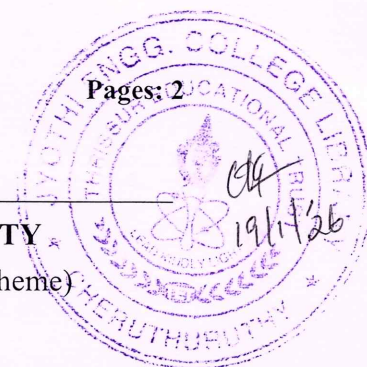


Reg No.: _____

Name: _____

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
