



**B.E DEGREE EXAMINATIONS: APRIL / MAY 2023**

(Regulation 2018)

Sixth Semester

**AUTOMOBILE ENGINEERING**

U18AUE0021: STM32 Microcontroller and Embedded C Programming

**COURSE OUTCOMES**

- CO1:** Gain knowledge on different peripherals of 32-bit microcontroller and their applications  
**CO2:** Understand the Timer and counter configuration and programming  
**CO3:** Identify different GPIO interface using I/O devices  
**CO4:** Apply the PWM techniques for motor speed control using timer  
**CO5:** Understand the ADC, DAC, Sensor Interfacing  
**CO6:** Apply the CAN communication technologies for ECU communication

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 2 = 20 Marks)**

**(Answer not more than 40 words)**

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|--|-----|-------------------|
| 1. Identify the naming conventions of STM32F103C8T6                          | CO1 | [K <sub>2</sub> ] |
| 2. List the Keywords in C  | CO1 | [K <sub>2</sub> ] |
| 3. Differentiate Timer and counter function.                                 | CO2 | [K <sub>2</sub> ] |
| 4. What is the use of a crystal oscillator in STM32 microcontroller?         | CO2 | [K <sub>2</sub> ] |
| 5. What are the two basic function of GPIO.                                  | CO3 | [K <sub>2</sub> ] |
| 6. Draw circuit diagram of relay with opto-isolator to control the 12V Load. | CO4 | [K <sub>2</sub> ] |
| 7. List the various characteristics of DAC in STM32.                         | CO5 | [K <sub>2</sub> ] |
| 8. Identify the use of ADC in STM32 Controller.                              | CO5 | [K <sub>3</sub> ] |
| 9. Differentiate Recessive state and Dominant state in CAN protocol?         | CO6 | [K <sub>2</sub> ] |
| 10. Illustrate the features of bxCAN.  | CO6 | [K <sub>2</sub> ] |

**Answer any FIVE Questions:-**

**PART B (5 x 16 = 80 Marks)**

**(Answer not more than 400 words)**

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|--|----|-----|-------------------|
| 11. a) Explain with neat block diagram the architecture of STM32F103C8T6 controller. | 12 | CO1 | [K <sub>2</sub> ] |
| b) List the application of STM32 bit microcontroller.                                | 4  | CO1 | [K <sub>2</sub> ] |
| 12. a) Explain the function of timer and prescaler in STM 32 controller.             | 12 | CO2 | [K <sub>2</sub> ] |

	b)	Write short notes on Pulse counter programming.	4	CO2	[K <sub>2</sub> ]
13.	a)	Construct the relay interface circuit for STM32 controllers.	12	CO4	[K <sub>4</sub> ]
	b)	Write short notes on PWM and Its types.	4	CO3	[K <sub>3</sub> ]
14.	a)	Explain in detail about	12	CO5	[K <sub>5</sub> ]
		i.    ADC block			
		ii.   Channel selection			
		iii.  Conversion Mode			
	b)	Write short notes on Interfacing to a DAC.	4	CO5	[K <sub>2</sub> ]
15.	a)	Illustrate the function block diagram of CAN function in Loop back Mode.	12	CO6	[K <sub>2</sub> ]
	b)	Explain and draw the CAN frame formats.	4	CO6	[K <sub>2</sub> ]
16.	a)	Explain the decision-making statement in embedded c with example.	12	CO1	[K <sub>2</sub> ]
	b)	Draw the pin diagram of STM32F103.	4	CO1	[K <sub>2</sub> ]

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