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. IOT	**I**	**BASIC ELECTRICITY AND DEVICES**	**R20IOTELE101A**	**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	4	3	3 Hours	25	75	4

Objectives

1.To prepare the students to have a basic knowledge in the analysis of Electric Networks
2 .To solve the given circuit with various theorems and methods.
3 .To analyse the various three phase circuit's star and delta connections.
4. To distinguish between tie set and cut set methods for solving various circuits.
5 .To design various types of filters.
6. To relate various two port parameters and transform them.

Outcomes

1. Will able to articulate in working of various components of a circuit.
2.Will be familiar with ac and dc circuits solving.
3. Will be ready with the most important concepts like mesh and nodal analysis.
4. Ability to Solve Circuits using Tree, Node, Branch, Cutset, Tie Set Methods.
5. Ability to measure three phase voltages and current, active, reactive powers
6. Ability to convert Three phase Star to Three phase Delta circuits and Vice Versa.
7. Ability to Express given Electrical Circuit in terms of A,B,C,D and Z,Y Parameter Model and Solve the circuits.

SEMESTER-1

BASIC ELECTRICITY AND DEVICES

UNIT-1: SINUSOIDALALTERNATINGWAVEFORMS: (10Hrs)

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. Basic elements and phasorBasic Response of R, L &C elements,

UNIT-II:PASSIVENETWORKS(D.C) :(10hrs)

Kirchhoff'scurrentand VoltageLaw's - Branchcurrent Method, MeshAnalysis,NodalAnalysis,startodelta&deltatostarconversions, z-parameter, Y-parameters and h-parameters.

UNIT-III:NETWORK THEOREMS (D.C) (8hrs)

SuperpositionTheorem,Thevenin'sTheorem,Norton's Theorem,MaximumPower transfer theorem, Milliman'sand Reciprocity theorems

UNIT1V:PN-JUNCTIONDIODES&APPLICATIONS:(10Hrs)

P-N junction Diode, Depletion region, Working in Forward and Reverse bias condition–, varactordiode, Zenordiode and Tunnel diode and their V-I characteristics.- half wave rectifier,full wave rectifier-Working and their expressions for efficiency.

UNIT–V: BIPOLAR JUNCTION TRANSISTOR, FET AND MOSFETS (D.C) (10 hrs)

Introduction, Transistor Construction, Operation, and characteristics of CB, CE, and CC- Configurations-Current amplification- relation between α, β,√,Complete hybrid equivalent model , Transistor as a switch , Introduction, Construction, Operation and Characteristics of FET/JFET, Drain and Transfer characteristics, Depletion-type, and Enhancement-Type MOSFETs.

TEXTBOOKS:

1. IntroductorycircuitAnalysis(UBSPublications)----**RobertL.Boylestad.**
2. ElectronicDevicesandCircuitTheory---**RobertL.Boylestad&LouisNashelsky.**
3. CircuitAnalysisby **P.Gnanasivam-PearsonEducation**
4. ElectronicDevicesandCircuits–**T.L.Floyd-PHIFifthEdition**

REFERENCEBOOKS:

1. IntegratedElectronics–**Millmam&Halkias.**
2. ElectronicDevices& Circuits–**Bogart.**
3. SedhaR.S.,ATextBookOfAppliedElectronics,S.Chand&CompanyLtd

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ELECTRONICS	R20IOTELE101A	2022-23	IB.SC(IOT)

SEMESTER–I SYLLABUS PAPER-I

BASICELECTRICITYANDDEVICES

MARKS:60M TIME:3HOURS

SECTION-A

I)ANSWERANYFIVEQUESTIONS (5X4=20M)

1) WhatarethedifferencesbetweenACandDC?
2) Whatisalternatingcurrent?Howitdiffersfromdirectcurrent?
3) ExplainNodevoltage Analysisofsinglenetworkwithexample.
4) Explain About Z-parameters?
5) State and prove super position theorem.
6) Explain the working of NPN transistor.
7) Obtain relation between α,β,γ of a transistor configuration?
8) Explain the differences between BJT and FET.

SECTION-B

II) ANSWER THE FOLOWING QUESTIONS (5 X 8 =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) How do you to convert star to delta and delta to star conversions.

11.a) State and prove Maximum power transfer theorem and Reciprocity theorem.

(Or)

b) State and prove Thevenins and Norton's theorem?

12.a) What is P-N junction ? Explain the working and V-I characteristics of P-N junction diode?

(Or)

b) Draw the circuit diagram of Full wave rectifier and explain its operation. Discuss its efficiency and ripple factor?

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

(Or)

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. MEIOT	**II**	**ANALOG ELECTRONICS & DATA ACQUISITION**	**R20IOTELE201A**	**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	4	3	3 Hours	25	75	04

OBJECTIVE

- Design and Develop sensor output conditioning and measurement circuits for data acquisition system
- To make the student understand the basic concepts in the design of electronic circuit using linear integrated circuits and their applications. To introduces one special function ICs.
  OP-AMP.

OUTCOMES:

- .Design & Develop signal conditioning/sensing circuits for sensor interfaces
- .Test different data loggers for their features
- Understand the basic building blocks of linear integrated circuits and its characteristics.
- Analyse the linear- non-linear and specialized applications of operational amplifiers.
- Understand the theory of ADC and DAC.

ANALOG ELECTRONICS & DATA ACQUISITION

UNIT-I: Signal Conditioning: Amplification

Signal Amplifiers need and their applications -Transistor Biasing- Load line- configurations and applications – power Amplifier types (A- B- C...etc) and applications- RC-coupled amplifiers - Advantages and applications.

UNIT-II: Operational Amplifier circuits And Applications

Operational Amplifiers: Definition-Basic op-amp- op-amp parameters-Ideal op-amp-Block diagram of op-amp-Inverting-non -inverting - virtual ground -Adder-subtractor-summing amplifier-voltage follower--voltage to current convertor-integrator- differentiator-differential amplifier-Logarithmic amplifier.

