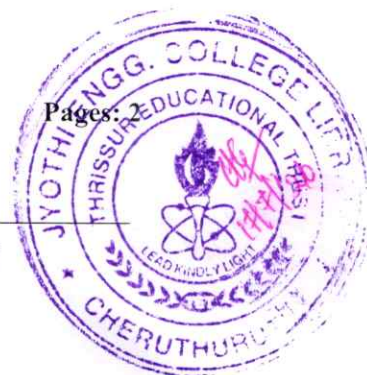




Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
B.Tech Degree S4 (S,FE) Examinations May 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 | Describe the basic block diagram of a computer. | 3 |
| 2 | Define the term 'computer architecture' and summarize the type of computer architecture and instruction type of 8051 microcontroller. | 3 |
| 3 | Explain the role of SCON register in selecting different modes of serial communication in 8051. | 3 |
| 4 | Illustrate how an LED can be connected to pin P2.3 of 8051. | 3 |
| 5 | Define an Embedded System and describe the components also. | 3 |
| 6 | List 3 examples of embedded systems from consumer electronics. | 3 |
| 7 | Identify the digital I/O pins of Arduino UNO which has the PWM feature. | 3 |
| 8 | Describe the technical specifications of Arduino UNO. | 3 |
| 9 | List 3 examples for RTOS. | 3 |
| 10 | Differentiate Task/process Vs Thread in an OS. | 3 |

PART B

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

Module -1

- | | | |
|----|---|---|
| 11 | a) With the help of the pinout of 8051 microcontroller, Illustrate the alternate functions of I/O ports P3, P2 and P0. | 9 |
| | b) List out the type of instructions in 8051 microcontrollers. | 5 |
| 12 | a) a) MUL AB c) DIV AB d) MOVX A, @DPTR explain the functions of register Accumulator in the above given instructions. | 6 |
| | b) Write an assembly language program to perform the following arithmetic operations a) addition b) subtraction | 8 |

Module -2

- | | | |
|----|---|---|
| 13 | a) Write an ALP to turn on and turn off an LED by interfacing with 8051 microcontroller | 5 |
|----|---|---|

- b) Describe in detail 4 different operating modes of Timer and counter operation of 16-bit Timer0/1 in 8051. 9
- 14 a) Write a program (embedded C) to display numbers "0 to 9" continuously on a 7-segment display interfaced with Port 2 of 8051. 10
- b) Summarize the interrupt sources of 8051 microcontroller. 4

Module -3

- 15 a) Explain in detail the software development tools used in Embedded System design process. 8
- b) Describe the hardware-software co-design steps in the Embedded System development process. 6
- 16 a) Discuss the desirable features and characteristics of an Embedded System. 5
- b) Summarize the embedded system development Water-fall lifecycle model. 9

Module -4

- 17 a) With the help of a board level schematic explain the different elements of Arduino UNO board. 10
- b) Write a program to blink an LED continuously. 4
- 18 a) Illustrate basic GPIO functions available in Arduino UNO. 7
- b) Write a program to rotate stepper motor in the clockwise direction in a loop. 7

Module -5

- 19 a) Explain in detail memory hierarchy and virtual memory concept in an OS. 8
- b) Describe the functional layers of an OS in detail. 6
- 20 a) Discuss the features of the communication protocols RS 232 and SPI. 8
- b) Compare GPIO with RTOS. 6
