UG PROGRAM (4 Years Honors)

CBCS - 2020-21

SUBJECT
ELECTRONICS

Syllabus and Model Question Papers

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Note: BOS is to providefinal soft copy in PDF and word formats and four copies of hard copies in bounded form to the office of Dean Academic affairs.

ADIKAVI NANNAYA UNIVERSITY
RAJAHMAHENDRAVARAM, A.P., INDIA

1. **Resolutions of the Board of Studies**
   Meeting held on: 22-01-2021Time:10.00 am
   At: Convention Center,Adikavi Nannaya University

Agenda:

1. Syllabus
2. Preparation of model question paper
3. Paper setters list (Out of University)

Members present:

1. Dr.Y.V.V.Appa Rao,
   Chairman, BOS
   Principal
   SVKP & DRKS Raju Arts & Science College,Penugonda.
2. Dr.Ch Kanaka Rao
   Sri Y N College(Autonomous)Narsapur
3. B.Ravi kumar
   SEIM
   Government College,
   Tanuku
4. Y.Sushma Priya
   Assistant Professor,
   Department of Physics,
   Adikavi Nannaya University

Resolutions:

1. It is unanimously resolved to follow the pattern of 75% of marks for external assessment and 25% of marks for internal(for theory papers only) also resolved to continue the pattern of 50 marks for practical examinations for all the semester end practical examinations in electronics.
2. It is resolved that all the semester end examinations in electronics with section B has a weightage of 50 marks having internal choice questions and section A has a weightage of 25 marks in which the student has to answer 5 questions out of 10 questions given
3. It is resolved to implement the enclosed syllabus in theory and practicals to I, II, III and IV semester students with effect from 2020-21 academic year
4. It is resolved and submitted model question paper for I to IV semesters based on the weightage specified above
5. It is resolved and submitted the list of question paper setters from outside university

ADIKAVI NANNAYA UNIVERSITY
RAJAHMAHENDRAVARAM, A.P., INDIA

UG Program (4 years Honors) Structure (CBCS)

2020-21 A. Y., Onwards

BACHLOR OF SCIENCE

(3rd and 4th year detailed design will be followed as per APSCHE GUIDELINES)

Subjects/ Semesters		I		II		III		IV		V		VI			
		H/W	C	H/W	C	H/W	C	H/W	C	H/W	C	H/W	C		
Languages												THIRD PHASE of APPRENTICESHIP Entire 5th / 6th Semester		FIRST and SECOND PHASES (2 spells) of APPRENTICESHIP between 1st and 2nd year and between 2nd and 3rd year (two summer vacations).	
English		4	3	4	3	4	3								
Language (H/T/S)		4	3	4	3	4	3								
Life Skill Courses		2	2	2	2	2+2	2+2								
Skill Development Courses		2	2	2+2	2+2	2	2								
Core Papers															
M-1	C1 to C5	4+2	4+1	4+2	4+1	4+2	4+1	4+2 4+2	4+1 4+1						
M-2	C1 to C5	4+2	4+1	4+2	4+1	4+2	4+1	4+2 4+2	4+1 4+1						
M-3	C1 to C5	4+2	4+1	4+2	4+1	4+2	4+1	4+2 4+2	4+1 4+1						
M-1	SEC (C6,C7)									4+2 4+2	4+1 4+1				
M-2	SEC (C6,C7)									4+2 4+2	4+1 4+1				
M-3	SEC (C6,C7)									4+2 4+2	4+1 4+1				
Hrs/ W (Academic Credits)		30	25	32	27	32	27	36	30	36	30	0	12	4	4
Project Work															
Extension Activities (Non Academic Credits)															
NCC/NSS/Sports/Extra Curricular									2						
Yoga							1		1						
Extra Credits															
Hrs/W (Total Credits)		30	25	32	27	32	28	36	33	36	30	0	12	4	4

M= Major; C= Core; SEC: Skill Enhancement Courses

Marks & Credits distribution: UG-Sciences

Sl. No	Course type	No. of courses	Each course teaching Hrs/wk	Credit for each course	Total credits	Each course evaluation			Total marks
						Conti-Assess	Univ-exam	Total	
1	English	3	4	3	9	25	75	100	300
2	S.Lang	3	4	3	9	25	75	100	300
3	LS	4	2	2	8	0	50	50	200
4	SD	4	2	2	8	0	50	50	200
5	Core/SE -I	5+2	4+2	4+1	35	25	75+50	150	1050
	Core/SE -II	5+2	4+2	4+1	35	25	75+50	150	1050
	Core/SE -III	5+2	4+2	4+1	35	25	75+50	150	1050
6	Summer-Intern	2		4	8		100	200	200
7	Internship/ Apprentice/ on the job training	1		12	12		200	200	200
		38			**159**				**4550**
8	**Extension Activities (Non Academic Credits)**								
	NCC/NSS/Sports/ Extra Curricular			2	2				
	Yoga	2		1	2				
	Extra Credits								
	Total	**40**			**142**				

2. DETAILS OF PAPER TITLES & CREDITS

Sem	Course no	Course name	Course type (T/L/P)	Hrs./ week	Credits	IA	ES	Total
	FIRST YEAR							
I	1	Circuit Theory and Electronic Devices	T	4	4	25	75	100
		Circuit Theory And Electronic Devices Lab	L	2	1	50	0	50
II	2	Digital Electronics	T	4	4	25	75	100
		Digital Electronics Lab	L	2	1	50	0	50
	SECOND YEAR							
III	3	Analog Circuits and Communication Electronics	T	4	4	25	75	100
		Analog Circuits and Communication Electronics Lab	L	2	1	50	0	50
IV	4	Microprocessor Systems	T	4	4	25	75	100
		Microprocessor Systems Lab	L	2	1	0	50	50
	5	Microcontroller and Interfacing	T	4	4	25	75	100
		Microcontroller And Interfacing Lab	L	2	1	50	0	50
V	6A	Industrial Electronics	T	4	4	25	75	100
		Industrial Electronics Lab	L	2	1	50	0	50
	7A	Electronic Instrumentation	T	4	4	25	75	100
		Electronic Instrumentation Lab	L	2	1	50	0	50
	OR							
	6B	Embedded systems design	T	4	4	25	75	100
			L	2	1	50	0	50
	7B	Consumer Electronics	T	4	4	25	75	100
		Consumer Electronics **Lab**	L	2	1	50	0	50
	OR							
	6C	VLSI Design	T	4	4	25	75	100
		VHDL / Verilog HDL LAB	L	2	1	50	0	50
	7C	Data Communication and Networking	T	4	4	25	75	100
		Data Communication And Networking Lab	L	2	1	50	0	50

Note : *Course type code: T: Theory, L: Lab, P: Problem solving.

Note 1: For Semester–V, for the domain subject **ELECTRONICS**, any one of the three pairs of SECs shall be chosen as courses 6 and 7, i.e., 6A & 7A or 6B & 7B or 6C & 7C. The pair shall not be broken (ABC allotment is random, not on any priority basis).

Note 2: One of the main objectives of Skill Enhancement Courses (SEC) is to inculcate field skills related to the domain subject in students. The syllabus of SEC will be partially skill oriented. Hence, teachers shall also impart practical training to students on the field skills embedded in the syllabus citing related real field situations.

Note 3: To insert assessment methodology for Internship/ on the Job Training/Apprenticeship under the revised CBCS as per APSCHE Guidelines.

- **First internship (After 1st Year Examinations):** Community Service Project. To inculcate social responsibility and compassionate commitment among the students, the summer vacation in the intervening 1st and 2nd years of study shall be for Community Service Project (the detailed guidelines are enclosed).
- **Credit For Course: 04**

- **Second Internship (After 2nd Year Examinations):** Apprenticeship / Internship / on the job training / In-house Project / Off-site Project. To make the students employable, this shall be undertaken by the students in the intervening summer vacation between the 2nd and 3rd years (the detailed guidelines are enclosed).
- **Credit For Course: 04**

- **Third internship/Project work (6th Semester Period):**
  During the entire 6th Semester, the student shall undergo Apprenticeship / Internship / On the Job Training. This is to ensure that the students develop hands on technical skills which will be of great help in facing the world of work (the detailed guidelines are enclosed).
- **Credit For Course:12**

a. Proposed combination subjects: Mathematics, Physics, Electronics(MPE),
Mathematics, Electronics, Computer Science (MECS)
Mathematics, Electronics, Internet of Things (MEIOT)

b. Student eligibility for joining in the course:
Intermediate MPC
Intermediate Vocational (EET)(for those who have passed the bridge course)
Intermediate Vocational (ET)(for those who have passed the bridge course)
Diploma in ECE
Diploma in EEE

c. Faculty eligibility for teaching the course:
M.Sc. Electronics or M.Sc. Physics with Specialization Electronics.

d. List of Proposed Skill enhancement courses with syllabus, if any
   i. Embedded Systems
   ii. Internet of Things
   iii. Electric Vehicles
   iv. Consumer Electronics

e. Any newly proposed Skill development/Life skill courses with draft syllabus and required resources :
   i. Artificial Intelligence
   ii. Programming Python

f. Required instruments/software/ computers for the course (Lab/Practical course-wise required i.e., for a batch of 15 students)

Sem. No.	Lab/Practical Name	Names of Instruments/Software/ computers required with specifications	Brand Name	Qty Required
I	Circuit Theory and Electronic Devices Lab	Bread Board Trainer, System, Function Generator, Decade Resistance Box, Decade Capacitance Box, Decade Inductance Box, CRO(50MHz), Digital Multimeter, DC Ammeter(0-200mA), AC Ammeter (0-200mA) Resistors 220Ω, 330Ω, 470Ω , 100Ω(As per requirement), Capacitors, BJT (BC107), FET(BFW11), IC7805 UJT(2N2646), connecting wires + Intel Desktop PC, Multisim Simulation Software	As per requirement	15 per batch
II	Digital Electronics lab	Bread Board Trainer, System, Digital Multimeter, Resistors, Diodes(IN4007), BJT(BC107), IC7400, IC7402, IC7404, IC7408, IC7432, IC 7486, IC7476, IC7483, connecting wires +Intel Desktop PC, Multisim Simulation Software	As per requirement	15 per batch

