GOVERNMENT OF RAJASTHAN
BOARD OF TECHNICAL EDUCATION, RAJASTHAN, JODHPUR
TEACHING AND EXAMINATION SCHEME FOR
Diploma III Year (ELECTRONICS ENGINEERING)
ANNUAL SCHEME SESSION 2012-2013 & **ONWARDS**

Code No.	Subject	Distribution of Time				Distribution of Max. Marks/ Duration							Total Marks
		Hours per week				Board's Exam.				Sessionals			
		L	T	P	Tot	TH	Hrs.	PR	Hrs.	CT	TU	PR(S)	
*EL 301	Electronic Circuits	2	--	2	4	70	3	50	3	30	--	50	200
*EL 302	Advance Microprocessor & Microcontroller	2	--	2	4	70	3	50	3	30	--	50	200
EL 303	Advance Communication System	2	--	2	4	70	3	--	--	30	--	50	150
EL 304	Microwave & Optical Fiber Engineering	2	2/2	--	3	70	3	--	--	30	50	--	150
*EL 305	Power & Industrial Electronics	2	--	2	4	70	3	50	3	30	--	50	200
*EL 306	Biomedical Instrumentation	2	--	2	4	70	3	--	--	30	--	50	150
*EL 307	Linear Integrated Circuits & Design	2	--	2	4	70	3	50	3	30	--	50	200
EL 308	Telecommunication & Switching Networks	2	2/2	--	3	70	3	--	--	30	50	--	150
*EL 309	Computer Communication	2	2/2	--	3	70	3	--	--	30	50	--	150
*EL 310	Management &Entrepreneurship	2	1	--	3	70	3	--	--	30	50	--	150
	PROJECT	--	--	--	--	--	--	100	--	--	--	--	100
	Total	20	4	12	36	700	--	300	--	300	200	300	1800

Grand Total : **1800**

1. L :Lecture
2. T :Tutorial
3. P :Practical
4. TH :Marks for Board Examination for Theory
5. PR : Marks for Board's Examination for Practicals
6. CT : Marks for Class Tests
7. TU : Marks for Tutorials
8. PR(S) : Marks for Practical and Viva

*EL 301/ EL 302 / El 307 / EL 309 Same as EF 301/ EF 302 / EF 307 / EF 309
*EL 305 same as EF305/IE305
*EL 306 same as IE306
*EL 310 Common to all branches except CC/CE/CS/EE/ IT/MA/MR

ELECTRONIC CIRCUITS

CODE EL 301   L   T   P
       EF 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 EL 302   L   T   P

        EF 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
2.   Micro Computer Systems The 8086/8088 Family   Liu & Gibson

3.   An Introduction to Microprocessors   A.P. Mathur
4.   Microprocessor Architecture & Organization   Gaonkar
5.   Introduction to 8086/8088 Microprocessor   Douglus V. Hall
6.   The 8051 microcontroller   Ayala Kenneth
7.   Microcontrollers: Fatures & Application   D. S. Yadav, A.K. Singh

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ADVANCE COMMUNICATION SYSTEM

CODE EL 303
                                                                                L   T   P
                                                                                2   --   2

RATIONALE

With the need of more number of channels for faster and accurate communication over long distances being increasing, it is essential to know about Advance communication system like satellite communication and optical fibre communication. The curriculum in this subject aims at providing the foundation   in Advance communication system.

CONTENTS

1.   Pulse Modulation :

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, difference between them)
        3.2.3   Quantization noise
        3.2.4   PCM reconstruction

3.3   Basic principle and block diagram of Delta modulation
3.4   Basic principle and block diagram of Adaptive Delta modulation

2.   Digital Communication :

4.1   Block diagram of Digital Communication system
4.2   Multiplexing - FDM, TDM

        4.2.1   Basic concept of synchronisation

4.3   Basic idea of digital modulation techniques

        4.3.1   ASK
        4.3.2   FSK
        4.3.3   PSK, QPSK

4.7   Comparison of analog and digital communication

3.   Information Theory :

1.1   Amount of information
1.2   Average information
1.3   Entropy
1.4   Information rate
1.5   Channel capacity
1.6   Shannon Hartley theorem (No formula derivation)
1.7   Brief idea of coding

