# SRM VALLIAMMAI ENGINEERING COLLEGE

**(An Autonomous Institution)**

SRM Nagar, Kattankulathur – 603 203.

## DEPARTMENT OF

## ELECTRICAL AND ELECTRONICS ENGINEERING

**QUESTION BANK**

**VI SEMESTER**

# 1905608 EMBEDDED SYSTEMS

# (Common to EIE)

**Regulation–2019**

**Academic Year 2022–23**

**Even Semester**

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# SRM VALLIAMMAI ENGINEERING COLLEGE

## (An Autonomous Institution)

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**DEPARTMENT OF ELECTRONICS AND INSTRUMENTATION ENGINEERING**

## QUESTION BANK

**SUBJECT : 1905608 EMBEDDED SYSTEMS**

**SEM / YEAR: VII / IV**

| UNIT I - INTRODUCTION TO EMBEDDED SYSTEMS | | | |
|---|---|---|---|
| **Introduction to Embedded Systems - Structural units in Embedded processor , selection of processor & memory devices- DMA – Memory management methods- Timer and Counting devices, Watchdog Timer, Real Time Clock, In circuit emulator, Target Hardware Debugging.** | | | |
| **PART-A** | | | |
| **Q.No** | **Questions** | **BT Level** | **Competence** |
| 1. | List the characteristics of an embedded system. | 1 | **Remember** |
| 2. | Name some of the hardware components of Embedded system. | 1 | **Remember** |
| 3. | Write the purpose of timing and counting devices | 5 | **Evaluate** |
| 4. | Identify the use of DMAC. | 3 | **Apply** |
| 5. | Explain the important considerations when selecting a processor. | 4 | **Analyze** |
| 6. | What is Real Time Clock? | 1 | **Remember** |
| 7. | Classify the methods of memory management system. | 4 | **Analyze** |
| 8. | What is a Compiler? | 1 | **Remember** |
| 9. | Give the purpose of Watch dog timer. | 2 | **Understand** |
| 10. | Define In circuit emulator. | 5 | **Evaluate** |
| 11. | Justify the Need of Target Hardware debugging. | 6 | **Create** |
| 12. | Explain the abbreviation term MAR and MDR | 2 | **Understand** |
| 13. | Compare embedded system and non-embedded system with examples. | 4 | **Analyze** |
| 14. | Explain Simulator. | 2 | **Understand** |
| 15. | Define DMA. | 1 | **Remember** |
| 16. | Distinguish between CISC and RISC. | 2 | **Understand** |
| 17. | Classify the types of processors in Embedded System. | 3 | **Apply** |
| 18. | Define Embedded system. | 1 | **Remember** |
| 19. | How can an embedded system be illustrated? | 3 | **Apply** |
| 20. | Write about memory management system used in Embedded system. | 6 | **Create** |
| 21. | List out some classifications of embedded systems | 1 | **Remember** |
| 22. | Analyze the list of steps involved in the design of an embedded systems. | 4 | **Analyze** |
| 23. | Analyze the factors to be considered while selecting a processor for an embedded system. | 4 | **Analyze** |
| 24. | Classify various forms of memory used in embedded systems | 3 | **Apply** |
| **PATR-B** | | | |
| 1. | How do you select processor for different application of Embedded system? (13) | 1 | **Remember** |
| 2. | Explain the classification of embedded systems with examples. (13) | 1 | **Remember** |
| 3. | Outline the process of memory allocation for different application of Embedded systems. (13) | 1 | **Remember** |