III	Analog Circuits and Communication lab	Bread Board Trainer, System, Function Generator, Decade Resistance Box, Decade Capacitance Box, Decade Inductance Box, CRO(50MHz), Digital Multimeter, Resistors & Capacitors (As per requirement), IC741, Diodes (IN4007, IN4148), Transistor BC107, connecting wires + Intel Desktop PC, Multisim Simulation Software	As per requirement	15 per batch
IV	Microprocessor Systems	8085 & 8086 Microprocessor Training Kits, Digital Multimeter+ Intel Desktop PC, 8085 & 8086 Simulators	As per requirement	15 per batch
	Microcontroller and Interfacing Lab	8051 Microcontroller Training Kits, Digital Multimeter+ Intel Desktop PC, Keil Software	As per requirement	15 per batch

g. List of Suitable levels of positions eligible in the Govt/Pvt organizations
Suitable levels of positions for these graduates either in industry/govt organization like., technical assistants/ scientists/ school teachers., clearly define them, with reliable justification

S.No	Position	Company/ Govt organization	Remarks	Additional skills required, if any
01	Communication System Operator.	Electronics Industry	---	Industrial Training
02	Broadcast and Sound Technician.	Electronics Industry	---	Industrial Training
03	Broadcast and Sound Technician.	Electronics Industry	----	Industrial Training
04	Audiovisual Production Specialist.	Electronics Industry	----	Industrial Training
05	Lab Technician	Educational Institutions & Research Agencies	---	Skills in functional English, and aptitude
06	Scientific Assistant	DRDO , ISRO & Other Research Agencies	---	---
07	SSC	Central Govt.	--	Skills in functional English, and aptitude with GK.

h. List of Govt. organizations / PVT companies for employment opportunities or internships or projects

S.No	Company/ Govt organization	Position type	Level of Position
1	Efftronics Systems Pvt. Ltd., Vijayawada	Customer Relationship Coordinator & Technician	---
2	DRDO , ISRO & Other Research Agencies	Scientific Assistant/Lab Technician	---

i. Any specific instructions to the teacher /paper setters/Exam-Chief Superintendent

Teachers should make use of all the approaches for an efficient teaching-learning process i.e.:

- ✓ Use of Smart class rooms for simulation and demonstration for conveying thedifficult concepts of Electronics in class room teaching and laboratories.
- ✓ Teaching should be complimented with students seminar to be organized very Frequently.
- ✓ Open-ended project work should be given to all students individually, or in group to

2-3 students depending upon the nature of the course.

- ✓ It is recommended that the maximum size of group for all Electronics Laboratory courses shouldbe 12-15 students.
- ✓ Sufficient infrastructure for ICT and other facilities needed for technology-enabledlearning like computer facilities, PCs or laptops, Wi-Fi and internet facilities with all thenecessary software.
- ✓ Virtual and remote laboratories are e-learning resources that enhance the accessibility of experimental setups providing a distance teaching framework which meets the student's hands-on learning needs. The use of virtual remote laboratory should be encouraged as it enhances student's life-long learning capabilities along with routine subject/experimental skills.

3. Program objectives, outcomes, co-curricular and assessment methods

BSc	ELECTRONICS

1. Aim and objectives of UG program in Subject:

The overall aim and objectives of the B.Sc. Programme with Electronics are to:

- Provide students with learning experiences that develop broad knowledge andunderstanding of key concepts of electronic science and equip students with advancedscientific/technological capabilities for analyzing and tackling the issues and problems inthe field of electronics.
- Develop ability in students to apply knowledge and skills they have acquired to thesolution of specific theoretical and applied problems in electronics.
- Develop abilities in students to design and develop innovative solutions for benefits ofsociety, by diligence, leadership, team work and lifelong learning.
- Provide students with skills that enable them to get employment in industries or pursue higher studies or research assignments or turn as entrepreneurs.

2. Learning outcomes of Subject:

The student graduating with the Degree B.Sc. Programme with Electronics discipline, B.Sc. (MPE/MECS/MEIOT) should be able to.

- Acquire a systematic and coherent understanding of basic Electronics including the concepts, theories and relevant experimental techniques in the domains of Circuit Theory & Electronic Devices, Digital Electronics, Analog Circuits & Communication, Microprocessor Systems and Microcontroller & Interfacing and of the specialized field like Embedded Systems, Internet of Things, Consumer Electronics & Electric Vehicles. in their choice of Skill Enhancement Courses.
- Acquire wide ranging and Circuit Theory & Electronic Devices, Digital Electronics, Analog Circuits & Communication Electronics, Microprocessor Systems and Microcontroller & Interfacing, etc. Students acquire the ability for systematic designing and analysis of circuits, recording of proper observations, use of scientific research instruments, analysis of observational data, making suitable error estimates and scientific report writing.
- Acquire procedural knowledge that creates different types of professionals related to the disciplinary/subject area of Electronics and multi/interdisciplinary domains, including professionals engaged in research and development, teaching, technology professions and government/public service.
  - Acquire skills in areas related to their specialization area within the disciplinary/subject area of Electronics.
  - Demonstrate the ability to use skills in Electronics and its related areas of technology for formulating and solving problems and identifying and applying appropriate physical principles and methodologies to solve a wide range of problems associated with Electronics and its interface with other subjects studied in the course.
  - Recognize the importance of modelling simulation and computing, and the role of approximation and mathematical approaches to describing the Electronic world.
  - Plan and execute experiments or investigations related to Electronics and its interface

with other subjects studied in the course analyze and interpret data/information collected using appropriate methods, including the use of appropriate software such as programming languages and purpose-written packages, and report accurately the findings of the experiment/investigations while relating the conclusions/findings to relevant theories.

- Demonstrate relevant generic skills and global competencies such as

a. problem-solving skills that are required to solve different types of Electronics-related problems with well-defined solutions, and tackle open-ended problems that belong to the disciplinary area boundaries;
b. investigative skills, including skills of independent investigation of problems;
c. communication skills involving the ability to listen carefully, to read texts and research papers analytically and to present complex information in a concise manner to different groups/audiences of technical or popular nature;
d. analytical skills involving paying attention to detail and ability to construct logical arguments, using correct technical language and ability to translate them with popular language when needed;
e. ICT skills;
f. personal skills such as the ability to work both independently and in a group.

- Demonstrate professional behaviour such as

a. being objective, unbiased and truthful in all aspects of work and avoiding unethical, irrational behaviour such as fabricating, falsifying or misrepresenting data or committing plagiarism;
b. the ability to identify the potential ethical issues in work-related situations;
c. be committed to the free development of scientific knowledge and appreciate its universal appeal for the entire humanity;
d. appreciation of intellectual property, environmental and sustainability issues; and
e. Promoting safe learning and working environment.

3. Recommended Skill enhancement courses: (Titles of the courses given below and details of the syllabus for 4 credits (i.e., 2 units for theory and Lab/Practical) for 5 hrs class-cum-lab work
   i. Embedded Systems
   ii. Internet of Things
   iii. Electric Vehicles
   iv. Consumer Electronics
4. Recommended Co-curricular activities:(Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and group learning)

A. Measurable:

1. Assignments
2. Student seminars (Individual presentation of papers)
3. Quiz Programmes
4. Individual Field Studies/projects
5. Group discussion
6. Group/Team Projects

B General

1. Collection of news reports and maintaining a record of paper-cuttings relating to topics covered in syllabus
2. Group Discussions

3. Watching TV discussions and preparing summary points recording personal observations etc., under guidance from the Lecturers
4. Any similar activities with imaginative thinking.

5. Recommended Continuous Assessment methods:

Electronics is a professional academic program, so there is need to focus more on activity based evaluation rather than purely written examination. A variety of assessment methods that are appropriate within the disciplinary area of electronics must be used. Progress of learners towards achieving learning outcomes may be assessed making creative use of the following, either independently or in combination:

- Time-constrained examinations (say 1-hour or 2-hour tests);
- Closed-book and open-book tests (if applicable);
- Problem based assignments;
- Quizzes
- Real life projects;
- Lab reports
- Individual/Team project reports;
- Oral presentations, including seminar presentation;
- Viva voce,
- Interviews;
- Computerized adaptive testing for MCQ;
- Peer and self-assessment etc.
- Any other pedagogic approaches as may be relevant keeping in view the learners' level, credit load and class size

Details of course-wise Syllabus

B. Sc	Semester: I	Credits: 4
Course: 1	Circuit Theory And Electronic Devices	Hrs/Wk: 4

Aim and objectives of Course(BSc/ CIRCUIT THEORY AND ELECTRONIC DEVICES)

- To explain the basic concepts and laws of DC and AC electrical networks and solve them using mesh and nodal analysis techniques.
- To analyze circuits in time and frequency domain.
- To synthesize the networks using passive elements.
- To understand the construction, working and VI characteristics of electronic devices.
- To understand the concept of power supply.

Learning outcomes of Course

- Apply concepts of electric network topology, nodes, branches, loops to solve circuit problems including the use of computer simulation.
- Apply time and frequency concepts of analysis.
- Synthesize the network using passive elements.
- Know about switching circuits and oscillator circuits their design and use in electronics.
- Design and construction of a power supply.

UNIT I: **(12Hrs)**

SINUSOIDAL ALTERNATING WAVEFORMS:

Definition of current and voltage. The sine wave, general format of sine wave for voltage or current, phase relations, average value, effective (R.M.S) values. Differences between A.C and D.C. Phase relation of R, L and C. Circuit analysis-loop current method, Nodal Voltage method.

UNIT II: **(12hrs)**

NETWORKS THEOREMS (D.C):

Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power, Milliman and Reciprocity theorems

UNIT III: **(12hrs)**

RC, RL AND RLC CIRCUITS:

Frequency response of RC and RL circuits, their action as low pass and high pass filters. Passive differentiating and integrating circuits. Series resonance and parallel resonance circuits, Q – Factor.

UNIT IV: **(12hrs)**

BJT, FET and UJT:

BJT: Construction, working, and characteristics of CE Configurations.
FET: Construction, working and characteristics of JFET.
MOSFET construction and working, Characteristics. Advantages of FET overBJT.

