

BSC
ELECTRONICS CBCS
SYLLABUS BLOWUP
2017-2018

Paper-I (Semester-I) Circuit Analysis

Lecture	Topic	Remarks
	Unit-I Introduction to current, voltage, resistance, ohms law	
Lecture-1	Sine wave :- equation, real value frequency	
Lecture-2	Average value:- definition, derivation, problem	
Lecture-3	RMS value:- definition, derivation, problem	
Lecture-4	J. Operator:- phase difference	
Lecture-5	Phasor diagram	
Lecture-6	Impedance:- Complex and admittance	
Lecture-7	Rectangular form of complex numbers -problems	
Lecture-8	Polar form of complex numbers and conversion	
Lecture-9	Polar to rectangular by polar problem	
Lecture-10	concept of voltage and current source	
Lecture-11	KVL - Application to simple circuits	
Lecture-12	KVL - Application to simple circuits	
Lecture-13	finding mesh currents - AC & DC sources	
Lecture-14	KCL- Nodal analysis Application to simple circuit	
Lecture-15	Finding mesh currents AC- circuit	
Lecture-16	problems	
Lecture-17	Problems	
	Unit - II Superposition theorem - Definition proof	
Lecture-19	Finding individual currents in simple circuits using superposition	
Lecture-20	Thevenin's theorem definition proof	
Lecture-21	Finding thevenin's equivalent ckt of simple ckt	
Lecture-22	Norton's theorem - Definition proof	
Lecture-23	Nortonization the give simple circuit	
Lecture-24	maximum power transfer theorem definition proof	
Lecture-25	finding value RL using maximum power theorem	
Lecture-26	Reciprocity theorem - definition, proof	
Lecture-27	application to simple circuit	
Lecture-28	Millman's theorem	
Lecture-29	application to simple circuit	
Lecture-30	Problems	
	Unit -III RC & RL Circuit	
Lecture-31	Transient response of RC ckt with step input changing of capacitor of and discharging of capacitor –problem capacitance Discharge	
Lecture-32	RL Circuit step input - transient response increase and decrease of circuit	

Lecture-33	RC as LPF & HPE	
Lecture-34	frequency of RC HPE - problem on LPE & HPE	
Lecture-35	frequency response of RL as HPE	
Lecture-36	RL as HPE problem of LPE & HPE	
Lecture-37	RC as intergration	
Lecture-38	RC as defferention	
Lecture-39	RL AS integration	
Lecture-40	RL AS defferntation	
	Unit-IV LCR Serices Circuit - Condition of resonce	
Lecture-41	Q factor of serices LCR	
Lecture-42	Sharpness of resonace of series LCR ckt	
Lecture-43	Problems on Q factor	
Lecture-44	LCR parallel resonant circuit	
Lecture-45	Q- factor	
Lecture-46	Sharpness of resonace bandwith & seleclivity	
Lecture-47	Cathode ray oscllioscope	
Lecture-48	Problems	

Text books:

- 1) Basic Electronics-Grob 10th edition (TMH)
- 2) Circuit Anallysis-P. Gnanaswan pearson Education.
- 3) Circuit and Networks-A. Sudhakar & S. Pallri(TMh)
- 4) Pulse, digital & switching waveforms-Milliman &Taub.
- 5) Networks, Lines and Fields –John Ryder(PHI)
- 6) Network theory-Smarajit Ghosh(PHI)

