UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2020
Programme Name: B. Tech- CSE(Mainframe, BAO,CCVT, BFSI, IT-Infra, Graphic & Gaming, MAD, ECRA) Semester   : V
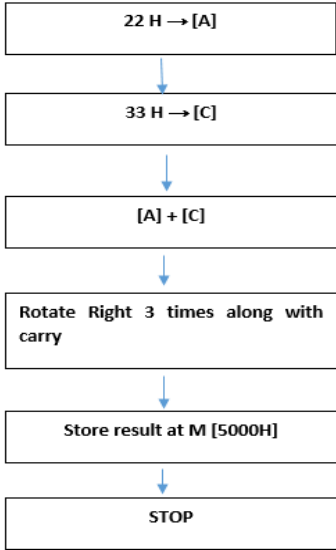**Course Name   : Microprocessor & Embedded Systems**   **Time   : 03 hrs**
Course Code   : CSEG 3018   **Max. Marks: 100**
Nos. of page(s)   : 03
Instructions: Assume any data in programming, if required

SECTION-A (6 x 5 = 30 Marks)			
S. No.	Attempt *all* the questions	Marks	CO
Q.1	Write the full forms of the followings for microprocessor and microcontroller RISC CISC SFR DMA EEPROM	5	CO2
Q.2	Write the role of the followings pins of 8085 microprocessor ALE HLDA INTR TRAP SOD	5	CO1
Q.3	(a) Write the truth table of the full adder and Boolean expressions. (b) Convert the following number to target base number $(110010100001.000010)_2 = (\quad)_{16}$ $(127.7)_8 = (\quad)_{10}$	3 + 2	CO1
Q.4	Write an assembly language program for 8085 microprocessor as per following flowchart. Hence, determine content of accumulator [A] after operation. 22 H → [A] 33 H → [C] [A] + [C] Rotate Right 3 times along with carry Store result at M [5000H] STOP	5	CO4

Q.5	Define Embedded system. Discuss the challenges and future trends in embedded system	5	CO5
Q.6	Write down the program in assembly language/ C to interface LEDs with port 0 of 8051 microcontroller	5	CO4

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SECTION-B (5 x 10 = 50 Marks)

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	Attempt *all* the questions		
Q.7	(a) Calculate the time delay for the following subroutine with XTAL frequency 3 MHz for 8085 microprocessor. MVI B, 20H LOOP 1: MVI C, 98H LOOP 2: DCR C JNZ LOOP2 DCR B JNZ LOOP 1 RET MVI takes 7 T states, DCR 4 T states, JNZ 7/10 T states and RET 10 T states. **(b)** For a RAM Memory 16 K x 8 RAM IC, Calculate the followings. **(i)** No of Address lines **(ii)** No of data lines **(iii)** No of registers **(iv)** No. of memory cells **(v)** No of chips required using 8K x 8 RAM IC.	6 + 4	CO1
Q.8	Two numbers 98H and 9AH are at 2501 H and 2502 H memory locations and their results are stored in 2503H and 2504 H. Write the ALPs 8085 microprocessor/8051 microcontroller to support the following operations of ALU. (a) Multiplication (b) Division *OR* (c) Draw the pin diagram of 8051 microcontroller and detail the role of each pin and port	10	CO2
Q.9	(a) What are the different types of the flip-flops? Write the detailed working of J-K flip flop using NAND and NOR with truth table/characteristic table and characteristics equation *OR* (b) Explain the working of 3 x 8 decoder with truth table, logic diagram and Boolean expressions	10	CO1
Q.10	Write the assembly language format, development tools and flow to develop the code in assembly language programming in Keil uVision.	10	CO5
Q.11	Write an assembly language/ C program and draw flowchart to interface 4 x 4 matrix keyboard with 8051 microcontroller. Assume P1 and P2 ports are initialized as output and input respectively *OR* Interface the 8051 microcontroller with 7 segment display device and write the assembly/embedded 'C' code to display the numbers 0 to 9.	10	CO4

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SECTION-C (1 x 20 = 20 Marks)

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Attempt any *one* of the followings

Q.12	(a) Calculate the time required to execute the instruction STA 9000 H, if the XTAL frequency is 3 MHz, also explain its timing diagram with the following data shown in table 1. Table 1 STA instruction	10	

Address	Mnemonics	Opcode
800F	STA 9000 H	32
8010		00
8011		90

	(b) Draw and explain the block diagram (decoder circuit) explain the generation of control signals. Also write its corresponding truth table	10	

| Q.12	(c) You are dealing with a simple system that can control 100 car at the maximum. Each time a car enters, microcontroller automatically adds it to a total sum of other cars found in the garage. Each car that comes out will automatically be taken off. When 100 cars park, a signal will turn on signalizing that a garage is full and notifying other drivers not to enter because there is no space available.		
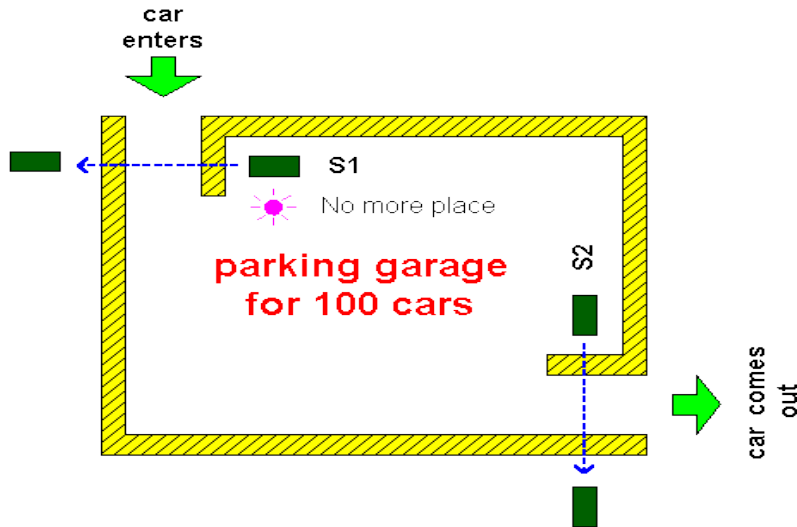
Fig. 1

Signal from a sensor at the garage entrance sets bit IR200.00. This bit is a condition for execution of the following two instructions in a program. First instruction resets carry bit CY (it is always done before some other calculation that would influence it), and the other instruction adds one to a number of cars in word HR00, and a sum total is again stored in HR00. HR memory space is selected for storing a total number of cars because this keeps the status even after supply stops

Develop a code to display the information of car parking on LCD (16 x 2). Use any microprocessor or microcontroller reference to develop the program
(a) FULL PARKING
(b) VACANT PARKING
Also draw the interface diagram to the microcontroller /microprocessor and description of each pin of 16 x 2 LCD.

20   **CO3**