunication	N Sharma
6.	An Introduction to Optical Fibers	Allen H Cherin
7.	Optoelectronics- An Introduction	J Wilson & Hawkes
8.	Fiber Optics & Optoelectronics	Peter K Cheo
9.	Optical Communication Systems	John Gowar
10.	Optical Fiber Communication	Gerd Keiser
11.	Optical Communication	Senior J.M.

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FIBER OPTIC DEVICES AND INSTRUMENTATION

CODE EF 304

L	T	P
2	--	2

RATIONALE

Reliability of a telecommunication system can be enhanced by proper and regular maintenance activities. Students are therefore should be equipped with adequate knowledge of measurements and techniques to study various parameters. They are also exposed to optical sensors that form important elements for measurement of various parameters. This paper also highlighted to advanced techniques and devices that are used in fiber optics.

CONTENTS

1. Optical Sources :

- 1.1 Direct and indirect band gap semiconductors
- 1.2 Internal and external quantum efficiency
- 1.3 Principle, characteristics and construction of LED
- 1.4 Transient response, power – BW product
- 1.5 Semiconductor Lasers
  - 1.5.1 Laser action
  - 1.5.2 PN junction laser
  - 1.5.3 Febry – Perot resonators

2. Detectors :

- 2.1 Introduction
- 2.2 Photodiode – Materials and types
- 2.3 Avalanche photo diode (APD), PIN diode
- 2.4 Temperature effect on avalanche gain, noise in APD
- 2.5 Photo transistors, PIN-FET, Photo Darlington
- 2.6 Response time, BW, noise equivalent power, responsivity
- 2.7 Spectral response, dark current and quantum efficiency

3. Connectors :

- 3.1 Need of connectors
- 3.2 Types of connectors
- 3.3 Single and multimode fiber connectors

4. Splicers :

- 4.1 Need of splicing
- 4.2 Types of splicers
- 4.3 Different splicing techniques

5. Couplers and Splitters :

- 5.1 Need and types of couplers
- 5.2 Source to fiber couplers, fiber to fiber couplers, fiber to detector couplers
- 5.3 Splitters
- 5.4 Intrinsic and extrinsic coupling loss

6. Cables :

- 6.1 Reasons and types - under ground, under sea and overhead
- 6.2 Elements of cable structure and its characteristics
- 6.3 Cable installation and design consideration
- 6.4 Cable jacketing
- 6.5 Cable laying, transport and handling

7. Fiber Measurement :

7.1 Introduction
7.2 Transmission loss measurements

7.2.1 Fiber attenuation
7.2.2 Fiber absorption loss measurement
7.2.3 Fiber scattering loss measurement

7.3 Fiber dispersion measurement

7.3.1 Time domain measurement
7.3.2 Frequency domain measurement

7.4 Fiber cut off wavelength measurements
7.5 Fiber numerical aperture measurements
7.6 Field measurements - Optical time domain reflectometer (OTDR)
7.7 Eye pattern, noise margin and time jitter

8. Project Formulation, Implementation and System Maintenance :

8.1 Introduction
8.2 Multiplex equipments
8.3 Instruments
8.4 Splice environments
8.5 System maintenance

PRACTICALS

1. Study of LED characteristics.
2. Study of Laser characteristics.
3. Study of optical detector characteristics.
4. Study of different connectors.
5. Study of different splicers
6. Study of different couplers and splitters
7. Measurement of connector loss
8. Measurement of splice loss
9. Measurement of coupling loss
10. Study of fiber cables.
11. Measurement of rise time and pulse width distortation for a digital signal
12. Fiber fault analysis using OTDR
13. Study of dispersion loss in fiber.
14. Study of absorption loss in fiber.
15. Study of eye pattern for a fiber.
16. Measurement of fiber cut off wavelength.

REFERENCE BOOKS :

1. Understanding Fiber Optics — Jeff Hecht
2. Fiber Optics in Telecommunication — N Sharma
3. An Introduction to Optical Fibers — Allen H Cherin
4. Optoelectronics- An Introduction — J Wilson & Hawkes
5. Fiber Optics & Optoelectronics — Peter K Cheo
6. Optical Communication Systems — John Gowar
7. Optical Fiber Communication — Gerd Keiser
8. Optical Communication — Senior J.M.

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POWER AND INDUSTRIAL ELECTRONICS

	L	T	P
CODE EF 305			
EB305/ EL 305/IE305	2	--	2

RATIONALE

Industrial plants adopted electronics in terms of timing action, switching action, power control, process control, motor speed control etc called power and industrial electronics. The student should study this subject with a view to understand the use of electronics to bring about faster and more accurate response for industrial plants.

