Q1(a)	Design a minimized combinational circuit that accepts a four-bit number and generates an output binary number equal to one when following condition is satisfied by input value- $(input\_value \bmod 2 = 0)$	(3)
Q1 (b)	A digital computer has a memory unit with a capacity of 4,096 words with 32 bits per word. The instruction code format consists of three bits for the operation part and two instructions are packed in one memory word and instruction register size is same as size of word. Draw the instruction word format and indicate the number of bits in each part.	(3)
Q2(a)	Represent given decimal number (+105.625) in to IEEE single precision floating point format.	(3)
Q2(b)	Design full adder circuit with the help of two half adders and some external gates.	(3)
Q3(a)	The 8-bit registers AR, BR, CR, and DR initially having the following values- AR=01001111, BR=11111111, CR=10011101, DR=01010111 Determine the 8-bit values in each register after the execution of following sequence of micro operations- $AR = AR + BR$ $CR = CR \hat{} DR, BR = BR + 1$ $AR = AR - CR$	(3)
Q3(b)	Design the 4-bit combinational shift circuit for shift left (IR) and right operations (IR) by taking one selection variable S.	(2)
Q3(c)	A two word instruction is stored at address A. The address field of the instruction (stored at A+1) is designated by B. The address of the operand is designated by Z. What will be the value of Z if the addressing mode of instruction is: a. Direct b. Indirect	(2)

Q4(a)	Show the content in hexadecimal of registers PC, AC, AR, DR, IR and SC of the basic computer. Given the initial content of PC is EFF, the content of AC is 7EC3. The content of memory at address EFF is 8BCD. The content of memory at address BCD is B420. The content of memory at address 420 is FFFF. Give the answer in table with six columns, Repeat the problem with these two memory reference instructions such as ADD and ISZ starting with an initial values.	(3)
Q4(b)	For each of the following 16-bit instructions, give the equivalent four-digit hexadecimal code and explain the instruction which is going to perform. (i) 0011 0111 0110 1001 (ii) 0111 0000 0000 1000 (iii) 1111 0100 0000 0000	(3)