ISO-9001-2015 CERTIFIED INSTITUTION CPE NAAC 'A' GRADE

KAKARAPARTI BHAVANARAYANA COLLEGE (AUTONOMOUS)

(Sponsored by S.K.P.V.V.Hindu High Schools' Committee)

Kothapeta, Vijayawada

(An Autonomous College in the Jurisdiction of Krishna University)

Class:	Semester:	Title of The Paper:	Paper Code:	W.E.F
I B.Sc. MECS	**I**	**CIRCUIT THEORY AND ELECTRONIC DEVICES**	**R20ELE101A**	**2020-21**

Total No of Hours for Teaching - Learning	Instructional Hours for Week		Duration of Semester End Examination in Hours	Max Marks		Credits
	Theory	Practical		CIA	SEE	
60 Hours	4	3	3 Hours	25	75	4

CourseObjectives:

- To explain the basic concepts and laws of DC and AC electrical networks and solve them using mesh and nodal analysistechniques.
- To analyze circuits in time and frequencydomain.
- To synthesize the networks using passiveelements.
- To understand the construction, working and V - I characteristics of electronicdevices.
- To understand the concept of powersupply.

CourseOutcomes:-

- Apply concepts of electric network topology, nodes, branches, loops to solve circuit problems including the use of computersimulation.
- Apply time and frequency concepts ofanalysis.
- Synthesize the network using passiveelements.
- Know about amplifier circuits, switching circuits and oscillator circuits their design and use inelectronics.
- Design and construction of a powersupply.

SEMESTER-I **PAPER –I**

CIRCUIT THEORY AND ELECTRONIC DEVICES

UNIT- 1: (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.

UNIT-II: (12hrs)
PASSIVE NETWORKS AND NETWORKS THEOREMS (D.C): Kirchhoff's Laws-Branch current method, Nodal Analysis, star to delta & delta to star conversions. 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)
POWER SUPPLIES & PHOTO ELECTRIC DEVICES
Junction Diodes - Rectifiers: - Half wave, Full wave rectifiers – Efficiency - Ripple factor – Filters - L-section & π-section filters, Three terminal fixed voltage I.C. Regulators (78XX and &79XX), Light Emitting Diode (LED), Photo diode and Light Dependent Resistor (LDR).

UNIT-V: (12hrs)
BJT, FET and UJT:
BJT: Construction, working, and characteristics of CE Configurations, Hybrid parameters and hybrid equivalent circuit of CE Transistor.
FET: Construction, working and characteristics of JFET and MOSFET, Advantages of FET over BJT.
UJT: Construction, working and characteristics of UJT, UJT as a Relaxation oscillator.

TEXT BOOKS:

1. Introductory circuit Analysis(UBSPublications) --------- Robert L.Boylestad.
2. Electronic Devices andCircuit Theory ---- Robert L. Boylestad&Louisashelsky.
3. Circuit AnalysisbyP.Gnanasivam----- PearsonEducation
4. Electronic Devices andCircuit Theory ---- Robert L.Boylestad& LouisNashelsky.
5. Electronic Devices and Circuits I – T.L.Floyd- PHI FifthEdition

REFERENCE BOOKS:

1. Engineering Circuit Analysis By: Hayt&Kemmerly -MG.
2. Networks and Systems – D.RoyChowdary.
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. A Text Book Of Applied Electronics, -- Dr.Sedha R.S., S.Chand& CompanyLtd

ELECTRONICS LAB – I

(Circuit Theory and Electronic Devices)

LAB LIST:

1. Thevenin'sTheorem-verification.
2. Norton'sTheorem-verification.
3. Maximum Power TransferTheorem-verification.
4. LCR series resonancecircuit.
5. BJT input and outputcharacteristics.
6. FET Output and transfercharacteristics.
7. UJT V-Icharacteristics.
8. LDR characteristics.
9. IC regulated power supply(IC-7805).
10. IC regulated power supply(IC-7905).

