G.V.P. COLLEGE FOR DEGREE AND P.G. COURSES (A)
Re-accredited by NAAC
DEPARTMENT OF ELECTRONICS

SYLLABUS OF B.Sc. (Honours) For Minor IOT
w.e.f. 2023-24
SEMESTER-II

COURSE1: DIGITAL ELECTRONICS

SEM	COURSE TITLE	HOURS	CREDITS
2	DIGITAL ELECTRONICS	3+2	4

OBJECTIVES

- 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 sampled information.
- Use the "tools of the trade": basic instruments, devices and design tools.
- Work in a design team that can propose, design, successfully implement and report ona digital systems project.
- Communicate the purpose and results of a design project in written and oral presentations.

UNIT-I 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 BOOLEAN ALGEBRA AND THEOREMS:

Boolean Theorems, De Morgan‘s laws. Digital logic gates, Multilevel NAND & NORgates. Standard representation of logic functions (SOP and POS), Minimization Techniques (Karnaugh Map Method: 4 variables), don‘t care condition.

Unit-III 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 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 SEQUENTIAL DIGITAL CIRCUITS:

Flip -Flops: S-R FF,J-K FF,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&Ring counter.

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 noise margins.
- Create the appropriate truth table from a description of a combinational logicfunction.
- Create a gate-level implementation of a combinational logic function described bya 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 withthe appropriate combinational and sequential components.
- Describe the operation and timing constraints for latches and registers.
- Draw a circuit diagram for a sequential logic circuit and analyse its timing properties (input setup and hold times, minimum clock period, output propagationdelays).
- Evaluate combinational and sequential logic designs using various metrics: switching speed, throughput/latency, gate count and area, energy dissipation andpower
- Properly incorporate synchronous and asynchronous memories into a circuitdesign.

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 Age International.1992.

3.D.K. Anvek arand B.S. Sonade. "Electronic Data Converters: Fundamentals& Applications".TMH.1994.

4.Malvino and Leach."Digital Principles and Applications". T MG Hill Edition.

LAB COURSE1: DIGITAL ELECTRONICS

LIST OF EXPERIMENTS:

The laboratory work can be done by using physical gates and necessary equipment or simulators.

1. Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, concept of Vcc and ground, verification of the truth tables of logic gates using TTL ICs.
2. Implementation of the given Boolean functions using logic gates in both SOP and POS forms
3. Realization of basic gates using universal gates.
4. Implementation of half and full adder circuits using logic Gates.
5. Implementation of half and full subtractor circuits using logic gates.
6. Verification of stable tables of RS, JK, T and D flip-flops using NAND gates.
7. Verification of stable tables of RS, JK, T and D flip-flops using NOR gates.
8. Implementation and verification of Decoder and encoder using logic gates.
9. Implementation of 4X1 MUX and DeMUX using logic gates.
10. Implementation of 8X1 MUX using suitable lower order MUX.
11. Implementation of 7-segment decoder circuit.
12. Implementation of 4-bit parallel adder.
13. Design and verification of 4-bit synchronous counter.
14. Design and verification of 4-bit asynchronous counter.