Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S4 (R,S) Examination April 2025 (2019 Scheme)

Course Code: MRT206

Course Name: MICROPROCESSOR & EMBEDDED SYSTEMS

Max. Marks: 100 Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks) Marks

1	Draw the clean diagram of the 8085-flag register and its working.	3
2	Define the direct and immediate addressing mode of 8085 with suitable examples.	3
3	Differentiate between microcontroller and microprocessor with suitable example.	3
4	Define the waterfall lifecycle model for embedded system design.	3
5	Configure 8255 with Port A as input, Port B as output, Port C (L) as output, port C (upper) as input using mode=00. Specify the configuration byte code to be loaded to control register.	3
6	Define soft and hard real-time systems with specific examples.	3

Answer questions 7-10 based on the given case.

In a factory having 250 employees, late coming of employees is managed by 8051 (16 MHz frequency) based system, Employees coming later than 10 minutes have to enter their names in a register. Such employees get 0.9 times of their daily wages for the days they have reported late.

At exactly 8.00 AM the supervisor presses a switch which sends a HIGH signal to P0.0. Exactly after 10 minutes (time delay managed by timer 1), 8051 glows LED connected to P0.7. It also sends 0FFH to port P1. This action opens a separate gate for latecomers.

The latecomer gate has an IR sensor which sends a pulse to P3.4 (i.e. T0 input to timer/counter 0) as soon as an employee enters. The late comers are allowed only for 15 minutes (Time delay managed by software). At that instant 8051 sends 00H to port P1 which closes the gate.

The number of latecomers is sent to port P2. If the number of latecomers is more than 30 then LED connected to P0.6 is glowed. The supervisor then takes suitable action

Note – Sending a HIGH signal to port line connected to LED will glow the LED.

7	Develop hardware schematic diagram of the complete system.	3

8		Develop delay strategy and delay routine for 10 minutes using Timer/Counter 1.	3
9		Develop delay strategy and delay routine for 15 minutes by software.	3
10		Develop program using assembly language with comments at every stage to explain the logic	3

PART B

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

Module -1

11	a)	Draw the CPU block diagram of the 8085 microprocessor.	7
	b)	Define different I/O ports of 8255 PPI in detail.	7
12		Write a subroutine in 8085 to produce a delay of 10seconds at 2MHz frequency using register pair.	14

Module -2

13 a) Classify whether the following pins are input or output and explain their functions- 6

a. INTA b. ALE c. RST d. HLDA

b) Decode the following 8051 program and write the operation and result at each step. 8

```
ORG 00H
SJMP 30H
ORG 30H
MOV R0, #40H
MOV DPTR, #ARY
LL: CLR A
MOVC A, @A+DPTR
MOV 30H, A
PUSH 30H
INC DPTR
CJNE A, #00, LL
MOV R5, #08
LM: POP 20H
MOV @R0, 20H
INC R0
DJNZ R5, LM
SJMP $
ARY: DB "EMOCLEW",0
END
```

14 Draw the interfacing block diagram of 8051 microcontroller with 8255 14

PPI. Also, define the latch chip and role of ALE pin.

Module -3

15 Define the terms coupling and cohesion in embedded system design. State and define various types of cohesion in embedded system design 14

16 Explain the following terms concerning C program execution: 14

i) Compiler ii) Assembler iii) Linker iv) Loaders.

Also, draw the process flow chart to show the role of the above terms in executing the Embedded C program.

Module -4

17 Write programs for Intel 8051 Microcontroller that will accomplish the desired tasks listed below, using a few lines of code as possible. Comment on each line of code. 14

Display characters 'A' 'B', 'C' and 'D' on Seven Segment Display.

Note:

Port B bit 0 i.e. PB0 is used to output serial data

Port C bit 0 i.e. PC0 is used to output clock

18 a) Write a C Program to send hex values for ASCII characters 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, a, b, c, d, e, f to port 1. 7

b) Write a C program to toggle bit D0 of port 1 50,000 times. 7

Module -5

19 Consider the following details of 8051 based embedded system connected to a PC. A block of 50 bytes to be received serially and stored in IDR memory locations 30H onwards. 14

Baud rate = 9600, 8051 frequency=11.0592 MHz

12 clock m/c cycle.

Write an assembly program to transfer the data using serial communication.

20 In a plant when there is gas leakage, the gas detector sends a high to low interrupt on INT0. The 8051 (12MHz clock) starts water spray by sending control signal (5V) to P0.1 and sends alarm signal by blinking LED connected to P2.0(Common Anode). Write a program to support the gas leakage detection in plant. 14

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