UNIT V: **(12hrs)**

POWER SUPPLIES & PHOTO ELECTRIC DEVICES

Rectifiers: Half wave, full wave and Bridge Rectifiers-Efficiency-ripple factor.
Filters- L-section & π-section filters(qualitativeonly). Three terminal fixed voltage I.C. regulators (78XX&79XX)., Light Emitting Diode and Photo diode.

TEXT BOOKS:

1. Introductory circuit Analysis(UBSPublications) ------ **Robert L. Boylestad.**
2. Electronic Devices and Circuit Theory --- **Robert L. Boylestad& Louisashelsky.**
3. Circuit Analysis by **P.Gnanasivam- PearsonEducation**
4. Electronic Devices andCircuitTheory---- **Robert L. Boylestad& Louis Nashelsky.**
5. Electronic Devices and Circuits I **– T.L.Floyd- PHI FifthEdition**

REFERENCEBOOKS:

1. Engineering Circuit Analysis **By: Hayt & Kemmerly -MG.**
2. Networks and Systems – **D.Roy Chowdary.**
3. Unified Electronics (Circuit Analysis and Electronic Devices) **by Agarwal-Arora**
4. Electric Circuit Analysis- **S.R. Paranjothi**- New AgeInternational.
5. Integrated Electronics – **Millmam &Halkias.**
6. Electronic Devices & Circuits –**Bogart.**
7. Sedha R.S., A Text Book Of Applied Electronics, S.Chand & CompanyLtd
8. Hand Book of Electronics1&2 –SL Gupta and V Kumar, Pragathi prakasan, Meerut
9. Circuit theory and Electronic Device-Agarwal and Garge , Pragathi prakasan, Meerut

Details of Lab/Practical/Experiments/Tutorials syllabus:

.

B Sc	Semester: I	Credits: 1
Course: 1(L)	Circuit Theory And Electronic Devices Lab	Hrs/Wk: 2

Electronics lab-1(Circuit theory and Electronic devices)

1. Thevenin's Theorem-verification
2. Norton's Theorem-verification
3. Maximum Power Transfer Theorem-verification
4. LCR series resonance circuit.
5. LCR parallel resonance circuit
6. BJT input and output characteristics
7. FET Output and transfer characteristics
8. UJT VI characteristics
9. IC regulated power supply(IC-7805)

Lab experiments are to be done on breadboard and simulation software (using Multisim) and output values are to be compared and justified for variation.

Recommended Text books:

1. Electrical Circuits, M. Nahvi & J. Edminister, Schaum's Outline Series, Tata McGraw-Hill (2005).
2. 2000 Solved Problems in Electronics, J. J. Cathey, Schaum's outline Series, Tata McGraw Hill (1991).

Recommended Reference books:

1. Basic Electronics: Principles and Applications, C.Saha, A.Halder, D.Ganguli, 2018, Cambridge University Press
2. Electronic Principles, A. Malvino, D.J. Bates, 7th Edition, 2018, Tata Mc-Graw Hill Education.

3. Recommended Co-curricular activities:(Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and group learning)

A. Measurable:

1. Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)
2. Student seminars (on topics of the syllabus and related aspects (individual activity))
3. Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))
4. Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and

contribution of students shall be ensured (team activity)

B. General

1. Collection of news reports and maintaining a record of paper-cuttings relating to topics covered in syllabus
2. Group Discussions
3. Any similar activities with imaginative thinking.

4. Recommended Continuous Assessment methods:

Some of the following suggested assessment methodologies could be adopted;

1. The oral and written examinations (Scheduled and surprise tests),
2. Closed-book and open-book tests,
3. Practical assignments and laboratory reports,
4. Observation of practical skills,
5. Individual and group project reports,
6. Efficient delivery using seminar presentations,
7. Viva voce interviews.
8. Peers and self-assessment, outputs form individual and collaborative work

MODEL QUESTION PAPER (Sem-end. Exam)
B. Sc DEGREE EXAMINATIONS
SEMESTER – I
Course 1:Circuit theory and Electronic devices

Time: 3Hrs. **Max.Marks:75**

SECTION-A

Answer any **FIVE** of the following: **5x5=25M**

1. A Sinusoidal voltage $e = 200 \sin 314t$ is applied to a resistor of 10Ω. Find (i) Frequency (ii) Time period (iii) RMS value of voltage.
2. What do you know about Loop current method to analyse a circuit.
3. State and prove Superposion theorem.
4. Describe the working of RC circuit as Integrator.
5. A series LCR circuit has R = 50Ω, L = 40mH, C = 1μF. Calculate (i) Resonant frequency (ii) Q-factor and (iii) bandwidth..
6. What are the advantages of FET over BJT?
7. Explain the working of L-section filter.
8. Explain the working of a Photo diode.

SECTION-B

Answer **ALL** the following: **5x10=50M**

9. A). Derive the expressions for Average value and RMS value of AC current.

(OR)

B). Explain the V-I phase relation for the circuit containingR, L and C.

10. A). State and prove maximum power transfer theorem?

(OR)

B). State and prove Thevenin's theorem.

11. A).Deduce expressions for resonant frequency and Q-factor for a Series resonant circuit.

(OR)

B). Obtain the expressions for resonant frequency and Q-factor for a Parallel resonant circuit.

12. A). Draw and explain input and output characteristics of transistor in CE configuration.

(OR)

B). Explain the working and characteristics of FET.

13. A). Explain the working of Full wave Bridge rectifier and find its ripple factor.

(OR)

B). Explain the construction and working of LED. Mention its applications.

B. Sc	Semester: II	Credits: 4
Course: 2	Digital Electronics	Hrs/Wk: 4

Aim and objectives of Course(BSc/ DIGITAL ELECTRONICS)

- To understand the number systems, Binary codes and Complements.
- To understand the Boolean algebra and simplification of Boolean expressions.
- To analyze logic processes and implement logical operations using combinationallogic circuits.
- To understand the concepts of sequential circuits and to analyze sequential systems in terms of state machines.
- To understands characteristics of memory and their classification.
- **To implement combinational and sequential circuits using**

VHDL.Learning outcomes of Course

- Develop a digital logic and apply it to solve real life problems.
- Analyze, design and implement combinational logic circuits.
- Classify different semiconductor memories.
- Analyze, design and implement sequential logic circuits.
- Simulate and implement combinational and sequential logic circuits using VHDL

UNIT I : (12hrs)

NUMBER SYSTEM AND CODES: Decimal, Binary, Hexadecimal, Octal- conversions Codes: BCD, Gray and Excess-3 codes Complements (1's and 2's), Addition - Subtraction using complement methods.

UNIT II: (12hrs)

BOOLEAN ALGEBRA AND THEOREMS: Boolean Theorems, De-Morgan's laws. Digital IC logic gates, NAND & NOR as universal gates. Standard representation of logic functions (SOP and POS), Minimization Techniques (Karnaugh Map Method: 2,3 variables).

UNIT III: (12hrs)

COMBINATIONAL DIGITAL CIRCUITS:

Adders: Half & full adder. Subtractor: Half and full subtractors, Parallel binary adder, Multiplexers (4:1)) and Demultiplexers (1:4), Encoder (8-line-to-3- line) and Decoder (3-line-to-8-line).

IC-LOGIC FAMILIES:TTL logic (NAND Gate), CMOS Logic (NOR Gate) operations with truth tables. Differences between CMOS and TTL logic families.

UNIT IV: (12hrs)

SEQUENTIAL DIGITAL CIRCUITS: **Flip Flops**: S-R FF, Clocked RS FF,D FF, Edge triggering J-K FF, Master-Slave JK FFs, Conversion of JK FF into D and T FFs. **Registers:** -Serial In Serial Out andParallel In and Parallel Out. **Counters:** Asynchronous Ripple counter (Mod-16), Mod-10. Synchronous counter- 4-bit parallel binary counter.

UNIT V: **(12hrs)**

MEMORY DEVICES:

General Memory Operations, ROM, RAM (Static and Dynamic), Qualitative- PROM, EPROM, EEPROM,EAROM.

TEXT BOOKS:

1. M.Morris Mano, " Digital Design " 3rd Edition, PHI, NewDelhi.
2. Ronald J. Tocci. "Digital Systems-Principles and Applications" 6/e. PHI. New Delhi. 1999.(UNITS I to IV)
3. G.K.Kharate-Digital electronics-oxford universitypress
4. S.Salivahana & S. Arivazhagan-Digital circuits anddesign
5. Fundamentals of Digital Circuits by AnandKumar
6. Digital Electronics-Deepak Garge, , Pragathi prakasan, Meerut

REFERENCE BOOKS :

1. HerbertTaubandDonaldSchilling."DigitalIntegratedElectronics". McGraw Hill.1985.
2. S.K. Bose. "Digital Systems". 2/e. New Age International.1992.
3. D.K. Anvekar and B.S. Sonade. "Electronic Data Converters : Fundamentals &Applications". TMH. 1994.
4. *Malvino and Leach. " Digital Principles and Applications". TMG HillEdition*

BSc	Semester: II	Credits: 1
Course: 2(L)	Digital Electronics Lab	Hrs/Wk: 2

DIGITAL ELECTROINCS LAB

List of the Experiments:

1. Verification of IC-logicgates
2. Realization of basic gates using discrete components (resistor, diodes &transistor)
3. Realization of basic gates using Universal gates (NAND & NORgates)
4. Verification of Half adder and Full adder circuits usinggates
5. Verification of Half subtractor and Full subtractor usinggates.
6. Verification of truth tables- Multiplexer andDemultiplexer.
7. Verification of truth tables- Encoder and decoder.
8. Verification of truth tables- RS , JK, T-F/F using NANDgates
9. 4-bit binary parallel adder and subtractor using IC7483

Lab experiments are to be done on breadboard and simulation software (using multisim) and output values are to be compared and justified for variation.

Recommended Text books:

1. Fundamentals of Digital Circuits, Anand Kumar, 4th Edn, 2018, PHI Learning.
2. Digital Computer Electronics, A.P. Malvino, J.A. Brown, 3rd Edition, 2018, Tata McGraw Hill Education.