Unit-III: Signal Conditioning

Noise-Filtering: Active filters –lowpass-highpass-bandpassfilter band rejection filter.

Isolation-Need of Isolation- different types of isolation -Capacitive- Inductive-optical galvanic and their applications. Protections: Over voltages- surges reverse input protections
Signal Conditioning: Attenuation: Attenuation – Need -methods and applications

Unit-iv: Signal Sensing:

Different sensing methods with their resolution/ range and accuracy considerations for sensors applications-Resistance Measurement circuits and their applications- Capacitance Measurement circuits and their applications- Inductance Measurement circuits and their applications.

Unit-V:Data Acquisition System:

Architecture-Single Channel Data Acquisition system- Multi-Channel Data Acquisition system.Applications of Data Acquisition system. Ana log-To-Digital Conversion (ADC), Successive approximation A/D Converter- Flash A/D converter- Digital- To-Ana log Conversion (D/A)-R-2R ladder Network.

Textbooks:

1. Electronic Devices and Circuits By S Salivahanan, N Suresh Kumar and Vallavaraj.
2. Electronic Devices and Circuits – J.Millman, C.C.Halkias, and Satyabratha Jit Tata McGraw Hill.
3. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall.
4. Operational Amplifiers & Linear IC's - David A Bell Oxford University Press.

Lab list:

1. To study fixed bias of a BJT.
2. OP-amp as an inverting amplifier-to calculate its gain.
3. OP-amp as a non-inverting amplifier-to calculate its gain.
4. Active filters-low and high pass filters.
5. Photo-transistor and its characteristics.
6. Generate a Ramp output waveform using DAC0800 (Inputs are given to DAC through IC74393 dual 4-bit binary counter).
7. To implement analog to digital converter(ADC).

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MODEL QUESTION PAPER

ANALOG ELECTRONICS & DATA ACQUISITION

Section -A

I.ANSWER ANY FIVE QUESTION 5X4=20M

1. What is the transistor biasing?
2. What is the signal amplification application?
3. Explain the working of inverting amplifier.
4. Explain the working of op-amp as a voltage follower.
5. What is the isolation and explain its needs.
6. What is the attenuation?
7. What are the different types of sensing methods?
8. Explain briefly about data acquisition.

SECTION-B

II. ANSWER ALLTHE QUESTION: 5X8=40M

9. (a) Explain working of class B and class –C amplifier discuss advantages and disadvantages .

OR

(b) Discuss the working of coupled amplifier and give a note on its advantages.

10. (a) Explain the block diagram of op-amp and its working.

OR

(b) Explain the op-amp as Summing amplifier and Subtractor.

11) (a) Describe attenuation . Describe about different types of isolation.

OR

(b) Discuss about low pass filter. Write a note on surges reverse input protection.

12. (a)Discuss about the inductor measurements circuits and their application.

OR

(b). Discuss about the resistance measurements circuits and their application.

13.(a) Explain the working of SAR method A/D converter .

(Or)

(b) Discuss the working of R-2R Ladder network for D/A Conversion.

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Class:	Semester:	Title of The Paper:	Paper Code:	W.E.F
II B.Sc. IOT	III	DIGITAL ELECTRONICS	R20IOTELE301	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

More broadly, they will be ready to handle substantial and challenging design problems. In particular, students will be able to:

- Explain the elements of digital system abstractions such as digital representations of information, digital logic, Boolean algebra, state elements and finite state machine (FSMs).
- Design simple digital systems based on these digital abstractions, using the "digital paradigm" including discrete sampledinformation.
- Use the "tools of the trade": basic instruments, devices and designtools.
- Work in a design team that can propose, design, successfully implement and report on a digital systemsproject.
- Communicate the purpose and results of a design project in written and oral presentations.

COURSE OUTCOMES

Student will be able to

- Describe how analog signals are used to represent digital values in different logic families, including characterization of the noisemargins.
- Create the appropriate truth table from a description of a combinational logic function.
- Create a gate-level implementation of a combinational logic function described by a truth table using and/or/inverter gates, MUX'S or ROMs, and analyse its timing behaviour.
- Create a state transition diagram from a description of a sequential logic function and then convert the diagram into an implementation of a finite-state machine with the appropriate combinational and sequentialcomponents.
- Describe the operation and timing constraints for latches andregisters.
- Draw a circuit diagram for a sequential logic circuit and analyse its timing properties (input setup and hold times, minimum clock period, output propagation delays).
- Evaluate combinational and sequential logic designs using various metrics: switching speed, throughput/latency, gate count and area, energy dissipation and power
- Properly incorporate synchronous and asynchronous memories into a circuit design.

DIGITAL ELECTRONICS

UNIT –I(9HRS)
NUMBER SYSTEM AND CODES:

Decimal, Binary, Hexadecimal, Octal BCD, Conversions, Complements (1's,2's, 9's and 10's), Addition, Subtraction, Grey, Excess-3, inter Code conversion between number system.

UNIT-II (12hrs)
BOOLEAN ALGEBRA AND THEOREMS:

Boolean Theorems, De Morgan's laws. Digital logic gates, Multilevel NAND &NOR gates. Standard representation of logic functions (SOP and POS), Minimization Techniques (Karnaugh Map Method: 4 variables), don't carecondition.

Unit-III (15hrs)
IC LOGIC FAMILIES:

Digital Logic Families: Characteristics of logic families – fan in, fan out, power dissipation, propagation delay, noise margin., DTL, ECL, RTL, TTL and CMOS logic circuits- Inverter, NAND , NOR. Bi- CMOS Inverter and its characteristics.