Paper -II (Semester-II)Electronic Device

Lecture	Topic	Remarks
	Unit-I Formation of PN Junction	
Lecture-1	Depletion region	
Lecture-2	Junction capacitance, Diode Equation	
Lecture-3	Effect of temperature on reverse saturation current	
Lecture-4	V-I Characteristic of junction diode	
Lecture-5	Diode as half wave rectifier	
Lecture-6	Diode as full wave rectifier	
Lecture-7	Zener diode V-I characteristics	
Lecture-8	Zener diode as V-I voltage regulation	
Lecture-9	Thermal diode V-I Characteristics	
Lecture-10	Varactor diode voltage & Characterisation	
Lecture-11	Problems	
	Unit-II PNP & NPN Transistor	
Lecture-12	Current components in BJT	
Lecture-13	Configuration of transistor CB,CE,CC	
Lecture-14	Input characteristics of BJT-CE mode	
Lecture-15	Output characteristics of BJT -CE mode	
Lecture-16	Bias conditions(Cut off, active, saturation regions)	
Lecture-17	Two port networks	
Lecture-18	h-parameters	
Lecture-19	hybrid model of CE transistor	
Lecture-20	Determination h-parameter from load line	
Lecture-21	DC load time	
Lecture-22	AC load time analysis	
Lecture-23	Transistor biasing- self bias	
Lecture-24	Transistor biasing - fixed bias	
Lecture-25	Problems	
Lecture-26	Problems	
	Unit-III FET- Construction and working	
Lecture-27	FET output characteristics	
Lecture-28	FET transfer characteristics	
Lecture-29	FET parameters and their relation	
Lecture-30	FET as voltage variable resistor	
Lecture-31	advantage of FET over BJT	
Lecture-32	MOSFET construction and working	
Lecture-33	Enhancement MOSFET	
Lecture-34	Output and transfer characteristics	

Lecture-35	Depletion MOSFET	
Lecture-36	Output and transfer characteristics	
Lecture-37	MOSFET as a Switch	
Lecture-38	unijunction transistor- construction	
Lecture-39	unijunction transistor- working	
Lecture-40	Characteristics of UJT	
Lecture-41	UJT as relaxation oscillator	
	Unit-IV SCR Construction	
Lecture-42	Two transistor model	
Lecture-43	working of SCR	
Lecture-44	V-I Characteristics of SCR	
Lecture-45	SCR - power control	
Lecture-46	LDR-Construction	
Lecture-47	Characteristics of LDR	
Lecture-48	Photo voltaic cell working	
Lecture-49	Photo diode working	
Lecture-50	Photo transistor working	
Lecture-51	Photo transistor characteristics	
Lecture-52	LED working	
Lecture-53	LED Characteristics	

Books Recommended:

- 1) Electronic Devices and circuits-Millman and Halkias,(TMH)
 - 2) Principles of Electronics-V.K.Metha & Rohit Mehta
 - 3) Electronics Devices and Circuits-Allen Moltershed(PHI)
 - 4) Basic Electronics and Linear Circuits-Bharghava U
 - 5) Electronic Devices and Circuits-Y.N.Bapat
 - 6) Electronic Devices and Circuits-Mithal.
 - 7) Experiments in Electronics-S.V.Subramanyam.
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Paper -III (Semester-III)Analog circuits

Lecture	Topic	Remarks
	Unit-I Halfwave rectifier working	
Lecture-1	Halfwave rectifier I_{dc} , I_{rms} , Regulation	
Lecture-2	HWR Ripple factor Efficiency	
Lecture-3	Fullwave rectifier –Working	
Lecture-4	FWR I_{dc} , I_{rms} , regulation	
Lecture-5	FWR ripplefactor Efficiency	
Lecture-6	Bridge rectifier – working	
Lecture-7	Bridge rectifier-Efficiency ripple factor	
Lecture-8	Harmonic components of rectifier output	
Lecture-9	FWR-working of series inductor filter	
Lecture-10	series inductor filter ripple factor	
Lecture-11	FER Shunt capacitor filter	
Lecture-12	Shunt capacitor filter ripple factor	
Lecture-13	FWR L section filter working	
Lecture-14	L Section filter ripple factor	
Lecture-15	FWR π Section filter working	
Lecture-16	π section ripple factor	
	Unit-II Block diagram of regulated power supply	
Lecture-17	Three terminal IC 78XX, 79XX	
Lecture-18	Series transistor regulated power supply	
Lecture-19	Shunt transistor regulated power supply	
Lecture-20	Principle and working of SMPS	
Lecture-21	Principle and working of UPS	
	Unit-III Classification of amplifier	
Lecture-22	RC Coupled amplifier working	
Lecture-23	RC coupled amplifier -Gain in middle frequency	
Lecture-24	RC coupled amplifier -Gain in low frequency	
Lecture-25	RC Coupled amplifier -Gain in high frequency	
Lecture-26	Frequency response of RC coupled amplifier	
Lecture-27	Hybrid parameters	
Lecture-28	Hybrid model of a transistor	
Lecture-29	Hybrid model of a transistor (cont)	
Lecture-30	Feed back in amplifiers	
Lecture-31	Concept of feed back	
Lecture-32	Effect of negative feed back on gain, bandwidth, noise	
Lecture-33	Effect of negative feed back on in input and output impedance	
Lecture-34	Emitter follower	

