

IIIrd & IV Semester B.E.  
(Electronics & Telecommunication /  
Industrial Electronics )

Prospectus No. 101719

संत गाडगे बाबा अमरावती विद्यापीठ  
SANT GADGE BABA AMRAVATI UNIVERSITY

(FACULTY OF ENGINEERING & TECHNOLOGY)

## PROSPECTUS

PRESCRIBED FOR  
FOUR YEAR DEGREE COURSE  
BACHELOR OF ENGINEERING  
ELECTRONICS & TELECOMMUNICATION /  
INDUSTRIAL ELECTRONICS ENGINEERING  
THIRD & FOURTH SEMESTER  
EXAMINATIONS, 2009-2010  
SEMESTER PATTERN



2009

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1  
SYLLABUS

PRESCRIBED FOR

THIRD & FOURTH SEMESTERS B.E. EXAMINATIONS

ELECTRONICS AND TELECOMMUNICATION /

INDUSTRIAL ELECTRONICS

THIRD SEMESTER

3SULI1

MATHEMATICS - III

SECTION-A

UNIT-I Ordinary differential equations:- Complete solution, Operator D, Rules for finding complementary function, the inverse operator, Rules for finding the particular integral, Method of variations of parameters, Cauchy's and Legendre's linear differential equations (10 Hrs.)

UNIT-II Laplace transforms: definition, standard forms, properties of Laplace transform, inverse Laplace transform, initial and final value theorem, convolution theorem, Laplace transform of impulse function, Unit step function, Laplace transforms of periodic function, solution of Linear differential equations, Simultaneous differential equation by Laplace transform method. (10 Hrs.)

UNIT-III a) Difference equation:- solution of difference equations of first order, Solution of difference equations of higher order with constant co-efficients,  
b) Z-transform:- Definition, standard forms, Z-transform of impulse function, Unit step functions, Properties of Z-transforms (linearity, shifting, multiplication by k, change of scale), initial and final values, inverse Z-transforms (by direct division and partial fraction), Solution of difference equation by Z-transforms. (10 Hrs.)

SECTION-B

UNIT-IV a) Fourier transforms- Definition, standard forms, inverse Fourier transforms, properties of Fourier transforms, convolution theorem, Fourier sine and Fourier cosine transforms and integrals.  
b) Partial differential equation of first order of following form-  
(i)  $f(p,q)=0$ ; (ii)  $f(p,q,z)=0$ ; (iii)  $f(x,p)=g(y,q)$ ; (iv)  $Pp+Qq=R$  (Lagrange's Form); (v)  $Z=px+qy+f(p,q)$  (Clairaut form  
Statistics:

2

Binomial, Poisson and Normal Distribution. (10 Hrs.)

UNIT-V Complex Analysis :- Functions of complex variables, Analytic function, Cauchy-Reimann conditions, Harmonic function, Harmonic conjugate functions, Milne's method, conformal mappings translation, rotation, magnification, inversion and bilinear transformation), singular points, expansion of function in Taylor's and Laurent's series. Cauchy's integral theorem and formula, Residue theorem. (10 Hrs.)

UNIT-VI Vector calculus:- Scalar and vector point functions, Differentiation of vectors, Curves in space, Gradient of a scalar point function, Directional derivatives, Divergence and curl of a vector point function and their physical meaning, expansion formulae (with out proof), line, surface, volume integrals, irrotational and solenoidal vector fields, Stoke's and Divergence theorem (without proof). (10 Hrs.)

BOOKS RECOMMENDED:-

- 1) Elements of Applied Mathematics by P.N. Wartikar and J.N. Wartikar
- 2) A text book of Differential Calculus by Gorakh Prasad.
- 3) Engg. Mathematics by Chandrika Prasad.
- 4) Advancing Engg. Mathematics by E.K. Kreyzig.
- 5) A text book of Applied Mathematics by P.N. Wartikar and J.N. Wartikar.
- 6) Higher Engg. Mathematics by B.S. Grewal.
- 7) Control System by Gopal and Nagrath.
- 8) Integral Transforms by Goyal & Gupta.

3SULI2 ELECTRONIC DEVICES AND CIRCUITS-I

SECTION-A

UNIT-I P-N Junction diode theory, Rectifiers - Half wave, full wave and bridge. Filters-C, LC and their analysis, Zener diode and its applications.

UNIT-II Theory and Analysis of BI Junction transistor, 'H' Parameter, Methods of biasing, their needs, 'Q' and stability factor.

UNIT-III Study of typical transistor amplifier circuits:

- i) Emitter follower,
- ii) Darlington emitter follower.

- iii) Bootstrap emitter follower,
- iv) RC coupled amplifier,
- v) Transformer coupled amplifier,
- vi) Cascaded amplifier,
- vii) Direct coupled amplifier,
- viii) Cascade stage.

### SECTION-B

- UNIT-IV Class 'A', 'B', 'AB' and 'C' amplifiers, Configuration of audio amplifiers, Calculations of power gain, efficiency, power dissipation and distortion, Oscillators, their criteria, Hartley, Colpitt and R-C oscillators, Crystal oscillator,
- UNIT-V Theory, construction and applications of Schottky diode, Tunnel diode, Varactor diode, Selenium diode, LED, Photo diode, PIN diode, photo-transistor.
- UNIT-VI FETs (JFET & MOSFET):  
Types, Characteristics and parameters ( $\mu$ ,  $g_m$  &  $R_{ds}$ ), Biasing of FET Amplifiers, UJT: Characteristics, working, UJT as relaxation oscillator.

### BOOKS RECOMMENDED:

- 1) Milliman H. and Halkies: "Integrated Electronics", Tata Mc-Graw Hill Book Co., New Delhi.
- 2) Mottershead Allen: "Electronics Devices & Circuits" Prentice Hall of India Private Limited, New Delhi, 1986.
- 3) Boylestad R. and "Electronics Devices & Circuits", Prentice Hall of India Private Limited, New Delhi (Fifth Edition), 1993.
- 4) Ramanan K.V.: "Functional Electronics", Tata Mc-Hill Publication Co. Ltd., New Delhi, 1989.
- 5) Milliman S., Tube H. and Halkies: "Electronics Devices & Circuits", Mc-Graw Hill Int. Co., Auckland, 1982.

### PRACTICALS-I

### 3SULI2- ELECTRONIC DEVICES AND CIRCUITS-I

#### LIST OF EXPERIMENTS

Experiments based on -

- | Topic   | Nos. |
|---|------|
| 1) Characteristics of Devices<br>(Such as diode BJT, FET etc) | 02   |

- |                              |    |
|------------------------------|----|
| 2) Rectifiers & Filters      | 03 |
| 3) Transistorized Amplifiers | 02 |
| 4) Oscillators               | 03 |
| 5) Special Devices           | 02 |

Minimum 8 Experiments to be conducted from above. Minimum one experiment from each topic

### 3SUL3

### ELECTRO MAGNETIC FIELDS

#### SECTION-A

#### UNIT-I ELECTROSTATICS:

Introduction to cylindrical and spherical coordinate systems. Electric field intensity, flux density, Gauss's law, divergence, divergence theorem, Electric potential and potential gradient.

#### UNIT-II MAGNETOSTATICS:

Current density and continuity equation, B-S law, Ampere's circuital law and applications, Flux density, Scalar and Vector magnetic potentials. Maxwell's equations for steady fields.

#### UNIT-III MAXWELL'S EQUATIONS AND BOUNDARY CONDITIONS:

Maxwell's equations for time varying fields. Electric and magnetic boundary conditions.

#### SECTION-B

#### UNIT-IV ELECTROMAGNETIC WAVES:

Electromagnetic wave equation, wave propagation in a perfect dielectric, lossy dielectric and perfect conductor. Poynting vector and Poynting theorem. Reflection and refraction of plane wave.

#### UNIT-V WAVEGUIDES:

Rectangular waveguide, TE, TM, TEM waves in rectangular guides. Bessel functions, TE and TM waves in circular waveguides, wave impedance.

#### UNIT-VI RADIATION:

Retarded potential, Electric and magnetic fields due to oscillating dipole (Alternating current element), Power radiated and radiation resistance. Application to short

monopole and dipole. Power radiated and radiation resistance of quarter wave monopole and half wave dipole.

**BOOKS RECOMMENDED:**

- 1) Hayt W.H.: "Engineering Electromagnetics", Tata Mc-Graw Hill
- 2) Jordan E.C. and Balmain K.C.: "Electromagnetic Waves and Radiating System" Prentice Hall of India Private Limited, (Second Edition), 1985.
- 3) Krauss J.D.: "Electromagnetics", Mc-Graw Hill Books Co. (Third Edition), 1984.
- 4) Ramo S. & Whinnery R.: "Fields and Waves in Communication Electronics", John Wiley & Sons, New Delhi, 1984.
- 5) Weeks "Electromagnetic Theory for Engineers", (Wiley).

**3SUL4**

**ELECTRICAL ENGINEERING-III**

**SECTION- 'A'**

- Unit-I : Measurement of resistance: Kelvin Double Bridge, Loss of change method and megger.  
Measurement of Inductance and Capacitance: Maxwell's bridge, Hay's bridge, Anderson's bridge, Schering bridge and Carey Foster bridge. Measurement of Q factor and tan  $\delta$ .
- Unit-II : Measurement of active and reactive power in 3-phase balanced and unbalanced load. Electrodynamic type power factor meter, frequency meter. Watt meter.
- Unit-III : D.C. Motors: Electrical and mechanical characteristics of motor, Speed control methods for constant torque and constant horse power. Performance of D.C. motor under pulsating voltage. Application of D.C. motors.  
Braking-resistance and regenerative.

**SECTION- 'B'**

- Unit-IV : Induction Motors: Characteristics, Speed control methods: Armature voltage, V/f control, rotor control, slip power recovery scheme and applications, plugging, Resistance braking.  
Eddy current coupling, its application.
- Unit-V : Transformers: 3  $\phi$  transformers, rectifier transformers, pulse transformers. Scott connection, Ferrite core transformer. Coils and chokes.
- Unit-VI : Construction, principle of operation, characteristics and applications of: Tachogenerator, (DC & AC), Stepper motor,

A.C. Servo motor 1 $\phi$  induction motors and Universal motor. Two dial D.C. potentiometers-Construction & application.

**BOOKS:**

- i) M.V. Deshpande:- Elements of Electrical Machines.
- ii) A.K. Sawhney:- Electrical and Electronic Measurement and Instrumentation.

**REFERENCE BOOKS:**

- i) E.W. Golding:- Electrical measurement and measuring Instrument, ELBS Pub.
- ii) First Course on Electrical Drives-S.K. Pillai

**PRACTICALS:**

Minimum Eight experiments based on above syllabus.

**3SUL5**

**INSTRUMENTATION**

**SECTION-A**

- Unit I : Transducer & Instrumentation systems (1)  
Transducer classification: Active/Passive. Primary/Secondary. Analog/Digital and transduction Principles.  
Basic Signal conditioning Circuits:- Resis/Capacitive/Inductive reactance bridge. Current/Voltage Sensitive Wheatstone bridges & Generalised instrumentation system with particular examples (9 Hrs)
- Unit II : Static characteristics, errors & statistical parameters: (1)  
Static characteristics: Accuracy, Precision, Sensitivity, Threshold, Resolution, Repeatability and Hysteresis.  
Errors: Gross error, Systematic error, Random error, Limiting error.  
Statistical Parameters: Arithmetic mean Average deviation Standard deviation. Probable error, Histogram, Normal & Gaussian curve of errors (7 Hrs)
- Unit III : Electronics Instrumentation: (1,2,3):  
Analog & Digital data acquisition system, Analog electronic multimeter, Introduction to digital voltmeter & universal counter. Stripchart & X-Y recorders. Optical Encoders. Seismic mass vibration transducer Introductory block diagram of smart sensors. (3) (9 Hrs.)

**SECTION-B**

- Unit IV : Measurement of Temperature & Strain (1,3)  
 Temperature Sensors: LM335, RTD. THERMISTORS, Thermocouples, Thermocouples laws & its compensation methods.  
 Pyrometers: Total/Partial radiation & optical pyrometers.  
 Strain Gauges: Wire factor. Strain measurement & temperature compensation methods.
- Unit V : Measurement of Displacement. Pressure & Level.  
 Displacement Measurement: (1) using resistive, capacitive, inductive (LVDT & RVDT) & Eddy current.  
 Pressure Measurement: (1)  
 Elastic, Inductive, Piezoelectric & capacitive transducers, Low pressure measurement using ionization gauge, Pirani gauge, thermocouple vacuum gauge.  
 Level Measurement: (1,3)  
 Using ultrasonic, capacitive, inductive, resistive with float, gamma rays & eddy currents techniques. (8 Hrs.)
- Unit VI : Measurement of Flow, Humidity, Velocity (1)  
 Flow Measurement: using ultrasonic, electroaquatic & hot wire Anemometer.  
 Humidity Measurement : using resistive, Capacitive & Crystal transducers.  
 Velocity Measurement: Using electroaquatic & photodetectors (both linear & angular velocity)

**Practicals** Minimum Eight experiments based on above syllabus.

**Books Recommended:**

- 1) Sawhney A.K.: A course in Electrical/Electronics Measurement & Instrumentation, Dhanpat Rai & Sons., Delhi.
- 2) Rangan C.S., Sharma G.R., & Mani V.S.V.: Instrumentation Devices & System, Tata Mc-Graw Hill.
- 3) Patranbis D. : 'Sensors & Transducers', A.H. Wheeler & company, Prayag, India.

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**FOURTH SEMESTER****COMMUNICATION THEORY****SECTION-A****UNIT-I****SIGNAL AND NOISE :**

Audio signals, frequency range for speech and music, sound intensity, loudness, level, frequency response, bandwidth, bandwidth requirement for different types of signals such as telegraph, telephone speech, music and video.