UNIT-IV (14hrs)
COMBINATIONAL DIGITAL CIRCUITS:

Adders: Half & full adder, Subtractor – Half and Full Subtractor, Parallel binary adder, Magnitude Comparator, Multiplexers (2:1, 4:1)) and De-multiplexers (1:2, 4:1) , Encoder (8- line-to-3-line) and Decoder (3-line-to-8-line).

UNIT-V (10hrs)
SEQUENTIAL DIGITAL CIRCUITS:

Flip -Flops: S-RFF,J-KFF,T and D type FFs , Master –Slave FFs ,Excitation tables , Registers: shift left register, shift rightregister,Counters-Asynchronous-Mod16, Mod-10, Mod-8, Downcounter,,Synchronous-4-bit&Ringcounter.

TEXTBOOKS:

1. M.MorrisMano, "Digital Design" 3rdEdition,PHI, New Delhi.
2. RonaldJ.Tocci."Digital Systems-Principles and Applications"6/e.PHI.New Delhi. 1999.(UNITSI to IV)
3. G.K.Kharate-Digital electronics-oxford university press
4. S.Salivahana&S.Arivazhagan- Digital circuits and design
5. Fundamentals of Digital Circuits by Anand Kumar

ReferenceBooks:

1. Herbert Tau band Donald Schilling. "Digital Integrated Electronics".McGraw-Hill. 1985.
2. S.K.Bose."DigitalSystems".2/e. New AgeInternational.1992.
3. D.K. Anvekarand B.S. Sonade. "Electronic Data Converters: Fundamentals& Applications".TMH.1994.
4. *Malvino and Leach."Digital Principles and Applications".T MG Hill Edition.*

MODEL PAPER
Paper-III: DIGITAL ELECTRONICS
SUB:ELECTRONICS(SEMESTER-III) MARKS: 75
PAPERCODE:R20IOTELE301 TIME:3H

SECTION-A

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

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

(OR)

b).Explain about Excess-3 code & BCD to Excess-3 code & Excess-3 code to BCD Conversions.

2. a)ExplainaboutNANDasUniversalgate(AND,OR,NOT,NOR,XORfromNAND).

(OR)

b)WriteaboutKarnaughMaps&Explainabout2,3,4 variableK-mapswith examples.

3.a) Design CMOS Logic circuits using NAND,NOR.

(OR)

b) Explain the operation of RTL, DTL, TTL and its characteristics.

4.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.

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

(OR)

b) Explain the working of Asynchronous Mod-16 Counter with diagram.

SECTION-B

II) ANSWER ANYFIVEQUESTIONS: (5 X 5=25M)

6. Explain about 9's and 10's Complements withexamples.
7. ExplainaboutBinaryadditionandBinarySubtractionwithexamples.
8. State and prove De-Morgan'stheorem.
9. Write a brief note on SOP and POS forms withexamples.
10. Write a brief note on Parallel BinaryAdder.
11. Explain about characteristics of digital logiccircuits.
12. Explain the working of D- flip flop with truthtable.
13. Explain 3 to 8decoder.

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Class:	Semester:	Title of The Paper:	Paper Code:	W.E.F
II B.Sc. MEIOT	**IV**	**INTRODUCTION TO MICROPROCESSOR AND MICROCONTROLLER**	**R20IOTELE401**	**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

OBJECTIVE

More broadly- they will be ready to handle substantial and challenging design problems. In particular- students will be able to:

- Acquire knowledge about Sensors and External peripherals interface to Microprocessors andmicrocontrollers.
- To have knowledge about the basic working of a microcontroller system and its programming in assemblylanguage**.**

Course Outcomes

After learning the course the students should be able to:

- Apply the concept of buses, microprocessor architecture andinterrupts.
- Interface memory and I/O deviceswith8bitmicroprocessor/microcontroller
- Describe 8 bit microcontroller architecture-of MCS -51families
- Program assembly language programming/ C programming of8051
- Design microcontroller based smallsystem

INTRODUCTION TO MICROPROCESSOR AND MICROCONTROLLER

UNIT-1: INTRODUCTION OF MICROPROCESSOR

Microprocessor Based Systems: Digital Computer, Microprocessor, Microcomputer, Van Neumann and Harvard Architecture, CISC and RISCProcessors-8085 Microprocessor: Introduction to Microprocessor- INTEL -8085Microprocessor- Architecture- CPU- ALU unit- Register organization- Address- data and control Buses. Pin -configuration of8085-Instruction set of 8085.Addressing modes- Instructions cycle-Machine cycle- Fetch and execute cycles- Instruction and data formats- -Assembly language programming.

UNIT-2: MICROCONTROLLER-8051 (15 HOURS)

Difference between microprocessor and microcontroller, Introduction to microcontroller- Advantages & its Applications of microcontroller- MCS -51 Family microcontrollers-Architectural block Diagram, Pin diagram and Pin Functions General Purpose and Special Function Registers- Oscillator and clock circuit- Reset circuit, I/O Port circuits, Memory organization, Internal program and data memory.

UNIT-3: 8051 ASSEMBLY LANGUAGE PROGRAMMING

Introduction to Program Development Tools (IDE): Concept of IDE, Editor, Assembler, Compiler, Linker, Simulator, Debugger and assembler directives.

8051 Assembly language programming: Programming model of 8051, Addressing modes, data transfer instructions, I/O Port programming, Arithmetic and Logical instructions, Bit level instructions, branching instructions (Jump and loop Jump and call), Concept of stack, subroutine and relatedinstructions.

UNIT4: 8051 PROGRAMMING IN C

8051 Programming in C:Data types in 8051 C, programming for time delay, I/O programming in 8051 C, Logic operations in 8051 C, Control statements and loops in embedded C, Functions and Arrays in embedded C, Data conversion programs in 8051 C, , Accessing code ROM space using 8051 C, Data serialization using 8051 C.
External Memory Interfacing: Memory address decoding, interfacing 8031/8051 with ROM/EPROM and Data ROM.