Lecture-35	Emitter follower	
Lecture-36	Darlington pair	
Lecture-37	Darlington pair	
Lecture-38	Problems on feedback	
	Unit-IV Oscillators-Barkhausen criteria	
Lecture-39	Phase-shift oscillator working	
Lecture-40	Phase-shift oscillator Frequency of oscillation	
Lecture-41	Wien bridge oscillator	
Lecture-42	Hartley oscillator	
Lecture-43	Colpitts oscillator	
Lecture-44	astable multivibrator	
Lecture-45	Bistable multivibrator	
Lecture-46	Monostable vibrator	
Lecture-47	Problems on oscillators	
Lecture-48	Problems on oscillators	

Recommended Books:

- 1) Electronic Devices and Circuits-Millman and Halkia(TM)
- 2) Basic Electronics and linear circuits- Bhargava, Kulshreshtha&GuptaTMH
- 3) A first course in Electronics-AA Khan and KK Dey-PHI
- 4) Electronic Devices and Circuit Theory-Robert Boylestad&Louis Nashelsky
- 5) Pulse, Digital and Switching circuits byMilliman and Taub

Paper -IV(Semester-IV) Operational Amplifiers		
Lecture	Topic	Remarks
	Unit-I Emitter Coupled Differential amplifier,	
Lecture-1	Block diagram of Op, Amp	
Lecture-2	Charactersitics of Op. Amp	
Lecture-3	Op. Amp parameters-Input resistance Output resistance	
Lecture-4	Common mode rejection ration(CMMR), Slew rate,	
Lecture-5	Offset Voltages	
Lecture-6	Input bias current	
Lecture-7	Virtual ground,	
Lecture-8	Basic OP-Amp circuits - Inverting Op-Amp,	
Lecture-9	Non-Inverting OP-Amp,	
Lecture-10	Frequency response of Op-Amp.	
Lecture-11	Op Amp as: Summing amplifier,	
Lecture-12	Op Amp as: subtractor	
Lecture-13	Op Amp as: Comparator	
Lecture-14	Op Amp as: Voltage follower	
Lecture-15	Op Amp as: Integrator	
Lecture-16	Op Amp as: Differentiator	
	Unit-II Logarithmic amplifier,	
Lecture-17	sine wave generator	
Lecture-18	Square wave[Astable] generator	
Lecture-19	Triangular wave generator	
Lecture-20	Mono stable multivibrator	
Lecture-21	Solving of simple second order differential equations	
Lecture-22	Basic OP- Amp series regulator and shunt regulator	
Lecture-23	IC 555 Timer [Block diagram and its working]	
Lecture-24	IC 555 as mono stable and astable multivibrators	
	Unit-III Need for modulation	
Lecture-25	Amplitude modulation	
Lecture-26	Frequency modulation	
Lecture-27	Phase modulation	
Lecture-28	Amplitude modulation	
Lecture-29	Analysis of Amplitude modulation	
Lecture-30	side bands	
Lecture-31	modulation index	
Lecture-32	AM modulator	

Lecture-33	Balanced modulator	
Lecture-34	Demodulation- diode detector	
	Unit- IV Frequency modulation	
Lecture-35	Analysis of FM	
Lecture-36	Working of simple frequency modulator	
Lecture-37	Detection of FM waves	
Lecture-38	FM Discriminator	
Lecture-39	Advantages of frequency modulation	
Lecture-40	AM and FM Transmitter and radio receivers	
Lecture-41	Introduction to PAM	
Lecture-42	Pulse position modulation (PPM)	
Lecture-43	Pulse width modulation (PWM)	
Lecture-44	Pulse code modulation(PCM)	
Lecture-45	Problems on modulation	
Lecture-46	Problems on modulation	

Reference Books:

- 1) Op amps and linear Integrated Circuits-Ramakant Gayakwad, PHI
 - 2) Linear Integrated Circuits-D Roy Choudhury and Shail B Jain
 - 3) Electronic Communication Systems-George Kennedy & BernardDavis
 - 4) Principles of Electronic Communication Systems-Louis E Freznel, TMH
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Paper-V (Semester-V)Digital Electronics

