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)   Explain how Port-based I/O is different from Bus-based I/O.
b)   What do you mean by Embedded System design process? State its importance.
c)   Given a choice to select RISC or CISC microcontroller, which one is preferred for embedded applications and why?
d)   Explain the basic architecture required for CAN.
e)   Specify the necessity of distinguishing the step system integration involved in embedded system design process.
f)   What are the features that make embedded operating systems different from a general-purpose operating system? Mention at least four embedded system operating systems.
g)   Explain the difference between Black box and White box testing.

(7x4)

2.
a)   Characterize embedded computing applications in terms of (i) providing sophisticated functionality, (ii) performing to meet deadlines, and (iii) costs.
b)   What is security modelling? State the objectives of security modelling.
c)   What are the necessary conditions for deadlock to occur in a system?

(9+5+4)

3.
a)   How do the computers and their operating systems know, how to control every device, both existing devices and the devices to be included in the future? Compare device servicing without using the ISR and Device driver ISR?
b)   Why do we have triangular routing in Mobile IP? Explain, how minimal encapsulation in Mobile IP is carried out.

(9+9)

4.
a)   What are the benefits of using a general-purpose processor in the case of designing an embedded system? In this context, describe the benefits of using a standard single-purpose processor instead of using a general-purpose one.
b)   Differentiate registers from memory. Compare Princeton architecture and Harvard architecture. How is Cache memory related to embedded computing system?

(9+9)

5.
a)   Describe the need for security in a Bluetooth system. How Bluetooth wireless protocol is differentiated from IrDA?
b)   Describe why an application developer may choose to run its application over UDP rather than TCP.

(12+6)

6.

a)   How are kernel functions invoked? Explain briefly how a fault and sensitive information is prevented where multiple programs are running on a single computer.

b)   Why is a kernel sometimes not able to use the abstraction mechanisms that it provides to other software? How does it make appear to the user in pre-emptive multitasking system as if these processes are being executed simultaneously?

(10+8)

7.

a)   Why is debugging real-time software difficult? Explain how real-time software can be efficiently debugged.

b)   How is CSMA/CD protocol used as an embedded communication protocol?

c)   Why do Java programs compiled by a JIT compiler generally run much faster than when the bytecode is executed by an interpreter?

(6+6+6)