**Noise :** External and internal noise, noise figure, signal to noise ratio, noise figure measurement.

**UNIT-II****WAVE PROPAGATOR :**

Electromagnetic waves, Sky waves, ground waves, space waves, Ionosphere, critical frequency, maximum suitable frequency, virtual height, fading, single hop and multi hop propagation, duct propagation, skip distance.

**UNIT-III****ANTENNA:**

Principle of radiation, isotropic, radiator, resonant antenna, Half wave dipole antenna, non resonant antenna, antenna arrays, parasitic reflector, parasitic director, folded dipole, Yagi-uda antenna, antenna power gain, beam width, polarization, bandwidth and radiation resistance.

**SECTION-B****UNIT-IV****DIFFERENT TYPES OF ANTENNA:**

Long wire, helical, rhombic, discone, log periodic, loop antenna, low, medium and high frequency antenna.

**RF TRANSMISSION LINE:**

Parallel and coaxial transmission line, standing wave, characteristic impedance, quarter wave and half wave length line, Smith chart, stub matching and balun.

**UNIT-V****ELECTRO-ACOUSTICS:**

Microphones: different types of microphone, characteristics, construction and principle, operation of carbon, condenser, electric and moving coil microphone.

Loudspeakers: Different types of loudspeakers, construction and principle of operation of horn-type, moving

coil, woofer, tweeter, column speakers, loud speaker enclosures.

**UNIT-VI: RECORDING SYSTEM:**

Sound recording, magnetic recording, optical recording, sound reproduction, Hi-Fi system, stereo phony and quadraphony. Introduction to equalizers, Dolby systems concept, Compact Disc recording & reproduction.

**BOOKS RECOMMENDED:**

- (1) Kennedy G. : "Electronic Communication System" Tata Mc-Graw Hill Co., New Delhi (Third Edition) 1985.
- (2) Collins Dennis, Collins John "Electronic Communications" (PHI)
- (3) Sharma Ajay: "Audio and Video Systems", Dhanpat Rai & Sons, Delhi.

**4SULI2 COMPUTER PROGRAMMING AND APPLICATIONS**

**SECTION-A**

Unit I : Principles of object oriented Programming-ops paradigm, basic concept of op's Benefits of op's, structure of C++ Programming, Basic data types, user defined data type, derived data type operator and control statement.

Unit II : Functions classes and object in C++ Functions, Function over loading, Friend and Virtual Functions, Difference between class and structures tyupes of classes and its use concept of object and its implementation, constructor and destructors.

Unit III : Operator's overloading

Operator and their definition, overloading unary and binary opeator, Rules for overloading operators, overloading binary operators using friends and string manupalation.

**SECTION-B**

UNIT IV- Inheritance and Polymorphism-

Defining derived classes, single and multiple inheritance, multilevel inheritance, member classes pointer to objects, pointer to derived classes, virtual function.

Unit V : **INTRODUCTION TO SPICE/ PSPICE:-**

Description, types, circuit elements, sources, Types of analysis, output commands, Format of files.

**DC CIRCUIT ANALYSIS :** Registers, modelling of elements, Independent & dependent sources, DC output variables, types of DC analysis.

**TRANSIENT ANALYSIS -** Capacitors & Inductors, modelling of transient sources, transient Response.

**AC CIRCUIT ANALYSIS :** AC output variables, AC sources & analysis.

**UNIT VI : SPICE COMMANDS & DEVICES SIMULATION :**

Advanced commands, modelling, and analysis of diode, BJT & FET

**Practicals-** Minimum Eight experiments based on the above syllabus out of which at least four experiments should based on the last two units.

**BOOKS RECOMMENDED :**

- 1) Object Oriented Programming with C++ -E. Balaguruswamy, Tata Mc-Graw Hill publishing Co.Ltd., New Delhi, 1995.
- 2) Object Oriented Programming in Turbo C++ Rober Lofore Galgotia Publications Pvt.Ltd., New Delhi, 1995
- 3) The C++ Programming Language (Third Edition) - Bjarne Stroustrup Pub.Co., New York, 1995 (Addison Wesley)
- 4) C++ Primer - Lipman Stanley B., (Second Edition) New York, Addison Wesely Pub. Company, 1995
- 5) SPICE FOR CIRCUITS AND ELECTRONICS USING PSPICE Muhammad H. Rashid. (PHI).

**4SULEI3 NETWORK ANALYSIS**

**SECTION-'A'**

Unit-I : Basic Circuit elements: Circuit components- assumptions for Circuit analysis, sources of electrical energy-standard input signals- Kirchoff's laws-source transformation- mesh and node analysis-network equation for RLC network-magnetic coupling. (10)

Unit-II : Graph theory and network equation:- Graph of a network-Tress and loops, cut set of a network, Tie-set matrix and loop currents- analysis of network, Network equilibrium equation, dualit-network trasformation. (10)

Unit-III : Laplace transformation and its applications:- Laplace transformations-basic theorems-gate function-Impulse function-Laplace transform of periodic functions.

Solution of linear differential equations-Heaviside's partial fraction expansion-Solution of network problems. (10)

### SECTION-'B'

Unit-IV : Network theorems:- Superposition theorem-Reciprocity theorem, Thevenin's theorem-Norton's theorem-Milliaman's theorem-Max. power transfer theorem-Substitution theorem-Compensation theorem, Tellegen's theorems. (10)

Unit V : Twoport network:- Open circuit impedance parameters-short circuit admittance parameters-Transmission parameters-Inverse transmission parameters-Hybrid and inverse hybrid parameters. interrelationship between the parameters-two port symmetry interconnection of two port networks, input impedance in terms of two-port parameters output impedance-image impedance. (10)

Unit-VI : Network functions:- Ports and terminal pairs-network functions-poles and zeros-necessary conditions for driving point function-necessary conditions for transfer function-Applications of network analysis in driving network functions-positive real functions-driving point and transfer impedance function-LC network (10)

### TEXT BOOK :

Network and systems-D,Roy Choudhary (Wiley Eastern Ltd.1988)

### REFERENCES-

1. Circuit Theory-ISKV Iyer (Tata Mcgraw Hill)
2. Network Analysis, M.E.Van Valkenburg (Prentice Hall India) 3rd Ed.

### PRACTICALS-

About 10 experiments based on above syllabus.

### 4SRULE14 SOCIAL SCIENCES & ENGINEERING ECONOMICS

#### SECTION - A

Unit I : Study of Social Science : Importance to Engineer, salient features of Indian constitution. Fundamental Rights and Duties. Directive Principles of State Policy. (9)

Unit II : Indian Parliament : composition and powers.

President of India : Election and Powers.

Council of Ministers and Prime Minister (9)

Unit III Impact of Science and Technology on Culture and Civilization. Human Society : Community Groups, Social Control : Meaning, Types and Agencies. Marriage and Family : Functions, Types and problems.

### SECTION - B

Unit IV Nature and scope of Economics : Special significance of Economics to Engineers.

Production : Factors of production, Laws of return, Various Economic systems, Forms of Business Organisation. (9)

Unit V : Banking : Functions of Central and Commercial Banks.

Taxation : Principle of taxation, Direct and Indirect taxes.

Market : Forms, perfect and imperfect competition, pricing under perfect and imperfect competition, prices discrimination under monopoly. (9)

Unit VI Economics of Development : Meaning, Characteristics of under development, obstacles to Economic growth and vicious circle of poverty.

Economic Planning : meaning, objective and salient features of current five years plan of India.

Planning horizons, life structuring the alternatives.

Economics of comparison of different alternative projects. (10)

### Books Recommended :

1. Pylee M.V. : Constitutional Govt. in India, S.Chand and Co.
2. Joshi G.N. : The Constitution of India, Macmillan India Ltd.
3. Mahajan : The Constitution of India, S.Chand, New Delhi.
4. Maclaver and Page : Principle of Sociology.
5. Davis K. : Human Society
6. Dewett and Varma J.D. : Elementary Economic Theory, S.Chand and Co.
7. A.N.Agrawal : Indian Economy, Problem of Development and Planning (Wiley Eastern Ltd), New Delhi.
8. S.K.Mishra : Indian Economy, Its Development Experience, Himalaya

Pub.House, Bombay.

9. Datt R.K. : Indian Economy, S.Chand and Comp, New Delhi  
P.M.Sundharam
10. Dhingra I.C. : Indian Economy
11. E.Kuper : Economics of W.R.Development, McGraw Hill Co.,
12. James L.E., R.R.Lee : Economics of W.R.Planning, McGraw Hill Co.

#### 4SUL5 COMPONENTS AND DEVICES TECHNOLOGY

##### SECTION-A

- Unit-I Electronic passive components  
Resistors, Capacitors-types, construction, selection procedure and failures.  
Testing of devices - diode, transistor, FET.
- Unit-II
- i) Switches and relays- types, construction, specifications, applications and testing.
  - ii) Fuses, Cables and connectors - types, construction, specifications and applications.
  - iii) Analysis and Design of heat sinks, choke and transformer.
- Unit-III Structure and properties of Si, Ge and GaAs. Preparation, purification by zone refining and single crystal growth by CZ method for Si, Ge and GaAs.  
Cutting of crystal, cementing of slices and ingots, lapping and polishing.

##### SECTION-B

- Unit-IV (a) Measurements and Etching:  
Determination of conduction type by Hall effect. Resistivity measurement by two probe, four probe method Etching - Types, Electrolytic etching and etchants for Si and Ge. Photoengraving.
- (b) Formation of P-N junction by i) Alloying ii) Diffusion iii) Epitaxy and iv) Ion-implantation. Significance and formation of ohmic contact by welding (Electric and Ultrasonic welding) and thermocompression bonding.  
Protection of P-N junction by Oxidation and using desiccants.
- Unit-V : Planar technology for P-N junction diode and transistor.  
Hermetic encapsulation of devices.

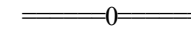
Properties of monolithic integrated circuits, characteristics of integrated components, Monolithic integrated diodes, resistors, capacitors, transistors and FETs, Introduction to various technologies SSI, MSI, LSI, VLSI, ULSI.

- Unit VI : Basics of Electronic component layout. Printed circuit boards Material, Properties and specifications. Basic manufacturing process of PC Board, Soldering techniques.

#### Reference:

- 1) VLSI technology, S.M. Sze.
- 2) Modern Electronic Equipments, R.S.Khandpur (TMH)
- 3) Electronics Testing & Fault Diag - "G.C.Loveday (Wheeler)
- 4) VLSI Fabrication principles, 'Silicon and Gallium Arsenide'  
S.K.Ghandhi
- 5) Printed circuit boards: W.C.Bosshart (TMH)
- 6) Semiconductor Devices Technology, Dr.A.A.Ghatol.
- 7) Basic of Electronic Devices Technology,  
Dr.(Mrs.)S.D.Wakde and Mrs. V.V.Gohokar
- 8) Solid State Electronics Devices, Streetman.

**PRACTICALS:-** Minimum six practicals out of which at least two should be based on PCB layout design using any standard software package.



APPENDIX-B  
FOUR YEAR B.E. DEGREE COURSE  
SEMESTER PATTERN  
SEMESTER : THIRD

L : Theory Lecture  
T : Tutorial  
P : Practical  
D : Drawing / Design

BRANCH : ELECTRONICS AND TELECOMMUNICATION/INDUSTRIALELECTRONICS

ABBREVATIONS :-  
S - SEMESTER PATTERN  
U - Electronics & Tele.  
L - Industrial Electronics  
I - Instrumentation  
E - Electrical  
R - Computer Sc.& Engg.

Sr. No.	Sub. Code	SUBJECT	Teaching Scheme			Examination Scheme									
			L	T	P/D	Theory					Practical				
No.	No.					Total Hours/Week	Duration of Papers (Hrs)	Max. Marks Theory Papers	Maximum Marks College Assessment	Total	Min. Pass Marks	Max. Marks External	Max. Marks Internal	Total Marks	Minimum Pass Marks
1.	3SULI1	Mathematics-III	4	1	-	5	3	80	20	100	40	—	—	—	—
2.	3SULI2	Electronic Devices & Circuits -I	4	1	2	7	3	80	20	100	40	25	25	50	25
3.	3SUL3	Electromagnetic Fields	4	1	-	5	3	80	20	100	40	—	—	—	—
4.	3SUL4	Electrical Engineering-III	4	1	2	7	3	80	20	100	40	25	25	50	25
5.	3SUL5	Instrumentation	4	-	2	6	3	80	20	100	40	25	25	50	25
<b>TOTAL</b>			20	5	6	31				500				150	

**GRAND TOTAL : 650**

SEMESTER : FOURTH  
BRANCH : ELECTRONICS AND TELECOMMUNICATION/INDUSTRIALELECTRONICS

Sr. No.	Sub. Code	SUBJECT	Teaching Scheme			Examination Scheme									
			L	T	P/D	Theory					Practical				
No.	No.					Total Hours/Week	Duration of Papers (Hrs)	Max. Marks Theory Papers	Maximum Marks College Assessment	Total	Min. Pass Marks	Max. Marks External	Max. Marks Internal	Total Marks	Minimum Passing Marks
1.	4SUL1	Communication Theory	4	1	-	5	3	80	20	100	40	--	--	--	--
2.	4SULI2	Computer Programming & Applications.	4	1	2	7	3	80	20	100	40	25	25	50	25
3.	4SULEI3	Network Analysis	4	1	2	7	3	80	20	100	40	25	25	50	25
4.	4SRULEI4	Social Science and Engineering Economics	4	-	-	4	3	80	20	100	40	—	—	—	—
5.	4SUL5	Components & Device Technology.	5	-	2	7	3	80	20	100	40	25	25	50	25
<b>TOTAL</b>			21	3	6	30				500				150	

**GRAND TOTAL : 650**

**% REGULATION NO. 13 OF 2002**

Examinations leading to the Degree of Bachelor of Engineering (Electronics & Telecommunication Engineering) (Four Year Degree Course.... Semester Pattern) Regulation, 2002.

