UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course: Microprocessor based control system　　　　　　　　**Semester: V**
Programme: B. Tech. / ADE
Time: 03 hrs.　　　　　　　　　　　　　　　　　　　**Max. Marks: 100**
Instructions: Attempt all the questions

SECTION A		(5 X 4 =20)

S. No.		Marks	CO
Q1	Answer the following questions (a) How many T-states are required for execution of OUT 80H instruction? (i) 10　　　(ii) 13　　　(iii) 4　　　(iv) 7 (b) Which instruction is required to rotate the content of accumulator one bit right along with carry? (i) RLC　　　(ii) RAL　　　(iii) RRC　　　(iv) RAR (c) Which interrupt is not level sensitive in 8085? (i) RST 6.5　　(ii) RST 7.5　　(iii) RST 5.5　　(iv) INTR (d) Consider the following fragment of an 8085 program 　　2000 MVI A, 13H 　　2002 MVI B, 23H 　　2004 ANA B 　　2005 CMA 　　2006 ANI 01H 　　2008 OUT PORT1 　　200A HLT 　　The output at PORT1 is_____	4	CO1, CO2
Q2	Write an assembly language program with an assumption that the microprocessor is completing an RST 7.5 interrupt request, check to see if RST 6.5 is pending. If it is pending, enable RST 6.5 without affecting any other interrupt; otherwise, return to the main program.	4	CO4
Q3	Explain the principle of operation of combustion knock sensor with suitable diagram.	4	CO5
Q4	Determine the primary and foldback memory address range of the 8155 and explain the decoding logic for the circuit shown in figure 1.	4	CO3

Figure 1
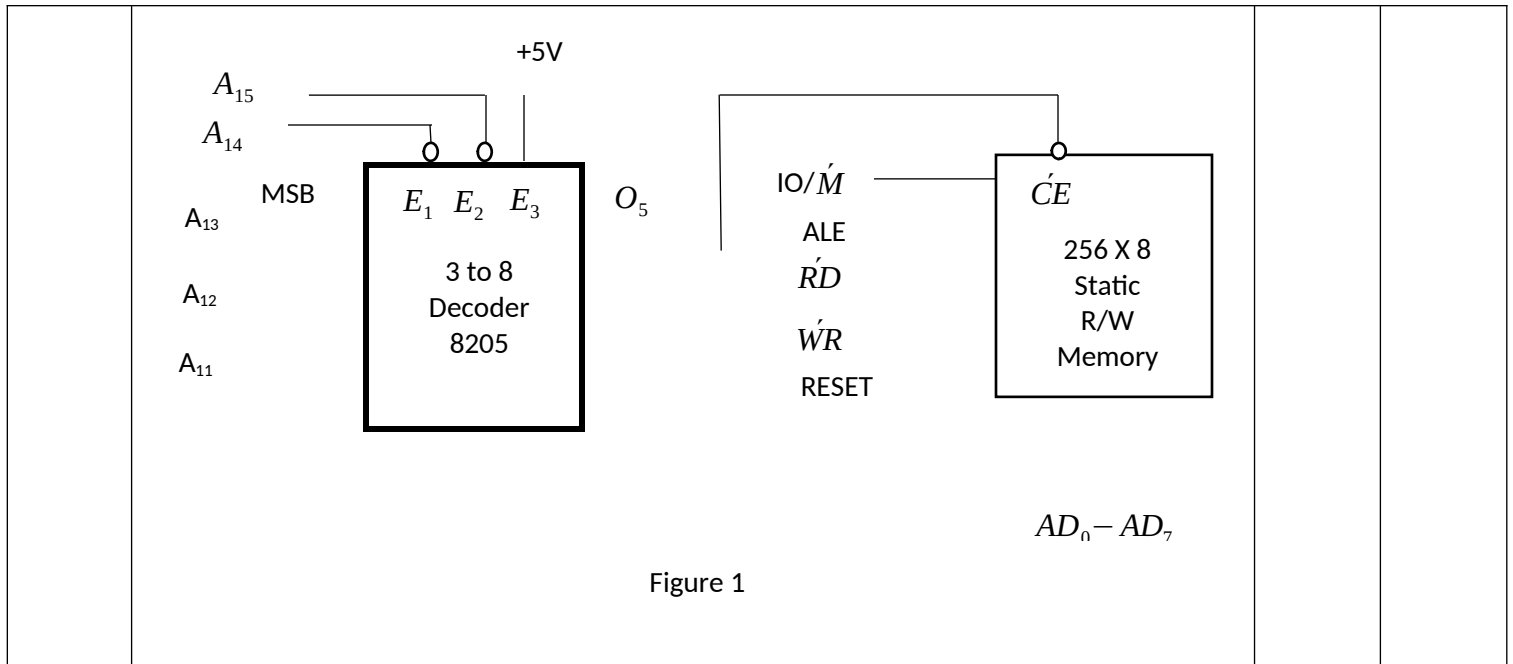
| Q5	Explain how the matrix keyboard and multiplexed display can be interfaced with the microprocessor using 8279 IC.	4	CO4

