

MAHATMA GANDHI UNIVERSITY, KOTTAYAM

MGU-UGP (HONOURS)
FIFTH SEMESTER EXAMINATION
(2024 ADMISION ONWARDS)

MG5DSCECT300/ MG5DSCECC300 – Digital Design using Verilog

Duration: 2 hour

Maximum Marks: 35

Practical Examination – Model Question Paper

Instructions:

- Demonstrate the given task
- Viva session (Minimum 5 questions from the Practical Module)
- Lab Report

Evaluation Criteria:

- Viva: **10 marks**
- Lab Report: **5 marks**
- Design & Demonstration: **20 marks**

Tasks: (*Choose any one*)

1. Design & Simulate a **dataflow** model of a **2-input AND, OR, NOT, NAND, NOR, XOR and XNOR** gate using the **assign** statement; each with a **rise delay of 3ns and fall delay of 2ns**
2. Design & Simulate the basic gates (AND, OR, NOT) using any one of the universal **gates** in dataflow modeling.
3. Design & Simulate a **dataflow** model of a **Half-Adder** using the **assign** statement with a **rise delay of 2ns and fall delay of 3ns for Sum and Carry outputs separately**.
4. Design & Simulate a **dataflow** model of a **Full-Adder** using an **always block** (procedural, using **case/if-else**) without any delay.
5. Design & Simulate a **dataflow** model of a **Half-Subtractor** (Difference and Borrow)
6. Design & Simulate a **dataflow** model of a **4-to-2 priority encoder** using **conditional (?) operators**
7. Design & Simulate a **dataflow** model of a **2-to-4 decoder** (with enable) using a **case statement**

8. Design & Simulate a **behavioral** model of a **4:1 Multiplexer** using a **case statement** inside an **always** block
9. Design & Simulate a **dataflow** model to convert a **4-bit Binary number to Gray code** using **XOR operations**.
10. Design & Simulate a **behavioral** model of an **SR flip-flop (with clock)** using an **always @ (posedge clk)** block.
11. Design & Simulate a **behavioral** model of a **T flip-flop derived from a D flip-flop** ($T = J = K$ logic).
12. Design & Simulate a **dataflow** model of an **odd/even parity generator** for an **8-bit data word**
13. Design & Simulate a **behavioral** model of a **LIFO (Stack) register** of depth 8 using a **reg array**, with **push/pop operations** controlled by clock.
14. Design & Simulate a **behavioral** model of a **4-bit Up-Down counter** using an **always @ (posedge clk)** block with an **up/down control signal**.
15. Design & Simulate a **BCD (decade) up-counter** with a **ripple-carry-out (RCO) signal** that goes **high one clock before rollover**.
16. Design & Simulate a **dataflow** model of an **8-bit ALU** supporting **ADD, SUB, AND, OR, XOR** operations selected by a **3-bit opcode**, using the **conditional operator**.

MAHATMA GANDHI UNIVERSITY, KOTTAYAM
MGU-UGP (HONOURS)
V SEMESTER EXAMINATION
(2024 ADMISION ONWARDS)
MG5DSCECT301 - Artificial Intelligence and Machine Learning

Duration: 2 hours

Maximum Marks: 35

PRACTICAL EXAMINATION

Instructions:

- Demonstrate the given task. (Any one of the tasks listed below)
- Viva session (Minimum 5 questions from the Practical Module)
- Lab Report

Evaluation Criteria:

- Viva: 10 marks
- Lab Report: 5 marks
- Demonstration: 20 marks

Tasks: (Choose any one Program)

- A. Understanding AI & Rational Agents
 - 1. Simple Temperature Control Agent
 - 2. Simulate a vacuum cleaner agent that cleans a dirty room.
 - 3. create an agent that decides actions based on traffic signal colors.
- B. Problem Formulation & Goal-Based Agent
 - 4. Goal-Based Agent to Find an Item in a List
 - 5. Goal-Based Agent to Reach a Destination
 - 6. Goal-Based Number Guessing Agent
- C. Greedy Best-First Search
 - 7. Write a Python program to implement Greedy Best-First Search on a graph.
 - 8. Write a Python program to implement A* search on a graph.
- D. Hill Climbing Algorithm
 - 9. Finding the Maximum in a List

10. Finding the largest element in an array by moving to neighbouring elements with higher value

E. Mini-Max Algorithm (Game AI)

11. Write a Python program to simulate a Stone Removal Game

F. Bayes Theorem Implementation

12. Calculate the probability of a student passing an examination given that the student has attended a particular number of classes.