Whereas it is expedient to frame the Regulation in respect of Examinations leading to the Degree of Bachelor of Engineering (Electronics & Telecommunication Engineering) (Four Year Degree Course.....Semester Pattern) for the purposes hereinafter appearing the Management Council is hereby pleased to make a following Regulation.

1. This regulation may be called “Examinations leading to the Degree of Bachelor of Engineering (Electronics & Telecommunication Engineering) (Four Year Degree Course.... Semester Pattern) Regulation, 2002.
2. This Regulation shall come into force w.e.f. the Academic session-
  - i) 2000-01 for Ist & IInd Semester B.E.,
  - ii) 2001-02 for IIIrd & IVth Semester B.E.,
  - iii) 2002-03 for Vth & VIth Semester B.E., and
  - iv) 2003-04 for VIIth & VIIIth Semester B.E.
3. The Schemes of Teachings and Examinations for Ist & IInd, IIIrd & IVth, Vth & VIth, and VIIth & VIIIth Semester in respect of Bachelor of Engineering (Electronics & Telecommunication Engineering) (Four Year Degree Course.... Semester Pattern) shall be as per Appendices-A, B, C, and D appended with this Regulation respectively.

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% As amended by Regulation Nos. 32 of 2003 & 16 of 2007.

**SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI**  
**\* ORDINANCE NO. 42 OF 2005**

**Examination in Environmental Studies leading to Bachelor Degree, Ordinance, 2005**

Whereas it is expedient to frame an Ordinance relating to Examination in Environmental Studies leading to Bachelor Degree level, hereinafter appearing, the Management Council is hereby pleased to make the following Ordinance.

1. This Ordinance may be called "Examination in Environmental Studies leading to Bachelor Degree, Ordinance, 2005."
2. This Ordinance shall come into force from the Academic session 2005-06.
3. In this Ordinance and in other ordinances relating to the examination, unless there is anything repugnant in the subject or context :-
  - (i) "Academic session" means a session commencing on such date and ending with such date of the year following as may be appointed by the Management Council.
  - (ii) "Admission to an examination" means the issuance of an admission card to a candidate in token of his having complied with all the conditions laid down in the relevant ordinance, by a competent officer of the University.
  - (iii) "Applicant" means a person who has submitted an application to the University in the form prescribed for admission to an examination.
  - (iv) "Candidate" means a person who has been admitted to an examination by the University.
  - (v) "Regular Candidate" means an applicant who has applied for admission to a University examination through an affiliated college, Department or Institute in which he/she has prosecuting a regular course of study.
  - (vi) "Examinee" means a person who present himself/herself for an examination to which he/she has been admitted.
  - (vii) "Examination" means an examination prescribed by the University under the relevant Ordinance.
  - (viii) "External Candidate" means a candidate who is allowed to take a University examination in accordance with the provision of Original Ordinance No. 151.
  - (ix) " Non-Collegiate Candidate" means a candidate who is not a collegiate candidate.

- (x) An "Ex-student" is a person who having once been admitted to an examination of this University, is again required to take the same examination by reason of his failure or absence thereat and shall include a student who may have joined a college, Department or Institute again in the same class.
  - (xi) "Bachelor Degree Examination" means an examination leading to Bachelor Degree of the University.
  - (xii) "Previous Year" means a year following by final year of Bachelor Degree.
4. Save as otherwise specifically provided, the conditions prescribed for admission to the examination under this Ordinance shall apply to all persons who wish to take the examination to the Degrees of the University mentioned in para 5 below.
  5. The conditions prescribed for admission to examination under this Ordinance shall apply to following degrees of the University :-
    - 1) Bachelor of Arts
    - 2) Bachelor of Performing Arts
    - 3) Bachelor of Fine Arts
    - 4) Bachelor of Mass Communication
    - 5) Bachelor of Social Work
    - 6) Bachelor of Commerce
    - 7) Bachelor of Business Administration
    - 8) Bachelor of Science
    - 9) Bachelor of Computer Science
    - 10) Bachelor of Computer Applications
    - 11) Bachelor of Pharmacy
    - 12) Bachelor of Science (Home Science)
    - 13) Bachelor of Technology (Cosmetics)
    - 14) Bachelor of Engineering
    - 15) Bachelor of Engineering (Part Time) (Civil)
    - 16) Bachelor of Textile
    - 17) Bachelor of Technology (Chemical Technology)
    - 18) Bachelor of Technology (Chemical Engg.)
    - 19) Bachelor of Architecture, and
    - 20) Bachelor of Laws (Five Year Course)
  6. i) Environmental Studies shall be a compulsory subject for a previous year examination of the following Bachelor Degrees of the University,
    - 1) Bachelor of Arts
    - 2) Bachelor of Performing Arts
    - 3) Bachelor of Fine Arts
    - 4) Bachelor of Mass Communication

- 5) Bachelor of Social Work
  - 6) Bachelor of Commerce
  - 7) Bachelor of Business Administration
  - 8) Bachelor of Science
  - 9) Bachelor of Computer Science
  - 10) Bachelor of Computer Applications
  - 11) Bachelor of Pharmacy
  - 12) Bachelor of Science (Home Science)
  - 13) Bachelor of Technology (Cosmetics)
  - 14) Bachelor of Engineering (Part Time) (Civil)
- ii) Environmental Studies shall be a compulsory subject for IIIrd & IVth Semester of the following Bachelor Degrees of the University,
- 1) Bachelor of Engineering
  - 2) Bachelor of Textile
  - 3) Bachelor of Technology (Chemical Technology)
  - 4) Bachelor of Technology (Chemical Engineering)
  - 5) Bachelor of Architecture, and
- iii) Environmental Studies shall be a compulsory subject for Vth & VIth Semester of the Degree of Bachelor of Laws (Five Year Course)
- iv) Students admitted to Second Year/Third Year/IVth Semester/ VIth Semester of various degree examination courses in different Faculties in the academic session 2005-06 or thereafter shall have to appear for examination in the subject Environmental Studies.
7. The main examination leading to Environmental Studies shall be held in Summer and supplementary examination in Winter every year, at such places and on such dates as may be appointed by Board of Examinations.  
**Explanation:-** Examination shall be conducted on the basis of one common question paper for all Bachelor Degree Examination courses irrespective of annual or semester pattern.
8. Scope of the subject for annual pattern examination and or semester pattern examination shall be as provided under the syllabus.
9. Common question paper for all courses covered under this Ordinance alongwith answer books shall be supplied by the University to the Colleges, Departments and Institutes for conducting the examination of the subject.
10. Valuation of the answer books relating to this subject shall be done at College/Department/Institution level only. Remuneration for valuation of answer books shall not be paid by the University.  
Provided that prescribed evaluation fee for evaluation of each answer

book/s of an external examinee/s appeared from the examination centre shall be paid to each examination centre.

11. It shall be obligatory on the part of the College/Department/Institute to submit candidate wise following information to the University on or before the date as may be prescribed by the University :-

Sr. No.	Grade/Category	Marks secured
1.	“A”	- 60 and above
2.	“B”	- 45 to 59
3.	“C”	- 35 to 44
4.	“D”	- 25 to 34
5.	“Fail”	- 24 and below
6.	“Absent”	

12. For the purposes of teaching, learning and examination, the Committee consisting of three teachers shall be appointed by the Principal/ Head of the Department/Head of the Institution under his/her Chairmanship/ Chairpersonship. While appointing three teachers on the said committee, the Principal shall take care that the teachers to be appointed on the committee, if necessary, shall be from different faculty.
13. i) Duration of theory examination of this subject shall be three hour.  
ii) For all Bachelor Degree examinations, common question paper of 100 marks shall be provided by the University.  
iii) Distribution of these 100 marks shall be as follows :-
- |   |   |          |
|---|---|----------|
| a) Part-A, Short Answer Pattern           | - | 25 Marks |
| b) Part-B, Essay type with inbuilt choice | - | 50 Marks |
| c) Part-C, Essay on Field Work            | - | 25 Marks |
14. Medium of instruction shall be English or Marathi or Hindi. Question paper shall be supplied in English and Marathi and Hindi. A candidate shall have option to write answers in English or Marathi or Hindi.
15. Examination for the subject Environmental Studies shall be compulsory for external candidates appearing as a fresh candidate at Winter and/or summer examination.
16. For teaching of the subject, there shall be atleast two hour per week. For teaching the subject to the regular candidates, a full time approved teacher of the University and or a person having Postgraduate Degree in any faculty with second class shall be considered eligible.
17. For teaching of the subject, additional fee to be charged to regular

candidate shall be as prescribed by the University.

18. Every College/ University Teaching Department shall charge additional fee of Rs. 100/- to every Student of the subject Environmental studies. Out of this Rs. 100/-, the College/University Teaching Department shall have to pay Rs. 25/- to the University as an examination fee of each candidate for the subject environmental studies.
19. The Grade secured by an examinee in the examination of this subject shall not be considered for providing the facility of A.T.K.T. in next higher class.
20. The provisions of Ordinance No. 18/2001 shall not be applicable for securing a grade or higher grade in the examination of this subject.
21. Result of the Final Year of the respective Degree shall not be declared of an examinee unless he/she secures any one of the grade in the examination of subject.

Provided an examinee admitted to Five Year LL.B. course desiring not to continue his/her education beyond Sixth Semester of the said course shall have to secure any one of the grade in the examination of the subject otherwise his/her result of Sixth Semester for awarding B.A. degree shall not be declared.

22. Certificate shall be issued, to the successful examinees in the subject Environmental Studies, after the examination.

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## ENVIRONMENTAL STUDIES

**Total Marks : 100**

### PART-A

#### SHORT ANSWER PATTERN

**25 Marks**

#### 1. The Multidisciplinary nature of environmental studies

- . Definition, scope and importance.
- . Need for public awareness.

(2 lecture hours)

#### 2. Social Issues and the Environment

- . From Unsustainable to Sustainable development
- . Urban problems related to energy
- . Water conservation, rain water harvesting, watershed management
- . Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- . Environmental ethics : Issues and possible solutions.
- . Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- . Wasteland reclamation.
- . Consumerism and waste products.
- . Environment Protection Act.
- . Air (Prevention and Control of Pollution) Act.
- . Water (Prevention and Control of Pollution) Act.
- . Wildlife Protection Act.
- . Forest Conservation Act.
- . Issues involved in enforcement of environmental legislation.
- . Public awareness. (7 lecture hours)

#### 3. Human Population and the Environment

- . Population growth, variation among nations.
- . Population explosion - Family Welfare Programme.
- . Environment and human health.
- . Human Rights.
- . Value Education.
- . HIV / AIDS.
- . Women and Child Welfare.
- . Role of Information Technology in Environment and human health.
- . Case Studies. (6 lecture hours)

**PART-B**  
**ESSAY TYPE WITH INBUILT CHOICE      50 Marks**

**4. Natural resources :**

- **Renewable and non-renewable resources :**
    - Natural resources and associated problems.
      - Forest resources : Use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
      - Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
      - Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
      - Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer - pesticide problems, water logging, salinity, case studies.
      - Energy resources : Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, Case studies.
      - Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
    - Role of an individual in conservation of natural resources.
    - Equitable use of resources for sustainable lifestyles.
- (8 lecture hours)

**5. Ecosystems**

- Concept of an ecosystem.
  - Structure and function of an ecosystem.
  - Producers, consumers and decomposers.
  - Energy flow in the ecosystem.
  - Ecological succession.
  - Food chains, food webs and ecological pyramids.
  - Introduction, types, characteristic features, structure and function of the following ecosystem :-
    - Forest ecosystem
    - Grassland ecosystem
    - Desert ecosystem
    - Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)
- (6 lecture hours)

**6. Biodiversity and its conservation**

- Introduction - Definition : genetic, species and ecosystem diversity.
- Biogeographical classification of India.
- Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values.
- Biodiversity at global, National and local levels.
- India as a mega-diversity nation.
- Hot-spots of biodiversity.
- Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife

- conflicts.
  - Endangered and endemic species of India.
    - Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.
- (8 lecture hours)

**7. Environmental Pollution**

- Definition
    - Causes, effects and control measures of :-
      - Air pollution
      - Water pollution
      - Soil pollution
      - Marine pollution
      - Noise pollution
      - Thermal pollution
      - Nuclear hazards
    - Solid Waste Management : Causes, effects and control measures of
      - Role of an individual in prevention of pollution.
      - Pollution case studies.
      - Diaster management : floods, earthquake, cyclone and landslides.
- (8 lecture hours)

**PART-C**  
**ESSAY ON FIELD WORK      25 Marks**

**8. Field work**

- Visit to a local area to document environmental assets - river / forest / grass land / hill / mountain
  - Visit to a local polluted site - Urban / Rural / Industrial / Agricultural
  - Study of common plants, insects, birds.
  - Study of simple ecosystems - pond, river, hill slopes, etc.
- (5 lecture hours)

- (Notes :**
- i) Contents of the syllabys mentioned under paras 1 to 8 shall be for teaching for the examination based on Annual Pattern.
  - ii) Contents of the syllabys mentioned under paras 1 to 4 shall be for teaching to the Semester commencing first, and
  - iii) Contents of the syllabys mentioned under paras 5 to 8 shall be for teaching to the Semester commencing later.