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

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MODEL QUESTION PAPER
Paper-I: CIRCUIT THEORY AND ELECTRONIC DEVICES
(w.e.f:2022-23)

SUB: ELECTRONICS-I **MARKS: 60**
PAPER CODE: R20ELE101A **TIME: 3HOURS**

SECTION-A

I) ANSWER ANY FIVE QUESTIONS: **5X4 =20M**

1. Difference between AC and DC.
2. What do you mean by Node voltage method of analysis.
3. State and prove super position theorem.
4. Explain the Working of Integrator and Differentiator with RC combination.
5. Distinguish between Series and Parallel resonance.
6. Explain the working of varactor Diode.
7. Explain briefly about Three terminal fixed voltage I.C. Regulators (78XX).
8. Distinguish between BJT and FET.

SECTION-B

II) ANSWERTHE FOLLOWING QUESTIONS **8X5 =40M**

9. a) Explain Phasor representation of sinusoidal voltages and currents.

(Or)

b) Derive an expression for average value of an AC and RMS value of an AC.

10) a) State and explain Kirchhoff's laws. Describe the loop current method for single source network.

(Or)

b) State and prove Thevenin's and Norton's theorem.

11)a) What is a Low pass filter and discuss the frequency response of RC and RL circuits with necessary Mathematical theory.

(Or)

b) Draw the series resonance circuit. Deduce an expression for a resonant frequency, bandwidth, Q-factor and selectivity.

12)a) What is rectifier? Derive an expression for full wave rectifier with neat circuit and wave forms.

(Or)

b) Discuss the principle and working and characteristics of LDR.

13)a) Explain the input and output characteristics of Common Emitter Configuration of a Transistor?

(Or)

b) Discuss the structure and working of an JFET and explain its characteristics.

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Class:	Semester:	Title of The Paper:	Paper Code:	W.E.F
I B.Sc. MECS	**II**	**DIGITAL ELECTRONICS**	**R20ELE201A**	**2020-21**

Total No of Hours for Teaching - Learning	Instructional Hours for Week		Duration of Semester End Examination in Hours	Max Marks		Credits
	Theory	Practical		CIA	SEE	
60 Hours	4	3	3 Hours	25	75	04

Objectives:

- To understand the number systems, Binary codes andComplements.
- To understand the Boolean algebra and simplification of Booleanexpressions.
- To analyze logic processes and implement logical operations using combinational logic circuits.
- To understand the concepts of sequential circuits and to analyze sequential systems in terms of statemachines.
- To understands characteristics of memory and theirclassification.
- To implement combinational and sequential circuits usingVHDL.

Outcomes:-

- Develop a digital logic and apply it to solve real lifeproblems.
- Analyze, design and implement combinational logic circuits.
- Classify different semiconductormemories.
- Analyze, design and implement sequential logic circuits.
- Simulate and implement combinational and sequential logic circuits usingVHDL

SEMESTER-II **PAPER –2**

DIGITAL ELECTRONICS

Unit – I (12hrs)

NUMBER SYSTEM AND CODES: Decimal, Binary, Octal, Hexadecimal Numbers Systems and their conversions, Codes: BCD, Gray and Excess-3 codes - Code conversions - Complements (1's, 2's, 9's and 10's), Binary Addition, Binary Subtraction using 1's & 2's complement methods.

Unit- II (12hrs)

BOOLEAN ALGEBRA AND THEOREMS: Boolean Laws, De-Morgan's Theorem, Basic logic gates, Universal Logic Gates (NAND & NOR), Standard representation of logic functions (SOP and POS), Minimization Techniques (Karnaugh Map Method: 2, 3, 4 variables).

Unit-III (12hrs)

COMBINATIONAL DIGITAL CIRCUITS: Adders - Half & Full adder, Subtractor - Half and Full subtractors, Parallel binary adder, Magnitude Comparator, Multiplexers (4:1) and Demultiplexers (1:4), Encoder (8-line-to-3-line) and Decoder (3-line-to-8-line), BCD to Seven SegmentDecoder.