8**051 Timer/Counter and Programming**: Use of counter as timer, Timer/Counters and associated registers, Various modes of timer/counter operations, Time delay programs in Embedded C
8051 Serial Port and Programming: Basics of serial communication, RS232 standards, 8051 connection to RS232, Serial data input/output and associated registers, Various modes of serial data communication, serial data communication programs in EmbeddedC.

UNIT: 5 INTERFACING

8051 Interrupts: Concept of Interrupt, interrupt versus polling, Types of interrupts in 8051, Reset, interrupt control and associated registers, interrupt vectors, Interrupt execution, RETI instruction, software generated interrupt, interrupt handler subroutine for timer/counter and serial data transmission/reception in EmbeddedC
Interfacing: Interfacing of LEDs, 7 Segment display device, LCD display, DIP Switches, Push Button switches, Key denounce techniques, Keyboard connections load per key and matrix form, Interfacing A/D converter, D/A converter, Relay, opto isolator stepper motor and DC motor.

Text books:

1. Microprocessor Architecture, Programming, and Applications with the 8085, By Romesh Gaonkar,

Penram International Publishing (India) LTD.
2. The 8051 Microcontroller and Embedded Systems Using Assembly and C, 2/e by MuhammadAli
Mazidi, Janice GillispieMazidi and RolinMcKinlay(Second Edition , Pearson Education)
3. The8051Microcontroller&EmbeddedSystemsusingAssemblyandCByK.J.Ayala,
D. V.
Gadre (Cengage Learning , India Edition).
4. Using the MCS-51 Microcontrollers By Han Way Huang Oxford UniPress
5. Programming and Customizing the 8051 Microcontroller by MykePredko Tata Mcgraw Hill.

LIST OF EXPERIMENTS:

1. Introduction to IDE and Assemblerdirectives.
2. 8051 Assembly language programming for addition, subtraction, multiplication and division oftwo
8-bit numbers.
3. 8051 Assembly language programming for block data transfer between internal and external
memory including overlapping blocks.
4. 8051 Assembly language programming using Arithmeticinstructions
5. 8051 Assembly language programming using Logical Instructions
6. 8051 Assembly language programming for code conversions
7. 8051 Assembly language programming for Timers in differentmodes.
8. I/O port programming in embeddedC.
9. Timers and Counters programming in embedded C for time delay and frequency measurementusing ISRs.
10. Digital clock programming using 7- segment display in embeddedC.
11. Programming of LCD in embeddedC.
12. Programming of keyboard in embeddedC.
13. Serial communication and UART programming in EmbeddedC.
14. Programming of parallel ADC and DAC in embeddedC.
15. Interfacing Stepper Motor.
16. Speed Control of DC motor using PWM Technique andMicrocontroller
17. Designing of SCR firing Circuit for D. C. Converter usingMicrocontroller
18. Interfacing Relay and opto isolators using Microcontroller

MODEL PAPER

Paper-IV: INTRODUCTION TO MICROPROCESSOR AND MICROCONTROLLER

SUB:ELECTRONICS(SEMESTER-IV) **MARKS:75**

PAPERCODE: R20IOTELE401 **TIME:3H**

SECTION-A

ANSWER THEFOLLOWINGQUESTIONS: **(5X10=50M)**

1. A) Draw the architecture of 8085 Micro-Processor. Explain the function of eachblock.

(OR)

B) Discuss the Instruction set of 8085 Microprocessor.

2. a) Draw and explain pin diagram of 8051microcontroller.

(OR)

b) Explain Memory Organization of 8051 with circuit diagrams

3. a) What are the addressing modes of 8051 microcontroller? Explain each with oneexample

(OR)

b) Explain data transfer, Arithmetic, logical, branch and bit level instructions.

4. a) Explain briefly about Timer/Counter programming in8051.

(OR)

b) Explain briefly about Serial communication mode programming in 8051.

5. a) What is the interrupt? Explain briefly about external and internal interrupts in8051.

(OR)

b) Explain how to interface LCD with 8051microcontroller and write command codes for LCD.

SECTION-B

ANSWER ANYFIVEQUESTIONS: **(5 X 5=25M)**

6. Difference between RICS andCICS.
7. Write a program on addition of two 8-bitnumbers.
8. Differences between Microprocessor andMicrocontroller.
9. What are the applications of8051?
10. Explain Concept ofIDE.
11. Explain different data types in embeddedc.
12. Write a program on LED blinking using8051
13. Write a program on DC motor using8051

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Class:	Semester:	Title of The Paper:	Paper Code:	W.E.F
II B.Sc. MEIOT	**IV**	**INTRODUCTION TO ARM MICROCONTROLLER**	**R20IOTELE402**	**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**	**04**

Course Objectives:

1. To provide an overview of Design Principles of EmbeddedSystem.
2. To provide clear understanding about the role of firmware, operating systems in correlation with hardwaresystems.

Course Outcomes:

1. Expected to understand the selection procedure of Processors in the embeddeddomain.
2. Design Procedure for EmbeddedFirmware.
3. ExpectedtovisualizetheroleofRealtimeOperatingSystemsinEmbeddedSystems
4. ExpectedtoevaluatetheCorrelationbetweentasksynchronizationandlatencyissues

INTRODUCTION TO ARM MICROCONTROLLER

Unit – I: ARM7MicrocontrollerArchitecture 12HRS

Introduction to the ARM Microcontrollers –LPC2148 ARM 7 Microcontroller – FeaturesofLPC2148–BlockDiagramofLPC2148–PinDiagramofLPC2148–Architectural Overview – On-Chip Flash Program Memory – On-Chip Static RAM.

Unit – II: System Control- Memory Map- Pin ConnectBlock-GPIO 12HRS

External Interrupt Input – Memory Mapping Control – Power Control- VPB – Memory Map – Pin Connect Block – General Purpose I/O Features.