**LIST OF REFERENCES :-**

- 1) Agarwal, K.C., 2001, Environmental Biology, Nidi Publ. Ltd., Bikaner.
- 2) Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad - 380 013, India, Email : [mapin@icenet.net](mailto:mapin@icenet.net) (R)
- 3) Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
- 4) Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- 5) Cunningham, W.P.Cooper, T.H.Gorhani, E & Hepworth, M.T., 2001,

- Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.
- 6) De A.K., Environmental Chemistry, Wiley Eastern Ltd.
  - 7) Down to Earth, Centre for Science and Environment **(R)**
  - 8) Gleick, H.P. 1993, Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press. 473p.
  - 9) Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Mumbai **(R)**
  - 10) Heywood, V.H. & Watson, R.T. 1995, Global Biodiversity Assessment, Cambridge Univ. Press 1140p
  - 11) Jadhav, H & Bhosale, V.M. 1995, Environmental Protection and Laws, Himalaya Pub. House, Delhi. 284 p.
  - 12) McKinney, M.L. & Schoch, R.M. 1996, Environmental Science Systems & Solutions, Web Enhanced Edition. 639 p.
  - 13) Mhaskar A.K., Matter Hazardous, Techno-Science Publications **(TB)**
  - 14) Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co. **(TB)**
  - 15) Odum, E.P., 1971, Fundamentals of Ecology, W.B.Saunders Co., U.S.A., 574p.
  - 16) Rao M.N. & Datta A.K., 1987, Waste Water Treatment, Oxford & IBH Publ. Co. Pvt. Ltd. 345 p.
  - 17) Sharma B.K., 2001, Environmental Chemistry, Goel Publ. House, Meerut.
  - 18) Survey of the Environment, The Hindu **(M)**
  - 19) Townsend C., Harper J., and Michael Begon, Essentials of Ecology, Blackwell Science **(TB)**
  - 20) Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media **(R)**
  - 21) Trivedi R.K. and P.K. Goel, Introduction to Air Pollution, Techno-Science Publications **(TB)**
  - 22) Wagner K.D., 1998, Environmental Management, W.B.Saunders Co., Philadelphia, USA 499p.
  - 23) डॉ. विठ्ठल घारपुरे : पर्यावरणशास्त्र- पिंपळापूर अॅन्ड कंपनी पब्लिशर्स, नागपूर.**(R)**
  - 24) Dr. Deshpande, A.P.Dr. Chudiwale, A.D., Dr. Joshi, P.P., Dr. Lad, A.B.: Environmental Studies, Pimpalapur & Co., Publishers, Nagpur. **(R)**
  - 25) R.Rajagopalan : Environmental Studies, Oxford University Press, New Delhi, 2005 **(R)**

**(M) Magazine**

**(R) Reference**

**(TB) Textbook**

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1  
**SYLLABUS**

**PRESCRIBED FOR**  
**BACHELOR OF ENGINEERING**  
**ELECTRONICS & TELECOMMUNICATION ENGG**  
**SEMESTER PATTERN**  
**FIFTH SEMESTER**

**Inplant Training & Industrial Visit** in the faculty of Engineering & Technology

- 1) a) the inplant training shall not be compulsory,  
b) the inplant training shall be taken by students strictly during Summer vacation. after IVth or VIth Semester examination and / or during Winter vacation after Vth or VIIth Semester examinations,  
c) the inplant training shall not be part of examination system, however, student shall prepare and submit report after completion of training to the concerned Head of Department alongwith certificate issued by the industry,  
d) the inplant training shall be of minimum two weeks duration,  
e) there shall not be any liability whatsoever on the Institution with respect to inplant training of the students,  
f) students shall undertake inplant training on their own risk and cost. An undertaking in this regards signed by student and parents shall be submitted before proceeding for training to the concerned Head of Department/ Head of Institution.  
g) the students shall complete inplant training under the supervision of concerned person in the industry,  
h) Institutes shall help students to organise inplant training by way of correspondance,
- 2) Industrial Visit : Industrial visit may be organised for the students. Students should prepare & submit the report on Industrial visit to the concerned Head of Department/Head of Institution.

**5 SUL 1 ELECTRONIC DEVICES AND CIRCUITS-II**

**SECTION-A**

- Unit I : Linear wave shaping using RC and RL circuits, analysis and calculations of RC low pass and high pass filters, analysis of clipping and clamping circuits using diodes and switching transistors.

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- Unit II : Collector coupled biastable, monostable and astable multivibrators, Time base generators & Sweep Generators. Number systems, Gray codes, Arithamtic operations, 2's compliments, floating point arithmetic and its representation.
- Unit III : Switching characterisites of semiconductor devices : Diode as switch, transistor as a switch, characteristics and analysis, FET as a switch, characteristics, JFET, CMOS, switching speed of devices : Shottkey diode, transistor, Logic gates, Boolean Algebra.

**SECTION-B**

- Unit IV : Study and analysis of Digital Logic Families : RTL, DTL, HTL, TTL, ECL, IIL, CMOS, and their characteristics, tri-state logic, 5400/7400 TTL series.
- Unit V : Flip-flops : R-S, J-K, Master slave J-K, D-type, T-type; registers and counters, adders and subtractors using logic gates, brief review of ADC and DAC techniques.
- Unit VI : Types of semiconductor memories, sequential memories, 2 and 4 phase ratioless shift registers, CMOS register stages, static shift registers, implementation of ROM (ROM, PROM, EPROM, EEPROM) BJT, RAM cell, MOS-RAM, CCD memories.

**PRACTICALS:** Minimum 8 practicals based on above syllabus, preferably uniformly distributed.

**BOOKS RECOMMENDED:**

- 1) Jacob Millman & Herbert Taub : "Pulse Digital & Switching waveforms", McGraw Hill International Book Company, 1985.
- 2) Taub H. and Schillings D.L., London, : "Digital Integrated Electronics", McGraw Hill Company, 1984.
- 3) R.P.Jain : "Modern Digital Electronics", Tata McGraw Hill, New Delhi 1998.
- 4) Malvino A.P. and Leach D.P. : "Digital Principles and Applications", TMH Publishing Co., New Delhi (Third Edition), 1981.
- 5) Mathur S.P. and Chada P.R. : "Electronics Devices, Application and Integrated Circuits", New Delhi, Umesh Publications, 1985, (IV Ed.)

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**5 SUI2 POWERELECTRONICS****SECTION-A**

- Unit I : SCR, Triac, Diac-construction, characteristics & applications, two transistor analogy for turning ON-OFF SCR, turn ON mechanism, different methods of turning ON-OFF SCR, turn OFF mechanism, Thyristor firing circuits. Introduction to GTO, power transistor, power MOSFET & IGBT & their construction & characteristics.
- Unit II : Series parallel operation of SCR's, static & dynamic equalising ckt., equalisation of current in parallel connected SCR's, string efficiency, derating factor, Protection of SCR's against di/dt, dv/dt, radio freq., interference, over voltage, over current.
- Unit III : Principle of phase control, half wave controlled rectifier, half controlled bridge & fully controlled bridge rectifier for resistive and RL load derivation for output voltage and current, effect of free wheeling diode, single phase dual converters.
- Three phase half controlled bridge and fully controlled bridge rectifier. (only descriptive approach)

**SECTION-B**

- Unit IV : Classification of ckt. for forced commutation, series inverter, improved series inverter, parallel inverter, out put voltage and waveform control, principle of operation for three phase bridge inverter in 120 deg. and 180 deg. mode, single phase transistorised bridge inverter.
- Unit V : Basic principles of chopper, time ratio control and current limit control techniques, voltage commutated chopper ckt., Jones chopper, step-up chopper and AC chopper.
- Basic principle of cycloconverters, single phase to single phase cycloconverter.
- Unit VI : Speed control of DC series motors using chopper, speed control of DC shunt motor using phase controlled rectifiers, speed control of three phase induction motor by stator voltage control, v/f control and slip power recovery scheme.
- Static ckt. braker, UPS, fan speed regulator, principle of soft start ckts. Zero Voltage Switch.

**PRACTICALS:** Minimum 8 practicals based on above syllabus, preferably uniformly distributed.

**REFERENCES:**

- 1) M. Ramamoorthy - Thyristor and their application.
- 2) M.H.Rashid - Power Electronics Ckts., Devices and Application.
- 3) Dr.P.S. Dhimbra - Power Electronics.
- 4) P.C.Sen - Power Electronics.
- 5) H.C.Rai - Industrial and Power Electronics.
- 6) G.K.Dubey, S.R.Doradia, A.Joshi, R.M.K. Sinha - Thyristorised Power Controller.
- 7) M.D.Singh & K.B.Khanchandani - Power Electronics, Tata McGraw Hill.

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**5 SUL3 INDUSTRIAL MANAGEMENT AND QUALITY CONTROL****SECTION-A**

- Unit I : Principles and Techniques of Management : Meaning of and differences among business, management, administration and organisation, Principles of management, functions of management, planning, organisation structure and relationships, direction, co-ordination, control, motivation, delegation and decentralisation, communication, leadership and decision making.
- Unit II : Market and Materials Management :
- A) Marketing strategy, market research, consumer behaviour, advertising and sales promotion, channels of distribution, pricing of products.
  - B) Classes of material, scope of material control, scope of purchasing department, purchasing procedures, order procedures, inventory control, introduction to production, planning and control.
- Unit III : Personnel Management :
- Meaning and functions of personnel management, recruitment, selection, promotion, wages and salary administration, training and development, functions and scope of trade unions in Indian industries. Welfare of labour, Problems of labour turn over & retention.

**SECTION-B**

- Unit IV : Project and Financial Management :
- A) Case studies of project report, preparation of profit and loss statement and balance sheet, ratio analysis.
- B) Principles of costing, cost sheet preparation, variance analysis, meaning and application of various budgets, types of budgets and their importance.
- Unit V : Quality Control :
- Concept of quality and quality control, elements of quality, factors controlling quality of design and conformance, process control, inspection planning and scheduling, 7QC (Seven Quality Control) techniques, vendor inspection, sampling inspection, sampling plans, Quality audit system.
- Unit VI : Quality Management :
- Concepts and applications of Kaizen, quality circle, ISO 9000 series, just-in-time, quality planning and total quality management, elements of TQM, Quality Circles.

**TEXT BOOKS :**

- 1) Koontz H., O'Donnel C. and Whierich : Principles of Management, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
- 2) Khanna O.P. : Industrial Engineering and Management.
- 3) Mody Suresh M. : Total Quality Management, D.L.Shah and Trust, Mumbai
- 4) Sherlekar S.A. : Business, Organisation and Management, Himalaya Pub. House Ltd., Mumbai.
- 5) Gupta P.B. & Sharma P.B. : Industrial Management & Managerial Economics, Ratnasagar Pvt. Ltd., New Delhi.
- 6) Khanka : Entrepreneurial Development, S.Chand & Co., New Delhi.
- 7) Mahajan S.M. : Statistical Quality Control.

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**5 SUL4 COMMUNICATION ENGINEERING-I****SECTION-A**

- Unit I : AM Transmitters : Modulation, need of modulation, AM Modulation, Frequency spectrum, Principles of DSB-FC, DSB-SC, SSB-SC modulation and their comparison, Details of DSB-FC Transmitter, Generation of DSB-SC by using balanced modulators (FET & Diodes), DSB-SC Transmitter.. Generation of SSB-SC by phase-shift method.

- Unit II : AM Receivers : TRF receiver, Superhetrodyne receiver, Details of each block such as RF amplifier, mixer oscillator, IF amplifier, Diode detector, Audio Amplifier.
- Need and type of AGC, Practical Radio Receiver Circuit with AGC, Characteristics such as selectivity, sensitivity, fidelity communication receiver.
- Unit III : FM Transmitters : FM Modulation, Frequency Spectrum, Circuits & Analysis for direct FM generation using FET and varactor diode. Circuit & analysis of Indirect FM generation, Narrow Band and Wide Band FM, their comparison, De-emphasis and pre- emphasis. FM Transmitter & stereo FM Transmitter.

**SECTION-B**

- Unit IV : FM Receivers : Details of FM receiver, blocks such as R.F. amplifier, local oscillator, IF amplifier, Mixer, Audio Ampl., AGC, Limiter, FM Discriminator, Single Slope and Balanced slope detector, Analysis of Foster seeley and ratio detectors, Stereo FM receiver.
- Unit V : Monochrome TV : Basic television system, simultaneous sound and picture transmission, scanning process, composite video signal, signal transmission and channel bandwidth, camera tubes, TV receiver; Block diagram and functional requirements, Basic concept of colour TV.
- Unit VI : Satellite Communication : Orbital satellites, Geostationary Satellites, Orbital patterns, Look angles, satellite system link models, Transponder, Up link, Down link, cross link, satellite system parameters, Radiated power.

**PRACTICALS :** Minimum 8 practicals based on above syllabus, preferably uniformly distributed.

**BOOKS :**

- 1) Kennedy G. : Electronics Communication System, Tata McGraw Hill Co., New Delhi (Third Edition), 1985.
- 2) Young P.H. : Electronics Communication Techniques, Coloumbus, A Bell and Howell Co. (First Edition)
- 3) Martin James : Telecommunication and the Computer, Prentice Hall Inc. New Jersey (Third Edition), 1972.
- 4) Roddey D., Coolen S. : Electronics Communication, Prentice Hall India Pvt. Ltd. (Third Edition), 1983.
- 5) Beck, Robert and J. Schoen : Electronics Communication, Modulation

and Transmission, A Bell and Howell Co., Indiana.

- 6) Murphy R.J. : Telecommunication Network, Hiward W., Sams & Co., 1987.
- 7) Dhake : TV Engineering.
- 8) Agrawal D.G. : Satellite Communications, Khanna Publication.

