

**GULBARGA UNIVERSITY,
KALABURAGI**

**Model Curriculum
of
BSc Honours
in
Electronics
III and IV Semesters**

A handwritten signature in green ink, which appears to read "R. Raibagkar", is written over the printed name and title of the author.

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GULBARGA UNIVERSITY, KALABURAGI

Curriculum

Program Name	BSc in Electronics	Semester	Third Semester
Course Title	Programming in C and Digital Design using Verilog (Theory)		
Course Code:	ELE CT3.1	No. of Credits	4
Contact hours	60 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60


Course Objectives: After the successful completion of the course, the student will be able to:

- The ability to code and simulate any digital function in Verilog HDL.
- Know the difference between synthesizable and non-synthesizable code.
- Understand library modelling, behavioural code and the differences between simulator algorithms and logic verification using Verilog simulation.
- Learn good coding techniques required for current industrial practices.
- Gain the knowledge of programming the system using C programming language.

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

- CO1. Apply the acquired knowledge of digital circuits in different levels of modelling using Verilog HDL.
- CO2. Apply the acquired knowledge of digital circuits in different levels of modelling using Verilog HDL.
- CO3. Design and verify the functionality of digital circuit/system using test benches.
- CO4. Develop the programs more effectively using directives, Verilog tasks and constructs.
- CO5. Design and analyse algorithms for solving simple problems.
- CO6. Write and execute and debug C codes for solving problems.

Contents	60Hrs
Unit-1:	15 Hrs
<p>C Programming: Introduction, Importance of C, Character set, Tokens, keywords, identifier, constants, basic data types, variables: declaration & assigning values. Structure of C program</p> <p>Arithmetic operators, relational operators, logical operators, assignment operators, increment and decrement operators, conditional operators, bitwise operators, expressions and evaluation of expressions, type cast operator, implicit conversions, precedence of operators.</p>	


 Page 1
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Arrays: Basics of arrays, declaration, accessing elements, storing elements, two-dimensional and multi-dimensional arrays. Input output statement – printf(), scanf() and getch(), and library functions (math and string related functions).

Unit -2:

15 Hrs

Decision making, branching, and looping: if, if-else, else-if, switch statement, break, for loop, while loop and do loop.

Functions: Defining functions, function arguments and passing, returning values from functions, example programs.

Pointers: Pointer declaration, assigning values to pointers, pointer arithmetic, array names used as pointers, pointers used as arrays, pointers and text strings, pointers as function parameters.

Structures: Structure type declarations, structure declarations, referencing structure members, referencing whole structures, initialization of structures, structure bit fields

Unit -3:

15 Hrs

Overview of Verilog HDL: Evolution of CAD, emergence of HDLs, typical HDL flow, Trends in HDLs.

Hierarchical Modelling Concepts: Top-down and bottom-up design methodology, differences between modules and module instances, parts of a simulation, design block, stimulus block, Lexical conventions. Data types, system tasks, compiler directives.

Modules and Ports: Module definition, port declaration, connecting ports, hierarchical name referencing.

Gate-Level Modelling: Modelling using basic Verilog gate primitives, Description of and/or and buf/not type gates, Rise, fall and turn-off delays, min, max, and typical delays. Combinational logic circuit design using Gate level modelling

Unit -4:

15 Hrs

Dataflow Modelling: Continuous assignments, delay specification, expressions, operators, operands, operator types.

Behavioral Modelling: Structured procedures, initial and always, blocking and non-blocking statements. Delay control, generate statement, event control, conditional statements, Multiway branching, loops, sequential and parallel blocks.

