



BRAINWARE UNIVERSITY

Term End Examination 2024-2025

Programme – B.Tech.(EE)-2021

Course Name – Embedded System

Course Code - OE-EE702A

(Semester VII)

Library
Brainware University
398, Ramkrishnapur Road, Barasat
Kolkata, West Bengal-700125

Full Marks : 60

Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 15=15

1. Choose the correct alternative from the following :

- (i) Identify a common use case for an embedded system
 - a) Web browsing
 - b) Word processing
 - c) Home automation
 - d) Video editing
- (ii) Identify a real-time constraint in an embedded system
 - a) The system must complete a task within a specific time frame
 - b) The system must be able to execute any arbitrary task
 - c) The system must handle unlimited storage capacity
 - d) The system must have a graphical user interface
- (iii) Choose the quality attribute that involves the ease with which an embedded system can be repaired or enhanced after deployment.
 - a) Maintainability
 - b) Performance
 - c) Portability
 - d) Scalability
- (iv) Select the difference between an ASIC and an FPGA
 - a) ASICs are reprogrammable; FPGAs are not
 - b) FPGAs have lower performance compared to ASICs
 - c) ASICs are designed for general-purpose use, while FPGAs are not
 - d) FPGAs are designed specifically for a single task, while ASICs can be reprogrammed
- (v) In the context of PLDs, select "reconfigurable" meaning
 - a) The device can be physically altered after manufacturing.
 - b) The logic functions of the device can be changed by reprogramming.
 - c) The device can automatically adjust its operating frequency.
 - d) The device can be upgraded to a different model without replacing the hardware.
- (vi) Choose the primary purpose of an I2C (Inter-Integrated Circuit) interface

- a) To provide high-speed communication over long distances
 c) To connect peripherals with a direct memory access
 (vii) Select the maximum clock frequency for the PIC 16C6X/7X series
 a) 1 MHz
 c) 8 MHz
 (viii) Identify the primary function of the TMRO register in the PIC 16C6X/7X series
 a) Serial communication
 c) Port expansion
 (ix) Select the primary difference between a hardware reset and a software reset
 a) Hardware reset is triggered by physical components, while software reset is triggered by software instructions. D)
 c) Hardware reset does not require power, while software reset does.
 (x) In a brown-out protection circuit, select the correct option when the voltage drops below the preset threshold
 a) The system increases its clock frequency
 c) The system performs a hardware reset or shuts down
 (xi) Select the primary function of a Real-Time Clock (RTC) in electronic devices
 a) To regulate the power supply
 c) To keep track of the current time and date
 (xii) Choose the two main types of processor connection to the motherboard
 a) sockets and slots
 c) slots and pins
 (xiii) Choose the primary programming language used in embedded system development
 a) Python
 c) Java
 (xiv) Choose the correct option for firmware in the context of embedded systems
 a) The operating system of a computer
 c) Software that is permanently stored in hardware
 (xv) Identify the standard software components that can be reused
 a) application manager
 c) application software
 b) To enable communication between multiple devices using only two wires
 d) To manage wireless data transmission
 b) 4 MHz
 d) 20 MHz
 b) Timer operation
 d) Data storage
 b) Hardware reset can only be triggered by a user, while software reset can be triggered automatically.
 d) Software reset is typically slower than hardware reset.
 b) The system enters a low-power mode
 d) The system continues to operate with reduced performance
 b) To store and manage data
 d) To process user input
 b) sockets and pins
 d) pins and ports
 b) C
 d) HTML
 b) Temporary data stored in RAM
 d) A special type of software for developing websites
 b) operating system
 d) memory

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Discuss three characteristics of hard real time embedded system.
3. Describe WATCH DOG TIMER (WDT)
4. Examine byte-oriented instruction format.
5. Explain the purpose of a process control block (PCB).
6. Distinguish between an analog sensor and a digital sensor.

OR

Estimate the primary factors to consider when selecting an actuator for a specific application.

Group-C
(Long Answer Type Questions)

7. Compare and contrast the use of C and C++ in embedded system development. (5)
8. Describe the role of the Watchdog Timer (WDT) in managing interrupts in the PIC 16C61/71 microcontrollers. (5)
9. Explain the difference between ARM core and Thumb state (5)
10. Estimate the role of configurable logic blocks (CLBs) in FPGAs (5)
11. Distinguish Fast PWM and Phase-Correct PWM (5)
12. Given a set of processes with their arrival times and burst times, calculate the average turnaround time using FCFS scheduling. Processes: P1: Arrival Time = 0, Burst Time = 4 P2: Arrival Time = 1, Burst Time = 3 P3: Arrival Time = 2, Burst Time = 2 (5)

OR

Compare the turnaround times of two scheduling algorithms: FCFS and Shortest Job First (SJF). Processes: P1: Arrival Time = 0, Burst Time = 8 P2: Arrival Time = 1, Burst Time = 4 P3: Arrival Time = 2, Burst Time = 9 (5)