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|---|---|---|---|---|
| 4. | Write a short note on | | 1 | **Remember** |
| | (i) | Timing unit. (7) | | |
| | (ii) | Counting devices. (6) | | |
| 5. | Describe the advanced architectures of embedded processor with neat diagram. (13) | | 2 | **Understand** |
| 6. | (i)How much amount of memory required for Embedded systems for different applications. (7)<br>(ii)Compare memory allocation for different application of Embedded system. (6) | | 2 | **Understand** |
| 7. | With a neat diagram explain the working of Direct Memory Access (DMA) with architecture. (13) | | 2 | **Understand** |
| 8. | Discuss the following terms | | 3 | **Apply** |
| | (i) | In Circuit Emulator (6) | | |
| | (ii) | Target Hardware Debugging (7) | | |
| 9. | Demonstrate about the different data transfer techniques involved in DMA method. (13) | | 3 | **Apply** |
| 10. | Explain the main components of Embedded hardware units with neat diagram. (13) | | 4 | **Analyze** |
| 11. | Describe about the structural units of processor architecture and advanced processor architecture with neat diagram. (6+7) | | 4 | **Analyze** |
| 12. | Explain the various forms of memories present in an embedded systems. (13) | | 4 | **Analyze** |
| 13. | Recommend an embedded processor for any application of your own.(13) | | 6 | **Create** |
| 14. | Describe the design process for embedded system | | 4 | **Analyze** |
| 15. | Analyze the design metrics used in embedded systems | | 4 | **Analyze** |
| 16. | Briefly explain some examples for each classifications of an embedded systems. | | 2 | **Understand** |
| 17. | With a neat diagram discuss the following terms in Embedded Processor | | 5 | **Evaluate** |
| | Watch dog Timer. (6) | | | |
| | Real Time Clock. (7) | | | |
| **PART – C** | | | | |
| 1. | Mention the necessary hardware units that must be present in the embedded systems. (15) | | **2** | **Understand** |
| 2. | Elaborate about Structural unit of Embedded Processor including processor architecture and advanced processor architecture. (15) | | 5 | **Evaluate** |
| 3. | Analyze in detail with suitable diagram for | | **3** | **Apply** |
| | (i) | In Circuit Emulator. (7) | | |
| | (ii) | Target Hardware Debugging. (8) | | |
| 4. | Discuss in detail about Timer and counting devices for Embedded systems with neat diagram. (15) | | 5 | **Evaluate** |
| 5 | Analyze the challenges present in embedded system design. (15) | | 4 | **Analyze** |

| UNIT II - EMBEDDED NETWORKING | | | | |
|---|---|---|---|---|
| **Embedded Networking: Introduction, I/O Device Ports & Buses– Serial Bus communication protocols RS232 standard – RS422 – RS 485 - CAN Bus -Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I2C) –need for device drivers. USB, Bluetooth, Zigbee.** | | | | |
| **PART – A** | | | | |
| **Q.No** | **Questions** | | **BT Level** | **Competence** |
| 1. | What is half duplex communication? | | 1 | **Remember** |
| 2. | Expand :<br>(a) SPI<br>(b) SCI | | 2 | **Understand** |
| 3. | What is a CAN bus? Where is it used? | | 1 | **Remember** |
| 4. | Show which is better Zigbee or Bluetooth? | | 3 | **Apply** |
| 5. | State the special features of $I^2C$. | | 1 | **Remember** |
| 6. | Define body electronics. | | 1 | **Remember** |
| 7. | Mention few serial bus communication protocols. | | 1 | **Remember** |
| 8. | Distinguish between Synchronous and Asynchronous communication. | | 2 | **Understand** |
| 9. | Draw the write byte format and read byte format of $I^2C$. | | 2 | **Understand** |
| 10. | Classify I/O devices in embedded system. | | 3 | **Apply** |
| 11. | What are the two characteristics of synchronous communication? | | 1 | **Remember** |
| 12. | State the difference between RS422 and RS485. | | 4 | **Analyze** |
| 13. | Differentiate between RS232 and RS485. | | 2 | **Understand** |
| 14. | Explain about the limitations of $I^2C$. | | 5 | **Evaluate** |
| 15. | Justify the need for RS-485. | | 6 | **Create** |
| 16. | Analyze the features of RS232 standard. | | 4 | **Analyze** |
| 17. | What is USB? Where is it used? | | 1 | **Remember** |
| 18. | Compare the buses used in serial communication. | | 4 | **Analyze** |
| 19. | Draw the data frame format of CAN. | | 3 | **Apply** |
| 20. | What is the need for device driver? Justify it. | | 6 | **Create** |
| 21. | Does Zigbee use Bluetooth? | | 5 | **Evaluate** |
| 22. | List out the classifications of device drivers. | | 3 | **Apply** |
| 23. | Analyze the limitations of Bluetooth. | | 4 | **Analyze** |
| 24. | Mention the structural units of and application areas ZigBee | | 5 | **Evaluate** |
| **PART-B** | | | | |
| 1. | (i) | Describe the functions of a I/O interface with a neat diagram. (8) | 1 | **Remember** |
| | (ii) | Explain the classification of IO devices. (5) | | |
| 2. | Elaborate the architecture of CAN with necessary sketches (13) | | 4 | **Analyze** |
| 3. | Write a short note on | | 1 | **Remember** |
| | (i) | Data frame format in CAN bus (7) | | |
| | (ii) | Error frame format in CAN bus (6) | | |
| 4. | Explain in detail about serial bus communication protocols. (13) | | **2** | **Understand** |
| 5. | With neat diagram, explain about EIA 485 standard Configuration. (13) | | 5 | **Evaluate** |
| 6. | Demonstrate with all necessary sketches to enable intra communications among peripherals using $I^2C$ bus. (13) | | **2** | **Understand** |
| 7. | Tabulate the difference between the EIA 232, EIA 485 and EIA 422 standard. (13) | | 1 | **Remember** |
| 8. | Illustrate about the following multiple slave configuration in SPI bus | | | |
| | (i) | Independent slave configuration. (7) | 3 | **Apply** |
| | (ii) | Daisy chain configuration. (6) | | |

