# 8BEIE042 / IN804M-II - Core Elective : Embedded System for Instrumentation

P. Pages : 2

Time : Three Hours

Max. Marks : 80

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Notes : 1. All questions carry marks as indicated.
2. Due credit will be given to neatness and adequate dimensions.
3. Illustrate your answers wherever necessary with the help of neat sketches.

**1.** a) What is an embedded system? And how does it differ from a general-purpose computer system explain in brief. **8**

b) Describe the role of memory management in embedded systems, and discuss some techniques for optimizing memory usage. **8**

**OR**

**2.** a) What are some recent trends in embedded systems? And how are these trends shaping the future of this field? **8**

b) Name any 4 on chip peripherals in AVR microcontroller and explain there working? **8**

**3.** a) Explain the concept of interrupts in AVR microcontrollers, and discuss some examples of how interrupts are used in embedded systems. **8**

b) What is an AVR microcontroller, and what are some of its key features and advantages over other microcontrollers? **8**

**OR**

**4.** a) What is assembly language programming and how is it used to program AVR microcontrollers? **8**

b) Describe some common peripherals and interfaces available on AVR microcontrollers, such as timers, analog-to-digital converters, and serial communication interfaces. **8**

**5.** a) What is an ADC? How is it used in microcontrollers? Explain with diagram. **8**

b) Explain the function of a Watch-Dog Timer in a microcontroller. What happens when it is triggered? Give a real time example on it. **8**

**OR**

**6.** a) What is the difference between a timer and a counter in a microcontroller? **8**

b) How does a microcontroller communicate with an external device using its I/O ports? Give an example and Explain with diagram. **8**

| 7. | a) | What is PWM, Draw and explain the registers used to program the PWM pin, and where is it used in microcontrollers? | **8** |
|----|----|----|----|
| | b) | What is SPI, and how is it used in microcontrollers? Draw and explain how two devices Communicate using SPI. | **8** |

**OR**

| 8. | a) | How do you configure a timer to generate a periodic interrupt in a microcontroller? Explain with diagram. | **8** |
|----|----|----|----|
| | b) | What is the role of interrupt priorities in microcontroller programming? | **8** |
| 9. | a) | How are interrupt routines handled in an RTOS environment Explain in brief'? | **8** |
| | b) | What are semaphores, and how are they used in an RTOS environment? | **8** |

**OR**

| 10. | a) | What are timer functions, and how are they used in an RTOS environment? | **8** |
|----|----|----|----|
| | b) | How is data shared between tasks in an RTOS environment? | **8** |

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