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SECTION B   **(10 X 4 =40)**

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Q6	Write an assembly language program to search for number A9H from memory 2000H to 2010H. If found store the number in memory location 3005H.	10	CO2
Q7	Explain the following terms: (a) Absolute and Partial Decoding (b) Magnetic memory (c) Hardware and software data transfer schemes (d) Burst mode and Cycle stealing technique of DMA data transfer	10	CO3
Q8	Define engine management system. With respect to automated vehicle explain the principle of operation of electromagnetic and exhaust gas oxygen sensor with suitable diagram.	10	CO5
Q9	(a) Write a BSR control word subroutine to set bits PC7 and PC3 and reset them after 10ms. Use the schematic in figure 2. Figure 2	10	CO4
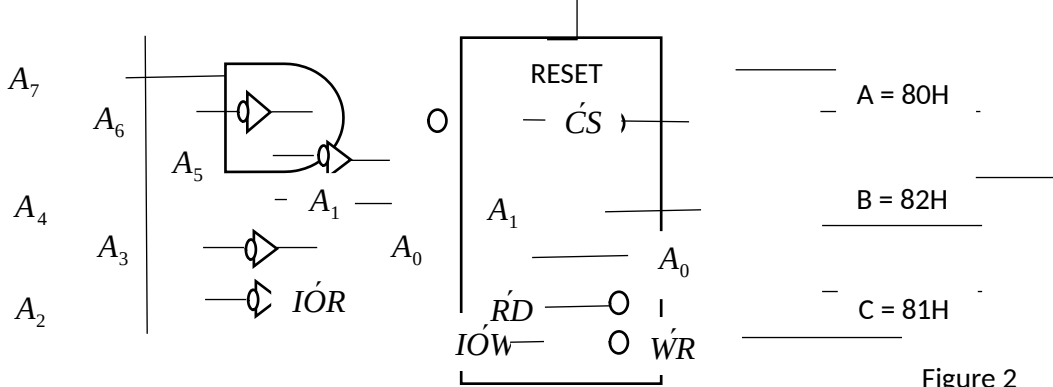
	OR (b) Draw and explain the architecture of 8254 programmable interval timer. Discuss the format of control word register.		
	SECTION-C	**(2 X 20 =40)**	
Q10	(a) Design a railway crossing signal controller by writing a program which provide the given on/off time to two crossing lights (Green, Red) and two pedestrian signs (WALK and DON'T WALK). The signal lights and signs are turned on/off by the data bits of an output port as shown below: <table><tr><th>Lights</th><th>Data Bits</th><th>On Time</th></tr><tr><td>Green</td><td>D0</td><td>15 seconds</td></tr><tr><td>Red</td><td>D3</td><td>20 seconds</td></tr><tr><td>WALK</td><td>D4</td><td>15 seconds</td></tr><tr><td>DON'T WALK</td><td>D6</td><td>20 seconds</td></tr></table> The train and pedestrian flow are in the opposite direction; the pedestrian should cross the railway crossing when the Green light is on. (b) Write an assembly language program with algorithm to find sum of ten numbers stored in memory location starting from 3000H. Store the result in memory location 6500H.	**20**	**CO2**
Q11	(a) Draw and analyze the timing diagram of the following set of instructions. Also identify their addressing modes. LXI H, 2005H MOV A,M (b) Write an assembly language program to count from 0-9 with a two second delay between each count. Write a service routine at 2050H to find 2's complement of a 16 bit number.	**20**	**CO1, CO4**