Unit – III: Timer- Interrupt andSerialCommunication 12HRS

General Purpose Timer – External Event Counters: Features – Interfacing Timer and CounterOperation–InterruptsontheARM7–InterruptSources–ExternalInterrupt–UART s Features – Serial Communication – RS 232 – RS485.

Unit – IV: I^2C- SPI- PWM- Watchdog Timer and MemoryCardInterfacing 12 HRS

I^2C Bus Serial I/O Controller – Interfacing With AT24C1024 – SPI Port Operation – Interfacing with 25LC040– Real Time Clock – SD Memory Card Basics – SPI Memory Card Operation in SPI Mode - LPC 2148 Interfacing withSD Memory Card.

Unit – V: Interfacing Digital InputandOutput 12 HRS

Interfacing LEDs and Switches – Interfacing Keypads – Interfacing Seven Segment Display – Interfacing LCD –Interfacing Temperature Sensor LM35 – 10bit DAC Features - Interfacing DAC – PWM Audio.

Text and Reference Books:

1. Steve Furber- ARM System-on-Chip Architecture- Second Edition-Pearson-2012.
2. Wayne Wolf- Computer as Components: Priciples of Embedded Computing System Design- Third Edition-Morgan KaufmannPublication.
3. J.R.Gibson- ARM Assembly Language- Second Edition- CengageLearning
4. Trevor Martin- Hitex- ARM7-Based Microcontrollers-The Insider's Guide To The Philips.
5. Warwick A.Smith- ARM Microcontroller Interfacing Hardware and Software- Elektor (www.elecktor.com)

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MODEL PAPER

Paper-V: INTRODUCTION TO ARM MICROCONTROLLER

SUB: ELECTRONICS(SEMESTER-IV) **MARKS: 75**

PAPERCODE:R20IOTELE402 **TIME:3H**

SECTION-A

ANSWER THEFOLLOWING QUESTIONS:(5X10=50M)

1. A) Draw and explain the architecture ofLPC2148.
   (OR)
   B) Draw and explain the pin diagram of LPC2148.

2. A) Whatis the Interrupt? Explain the different types of Interrupt inLPC2148.
   (OR)
   B) Explain memory mapping concept in LPC2148.

3. A) Whatis the serial communication? Explain RS 232 inLPC2148.
   (OR)
   B) Explain UART in detail.

4. A) Interfacing with AT24C1024 using I^2CBus.
   (OR)
   B). Explain how LPC 2148 Interfacing with SD Memory Card.

5. A) Explain how LM35with LPC2148
   (Or)
   B) Explain how Interfacing DAC with LPC2148.

SECTION-B

ANSWER ANYFIVEQUESTIONS: **(5 X 5=25M)**

6. Explain the Applications of ARMProcessor.
7. Explain On-Chip StaticRAM.
8. Explain Features of General Purpose I/O inLPC2148.
9. ExplainPLL
10. What is theUSB?
11. What is the importance of timeinterrupts?
12. Explain watchdogtimer.
13. Explain interfacing ofLED.

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KAKARAPARTI BHAVANARAYANA COLLEGE (AUTONOMOUS)

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Kothapeta, Vijayawada

(An Autonomous College in the Jurisdiction of Krishna University)

Programme	Semester:	Title Of The Course	Paper Course	W.E.F
III B.Sc. MEIoT	**V**	**Robotics And Its Applications**	**R20IOTA501**	**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	
45 Hours	3	3	90 Hours	25	75	05

Course Objectives:

1. To introduce basic concepts, parts of robots and types of robots.
2. To make the students familiar with various drive systems of robots, sensors and their applications in programming of robots.
3. To discuss the applications of robots, and implementations of robots.

Course Outcome:

1. Explain the basic concepts of working of robot
2. Analyses the function of sensor in robot and design the robotic arm with various tools
3. Program the robot for a typical application and path planning using robotic vision
4. Understand the various robot programming languages
5. Conduct and design the experiments for various robot operations
6. Use the advanced techniques for robot processing
7. Advanced techniques for robot processing

ROBOTICS AND ITS APPLICATION

UNIT-1:

Introduction, brief history, types, classification and usage, science and technology of robots, Artificial Intelligence in Robotics.

UNIT-2:

Elements of Robots-Joints, Links, Actuators, and Sensors Representation of joints, link representation using D-H parameters, Examples of D-H parameters and link transforms, different kind of actuators, stepper-DC-servo-and brushless motors- model of a DC servo motor-types of transmissions-purpose of sensor-internal and external sensor-common sensors-encoders-tachometers-strain gauge-based force torque sensor-proximity and distance measuring sensors-and vision

UNIT-3

End Effectors Classification of end effectors-tools as end effectors-drive system for grippers-mechanical adhesive- vacuum magnetic-grippers-hooks and scoops-gripper force analysis-and gripper design active and passive grippers

UNIT-4

Planning and Navigation Introduction, path planning-overview-road map path planning-cell decomposition path planning potential field path planning-obstacle avoidance-case studies

Vision system Robotic vision systems-image representation-object recognition-and categorization-depth measurement- image data compression-visual inspection-software considerations

UNIT-5

Robot Programming Introduction to robot languages-VAL-RAPID-language-basic commands-motion instructions pick and place operation using industrial robot manual mode-automatic mode-subroutine command-based programming-move master command language-introduction-syntax-simple problems

Field and service robots / Industrial Robots Ariel robots-collision avoidance robots for agriculture-mining-exploration-underwater-civilian and military applications ect,.