CONTENTS

1. Introduction :

1.1 Principle, Construction and characteristics of SCR, TRIAC, DIAC, UJT, PUT, Power MOSFET, LASCR, solar cell
1.2 Ratings of SCR
1.3 "Turn on" and "Turn off" mechanism of SCR
1.4 Series and parallel connections of SCR
1.5 Snubber circuits
1.6 UJT as a relaxation oscillator

2. Power Control and Rectifiers :

2.1 Phase control circuit of SCR

- 2.1.1 Simple R-C circuit
- 2.1.2 Transformer circuit
- 2.1.3 UJT circuit
- 2.1.4 Ramp and Pedestal circuit

2.2 Different methods of turning off SCRs
2.3 SCR Half Wave rectifier (single phase)

- 2.3.1 SCR with resistive load
- 2.3.2 SCR with inductive load (with and without free wheeling diode)

2.4 TRIAC as a power control circuit
2.5 Three phase HW and FW rectifier using PN junction diode

- 2.5.1 Calculation of RMS value
- 2.5.2 Average value
- 2.5.3 Ripple factor
- 2.5.4 PIV
- 2.5.5 TUF

3. Inverters, Choppers and Cyclo-converters :

3.1 Basic principle of inverters
3.2 Series and parallel inverter circuits using SCR (Single phase)
3.3 Basic idea of PWM inverter
3.4 Choppers
- 3.4.1 Principle of operation
- 3.4.2 Chopper control techniques
- 3.4.3 Voltage step down chopper
- 3.4.4 Voltage step up chopper

3.5 Cycloconverters
- 3.5.1 Principle of operation
- 3.5.2 Single phase/single phase cycloconverters (mid point & bridge configuration)

4. AC Stabilizer and Power Supply :

4.1 Resonant stabilizer
4.2 Electro mechanical stabilizer (using relay and servo motor)
4.3 Electronic stabilizer
4.4 Block diagram of UPS (OFF line and ON line)
4.5 Switched mode power supply (SMPS)

4.5.1 Block diagram and basic principle
4.5.2 Types of SMPS
4.5.3 Merits and demerits of SMPS

5. A.C., D.C. Motors & control:

5.1 Principle, construction , operation & applications of A.C. & D.C. motors
5.2 Concept of motor speed control (for D.C. motor only)
5.3 Speed torque relation for motor (for D.C. motor only)
5.4 Armature voltage control method (using SCR) (for D.C. motor only)
5.5 Speed control method (using techo-generator) (for D.C. motor only)
5.6 Brief idea of speed control of stepper motor

6. Heating, Welding and their Application :

6.1 Principle and application of induction heating
6.2 Principle and application of dielectric heating
6.3 Principle of resistance welding
6.4 Type of resistance welding
6.5 Sequential timing circuit

PRACTICALS

1. To plot V-I characteristics of SCR
2. To plot V-I characteristics of TRIAC
3. To plot V-I characteristics of UJT
4. To plot V-I characteristics of DIAC
5. Observe the various waveforms of UJT relaxation oscillator
6. Study of half wave rectifier using SCR with resistive load and inductive load.
7. Application of TRIAC as light dimmer/fan regulator
8. Study of phase inverter circuit using transistor
9. Study of inverter circuit using SCR
10. Study of electronic-mechanical/electronic A.C. stabilizer
11. Study of UPS
12. Study of SMPS
13. Study of speed control of D.C. motor
14. Study of resistance welding
15. Assembling and testing of manual stabilizer with auto cut facility.

REFERENCE BOOKS :

1. An Introduction to Thyristor & their Application	M. Ramamoorthy
2. Industrial Electronics	G.K. Mithal
3. Industrial Electronics	O. Cage
4. Thyristor Engineering	M.S. Berde
5. Thyristor & its Application	H.C. Rai
6. Electronics in Industry	Chute & Chute
7. पॉवर एण्ड इन्डिस्ट्रीयल इलेक्ट्रोनिक्स (हिन्दी)	जलान्धरा, माथुर
8. Industrial Electronics & Control	Biswanth Paul
9. Power Electronics	P.C. Sen
10. Power Electronics	P.S. Bhimbhara
11. Industrial electronics & control	Biswanath Paul

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OPTICAL FIBER COMMUNICATION

CODE EF 306

L	T	P
2	--	2

RATIONALE

In present scenario telecommunication networks are using fiber optics widely. To meet the requirements of this technology the students should be prepared. This subject will provide adequate knowledge related to optical transmitting and receiving circuits, modulation techniques and their applications in various networks. Students are also exposed to various techniques that increase communication capacity.