UNIT-IV(12hrs)

SEQUENTIAL DIGITAL CIRCUITS: Flip-flops: S-R Flip-flop, J-K Flip-flop, T and D type Flip-flops, Master-Slave Flip-flop, Excitation tables, Registers:- Serial In Serial Out and Parallel In and Parallel Out, Counters Asynchronous : Mod-8, Mod-10,Mod-16 Synchronous - 4-bit Ring counter.

UNIT- V (12hrs)

MEMORY DEVICES & LOGIC FAMILIES:

General Memory Operations, ROM, RAM (Static and Dynamic), PROM, EPROM, EEPROM, EAROM. IC – Logic Families: RTL, DTL, TTL logic, CMOS NAND & NOR Gates, CMOS Inverter, Programmable Logic Devices – Programmable Logic Array (PLA), Programmable Array Logic (PAL).

TEXT BOOKS:

1. M.Morris Mano, " Digital Design " 3rdEdition, 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

Reference Books :

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

LAB LIST:

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. Verify Half adder and full adder usinggates.
5. Verify Half subtractor and full subtractor usinggates.
6. Verify the truth table Multiplexer anddemultiplexer.
7. Verify the truth table Encoder anddecoder.
8. Verify the truth table of RS , JK, T-F/F using NANDgates.
9. 4-bit binary parallel adder and subtractor using IC7483.
10. BCD to Seven Segment Decoder using IC-7447/7448.

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

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MODEL QUESTION PAPER

DIGITAL ELECTRONICS

SUB: ELECTRONICS (SEMESTER-II) MARKS: 60

PAPER CODE: R20ELE201A TIME: 3 HOURS

SECTION-A

I) ANSWER ANY FIVE QUESTIONS: **(5 X4=20M)**

1. Explain about Binary addition and Binary Subtraction with examples.
2. Explain about Excess-3code & BCD.
3. Write a brief note on SOP and POS forms with examples.
4. State and prove DE Morgan's theorem.
5. Write a brief note on Parallel Binary Adder.
6. Explain the working of D- flip flop with truth table.
7. Define Decoder. Explain about 3 to 8 line decoder with diagram and truth table.
8. Write a short note on characteristics of RTL logic.

SECTION-B

II) ANSWER THE QUESTIONS: **(5 X8=40M)**

9) a) Explain about Decimal, Binary, Hexadecimal, Octal & BCD number systems with examples.

(OR)

b) Explain about 1's, 2's, 9's and 10's Complements with examples.

10) a)Explain about AND, OR, NOT, XOR, X-NOR logic gates with their truth tables.

(OR)

b) Write about Karnaugh Maps& Explain about2,3,4&5 variable K-maps with tables.

11.a)Explain the working of Half adder & Full adder with their diagrams and truth tables.

(OR)

b) Define Multiplexer? Explain the working of 2 to1 & 4 to 1 Multiplexer with diagrams.

12.a) Explain the operation of Master- Slave flip flop with neat circuit & timing diagrams.

(OR)

b) Explain the working of Asynchronous Mod-10 Counter (or) Decade Counter with diagram.

13. a) Explain about operation of Programmable logic Array with diagram.

(OR)

b) Draw and Explain the working and characteristics of TTL logic

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Class:	Semester:	Title of The Paper:	Paper Code:	W.E.F
II B.Sc. MECS	**III**	**ANALOG CIRCUITS AND COMMUNICATION**	**R20ELE301**	**2021-22**

Total No of Hours for Teaching - Learning	Instructional Hours for Week		Duration of Semester End Examination in Hours	Max Marks		Credits
	Theory	Practical		CIA	SEE	
60 Hours	4	3	3 Hours	25	75	4

Objectives:

- To 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 analyze different parameters of analog communication techniques.
- It also focuses on Transmitters and Receivers.

Out Comes:

- 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.