Lecture	Topic	Remarks
Unit-I Number system and Logic gates:		
Lecture-1	Conversions of Binary to Octal and Decimal	
Lecture-2	Octal, Decimal to binary Conversion	
Lecture-3	Hexadesimal number system	
Lecture-4	Binary addition and subtraction	
Lecture-5	OR, AND,NOT Gates & Truth tables	
Lecture-6	XOR, NAND, NOR Gates & Truth tables	
Lecture-7	Design of basic gates using Universal gate(NOR)	
Lecture-8	Design of basic gates using Universal gate(NAND)	
Lecture-9	Half adder	
Lecture-10	Full adder	
Lecture-11	Parallel adder	
Lecture-12	Logic families and their characteristics TTL Logic circuits	
Lecture-13	TTL Logic circuits	
Lecture-14	CMOS Logic circuits	
Lecture-15	ECL Logic circuits	
Lecture-16	Problems on Conversions	
Lecture-17	Problems on Conversions	
Unit-II Boolean algebra and Combinational logic circuits		
Lecture-18	Boolean algebra Laws	
Lecture-19	Boolean identities	
Lecture-20	DeMorgan's Theorem –I	
Lecture-21	DeMorgan's Theorem –II	
Lecture-22	Simplification of Boolean expressions using Boolean Identities	
Lecture-23	Reduction of Boolean expressions using Karnaugh Maps	
Lecture-24	Sum of products representation 2 Variable	
Lecture-25	Sum of products representation 3 Variable	
Lecture-26	Sum of products representation 4 Variable	
Lecture-27	Problems on SOP	
Lecture-28	Problems on SOP	
Lecture-29	Multiplexer	
Lecture-30	De Multiplexer	
Lecture-31	De Decoder(3 to8)_	
Lecture-32	Encoder(8 to3)	
Unit-III Sequential logic circuits		
Lecture-33	Flip-flops –SR	
Lecture-34	JK Flip flop	
Lecture-35	jK Master-Slave Flip-flop	
Lecture-36	D,T Flip flop	

Lecture-37	Registers SISO	
Lecture-38	PISO Register	
Lecture-39	SIPO Register	
Lecture-40	PIPO Register	
Lecture-41	Universal shift register (IC 7496)	
Lecture-42	shift register	
Lecture-43	Ring Counter	
Lecture-44	Johnson Counter	
	Unit-IV Counters and Semicoundctor memories	
Lecture-45	4-bit Asynchronous (Ripple) counter	
Lecture-46	Modulo-N Counter Working truth tables, timing diagram	
Lecture-47	Syschronous Counter Working truth tables,timing diagram	
Lecture-48	Up/down counters Working truth tables,timing diagram	
Lecture-49	Ripple counter IC7493 Working truth tables,timing diagram	
Lecture-50	Decade counter IC7490 Working truth tables,timing diagram	
Lecture-51	Organization and working of ROM	
Lecture-52	Types of ROM's	
Lecture-53	Types of PROM	
Lecture-54	Types of EPROM	
Lecture-55	Types of EEPROM	
Lecture-56	Types of FLASH	
Lecture-57	Types of RAM	
Lecture-58	Static RAM Organization	
Lecture-59	Dynamic RAM Organization	

Books Recommended:

- 1) Digital Principles and Applications- Malvino& Leach- TMH.
- 2) Digital Principles and Applications- Ronald J. Tocci- Person Education.
- 3) Text book of Electronics Bsc III year(vol.III)-Telugu Akademi.
- 4) Digital Fundamentals- F.Loyd&Jain-Pearson Education.
- 5) Fundamentals of Digital Circuits- Anand Kumar- PHI.
- 6) Digital Electronics Principles and Integrated circuits-Maini –Wiley India.
- 7) Digital Electronics - Gothman