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|---|---|---|---|
| 9. | Explain in detail about SPI communication protocol and its interfacing techniques. (13) | 1 | **Remember** |
| 10. | Explain with all necessary sketches to enable intra communications among peripherals using $I^2C$ bus. (13) | **6** | **Create** |
| 11. | Explain in detail about | 4 | **Analyze** |
| | (i) Zigbee. (7) | | |
| | (ii) Bluetooth. (6) | | |
| 12. | Explain the various features in USB communication protocol. (13) | **2** | **Understand** |
| 13. | Describe about the EIA 422 standard Configuration with neat diagram and summarize the limitations of EIA 422 standard configuration. (13) | 4 | **Analyze** |
| 14. | Illustrate the EIA -232 interface standard and major elements of EIA -232 with the help of neat diagram. (13) | 3 | **Apply** |
| 15. | Justify the need of device drivers with suitable examples. (13) | 4 | **Analyze** |
| 16. | Explain the functions of master and slave devices during I2C communication. (13) | 4 | **Analyze** |
| 17. | Draw and explain the structure of network during transfer of data using CAN also draw the format of the bits at CAN bus. (13) | **6** | **Create** |
| | **PART-C** | | |
| 1. | Describe one type of serial communication bus with its communication protocol. (15) | **2** | **Understand** |
| 2. | Present a case study on comparison of features of RS-232,RS485 and CAN bus standards. | | |
| 3. | Design the Half-duplex operational sequence of EIA -232 with neat flow sketch between DTE and DCE over public switched telephone network. (15) | **6** | **Create** |
| 4. | Demonstrate the signal using a transfer of byte when using the $I^2C$ bus and also the format of bits at the $I^2C$ bus with diagram. (15) | **1** | **Remember** |
| 5. | Why we need wireless transmission? Choose any one protocol which supports for longer this wireless communication. (15) | **4** | **Analyze** |