SEMESTER – III **PAPER – 3**

ANALOG CIRCUITS AND COMMUNICATION

Unit – I (12hrs)

OPERATIONAL AMPLIFIERS: Definition, Characteristics of Op-Amp, Block diagram of op-amp, inverting, non-inverting, virtual ground, summing amplifier, subtractor, voltage follower, op-amp parameters, voltage to current convertor, integrator, differentiator, differential amplifier, Logarithmic amplifier.

Unit- II: (12hrs)

OP-AMP CIRCUITS: Voltage regulator, Comparator, Instrumentation amplifier, Schmitt trigger, Sine wave generator, Square wave generator - Astable Multi-vibrator, Triangular wave generator, Active filters (Basics) - Low pass, High pass, Band pass filters. IC - 555 –functional block diagram.

UNIT –III: (12Hrs) AMPLITUDE MODULATION:

Need for modulation, Types of Modulation, Amplitude modulation - frequency spectrum of AM wave, representation of AM, power relations in the AM wave. Generation of AM- Transistor modulators, Detection of AM signals – 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, frequency spectrum and bandwidth of FM waves, Generation of FM signals – Varactor diode modulator and Reactance modulator. Detection of FM waves – FM demodulation. Phase Locked Loop (PLL).

UNIT-V: (12hrs)

RADIO BROADCASTING AND RECEPTION:

Spectrum of electromagnetic waves, Radio broadcasting and reception – Block Diagram, AM Transmitter & Super heterodyne AM receiver, FM Transmitter & Super heterodyne FM receiver. Differences between AM and FM.

TEXT BOOKS:

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

Reference Books :

1. Jacob Millan ,Micro Electronics,McGraw Hill.
2. Mithal G K, Electronic Devices and Circuits Thana Publishers.
3. Allan Motter shead ,Electronic Devices and Circuits – An Introduction- Prentice Hall
4. Electronic Communications – Roody & Colen
5. Communication Systems – Hayken --- 4th Edition
6. Modern digital and analog communication system –B.P. Lathi

Electronics Lab – 3

(ANALOG CIRCUITS AND COMMUNICATION)

LAB LIST:

1. Op-Amp as inverting and non-inverting
2. Op-Amp Voltage follower and current follower.
3. Op-Amp as integrator and differentiator
4. Op-Amp as adder & subtract or
5. Op-Amp as voltage to current converter
6. Op-Amp as square wave generator
7. AStable Multi-vibrator using IC- 555.
8. AM Modulation and Demodulation.
9. FM Modulation and Demodulation.
10. PM Modulation and Demodulation.

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MODEL PAPER
ANALOG CIRCUITS AND COMMUNICATION

SUB: ELECTRONICS-III **MARKS: 75**
PAPER CODE: R20ELE301 **TIME: 3HRS**

SECTION-A
ANSWER THE FOLLOWING QUESTIONS: (5 X 10= 50M)

1) a) What is an Op-Amp? Draw and explain the block diagram of OP-AMP and explain itsCharacteristics.

(Or)

b) Explain the working of op-amp as Inverting and Non Inverting amplifier and derive theirVoltage Gains.

2.a) Draw the circuit of A stable Multi-vibrator using OP-AMP? Explain its working and Derive expressionfor frequency of oscillations?

(Or)

b) Draw and explain the functional block diagram of IC 555 and its applications.

3.a) Define Amplitude modulation. Describe with suitable waveforms and discuss the frequency spectrum ofAM Wave.

(Or)

b). Explain how AM signals are detected using a diode detector.

4. a) Explain frequency modulation ? Draw and explain working of FET basic reactance Modulator.

(OR)

b) Draw and explain how FM waves can be detected using PLL method.

5. a) Draw the block diagram of AM super heterodyne receiver and explain each block.

(OR)

b) Draw the block diagram of FM transmitter and explain each block.

SECTION-B

ANSWER ANY FIVE QUESTIONS **5X5=25M**

6. Explain op-amp as a summing amplifier.
7. Explain in detail about OP-AMP integrator.
8. What is comparator? Describe the working of OP-amp Comparator and mention its Uses?
9. Explain the working of Active low pass filter.
10. Explain side bands in AM wave.
11. .Explain need for modulation.
12. Give the differences between AM and FM.
13. Explain frequency spectrum in FM.