Recommended Reference books:

1. Digital Electronics, S.K. Mandal, 2010, 1st edition, Tata McGraw

Recommended Co-curricular activities:

(Co-curricular Activities should not promote copyingfrom text book or from others' work and shall encourage self/independent and group learning)

A. Measurable:

1. Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)
2. Student seminars (on topics of the syllabus and related aspects (individual activity))
3. Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))
4. Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity)

B. General

1. Collection of news reports and maintaining a record of paper-cuttings relating to topics covered in syllabus
2. Group Discussions
3. Any similar activities with imaginative thinking.

Recommended Continuous Assessment methods:

1. The oral and written examinations (Scheduled and surprise tests),
2. Closed-book and open-book tests,
3. Practical assignments and laboratory reports,
4. Observation of practical skills,
5. Individual and group project reports,
6. Efficient delivery using seminar presentations,
7. Viva voce interviews.
8. Peers and self-assessment, outputs form individual and collaborative work

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ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM

B.Sc Electronics Syllabus (w.e.f: 2020-21 A.Y)

MODEL QUESTION PAPER (Sem-end. Exam)

B.Sc DEGREE EXAMINATIONS

SEMESTER – II

Course 2:Digital Electronics

Time: 3Hrs. **Max.Marks:75**

Section - A

Answer any **FIVE** of the following **5 X 5M = 25M**

1. Explain Excess-3 code with an example.
2. Subtract 11001 from 10101 using 2's complement method
3. Prove the Boolean identity (AB +C) (AB +D) = AB + CD
4. State and prove Demorgan's law's.
5. Write down differences between CMOS and TTL logic families.
6. Explain the working of Multiplexer (4:1) with its truth table.
7. Explain the operation of Rs flip – flop with truth table
8. Explain EPROM and EEPROM in brief.

Section - B

Answer **ALL** the following **5 X 10M =50M**

9. A). Explain in detail about BCD Code

(OR)

B). Explain the conversion of Decimal to Binary and binary to decimal with an example.

10. A). Why NAND and NOR gates are universal gates? Realize AND, OR and NOT gates using NAND and NOR gates

(OR)

B).Explain in detail about 3 variable karnaugh map method to simplify logic Expression.

11 A). Explain the operation of a full adder circuit with its truth table.

(OR)

B). Explain the working of TTL NAND Gate circuit with its truth table.

12. A). Describe the working of Master slave JK flip-flop with its truth table.

(OR)

B).Draw the circuit diagram of decade counter and explain it's operation. Draw its timing diagram.

13. A). Explain the operation of ROM

(OR)

B). Explain the operation of Dynamic RAM

B Sc	Semester: III	Credits: 4
Course: 3	Analog Circuits and Communication Electronics	Hrs/Wk: 4

Aim and objectives of Course (BSc/ ANALOG CIRCUITS AND COMMUNICATION):

- **T**o understand the concepts, working principles and key applications of linear integrated circuits.
- To perform analysis of circuits based on linear integrated circuits.
- To design circuits and systems for particular applications using linear integrated circuits.
- To introduce students to various modulation and demodulation techniques of analog communication.
- To analyse different parameters of analog communication techniques.
- It also focuses on Transmitters and Receivers.

Learning outcomes of Course:

- Understand the fundamentals and areas of applications for the integrated circuits.
- Analyze important types of integrated circuits.
- Demonstrate the ability to design practical circuits that perform the desired operation.
- Select the appropriate integrated circuit modules to build a given application.
- Use of different modulation and demodulation techniques used in analog communication.
- Identify and solve basic communication problems.
- Analyze transmitters and receiver circuits.

UNIT I: (12hrs)

OPERATIONAL AMPLIFIERS: Definition of OP-amp, Characteristics of Op-Amp, Block diagram of op-amp, concept of virtual ground,op-amp parameters, inverting, non-inverting summing amplifiers analysis. Subtractor, voltage follower, integrator, differentiator, Logarithmic amplifier.

UNIT II: (12hrs)

OP-AMP CIRCUITS: voltage regulator, comparator, Schmitt trigger. Sine wave generator, Square wave generator, Active filters (Basics)-low pass, high pass filters, IC-555 –functional block diagram and mention its applications

UNIT III: (12Hrs)

AMPLITUDE MODULATION: Need for modulation, Expression for amplitude modulation-frequency spectrum, bandwidth of AM, power relations in the AM wave. Generation of AM-Transistor modulator. Detection of AM signals: Necessity for detection – Diode detector.

UNIT IV: (12hrs)

FREQUENCY MODULATION: Theory of FM, Frequency deviation and carrier swing, modulation index, deviation ratio, Percent modulation. Mathematical representation of FM wave, frequency spectrum and bandwidth of FM waves, Generation of FM signals – Reactance modulator. Detection of FM waves – Ratio detector.

UNIT-V (12hrs)

RADIO BROADCASTING AND RECEPTION: Spectrum of electromagnetic waves, Radio broadcasting and reception, AM Transmitter, AM receiver- block diagram approach, Super heterodyne receiver. FM receiver- Block diagram.

TEXT BOOKS:

1. Op Amp and Linear Integrated Circuits By RamakantGaykwad
2. Linear Integrated Circuits By Roy Choudary
3. Unified Electronics Vol II – J.P. Agarwal and Amit Agarwal.
4. Electronic Communications - GeorgeKennedy
5. Antennas and Wave Propagation – G.S.N.Raju –PHI
6. Principles of communication system –Herbert Taub &D.L.Schilling

REFERENCE BOOKS :

1. Analog Circuit and Communication-Deepak Garge, , Pragathi prakasan, Meerut
2. Jacob Millan ,Micro Electronics,McGrawHill.
3. Mithal G K, Electronic Devices and Circuits ThanaPublishers.
4. Allan Motter shead ,Electronic Devices and Circuits – An Introduction-PrenticeHall
5. Electronic Communications – Roody &Colen
6. Communication Systems–Hayken --- 4thEdition
7. Modern digital and analog communication system –B.P.Lathi

B Sc	Semester: III	Credits: 1
Course: 3(L)	Analog Circuits and Communication Electronics Lab	Hrs/Wk: 2

Details of Lab/Practical/Experiments/Tutorials syllabus:

Analog Circuits and Communication Electronics

1. Op-Amp as inverting andnon-inverting
2. OpAmp Voltage follower.
3. Op-Amp as integrator anddifferentiator
4. Op-Amp as adder
5. Op-Amp as voltage to currentconverter
6. Op-Amp as square wavegenerator
7. Amplitude modulation anddemodulation.
8. AM Transimitter andReceiver.
9. FM Transmitter andReceiver.

RECOMMENDED TEXT BOOKS:

1. OP-Amps and Linear Integrated Circuit, R.A. Gayakwad, 4th edition, 2000, Prentice Hall.

2. Electronic Communication system, Blake, Cengage, 5th edition.

RECOMMENDED REFERENCE BOOKS:

1. Operational Amplifiers and Linear ICs, David A. Bell, 3rd Edition, 2011, Oxford University Press.
2. Introduction to Communication systems, U. Madhow, 1st Edition, 2018, CambridgeUniversity Press.

Recommended Co-curricular activities:(Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and group learning)

A. Measurable:

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B. General

1. Collection of news reports and maintaining a record of paper-cuttings relating to topics covered in syllabus
2. Group Discussions
3. Any similar activities with imaginative thinking.

Recommended Continuous Assessment methods:

1. The oral and written examinations (Scheduled and surprise tests),
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3. Practical assignments and laboratory reports,
4. Observation of practical skills,
5. Individual and group project reports,
6. Efficient delivery using seminar presentations,
7. Viva voce interviews.
8. Peers and self-assessment, outputs form individual and collaborative work

MODEL QUESTION PAPER (Sem-end. Exam)
B.Sc DEGREE EXAMINATIONS
SEMESTER – III
Course 3: Analog Circuits and Communication Electronics

Time: 3Hrs. **Max.Marks:75**

Section - A

Answer any FIVE of the following. **5 X 5M = 25M**

1. What are the characteristics of an ideal Op-Amp
2. Explain Op-Amp as summing amplifier.
3. Describe the working of Op-Amp voltage regulator.
4. An op-amp has a differential gain of 100 and a common mode gain of 0.01. Find CMRR and also express CMRR in dB.
5. Explain what is the need for modulation
6. Explain the working of AM modulator.
7. Explain the frequency deviation and modulation index of FM.
8. A sinusoidal carrier voltage of 80 volts amplitude and 1 MH_Z frequency is amplitude modulated by a sinusoidal voltage of frequency $5KH_Z$ producing 50% modulation. Calculate the amplitude and frequency of lower and upper side frequencies.

Section -B

Answer ALL the following **5 X 10M =50M**

9. A). Draw the block diagram of OP-AMP and explain the function of each block
   (OR)
   B).Explain the operation of Integrator and differentiator using Op-Amp .

10. A). Using OP-AMP explain the working of Square wave generator circuit.
    (OR)
    B). Draw and explain IC-555 functional block diagram.

11. A). Explain Amplitude modulation and obtain an expression for an AM wave.
    (or)
    B). Explain the need for demodulation. Explain the operation of diode detector with a neat circuit diagram.

12. A). Explain the working of FM modulator with a neat circuit diagram.
    (OR)
    B). Explain the operation of ratio detector for FM waves with a neat circuit diagram.

13. A). Explain the working of Supper heterodyne receiver with the help of block diagram.
    (OR)
    B). Draw the block diagram of FM Receiver and explain the function of each block.

B Sc	Semester: IV	Credits: 4
Course: 4	Microprocessor Systems	Hrs/Wk: 4

Aim and objectives of Course (B Sc/ MICROPROCESSOR SYSTEMS):

- To understand basic architecture of 16 bit and 32 bit microprocessors.
- To understand interfacing of 16 bit microprocessor with memory and peripheral chips involving system design.
- To understand techniques for faster execution of instructions and improve speed of
- operation and performance of microprocessors
- To understand RISC based microprocessors.
- To understand concept of multi core processors.

