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Pages: 2

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S4 (S,FE) Examination January 2026 (2019 Scheme)

Course Code: RAT206

Course Name: MICROCONTROLLERS AND EMBEDDED SYSTEMS

Max. Marks: 100 Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks)

		Marks
1	Define the terms a) system clock b) system buses of a computer.	3
2	Draw the structure of I/O Port1 of 8051 microcontrollers.	3
3	Define an interrupt of 8051.	3
4	Describe register format and functions of each bit of IE register.	3
5	Identify the different types of Embedded Systems.	3
6	List the advantages of Embedded Systems.	3
7	List out the features of Atmega328P in Arduino UNO.	3
8	Describe different mode options available in the pin function of Arduino UNO: pinMode (pin no, Mode)	3
9	Describe the function of a Task scheduler in an Operating System.	3
10	Differentiate between hard-Realtime and soft-Realtime task.	3

PART B

(Answer one full question from each module, each question carries 14 marks)

Module -1

11	a)	Illustrate the register format of PSW with functions of each bit.	4
	b)	Describe the memory organization of 8051 with a list of any 5 SFR and its role.	10
12	a)	Identify the addressing modes used in the following instructions of 8051: a) MOVX @DPTR, A b) PUSH 0E0H c) ADD A, R5 d) MOV @R1, A e) MOVC A, @A+DPTR f) MOV A, #10001001B.	6
	b)	Write an assembly language program to add 10 numbers stored from 4601H to 460AH, store the result at location 460BH.	8

Module -2

13	a)	With the help of a diagram explain in detail the interrupt structure of 8051 microcontroller.	10
	b)	Given the clock frequency =11.0592MHz of 8051, calculate the hexadecimal value to be loaded into the Timer0 register to generate a delay of 1ms.	4
14	a)	Write an embedded C program to display 'MCES END SEM EXAM'25' on an LCD interfaced with ports P2 and P1 of 8051.	10
	b)	Describe the steps to be done by the microcontroller to handle the occurrence of an interrupt.	4

Module -3

15	a)	Draw and explain in detail the Embedded System Hardware Architecture.	9
	b)	Illustrate the application of Embedded System in Automotive Electronics.	5
16	a)	Identify the different steps involved in the Embedded System Design Process.	10
	b)	Compare general purpose computer system with an Embedded System.	4

Module -4

17	a)	Write a program to blink an LED with a push button switch interfaced with Arduino UNO.	8
	b)	Describe how we can program Arduino using the Arduino IDE.	6
18	a)	Define GPIO and its associated functions.	4
	b)	Write a program to display numbers 0 to 9 using a 7-segment display interfaced with Arduino UNO.	10

Module -5

19	a)	Draw and explain state transition diagram/process life cycle of a process in an OS.	7
	b)	Differentiate between microkernel and monolithic kernel.	7
20	a)	Identify the features of communication protocols a) USB b) I2C.	5
	b)	Describe the functions of an OS.	9

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