CONTENTS

1. Basic LW Engineering System :

1.1 Introduction
1.2 Basic LW communication system
1.3 Types of modulation
1.4 ON-OFF modulation
1.5 Analog and digital transmission
1.6 Audio video and data transmission
1.7 Computer communication using RS 232 port
1.8 Coherent system
1.9 Operating wavelength
1.10 Coding of signals

2. Transmitter Circuits :

2.1 Elements of fiber optic transmission
2.2 Optical transmitters

2.2.1 Source limitations
2.2.2 LED and laser drive circuits
2.2.3 Functional differences between LED and lasers
2.2.4 Functional differences between LED and laser transmitters

2.3 Bias and control circuit
2.3.1 Automatic current control circuits
2.3.2 Automatic power control circuits

3. Modulation techniques

3.1 Direct modulation
3.2 Indirect modulation
3.3 Intensity modulation
3.4 AM, FM, PWM, PCM subcarrier intensity modulation

4. Receiver Circuits :

4.1 Basic elements of analog and digital receiver
4.2 Detection methods

4.2.1 Direct – analog and digital
4.2.2 Coherent method - fundamental concept, homodyne detection and heterodyne detection
4.2.3 Requirement of semiconductor laser

4.3 Receiver sensitivity, bandwidth and dynamic range
4.4 Sources of noise and noise characteristics

4.5 Receiver circuit

4.5.1 Using FET
4.5.2 Photo transistor

4.6 Significance of SNR
4.7 Fiber amplifiers

4.7.1 Rare earth doped
4.7.2 Raman and Brillouin

4.8 Application of optical amplifiers
4.9 Regenerative repeaters

5. Budgeting and System Design :

5.1 System design consideration
5.1.1 Power budget
5.1.2 Rise time budget

5.2 Fiber response time
5.3 System margin
5.4 Cost/ performance trade offs

6. Wave Length Division Multiplexing :

6.1 Introduction
6.2 Optical FDM
6.3 Wave length division multiplexing (WDM)
6.4 Simplex and duplex optical multiplexers
6.5 Prism and diffraction grating

PRACTICALS

1. Study of voice link
2. Study of video link
3. Design and evaluation of a laser diode analog IM system
4. Study of ACC and APC mode of operation and their comparison
5. Design and evaluation of a laser diode digital transmission
6. Study of AM subcarrier intensity modulation for analog link
7. Study of PWM subcarrier intensity modulation for analog link
8. Study of FM subcarrier intensity modulation for analog link
9. Study of AM subcarrier intensity modulation for voice link
10. Study of PWM subcarrier intensity modulation for voice link
11. Study of FM subcarrier intensity modulation for voice link
12. Full duplex computer communication using RS 232 ports
13. Fiber optic analog link design and analysis
14. Fiber optic digital link design and analysis
15. Study of WDM
16. Study of fiber amplifier - EDFA

REFERENCE BOOKS :

1.	Understanding Fiber Optics	Jeff Hecht
2.	Optical Communication	J Paulis
3.	An Introduction to Optical Fibers	Allen H Cherin
4.	Optoelectronics- An introduction	J Wilson & Hawkes
5.	Fiber Optics & Optoelectronics	Peter K Cheo
6.	Optical Communication Systems	John Gowar
7.	Optical Fiber Communication	Gerd Keiser
8.	Optical Communication	Senior J.M.

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LINEAR INTEGRATED CIRCUITS & DESIGN

CODE EF 307	L	T	P
EB307/ EL 307	2	--	2

RATIONALE

Integrated circuits are essential part of modern electronics / IC fabrication method, operational amplifier, Timer chip, PLL, are advanced technological devices, which reduces the cost and size of circuits. This curriculum helps the student to learn the same.