Reference books,

- INTRODUCTION TO ROBOTICS: S Saha
- 123 Robotics Experiments for the Evil Genius
- Introduction to Autonomous Mobile Robots 2e (Intelligent Robotics & Autonomous Agents Series)
- Robotics Appuu K.K. Kuttan
- Introduction To Robotics : Analysis, Control, Applications (English) 2nd Editio

COURSE 6A: ROBOTICS AND ITS APPLICATIONS

PRACTICAL SYLLABUS *(30 HRS. MAX MARKS: 50)*

1. DC MOTOR INTERFACING WITH LPC2148
2. STEPPER MOTOR INTERFACING WITH LPC2148
3. ULTRASONIC INTERFACING WITH ARDUNIO UNO
4. LDR (LIGHT DEPENDENT RESISTOR) INTERFACING WITH LPC2148
5. IP INTERFACING WITH LPC2148
6. IR INTERFACING WITH LPC2148 AND MAKE A UP COUNTERS USING SEVEN SEGMENT

MODEL PAPER

Paper-6A: ROBOTICS AND ITS APPLICATION

SUB: IOT (SEMESTER-V) MARKS: 75
COURSE CODE: R20IOTA501 **TIME: 3H**

SECTION-A

ANSWER THE FOLLOWING QUESTIONS: **(5X10=50M)**

1. A) What is the robot? Classification of robots
(OR)
B) Explain Artificial Intelligence in Robotics.

2. A) Explain Elements of Robots
(OR)
B) What is the sensor and Explain proximity and distance measuring sensors

3. A) Classification of end effectors.
(OR)

B) Explain gripper design active and passive grippers

4. A) What is the road map path planning?
(OR)
B) Explain Robotic vision systems

5. A) What are the Field robots?
(Or)
B) Explain how robot uses in agriculture systems.

SECTION-B

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

6. What is the robot and applications of robots?
7. Explain history of robots?
8. What are the tachometers?
9. Explain DC servo motor-types
10. Explain drive system for grippers
11. Explain Planning and Navigation in robots.
12. What are the software considerations?
13. Explain civilian robots.

BLUEPRINT:

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

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KAKARAPARTI BHAVANARAYANA COLLEGE (AUTONOMOUS)

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Kothapeta- Vijayawada
(An Autonomous College in the Jurisdiction of Krishna University)

PROGRAMME	SEMESTER	TITLE OF THE COURSE	COURSE CODE	W.E.F
III.BSc (MEIoT)	**V**	**IOT Sensors & Communication protocols**	**R20IOTA502**	**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	
45 HOURS	3	3	90 Hours	25	75	05

OBJECTIVE

- Acquire the knowledge on types of sensors/transducers, working principles, selection Procedure, applications of sensing systems.
- Acquire knowledge about transferring data into cloud using various Wired/Wireless Communication technologies.

OUTCOMES:

- Select a sensor/sensing systems for a requirement.
- Able to test, install and collect the data from a group of sensors.
- Able to derive sensor based solution for different applications.
- Able to develop sensor networks
- Able to communicate data via Wired/Wireless communication
- Configure and test communication technologies

IOT Sensors & Communication protocols

UNIT-I: Introduction to Communication and Networking

Communications, Signal Types and its characteristics (Analog/Digital), Data Transmission Types (Serial/Parallel), Communication Techniques (Asynchronous, Synchronous), Data Transmission Modes (Simplex, Half/Full Duplex)

UNIT: 2:

Wired Communication Protocols**:** UART (RS485, RS232), I2C SPI, CAN, SSP With examples. Wireless Communication Protocols: Zigbee, Bluetooth, Wi-Fi, GPRS, GSM, NFC, IR, Satellite Communication. Advantages, Disadvantages and its applications.

UNIT: 3

Temperature Sensors: Thermo resistive, Resistance Temperature Detectors, SiliconResistive, Thermistors, Semiconductor.

Humidity and Moisture Sensors: Capacitive, Electrical Conductivity, Thermal Conductivity.

Unit:4

Pressure and Force Sensors: Mercury Pressure, Bellows, Membranes, and Thin Plates, Piezo resistive, Capacitive, Optoelectronic, Vacuum, Strain Gauges, Piezoelectric Force
Occupancy and Motion Detectors: Ultrasonic, Visible and Near-Infrared Light , Far-Infrared Motion ,PIR Motion.

Unit-5

Velocity and Acceleration Sensors: Capacitive Accelerometers, Piezoresistive Accelerometers, Thermal Accelerometers, Heated-Plate Accelerometer, Heated-Gas Accelerometer, Gyroscopes,
Flow Sensors: Pressure Gradient Technique, Thermal Transport, Ultrasonic, Electromagnetic, and Micro Flow.

Textbooks:

1. Introduction to data communication and networking by Wayne Tomasi
2. Introduction to data communication and networking by Behrouz Forouzan
3. Basics of data communications byWilliam Stallings
4. Basics of computer networking byThomas Robertazzi
5. Handbook of Modern Sensors , physics, design and applications – JacobFraden
6. Sensor Technology Handbook, John S.Wilson
7. Transducers & Instrumentation- DVS Murthy, IIEdition
8. Instrumentation devices & systems - Rangan, Mani,Sharma

MODEL PAPER
Paper7A -: IOT Sensors & Communication protocols

SUB: IOT (SEMESTER-V) **MARKS: 75**
COURSE CODE: R20IOT502 **TIME: 3H**

SECTION-A

ANSWER THE FOLLOWING QUESTIONS: (5X10=50M)

1. A) What is the communication? Explain type of communication with examples.
(OR)
B) Explain Data Transmission Modes with examples.

2. A) Explain i2c communication protocol
(OR)
B) Explain Bluetooth communication protocol

3. A) What is the thermal conductivity? Explain the working of thermocouple.
(OR)
B) What is the humidity? Explain capacitive type of humidity sensors.

4. A) What is Strain? Explain working of Strain Gauge sensor.
(OR)
B) Explain PIR motion sensor with one real time example.

5. A) What is acceleration? Explain capacitive type accelerometer
(Or)
B) What is the flow sensor? Explain working of Ultrasonic flow sensor.

