



Government Engineering College Sec-28 Gandhinagar

Sem: - 3

Subject: - Digital Fundamental

Subject Code: - 3130704



Government Engineering College

Sec-28 Gandhinagar

Certificate

This is to certify that

Mr./Ms. Of class

..... Division, Enrollment No. Has

Satisfactorily completed his/her term work in

..... Subject for the term ending in

.....2022.

Date: -

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Institute Vision/Mission

Vision:

- To be a premier engineering institution, imparting quality education for innovative solutions relevant to society and environment.

Mission:

- To develop human potential to its fullest extent so that intellectual and innovative engineers can emerge in a wide range of professions.
- To advance knowledge and educate students in engineering and other areas of scholarship that will best serve the nation and the world in future.
- To produce quality engineers, entrepreneurs and leaders to meet the present and future needs of society as well as environment.

Computer Engineering Department

Vision/Mission

Vision:

Mission:

Program Educational Outcome (PEO)

- To provide students with a strong foundation in the mathematical, scientific and engineering fundamentals necessary to formulate, solve and analyze engineering problems and to prepare them for graduate studies, R&D, consultancy and higher learning.
- To develop an ability to analyze the requirements of the software, understand the technical specifications, design and provide novel engineering solutions and efficient product designs.
- To provide exposure to emerging cutting edge technologies, adequate training & opportunities to work as teams on multidisciplinary projects with effective communication skills and leadership qualities.
- To prepare the students for a successful career and work with values & social concern bridging the digital divide and meeting the requirements of Indian and multinational companies.
- To promote student awareness on the life-long learning and to introduce them to professional ethics and codes of professional practice

PSO

By the completion of Computer Engineering program the student will have following Program specific outcomes.

- Design, develop, test and evaluate computer-based systems by applying standard software engineering practices and strategies in the area of algorithms, web design, data structure, and computer network
- Apply knowledge of ethical principles required to work in a team as well as to lead a team

POs

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of

mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Digital Fundamental (3130704)

Course Outcomes (COs)

CO-1	
CO-2	
CO-3	
CO-4	
CO-5	

7. Assignment Index

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1	Assignment 1			
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8. Practical Index

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9. Assignment 1

CO1: Solve the given problem using fundamentals of Number systems and Boolean algebra

Module 1

1. State and explain De Morgan's theorems with truth tables.
2. Simplify Boolean Function: $F=A'B'C+A'BC+AB'$.
3. List & explain logic family.
4. Describe error detecting & correcting code.
5. Differentiate TTL, Schottky TTL, CMOS

10. Assignment 2

CO2: Analyze working of logic families and logic gates and design the simple circuits using various gates for a given problem

Module 2

1. Explain K map.
2. Obtain the simplified expressions in sum of products for the following Boolean Functions:
 - 2.1. $F(x,y,z) = \Sigma (2,3,6,7)$
 - 2.2. $F(A,B,C,D) = \Sigma (4,6,7,15)$
3. Describe adder & subtractor.
4. Explain multiplexer & demultiplexer.
5. Describe parity checker & generator

11. Assignment 3

CO3: Design and implement Combinational and Sequential logic circuits and verify its working.

Module 3

1. Differentiate sequential & combination circuits.
2. List & explain flip flops.
3. List & explain registers.
4. Describe ring counter.
5. Describe how to design counters using flip flops.

12. Assignment 4

CO4: Examine the process of Analog to Digital conversion and Digital to Analog conversion.

Module 4

1. Explain weighted resistor/converter.
2. Explain R-2R Ladder D/A converter.
3. Describe specification of A/D & D/A converter.
4. Explain quantization and encoding.
5. Explain parallel comparator A/D converter.

13. Assignment 5

CO5: Implement PLDs for the given logical problem.

Module 5

1. Explain content addressable memory (CAM).
2. Explain charge de coupled device memory (CCD).
3. Explain classification of memory.
4. Describe semiconductors.
5. Explain Field Programmable Gate Array (FPGA).

14. Practical 1

CO2: Analyze working of logic families and logic gates and design the simple circuits using various gates for a given problem.

Module 1

Aim: Getting familiar with Logisim, Study and implement all basic logic gates. Implement NAND and NOR logic gates as universal gates.

Code:

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15. Practical 2

CO3: Design and implement Combinational and Sequential logic circuits and verify its working.

Module 2

Aim: Implement half and full Adders using logic gates.

Code:

Output snapshot: (In output include practical details and execution date & time with your enrollment number)

16. Practical 3

CO3: Design and implement Combinational and Sequential logic circuits and verify its working.

Module 2

Aim: Implement half and full Subtractors using logic gates.

Code:

Output snapshot: (In output include practical details and execution date & time with your enrollment number)

17. Practical 4

CO3: Design and implement Combinational and Sequential logic circuits and verify its working.

Module 2

Aim: Perform Parity Checker.

Code:

Output snapshot: (In output include practical details and execution date & time with your enrollment number)

18. Practical 5

CO3: Design and implement Combinational and Sequential logic circuits and verify its working.

Module 2

Aim: Study and implement Multiplexer and Demultiplexer.

Code:

Output snapshot: (In output include practical details and execution date & time with your enrollment number)

19. Practical 6

CO4: Examine the process of Analog to Digital conversion and Digital to Analog conversion

Module 4

Aim: Study and configure A to D convertor and D to A convertor.

Code:

Output snapshot: (In output include practical details and execution date & time with your enrollment number)

20. Practical 7

CO3: Design and implement Combinational and Sequential logic circuits and verify its working

Module 3

Aim: Study and implement a shifter.

Code:

Output snapshot: (In output include practical details and execution date & time with your enrollment number)

21. Practical 8

CO3: Design and implement Combinational and Sequential logic circuits and verify its working

Module 3

Aim: Study and implement Flip-flops.

Code:

Output snapshot: (In output include practical details and execution date & time with your enrollment number)

22. Practical 9

CO3: Design and implement Combinational and Sequential logic circuits and verify its working

Module 3

Aim: Study and implement Counter.

Code:

Output snapshot: (In output include practical details and execution date & time with your enrollment number)

23. Practical 10

CO3: Design and implement Combinational and Sequential logic circuits and verify its working

Module 3

Aim: Study and implement a shift register.

Code:

Output snapshot: (In output include practical details and execution date & time with your enrollment number)

24. Practical 11

CO3: Design and implement Combinational and Sequential logic circuits and verify its working

Module 2

Aim: Study and implement K-Map for the given function:(SOP)

$$F = ABC'D + AB'C'D' + AB'CD' + A'B'CD' + A'B'C'D'$$

Code:

Output snapshot: (In output include practical details and execution date & time with your enrollment number)