

BE1-R3: EMBEDDED SYSTEMS

NOTE:

1. Answer question 1 and any FOUR questions from 2 to 7.
2. Parts of the same question should be answered together and in the same sequence.

Time: 3 Hours

Total Marks: 100

1.

- a) Why do you need at least one timer device in an embedded system?
- b) By enumerating a number of distinguished characteristics, explain which one of processors such as RISC or CISC is better for embedded and industrial applications.
- c) With suitable examples, enumerate the use of ADC (analog to Digital Converter) in most popular embedded systems.
- d) Why do we use loader in a computer system and locator in an embedded system?
- e) Why is real time system software difficult to test compared to non-real time software?
- f) Explain the functions which are handled by RTOs.
- g) Why does an IrDA receiver have a viewing angle of 15° either side of the line of sight? What are the protocol layers for communication specified by IrDA standard?

(7x4)

2.

- a) Why does a processor system always need an Interrupts Handler (Interrupt Controller)?
- b) What are the advantages of Harvard Architecture? Why is the ease of accessing stack and data table at program memory less in Harvard memory architecture compared to Princeton memory architecture?
- c) What are the two important functions of the Digital Signal Processor (DSP)? Draw a block diagram of the main structural units of the DSP and explain the function of each unit in brief.

(6+6+6)

3.

- a) Why does an embedded system have to perform a number of tasks? How is task scheduling performed in an embedded system?
- b) Why are the device drivers routines important in a system?

(9+9)

4.

- a) Assemblers, Compilers, Linkers and cross Assemblers are used as software tools for development of embedded systems. Explain each of them in brief.
- b) What are the standard guidelines for debugging in embedded software? Explain various embedded system debugging techniques used during and after the software development process.
- c) Explain the basic structure of a USB (Universal Serial Bus) to interface embedded system to the desktop computer.

(6+6+6)

5.

- a) Does an embedded system always need an RTOS? Explain when an RTOS is necessary and when it is not necessary in the embedded systems.
- b) Why are the mobile OS becoming popular in embedded systems for telephones and pocket PCs? Explain with examples.
- c) Draw a schematic for interfacing Ethernet controller with embedded system and explain the components used in the system design.

(6+6+6)

6.

- a) Draw a functional diagram of a UART (Universal Asynchronous Receiver Transmitter) and explain working of each block in brief. Explain Asynchronous serial data transmission in UART.
 - b) What is the most important feature in C or C++ which makes it a popular high level language for an embedded system?
 - c) Why is Controller Area Network (CAN) required for implementing a real-time communication? Draw a diagram of a CAN bus indicating details of each component.
- (6+6+6)**

7.

- a) Implementation of protection mechanism and enforcement of security policy for resources is a challenging issue before any OS software designer. Give the various activities for implementing important security functions.
 - b) What is the most important feature in Java that makes it a highly useful high level language for an embedded system in many network related applications?
 - c) Explain the following:
 - i) token packet
 - ii) data packet
 - iii) handshaking packet, and
 - iv) descriptor
- (6+6+6)**