| **UNIT III - EMBEDDED FIRMWARE DEVELOPMENT ENVIRONMENT** | | | |
|---|---|---|---|
| **Embedded Product Development Life Cycle- objectives, different phases of EDLC, Modelling of EDLC; issues in Hardware-software Co-design, Data Flow Graph, state machine model, Sequential Program Model, concurrent Model, object oriented Model.** | | | |
| | **PART-A** | | |
| **Q.No** | **Questions** | **BT Level** | **Competence** |
| 1. | List the different phases in EDLC. | **1** | **Remember** |
| 2. | Mention different models used for the development of an embedded system. | **2** | **Understand** |
| 3. | Summarize the objective of EDLC. | **2** | **Understand** |
| 4. | Point out the features of Linear or Water fall Model. | **5** | **Evaluate** |
| 5. | Classify the 3 categories of product development. | **3** | **Apply** |
| 6. | Define Conceptualization phase. | **1** | **Remember** |
| 7. | Define Product design phase and development phase. | **1** | **Remember** |
| 8. | Elucidate on data flow graph. | **5** | **Evaluate** |
| 9. | What is meant by need? | **1** | **Remember** |

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| 10. | What are the activities performed in deployment phase? | **1** | **Remember** |
| 11. | Why is state model essential? | **4** | **Analyze** |
| 12. | Define Evolutionary Model. | **3** | **Apply** |
| 13. | What is state machine model? | **4** | **Analyze** |
| 14. | What are the differences between data flow model and finite state model? | **2** | **Understand** |
| 15. | State Object Oriented Model. | **1** | **Remember** |
| 16. | Summarize the advantages and disadvantages of Linear or Water fall model. | **2** | **Understand** |
| 17. | Analyze the issues of hardware-software co-design. | **4** | **Analyze** |
| 18. | Mention the different types of product development. What are the processes involved in Co-Design? | **6** | **Create** |
| 19. | Justify the quality of products. | **6** | **Create** |
| 20. | Define Concurrent Model. | **3** | **Apply** |
| 21. | List out the various types of models in program model | **4** | **Analyze** |
| 22. | What is meant by SDFG? | **1** | **Remember** |
| 23. | Define state machine and state transition | **1** | **Remember** |
| 24. | Give some examples for non-acyclic data input. | **3** | **Apply** |
| | **PART – B** | | |
| 1. | Explain in detail about Embedded Product Development Life Cycle(EDLC). (13) | **3** | **Apply** |
| 2. | Mention the essential and objectives of following phases of Embedded Product Development Life Cycle<br>(i) Need phase (6)<br>(ii) Conceptualization phase (7) | **2** | **Understand** |
| 3. | Demonstrate about the State Machine Model of an Automatic Tea Vending Machine with suitable example. (13) | **4** | **Analyze** |
| 4. | Describe Data Flow Graph model, Control Data Flow Graph model and State Machine model with a suitable example. (13) | **1** | **Remember** |
| 5. | Name the different phases of ELDC and explain EDLC model with neat diagram. (13) | **2** | **Understand** |
| 6. | Discuss in detail about the computational models of Concurrent Process Model and Sequential Program Model computational models in embedded system. (13) | **5** | **Evaluate** |
| 7. | (i) Describe in detail explain the Waterfall model and Incremental or Fountain Model with suitable flowchart. (7) | **1** | **Remember** |
| | (ii) Describe in detail explain the Evolutionary model and spiral Model with suitable flow chart. (6) | | |
| 8. | Discuss in detail about Hardware Software co-Design and program modelling. (13) | **3** | **Apply** |
| 9. | Discuss about the fundamental issues in Hardware and Software Co-Design. (13) | **5** | **Evaluate** |
| 10. | (i) Explain about sequential program model for the development of embedded platform. (6) | **1** | **Remember** |
| | (ii) With a suitable example, explain about the State Machine model of embedded platform. (7) | | |
| 11. | (i) Write detailed notes on Linear and iterative model in EDLC. (7) | **2** | **Understand** |
| | (ii) Explain about prototyping model and spiral model in EDLC. (6) | | |
| 12. | (i) Explain about Concurrent Process Model with suitable diagram.(6) | **1** | **Remember** |
| | (ii) Explain the Object Oriented Model with suitable example. (7) | | |