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## 5 SUL15 CONTROL SYSTEM ENGINEERING

### SECTION-A

- Unit I : Basic definition; closed and open loop systems; transfer function, block diagrams, derivation of transfer functions of physical systems, signal flow graphs, basic control action.
- Unit II : Time Response Analysis, Impulse response function, Analysis of first, second & higher order systems, stability of control system, Routh Hurwitz's stability criterion, static and dynamic errors coefficients, errors criteria.
- Unit III : Introduction of Root Locus method; Root Locus plots, Rules for constructing root loci, stability analysis of systems using Root locus, concept of dominant, closed loop pole pair, Root-contour plots, effect of zeros & poles.

### SECTION-B

- Unit IV : Introduction of frequency response, Bode plots, stability margins on the Bode plot, stability analysis of systems using Bode plots, polar plots, Nyquist stability criterion, relative stability.
- Unit V : State Space representation of systems, conversion of state variable models to transfer functions, conversion of transfer functions to state variable models, solution of state equations, concepts of controllability and observability.
- Unit VI : Sample Data Control Systems :  
Representation of sampled data (Discrete) systems, review of Z-transforms, Sampler and hold ckt., Zero order hold, sampling theorem, Z-transform analysis of sampled data of Sampled data control systems (open & closed loop systems), Z transform of systems. Solution of difference equation by Z-transform methods. Response of discrete systems. Pulse Transform functions of open loop, closed loop systems with different sampler locations. Digital controller & its transfer functions Stability analysis of discrete time system using bilinear transformation.

## BOOKS :

- 1) K. Ogata : Modern Control Engg. (PHI)
- 2) M. Gopal : Digital Control Systems Principles & Design (TMH)
- 3) I.J. Nagrath & M.Gopal : Control System Engg. (Wiley Eastern)

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## SIXTH SEMESTER

### 6 SUL 1 COMPUTER ORGANISATION

#### SECTION-A

- Unit I : DESIGN METHODOLOGY :  
Introduction of system modelling, design levels, Register level design methodology and design methods. Processor level design methodology and design techniques, queueing models, simulation.
- Unit II : PROCESSOR DESIGN :  
Processor organisation, information representation, number formats, Instruction sets and its implementation. Arithmetic operation, ALU design, Floating point arithmetic.
- Unit III : CONTROL DESIGN :  
Introduction to instruction sequencing and instruction interpretation, Hardware control, Design methods, Microprogrammed control, control design.

#### SECTION-B

- Unit IV : MEMORY ORGANISATION :  
Concept of virtual memory, Memory hierarchies, Main memory allocation, Replacement policies, segments and pages, file organisation, High speed memory, interboard memories, Cache memories, Associative memories.
- Unit V : PARALLEL PROCESSING :  
Basic concepts, types of parallel processors and performance considerations.  
  
Pipeline processor : Pipeline types, design, structures, Multiprocessors : Types, performance, parallel programming, Multiprocessor Architecture.

## Unit VI : ADVANCED PROCESSORS:

Architecture, organisation and features of Pentium, Power PC-620 processors.

**BOOKS RECOMMENDED:**

- 1) Hayes J.P. : Computer Architecture and Organisation, McGraw Hill, Auckland.
- 2) Mano Morris : Computer System Architecture, Prentice Hall of India New Delhi.
- 3) Tanenbaum A.S. : Structure Computer Organisation, Prentice Hall of India, New Delhi.
- 4) Wiliam Stallings : Computer Organisation and Architecture, Addison Wesley Longman (Singapore) Ltd.

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**6 SUL 2 INTRODUCTION TO MICROPROCESSORS****SECTION-A**

- Unit I : 8085 : Architecture, Register Structure, Addressing modes, Instruction set of 8085, Timing diagrams.
- Unit II : Assembly Language Programming of 8085, Stack, Subroutine. Address space partitioning schemes : Memory mapped I/O and I/O mapped I/O, Address decoding techniques.
- Unit III : Internal architecture, programming and interfacing of 8255, 8259, 8279.

**SECTION-B**

- Unit IV : Data Transfer Schemes : Interrupt driven (Interrupt system of 8085, software and hardware interrupts), Serial data transfer through SOD and SID. Introduction to DMA data transfer.
- Unit V : 8086 : CPU architecture, internal operations, Addressing modes, instruction formats, Execution timing.
- Unit VI : Instruction set of 8086, Assembly language programming (ELEMENTARY PROGRAMMING) Assembly Directives, Operators.

**PRACTICALS:** Minimum 8 practicals based on above syllabus, preferably uniformly distributed.

**BOOKS RECOMMENDED:**

- 1) Gibson G.A., Liu Y.C. : Microcomputer system the 8086/8088 family, Prentice Hall India Pvt. Ltd., New Delhi (Second edition), 1996.
- 2) Hall D.V. : Microprocessor and Interfacing Programming and Hardware, McGraw Hill Co., New York, 1986.
- 3) Gaonkar R.S. : Microprocessor Architecture Programming and Applications with the 8085, Penram International Pub. (Third Edition), 1997.
- 4) Mathur A.P. : Introduction to Microprocessor, Tata McGraw Hill Pub., New Delhi (Second Edition), 1986.
- 5) Gilmore : Microprocessors Principles and Applications, Tata McGraw Hill Pub. Co. (Second Edition)

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**6 SU 3 COMMUNICATION ENGINEERING-II****SECTION-A**

- Unit I : ANALYSIS  
Classification of signals, Fourier Series, Exponential Fourier Series, Fourier Transform, Properties of Fourier Transform, Delta Function, Fourier Transform of Periodic functions, Power Spectral Density, Energy Spectral Density, Correlation, Auto-correlation, Cross-correlation.
- Unit II : PROBABILITY AND RANDOM SIGNAL THEORY  
Probability, Random variable, PDF Random processes, stationarity, Mean, Correlation and Covariance Functions, Ergodicity, Spectral Density, Gaussian Process, White Gaussian Noise.
- Unit III : NOISE IN CW MODULATION  
Mathematical Representation of Noise, AM Receivers, Signal-To-Noise Ratio, SNRs of SSB-SC, DSB-SC, and DSB-FC systems, FM Receivers, Noise in FM Reception, FM Threshold Effect, Comparison of AM and FM

**SECTION-B**

- Unit IV : PULSE MODULATION  
The sampling theorem, Sampling of Band-Pass Signal, Quantization and types of quantization, Practical aspects of sampling, Reconstruction of message Process from its

Samples, Time Division Multiplexing, Pulse Amplitude Modulation, Pulse Time Modulation, PCM, DM.

Unit V : TELEPHONE SWITCHING TECHNIQUES

Introduction to Switching System, Pulse dialling, Touch tone dial telephone, Space Division Switching SPC, Centralized and Distributed SPC, Time Division Switching : Basic Time Division space switching, Time Division time switching, Time Multiplexed space switching, Time Multiplexed time switching, EPABX.

Unit VI : FIBER OPTIC COMMUNICATION

Introduction, Principle of light transmission in fiber, losses in fiber, Introduction to light sources and photodetector, splicing techniques, fiber optic transmission system.

**PRACTICALS:** Minimum 8 practicals based on the above syllabus, preferably uniformly distributed.

**TEXT BOOKS RECOMMENDED:**

- 1) John Wiley, Simon Haykin : Communication System, Eastern Ltd., New York, (Third Edition), 1994.
- 2) Taub and Schilling D.L. : Principles of Communication Systems, Mc-Hill Co, Tokeyo, 1994 (II Ed.)
- 3) Keiser Geord : Optical Fiber Communication, McGraw Hill Int. Book Co., New York, (Second Edition), 1991.
- 4) R.P.Singh, S.D.Sapre : Communication Systems Analog and Digital, Tata McGraw Hill Co.
- 5) Lathi B.P. : Communication System, Wiley Eastern Ltd., 1983.
- 6) S.S.Das : Electronic Telephony.

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**6SUL4 NUMERICAL METHODS AND OPTIMIZATION TECHNIQUES**

**SECTION-A**

Unit I : Error Analysis, Absolute, relative and percentage errors. A general error formula and error in series approximation, Solution of Non linear and polynomial equations : False position, modified false position, secant, Newton Raphson methods, Convergence and error properties of the above methods.

Unit II : A) Solution of Linear Systems of Equation :

Gauss elimination method, Ill conditioned equations, Refinement of solution obtained by Gaussian elimination, matrix inversion method, L-U factorisation method, Gauss Seidel iterative method.

B) Curve fitting : Least Square Method.

Unit III : Differentiation : Integration and Differential equations. Finite differences, Newtons forward and backward interpolation formula. Numerical differentiation : Maximum and minimum values. Numerical integration : General quadrature formula, rectangular, trapezoidal, Simpsons one third and three eight rules, Romberse method, Double integration.

Ordinary differential equations : Initial value problem, Euler's method, Runge Kutta methods, Predictor Corrector method, Higher order differential equations.

**SECTION-B**

Unit IV : Operations Research Models and Dynamic Programming :

Operations research models : classification of problems, phases of operation research, scope and limitation of operations research.

Dynamic programming : Multistage decision process, concept of sub-optimization and Bellman's principle of optimality, conversion of final value problem into an initial value problems.

Unit V : Linear and Non Linear Programming

Linear programming - formulation of problems, simplex method, artificial variable technique, two phase simplex method, concept of duality, transportation problems.

Non linear, programming - random search method, pattern search method, Steepest Descent method.

Unit VI : PERT and CPM : Pert Networks, ET, TE, TL, SE and Critical path, Probability of completion.

Decision theory : Introduction, Minimax decision procedure, Bayes decision procedure with and without data, Regret function Vs. Loss function.

**TEXT BOOKS :-**

- 1) Computer Oriented Numerical Methods : V.Rajaraman, Second Edition, Prentice Hall of India Pvt. Ltd., New Delhi.

- 2) Introduction to Methods of Numerical Analysis : S.S.Shastry, Second Edition, Prentice Hall of India Pvt. Ltd., New Delhi.
- 3) Numerical Methods for Mathematics Science and Engineering : John H. Mathews, Prentice Hall (India) Publication.
- 4) Introduction to Operation Research : Billy, E.Gillett, 15th edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi.
- 5) Optimization Theory and Applications : S.S.Rao, Second Edition, Wiley Eastern Limited, New Delhi.

### 6SULI5 LINEAR INTEGRATED CIRCUITS

#### SECTION-A

- Unit I : Operational Amplifier
- Differential amplifier : gain expressions using H parameters, transfer-characteristics, constant current source, level shifting, block diagram of op-amp, frequency response, frequency compensation methods, study of ICs uA741, measurement of parameters of op-amp and off set nulling and their importance.
- Unit II : Linear Applications of Op-Amp
- Inverting and non inverting amplifiers, voltage followers (AC-DC), integrator, differentiator, differential amplifier, bridge amplifier, instrumentation amplifiers, precision rectifiers, RMS to DC converter, voltage to current converter, sinusoidal RC oscillators, constant voltage sources, frequency to voltage and voltage to frequency converter.
- Unit III : Non Linear Applications of Op-Amp and Filter Circuits
- Clipping and clamping circuits, comparator, astable, monostable and bistable multivibrator, Schmitt trigger, voltage sweep generator, active filters : Butterworth, Chebyshev filters using op-amp, log and antilog amplifiers

#### SECTION-B

- Unit IV : Voltage Regulator
- Block schematic of regulator IC 723, regulated power supply using IC 723, short circuit protection, switch mode power supply, dual tracking regulators, regulator using 78\*\*, 79\*\*, and LM 317.

- Unit V : 1. Timers :
- Block schematic of IC 555, application of timer 555 as astable, monostable and bistable multivibrators, delayed timer, sawtooth generator, FSK modulator.
2. Sample & hold circuit, basics of analog multiplexer.
- Unit VI : 1. PHASE LOCKED LOOPS
- Operation of phase lock loop system, transfer characteristics, lock range and capture range, study of PLL IC-LM 565 and its applications as AM detector, FM detector and frequency translator.
2. Analog Multiplier : IC 1496

**PRACTICALS :** Minimum Eight practicals based on the above syllabus, preferably uniformly distributed.

#### BOOKS RECOMMENDED :-

- 1) Gayakwad R.A. : OP-Amps and Linear Integrated Circuits, Prentice Hall of India Pvt. Ltd., New Delhi (Second Edition), 1980.
- 2) Milliman J. and Grabel A. : Microelectronics, McGraw Hill Book Co., New Delhi, 1985.
- 3) Tobey J.E. and Grame J.E. : Operational Amplifier Design and Applications, International Student Edition, 1983.
- 4) Linear Application Handbook : National Semiconductors.
- 5) Application Note on IC : BEL India.
- 6) Herb Taub and Donald Schilling : Digital Integrated Circuits, McGraw Hill Pub.

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### 6SULIMETX6 COMMUNICATION SKILLS

- Unit I: Comprehension over an unseen passage.
- Comprehension - A - word study :-
- Synonym, antonym, meanings, matching words, adjectives, adverbs, prefix and suffix, correct forms of commonly misspelled words, understanding of the given passage.
- Comprehension - B - Structure study :-
- Simple and compound sentences, types of conjunctions, singular and plural, tenses and their effect on verb forms. Use of - not only - but also, if clause, since, may, can, could,

would, too etc.

Active and passive forms, negative and interrogative, punctuation and capitalization. (10 Hours)

Unit II : Theoretical background - importance of communication, its process, model of communication its components & barriers.

Verbal communication, its significance, types of written communication, organization of a text (Titles, summaries, headings, sequencing, signaling, cueing etc.), Important text factors (length of paragraph, sentences, words, clarification and text difficulty). Evaluation of written communication for its effectivity and subject content.

Non-verbal communication, types of graphics and pictorial devices. (10 Hours)

Unit III : Specific formats for written communication like - business correspondence, formal reports, technical proposals, research papers and articles, advertising and graphics. Format for day-to-day written communication like applications, notices, minutes, quotations, orders, enquiries etc.