CONTENTS

1. IC Fabrication :

1.1 Basic monolithic integrated circuit
1.2 General IC processing steps

1.2.1 Epitaxial growth
1.2.2 Masking and etching
1.2.3 diffusion of impurity
1.2.4 Metallization

1.3 Transistor for monolithic circuit
1.4 Monolithic diode
1.5 Integrated resistor
1.6 Integrated capacitor
1.7 Concept of SSI, MSI, LSI and VLSI

2. Operational Amplifier :

2.1 OP AMP, symbol, equivalent circuit and characteristics.
2.2 Differential amplifier and its configurations
2.3 Working of emitter coupled differential amplifier
2.4 Characteristics of ideal and practical OP-AMP
2.5 Block diagram of OP AMP
2.6 Inverting and non-inverting OP AMP
2.7 OP AMP parameters and their measurements
2.8 Off set null techniques
2.9 OP AMP applications as :

2.9.1 Adder, subtractor, differential amplifier and instrumentation amplifier
2.9.2 Differentiator and integrator
2.9.3 Peak detector, precision rectifier
2.9.4 Log and anti log amplifier
2.9.5 Wein bridge and RC phase-shift oscillator
2.9.6 Pulse, square, triangular and sawtooth wave generator
2.9.7 Comparator and Schmitt trigger
2.9.8 Active filters (single order) – LPF and HPF
2.9.9 Sample and hold circuit
2.9.10 Frequency selective amplifiers

3. Timer Chip 555 :

3.1 Functional block diagram and working
3.2 555 Applications as -

3.2.1 Saw tooth generator
3.2.2 BMV, AMV and MMV
3.2.3 PWM and PPM

4. **Voltage Regulation :**

   4.1 Need of voltage stabilisation
   4.2 Transistor series voltage regulator – open loop and close loop
   4.3 Short circuit and overload protection circuit
   4.4 Functional diagram of IC voltage regulator chip (fixed and variable) 723 and 78XX, 79XX
   4.5 Voltage regulator using OP-AMP

5. **Phase Locked Loop :**

   5.1 Block diagram, working and uses of PLL
   5.2 Application for frequency multiplication translation and division
   5.3 FM demodulation

6. Design of Digital Circuits :

   6.1 2 bit simultaneous analog to digital converter
   6.2 Multi range DVM using suitable IC
   6.3 Design of Digital Clock
   6.4 Design of 2-digit low frequency counter
   6.5 Design of traffic light controller using ICs

PRACTICALS

1. Study of IC 741 OP AMP
2. Design and test the null circuit for OP AMP
3. Design and test an adder and subtractor circuits using OP AMP
4. Design and test an integrator and differentiator circuit using OP AMP
5. Wein bridge and RC phase shift oscillator using OP AMP
6. Design and test a Schmitt trigger circuit using OP AMP
7. Assemble and test a square wave generator and pulse generator circuit using OP AMP
8. Assemble and test a triangular wave generator circuit using OP AMP
9. Design and test a BMV and Schmitt trigger circuits using 555
10. Design and test a MMV and precision timing circuit using 555.
11. Design and test a AMV and a square wave generator circuit using 555
12. Assemble and test high and low voltage regulator using 723 IC
13. Assemble and test a fixed positive and negative voltage regulator using 78XX, 79XX ICs.
14. study of PLL 565 as a FM demodulator

REFERENCE BOOKS :

1.	OP AMP & Linear ICs	Gyakwar
2.	Integrated Circuits	Botkar
3.	Interested Circuits	Millman Halkias
4.	OP AMP & Linear ICs	Caughlin & Driscoll
5.	Pulse Circuit	Rajul Singhal
6.	Linear Integrated Circuit & Application	Dr. Y. Venkataramani(ISTE)

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OPTO-ELECTRONICS, DIGITAL AND MICROWAVE ENGINEERING

CODE EF 308

L	T	P
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RATIONALE

The role of opto-electronic devices is finding great importance in emerging technology. Microwave engineering is the basis of communication in present scenario. The course is compatible to the satisfy the industry demands.

CONTENTS

1. Introduction to opto-electronics :

- 1.1 Birefriengence
- 1.2 Optical activity
- 1.3 Kerr modulators
- 1.4 Scanning and switching
- 1.5 Magneto optic, electro optic and acousto optic effect

2. Integrated Optics :

- 2.1 Concepts of integrated optics (IO)
- 2.2 Planar wave-guides IO
- 2.3 Beam splitters, couplers and switches
- 2.4 Modulators
- 2.5 Optical bi-stability and digital optics

3. Pulse Modulation System :

- 3.1 General description of PAM, PWM, PPM
- 3.2 Pulse code modulation
  - 3.2.1 Sampling and sampling theorem
  - 3.2.2 Quantization - uniform and non uniform (definition, different between them)
  - 3.2.3 Quantization noise
  - 3.2.4 PCM reconstruction
- 3.3 Basic principle and block diagram of Delta modulation