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| 13. | Illustrate the following type of computational state model<br>(i) Data Flow Graph Type Model. (7)<br>(ii) State Diagram Type Model. (6) | **4** | **Analyze** |
| 14. | Explain the Sequential Model Program for seat belt warning system with suitable flow chart. (13) | **6** | **Create** |
| 15. | What are the various types of program models and explain briefly. (13) | **1** | **Remember** |
| 16. | Explain briefly about State machine programming models for event controlled program flow. (13) | **2** | **Understand** |
| 17. | Explain in detail about Concurrent process and its implementation.(13) | **4** | **Analyze** |
| | **PART – C** | | |
| 1. | Evaluate functional description about the different phases of Embedded Design Life Cycle Method. (15) | **3** | **Apply** |
| 2. | Analyze the various modeling of EDLC With neat flow chart. (15) | 4 | **Analyze** |
| 3. | Analyze the various computational models in embedded design with suitable example. (15) | **2** | **Understand** |
| 4. | With a neat diagram, explain about State Machine Model for seat belt alarm system. (15) | **6** | **Create** |
| 5. | Explain the design concept of an Elevator control mechanism using a sequential model. (15) | **6** | **Create** |

**UNIT IV - RTOS BASED EMBEDDED SYSTEM DESIGN**

**Introduction to basic concepts of RTOS- Task, process & threads, interrupt routines in RTOS, Multiprocessing and Multitasking, Pre-emptive and non-pre-emptive scheduling, Task communication-shared memory, message passing-, Inter process Communication – synchronization between processes-semaphores, Mailbox, pipes, priority inversion, priority inheritance**

**PART-A**

| Q.No | Questions | BT Level | Competence |
|---|---|---|---|
| 1. | Define task and task state. | 1 | **Remember** |
| 2. | Demonstrate the Process Control Block (PCB). | 3 | **Apply** |
| 3. | What is multithreading? | 1 | **Remember** |
| 4. | Differentiate pre-emptive and non pre-emptive multitasking. | 5 | **Evaluate** |
| 5. | Define real time operating system. | 1 | **Remember** |
| 6. | Point out the consequences of context switching. | 4 | **Analyze** |
| 7. | List the functions of kernel. | 1 | **Remember** |
| 8. | Define multi-rate embedded system. | 2 | **Understand** |
| 9. | Compare the release time and deadline. | 4 | **Analyze** |
| 10. | How deadlock condition is raised in embedded system? | 5 | **Evaluate** |
| 11. | Compare pre-emptive and non pre-emptive scheduling. | 2 | **Understand** |
| 12. | Classify the three basic scheduling states in OS. | 3 | **Apply** |
| 13. | Define scheduling policy. | 1 | **Remember** |
| 14. | What do you mean by priority inversion? | 2 | **Understand** |
| 15. | Compare user threads and kernel threads. | 4 | **Analyze** |
| 16. | Justify the use of a thread in a process. | 6 | **Create** |