Oral communications - Important objectives of interpersonal skills, (verbal and non-verbal), face to face communications, group discussion and personal interviews.

Methodology of conduction of meetings, seminars, symposia, conference and workshop. (10 Hours)

#### **BOOKS RECOMMENDED:**

- 1) Krishna Mohan, Meera Banerjee : Developing Communication Skills, MacMillan India Limited.
- 2) Chrissie Wright (Editor) : Handbook of Practical Communication Skills, Jaico Publishing House.
- 3) Curriculum Development Centre, TTTI WR, Bhopal : A Course in Technical English, Somaiya Publication Pvt. Ltd.
- 4) F.Frank Candlin : General English for Technical Students, University of London Press Ltd.

#### **COMMUNICATION SKILLS LABORATORY**

##### **Objective :**

On completion of this laboratory the candidate should be able to demonstrate adequate skills in oral and written communication for technical English language, actively participate in group discussions and interviews and exhibit

the evidence of vocabulary building. Candidates should be assessed through continuous monitoring and evaluation.

The sample list of experiments is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

1. Assignments and tests for vocabulary building
2. Technical report writing
3. Group discussions
4. Interview techniques
5. Projects and tasks such as class news letter
6. Writing daily diaries and letters
7. Interactive language laboratory experiments.

TEXT BOOK : Norman Lewis : Word Power Made Easy

<http://www.teachingenglish.org.uk>

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L : Theory Lecture  
T : Tutorial  
P : Practical  
D : Drawing / Design

APPENDIX-C  
FOUR YEAR B.E. DEGREE COURSE  
SEMESTER PATTERN  
SEMESTER : **FIFTH**  
BRANCH : ELECTRONICS AND TELECOMMUNICATION

ABBREVIATIONS :-  
S - SEMESTER PATTERN  
U - ELECTRONICS & TELE.  
L - INDUSTRIAL ELECTRONICS  
I - INSTRUMENTATION  
E - ELECTRICAL

Sr. No.	Sub. Code No.	SUBJECT	Teaching Scheme			Examination Scheme										
			L	T	P/D	Total Hours/Week	Theory				Total Assessment	Min. Pass Marks	Practical		Total Marks	Minimum Passing Marks
							Duration of Papers	Maximum Marks		External			Internal			
								Theory (Hrs)	College Papers							
1.	5SUL1	Electronic Devices and Circuits-II	4	1	2	7	3	80	20	100	40	25	25	50	25	
2.	5SUL2	Power Electronics	4	1	2	7	3	80	20	100	40	25	25	50	25	
3.	5SUL3	Industrial Management & Quality Control	4	-	-	4	3	80	20	100	40	--	--	--	--	
4.	5SUL4	Communication Engineering-I	4	1	2	7	3	80	20	100	40	25	25	50	25	
5.	5SUL15	Control System Engineering	4	1	-	5	3	80	20	100	40	--	--	--	--	
TOTAL			20	4	6	30				500				150		

**GRAND TOTAL : 650**

SEMESTER : **SIXTH**  
BRANCH : ELECTRONICS AND TELECOMMUNICATION

Sr. No.	Sub. Code No.	SUBJECT	Teaching Scheme			Examination Scheme										
			L	T	P/D	Total Hours/Week	Theory				Total Assessment	Min. Pass Marks	Practical		Total Marks	Minimum Passing Marks
							Duration of Papers	Maximum Marks		External			Internal			
								Theory (Hrs)	College Papers							
1.	6SUL1	Computer Organisation	4	-	-	4	3	80	20	100	40	—	—	—	—	
2.	6SUL2	Introduction to Microprocessors	4	1	2	7	3	80	20	100	40	25	25	50	25	
3.	6SU3	Communication Engineering-II	4	1	2	7	3	80	20	100	40	25	25	50	25	
4.	6SUL4	Numerical Methods & Optimization Techniques	4	1	-	5	3	80	20	100	40	—	—	—	—	
5.	6SUL15	Linear Integrated Circuits	4	1	2	7	3	80	20	100	40	25	25	50	25	
6.	6SUL16	Communication Skills	2	1	-	3	2	40	10	50	20	15	10	25	12	
TOTAL			22	5	6	33				550				175		

**GRAND TOTAL : 725**



**SEVENTH SEMESTER****7SU1****DIGITAL COMMUNICATION****UNIT-I : DIGITAL COMMUNICATION SYSTEM**

Elements of digital communication system, source encoder, decoder, channel encoder, decoder, modulator, demodulator, Line coding, Synchronization : Clock synchronization and carrier synchronization . (9)

**UNIT-II : DISCRETE COMMUNICATION CHANNEL**

Measure of information, Entropy and information rate of independent and dependent sequences, Source encoding , Shannon's Encoding algorithm, Huffman encoding algorithm, discrete communication channel, capacity of discrete communication channel. Shannon's theorem on channel capacity. (9)

**UNIT-III : DIGITAL MODULATION TECHNIQUES**

Digital carrier modulation schemes, binary ASK, PSK, FSK coherent scheme, probability of errors, comparison of digital modulation systems, Basics of DPSK, QPSK, MSK. (9)

**UNIT-IV : ERROR CONTROLLING AND CODING**

Introduction to error control coding, methods of controlling errors, type of errors and code, linear block codes, Matrix description of linear block code, error detection and error correction capabilities of linear block code, cyclic code, cyclic code. (9)

**UNIT-V : BASE BAND TRANSMISSION**

Base band PAM system, inter symbol interference, Nyquist criteria, pulse shaping, equalization, eye diagram, synchronization, scrambler and unscrambler, Duo binary signaling scheme . (9)

**UNIT-VI : MODERN TECHNIQUES OF COMMUNICATION**

Introduction to mobile communication, cellular mobile telephone architecture, frequency assignments, frequency reuse, cell splitting, call initialization, call termination, handover. Multiple access schemes : TDMA, FDMA, CDMA, spread spectrum communication, D.S. spread spectrum, frequency hopping spread spectrum, comparison. (9)

**TEXT BOOKS:**

1. Shanmugam K.S. : "Digital & Analog Communication Systems", John Wiley & Sons, New York, 1996.
2. Lathi B. P. : "Modern Digital and Communication Systems", Holt Rinehart and Winston Inc., New York, 1993.
3. Simon Haykin : "Digital Communication", John Wiley and Sons, Pvt. Ltd., Singapore.

**REFERENCE BOOKS:**

1. Proakis J. K. : "Digital Communication", Mc-Graw Hill Book Co., London (Second Edition)
2. Taub, Herbert, Schilling D.L : "Principles of Communication Systems", Mc-Graw Hill International Book Co., Tokoyo.
3. Wcy Lee : "Mobile Cellular Telecommunications Systems", Mc-Graw Hill International Editions, 1990
4. Glover and Grant : "Digital Communication", Prentice Hall Publication .

**7SUL2****MICROPROCESSOR PERIPHERALS AND MICROCONTROLLER**

**UNIT-I:** Hardware and Software development aids : Logic analyser, in-circuit emulator, simulator, one pass and two pass assembler, Cross assemblers, linker, loader, compiler, cross compiler, Introduction to operating system : Definition, types and functions.

Bus standards : Serial RS 232, Parallel IEE-488 (8)

**UNIT-II :** Interfacing Devices with 8085 : Architecture and programming of programmable DMA CONTROLLER 8237, Programmable interval timer/counter 8253, Architecture and functioning of programmable floppy disk controller 8272. (9)

**UNIT-III :** Computer Peripherals and Interfacing : CRT controller 8275, Architecture and function of programmable dot matrix printer controller 8295, USART 8251. (9)

**UNIT-IV :** Analog to Digital and Digital to Analog Conversion Techniques: Case study of ADC 0809, ADC 1210, DAC 0808, 1008 and their interfacing with microprocessor. Use of ADC in applications like measurement of temperature, flow, speed, pressure, capacitance, inductance and resistance. (10)

**UNIT-V :** An Introduction to uC 8051: Architecture of 8051, Signal description of 8051, Register set of 8051, Timer structure and their mode and I/O port structure. (10)

UNIT-VI : Instruction set of 8051, Addressing modes of 8051, Memory and I/O addressing by 8051, Programming using 8051. Study of microcontroller based system. (8)

**Practicals:** Eight experiments should be based on above syllabus.

**TEXT BOOKS :**

1. Hall D.V. and Douglas V : "Microprocessor and Interfacing Programming and Hardware", Tata Mc-Graw Hill Book Co., New York (2/e)
2. Gaonkar R.S. : "Microprocessor Architecture Programming and applications with 8085/8080A", Penram International Publications, India.
3. K.J.Ayala : "The 8051 Microcontroller", Penram Int. Pubs., 1996

**REFERENCE BOOKS :**

1. National Semiconductor : Data Acquisition Linear Devices Data Book.
2. Embedded Microcontrollers and Processors:-Volume-I-Intel
3. 8085/8086 Microprocessor Book-Intel.
4. Intel Peripheral Devices Data Book.
5. B.B.Brey : The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Pro Processor (4/e)
6. A. K. Ray and K. M. Burchandi : Advanced Microprocessor and Peripherals, Architecture Programming and Interfacing, Tata McGraw Hill Publishing Co. Ltd., New Delhi (TMH)

**7SU3 DIGITAL SIGNAL PROCESSING**

UNIT-I : Introduction to DSP, Frequency domain description of signals & systems, Discrete time sequences systems, Linearity unit sample response, Convolution, Time invariant system, Stability criteria for discrete time systems, Solutions of linear difference equations. (9)

UNIT-II : Introduction to Fourier transform of Discrete Time Signal and its properties, Inverse Fourier transform, Sampling of continuous time signal, reconstruction of continuous time signal from sequences, Z- transform and its properties, complex Z-plane, ROC determination of filter coefficients, relationship between Fourier transform and Z-transform, inverse Z-transform. (12)

UNIT-III : DFT and its properties , Circular convolution, Linear convolution from DFT, FFT, Decimation in time and frequency algorithm. Introduction to wavelet transform. (10)

UNIT-IV : Filter categories, Direct form I, Direct form II, Cascade and parallel structure for IIR and FIR Filter, Frequency sampling structures for F.I.R. filter, Steps in Filter Design, Design by Pole Zero Placements, FIR filter design by Windowing method, Rectangular, Triangular and Blackman window. (8)

UNIT-V : Analog filter types, Butter worth, Elliptic filter, Specification and formulae to decide to filter order, Methods to convert analog filter into IIR digital, Mapping of differential, Impulse invariant, Bilinear, Matched Z transformation. (8)

UNIT-VI : Multi rate DSP, Introductory concept of multi rate signal processing, Design of Practical sampler, Rate converters, Decimators and Interpolator, Filter Bank application and examples. (8)

**Practicals:** Eight experiments should be based on above syllabus.

**TEXT BOOKS :**

1. Oppenham & Scheffer : Discrete time Processing (PHI)
2. Proakis & Monolakis D.G : Digital Signal Processing (PHI)
3. Mitra S.K. : Digital Signal Processing (PHI)

**REFERENCE BOOKS :**

1. Roman Kuo : Digital Signal Processing (MCW)
2. Ifeachor E.C., Jervis B. W. : Digital Signal Processing (Addison Wesley)
3. P. P. Vaidyanathan : DSP and Multirate Systems (PHI)
4. Rabiner and Chrocherie : Multirate DSP (PHI)

**7SUL4 DIGITAL IC'S & DESIGN**

UNIT-I : Combinational Logic Design:

Function of binary variables, Boolean Algebraic theorems, standard form of logical functions, K-map up to five variables, Quine Mcclusky method, Don't care conditions and it's effects, Synthesis using AND - OR gates. (8)

UNIT-II : Combinational logic design using 74/54 series MSI chip series concerning to multiplexers, demultiplexers, decoders, encoders, comparators, code converters, priority encoders parity generator/ checker & BCD-Seven segment decoder. (09)

- UNIT-III : Combinational logic design using ROM array, PLA, PAL, preliminary design concepts using FPGA's N-bit binary adder using 7480, Look-ahead carry adder construction. (8)
- UNIT-IV : Design of counter and sequential networks: Analysis of clocked sequential networks, General models of sequential machines, Equivalence and minimization networks, Deviation of state graph and tables, reduction of state assignments, S.M.Chart. (08)
- UNIT-V : Analysis of asynchronous sequential networks, derivation and reduction of primitive flow tables, state assignments and realization of flow tables, hazards, asynchronous sequential network design. (8)
- UNIT-VI : Fault detection and location in combinational circuits : Path sensitizing method, Equivalent - Normal-Form (ENF) method, Two-level fault detection.  
Fault detection and location in sequential circuits using circuit test approach. (09)

**Practicals:** Eight experiments should be based on above syllabus.

**TEXT BOOKS :**

1. Charles H. Roth : "Fundamental of Logic Design", 4<sup>th</sup> ed. Jaico Publication.
2. Lee S.C. : "Digital Circuit and Logic Design", Prentice Hall of India Pvt. Ltd., New Delhi
3. Jain R.P. : "Modern Digital Electronics Circuits and Systems", Macmillan Press, London

**REFERENCE BOOKS:**

1. Fleatcher : An Engineering approach to Digital System Design "", PHI
2. Morris N.M. : "Digital Electronics Circuits & Systems", Mac millan Press, London
3. Digital IC reference data manual
4. Texas Instru. Incorporated : Designing with TTL IC's.
5. Parag K. Lala : Fault Tolerant and Fault Testable Hardware Design, B.S. Publication, Hydrabad

**7SU5/7SL5/7SI5 ELECTIVE-I**

**(1)FUZZY LOGIC AND NEURAL NETWORKS**

- UNIT-I : Introduction :  
Biological Neurons and their artificial models, introduction

- to neural computing, Components of neuron, input and output weight, threshold, weight factors, transfer functions, concepts of supervised and unsupervised learning. (8)
- UNIT-II : Supervised Learning :  
Single layer network, perceptron, Linear separability, Training algorithm and limitations.  
Multilayer Network : Architecture of feed forward network, Learning rule, generalized delta rule, learning function. Back propagation algorithm. (9)
- UNIT-III : Unsupervised Learning:  
Introduction, Counter propagation networks, Kohonen's self organizing maps.  
Hopfield networks. (8)
- UNIT-IV : Introduction : Uncertainty in information, basic concepts of Fuzzy sets, operations on fuzzy sets, properties.  
Fuzzy relations : operations, properties, value assignments. (8)
- UNIT-V : Membership functions :  
Features, fuzzification, membership value assignments, Fuzzy Rule based systems, Graphical technique of inference.  
Defuzzification : Lambda-cuts for Fuzzy sets and Fuzzy relations, Defuzzification methods. (9)
- UNIT-VI : Applications:  
1. Fuzzy pattern Recognition - feature analysis, partitioning of feature space, single sample identification multifeature pattern recognition.  
2. Simple Fuzzy logic controller - Control system design stages, Assumptions in a Fuzzy control system design, general fuzzy logic controllers, simple examples.
- TEXT BOOKS :**
1. J.M. Zurada : "Introduction to Artificial Neural Systems", Jaico Publishing House.
  2. Meherotra Kishan, Mohan C.K., Ranka Sanjay : "Elements of artificial neural networks", Penram Int. Pub., Mumbai
  3. Timothy Koss : "Fuzzy Logic with Engineering Applications", McGraw Hill International Edition.