4.   Facsimile System :

5.1   Introduction
5.2   Use of facsimile
5.3   Facsimile transmitter
5.4   Facsimile receiver
        5.4.1   Synchronization
        5.4.2   Phasing

5.4.3   Photographic recording
5.4.4   Directing recording

5.   Satellite Communication :

2.1   Concept of satellite communication
2.2   Idea of satellite orbits
2.3   Operating frequency consideration
2.4   Basic idea of transponder
2.5   Path loss calculation
2.6   Multiple access techniques – basic idea
2.7   Simple block diagram of earth station
2.8   Advantage and limitations of satellite communication
2.9   Application of satellite communication
2.10   Introduction to DTH system

6.   Mobile Communication :

4.1   Limitation of conventional mobile telephone system
4.2   Basic concept of cellular telephone system
4.3   Operating frequency consideration of cellular telephone system
4.4   Basic concept of frequency reuse technique
4.5   General formula for mobile radio propagation
        (Path characteristics - no derivation)
4.6   Hand off mechanism
4.7   Consideration of the components of cellular system

PRACTICALS

1.   Study of PCM generation and reconstruction
2   Study of FAX machine
3   Study of satellite receiver.
4   Visit of satellite earth station.
5   Study of cellular telephone hand set.
6   Visit of Cellular Base station.
7   Study of TDM
8   Study of FDM
9   Study of Delta Modulation
10   Study of Adaptive Delta Modulation
11   Generation & detection of PWM signal
12   Generation & detection of PPM signal
13   Generation & detection of ASK signal
14   Generation & detection of PSK signal
15   Generation & detection of FSK signal
16   Study of DTH system

Reference Books :

1. Sattelite Communication   D.C.Agrawal Khanna Publishers
2. Sattelite Communication   Pratt
3. Communication Systems   George Kennady

4. Electronic Communication(PHI)   Roody,Coolen
5. Principles of Communication   Taub,Schilling
6. Mobile Cellular Telecommunication   William,C.Y.Lee
7. Information Technology   Dennis,Foley,Sen and Morin
8. Principles of Wireless Communication   Rappaport

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MICROWAVE AND OPTICAL FIBER ENGINEERING

CODE EL 304   L   T   P
                                                                                                 2   2/2 --

RATIONALE

Microwave and optical fiber engineering is widely used for long distance telephone communication, cellular, telephone, television, satellite and others. This subject provides adequate knowledge of microwave device, microwave measurement and microwave communication.

CONTENTS

1.   Microwave :

1.1   Introduction
1.2   Microwave region and bands
1.3   Advantage and applications

2.   Microwave Vacuum Tube Devices :

2.1   Construction, working principle and application of :

2.1.1   Klystron
2.1.2   Reflex klystron
2.1.3   Magnetron
2.1.4   Travelling wave tube

3.   Microwave Solid State Devices :

3.1   Construction, working principles and application of :

3.1.1   PIN Diode
3.1.2   Tunnel Diode
3.1.3   Gunn Diode
3.1.4   IMPATT Diode

4.   Microwave Components :

4.1   Rectangular and circular wave guides
4.2   T junction
4.3   Magic TEE
4.4   Couplers
4.5   Duplexer
4.6   Rotating joints
4.7   Wave guide terminations
4.8   Attenuators
4.9   Wave guide bends, Corners and Twist
4.10   Wave guide irises
4.11   Post and tuning screws
4.12   Coupling probes and coupling loops

5.   Microwave Measurements :

5.1   Introduction
5.2   Measurement of frequency and wavelength
5.3   Measurement of power

5.3.1   Calorimeter
5.3.2   Bolometer

5.4   Measurement of VSWR
5.5   Q Measurement
5.6   Noise Figure measurement

6. **Optical Fibre Communication :**

6.1   Block diagram of optical fibre communication
6.2   Guided light system
6.3   Acceptance angle
6.4   Numerical aperture
6.5   Attenuation in optical fibre
6.6   Dispersion in optical fibre (BW consideration)
6.7   Type of optical fibre

