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BTECH
(SEM V) THEORY EXAMINATION 2024-25
PROGRAMMING AND INTERFACING WITH MICROCONTROLLERS
TIME: 3 HRS **M.MARKS: 70**

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A

1. Attempt all questions in brief. 2 x 07 = 14

Q no.	Question	CO	Level
a.	Discuss the evolution of creative coding platforms.	1	K ₁ , K ₂
b.	Identify the major components of a circuit.	1	K ₁ , K ₂
c.	Compare openFrameworks with Arduino IDE in terms of usability, performance, and target applications.	2	K ₃ , K ₄
d.	Compare Arduino and Raspberry Pi's ARM processor in terms of speed and memory.	2	K ₃ , K ₄
e.	Explain the differences between Serial UART, I2C, and SPI communication protocols.	3	K ₁ , K ₂
f.	Explain how Arduino can interface with a MySQL database to log sensor data.	4	K ₂ , K ₃
g.	Discuss the role of IoT in industries.	5	K ₅ , K ₆

SECTION B

2. Attempt any three of the following: 07 x 3 = 21

Q no.	Question	CO	Level
a.	A temperature sensor outputs 10 mV/°C. If the output voltage is 250 mV, calculate the temperature being measured. Explain the process of sensor calibration and its importance in real-world applications.	1	K ₁ , K ₂
b.	Given a project requiring real-time data processing and internet connectivity, choose between Arduino and Raspberry Pi. Justify your choice with technical comparisons.	2	K ₃ , K ₄
c.	Compare Arduino-compatible microcontrollers in terms of I/O pins, communication protocols, and power consumption.	3	K ₁ , K ₂
d.	Explain how Arduino can be used for wired and wireless networking. Design a system where sensor data is transmitted to a server using Wi-Fi.	4	K ₂ , K ₃
e.	Design a system where sensor data is transmitted over TCP/IP to a remote server. Discuss how packet loss can be handled.	5	K ₅ , K ₆

SECTION C

3. Attempt any one part of the following: 07 x 1 = 07

Q no.	Question	CO	Level
a.	Write a Python program that interfaces with an Arduino board to control an LED based on user input. Discuss the flow of communication between Python and Arduino.	1	K ₁ , K ₂

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b.	Explain how real-world inputs are converted into digital signals for microcontrollers. Provide an example of a light sensor interfacing with an Arduino.	1	K ₁ , K ₂
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4. Attempt any one part of the following: 07 x 1 = 07

Q no.	Question	CO	Level
a.	Explain the working of a DAC. Design a DAC circuit to convert a 4-bit digital input to an analog voltage output.	2	K ₃ , K ₄
b.	Describe how analog audio signals are digitized and processed using microcontrollers.	2	K ₃ , K ₄

5. Attempt any one part of the following: 07 x 1 = 07

Q no.	Question	CO	Level
a.	Compare the performance of Arduino and openFrameworks for interfacing sensors and actuators. Provide a case study to support your comparison.	3	K ₁ , K ₂
b.	Describe parallel communication and its advantages over serial communication. Why is parallel communication less common in microcontrollers?	3	K ₁ , K ₂

6. Attempt any one part of the following: 07 x 1 = 07

Q no.	Question	CO	Level
a.	Discuss how XML and SQLite can be used to store and retrieve sensor data in openFrameworks. Provide code examples.	4	K ₂ , K ₃
b.	Design a system where Arduino sends real-time sensor data to openFrameworks for graphical visualization. Discuss the challenges of latency.	4	K ₂ , K ₃

7. Attempt any one part of the following: 07 x 1 = 07

Q no.	Question	CO	Level
a.	Explain how Arduino can communicate with cloud platforms. Write a program to send temperature data to the cloud.	5	K ₅ , K ₆
b.	Write a program to establish peer-to-peer communication between two Arduino boards using Bluetooth. Discuss its limitations.	5	K ₅ , K ₆