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Class:	Semester:	Title of The Paper:	Paper Code:	W.E.F
II B.Sc. MECS	**IV**	**MICROPROCESSOR SYSTEMS**	**R20ELE401**	**2021-22**

Total No of Hours for Teaching - Learning	Instructional Hours for Week		Duration of Semester End Examination in Hours	Max Marks		Credits
	Theory	Practical		CIA	SEE	
60 Hours	4	3	3 Hours	25	75	4

Objectives:

- 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.

OUTCOMES:

- The student can gain good knowledge on microprocessor and implement in practical applications
- Design system using memory chips and peripheral chips for 16 bit 8086
- 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.

SEMESTER – IV **PAPER – 4**

MICROPROCESSOR SYSTEMS

UNIT -I: (12Hrs)

8085 Microprocessor: Introduction to Microprocessor, INTEL 8085 Architecture, Register organization, Pin configuration of 8085, Interrupts and its Priority, Program Status Word (PSW).

UNIT -II: (12 Hrs)

8086 Microprocessor:

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

UNIT- III: Programming (12Hrs)

Instruction set of 8085, Addressing modes of 8085, Assembly Language Programming using 8085, Programmes for Addition (8-Bit & 16-Bit), Subtraction (8-Bit & 16-Bit), Multiplication (8- Bit), Division (8- Bit), largest and smallest number in an array, BCD to ASCII and ASCII to BCD.

UNIT -IV: **Interfacing (12Hrs)**

I/O Interfaces: Serial Communication interface (8251 – USART), Programmable peripheral Interface (8255- PPI), Programmable Interval Timers (8253), Keyboard and display (8279), DMA controller (8237).

UNIT -V: (12Hrs) ARM PROCESSOR: Introduction to 16/32 bit processors, ARM architecture & organization, ARM based MCUs, Programming model, 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 SA Gibson
3. Microcontrollers Architecture Programming, Interfacing and System Design – Raj Kamal Chapter: 15.1, 15.2, 15.3, 15.4.1
4. 8086 and 8088 Microprocessor by Tribel and Avatar Singh

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 – New Age
4. The Intel Microprocessors – Architecture, Programming and Interfacing – Bary B. Brey.
5. Arm Architecture reference manual –Arm ltd.

ELECTRONICS LAB – IV
MICROPROCESSOR SYSTEMS

LAB LIST:

Programs using Intel 8085 /8086:

1. Addition and Subtraction (8 bit)
2. Addition and Subtraction (16-bit)
3. Multiplication and Division (8-bit)
4. Largest number in an array.
5. Smallest number in an array.
6. BCD to ASCII and ASCII to BCD.
7. Program to Convert Two BCD Numbers into Hex
8. Program to Convert Hex Number into BCD Number.
9. Program to Find the Square Root of A Given Number.
10. Interfacing Experiments Using 8086 Microprocessor (Demo):
    i) Traffic Light Controller
    ii) Elevator
    iii) 7-Segment Display

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BLUE PRINT

UNIT	Essay	Short
I	2	2
II	2	2
III	2	2
IV	2	1
V	2	1

MODEL PAPER

MICROPROCESSOR SYSTEMS

Paper code: R20ELE401 (W.E.F: 2021-22)

SUB: ELECTRONICS-IV **MARKS: 75**

PAPER CODE: R20ELE401 **TIME: 3HRS**

SECTION-A

ANSWER THE FOLLOWING QUESTIONS: (5 X 10= 50M)

1. a. Draw the architecture of 8085 micro Processor? Explain the function of each block.

(Or)

b. Draw and explain the pin configuration of 8085 microprocessor.

2. a. What is addressing mode? Explain different types of Addressing modes in 8086 microprocessor with one example?

(Or)

b. Draw the architecture of 8086 micro Processor? Explain the function of each block.

