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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Eighth Semester B.Tech Degree Regular Examination June 2023 (2019 Scheme)

Course Code: CST464

Course Name: EMBEDDED SYSTEMS

Max. Marks: 100 **Duration: 3 Hours**

PART A

Answer all questions, each carries 3 marks. Marks

1		Distinguish between Embedded Systems and General Purpose Computing Systems.	(3)
2		Explain the role of Real Time Clock (RTC) in Embedded System.	(3)
3		What is the difference between Data Flow Graph (DFG) and Control Data Flow Graph (CDFG)?	(3)
4		Design the Finite State Machine (FSM) Model for Automatic Seat Belt Warning System.	(3)
5		Differentiate Hard real time and Soft real time Operating System.	(3)
6		Define Priority Inversion.	(3)
7		Describe the advantages of 'Assembly language' based Embedded firmware development.	(3)
8		Why EDLC is essential in embedded product development?	(3)
9		What are the firmware requirements for building the Battery Operated Smart Card Reader?	(3)
10		Write about Timewheels. Also mention its applicability in IOT.	(3)

PART B

Answer any one full question from each module, each carries 14 marks.

Module I

11	a)	List out the requirements on a Computer Printer. Think of the non-functional and functional aspects of the product and also what extra features can be added over the basic functions.	(6)
	b)	Describe the relevance of Watchdog Timer and Brown out Protection Circuit in Embedded system design.	(8)

OR

12 a) Discuss about various on-board communication interfaces used in embedded systems. (10)

b) Describe the role of Digital Signal Processor (DSP) and Application Specific Integrated Circuits (ASIC) in Embedded system. (4)

Module II

13 a) Design and Draw a coin operated telephone unit based on Finite State Machine model. Clearly Specify your assumptions in the design. (10)

b) Suppose you are designing a digital motion camera. What are the trade-offs in implementing the multimedia codec part of the camera in hardware and in software. (4)

OR

14 a) With aid of diagram explain about hardware-software co design process. Also Explain the fundamental issues present in this design process. (10)

b) Under certain circumstances object oriented program model is considered as the best. Justify your answer. (4)

Module III

15 a) Three processes with process IDs P1, P2, P3 with estimated completion time 10, 5, 7 milliseconds 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 SJF algorithm. (8)

b) What is the need of Task synchronization? Explain How Mutual Exclusion through Busy Waiting and Semaphore achieves synchronization. (6)

OR

16 a) Discuss about Shared memory and Remote Procedure call task communication techniques. (10)

b) How to choose an RTOS for an Embedded Design? List out the functional requirements. (4)

Module IV

17 a) What are the difference between *Super loop* based and *OS* based embedded firmware design? Which one is the better approach? (8)

b) What life cycle model do you prefer for the development of complex embedded products and situations where requirements are changing from customer side? Give explanation. (6)

OR

18	a)	Explain the different ways of Mixing Assembly and High level Language. Also mention the conversion steps.	(9)
	b)	Differentiate In System Programming (ISP) and In Application Programming (IAP)?	(5)

Module V

19	a)	Illustrate the working of an Automated Meter Reading (AMR) system with suitable diagram. List out the firmware required for an AMR.	(10)
	b)	Identify the components required to build a Smart Watch system.	(4)

OR

20	a)	Explain Any two communication buses used in automotive applications.	(8)
	b)	Explain about wireless standards such as ZigBee and Bluetooth Low Energy.	(6)

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