Tasks and functions: Differences between tasks and functions, declaration, invocation, automatic tasks and functions. Combinational and sequential logic circuit design using all three modelling

References

1	Samir Palnitkar, "Verilog HDL: A Guide to Digital Design and Synthesis," 2 nd Edition, Prentice Hall PTR, 2006.
2	E. Balagurusamy, "Programming in ANSI C", 4 th Edition, Tata McGraw-Hill, 2008.
3	Donald E. Thomas, Philip R. Moorby, "The Verilog Hardware Description Language", 5 th Edition, Springer, 2002.
4	Michael D. Ciletti, "Advanced Digital Design with the Verilog HDL", 2 nd Edition, Pearson Education, 2010.
5	Padmanabhan, Tripura Sundari, "Design through Verilog HDL", Wiley Eastern, 2016.
6	Nazeih M. Botors, "HDL Programming VHDL and Verilog", 1 st Edition, Dreamtech Publication, New Delhi, 2006.
7	Yashavant P. Kanetkar, "Let us C", 18 th Edition, BPB Publications, 2021.
8	T Jeyapoovan, "A First Course in Programming with C," Vikas Publishing Pvt LTD, 2004.
9	Kevin Skahill, "VHDL for Programmable Logic," Pearson Education, 2006.
10	Cyril P R, "Fundamentals of HDL Design," Pearson, 2010.



GULBARGA UNIVERSITY, KALABURAGI

Curriculum

Program Name	BSc in Electronics	Semester	Third Semester
Course Title	Programming in C and Digital Design using Verilog (Practical)		
Course Code:	ELE CP3.1	No. of Credits	2
Formative Assessment Marks	25	Summative Assessment Marks	25
Note: Minimum of 10 programmes to be written and executed in each section			

Part -A: Programming in C Laboratory

Write and execute C Program to

1. Find the area and circumference of a circle
2. Find the biggest and smallest elements in a series
3. Find the factorial of a given number
4. Check the prime number in a series
5. Find the roots of quadratic equation
6. Find the gross salary of an employee
7. Remove all vowels from a string
8. Upper case and lower-case conversion and vice-versa
9. Reverse a string using library functions
10. Reverse a string without using library
11. Check whether the string is palindrome or not
12. Arrange the array in ascending and descending order using bubble sort
13. To perform arithmetic operations for a matrix.
14. Display prime numbers between intervals 0 to 100
15. Find GCD of two numbers.

R. L. Raibagkar

Page 4

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Part – B: Verilog HDL Laboratory

Write and execute Verilog code to realize

1. Realization of logic gates.
2. Encoder without priority and with priority.
3. Multiplexer, De-multiplexer.
4. Comparator, Code converters – Binary to Gray and vice versa.
5. Adder/Subtractor (Half and Full) using different modelling styles.
6. 4-bit parallel adder and 4-bit ALU/8-bit ALU.
7. SR, D, JK, T-flip-flops.
8. To realize counters: Up/Down (BCD and Binary).
9. 4-bit Binary counter, BCD counters (Synchronous reset) and any arbitrary sequence counters.
10. 4-bit Binary counter, BCD counters (Asynchronous reset) and any arbitrary sequence counters.
11. Modelling of Universal shift registers.



Page 5

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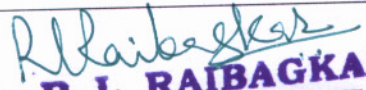


GULBARGA UNIVERSITY, KALABURAGI

Curriculum

Program Name	BSc in Electronics		Semester	Third Semester
Course Title	Fundamentals of Electronics. (Theory)		Course Code:	ELE OE 3.1
Contact hours	45 Hours		No. of Credits	3
Formative Assessment Marks	40	Summative Assessment Marks	60	
OE Paper is to be offered for the Students other than Science stream				

Theory Contents	
Unit-1:	15 Hrs
<p>Passive Components: Overview of passive components-Fabrication, Types, colour coding, and applications.</p> <p>Transformer: Principle, construction and working, turn ratio, Types of transformers (Step up and Step down).</p> <p>Semiconductors: Intrinsic and extrinsic semiconductors.</p> <p>Diodes: P-N Junction theory, V-I Characteristics, Rectifiers, Clippers, and Clampers (Qualitative analysis only).</p> <p>Special diodes: Zener diode, LED and LDR; Construction, working and applications.</p>	
Unit -2:	15 Hrs
<p>Bipolar Junction Transistor (BJT): Physical structures, modes of operations, characteristics. Transistor as an amplifier, RC- Coupled amplifier, Darlington pairs, Transistor as a switch.</p> <p>Field Effect Transistor (FET): Physical structures and modes of operations, Characteristics.</p> <p>Electronic Instruments: Ammeter, Voltmeter- design and construction, analog millimeter, Digital millimeter, function generator (Qualitative analysis only). Cathode Ray Tube (CRT), Cathode Ray Oscilloscope (CRO)- Block diagram.</p> <p>Digital fundamentals: Binary numbers, signed binary numbers, binary to decimal and Decimal to Binary conversion, Binary additions, and Subtractions,</p> <p>Logic gates: AND, OR and NOT gates.</p>	
Unit -3:	15 Hrs
<p>Component and Device Applications: To design and Construct at least Ten of the following circuits.</p>	