3. a. What is addressing mode? Explain different types of Addressing modes in 8085 microprocessor with one example.

(Or)

b. Explain briefly about the classification of Instruction set in 8085 Microprocessor.

4. a. Draw and explain 8255 PPI? Explain different modes of 8255 PPI.

(Or)

b. Draw and explain the Serial Communication interface of USART Intel 8251.

5.a. Draw and Explain the Architecture of ARM Processor.

(Or)

b. Discuss in brief the instruction set of ARM Processor.

SECTION-B

ANSWER ANY FIVE QUESTIONS: (5 X 5= 25M)

6. Discuss the register organization of 8085.
7. Explain briefly about PSW in 8085 MP.
8. Write the features of 8086 microprocessor.
9. Explain the instruction formats in 8086 Microprocessor.
10. Write an assembly language program for Addition of two -8 bit numbers.
11. Write an assembly language program for Multiplication of two -8 bit numbers.
12. Draw and explain the PIN configuration of DMA 8237.
13. Explain the features of ARM processor.

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Class:	Semester:	Title of The Paper:	Paper Code:	W.E.F
II B.Sc. MECS	**IV**	**MICRO CONTROLLER AND INTERFACING**	**R20ELE402**	**2021-22**

Total No of Hours for Teaching - Learning	Instructional Hours for Week		Duration of Semester End Examination in Hours	Max Marks		Credits
	Theory	Practical		CIA	SEE	
60 Hours	4	3	3 Hours	25	75	4

OBJECTIVES:

- To understand the concepts of microcontroller based system.
- To enable design and programming of microcontroller based system.
- To know about the interfacing Circuits.
- To have knowledge about the basic working of a microcontroller system and its programming in assembly language.
- To provide experience to integrate hardware and software for microcontroller applications systems.

OUTCOMES:

- The student can gain good knowledge on microcontrollers and implement in practical applications
- learn Interfacing of Microcontroller
- get familiar with real time operating system
- To acquire knowledge about microcontrollers embedded processors and their applications.
- Ability to understand the internal architecture and interfacing of different peripheral devices with Microcontrollers.
- Ability to write the programs for microcontroller.
- Ability to understand the role of embedded systems in industry.
- Ability to understand the design concept of embedded systems.

SEMESTER – IV

MICRO CONTROLLER AND INTERFACING

UNIT-I: **(10Hrs)**

Introduction: Comparison of Microprocessor and Micro controller, Evolution of microcontrollers from 4-bit to 32 bit, Overview and block diagram of 8051, Architecture of 8051, Development tools for micro controllers, Assembler – Compiler - Simulator / Debugger.

UNIT -II: (10Hrs)

Microcontroller organization: program counter and memory organization, Data types and directives, PSW register, Register banks and stack, pin diagram of 8051, Port organization, 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.

Unit -IV: (15Hrs)

Assemble language programming Examples: Addition, Multiplication, Subtraction, division, arranging a given set of numbers in largest / smallest order. Time delay generation and calculation, Timer/Counter Programming.

UNIT-V : (15Hrs)

Interfacing and Application of Microcontroller: Interfacing of – PPI 8255, DAC (0804), Temperature measurement (LM35), 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, cengage publishers
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

OUTCOMES:

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

ELECTRONICS LAB-V

MICROCONTROLLER LAB

LAB LIST:

1. Addition and Subtraction of Two 8-Bit Numbers.
2. Multiplication and Division of Two 8-Bit Numbers.
3. Largest number /smallest in an array.
4. Addition Of Two 8-Bit Numbers (Keil Software).
5. Addition Of Two 16-Bt Numbers (Keil Software).
6. Subtraction Of Two 8-Bit Numbers (Keil Software).
7. Subtraction Of Two 16-Bit Numbers (Keil Software).
8. Multiplication Of Two 8-Bit Numbers (Keil Software).
9. Interfacing Led To 8051 Microcontroller (Keil Software).
10. Interfacing Seven Segments To 8051 Microcontroller (Keil Software).