4. Digital Communication System :

- 4.1 Block diagram of digital communication system
- 4.2 Multiplexing FDM and TDM
- 4.3 Bit, Word and Frame synchronization
- 4.4 Digital modulation techniques
  - 4.4.1 ASK
  - 4.4.2 FSK
  - 4.4.3 PSK
- 4.5 MODEM

5. Microwave :

- 5.1 Introduction
- 5.2 Microwave region and bands
- 5.3 Advantage and applications

6. Microwave Vacuum Tube Devices :

6.1 Construction, working principle and application of :

6.1.1 Klystron
6.1.2 Reflex klystron
6.1.3 Magnetron
6.1.4 Travelling wave tube

7. Microwave Measurements :

7.1 Introduction
7.2 Measurement of frequency and wavelength

7.3 Measurement of power

7.3.1 Calorimeter
7.3.2 Bolometer

7.4 Measurement of VSWR
7.5 Q Measurement
7.6 Noise Figure measurement

REFERENCE BOOKS :

1. Optoelectronics- An Introduction — J Wilson & Hawkes
2. Optical Communication System — C.P. Sandbank
3. Optical Communication System — Subir Kumar Sarkar
4. Optical fibre Communication System — Jophn M. Senior
5. Electronic Communication System — Taub & Schilling
6. Microwave Engineering — Chatterjee
7. Microwave Engineering — A. Das & S.K. Das
8. Microwave Devices & Circuits — S.Y. Liao
9. Microwave Principles — Herbert J. Reich
10. Microwave Components & Measurement — A.J. Wheller
11. Electronic Communication System — G. Kennedy
12. Microwave Engineering — Collins

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COMPUTER COMMUNICATION

CODE EF 309 L T P
EL 309 2 2/2 --

RATIONALE

Today most urge of computer communication in Internet is for transferring files, video, sound, image and text at remote place. This subject has global utility in most of the field. The knowledge of subject will enable the student to work in organization having such type of facilities.

CONTENTS

1. Introduction :
- 1.1 Need of computer communication
- 1.2 Analog and Digital data transmission
- 1.3 Brief idea of transmission media - guided and wireless

2. Network Fundamental :
- 2.1 Network topology
- 2.2 General idea of LAN, MAN and WAN
- 2.3 Internet working
- 2.4 Switching techniques and their comparison
  - 2.4.1 Circuit switching
  - 2.4.2 Message switching
  - 2.4.3 Packet switching
- 2.5 Simple idea of MODEM
- 2.6 Brief idea of ISDN

3. Data Link and Medium Access :
- 3.1 Framing
- 3.2 Error detection and correction – cyclic redundancy check
- 3.3 Retransmission techniques
  - 3.3.1 Retransmission strategies
  - 3.3.2 Sliding window protocol
- 3.4 Medium Access Techniques
  - 3.4.1 CSMA and CSMA – CD
  - 3.4.2 ALOHA and Slotted ALOHA

4. Backbone Networks :
- 4.1 Routing Concepts
  - 4.1.1 Shortest path
  - 4.1.2 Flooding
- 4.2 Concentrators (HUB)
- 4.3 Bridges and Routers
- 4.4 Congestion control – basic concept – leaky bucket technique

5. Network Protocols :
- 5.1 Concept and functions
- 5.2 HDLC
- 5.3 ISO-OSI reference model
- 5.4 X.25 interface
- 5.5 TCP/IP model

REFERENCE BOOKS :

1. Computer Networks — A.S. Tenenbaum
2. Data & Computer Communication — W. Stallings
3. Computer Communication Networks — A. Shanmugam & S. Rajeev
4. Computer Communication — J. Martin
5. Introduction to Data Communication — M. Miller
6. Data Network & Open System — Halsall

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MANAGEMENT & ENTREPRENEURSHIP

CODE EF 310

Common to all branches except CC/CE/CS/EE/ IT/MA/MR

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RATIONALE

To achieve the target and goals in an organisation it is essential to co-ordinate the entire system. For this purpose the knowledge of principles of management, human resources development, material management and financial management is required.

Entrepreneurship will introduce the students about how to set up a small-scale industry. The subject includes the procedure for how to select, proceed and start the SSI, which also involves a concrete market survey report and project formulation.