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| 17. | Discuss the concept of message passing. | 2 | **Understand** |
| 18. | Define shared data problem. | 1 | **Remember** |
| 19. | How can a scheduling process be explained in real time? | 6 | **Create** |
| 20. | Compare counting semaphore and binary semaphore. | 3 | **Apply** |
| 21. | List out the various types of task states. | 4 | **Analyze** |
| 22. | What is meant by context and context switching? | 1 | **Remember** |
| 23. | Differentiate counting semaphore and binary semaphore. | 2 | **Understand** |
| 24. | What is Deadlock situation? | 1 | **Remember** |
| | **PART-B** | | |
| 1. | Describe the real time operating systems. Compare its features with window based real time operating systems. (13) | 1 | **Remember** |
| 2. | Discuss in detail about semaphores and its applications. (13) | 2 | **Understand** |
| 3. | Show the appropriate diagrams explain multiple tasks and multiple processes. (13) | 6 | **Create** |
| 4. | Write brief notes on<br>(i) Pre-emptive multitasking. (6)<br>(ii) Non-pre-emptive multitasking. (7) | 1 | **Remember** |
| 5. | With an example describe the different methods of Task scheduling algorithm. (13) | 1 | **Remember** |
| 6. | (i) Discuss critical section service by a pre-emptive scheduler. (7)<br>(ii) Brief about priority inheritance (6) | 2 | **Understand** |
| 7. | (i) List out the goals of operating system services. (5)<br>(ii) Describe about round robin scheduling with a suitable diagram. (8) | 4 | **Analyze** |
| 8. | Show the appropriate diagrams explain Task Communication and Synchronization. (13) | 3 | **Apply** |
| 9. | How do you resolve shared data problem in Embedded system? Explain the methods involved in it. (13) | 4 | **Analyze** |
| 10. | What is IPC? Mention the two methods available for it. Explain in detail about message queues. (13) | 2 | **Understand** |
| 11. | Discuss about the basic concepts for Inter Process Communication. (13) | 5 | **Evaluate** |
| 12. | Summarize the system level and task service functions of<br>(i) Priority inversion. (6)<br>(ii) Priority inheritance. (7) | 4 | **Analyze** |
| 13. | Explain how the interrupt routines are handled by RTOS. (13) | 1 | **Remember** |
| 14. | Explain the following<br>(i) Mailbox and message for inter process communication. (8)<br>(ii) Pipe and queue for multitasking. (5) | 3 | **Apply** |
| 15. | What is meant by shared data? Explain the various problems present in shared data. How it can overcome? (13) | 2 | **Understand** |
| 16. | Explain in detail about memory management and its managing strategy.(13) | 2 | **Understand** |
| 17. | Discuss in detail about inter process communication. (13) | 6 | **Create** |
| | **PART-C** | | |

| | | | |
|---|---|---|---|
| 1. | Explain task, process and thread with their types and examples which aids the real time system. (15) | 2 | **Understand** |
| 2. | Analyze interrupt handling mechanism for (i) Polling (ii) Wait States (iii) Interrupt. (15) | 1 | **Remember** |
| 3. | Analyze the various terminologies given below (i) Semaphores (ii) Mail box (iii) Pipes (iv) Shared memory RTOS. (15) | 1 | **Remember** |
| 4. | Define the term Multitasking. How the multitasking is distinguished with multiprocessing. (15) | 6 | **Create** |
| 5. | Elaborate the Interrupt routines in RTOS environment and handling of interrupt source calls. (15) | 6 | **Create** |

| **UNIT V - EMBEDDED SYSTEM APPLICATION DEVELOPMENT** | | | |
|---|---|---|---|
| **Case Study of Washing Machine- Automotive Application- Smart card System Application-ATM Machines-Digital Camera.** | | | |
| **PART-A** | | | |
| **Q.No** | **Questions** | **BT Level** | **Competence** |
| 1. | What is meant by smart card? What are the events involved in smart card application? | 1 | **Remember** |
| 2. | State the basic requirements while designing an embedded system. | 1 | **Remember** |
| 3. | Show the architectural hardware units needed in automotive applications. | 3 | **Apply** |
| 4. | List some evident examples of Real time embedded application. | 1 | **Remember** |
| 5. | What is the hardware units needed to design smartcard? | 5 | **Evaluate** |
| 6. | State the tasks for smartcard. | 1 | **Remember** |
| 7. | Integrate the various types of memory units that must be present in smartcard, adaptive cruise control and washing machine. | 2 | **Understand** |
| 8. | Show the architectural hardware units needed in washing machine. | 3 | **Apply** |
| 9. | Name the software units needed to design Digital Camera. | 1 | **Remember** |
| 10. | Draw the system components in the smart card. | 3 | **Apply** |
| 11. | Summarize the applications of embedded system. | 2 | **Understand** |
| 12. | Points out the various inter process communication methods required in implementing the washing machine. | 4 | **Analyze** |
| 13. | What is the hardware units needed to design adaptive cruise control? | 2 | **Understand** |
| 14. | Discuss the design specification for automatic washing machine. | 5 | **Evaluate** |
| 15. | What is the software units needed to design Automotive application? | 2 | **Understand** |
| 16. | Justify the need for watchdog timer. | 6 | **Create** |
| 17. | Analyze the major function of timer device in an Automotive application. | 4 | **Analyze** |
| 18. | Define the tasks for an ATM. | 1 | **Remember** |
| 19. | Recommend the different task for washing machine. | 6 | **Create** |
| 20. | Explain the various inter process communication methods required in implementing the smartcard. | 4 | **Analyze** |
| 21. | List out the various basic functions of RTOS. | 4 | **Analyze** |
| 22. | List out the various features or functions present in MUCOS-II. | 4 | **Analyze** |
| 23. | What are the various features of Vx Works? | 1 | **Remember** |
| 24. | What are major role of Adaptive Cruise Control (ACC)? | 1 | **Remember** |
| **PART – B** | | | |
| 1. | Elucidate the selection of processor and memory for any one embedded applications with suitable diagram in detail. (13) | 5 | **Evaluate** |