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BLUE PRINT

UNIT	Essay	Short
I	2	2
II	2	2
III	2	2
IV	2	1
V	2	1

MODEL PAPER

MICRO CONTROLLER AND INTERFACING

Paper code: R20ELE402 (W.E.F: 2021-22)

SUB: ELECTRONICS-V **PAPER CODE: R20ELE402**

TIME: 3HRS **MARKS: 75**

SECTION-A
ANSWER THE FOLLOWING QUESTIONS: (5 X 10= 50M)

1. a. Draw and explain the architecture of 8051 micro controller.

(Or)

b. Explain briefly about development tools in 8051 micro controller.

2. a. Explain briefly about data types and directives of 8051 MC.

(Or)

b. Draw the pin configuration of 8051 and explain each pin.

3. a. What are the Addressing modes of 8051 MC and explain each with one example.

(Or)

b. Explain briefly about Instruction set of 8051 MC and explain with one example.

4. a. Explain Timer/counter programming of 8051? Explain the Operation of mode selection of modes 0, 1, 2 and mode 3.

(Or)

b. Write an assembly language program for largest number in a given array.

5. a. Explain how it is interfacing of stepper motor with microcontroller and explain its operation and write a program for anti-clock wise direction.

(Or)

b. Describe the operation of LCD and explain how it is interfacing with microcontroller.

SECTION-B
ANSWER ANY FIVE QUESTIONS: (5 X 5= 25M)

6. Difference between Microprocessor and Microcontroller.
7. Write a short note on complier and assembler.
8. Discuss in detail about PSW register in 8051 MC.
9. Explain various types Register banks in 8051 MC.
10. Explain briefly about CALL instructions in 8051MC.
11. Mention any two examples of Direct addressing mode.
12. Write about functionality of each LCD pin and also write LCD command codes.
13. Write an assembly language program for Division of two -8 bit numbers.

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ISO-9001-2015 CERTIFIED INSTITUTION NAAC 'A' GRADE CPE NIRF 92ND RANK

KAKARAPARTI BHAVANARAYANA COLLEGE (AUTONOMOUS)

(Sponsored by S.K.P.V.V.Hindu High Schools' Committee)

Kothapeta, Vijayawada

(An Autonomous College in the Jurisdiction of Krishna University)

Class:	Semester:	Title of The Paper:	Paper Code:	W.E.F
III B.Sc. MECS	V/VI	INDUSTRIAL ELECTRONICS	CBELEA501/601	2022-23

Total No of Hours for Teaching - Learning	Instructional Hours for Week		Duration of Semester End Examination in Hours	Max Marks		Credits
	Theory	Practical		CIA	SEE	
60 Hours	3	3	3 Hours	25	75	05

OBJECTIVE

- Analyze the steady state and small signal AC response of simple electronic circuits containing diodes, transistors, and operational amplifiers
- Apply performance criteria in the design of basic amplifier circuits and verify that the criteria were met.
- Design and analyze circuits containing digital components and microprocessors.
- Analyze and evaluate performance parameters of AC and DC motors.

OUTCOMES

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

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

INDUSTRIAL ELECTRONICS

Syllabus:

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.

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

ELECTRONICS: LAB

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

INDUSTRIAL ELECTRONICS

SUBJECT CODE: R20ELEA501

TIME: 3 HOURS MAX.MARKS:75

W.E.F: 2022-23 PASS: 30

SECTION-A

I. Answer the following: 5X10=50M

1. a) Explain the operation &working of Full wave rectifier & derive its efficiency.

(Or)

b) Explain briefly about transistor series and shunt voltage regulators.

2 .a) Draw and explain the block diagram of Switch Mode Power Supply (SMPS).

(Or)

b) Draw and explain the block diagram of Regulated Power Supply (RPS).

3. a) Explain briefly about the working of Full wave voltage doubler.

(Or)

b) Explain briefly about the working of Full wave Voltage Tripler.