CONTENTS

1. Principles of Management :

1.1 Management, administration and organisation, difference between them.
1.2 Scientific management : Meaning, characteristics, object and advantage : Taylor's scientific management – Fayol's principles of management, functions of management
1.3 Types of ownership, sole trading, partnership, joint stock, co-operative and public enterprise
1.4 Types of organisation, different types and their charts.
1.5 Importance of human relation professional ethics
1.6 Need for leadership, leadership qualities
1.7 Motivation

2. Human Resources Development :

2.1 Introduction, object and functions of human resource development department
2.2 Recruitment, sources and methods of selection, need for effective training, method of training, duties of supervisor / Formen, Role of HRD in industries.

3. Wages and Incentives :

3.1 Definition and requirements of a good wage system methods of wage payment
3.2 Wage incentives - type of incentive, difference in wage incentive and bonus. incentive to supervisor.

4. Material Management :

4.1 Purchasing Functions and duties of purchase department organisation of purchase department, methods of purchasing, purchase order contracts, legality of contracts types of contracts i.e. piece work contract, lumpsum contract, item rate contract, percentage contract, merits and limitation of each contract system, departmental execution of works, rate contract - D.G.S & D and C.S.P.O. tender, necessity, types of tenders, tendering procedure, earnest money and security money
4.2 Store and store keeping : Functions and duties of store department, location and layout of store, bin cards, store ledger, receipt and issue procedure of materials, physical verification of stores, disposal method of unserviceable articles and protection of stores.
4.3 Sales : function and duties of sales department sales promotion advertisement service after sales.

5. Financial Management :

5.1 Function and duties of finance department
5.2 Brief idea of journal, ledger, trial balance, trading account, profit and loss account, balance sheet.
5.3 Cheques (crossed and bearer), draft, promissory note, letter of credit, brief idea of cost accounting.

5.4 Numerical problems.

6. Marketing Management :

6.1 Concept of Marketing
6.2 Problems of Marketing
6.3 Pricing policy
6.4 Distribution channels and methods of marketing

7. Entrepreneurship :

7.1 Entrepreneurship and Entrepreneur
7.2 Need of Employment and Opportunities.
7.3 Essential Characteristics of a good Entrepreneur
7.4 Industrial Policy.
7.5 Classification of industries- Tiny, small scale , Medium scale, Large scale, Handicraft, Ancillary
7.6 Type of industries- Production, Job based & Service

8. Entrepreneurial Development :

8.1 Product identification/ selection
8.2 Site selection
8.3 Plant layout
8.4 Institutional support needed
8.5 Pre-market survey

9. Entrepreneurship Support System:

9.1 Role of District Industries Centre in setting up industry
9.2 Function of NSIC, SISI, NISIET, NRDC, SSIC, SIDO, NMTC, KVIC, RSMML.
9.3 Role of state finance corporation, state electricity corporations, pollution control board, BIS, I.S.O. etc.

10. Setting up SSI :

10.1 Registration of SSI
10.2 Allotment of land by RIICO
10.3 Preparation of project report
10.4 Structure of organisation
10.5 Building construction
10.6 Establishment of machines

11. Tax System and Insurance :

11.1 Idea of income tax, sales tax, excise duty and custom duty
11.2 Industrial and fire insurance, procedure for industrial insurance.

12. Financial Sources for SSI :

12.1 Various institutions providing loans for industries
12.2 Various types of loans
12.3 Subsidies

13. Labour Legislation and Pollution Control Acts :

13.1 Industrial acts : factory act 1948
13.2 Workmen's compensation act 1923
13.3 Apprentices act 1961
13.4 Water pollution contract act 1974 and 1981
13.5 Air pollution contract act 1981
13.6 Environmental protection act 1986
13.7 Forest (animal conservation act 1972)

13.8 Pollution control provisions in motor vehicle act.

14. Project Report :

14.1 Procedure of preparing a project report
14.2 Format of project report
14.3 Preparation of project report for some SSI items

15. ISO : 9000 Series of Quality System :

15.1 Definition of few important terms related to ISO quality system
15.2 Various models for quality assurance in ISO : 9000 series
15.3 Various elements of ISO : 9001 model (20 points)
15.4 Benefits by becoming an ISO : 9000 company
15.5 Introduction to total quality management (TQM)

REFERENCE BOOKS :

1.	Industrial Management	V.K. Sharma & O.P. Harkut
2.	Industrial Engg. & Management	O.P. Khanana
3.	Industrial Engg. & Management	T.R. Banga
4.	Hand Book of Small Scale Industry	P.M. Bhandari
5.	Hand Book on Entrepreneurship Development	O.P. Harkut
6.	Entrepreneurial Development	S.S. Khanka
7.	Statistical Quality Control	Mahohar Mahajan
8.	ISO : 9000 Quality System	S. Dalela

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