    6.7.1   Single mode
    6.7.2   Multi mode

6.8   Light source – basic principle and working

    6.8.1   LED
    6.8.2   Laser diode

6.9   Light detector – basic principle and working

    6.9.1   PIN diode
    6.9.2   Avalanche photo diode

6.10   Brief idea of coupler and splicer
6.11   Advantage and disadvantage of optical fibre communication system

REFERENCE BOOKS :

1.   Microwave Engineering   Chatterjee
2.   Microwave Engineering   A. Das & S.K. Das
3.   Microwave Devices & Circuits   Liao
4.   Microwave Principles   Herbert J. Reich
5.   Microwave Components & Measurement   A.J. Wheller
6.   Electronic Communication System   G. Kennedy
7.   Microwave Engineering   Collins
8.   Introduction to Radar System   Skolnik
9.   Optical Communication System   C.P. Sandbank
10. Optical Communication System   Subir Kumar Sarkar
11. Optical fibre Communication System   John M. Senior

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POWER AND INDUSTRIAL ELECTRONICS

CODE EL 305   L   T   P

 EF 305/IE305   2   --   2

ʟRATIONALE

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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BIO- MEDICAL INSTRUMENTATION

CODE EL 306   L   T   P
      IE 306   2   --   2

RATIONALE

In view of the growing need for medical electronic technician to operate, maintain and service the electronic equipment used in diagnosis & treatment of diseases. Medical science is fully dependent on Electronics Engineering. Almost all-medical equipment's are nowaday electronics based. Therefore the knowledge of this subject will be useful.

CONTENTS

1.   Introduction to Physiology :

    1.1   Physiological systems of the human body
    1.2   Nerve physiology
    1.3   Mechanism of respiration
    1.4   Generation, propagation and distribution of action potentials

2.   Medical Electrodes :

    2.1   Introduction
    2.2   Bio-electrode theory
    2.3   Types of electrodes and implantation

        2.3.1   Microelectrode
        2.3.2   Body surface electrode
        2.3.3   Needle electrode

3.   Bio Medical Recording System :

    3.1   Introduction
    3.2   Construction of centre type PMMC Galvanometer
    3.3   Recording mechanism
    3.4   Writing techniques and recorder problems
    3.5   Constructional features of strip chart recorder
    3.6   Recorder electronics
    3.7   Stylus protection technique
    3.8   X-Y recorder

4.   Electro Cardiograph (E.C.G.) :

    4.1   Electrical activity of heart and its construction
    4.2   Block diagram of E.C.G. machine
    4.3   ECG electrodes
    4.4   Lead configuration
    4.5   ECG electronics
    4.6   ECG controls
    4.7   Heart rate measurement
    4.8   Artefacts and troubleshooting
    4.9   Principle of recording other bioelectric events like EEG and EMG

5.   Pace Makers :

    5.1   Need
    5.2   Classification
    5.3   Block diagram of Demand pacemaker
    5.4   Basic circuit of fixed rate and synchronous pacemaker

6. **Blood Pressure Monitoring :**

6.1 Blood circulation system
6.2 Blood pressure waveform
6.3 Blood pressure measurement techniques

6.3.1 Direct
6.3.2 Indirect

6.4 Circuit diagram of B.P. processor to indicate diastolic - systolic blood pressure

7. **Defibrillator :**

7.1 Need

7.2 Types of defibrillator

7.2.1 A.C. defibrillator
7.2.2 D.C. defibrillator

7.3 Basic defibrillator circuits and control circuits
7.4 Lawn waveform and its synchronization
7.5 Operating controls and precautions

8. **Biomedical Instruments :**

8.1 Blood Gas analyser
8.2 Densitometer
8.3 Flame photometer
8.4 Blood flow meter
8.5 Skin and systemic body temperature measurement
8.6 X- Ray machine

8.6.1 Tube construction and housing
8.6.2 High voltage power source
8.6.3 Block diagram of X-Ray machine
8.6.4 Image intensifier