Paper -VI (Semester-V)Microprocessor and Applications

Lecture	Topic	Remarks
	Unit-I Introduction to 8085 Microprocessor & its architecture	
Lecture-1	Introduction to Microcomputer	
Lecture-2	8085 Microprocessor Architecture	
Lecture-4	CPU	
Lecture-5	Timing & Control Unit	
Lecture-6	Instruction cycle	
Lecture-7	Fetch Cycle	
Lecture-8	Execute cycle(Timing diagram)	
Lecture-9	Machine cycle & Clock states	
Lecture-10	Interrupts - Hardware and Software	
Lecture-11	Address space partitioning	
Lecture-12	Memory mapped I/O	
Lecture-13	I/O mapped I/O	
	Unit-II Instruction set of 8085 microprocessor	
Lecture-14	Data transfer operations	
Lecture-15	Arithmetic operations	
Lecture-16	Logical operations	
Lecture-17	Branch control operations	
Lecture-18	I/O and Machine control operations	
Lecture-19	Stack Operations	
Lecture-20	Subroutines Operations	
Lecture-21	Addressing modes	
Lecture-22	Addressing modes	
Lecture-23	Addressing modes	
	Unit-III Programming of 8085 micriprocessor	
Lecture-24	Assembly language programming addition(8 & 16 bit)	
Lecture-25	ALP-8 bit- subtraction	
Lecture-26	ALP-Multiplication	
Lecture-27	ALP - Division	
Lecture-28	Finding the largest In data array-ALP	
Lecture-29	Finding Smallest number In data array-ALP	
Lecture-30	Program to arrange the given numbers in ascending order	
Lecture-31	Program to arrange the given numbers in descending order	
Lecture-32	Counters	
Lecture-33	Time delays	
Lecture-34	Programs	
Lecture-35	Programs	
	Unit-IV Interfaceing of peripherals	
Lecture-36	Typesof programmable Peripherals	

Lecture-37	Non programmable Peripherals	
Lecture-38	interfacing peripherals-8212(I/O port)	
Lecture-39	Programmable peripheral interface 8255	
Lecture-40	Programmable peripheral interface 8255	
Lecture-41	D/A Converters binary weighted	
Lecture-42	D/A Converters Ladder network	
Lecture-43	A/D Converters (Dual slope)	
Lecture-44	A/D Converters (Successive approximation)	
Lecture-45	Closed loop process	
Lecture-46	open loop process	
Lecture-47	Control systems(concept only)	
Lecture-48	Stepper motor control	

Books Recommended:

- 1) Microprocessor Architecture and Programming- Ramesh S. Goanker – Penram.
- 2) Fundamentals of Microprocessors and Micro controllers – B. Ram, Dhanpat rai & Sons.
- 3) Text book of Electronics B.Sc III year(Vol.III)-Telugu Academy.
- 4) Introduction to Microprocessor- Aditya P. Mathur- TMH.
- 5) Microprocessor Lab Premier- K.A. Krishnamurthy.

Paper-VII (Semester-V) Digital Communication		
Lecture No	Topic	Remarks
	Unit-I Signals Analysis	
Lecture1	Complex fourier spectrum	
Lecture2	Fourier Transform	
Lecture3	Properties of Fourier transform	
Lecture4	Sampling theorem	
Lecture5	Random signals	
Lecture6	Noise	
Lecture7	Correlation	
Lecture8	Power spectrum	
	Unit-II Digital Communication System	
Lecture9	A/D Converter	
Lecture10	D/A Converter	
Lecture11	Coded Communication	
Lecture12	AM (Amplitude modulation)	
Lecture13	PWM(Pulse width modulation)	
Lecture14	PPM(Pulse position modulation)	
Lecture15	PCM(Pulse Coded modulation)	
Lecture16	Delta modulation	
Lecture17	Adaptive Delta modulation	
Lecture18	Quantization	
Lecture19	noise Quantization	
Lecture20	Noise Consideration	
Lecture21	Digital transmission	
Lecture22	Reception	
Lecture23	Timing	
Lecture24	Base Band Systems	
Lecture25	ASK(Ampitude shift keying) Generation	
Lecture26	ASK(Ampitude shift keying) Detection	
Lecture27	FSK(Frequency shift keying)Generation	
Lecture28	FSK(Frequency shift keying) Detection	
Lecture29	PSK(Phase shift keying)Generation	
Lecture30	PSK(Phase shift keying)Detection	
Lecture31	QAM	
	Unit-III Error Detection and Coding	
Lecture32	Parity Check	
Lecture33	CRC Coding	
Lecture34	CRC Coding	
Lecture35	Hamming distance	
Lecture36	Hamming Codes	

Lecture37	Cyclic Codes	
Lecture38	Cyclic Codes	
Lecture39	Line Synchronization Codes	
Lecture40	Manchester Code	
Lecture41	NRZ Coding	
Lecture42	Walsh codes	
	Unit-IV Case studies	
Lecture43	Paging system	
Lecture44	Paging system	
Lecture45	Cellular telephone	
Lecture46	Global positioning Satellite	
Lecture47	Global positioning Satellite	
Lecture48	Global positioning Satellite	
Lecture49	Facsimile	
Lecture50	Videotext	