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1. V-I characteristics of semiconductor diode.
2. V-I characteristics of Zener diode. Determination of breakdown voltage.
3. V-I characteristics of LED. Determination of Cut-in voltage.
4. Characteristics of LDR.
5. Half wave rectifier; with and without filter. Determination of ripple factor.
6. Full wave rectifier (Centre tap/ Bridge); With and without filter, determination of ripple factor.
7. Zener diode voltage regulator; determination of line and load regulation.
8. Clipping circuits; Positive clipper, Negative Clipper, Biased positive and negative clippers. Trace the input and output waveforms.
9. Clamper circuits: Positive clamper, Negative Clamper. Trace the input and output waveforms.
10. Input and output characteristics of a transistor in Common Emitter configuration, determine of current gain β .
11. Input and output characteristics of a transistor in common base configuration, determine the current gain α .
12. Transistor as a switch.
13. Construct RC coupled amplifier. Plot the frequency response curve and determine the bandwidth.
14. V-I Characteristics of Common Source (CS) configuration of FET. Determine the current gain.
15. Construct an ammeter to read (0-1ma) of current.
16. Construct a voltmeter to read (0-1volt).
17. Measure V_p , V_{pp} and Time period of Sine and Square waves using CRO.
18. Construct OR, AND and NOT gates using diodes and transistors. Verify the truth tables.
19. Verify the truth tables OR, AND and NOT gates using Integrated Chips (ICs).
20. Construct four-bit binary adder.

References

1	"A Textbook of Electronics" R. S. Sedha; S Chand and Co, 3 rd edition.
2	"Principles of Electronics", V K Mehta and Rohit Mehta, S Chand and Co
3	"Basic Electronics", B L Theraja, S Chand and Co, 3 rd edition 2012
4	"Electronic Devices", Devid Bell, Reston Publishing Company.
5	"Electronic Devices and Circuit Theory", Pearson edition.
6	"Digital Principles and Applications", Malvino and Leach
7	"Electronics text lab manual", Paul B Zabar



GULBARGA UNIVERSITY, KALABURAGI

Curriculum

Program Name	BSc in Electronics	Semester	Third Semester
Course Title	Application of Electronics-1 (Theory)	No. of Credits	3
Course Code:	ELE OE 3.2	Contact hours	45 Hours
Formative Assessment Marks	40	Summative Assessment Marks	60
OE Paper is to be offered for the Students other than Science stream			

Theory Contents	
Unit-1: Basic Electronics	12 Hrs
Introduction to circuit components- Resistors, capacitors, inductor, transformer, diode and transistor. Symbols, pipples. LED and LCD display, relay, fuse, switches, wires. AC and DC applications.	
Unit -2: Applied Electronics	13 Hrs
Electronic instruments: DMM, CRO, Biomedical instruments-ECG, EEG, EMG, pH meter, X-ray, sphygmomanometer, Glucometer, Digital thermometer. Sensor-OMR, MICR, Scanner, Barcode reader.	
Unit -3: Power Supplies	10 Hrs
Dc power supply, Rectifiers-principle, Types Inverter and UPS. Adopter and SMPS. Inverter and UPS. Mobile chargers.	
Unit -4: Electronic calculators	10 Hrs
Types, Functions of Basic calculators-block diagram, Keypad using, use of calculator.	