8.7 Concept of Sonography
8.8 Concept of CT Scan
8.9 Concept of Magnetic Resonance Indication (MRI)
8.10 Concept of Laproscopic surgery

9. **Bed Patient Monitoring System :**

9.1 Introduction
9.2 ICU/ CCU systems

10. **Introduction to Bioinformatics :**

11. **Use of Nanotechnology in biomedical (Brief idea)**

PRACTICALS

1. Study of different types of electrodes
2. Study of different types of recorders
3. Study of ECG machine
4. Measurement of blood pressure using indirect method.
5. Study of blood pressure amplifier
6. Measurement of skin systemic temperature
7. Study of pacemakers
8. Visit to clinical laboratory or hospital
9. Visit to a hospital for X-ray machine / Sonography / CT scan.
10. Visit to ICU/ CCU of hospital

REFERENCE BOOKS :

1. Bio Medical Instrumentation   K.R. Nahar
2. Bio Medical Instrumentation   Chrompbell
3. Electronics for Medical Personnel   Buckstein
4. Servicing Medical &Bioelectronics Equipments   Carl J.J.
5. Medical Electronics   Khandpur
6. Nanotechnology: fundamentals & Applications   Manasi Karkare

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LINEAR INTEGRATED CIRCUITS & DESIGN

CODE EL 307   L   T   P
       EF 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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TELECOMMUNICATION & SWITCHING NETWORKS

CODE EL 308
<div align="right">L   T   P
2   2/2   --</div>

RATIONALE

The objective of this subject is to provide the knowledge of modern telephone system and detailed study about the electronic switching. This subject will impart the adequate knowledge to students before they enter in the vast growing field of communication system.

CONTENTS

1. Introduction :

1.1   Evaluation of telecommunication - Definition of source, destination, subscriber - calling and called. Link,
1.2   switching system, fully connected network and switching office.
1.3   Types of automatic telephone exchange
1.4   Various tone used in automatic telephone exchange
1.5   Basics of a switching system.
1.6   Electronic telephone hand set
1.7   Block diagram of cordless phone system
1.8   Brief idea of EPABX

2. Electronic Space Switching :

2.1   Introduction
2.2   Basic block diagram
2.3   Stored programmed control (SPC)

    2.3.1   Centralised SPC - Various modes, single processor and dual processor. Availability and unavailability of system
    2.3.2   Distributed SPC - Level of processing
    2.3.3   Idea of software architecture
    2.3.4   Idea of application software
    2.3.5   Enhanced services
    2.3.6   Two stage network
    2.3.7   Two stage representation of N x N Network
    2.3.8   Calculation of switching element and switching capacity for two stage network
    2.3.9   Three stage network - block diagram

3. Time Division Switching :

3.1   Introduction
3.2   Basic time division space switching
3.3   Switching capacity
3.4   Input controlled time division space switch
3.5   Output controlled time division switch
3.6   Basic time division time switching
3.7   Time multiplexed space switching
3.8   Source multiplexing and destination multiplexing
3.9   Time multiplexed time switching
3.10   Combination switching basic concept

    3.10.1   Two stage TS switch
    3.10.2   Three stage combinations switching - STS and TST

4.   **Traffic Analysis :**

    4.1   Network traffic load and parameters
    4.2   Grade of service and blocking probability
    4.3   Idea of Markov process
    4.4   Incoming traffic and service time characteristics
    4.5   Idea of delay system

5.   **Brief Idea of :**

    5.1   PSTN
    5.2   LAN
    5.3   MAN
    5.4   WAN

REFERENCE BOOKS :

1. Telecommunication Switching & Network   Tyagrajan
2. Digital Telephony   Bellamy
3. Telecommunication & Switching Network   Bishwanathan
4. Computer Communication   Tannenbaum
5. Data & Computer Network   William Stalling
6. Telephony   N.N. Biswas
7. Telephony   P.N. Das

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COMPUTER COMMUNICATION

CODE EL 309
EF 309

L   T   P
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 EL 310   **L   T   P**
Common to all branches except CC/CE/CS/EE/ IT/MA/MR   2   1   --

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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