Reference Books:

- 1) Analog and Digital Communication systems –M.S.Roden, 3rd Edition,
- 2) Modern Digital and Analog Communication Systems-B.P.Lathi.
- 3) Communication Techniques for digital and Analog signals – M.Kanefsky, John Wiley and Son.
- 4) Telecommunication-T.H.Brewster, McGraw Hill.
- 5) Principles of Digital communication, Das Chatterjee and Mallick, Wiley Eastern Ltd.

Paper-VIII(A) Semester-VI 8051 Microcontroller and Applications		
Lecture No	Topic	Remarks
	Unit-I The Microcontroller 8051:	
Lecture1	Overview and block diagram of 8051	
Lecture2	Architecture of 8051	
Lecture3	Pin Diagram of 8051	
Lecture4	Data types and directives	
Lecture5	Memory Organization	
Lecture6	Register bank	
Lecture7	Special function registers	
Lecture8	I/O port organization	
Lecture9	Interrupts modules	
Lecture10	Timer/Counter modules	
	Unit - II Instruction set of 8051 microcontroller	
Lecture11	Data transfer Instruction	
Lecture12	Arithmetic Instruction	
Lecture13	Logical Instruction	
Lecture14	Single Bit Instruction	
Lecture15	Jump Instructions	
Lecture16	loop and CALL Instructions and their usage	
Lecture17	Addressing modes- Immediate	
Lecture18	Register Addressing modes	
Lecture19	Direct Addressing modes	
Lecture20	Indirect Addressing modes	
Lecture21	Absolute addressing	
Lecture22	Relative addressing	
Lecture23	Indexed Addressing	
Lecture24	Accessing memory using various addressing modes	
	Unit-III Programming example of microcontroller 8051	
Lecture25	ALP Addition Programming	
Lecture26	ALP Subtraction Programming	
Lecture27	ALP Division Programming	
Lecture28	Picking the smallest number Among a given set of numbers	
Lecture29	Picking the largest number Among a given set of numbers	
Lecture30	Arranging a given a set of numbers in ascending order	
Lecture31	Arranging a given a set of numbers in Descending order	
Lecture32	Subroutines	
Lecture33	I/O Programming Bit manipulation	
Lecture34	Accessing specified port terminal	
Lecture35	Generating wave forms	
Lecture36	Timer/Counter	

Lecture37	Programming in 8051	
Lecture38	Programming 8051 timers	
Lecture39	Basic registers and timers	
Lecture40	Timer0, Timer1 registers,	
Lecture41	TMOD register	
Lecture42	TCON register	
Lecture43	Timer mode 01	
Lecture44	Mode02 programming	
Lecture45	Counter mode programming	
Lecture46	Program to generate time delay	
	Unit-IV Serial Communications	
Lecture47	Serial communication	
Lecture48	Serial communication Types	
Lecture49	Serial communication modes	
Lecture50	Serial communication Protocols	
Lecture51	Data transfer rate	
Lecture52	Serial communication program	
Lecture53	SBUF registers	
Lecture54	SCON registers	
Lecture55	RS232 standards	
Lecture56	Programming timer	
Lecture57	Interrupts	
Lecture58	Application of Micro controller	
Lecture59	Displaying information on a LCD	
Lecture60	Interfacing a keyboard	
Lecture61	Interfacing a temperature sensor	
Lecture62	Interfacing of DAC 0808 to microcontroller	
Lecture63	Interfacing of ADC 0804 to microcontroller	
Lecture64	Seven segment LED	

Books Recommended:

1. The 8051 Microcontrollers and Embedded Systems – Muhammad AliMazidi and Janice gillipsieMazidi- Pearson Education Asia, 4th Reprint, 2002.
2. Text book of Electronics BSC III year(vol.III)-Telugu Akademi.
3. Fundamentals of Microcontroller – B. Ram
4. The 8051 Microcontroller - architecture, programming and applications Kenneth J. AyalaPenran International Publishing 1995.
5. Micro-controller Theory and Applications-Ajay. V.Deshmukh.
6. Micro-Controller 8051 D. Karuna Sagar, Narosa