**REFERENCE BOOKS**

1. N. K. Bose and P. Liang : “Neural Network Fundamental with Graphs, Algorithms and Applications”, Tata McGraw Hill Edition.
2. G.J. Klir and T.A. Folger : Fuzzy sets, Uncertainty and Information”, PHI Publication
3. Kosko Bart : “Neural Networks & Fuzzy systems”, Prentice Hall of India Pvt.Ltd., New Delhi

**7SU5/7SL5****ELECTIVE-I****(2) FIBER OPTIC COMMUNICATION****UNIT-I: OPTICAL FIBER WAVEGUIDE :**

Total internal reflection, Snell’s law, Theory of circular wave guide, Modes in optical fibres, Single mode fibre, multimode fibre, N.A., power flow. (8)

**UNIT-II : TRANSMISSION CHARACTERISTICS OF FIBER:**

Attenuation, absorption losses, scattering losses, bending losses, dispersion, intra model - intermodel dispersion, bandwidth. Nonlinear effects in single-mode fiber. (8)

**UNIT-III : OPTICAL SOURCES:**

Optical emission from semiconductors, LED, power, efficiency, double heterojunction LED, Basic concept of Lasers, Semiconductor injection lasers. (8)

**UNIT-IV : OPTICAL FIBERS:**

Manufacturing, fiber splicing and connectors different manufacturing techniques, diff. splicing tech. and connectors. (8)

**UNIT-V : DETECTORS:**

Optical detection principle, absorption, quantum efficiency, responsivity, PIN photo diode, APD and noise in photodiode. MSM Photodetectors. (8)

**UNIT-VI : OPTICAL ELECTRONIC SYSTEM:**

Optical transmitter, receiver, digital system planning consideration, power budgeting coherent and noncoherent systems, modulation and demodulation scheme, wavelength multiplexing, Optical switches. (8)

**TEXT BOOKS :**

1. Senior J.M. : “Optical Fiber Communication and Application”, Prentice Hall of India Pvt. Ltd., New Delhi.
2. G.Keiser : “Optical Fiber Communication”, Mc-Graw Hill International Book Co., New York.

**REFERENCE BOOKS:**

1. Gowar : “Optical Communication System”, Prentice Hall
2. J. H. Franz and V. K.Jain : “Optical Communications, Components and System”, Narosa Publication
3. Ghatak & Thyagarajan : “Optical Electronics”, Cambridge foundation.
4. Djafar K. Mynbaev, Lowell I. Scheiner : “Fiber Optic Communication Technology”, LPE, Pearson Education, 2001.

**7SU5 /7SL5****ELECTIVE-I****(3) BIOMEDICAL ENGINEERING****UNIT-I: INTRODUCTION TO BIOMEDICAL ENGINEERING**

Physiological system of heart, Man instrument system, Sources of bioelectric potentials, Different bioelectric signals like ECG, EMG and EEG, Biopotential Electrode theory, Basic electrode, Electrodes for EEG, ECG, EMG, Biochemical electrodes. Skin contact Theory : skin contact impedance measurement of skin contact impedance, motion artifacts, nearest equation Nearnst Equation . (9)

**UNIT-II : BIOMEDICAL RECORDER AND MEASUREMENT**

Biomedical recorders for EEG, ECG, EMG, Blood pressure variation as a function of time, relationship of heart sounds to a function of the cardio vascular system, Measurement of Blood Pressure (Direct & Indirect), Blood flow, Heart sound. (8)

**UNIT-III : MEDICAL IMAGING SYSTEM**

Instrumentation for diagnostics X-ray , X- ray basics properties , X-ray machine , Special imaging technique. Ultrasonic imaging system : Physics of Ultrasound, Biological effect of ultrasound. Ultrasonic A-scan, M-scan, B-scan, Real-time ultrasonic imaging systems. (8)

**UNIT-IV : THERAPEUTIC EQUIPMENTS**

Need of Physiological and electrotherpy equipments. Cardiac

pacemaker machine, Cardiac Defibrillators, Nerve and Muscle stimulators. Diathermy : short wave, microwave, ultrasonic. (8)

**UNIT-V : PATIENT CARE AND MONITORING AND SAFETY**

System concepts, Bedside patient monitors, central monitors, Average reading heart monitor, Intensive care monitoring, Ambulatory monitoring. Biotelemetry : Single channel and Multichannel biotelemetry, telephonic data transmission.

**PATIENT SAFETY :** Electric shock hazards, leakage current. Types of Leakage current, measurement of leakage current, methods of reducing leakage current, precautions to minimize electric shock hazards. Telemedicine. (9)

**UNIT-VI : COMPUTERS IN BIOMEDICAL ENGINEERING**

Computerized Axial Tomography (CAT)

Computerized Aided ECG analysis

Computerized patient monitoring system.

Computerized Catheterization. (8)

**TEXT BOOKS:**

1. Khandpur R.S. : "Handbook of Biomedical Instrumentation", Tata Mc-Graw Hill, New Delhi.
2. Cromwell L. & Weibell F.J. : "Biomedical Instrumentation and Measurement", Prentice Hall of India.

**REFERENCE BOOKS:**

1. Dr. Lele R.D. : "Computer Applications of Medicine", Tata Mc-Graw Hill, New Delhi.
2. Webster J.G. : "Medical Instrumentation", 3rd Ed., John Wiley & Sons.
3. Carr and Brown : Biomedical Equipment Technology.

**7SU5**

**ELECTIVE -I**

**(4) PROCESS CONTROL & INSTRUMENTATION**

**UNIT I :** Introduction to Process Control: Process control principles, Introduction to Discrete state control systems, Process control block diagram, Process control drawings, Sensor time response.

Dynamic elements in control loop, single capacity and multicapacity process, interacting and noninteracting elements, Concepts of Gains and its types (8)

**UNIT II :** Basic Control Actions: On-off control, P, I, PI, PD, & PID controllers and their implementation using electronic components. Optimal controller settings-various methods.

Complex Control Actions : Feed back control, Ratio control systems, Split range control, Cascade control, Selective control, Feedforward control, Adaptive control. (10)

**UNIT III :** Multivariable process control : Choosing controlled variables, pairing controlled and manipulated variables, coupling and decoupling control systems.

Control Valves : Classification, characteristics, Determination of effective characteristics, selection of control valves. (8)

**UNIT IV :** Digital Control: Discrete state control system, Relay controllers, Programmable logic controllers: structure of PLC, basics of ladder diagram, applications of PLC, Digital control schemes, Data input, Control algorithms, Digital electronic methods. (9)

**UNIT V :** Computer Based Process Control: Data logging, SCADA (supervisory control & data acquisition) and case studies, DDC (direct digital control) and case studies, Process control networks. (8)

**UNIT-VI :** Typical process control :

Control of pumps, heat exchangers, furnaces, distillation columns, steam boilers, pH and chemical reactor.

Process instrumentation for : Steel plant, paper and pulp industries. (7)

**TEXT BOOKS :**

1. Johnson C. : "Process Control Instrumentation Technology", (7<sup>th</sup> Ed.) Prentice Hall of India, New Delhi.
2. Harroit P. : "Process Control", TMH, New Delhi.
3. Shinskey F.G. : "Process Control", Mc-Graw Hill Book Co., New York.

**REFERENCE BOOKS:**

1. Patranabis D. : "Principle of Process Control", Tata Mc-Graw Hill Pub. Co., New Delhi (1<sup>st</sup> Edition).
2. Eckman : "Automatic Process Control", Wiley Eastern Pvt. Ltd., New Delhi.
3. Krishna Kant : "Computer Based Industrial Control", PHI
4. Liptak B.G. : "Process Control Instrument Engineers Handbook", Chitton Book Co., Radnor.

**(5) ROBOTICS & AUTOMATION**

- UNIT-I : Definition of a Robot, A brief introduction to Robot Technology, Sensory perception, Intelligence, End Effectors, Sensory feedback, Robot Vision / Computer Vision and its fundamental components, Tactile Sensing, Range finding and real world navigation Speech synthesis and recognition.  
Robot control fundamentals : The Artificial intelligence view point, comparison of human brain and computer in the context of intelligent behaviour, problem representation in A.I. system problem solving technique in A.I. (12)
- UNIT-II : Definition of knowledge, Domain and logic : Elements of logic, propositional calculus, predicate calculus, pros and cons of logic, production system and their basis elements, semantic Nets and their characteristics, Frames, A Brief about Expert system comparison of various methods of knowledge representation. (10)
- UNIT-III : Elements of speech, Time Domain Analysis / Synthesis of speech and waveform digitization, frequency Domain Analysis / Synthesis of speech phoneme Speech Synthesis, various type of speech recognition Systems and their basic ideas, Isolated word Recognition, Connected Speech understanding. (12)
- UNIT-IV : Elements of vision, Image Transformation, Image Analysis, Image Understanding of Machine perception, Industrial Vision System. (9)
- UNIT-V : Triangulation Method, Time of Flight (TOF), Ranging Method, Robot Position and Proximity Sensing, Tactile-Sensing System, Sensing Joint Forces and their importance in Robot programming, sensing touch and slip. (9)
- UNIT-VI : Various Robot Programming Languages and their characteristics, characteristics of Robot Task Level language, comparison of Robot programming language, features of the high level languages used in conventional programming language, featuring with the high level language used in conventional programming. (12)

**TEXT BOOKS :-**

1. Staugard A.C. : "Robotic and AI", Prentice Hall, Engle Wood Cliff N.J. 1987.
2. Lee C.S.G., Fu K. S., Gonzalez R.C. : "Robotic-Control, Sensing and Intelligence", Mc-Graw Hill, Singapore, 1987.

**REFERENCE BOOKS:-**

1. Klafferetal : "Robotics"
2. Parent M. and Laugreau C. : "Robot Technology (Vol.4 : Logic and Programming", Kogan Page, London, 1985.
3. Aleksander I., Farreny H. and Ghallab M. : "Robot Technology" (Vol-1).
4. Decision and Intelligence "Kogan Page", 1986.

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**EIGHTH SEMESTER****8SU1****UHF & MICROWAVES****UNIT-I : MICROWAVE TUBES :**

Two cavity and reflex klystron, magnetron, TWT, noise in microwave tubes. (8)

**UNIT-II : SEMICONDUCTOR MICROWAVE DEVICES AND APPLICATIONS :**

Varactor diode, step recovery diode, parametric amplifiers, tunnel diode, gunn diode, negative resistance amplifier, PIN diode, IMPATT & TRAPATT diodes, MASER'S. (9)

**UNIT-III : TRANSMISSION OF MICROWAVES :**

Field analysis of transmission line, Rectangular wave guide, (TE and TM modes), Striplines- Microstrip lines characteristics, impedance losses in microstrip lines, types of strip lines. (9)

**UNIT-IV : WAVE GUIDING SYSTEM (PASSIVE COMPONENTS) :**

Microwave passive components, terminator, Attenuator, phase changer, directional coupler, hybrid junction, microwave propagation in ferrites, devices employing Faraday rotation Scattering matrix formulation for N port junction. (9)

**UNIT-V : MICROWAVE RESONATORS AND FILTERS :**

Basic Resonant circuits RLC, transmission line resonators, Fabry perot resonator, rectangular and circular cavities and

their Q. Transmission line filter, quarter wave & direct coupled cavity filter. (8)

**UNIT-VI : PRINCIPLES OF MICROWAVE COMMUNICATION**

Microwave link, tropospheric scatter link, line of sight system ( Ground base)

Microwave absorption in atmosphere (fading) . Noise in microwave communication system. (8)

**Practicals:** Minimum 8 practicals based on syllabus

**TEXT BOOKS :**

1. Liao, Samuel Y. : "Microwave devices & circuits", Tata Mc\_Graw Hill Co.Ltd., New Delhi
2. Collin, Robert E. : "Foundations for Microwave Engineering", Mc-Graw Hill, New York.