SECTION-B

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

6. Communication data transmission types.
7. What is the Asynchronous and Synchronous?
8. What is the SPI PROTOCOL?
9. What are advantage and disadvantages of wire communication?
10. What is difference between temperature and humidity?
11. What are the applications of Moisture Sensors?
12. What is NFC Communication?
13. What are Pressure Gradient Technique of flow sensors

Lab List

1. UART interfacing with LPC1768.
2. I^2C interfacing with LPC1768.
3. SPI interfacing with LPC1768.
4. CAN interfacing with LPC1768.
5. Bluetooth interfacing with LPC1768.
6. Zigbee interfacing with LPC1768.
7. LM35 sensor interfacing with LPC1768.
8. Moisture Sensors interfacing with LPC1768.
9. PIR motion interfacing with LPC1768.
10. IR interfacing with LPC1768.
11. Flow interfacing with LPC1768.

BLUEPRINT:

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

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KAKARAPARTI BHAVANARAYANA COLLEGE (AUTONOMOUS)

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Programme	Semester:	Title Of The Course	Paper Course	W.E.F
III B.Sc. MEIoT	**V**	**Embedded Systems Design With Stm-32**	**R20ELEA501**	**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	
45 Hours	3	3	90 Hours	25	75	05

COURSE OBJECTIVES:

For embedded systems, the course will enable the students to:

1. Understand the basics of an embedded system.
2. Understand the typical components of an embedded system.
3. To understand different communication interfaces.
4. To learn the design process of embedded system applications.
5. To understands the RTOS and inter-process communication.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

1. Understand the design process of an embedded system.
2. Understand typical embedded System & its components.
3. Understand embedded firmware design approaches.
4. Learn the basics of OS and RTOS.

EMBEDDED SYSTEMS DESIGN with STM-32

UNIT-I :INTRODUCTION TO EMBEDDED SYSTEMS

History of embedded systems, Classification of embedded systems based on generation and complexity, Purpose of embedded systems, The embedded system design process-requirements, specification, architecture design, designing hardware and software, components, system integration, Applications of embedded systems, and characteristics of embedded systems.

UNIT-II: TYPICAL EMBEDDED SYSTEM

Core of the embedded system-general purpose and domain specific processors, ASICs, PLDs, COTs; Memory-ROM, RAM, memory according to the type of interface, memory shadowing, memory selection for embedded systems, Sensors, actuators, I/O components: seven segment LED, relay, piezo buzzer, push button switch, other sub-systems: reset circuit, brownout protection circuit, oscillator circuit real time clock, watch dog timer.

UNIT-III: EMBEDDED FIRMWARE DESIGN AND DEVELOPMENT

Embedded firmware design approaches-super loop based approach, operating system based approach;embedded firmware development languages-assembly language based development, high level language based development.

UNIT-IV: RTOS BASED EMBEDDED SYSTEM DESIGN

Operating system basics, types of operating systems, tasks, process and threads, multiprocessing and multitasking, task scheduling: non-pre-emptive and pre-emptive scheduling; task communication- RTOS-Device Drivers.

UNIT -V: STM32F4 PERIPHERALS & PROGRAMING

STM32F4 PERIPHERALS & PROGRAMING GPIO, General Purpose Timers, GPIO: Introduction,Main Features, Function Description, Registers, Basic timers (TIM6&TIM7): introduction, mainfeatures, functional description, registers Embedded C Programming for GPIO and Timers- STM32 TIMERS, ADC Timers Basics, General Purpose Timer, Sys-Tick Timer, ADC Basics, Initialization,

TEXT BOOKS:

1. Introduction to Embedded Systems - shibu k v, Mc Graw Hill Education.
2. Computers as Components –Wayne Wolf, Morgan Kaufmann (second edition).
3.Shibu K V, ―Introduction to Embedded Systems‖, Tata McGraw Hill Education Private Limited,2nd Edition
4.Noviello, Carmine. "Mastering STM32." Obtenido de http://www2. keil. com/mdk5/uvision,2017.

REFERENCE BOOKS:

1. Embedded System Design -frank vahid, tony grivargis, john Wiley.
2. Embedded Systems- An integrated approach - Lyla b das, Pearson education 2012.
3. Embedded Systems – Raj Kamal, TMH
STM32F10xx User Manual

COURSE 6A: EMBEDDED SYSTEMS DESIGN WITH STM-32

PRACTICAL SYLLABUS ***(30 HRS. MAX MARKS: 50)***

1. SWITCH AND LED INTERFACING WITH STM32
2. LED BLINKING USING RTOS WITH STM32
3. INTERFACE EXTERNAL INTERRUPT WITH STM32
4. MQ135 INTERFACING WITH STM32
5. TIMER INTERFACING WITH STM32
6. UART INTERFACING WITH STM32 (CONTROL A LED USING BLUETOOTH APP)

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QUESTION PAPER

EMBEDDED SYSTEMS DESIGN WITH STM32

Section-A

I. Answer all the questions **5X10=50M**

1.a) What is embedded system. Explain the classification of embedded systems.

(Or)

b. Explain briefly about design process of embedded system.

2. a) Explain and design the core of embedded system.

(Or)

b) Explain the I/O sub system devices in embedded system.

3. a. Explain the design approaches of Embedded firmware.

(Or)

b. Explain the development languages of embedded firmware.

4. a) What is operating system? Explain the different types of operating systems.

(Or)

b. Explain in detail about non-pre-emptive and pre-emptive scheduling.

5. a) Explain interfacing of LED using STM32..

(Or)

b)) Explain interfacing of ADC using STM32.