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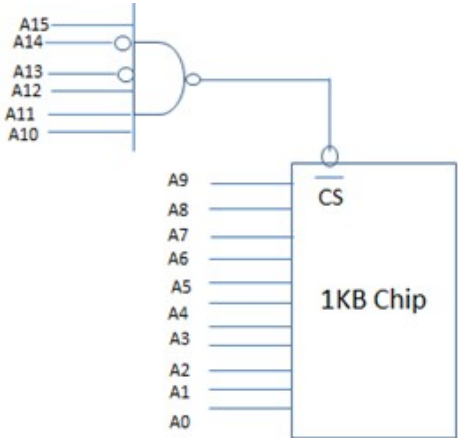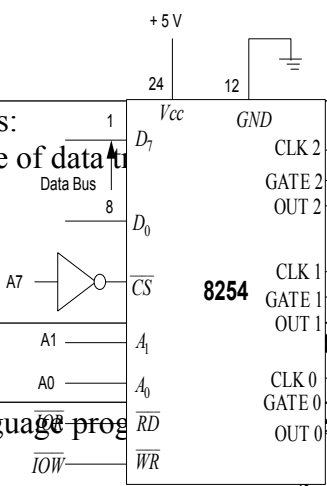
Time: 03 hrs.　　　　　　　　　　　　　　　　**Max. Marks: 100**
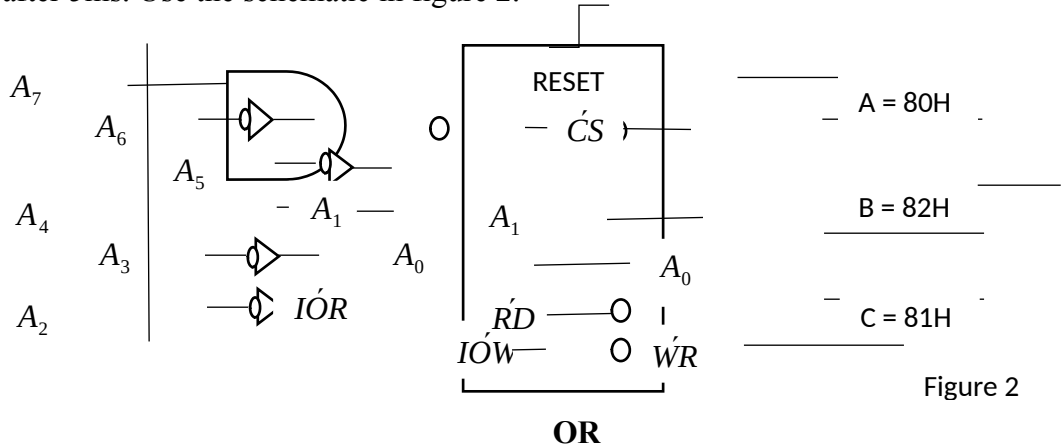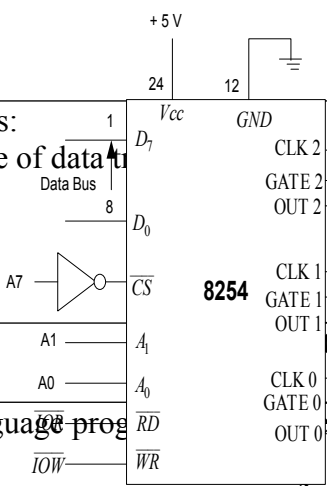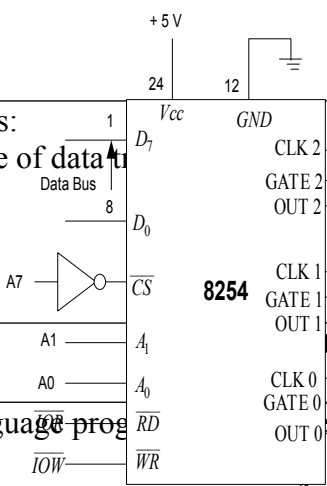
Instructions: Attempt all the questions