References	
1	Basic Electronics-Solid State – B L Theraja - S Chand And Company Ltd
2	Electronic Devices And Circuit Theory – Robert L Boylestad And Louis Nashelsky (PHI)



GULBARGA UNIVERSITY, KALABURAGI


Curriculum

Program Name	BSc in Electronics	Semester	Third Semester
Course Title	Robotics. (Theory)	No. of Credits	3
Course Code:	ELE OE3.3	Contact hours	45 Hours
Formative Assessment Marks	40	Summative Assessment Marks	60
OE Paper is to be offered for the Students other than Electronics stream			

Theory Contents	
Unit-1:	15 Hrs
<p>Definitions of Robots, Robotics, Motivation, A Brief History of Robotics, A Robot System, Interdisciplinary Areas in Robots, Classification of Robots, Introduction to embedded system, Understanding Embedded System, Overview of basic electronics and digital electronics. Microcontroller vs. Microprocessor, Common features of Microcontroller. Comparison between the two Different types of microcontrollers. Sensors, Classification of sensors (contact & non-contact), characteristics of sensors, Touch sensor, Position sensor, optical sensor, IR, PIR, Ultrasonic, temperature, displacement sensor.</p>	
Unit -2:	15 Hrs
<p>Getting Started with Programming platform of Robots: Installation of IDE, Pin configuration and architecture of Microcontroller (Atmel series/arduino), Device and platform features. Concept of digital and analog ports. Familiarizing with Interfacing Board, Introduction to Embedded C platform, Review of Basic Concepts, Arduino data types, Variables and constants, Operators, Control Statements, Arrays Functions, I/o Functions, Pins Configured as INPUT, Pins Configured as OUTPUT, Incorporating timedelay() function, delayMicroseconds() function ,millis() function , micros() function</p>	
Unit -3:	15 Hrs
<p>Programming different types of Robots:</p> <ol style="list-style-type: none"> 1. Temperature & Humidity controlled Robot (Fan Regulation, thermostat) 2. Infra-Red signal Controlled Robot (Measuring the speed of the vehicle) 3. Ultra-sonic signal operated Robot (automatic Tap system/Hand Drier/Floor drier) 4. Obstacle Follower & avoider Robot 	

References

1	Fundamentals of Robotics by D K Pratihari
2	Robotics Simplified: An Illustrative Guide to Learn Fundamentals of Robotics, by <u>Dr. Jisu Elsa Jacob</u> , <u>Manjunath N</u>
3	Introduction to Robotics Fourth Edition by <u>John Craig</u>
4	Arduino Robotics by John-David Warren (Author), Josh Adamsduino
5	Programming in 24 Hours by <u>Richard Blum</u>
6	Getting Started with Arduino: The Open Source Electronics Prototyping Platform Book by Massimo Banzi and Michael Shiloh



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Program Name	BSc in Electronics	Semester	Third Semester
Course Title	Medical Electronics. (Theory)	No. of Credits	3
Course Code:	ELE OE 3.4	Contact hours	45 Hours
Formative Assessment Marks	40	Summative Assessment Marks	60
OE Paper is to be offered for the Students other than Electronics stream			

Theory Contents	
Unit-1:	10Hrs
Fundamental Electronics: Amplifiers, Frequency response, signal generation. Different types of transducers & their selection for biomedical applications. Electrode theory, selection criteria of electrodes & different types of electrodes Bio electric amplifiers	
Unit -2:	12 Hrs
Introduction to Bio-medical instruments: Origin of bio-electric signals, active & passive transducer for medical application –Electrocardiography-waveform-standard lead systems, typical ECG amplifier, EEG electrode, recording systems, EMG basic principle-block diagram of a recorder.	
Unit -3:	10 Hrs
Medical Imaging: Nature and production of X-rays, Improving X-ray images, Computerised axial tomography, Using ultrasound in medicine, Ultrasound scanning, Magnetic resonance imaging PET and SPECT Imaging	
Unit -4:	13Hrs
Biomedical Signal Processing: Fundamentals of signal processing, digital image, transforming image, image enhancement, image Segmentation, image compression, image restoration and reconstruction of medical images. Demonstration using MATLAB	

References

1	L Cromwell, F J Weibell, Eapfeiffer, Biomedical Instrumentation and measurements, PHI Publications.
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