

Ans

E & ECE Department, IIT, Kharagpur
Mid-semester Examination

EC31006 Microcontroller and Embedded Systems # of students 100

Full marks 30

Time 2 hours

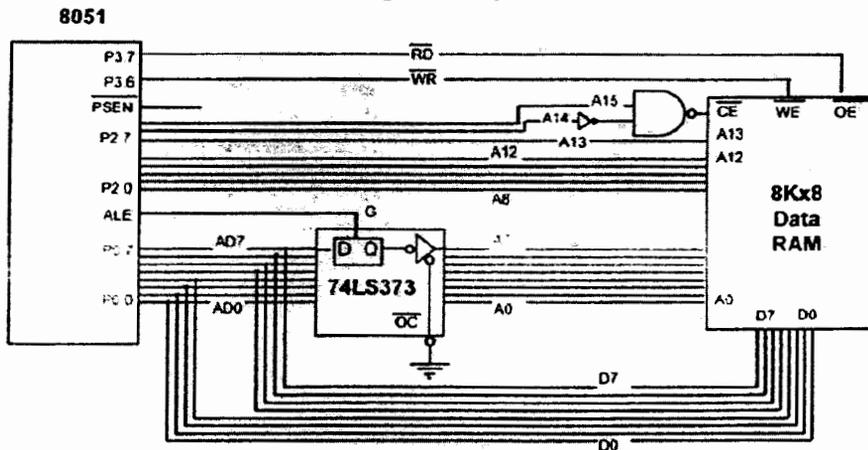
S. No.

Figures in the right hand margin indicate marks

- Q1. i. Differentiate between a microprocessor and a microcontroller. List two 8-bit and two 16-bit microcontrollers. (1×4)
- ii. How do you select different register banks in 8051? What is(are) the main advantage(s) of having the ability to switch between the register banks?
- iii. Is it possible to use two register banks simultaneously? Justify your answer.
- iv. The 8051 has only 8-bit ports, but can address a total of 64K external memory – explain.

- Q2. i. Write a program to calculate the checksum of 50 bytes of data stored in RAM locations starting from 30H. Store the result in register R3. The checksum of a series of bytes is computed by adding the bytes together, dropping the carries and then computing the 2's complement of the sum. (3×2)
- ii. Write an 8051 C program to send your first and last names to P2. Use ROM code space.

- Q3. The following figure shows interfacing of 8Kbyte of Data RAM to 8051. (8)



- i. State how it is different from interfacing of program memory.
- ii. What is the address space allocated to data RAM in this figure?

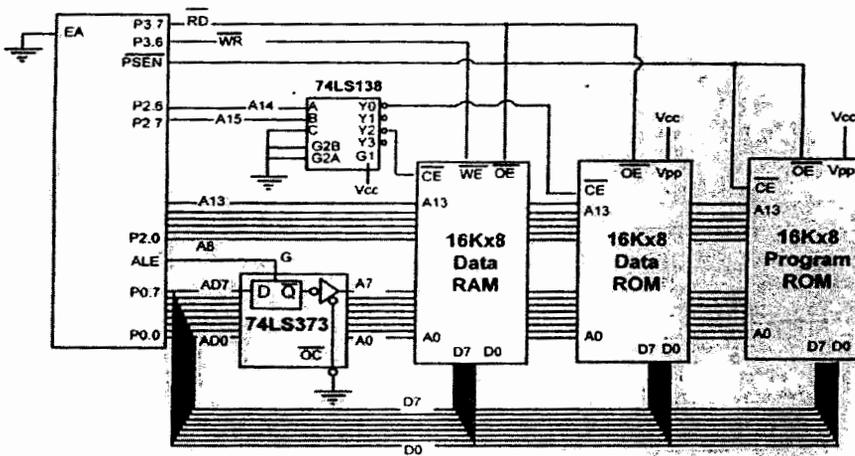
(PTO)

- 3 Contd.) ii. Write a program to read 200 bytes of data from P1 and save the data in external RAM starting at RAM location 5000H.
- iv. In an 8051 based system how to allow a single ROM chip to provide both program code space and data space?

Q4. Assume that we need an 8031 system with 16KB of program space, 16KB of data ROM starting at 0000, and 16K of NV-RAM starting at 8000H. Show the interfacing circuitry using a 74LS138 for address decoding. (4)

Q5. The 8255 PPI has got 3 different operation modes: 0, 1 and 2 and three ports A, B, and C. (8)

- Given that the control word to be written to 8255 is 91H, state which mode each of the ports is programmed in and whether it is programmed as an input or as an output port.
- The control signals associated with mode 1 are \overline{STB} , A, IBFA and INTR A. State the functionality of these control signals.
- Given the following interfacing circuitry, give possible addresses of port A, port B, port C, and the control word register.



- iv. What is the Bit Set/Reset mode of operation of 8255 and how can you use this?