SECTION-B

II. Answer any five of the following questions **5X5=25M**

1. What is embedded system and explain the applications of embedded systems.
2. Explain the characteristics of embedded systems.
3. Distinguish between RISC and CISC processors.
4. Explain about memory selection for embedded systems.
5. Explain briefly about OS Based Approach in Embedded system.
6. Explain in detail about RTOS.
7. Explain GPIO in STM32
8. Explain timer in STM32

BLUEPRINT:

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

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PROGRAMME	SEMESTER	TITLE OF THE COURSE	COURSE CODE	W.E.F
III.BSc (MEIoT)	V	INTRODUCTION TO ARDUINO PROGRAMMING	R20ELEA502	2022-23

Total No of Hours for Teaching - Learning	Instructional Hours for Week		Duration of Semester End Examination in Hours	Max Marks		Credits
45 HOURS	Theory	Practical	90 Hours	CIA	SEE	05
	3	3		25	75	

OBJECTIVE:

This Course focuses on hands-on IoT concepts such as sensing, actuation and communication. It covers the development of Internet of Things (IoT) prototypes—including devices for sensing, actuation, processing, and communication—to help you develop skills and experiences. The Internet of Things (IOT) is the next wave, world is going to witness.
Today we live in an Area of connected devices the future is of connected things.

Outcomes:
After the completion of the course, the students will be able design some IOT based prototypes.

INTRODUCTION TO ARDUINO PROGRAMMIN

Unit 1

Getting Started with Arduino

Introduction to Arduino -Pin configuration and architecture. - Device and platform features. - Concept of digital and analogports.-Familiarizing with Arduino Interfacing Board- Introduction to Embedded C and Arduino platform-Arduino Uno Architecture-Setup the IDE, Writing Arduino Software-Arduino Libraries-Basics of Embedded C programming for Arduino

Unit 2

Review of Basic Concepts

Arduino data types- Variables- - constants- Operators -Control Statements- Arrays- Functions pointers.

Arduino i/o Functions

Pins Configured as INPUT- Pull-up Resistors - Pins Configured as OUTPUT -pin Mode () Function- digital Write () Function- analog Read () function -Arduino Interrupts

Arduino Time

Incorporating Arduino time -delay () function -delay Microseconds () function -Millis () function micros () function.

Unit 3

Sensor &Actuators with Arduino

Overview of Sensors working- Analog and Digital Sensors- Interfacing of Temperature, Humidity, Motion, Light and Gas Sensor with Arduino-Interfacing of Actuators with Arduino. - Interfacing of Relay Switch and Servo Motor with Arduino.

Arduino Displays.

Working with Serial Monitor -Line graph via serial monitor -Interfacing a 8 bit LCD to Arduino Fixed one line static message display. - Running message display. -Using the LCD Library of Arduino.

Arduino Communications

Parallel Communication -Serial Communication Modules- Types of Serial Communications Arduino UART - GSM/GPRS- Arduino Interfacing

Unit 4

Basic Networking with ESP8266 Wi-Fi module

Basics of Wireless Networking-Introduction to ESP8266 Wi-Fi Modul- Various Wi-Fi library- Web server- introduction, installation, configuration- Posting sensor(s) data to web server- **IoT Protocols**- M2M vs. IOT- Communication Protocols.

Unit5

Cloud Platforms for IOT

Virtualization concepts and Cloud Architecture- Cloud computing, benefits - Cloud services -- SaaS, PaaS, IaaS-Cloud providers & offerings- Study of IOT Cloud platforms- Thing Speak API and MQTT- Interfacing ESP8266 with Web serve.

Reference books

- **Programming Arduino: Getting Started with Sketches, Second Edition. ...**
- **Exploring Arduino: Tools and Techniques for Engineering Wizardry. ...**
- **Arduino For Dummies. ...**
- **Getting Started with Arduino: The Open-Source Electronics Prototyping Platform.**

MODEL PAPER

Paper7A -: INTRODUCTION TO ARDUINO PROGRAMMING

SUB: ELECTRONIC (SEMESTER-V) ***MARKS: 75***
COURSE CODE: R20ELE502 **TIME: 3H**

SECTION-A

ANSWER THE FOLLOWING QUESTIONS: (5X10=50M)

1. A) Draw and explain the Arduino pin configuration.
(OR)
B) Draw and explain the Arduino architecture.

2. A) Explain Arduino data types.
(OR)
B) Explain Arduino I/O Functions.

3. A). what is the sensor &Actuators? Explain two sensors and actuators.
(OR)

B) what is the LCD explain it.

4. A) Explain ESP8266 Wi-Fi Module.
(OR)
B) Explain M2M IoT protocol.

5. A) Explain short note on MQTT protocol.
(Or)
B) Explain Cloud Architecture.

SECTION-B

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

6. What are the embedded systems?
7. What are the Arduino applications?
8. Write a short note on temperature sensor.
9. Explain serial monitor.
10. Explain read and write functions.
11. Explain Arduino Variables
12. What is the communication. Explain wired and wireless communications.
13. What is the SaaS, PaaS.

INTRODUCTION TO ARDUINO PROGRAMMING

Lab List

1. Interface LM35 (temperature sensor) with Arduino UNO
   - To control DC motor and RGB led based on different temperature levels
2. Interface HCSR04 (Ultrasonic sensor) with Arduino UNO
   - To measure the distance in centimetres (cm), inches.
   - To build an application with leds as the distance varies, various leds should be controlled
3. Interface LCD using Arduino UNO
   - Print temperature (from LM35) and height (from hcsr04) on the display
4. Interface servo motor with Arduino UNO
   - To control servo motor based on temperature levels using lm35
5. Interface Bluetooth module (HC05) with Arduino UNO
   - On and off the led using button component
   - Control brightness of led or speed of the motor using slider component
6. Control LEDs with webpage using ESP8266 (station mode)
7. Control LED with webserver using ESP8266 (access point mode)
8. LM35 interfacing with ESP8266 and uploading temperature data into Thing speak cloud
9. Control LED with ESP8266 using Blynk.

BLUEPRINT:

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