**REFERENCE BOOKS:-**

1. Kennedy G. : "Electronics Communication Systems", Tata Mc-Graw Hill Book Co., New Delhi..
2. K.C. Gupta : "Microwave Engg.", (WEL)
3. Reich, Scolnik, Ordung, Krangs : "Microwave Principles", PHI
4. M. Kulkarni : "Microwave and Radar Engineering", Umesh Publication.
5. M.L. Sisodiya and G.S. Raghuvanshi : "Microwave Circuits and Passive devices", (WEL)
6. Mathew M. Radmanesh : RF and Microwave Electronics – Illustrated.

**8SU2 ELECTRONIC CIRCUIT DESIGN**

**UNIT-I :** Design of regulated power supply using transistor as a regulated power supply, design of DC amplifier, comparator, window detectors, scaling and summing amplifier using IC 741 /IC 3245 or equivalent. (8)

**UNIT-II :** Design of waveform generator using IC 741, IC 8038, IC 566, IC 555. Design of sweep generator, voltage controlled oscillator. Design of first and second order filters, design of notch filter. (8)

**UNIT-III :** Design of instrumentation amplifier, Temperature controller / indicator using thermocouple, resistance thermal detector & thermister. Design of IC 555 based circuits. (8)

**UNIT-IV :** Introduction to CMOS / VLSI Circuits, MOS transistor switch, realization of universal gates and compound gates using MOS transistors, Fundamentals of circuit characterization and

performance estimation, basics of R, L and C estimation, CMOS circuits and Logic design, transistor sizing, basic physical design of simple logic gates. (9)

**UNIT-V :** Introduction to VHDL, Behavioral Modeling, sequential processing, data types, attributes, configurations, synthesis and synthesis issues, RTL simulation, place and route. Introduction to VERILOG. (9)

**UNIT-VI :** Design of combinational blocks such as multibit address, ALU, MUX, DEMUX , encoders, decoders, Design of sequential circuits, asynchronous and synchronous design issues, state machine modeling (moore and mealey machines). (9)

**Practicals :** Minimum Eight Practical based on the above. Using Hardware/Software.

**TEXT BOOKS :**

1. R.A. Gayakwad : "OP-AMP and Linear Integrated Circuits"
2. J. Bhaskar : "VHDL Primer", (Person Education)

**REFERENCE BOOKS:**

1. Goyal-Khetan : "A Monogram on Electronic Circuit Design.
2. Paul Horowitz - W.Hill : "The art of Electronics", (Cambridge Publication).
3. National Semiconductor Data Book.
4. Douglas L. Perry : VHDL (3<sup>rd</sup> Ed.) , McGraw Hill.
5. Neil Weste - K. Eshraghian : Principle of CMOS / VLSI Design (Person Education).
6. Carver Mead, Lynn Conway : Introduction to VLSI Systems.

**8SU3 COMMUNICATION NETWORK**

**UNIT-I :** Introduction to communication network, types of network - LAN, MAN, WAN, layer architecture, OSI reference model, LAN topologies- Bus, ring, star. Introduction to Circuit switching, packet switching and message switching. (8)

**UNIT-II :** Overview of transmission media :

Point to point protocol and links: ARQ retransmission strategy, selective repeat ARQ, sliding window, framing and standard data link control protocol - HDLC, SDLC, LAPD, queuing models in communication network. (8)

- UNIT-III : Multiple access protocol :  
Channel allocation, LAN access techniques, Random access methods, ALOHA, slotted ALOHA, CSMA, CSMA/CD, control access scheme, token ring, token bus, Performance modelling and analysis. (8)
- UNIT-IV : Networking devices and routing techniques:  
Hubs, repeaters, bridges, routers, gateways, switches and routing switches, routing algorithms : Fixed routing, random routing, flooding and adaptive routing (8)
- UNIT-V : Network architecture and connecting services : Ethernet, X.25, frame relay, FDDI, Introduction to SONET / SDH, Introduction to ISDN and Broad band ISDN, ATM. (8)
- UNIT-VI : TCP/IP Protocols  
Overview of TCP/IP, UDP, IP address type, IP addressing and related issues, IP address resolution techniques, IP datagram and datagram forwarding. (8)

**TEXT BOOKS :**

1. Amdrene S. Tanenbaum : "Computer Networks", PHI
2. W. Stallings : "Data and Computer Communications", (Maxwell Mechmillan)

**REFERENCE BOOKS :**

1. D Bertsekas and R.G. Gallager: "Data Networks", (2 e), Pearson Ed., (PHI)
2. Behrouz A Forouzan : "Data Communication and Networking", (TMH)
3. Uyles Black : "Computer Networks", (PHI)
4. Doglus E. Comer : "Computer Networks and Internets", ( Pearson Education)

**8SU4 /8SL4****ELECTIVE-II****(1) DIGITAL IMAGE PROCESSING**

- UNIT-I : Introduction to digital image processing, Digital Image Fundamental, Elements of Visual Perception, Simple Image Model, Sampling and Quantization, Basic Relationships between Pixel Imaging Geometry, Gray scale image representation. (8)
- UNIT-II : Image Transforms:  
Introduction to the Fourier Transform, DFT, Properties of Two Dimensional Fourier Transform, FFT, Hadamard, Harr

- DCT, Slant Transform. (8)
- UNIT-III : Image Enhancement :  
Basic Techniques, Enhancement by point processing, Spatial Filtering, Enhancement in Frequency domain, histogram based processing, homomorphic filtering. (8)
- UNIT-IV : Image Restoration:  
Degradation model, Diagonalisation concept, Algebraic approach to Restoration.  
Inverse filtering, Weiner (CNS) filtering Restoration in Spatial domain, Basic morphological concept, morphological principles, binary morphology, Basic concepts of erosion and dilation. (9)
- UNIT-V : Image Compression:  
Fundamentals, Image compression models, Elements of Information theory, Lossy and predictive methods, vector quantization, runlength coding, Hauff coding, and lossless compression, compression standards. (9)
- UNIT-VI : Image Segmentation :  
Detection of discontinuities, Edge Linking and boundary detection, Thresholding, Regional oriented Segmentation. (8)

**TEXT BOOKS :**

- 1) Gonzaler and Woods: "Digital Image Processing", Addison / Wesley.
- 2) Milan Sonka, Vaclav Hlavac, Roger Boyle : Image processing Analysis and Machine Vision", Book / Cole 2<sup>nd</sup> Edition.

**REFERENCE BOOKS:**

- 1) A.K.Jain : "Digital Image Processing", PHI
- 2) William K. Pratt : "Digital Image Processing", 3<sup>rd</sup> ed. , John Wiley and Sons Publi.

**8SU4****ELECTIVE -II****(2) SATELLITE COMMUNICATION**

- UNIT-I : Satellite frequency bands, Satellite types – LEO, MEO, GEO, HEO Communication satellite system, orbit, modulation, transmission and multiplexing. (8)

- UNIT-II : Orbital aspects of satellite communication : Orbital period and velocity, Effects of orbital inclination, azimuth and elevation, converge angle and slant range. Orbit determination, orbital effects in communication, system performance. (9)
- UNIT-III : Satellite channel :  
Electromagnetic field propagation, antennas, Atmospheric losses, receiver noise, carrier to noise ratio, satellite link analysis, Frequency reuse and depolarisation. (8)
- UNIT-IV : Satellite Transponder:  
The transponder model, satellite front end., satellite signal processing, transponder limiting, nonlinear satellite amplifier. (8)
- UNIT-V : Multiple access : Principles of frequency multiple access system, FDMA channelization, AM-PM conversion with FDMA, principles of TDMA system, satellite effects on TDMA performance, Code division multiple access, synchronised, non-synchronised CDMA. (9)
- UNIT-VI : Earth Station technology and satellite services :  
Earth Station design, tracking, equipment for earth stations, domestic satellite systems using small earth stations, VSAT, Global positioning system .

**Text Books :**

1. Gagliardi Robert M. : "Satellite Communication", CBS publications & Distributors, New Delhi.
2. Pratt Timothy and Bostian W. Charles: "Satellite Communication", Willey International Publication, New York.
3. Roddy D. : "Satellite Communications", Mc-Graw Hill Pub. Co. New York.

**8SU4 / 8SL4****ELECTIVE-II****(3) ADVANCED MICROPROCESSORS**

- UNIT-I : Overview of Intel 8086 architecture :  
Bus timing diagrams, Interrupt structure, ISRs, Minimum and Maximum mode. (8)
- UNIT-II : Multiprocessor System :  
Numeric processor 8087 : Architecture and interfacing.

- I/O processor 8089 : Architecture and interfacing.  
Bus arbitration and control, tightly coupled and loosely coupled systems . (8)
- UNIT-III : Introduction to 80286 :  
Architecture, hardware features, operation in real mode and protected virtual address mode basic bus operation minimum system configuration, 80287 Numeric co-processor . (8)
- UNIT-IV : Intel 80386 :  
Architecture, real mode operation, protected mode operation, segmentation, virtual 8086 mode. (9)
- UNIT-V : Intel 80386 conventional interfacing strategies, cache memory systems, 80486 family, internal architecture memory and I/O organization, interrupt, internal exceptions. (8)
- UNIT-VI : Pentium processor :  
Salient features of 80586 (Pentium), system architecture, branch prediction, MMX, MMX data types, wraparound and saturation arithmetic, Basic architecture of Pentium –IV.( 7)

**TEXT BOOKS :**

1. A.K. Ray and K.M. Bhurchandi : "Advanced Microprocessors and Peripherals", TMGH Publ.
2. S. K. Venkataram : "Advanced Microprocessor and Microcontrollers", Laxmi Publ.
3. Walter A. Triebel : " The 80386, 80486 and Pentium Processor – Hardware, software and interfacing", PHI Publ.
4. K. R. Venugopal and Rajkumar : "Microprocessor X86 programming", BPB Publ.
5. B.B.Brey : The Intel Microprocessor 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Proprocessor. (4/e)

**8 SU 4****ELECTIVE-II****(4) WIRELESS COMMUNICATIONS**

- Unit-I : Introduction to Cellular Mobile System : evolution of cellular mobile systems (1st, 2nd, 3rd generation), A basic cellular system, cell shape, concept of frequency reuse, hand off strategies, power control operation of cellular systems. Example of cellular calls. (8)
- Unit II : Cellular radio system design fundamentals : frequency assignments, channel assignment strategies, co-channel and

non-co-channel interference, cellular system capacity, performance criteria, trunking and grade of service, improving coverage and capacity in cellular system, multiple access schemes. (9)

Unit III : Mobile Radio propagation & Antennas : Radio propagation mechanism, path loss modelling and signal coverage, multipath propagation, fading, doppler shift, fast and slow fading, control of fading in mobile systems, Antennas at cell site, mobile antenna, diversity. (10)

Unit IV : Digital Cellular Systems : GSM : system architecture, radio subsystem, channel types, frame structure, signal processing in GSM, CDMA (IS 95) : frequency and channel specifications, forward & reverse CDMA channel. (9)

Unit V : Cordless systems and WLL : Introduction to cordless systems, CT2 and DECT standards, DECT architecture, DECT frame format and radio link, DECT operation.

WLL : role of WLL, propagation considerations for WLL, LMDS and MMDS. (9)

Unit VI : Wireless LAN : overview of wireless LAN, wireless LAN technologies ; infrared, spread-spectrum, narrow band microwave LAN, mobile data networks : CDPD, GPRS, WAP.

Bluetooth : overview, radio specification, base band specification, link manager specifications. (9)

#### **TEXT BOOKS :**

- 1) William CY Lee : “Mobile Cellular Telecommunications”(second edition) McGraw Hill Inc. (1995)
- 2) Theodore S.Rappaport : “Wireless Communications : Principles & Practice”, second edition, Pearson Education (2002)

#### **REFERENCE BOOKS:**

- 1) William Stallings : “Wireless Communications and Networks” Pearson Education Asia Publication (2002)
- 2) K.Pahlavan and P.Krishnamurthy : “Principles of Wireless Networks”, Pearson Education Asia Publication (2002)
- 3) Jochen Schiller : “Mobile Communications”, Pearson Education Asia Publication (2002)
- 4) Andy Dornam : “The Essential Guide to Wireless Communication Applications”, Pearson Education Asia Publication.

**8 SU 5**

**PROJECT & SEMINAR**

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**SANT GADGE BABA AMRAVATI UNIVERSITY**  
**\$ REGULATION NO. 13 OF 2002**

Examinations leading to the Degree of Bachelor of Engineering (Electronics & Telecommunication Engineering) (Four Year Degree Course.... Semester Pattern) Regulation, 2002.

Whereas it is expedient to frame the Regulation in respect of Examinations leading to the Degree of Bachelor of Engineering (Electronics & Telecommunication Engineering) (Four Year Degree Course.....Semester Pattern) for the purposes hereinafter appearing the Management Council is hereby pleased to make a following Regulation.

1. This regulation may be called "Examinations leading to the Degree of Bachelor of Engineering (Electronics & Telecommunication Engineering) (Four Year Degree Course.... Semester Pattern) Regulation, 2002.
2. This Regulation shall come into force w.e.f. the Academic session-
  - i) 2000-01 for Ist & IInd Semester B.E.,
  - ii) 2001-02 for IIIrd & IVth Semester B.E.,
  - iii) 2002-03 for Vth & VIth Semester B.E., and
  - iv) 2003-04 for VIIth & VIIIth Semester B.E.
3. The Schemes of Teachings and Examinations for Ist & IInd, IIIrd & IVth, Vth & VIth, and VIIth & VIIIth Semester in respect of Bachelor of Engineering (Electronics & Telecommunication Engineering) (Four Year Degree Course.... Semester Pattern) shall be as per Appendices-A, B, C, and D appended with this Regulation respectively.

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\$ as amended vide Regulation No.32 of 2003 & 16 of 2007.