G. Linear Regression (Basic ML Model)

13. Predict a student's marks based on the number of hours studied. Use a small dataset of study hours and marks.

H. K-Nearest Neighbours (KNN) Classification

14. Classify students into Pass or Fail based on their study hours and attendance percentage. Use $K = 3$.

MAHATMA GANDHI UNIVERSITY, KOTTAYAM
MGU-UGP (HONOURS)
FIFTH SEMESTER EXAMINATION
(2024 ADMISSION ONWARDS)

MG5DSCECT302 - Embedded Systems with AVR Microcontroller
PRACTICAL EXAMINATION

Duration: 2 hours

Maximum Marks: 35

Instructions:

- Demonstrate the given task (Any one of the tasks listed below)
- Viva session: (Minimum 5 questions from the practical mode)
- Lab Report

Evaluation Criteria:

- Viva: 10 marks
- Lab Report: 5 marks
- Demonstration: 20 marks

Tasks: (Select any two, one each from the interfacing and non-interfacing experiment category)

A. Non Interfacing

1. 8 bit addition, subtraction
2. Multiplication with and without using MUL instruction
3. Division
4. Ascending order
5. Descending order
6. Find out largest number
7. Find out smallest number
8. Swapping
9. Count number of ones in a byte
10. Find out odd and even numbers in an array

B. Interfacing programs

11. Stepper motor interface
12. DC motor interface
13. Keyboard interface
14. LCD interface
15. PWM
16. LED interface and Delay programming
17. Buzzer interface
18. Relay interface
19. Timer programming
20. Optoisolator interface
21. DS1307 RTC interfacing
22. RGB LED Interfacing

MAHATMA GANDHI UNIVERSITY, KOTTAYAM
MGU-UGP (HONOURS)
V SEMESTER ELECTRONICS ELECTIVE PRACTICAL EXAMINATION
(2024 ADMISION ONWARDS)
MG5DSEECT310- Robotics and Industrial Automation
PRACTICAL EXAMINATION

Duration: 2 Hours

Maximum Marks: 35

Instructions:

- Demonstrate the given task. (Any one of the tasks listed below)
- Viva session (Minimum 5 questions from the Practical Module)
- Lab Report (certified)

Evaluation Criteria:

- Viva: 10 marks
- Lab Report: 5 marks
- Demonstration: 20 marks

For Practical / Simulation Use (OpenPLC Editor, i- TRiLOGI, WPLSoft, Do-more Designer, plcsimulator.online or any other).

1. Basic ON/OFF Control: Use a switch to control an output (e.g., a lamp) using PLC.
2. Toggle Operation: Implement a toggle switch to alternate between two outputs.
3. Timer Functionality: Use timers to control the ON/OFF duration of an output.
4. Latching Circuit: Create a latch/unlatch mechanism to maintain output state.
5. Logic Gates Implementation: Use PLC programming to simulate AND, OR, NOT logic functions.
6. Motor Control: Control the direction and speed of a motor using PLC.
7. Traffic Light Simulation: Simulate a traffic light system with different timing sequences.
8. Temperature Control: Control a heating or cooling system based on temperature sensor inputs.
9. Water Level Monitoring: Use sensors to monitor and control water levels in a tank.
10. Conveyor Belt Control: Control the operation and speed of a conveyor belt using PLC.
11. Alarm System: Create an alarm system based on sensor inputs or specific conditions.
12. Robotic Arm Control: Basic control of a robotic arm using PLC
13. Robotic Application: Robotic arm pick-and-place tasks using PLC