

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
Eighth Semester B.Tech. Degree Examinations, September 2020

Course Code: CS404
Course Name: Embedded Systems

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 4 marks.

Marks

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| 1 | What are the building blocks of UML? | (4) |
| 2 | List the pros and cons of assembly language based embedded firmware development | (4) |
| 3 | Which are the different levels of abstraction that have to be analysed to understand the real-time behaviour of an embedded computing system? | (4) |
| 4 | List out the major drawbacks of 'super loop' based embedded system design with suitable examples. | (4) |
| 5 | Differentiate between In System Programming (ISP) and In Application Programming (IAP). | (4) |
| 6 | What is the purpose of 'Reverse engineering' in Embedded Product development? Also explain the tools used for reverse engineering. | (4) |
| 7 | Draw a sequential program model for Seat Belt Warning System of an automobile | (4) |
| 8 | Describe the Interrupt Handling mechanism of MicroC/OSII kernel. | (4) |
| 9 | What are the recent trends in embedded operating systems? | (4) |
| 10 | What are the limitations of standard Java in embedded application development? | (4) |

PART B

Answer any two full questions, each carries 9 marks.

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| 11 | Draw a system architecture diagram for a GPS hand held map and refine it to hardware and software architectural block diagrams with explanation. | (9) |
| 12 | a) Draw a Finite State Machine diagram for modeling the operation of a timer, indicating and explaining all the states, events, transitions and actions. | (5) |
| | b) Compare embedded systems and general purpose computers. | (4) |
| 13 | a) Explain Data Flow Graph/Diagram (DFGs) with an example. | (3) |

- b) Which type of embedded applications is best modeled using DFGs? (1)
- c) Illustrate multiple inheritance in UML with a neat diagram. (5)

PART C

Answer any two full questions, each carries 9 marks.

- 14 Illustrate a typical embedded system development environment with a neat figure and explain each of its components. (9)
- 15 Describe embedded firmware design approaches. (9)
- 16 a) List the advantages of High Level Language Based Development of embedded firmware. (4)
- b) List and explain the advantages and limitations of Simulator Based Debugging. (5)

PART D

Answer any two full questions, each carries 12 marks.

- 17 a) Three processes with process IDs P1, P2, P3 with estimated completion time 10, 5, 7 milliseconds and priorities 0, 3, 2 (0—highest priority, 3—lowest priority) respectively enters the ready queue together. Calculate the waiting time and Turn Around Time (TAT) for each process and the Average waiting time and Turn Around Time (Assuming there is no I/O waiting for the processes) in priority based scheduling algorithm. (6)
- b) What are the important functional and non-functional requirements that need to be analysed in the selection of an RTOS for an embedded design? (6)
- 18 Describe the modelling techniques for modelling the stages involved in the embedded product development life cycle. (12)
- 19 a) State and explain the three primary objectives of Embedded Product Development Life Cycle (EDLC) (6)
- b) Explain the various activities performed during the Deployment phase of an embedded product. (6)