Learning outcomes of Course:

- The student can gain good knowledge on microprocessor and implement in practical applications
- Design system using memory chips and peripheral chips for 16 bit8086 microprocessor.
- Understand and devise techniques for faster execution of instructions, improve speed of operations and enhance performance of microprocessors.
- Understand multi core processor and its advantages

UNIT I: (**12Hrs)**

8085μPARCHITECTURE: Introduction to Microprocessor, Intel 8085 μPArchitecture, register organization, Pin configuration of 8085. Instruction Set, Addressing modes, Timing diagrams, interrupts of 8085.

UNIT II: **(12Hrs)**

Assembly Language Programming using 8085, Programmes for Addition, Subtraction, Multiplication, Division, largest and smallest number in an array. Ascending and descending order of given array of numbers.

UNIT III: **(12 Hrs)**

8086 Microprocessor: Architecture, Pin description. Basic 8086 Configurations – Minimum mode and Maximum Mode, Instruction format, addressing modes. Interrupt Priority Management

UNIT IV: **(12Hrs)**

I/O Interfaces: Serial Communication, Parallel Communication, Keyboard and display, DMA controller (8257)

UNIT V: **(12Hrs)**

ARM PROCESSOR: Introduction to 16/32 bit processors, Armarchitecture & organization, Arm based MCUs, Instruction set.

TEXT BOOKS:

1. Microprocessor Architecture, Programming and Applications with the 8085 – Penram International Publishing, Mumbai.- Ramesh S.Gaonakar
2. Microcomputer Systems the 8086/8088 family – YU-Cheng Liu and Glenn SAGibson
3. Microcontrollers Architecture Programming, Interfacing and SystemDesign–RajKamal Chapter: 15.1, 15.2, 15.3,15.4.1
4. 8086 and 8088 Microprocessor by Tribel and AvatarSingh

REFERENCES:

1. Microprocessors and Interfacing – Douglas V.Hall
2. Microprocessor and Digital Systems – Douglas V.Hall
3. Advanced Microprocessors & Microcontrollers - B.P.Singh & Renu Singh – NewAge
4. The Intel Microprocessors – Architecture, Programming and Interfacing – Bary B. Brey.
5. Arm Architecture reference manual –Armltd.

B Sc	Semester: IV	Credits: 1
Course: 4(L)	Microprocessor Systems Lab	Hrs/Wk: 2

Details of Lab/Practical/Experiments/Tutorials syllabus:

MICROPROCESSORS SYSTEMS: Programs using Intel 8085 /8086.

1. Addition and Subtraction (8 bit and16-bit)
2. Multiplication and Division (8-bit)
3. Largest number in an array.
4. Smallest number in anarray.
5. Ascending Order
6. Descending Order
7. Program To Convert Two BCD Numbers into Hex
8. Program To Convert Hex Number Into BCDNumber.
9. Program To Find The Square Root Of A GivenNumber.
10. Interfacing Experiments Using 8086 Microprocessor(Demo):
    1. Traffic LightController
    2. 7-SegmentDisplay

RECOMMENDED TEXT BOOKS:

1. 8085 Microprocessor and Its Applications by Nagoorkani RBA Publications.
2. Microprocessor 8086 programming and Interfacing Nagoor Kani, RBA Publications.

RECOMMENDED REFERENCE BOOKS:

1. Fundamentals of Microprocessor & Microcomputer: B. Ram—Danpat Rai Publications.

Recommended Co-curricular activities:(Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and group learning)

A. Measurable:

1. Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)
2. Student seminars (on topics of the syllabus and related aspects (individual activity))

Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))

MODEL QUESTION PAPER (Sem-end. Exam)
B. Sc DEGREE EXAMINATIONS
SEMESTER – IV
Course 4: Microprocessor Systems

Time: 3Hrs. **Max.Marks:75**

Section - A

Answer any FIVE of the following **5 X 5M = 25M**

1. Explain 8085 microprocessor register organization
2. Explain logical instructions of 8085 microprocessor.
3. Write an ALP to find the the addition of Two 8-bit Numbers
4. Write an ALP to find the Multiplication of Two 8-bit Numbers
5. Describe briefly about minimum mode configuration of 8086 microprocessor
6. Write a short note on interrupt priority of 8086 microprocessor.
7. Explain about parallel communication interfacing of 8086 Microprocessor.
8. Explain the features of ARM Processor.

Section - B

Answer ALL the following **5 X 10M =50M**

9. (A) Draw the pin diagram of 8085 microprocessor and explain.
   (OR)
   (B) Explain the various Addressing Modes of 8085 Microprocessor with examples.

10. (A) Write an ALP to find the Largest number in a given array of 8-bit Numbers in 8085
    (OR)
    (B) Write an ALP to arrange given array of 8-bit numbers in Ascending order of 8085

11. (A) Draw the Architecture of 8086 Microprocessors and explain. .
    (OR)
    (B) Explain the Pin Description of 8086 with neat diagram.

12. (A) Explain in detail serial communication interfacing of 8086 Microprocessor
    (OR)
    (B) Explain DMA(8257) Controller with a neat diagram.

13. (A) Explain the ARM architecture in detail.
    (OR)
    (B) Explain ARM instruction set.

B Sc	Semester: IV	Credits: 4
Course: 5	Microcontroller And Interfacing	Hrs/Wk: 4

Aim and objectives of Course (MICROCONTROLLER AND INTERFACING):

- To understand the concepts of microcontroller based system.
- To enable design and programming of microcontroller based system.
- To know about the interfacing Circuits.

Learning outcomes of Course:

- The student can gain good knowledge on microcontrollers and implement in practical applications.
- Student Able to learn Interfacing of Microcontroller
- To get familiar with real time operating system

UNIT I: (10Hrs)

Introduction, comparison of Microprocessor and micro controller, Evolution of microcontrollers from 4-bit to 32 bit, Development tools for micro controllers, Assembler-Compiler-Simulator/Debugger.

UNIT II: (10Hrs)

Microcontroller Architecture: Overview and block diagram of 8051, Architecture of 8051, Pin diagram of 8051. program counter and memory organization, Data types and directives, PSW register, Register banks and stack, Interrupts and timers.

UNIT III: (10Hrs)

Addressing modes, instruction set of 8051: Addressing modes and accessing memory using various addressing modes, instruction set: Arithmetic, Logical, Simple bit, jump, loop and call instructions and their usage. Timer/Counter Programming,

UNIT IV: (15Hrs)

Assemble language programming Examples: Addition, Multiplication, Subtraction, division, largest, smallest.

UNIT V: (15Hrs)

Interfacing and Application of Microcontroller: Interfacing of – PPI 8255,interfacing seven segment displays, displaying information on a LCD, control of a stepper Motor (Uni-Polar).

TEXT BOOKS:

1. The 8051 microcontroller and embedded systems using assembly and c-kennet j. Ayalam, Dhananjay V. gadre, cengagepublishers
2. The 8051 microcontrollers and Embedded systems - By Muhammad Ali Mazidi and Janice Gillispie Mazidi – Pearson Education Asia, 4th Reprint,2002.

REFERENCE BOOKS:

1. Microcontrollers Architecture Programming, Interfacing and System Design – **Raj Kamal.**
2. The 8051 Microcontroller Architecture, Programming and Application - **Kenneth J. Ajala ,** west publishing company (ST PAUL, NEW YORK, LOS ANGELES, SAN FRANCISCO).
3. Microcontroller theory and application-Ajay V.Deshmukh

BSc	Semester: IV	Credits: 1
Course: 5(L)	Microcontroller And Interfacing Lab	Hrs/Wk: 2

Details of Lab/Practical/Experiments/Tutorials syllabus:

1. Addition And Subtraction Of Two 8-BitNumbers.
2. Multiplication And Division Of Two 8-BitNumbers.
3. Largest number /smallest in anarray.
4. Exchange Of Higher And Lower Nibbles InAccumulator.
5. Addition Of Two 8-Bit Numbers (KeilSoftware).
6. Addition Of Two 16-Bt Numbers (KeilSoftware)
7. Subtraction Of Two 8-Bit Numbers (KeilSoftware).
8. Subtraction Of Two 16-Bit Numbers (KeilSoftware).
9. Multiplication Of Two 8-Bit Numbers (KeilSoftware).
11. Program For Swapping And Compliment Of 8-Bit Numbers (KeilSoftware).
12. Program To Find The Largest Number In Given Array (KeilSoftware).
13. Program To Find The Smallest Number In Given Array (KeilSoftware).
14. Interfacing Led To 8051 Microcontroller (KeilSoftware).
15. Interfacing Buzzer To 8051 Microcontroller (KeilSoftware).
16. Interfacing Relay To 8051 Microcontroller (KeilSoftware).
17. Interfacing Seven Segments To 8051 Microcontroller (KeilSoftware).

RECOMMENDED TEXT BOOKS:

1. 8051 microcontrollers, Satish Shah, 2010, Oxford University Press.

RECOMMENDED REFERENCE BOOKS:

1. Embedded Systems: Design & applications, S.F. Barrett, 2008, Pearson Education India
2. Embedded Microcomputer systems: Real time interfacing, J.W.Valvano 2011, Cengage Learning

Recommended Co-curricular activities:(Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and group learning)

A. Measurable:
   1. Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)
   2. Student seminars (on topics of the syllabus and related aspects (individual activity))
   3. Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))
   4. Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity)

B. General
   1. Collection of news reports and maintaining a record of paper-cuttings relating to topics covered in syllabus
   2. Group Discussions
   3. Any similar activities with imaginative thinking.

06 Recommended Continuous Assessment methods:

1. The oral and written examinations (Scheduled and surprise tests),
2. Closed-book and open-book tests,
3. Practical assignments and laboratory reports,
4. Observation of practical skills,
5. Individual and group project reports,
6. Efficient delivery using seminar presentations,
7. Viva voce interviews.
8. Peers and self-assessment, outputs form individual and collaborative work

MODEL QUESTION PAPER (Sem-end. Exam)

B.Sc DEGREE EXAMINATIONS

SEMESTER – IV

Course 5: Microcontroller and interfacing

Time: 3Hrs. **Max.Marks:75**

Section - A

Answer any FIVE of the following **5 X 5M = 25M**

1. Write about evolution of microcontrollers.
2. Explain the development tools of Microcontroller
3. List and explain some 8051 16-bitregisters.
4. Explain about stack pointer
5. Explain the loop and Call instructions of 8085 Microprocessor.
6. Write an ALP to find the addition of two 8-bit numbers.
7. Write a short note on temperature measurement.
8. Draw the pin diagram for DAC.

