Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

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

Answer the questions 1-5 based on given case.

Microcontroller 8051(12 Mhz, 12 Clock Machine Cycle) is used in the dashboard of a car to monitor and control if the vehicle is driven by a drunken driver and when the vehicle collides with another vehicle/wall generating impact in the front. For this purpose, it is interfaced to Breath Analyzer and Impact Sensor.

When vehicle starts then high signal goes to PO.3, and system starts working. When alcohol in driver breaths is beyond prescribed limit, then Breath Analyzer sends high signal to port PO.1. The speed of vehicle is presented on port P1 by speedometer. When another vehicle/wall impacts the vehicle's front then Impact Sensor sends High signal to PO.2. After start, 8051 regularly checks PO.2 every second and PO.1 every minute parallelly.

When input from Breath Analyzer is high then

- If speed of vehicle is less than or equal 20KMPH then LED at P2.1 glows and hazard lights are put in by making P2.2=high

  Following message is written in IDR starting from location 30H:

  - "Drunken Driving".
- If the speed of vehicle is greater than or equal to 40KMPH then all the above actions are taken plus the accelerometer of vehicle is disconnected by making P2.0=High. When Vehicle speed becomes less than or equal to 20 KMPH then it is reconnected, by making P2.0=Low

When input from impact sensor is High and vehicle is running i.e., vehicle has collided, then 8051makes P2.3 High. This will put on the safety balloon system

to save the driver from hitting the steering wheel. The LED at P2.4 glows and following message is written in IDR starting from 50H.

"Vehicle Collision"

All LED's are connected in common cathode fashion i.e., making port bit high will glow LED connected to it.

1		Develop block schematic diagram of above system.	3
2		Develop Strategy for checking the status of PO.1 (after every minute) and PO.2(after every second) in parallel.	3
3		Develop delay routine along with delay calculation for 1 second.	3
4		Develop Flow Chart of the software.	3
5		Develop Program/pseudocode in assembly language with comments at different stages to explain the logic.	3
6		Compare 8085 and 8051 and write at least 3 differences between them.	3
7		A customer is required to purchase certain processor for his embedded system which involves specific controlling of systems. Suggest the customer to choose between Microcontroller and Microprocessor. Mention reasons and advantages for your choice.	3
8		Write and explain the instructions used to access the external memory data in 8051 microcontrollers.	3
9		Using single instruction, how can you transfer the content of register R2 to RegisterR3 (Use Register Bank= 1)?	3
10		Can you transfer the content of IDR location 30H to program memory location 2400H? Elaborate.	3

PART B

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

Module -1

11	a)	Define the flag register of 8085 and explain the working of each pin.	7
	b)	Draw the block diagram of 8085 architecture.	7
12	a)	Explains the cause of the errors in the following instructions	14

a. MOV R0, R4

b. CPL P1

c. PUSH A

d. MOV @R2, #4

e. MOV 2,3

f. MOVC @A+DPTR, A

Module -2

13 Discuss the purpose of 8255 PPI & Explain the operating modes of 8255 PPI. 14

14 Draw the block diagram of interfacing 8085 microprocessor with 1KB memory chip. 14

Module -3

15 Define translators, linkers, Loaders, Debuggers, Profilers. Specify the role of compiler and differentiate it with interpreter. 14

16 a) Explain all types of task classes in real time system? 7

b) Define embedded system and its applications. 7

Module -4

17 a) For an 8051 system of 11.0592Mhz, find how long it takes to execute each of the following instructions: 7

Instruction	Machine Cycles	Time to Execute
MOV R3, #55	1	
DEC R3	1	
DJNZ R2, TARGET	2	
LJMP	2	
SJMP	2	
NOP	1	
MUL AB	4	

b) Explain the flag register of 8051 microcontroller. 7

18 a) Define special function registers in 8051 microcontrollers. 7

b) Decode the following 8051 program and write the operation and result at each 7

step.

```
ORG 00H
SJMP 30H
ORG 30H
AXB DB: 2, 3, 2, 4, 0, 0, 3, 4
MOV R0, #30H
MOV R3, #5
MOV DPTR, #AXB
CLR A
XY: MOVC A, @A+DPTR
MOV @R0, A
INC R0
INC A
DJNZ R3, XY
SJMP $
END
```

Module -5

19 a) Write an embedded C program to generate a square wave for 1ms delay. 7

b) Write a C program to send the data using serial communication. 7

20 a) Write a C program to convert packed BCD 0x29 to ASCII and Display the bytes on P1and P2. 7

Example:

Packed BCD	Unpacked BCD	ASCII
0x29	0x02,0x09	0x32,0x39
00101001	00000010, 00001001	00110010,00111001

b) Write a C program to convert the hex to decimal and display the digits on P0, P1, and P2. 7

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