4. a) Draw and explain about circuit diagram and working of SCR Half wave rectifier circuit and mathematical analysis for resistive load.

(Or)

b) Draw and explain about circuit diagram and working of SCR Full wave rectifier circuit and mathematical analysis for resistive load.

5. a) Explain briefly about heat effects in Resistance & dielectric heating.

(Or)

b) Explain briefly about principle of operations in heat effects.

SECTION-B

II. Answer any FIVE of the following: 5X5=25M

6. Write a short note on three terminal regulators (78XX).
7. Explain briefly about L-section filter.
8. Write a short note on Power supplies.
9. Distinguish between RPS and SMPS.
10. Explain briefly about Half wave voltage doubler circuit.
11. Write a short note on applications of voltage multipliers.
12. Explain briefly about SCR as inverter by series circuits.
13. Write a short note on applications of Heat effects.

BLUE PRINT

UNIT	ESSAY	SHORTS
I	2	2
II	2	2
III	2	2
IV	2	1
V	2	1

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Class:	Semester:	Title of The Paper:	Paper Code:	W.E.F
III B.Sc. MECS	**V/VI**	**ELECTRONIC INSTRUMENTATION**	**R20ELEA502/602**	**2022-23**

Total No of Hours for Teaching - Learning	Instructional Hours for Week		Duration of Semester End Examination in Hours	Max Marks		Credits
	Theory	Practical		CIA	SEE	
60 Hours	3	3	3 Hours	25	75	05

OBJECTIVE

- The objective of the course is to introduce the fundamentals of Electronics Instruments and Measurement providing an in-depth understanding of Measurement errors,
- To measure Bridge measurements, Digital Storage Oscilloscope, Function Generator and Analyzer,
- To know about Display devices, Data acquisition systems and transducers.
- To address the underlying concepts and methods behind Electronics measurements

OUTCOMES

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

- Identify various facilities required to set up a basic Instrumentation Laboratory.
- Acquire a critical knowledge of various Electrical Instruments used in the Laboratory.
- Demonstrate skills of using instruments like CRO, Function Generator, Multimeter etc. through hands on experience.
- Understand the Principle and operation of different display devices used in the display systems and different transducers
- 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

ELECTRONIC INSTRUMENTATION

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.

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

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.

IV. 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 oxy-meter 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.

MODEL QUESTION PAPER

ELECTRONIC INSTRUMENTATION

SUBJECT CODE: R20ELEA502

TIME: 3 HOURS MAX.MARKS:75

W.E.F: 2022-23 PASS: 30

SECTION-A

I. Answer the following: 5X10=50M

1. a) Explain the Construction and working of an Analog Multimeter & Digital Multimeter.

(Or)

b) Explain about the block diagram of function generator.

2 .a) Draw and explain the block diagram of Cathode ray oscilloscope (CRO).

(Or)

b) Explain the measurement of voltage (AC and DC), frequency, phase difference by using CRO.

3. a) Explain briefly about the Classification of transducers .

(Or)

b) Explain briefly about LVDT, Piezoelectric transducer, Photo transducer.

4. a) Explain about Construction and Operation of LED Display.

(Or)

b) Explain about different types of SSD for Common Anode & Common Cathode types.

5. a) Explain briefly about Basic ideas of CT scan and MRI scan.

(Or)

b) Explain briefly about (i) ECG machine (ii) Radiography (iii) Clinical thermometer.

SECTION-B

II. Answer any FIVE of the following: 5X5=25M

6. Explain about Types of electronic Instruments .
7. Draw the block diagram of digital multi meter.
8. Write a short note on Electron Gun.
9. Explain about Different types of oscilloscopes and uses.
10. Explain briefly about Fibre optic sensors.
11. Explain briefly about Resistive and capacitive touch screen transducer.
12. Explain the Applications of LCD modules
13. Write a short note on Pulse oxymeter**.**

BLUE PRINT

UNIT	ESSAY	SHORTS
I	2	2
II	2	2
III	2	2
IV	2	1
V	2	1