Section - B

Answer **ALL** the following : **5x10=50M**

9.(A) Explain the difference between microprocessor and microcontroller.

(OR)

(B) Explain Assembler, Compiler and Simulator.

10. (A) Explain the architecture of 8051 and explain each pin in detail.

(OR)

(B) Draw the pin diagram of 8051 and explain each pin in detail.

11. (A) Explain about different types of Addressing modes with examples

(OR)

(B) Explain about Arithmetic and Logical instructions with examples

12.(A) Write a ALP to find the Largest number in a given array of 8-bit Number

(OR)

(B) Write an ALP to arrange given 8-bit numbers in ascending order.

13. (A) Explain the interfacing of PPI 8255 with 8051 Microcontroller

(OR)

(B) Explain about interfacing of stepper motor to 8051 microcontroller

B.Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:4
Course: 6A	Industrial Electronics	Hrs/Wk:4

Learning Outcomes:

Students after successful completion of the course will be able to:

1. Identify various facilities required to set up a basic Instrumentation Laboratory.
2. Acquire a critical knowledge of various Electrical Instruments used in the Laboratory.
3. Demonstrate skills in using instruments like Rectifiers, Multimeters, Power supplies, Voltage Regulators etc. through hands-on experience.
4. Understand the Principle and operation of different Electronic Heating devices.

Syllabus: *(Total Hours: 90 including Teaching, Lab, Field Training, Unit tests etc.)*

UNIT I: (20 hours)

Rectifiers and filters: Rectifiers– Half wave, full-wave and bridge rectifiers- Efficiency- Ripple factor- Regulation – Harmonic components in rectified output – Types of filters- Choke input (inductor) filter- Shunt capacitor filter- L section and section filters.

Voltage Regulators: Transistor Series voltage regulator - Transistor Shunt voltage regulator – Three terminal regulators (78XX and 79XX).

UNIT II: (10 hours)

Power Supplies: Block diagram of regulated power supply – A simple regulated transistorized power supply (circuit and working) – Principle and working of switch mode power supply (SMPS).

UNIT III: (10 hours)

Voltage Multipliers: Half wave voltage doubler, Full wave voltage doubler, Voltage Tripler circuit diagram and working mentioning of applications of voltage multipliers.

UNIT IV: (10 hours)

Controlled rectifiers: SCR Half wave rectifier circuit, working with wave forms, mathematical analysis for resistive load - SCR Full wave rectifier circuit, working with wave forms, mathematical analysis for resistive load – SCR as inverter parallel and series circuits.

UNIT V: (10 hours)

Heat effects: Resistance, inductance and dielectric heating. Principle of operations and its applications. Dielectric Properties: Introduction, effect of a dielectric on the behavior of a capacitor, dielectric losses, significance of the loss tangent.

REFERENCE BOOKS:

1. Unified Electronics Volume II by J.P Agarwal and Amit Agarwal.
2. Industrial Electronics, S.B. Biswas, Dhanapur Rai & Sons.
3. Industrial Electronics, G.K. Mithal, Khanna Publishers.
4. Electronic Devices and Circuits – G.K. Mithal.
5. Electronic Devices and Circuits-Millman and Halkias- Tata Mc Graw Hill (TMH)
6. Microelectronics- J. Millman and A. Grabel - TMH

B. Sc	Semester – V (Skill Enhancement Course-Elective)	Credits:1
Course: 6A	Industrial Electronics Lab	Hrs/Wk:2

ELECTRONICS: LAB – 6A

Industrial Electronics

(ANY SIX EXPERIMEMTS SHOULD BE DONE)

1. D.C Power supply and filters.
2. Transistor series regulator
3. Transistor as a shunt regulator
4. Voltage regulator using IC-7805and IC-7905.
5. Voltage doubler using diodes
6. Voltage Tripler using diodes
7. SCR VI characteristics.
8. SCR Series inverter
9. SCR parallel inverter.

MODEL QUESTION PAPER (Sem-end. Exam)
B Sc DEGREE EXAMINATION
Semester V (Skill Enhancement Course- Elective)
PAPER-6A: INDUSTRIAL ELECTRONICS

Time: 3 hours **Max. Marks: 75**

Section - A **(5 X 5 = 25 Marks)**

Answer any FIVE of the following:

1. Distinguish between Half Wave and Full Wave Rectifier.
2. Draw the circuit diagram of L-Section Filter and explain its operation.
3. Distinguish between Linear Power Supply and SMPS.
4. Draw the block diagram of Regulated Transistorized Power Supply.
5. What are different applications of Voltage Multipliers?
6. Distinguish between Half wave voltage doubler and Full wave voltage doubler.
7. Draw the circuit diagram of how SCR works as Parallel Inverter and explain its operation.
8. Draw the circuit diagram of how SCR works as Series Inverter and explain its operation.

Section - B **(5x10=50 Marks)**

Answer ALL the following

1. A) Draw the circuit diagram of Half wave rectifier and derive an expression for Efficiency, Ripple Factor, Voltage Regulation.

(OR)

B) Draw the circuit diagrams of Transistor Series Voltage Regulator and Transistor Shunt Voltage Regulators. Explain its operations.

2. A) Draw the Block Diagram of Regulated Power Supply and explain the operation of each block.

(OR)

B) Draw the Block Diagram of Switch Mode Power Supply and explain the operation of each block.

3. A) Draw the circuit diagram of Half wave voltage doubler circuit and explain its working.

(OR)

B) Draw the circuit diagram of Voltage Trippler circuit and explain its working.

4. A) Draw the circuit diagram of SCR Half wave rectifier circuit, explain its working with the help of waveforms. Show Mathematical analysis for resistive load.

(OR)

B) Draw the circuit diagram of SCR Full wave rectifier circuit, explain its working with the help of waveforms. Show Mathematical analysis for resistive load.

5. A) What is Dielectric heating explain factors on which the dielectric loss in a dielectric material depends.

(OR)

B) What is the difference between Induction heating and Dielectric heating

B. Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:4
Course: 7A	Electronic Instrumentation	Hrs/Wk:4

Learning Outcomes: Students after successful completion of the course will be able to:1.

1. Identify various facilities required to set up a basic Instrumentation Laboratory.
2. Acquire a critical knowledge of various Electrical Instruments used in the Laboratory.
3. Demonstrate skills of using instruments like CRO, Function Generator, Multimeter etc. through hands on experience.
4. Understand the Principle and operation of different display devices used in the display systems and different transducers
5. Comprehend the applications of various biomedical instruments in daily life like B.P. meter, ECG, Pulse oxymeter etc. and know the handling procedures with safety and security.

Syllabus: *(Total Hours: 90 including Teaching, Lab, Field Training, Unit tests etc.)*

UNIT I: *Introduction To Instruments* **(10 hrs)**

Types of electronic Instruments - Analog instruments & Digital Instruments, DC Voltmeter and AC Voltmeter, Construction and working of an Analog Multimeter and Digital Multimeter (Block diagram approach), Sensitivity, 3½display and 4½ display Digital multimeters, Basic ideas on Function generator. Block Diagram of Function Generator.

UNIT II: ***Oscilloscope*** **(10 hrs)**

Cathode Ray Oscilloscope-Introduction, Block diagram of basic CRO, Cathode ray tube, Electron gun assembly, Screen for CRT, Time base operation, Vertical deflection system, Horizontal deflection system, Use of CRO for the measurement of voltage (AC and DC), frequency, phase difference, Different types of oscilloscopes and uses.

UNIT III: ***Transducers*** **(10 hrs)**

Classification of transducers, Selection of transducers, Resistive, capacitive & inductive transducers, Resistive and capacitive touch screen transducer used in mobiles, Displacement transducer-LVDT, Piezoelectric transducer, Photo transducer, Digital transducer, Fibre optic sensors

OVERVIEW OF OPTICAL FIBER COMMUNICATION: Introduction, Historical development, general system, advantages, disadvantages, and applications of optical fiber communication

UNIT IV: ***Display Instruments*** **(10 hrs)**

Introduction to Display devices, Seven Segment Displays, LED Displays, Construction and operation (Display of numbers),Types of SSDs (Common Anode & Common Cathode type), Limitations of SSDs, Liquid Crystal Displays, Applications of LCD modules.

UNIT V: ***Biomedical Instruments*** **(10 hrs)**

Basic operating principles and uses of (i) Clinical thermometer (ii) Stethescope (iii) Sphygmomanometer (iv) ECG machine (v) Radiography (vi) Ophthalmoscope (vii) Ultrasound scanning (viii) Pulse oxymeter (ix) Glucometer, Basic ideas of CT scan and MRI scan.

REFERENCE BOOKS:

1. Electronic Instrumentation by H.S.Kalsi , TMH Publishers
2. Electronic Instrument Hand Book by Clyde F. Coombs , McGraw Hill
3. Introduction to Biomedical Instrumentation byMandeep Singh, PHI Learning.
4. Biomedical Instrumentation and Measurements by Leslie Cromwell ,Prentice Hall India.
5. Electronic Measurements and Instrumentation by Kishor, K Lal, Pearson, New Delhi
6. Electrical and Electronic Measurements by Sahan, A.K., Dhanpat Rai, New Delhi
7. Electronic Instruments and Measurement Techniques by Cooper, W.D. Halfrick, A.B., PHI Learning, New Delhi
8. Web sources suggested by the teacher concerned and the college librarian including reading material.

B. Sc	Semester – V (Skill Enhancement Course-Elective)	Credits:1
Course: 7A	Electronic Instrumentation Lab	Hrs/Wk:2

Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. List out, identify and handle various equipment in Instrumentation Laboratory or Electronic Laboratory.
2. Learn the construction, operational principles of various instruments.
3. Demonstrate skills in handling, Maintenance & troubleshooting of different instruments used in the Labs.
4. Acquire skills in observing and measuring various electrical and electronic quantities.
5. Perform some techniques related to Biomedical Instrumentation and measurement of Certain physiological parameters like body temperature, B.P. and sugar levels etc.

