

B.E. Instrumentation Engineering Model Curriculum Semester-VIII  
**IN804M2 - Core Elective-II - Embedded System for Instrumentation**

P. Pages : 2

Time : Three Hours



**GUG/W/24/14367**

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. Assume suitable data wherever necessary.
  4. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) What are some of the applications of embedded systems and how do these systems improve efficiency and productivity in various industries. 8
- b) What is an embedded system and how does it differ from a general purpose computer system explain in brief. 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) Discuss the hardware and software design and testing processes for embedded systems, including the use of simulation tools, debugging techniques and verification methods. 8
3. a) Explain status register of AVR microcontroller. 8
- b) Explain the concept of interrupt in AVR micro controllers and discuss some examples of how interrupt is used in embedded system. 8

**OR**

4. a) Write down the note on von Neumann Architecture and Harvard architecture. 8
- b) Differentiate between: 8
  - 1) Microcontroller and microprocessor
  - 2) RISC and CISC architecture
5. a) Explain USART protocol for serial communication. 8
- b) Write down the note on. 8
  - 1) I2C Protocol
  - 2) SPI Protocol

**OR**

6. a) What is SPI protocol? How it is used in microcontroller. 8
- b) What is ADC in AVR microcontroller? How it works in microcontroller explain with example. 8
7. a) How is timer 0 programmed in microcontroller? Write down steps to program timer 0. 8
- b) Assuming that XTAL = 8 MHz write a program to generate a square wave with a period of 10 ms and 10% duty cycle. 8

**OR**

8. a) Write down assembly program for Assuming XTAL = 8 MHz, using inverted mode, write a program that generates a wave with frequency of 61 Hz and duty cycle of 87.5%. 8
- b) How to calculate duty cycle explain with example. 8
9. a) Draw and explain what process management is, and how is it implemented in an operating system? 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 are interrupt routines handled in an RTOS environment Explain in brief? 8

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