	SECTION A		(5 X 4 =20)
S. No.		Marks	CO
Q1	Answer the following questions (a) Which of the following instruction is not possible in 8085? (i) POP PSW　　　(ii) POP B　　　(iii) POP D　　　(iv) POP 30H (b) In Intel 8085 microprocessor SIM instruction stands for＿＿＿＿＿＿＿ and RIM instruction stands for＿＿＿＿＿＿ (c) Temporary registers in 8085 are (i) B and C　　(ii) D and E　　(iii) H and L　　(iv) W and Z (d) In Intel 8085, which is the first machine cycle of an instruction? (i) An op-code fetch cycle　(ii) A memory read cycle　(iii) A memory write cycle (iv) An I/O read cycle (e) In 8085 microprocessor, the RST5 instruction transfer program execution to which of the following location (i) 0020H　　　　(ii) 0028H　　(iii) 0018H　　　(iv) 0019H	4	CO1, CO2
Q2	Determine the memory address range for the circuit shown in figure 1. Figure 1	4	CO3
Q3	Write an assembly language program t　Figure 1　complement of an 8 bit number which is present at FC50H and store the result in FC52H. Microprocessor is moving in a endless loop while executing the program which is being interrupted by applying a rising pulse at RST7.5 terminal manually.	4	CO4
Q4	Explain the principle of operation of optical sensor and discuss how it measure the	4	CO5

	speed of automated vehicle.		
Q5	Draw and explain the architecture of 8251 USART.	**4**	**CO4**
	SECTION B		**(10 X 4 =40)**
Q6	Write an assembly language program with algorithm to find sum of ten numbers stored in memory starting from 3000H. Store the result in memory location 6005H.	**10**	**CO2**
Q7	Explain how the temperature of an automated vehicle can be controlled using sensors and actuators. Discuss in detail the principle of operation of sensors and actuators used in the vehicle.	**10**	**CO5**
Q8	(a) Write a BSR control word subroutine to set bits PC6 and PC2 and reset them after 5ms. Use the schematic in figure 2. Figure 2 **OR** (b) Write instructions to generate a pulse every 50 microsecond from counter 0 with reference to figure 3.	**10**	**CO4**
Q9	Explain the following terms: (a) Serial and Parallel mode of data tr (b) Flash memory (c) Priority Encoder (d) Pending Interrupt	**10**	**CO3, CO4**
			(2 X 20 =40)
Q10	(a) Write an assembly language prog ... factorial of a number. (b) Write an assembly language program to count from 0-5 with a delay of 2 second between each count. Write a service routine to flash A5 and 5A four times when the program is interrupted with one second delay between each flash.	**20**	Figure 3 **CO2**
Q11	(a) Write an assembly language program with algorithm to control a railway crossing signal that has two alternately flashing red lights, with a 5-min delay on time for each light. (b) Draw and analyze the timing diagram of the following instruction and identify	**20**	**CO1, CO2**

	its addressing mode. LHLD 2005H		