Practical (Laboratory) Syllabus: *(30 hrs. Max marks: 50*)

1. Familiarisation of digital multimeter and its usage in the measurements of
   (i) resistance, (ii) current, (iii) AC & DC voltages and for (i) continuity test
   (ii)diode test and (iii) transistor test.
2. Measure the AC and DC voltages, frequency using a CRO and compare the values Measured with other instruments like Digital Multimeter.
3. Formation of Sine, Square wave signals on the CRO using Function Generator and measure their frequencies. Compare the measured values with actual values.
4. Display the numbers from 0 to 9 on a single Seven Segment Display module by Applying voltages.
5. Display the letters **a** to **h** on a single Seven Segment Display module by applying voltages.
6. Measurement of body temperature using a digital thermometer and list out the error and corrections.
7. Measurement of Blood Pressure of a person using a B.P. meter and record the values and analyze them.
8. Get acquainted with an available ECG machine and study the ECG pattern to understand the meaning of various peaks
9. Observe and understand the operation of a Digital Pulse oxymeter and measure the pulse rate of different people and understand the working of the meter.

LAB REFERENCES:

1. Electronic Measurement and Instrumentation by J.P. Navani. ,S Chand & Co Ltd
2. Principles of Electronic Instrumentation by A De Sa, Elsevier Science Publ.
3. Electronic Measurements and Instrumentation by S.P.Bihari, YogitaKumari, Dr. Vinay Kakka, Vayu Education of India.
4. Laboratory Manual For Introductory Electronics Experiments by Maheshwari, New Age
5. International (P) Ltd., Publishers.

6. Electricity-Electronics Fundamentals: A Text-lab Manual by Paul B. Zbar
7. ,Joseph Sloop, & Joseph G. Sloop, McGraw-Hill Education.
8. Web sources suggested by the teacher concerned.

Co-Curricular Activities

(a) Mandatory:(*Training of students by the teacher in field related skills: (lab:10 + field:05*)
For Teacher: Training of students by the teacher in the laboratory/field for not less than 15 hours on the field techniques/skills of understanding the operation, Maintenance and utility of various electrical and electronic instruments both in the Laboratory as well as in daily life.

For Student: Students shall (individually)visit a local electrical and electronics shop or small firm to familiarize themselves with the various electrical and electronic instruments available in the market and also to understand their functionality, principle of operation and applications as well as the troubleshooting of these instruments.(Or) The student shall visit a diagnostic centre and observe the ECG machine and the ECG pattern(Or) Student shall visit a diagnostic centre and observe the CT scan and MRI scan.(Or) Students shall visit a mobile smart phone repair shop and observe the different components on the PCB(Motherboard), different ICs (chips) used in the motherboard and troubleshooting of touch screens in smart phones. Observations shall be recorded in a hand-written Fieldwork/Project work not exceeding 10 pages in the given format to be submitted to the teacher.

1. Max marks for Fieldwork/Project work: 05.
2. Suggested Format for Fieldwork/Project work: *Title page, student details, index page, details of a place visited, observations, findings and acknowledgments*.
3. Unit tests (IE)

Suggested Co-Curricular Activities

1. Training of students by related industrial/technical experts.
2. Assignments (including technical assignments like identifying different measuring instruments and tools and their handling, operational techniques with safety and security.
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Make your own stethoscope at home.
5. Making a seven-segment display at home.
6. Preparation of videos on tools and techniques in various branches of instrumentation.
7. Collection of material/figures/photos related to products of Measuring Instruments, Display Modules and Biomedical Instruments and arrange them in a systematic way in a file.
8. Visits to Instrumentation Laboratories of local Universities or Industries like Cement, Chemical or Sugar Plants etc. or any nearby research organizations, private firms, etc.
9. Invited lectures and presentations on related topics by Technical /industrial experts.

MODEL QUESTION PAPER (Sem-end. Exam)
B Sc DEGREE EXAMINATION
Semester V (Skill Enhancement Course- Elective)
PAPER-7A: ELECTRONIC INSTRUMENTATION

Time: 3 hours **Max. Marks: 75**

Section - A

Answer any FIVE of the following: **(5 X 5 = 25 Marks)**

1. What types of Voltmeters are used for DC Measurements?
2. What is difference between AC Voltmeter and DC Voltmeter?
3. What are the Uses of CRO?
4. What are different types of Oscilloscopes?
5. What are main types of Transducers?
6. Explain about Fiber Optic Sensors.
7. What are different Applications of LCD modules?
8. How many types of SSDs are available in Seven Segment Display?

Section - B

Answer ALL the following. **(5x10=50 Marks)**

1. A) Draw the Block diagram of Analog Multimeter and explain its Construction and Working

(OR)

B) Draw the Block diagram of Digital Multimeter and explain its Construction and Working

2. A) Draw the Block Diagram of Cathode Ray Oscilloscope and explain the function of each block.

(OR)

B)Draw the Block Diagram of Cathode Ray Tube and explain the operation of each block.

3. A)Draw the circuit diagram of Linear Variable Differentiable Transformer LVDT and explain its operation.

(OR)

B)Draw the circuit diagram of Piezoelectric Transducer and explain its working.

4. A)Explain the Construction and Operation of Seven Segment Displays with neat Diagram

(OR)

B) Explain the Construction and Operation of LED Displays with neat diagram.

5. A) Draw the Block diagram of Stethoscope and explain its Operating Principle.

(OR)

B) Explain Basic Operating Principles and Uses of Clinical Thermometer.

B. Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:4
Course: 6B	Embedded systems design	Hrs/Wk:4

UNIT I: **(10Hrs)**

Introduction to Embedded Systems:
Embedded systems overview, Design Challenge, Processor Technology, IC Technology, and Design Technology.

UNIT II: **(15Hrs)**
Custom Single Purpose Processor – Hardware Development: Introduction, Combinational logic, Sequential logic, Custom Single Purpose Processor Design, RT-Level Custom Single-Purpose Processor.

UNIT III: **(15Hrs)**
General Purpose Processor – Software Development: Introduction, Basic Architecture, Operation, Programmer's View, ASIPs, and Development Environment: Host and Target Machines, Linker / Locators for Embedded Software, Getting Embedded Software into the target system. Debugging Techniques: Testing on your Host Machine, and Instruction Set Simulators.

UNIT IV: **(10Hrs)**

RTWA for Embedded Systems: Introduction, Timers, Counters and Watchdog Timers, UART, Pulse Width Modulators, Stepper Motor Controllers, Analog – to – Digital Converters, and Real Time Clocks.

UNIT V: **(10Hrs)**
Advanced Communication Principles: Parallel Communication, Serial Communication, Wireless Communication, Serial Protocols: I^2C, CAN, FireWire, and USB. Parallel Protocols: PCI BUS and ARM BUS. Wireless Protocols: IrDA, Bluetooth, and IEEE 802.11.

TEXT BOOKS:

1. Embedded System Design – A Unified Hardware / Software Introduction By Frank Vahid / Tony Givargis – WILEY EDITION.
2. Embedded Systems Architecture, Programming and Design – 2^{nd} Edition By Raj Kamal – Tata McGraw-Hill Education.

REFERENCES BOOKS:

1. An Embedded Software Premier - David E- Siman, PEARSON
2. Education Embedded / real - time systems - DR. K.V.K.K. Prasad, dreamtech
3. The art of programming Embedded systems, Jack G. Ganssle, academic press.
4. Intelligent Embedded systems, Louis L. Odette, Adison Wesly, 1991

MODEL QUESTION PAPER (Sem-end. Exam)
B Sc DEGREE EXAMINATION
Semester V(Skill Enhancement Course- Elective)

PAPER-6B : **Embedded systems Design**

Time: 3Hrs. Max.marks:75

Section - A

Answers any FIVE of the following: **(5 X 5 = 25 Marks)**

1. What are the components of an Embedded hardware system.
2. Explain the design challenges of Embedded systems.
3. Explain various steps to design a custom single-purpose processor.
4. Explain combinational logic circuit design.
5. Write a short note on the linker for embedded systems.
6. Briefly explain the operation of a general-purpose processor.
7. What is Watchdog Timer? Explain.
8. Explain the working of Real-time Clocks in embedded systems.

Section - B

Answer ALL the following: (5x10=50 Marks)

1. a) Draw the block diagram of an embedded system. Explain the features of Embedded Systems.

   (OR)

   b) Explain various technologies involved in designing an embedded system.

2. a) Explain (i) Combination logic and (ii) Sequential logic circuits

   (OR)

   b) Explain in detail about RT Level custom single purpose processor.

3. a) Explain in detail about embedded software development tools.

   (OR)

   b) Explain various debugging techniques used in Embedded Systems.

4. a) Define and explain Universal asynchronous receiver transmitter (UART).

   (OR)

   b) Explain the working of Stepper motor controller for embedded systems.

5. a)Distinguish between parallel and serial communication Principles. Explain USB Serial Protocol.

   (OR)

   b) Write a short note on (a)PCI BUS and (b) ARM BUS

B. Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:4
Course: 7B	Consumer Electronics	Hrs/Wk:4

Learning Outcomes:

- To study Microwave ovens – block diagram - working - types – wiring and safety instructions. – care and cleaning
- To study washing machines – block diagram - working - types – wiring and safety instructions. – care and cleaning
- To study Air conditioners and refrigerators – block diagram - working - types – wiring and safety instructions. – care and cleaning
- To study Home/Office digital devices – block diagram - working - types – wiring and safety instructions. – care and cleaning
- To study Digital access devices like – block diagram - working - types – wiring and safety instructions. – care and cleaning

UNIT I: (12hrs)

Microwave Ovens – Microwaves (Range used in Microwave ovens) – Microwave oven block diagram – LCD timer with alarm – Single-Chip Controllers – types of Microwave oven – Wiring and Safety instructions – care and Cleaning.

UNIT II: (12hrs)

Washing Machines – Electronic controller for washing machines – Washing machine hardware and software – Types of washing machines – Fuzzy logic washing machines Features of washing machines.

