PART – A

Answer all questions. Each question carries 2 marks.
1. Discuss any lifecycle model of embedded product development.
2. Draw and explain the register structure of ARM 7.
3. Explain the read cycle of DRAM, with the help of a timing diagram.
4. Discuss briefly the 12C bus and its working.
5. Discuss the life cycle diagram of a task/process.
6. What are the components of an Integrated Development Environment (IDE) of an embedded system?
7. What is meant by cross compilation? Give an example.
8. What is meant by RPC? Explain.
9. What is meant by the word GPIO? How is it used in embedded systems?
10. Why is SRAM the preferred memory technology for caches, but not used as main memory in computers?

PART – B

Answer any one question from each Module. (20 marks each)

Module – I

11. a) Draw the block diagram of a micro controller unit with the following peripherals connected to its GPIO pins.
   i) A single digit LED
   ii) Four toggle switches
   iii) A relay.

   Explain how each of these peripherals are used in the system.

   10
   P.T.O.
b) What is the concept of DMA? Draw a block diagram of a system with a DMA controller along with a processor and an I/O device.

OR

12. a) What are the special features that need to be taken into consideration when designing an embedded system? Elaborate.

Also make clear the criteria by which you select the processor to be used in the design.

b) For the task set given in the table, what is the CPU utilization? Is it schedulable using

i) the RM algorithm

ii) the EDF method? Show the Gantt charts if it is schedulable

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Period</th>
<th>CPU Burst</th>
</tr>
</thead>
<tbody>
<tr>
<td>T_1</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>T_2</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>T_3</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>T_4</td>
<td>24</td>
<td>4</td>
</tr>
<tr>
<td>T_5</td>
<td>12</td>
<td>3</td>
</tr>
</tbody>
</table>

Module – II

13. Explain how the following peripherals of a microcontroller work

i) Timer

ii) RTC

iii) DMA controller.

OR
14. a) Why are interrupts very important for embedded systems? Elaborate the sequence of events that occur when an interrupt occurs.
   b) What do the terms interrupt latency, interrupt vector and interrupt service routine mean?
   c) Discuss the interrupt structure of PIC.

Module – III

15. a) Distinguish between hard real time and soft real time systems.
   Give an example each of a system which needs
   i) hard real time.
   ii) soft real time.
   b) What are the advantages and disadvantages of having an RTOS for an embedded system?
   In a system without RTOS, how are multiple tasks managed?
   OR

16. a) What is meant by hardware software partitioning? What criteria are taken into account to partition a system design for this aspect?
   b) What kinds of testing are done for a product
   i) before its release
   ii) after its release?
   Write an elaborate paragraph on this.

Module – IV

17. a) What are the debugging methods used in embedded system design? Explain.
   b) List and describe the tools available for testing and debugging an embedded system design.
   c) What do you know of BDM and JTAG? Elaborate.
   OR

18. With a help of a block diagram, explain the design of a Burglar alarm which has internet connectivity and sends messages to a web page and also to a mobile phone.
   Which processor would you use to design the system?
   Explain the software development, starting from a flow chart for this system.