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| 2. | With suitable diagram explain in detail about the concept of washing machine application for Embedded system. (13) | 6 | **Create** |
| 3. | Tabulate hardware units needed in each of the systems: Smart card, Automotive applications, Washing machine. (13) | 4 | **Analyse** |
| 4. | Discuss the case study an adaptive crusie control system with neat diagram. (13) | 6 | **Create** |
| 5. | List various types of memories and the application of each in the following systems: Automotive applications, Smart card, and Washing machine. (13) | 4 | **Analyse** |
| 6. | Show and explain basic system of Automotive applications. (13) | 6 | **Create** |
| 7. | Apply suitable hardware and software to develop the embedded system for a smart card. (13) | 6 | **Create** |
| 8. | (i)With suitable diagram explain in detail about the concept of Smart Card System Application. (7)<br>(ii) Design architectural hardware and software units needed in smart card. (6) | 6 | **Create** |
| 9. | (i)With suitable Hardware and Software explain the case study for a High end CAR using Embedded System. (6)<br>(ii) Identify the tasks for a High end CAR. Explain the various inter process communication methods required in implementing the application. (7) | 6 | **Create** |
| 10. | With suitable diagram explain in detail about the concept of Automated Teller Machine. (13) | 1 | **Remember** |
| 11. | Identify and explain hardware units needed in digital camera. (13) | 2 | **Understand** |
| 12. | Discuss case study an ambulance vehicle with class diagram. (13) | 4 | **Analyse** |
| 13. | With suitable hardware and software explain the Digital Camera of the automotive embedded application domain. (13) | 6 | **Create** |
| 14. | With a suitable example, explain about an Automatic Chocolate Vending Machine. (13) | 6 | **Create** |
| 15. | Explain briefly about various design process in Adaptive cruise control in a car system. (13) | 2 | **Understand** |
| 16. | Explain briefly about various design process in Automatic Chocolate Vending Machine. (13) | 2 | **Understand** |
| 17. | Write the case study on IoT based Smart Irrigation with examples. (13) | 6 | **Create** |
| | **PART – C** | | |
| 1. | Create the block diagram for the case study of Embedded System for an Adaptive Cruise Control Systems in a car. (15) | 6 | **Create** |
| 2. | With suitable Hardware and Software explain the case study for an ATM Machine using Embedded System. (15) | 6 | **Create** |
| 3. | With suitable Hardware and Software explain the case study for a Washing Machine using Embedded System. (15) | 6 | **Create** |
| 4. | Design and discuss an embedded system solution for a typical automotive system. Your answer must include design and development of necessary hard wares and software for an automotive system to incorporate efficient fuel management systems, vehicle performance monitoring systems, and vehicle tracking and navigation systems. (15) | 6 | **Create** |
| 5. | Write the case study on IoT based Weather monitoring with examples. (15) | 6 | **Create** |