UNIT III: (12hrs)

Air Conditioners And Refrigerators - Air Conditioning – Components of air conditioning systems – All water air conditioning systems – All air conditioning systems – Unitary and central air conditioning systems – Split air conditioners.

UNIT IV: (12hrs)

Home/Office Digital Devices – Fascimile machine – Xerographic copier – calculators – Structure of a calculator – Internal organization of a calculator – Servicing electronic calculators – Digital clocks – Block diagram of a digital clock.

UNIT V: (12hrs)

Digital Access Devices – Digital computer – Internet access – online ticket reservation – functions and networks – barcode scanner and decoder – Electronic Fund Transfer – Automated Teller Machines(ATMs) – Set-Top boxes – Digital cable TV – Video on demand.

TEXT BOOKS:

1. S.P. Bali, Consumer Electronics – Pearson Education, New Delhi,2005.
2. R.G. Gupta Audio and Video systems Tata McGraw Hill (2004)

B. Sc	Semester – V (Skill Enhancement Course-Elective)	Credits:1
Course: 7B	Consumer Electronics **Lab**	Hrs/Wk:2

CONSUMER ELECTRONICS LAB

Learning outcomes:

- The Student can gain a good knowledge of microwave ovens and implement them in practical applications.
- The Student can gain a good knowledge of Washing Machines and implement in practical applications.
- The Student can gain a good knowledge of Air conditioners and Refrigerators and implement them in practical applications.
- The Student can gain a good knowledge of Digital access devices and implement in practical applications.
- Ability to measure strain, displacement, velocity, angular velocity , temperature, pressure Vacuum, and Flow.

(At least two Activities should be done)

1. Study of PA systems for various situations – Public gathering, closed theatre/ Auditorium, Conference room, Prepare Bill of Material(Costing)
2. Installation of Audio/Video systems – site preparation, electrical requirements, cables and connectors.
3. Market Survey of products (at least one from each module)
4. Identification of block and tracing the system. Assembly and Disassembly of system using Toolkit
5. Assembly and Disassembly of system and printer.

NOTE: one activity as directed in practical course is equivalent to 4 experiments.

MODEL QUESTION PAPER (Sem-end. Exam)
B Sc DEGREE EXAMINATION
Semester V (Skill Enhancement Course- Elective)

PAPER- 7B : CONSUMER ELECTRONICS

Time: 3 hours **Max. Marks: 75**

Section - A

Answer any FIVE of the following: **(5 X 5 = 25 Marks)**

1. Explain the microwave oven safety instructions.
2. What are the uses of a microwave oven?
3. Explain the features of the washing machine.
4. Explain the different types of washing machines.
5. Explain the working of the air conditioning system.
6. What is a unitary air conditioning system.
7. How servicing the electronic calculators.
8. What is facsimile machine? And give the two uses of it.

Section - B

Answer ALL the following: **(5x10=50 Marks)**

1. a) Draw the block diagram of the microwave oven and explain each block.
   (OR)
   b) Explain the LCD timer with alarm in the washing machine.

2. a) What is FUZZY logic washing machine.
   (OR)
   b) Explain the hardware details of washing machine.

3. a) Explain the different components of air-condition system.
   (OR)
   b) Explain the working of split air condition.

4. a) Draw the block diagram of digital clock and explain it.
   (OR)
   b) Draw the structure of calculator. And explain each one.

5. a) What is network and explain its online ticket reservation procedure.
   (OR)
   b) Explain the details about digital cable TV.

B. Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:4
Course: 6C	VLSI DESIGN	Hrs/Wk:4

UNIT I: **(12 hrs)**

Integrated Circuit- Definition, Classification's, and Advantages of IC's – MOS Transistors: Enhancement type, Depletion type, Modes of NMOS – CMOS, Fabrications: n-Well, p-Well.

UNIT II: **(12 hrs)**

NMOS Inverter – CMOS inverter – VLSI Design Flow: Design Specification's Design Entry – Examples of (Circuit Diagrams only) NMOS, PMOS and CMOS.

UNIT III: **(12 hrs)**

Basic logic gates in CMOS – Complex logic gate: Two, Three inputs of CMOS NAND gate – Combinational Logic: Two and Three inputs of CMOS NOR gate – Compound gates in CMOS.

UNIT IV: **(10 hrs)**

VHDL: Brief History, Logical, Relational, Arithmetic, Shift and Rotate Operators, Data types.
Verilog HDL: Brief History, Logical, Relational, Arithmetic, Shift and Rotate Operators, Data types – Comparison of VHDL and Verilog HDL.

UNIT V: **(14 hrs)**

Data – Flow Description's and HDL programs:- Basic Logic Gates, Universal Gates, Half-Adder, Multiplexer, Magnitude Comparator, Binary Adder.

TEXT BOOKS:

1. VLSI Design by Vilas S.Baged.
2. VHDL and Verilog programming By Nazeih M.Botros.
3. VLSI Design By A.Albert Raj and T.Latha.

B. Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:1
Course: 6C	VHDL / Verilog HDL LAB	Hrs/Wk:2

ELECTRONICS : LAB – 6C

List of Practical Experiments:

(**any six experiments should be done)**

1) BASIC GATES CIRCUIT
2) UNIVERSAL GATES
3) HALF –ADDER
4) FULL –ADDER
5) MULTIPLEXER
6) DECODER
7) S-R LATCH
8) D-LATCH
9) MAGNITUDE COMPARATOR
10) BINARY ADDER

MODEL QUESTION PAPER (Sem-end. Exam)

B Sc DEGREE EXAMINATION
Semester V (Skill Enhancement Course- Elective)

PAPER- 6C : VLSI DESIGN

Time: 3 hours **Max. Marks: 75**

Section - A

Answer any FIVE of the following: **(5 X 5 = 25 Marks)**

1. What are the Advantages of IC's.
2. Write a short note on Modes of NMOS?
3. Draw circuit diagram of NMOS.
4. Draw the circuit Diagram of PMOS.
5. Explain briefly about Three Input CMOS NAND Gate.
6. Explain briefly about Three Input CMOS NOR Gate.
7. Write a short note on Data Types of VHDL.
8. Write the Comparison of VHDL and Verilog HDL.

Section - B

Answer ALL the following: **(5x10=50 Marks)**

1. a) Define Integrated Circuit and explain the classification of Integrated Circuits.
   (OR)
   b) Explain the working of Enhancement type MOS Transistor.

2. a) Explain about NMOS Inverter.
   (OR)
   b) Explain the Process of VLSI Design Flow.

3. a) Explain the Construction of CMOS NAND Gate.
   (OR)
   b) Describe the Compound Gates in CMOS.

4. a) Explain Logical and Arithmetic Operators in VHDL
   (OR)
   b) Explain different Data Types of Verilog HDL

5. a) Explain about Universal Gates
   (OR)
   b) Explain the Binary Adder.

B. Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:4
Course: 7C	DATA COMMUNICATION AND NETWORKING	Hrs/Wk:4

UNIT I: **(12 Hrs)**

Data Communication and its Components – Introducing of Network, Types of Networks: Personal Area Network, wide Area Network.

UNIT II: **(14 hrs)**

Network Topologies: Bus Topology, Star Topology, Ring Topology, Mesh Topology, Tree Topology, Hybrid, Topology.

UNIT III: **(10 Hrs)**

Transmission Media's - Guided Media: Twisted pair Cable, Coaxial Cable, Optical Fiber Cable. Un-Guide Media: Radio Waves, Microwaves, Infrared.

UNIT IV: **(10 Hrs)**

Data Transmissions: Digital – To – Digital Conversion (line coding only), Analog – To – Digital Conversion (PCM only), Digital – To – Analog (ASK only) Analog – To – Analog Transmission (AM only) – Transmission Modes (Parallel and Serial).

UNIT V: **(14 Hrs)**

Frequency Division Multiplexing, Time Division Multiplexing Wave Division Multiplexing. Modems: Traditional Modems, Cable Modems.

TEXT BOOKS:

1. Data communication and Networking (2 Edition) By Behrouz A.Forouzan.
2. Data and Communication by Stallings Williams.
3. Computer Networks By Kurose James F.

B. Sc	Semester – V (Skill Enhancement Course- Elective)	Credits:1
Course: 7C	Data Communication And Networking Lab	Hrs/Wk:2

DATA COMMUNICATION AND NETWORKING LAB –
(Any Six Experiments Should Be Done)

1. To Study Different Types Of Transmission Media.
2. To Study The Serial Interface Using Rs-232.
3. To Study LAN Using Star Topology
4. To Study LAN Using Bus Topology
5. To Study LAN Using Tree Topology
6. To Study Configure Modem Of Computer
7. To Study Configure Hub/Switch
8. Analog To Digital Conversion
9. Digital To Analog Conversion

MODEL QUESTION PAPER (Sem-end. Exam)
B Sc DEGREE EXAMINATION
Semester V (Skill Enhancement Course- Elective)

PAPER- 7C : Data Communication and Networking

Time: 3 hours **Max. Marks: 75**

Section - A

Answer any FIVE of the following: **(5 X 5 = 25 Marks)**

1. Write a short note on Wide Area Network.
2. What are advantages of Personal Area Network?
3. Explain briefly about Star Topology.
4. Write a short note on Ring Topology.
5. Explain about Twisted Pair Cable.
6. Write a short note on Coaxial Cable.
7. Explain the types of Transmission Modes.
8. What are the advantages of PCM

Section - B

Answer ALL the following: **(5x10=50 Marks)**

1. a) What is Data Communication and explain its components..
   (OR)
   b) Explain about Personal Area Network.

2. a) Describe Bus Topology and Star Topology
   (OR)
   b) Describe Mesh Topology and Tree Topology.

3. a) Explain the Structure of Optical Fiber Cable.
   (OR)
   b) Describe types of Un-Guide Media.

4. a) Explain Digital to Analog Transmission using ASK
   (OR)
   b) Explain Digital to Analog Transmission using AM.

5. a) Explain the Time Division Multiplexing Technique.
   (OR)
   b) Explain the Frequency Division Multiplexing Technique.