CBCS SCHEME

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15CS44

Fourth Semester B.E. Degree Examination, Dec.2023/Jan.2024
Microprocessors and Microcontrollers

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define a Microprocessor. Explain in detail with a neat figure the working of the internal architecture of the 8086 microprocessor. **(08 Marks)**

b. Explain the following addressing modes of 8086 microprocessor with example.
(i) Register
(ii) Direct
(iii) Based Relative
(iv) Based – Indexed Relative **(08 Marks)**

OR

2 a. What is stack? Why it is needed? Explain the execution of PUSH and POP instructions with respect to stack. **(06 Marks)**

b. Write an Assembly Level Program (ALP) to add 5 bytes of data and save the result. The data should be the following hex numbers:
25, 12, 15, 1F and 2B **(05 Marks)**

c. What are Assembler Directives? Explain the following assembler directives with example.
i) DW ii) PROC iii) ORG iv) EQU **(05 Marks)**

Module-2

3 a. Write an Assembly Language Program (ALP) to calculate the total sum of 5 byte of data. Each byte represents the daily wages of a worker. This person does not more than $255 (FF h) a day. The decimal data is as follows: 125, 235, 197, 91 and 48 **(06 Marks)**

b. Explain the following instructions with suitable example:
i) SHL ii) SHR iii) CMP iv) DAA v) DAS **(05 Marks)**

c. With suitable program show how ASCII value is converted into packed BCD. **(05 Marks)**

OR

4 a. Differentiate between INT and CALL instructions. **(04 Marks)**

b. What is an Interrupt? Give the steps taken by 8088/86 CPU to process any of the Hardware/Software Interrupt. **(06 Marks)**

c. Write an ALP that read your name from the keyboard and display it at a specified location on the screen after the message "What is your name"? You must clear the entire screen before display. **(06 Marks)**

Module-3

5 a. Write the syntax of the following instruction and explain with example:
i) CWD ii) IMUL iii) STOSB iv) SCASB **(04 Marks)**

b. With example, explain handling of overflow problem using flags for performing arithmetic operation on 8-bit and 16-bit numbers. **(06 Marks)**

c. What is Memory Address decoding? Explain how 74138 decoder decides ROM for 64K×8 section of memory, with starting address is 8000H. Give the detailed Memory Map. **(06 Marks)**

OR

6 a. Explain the concepts of odd bank and even bank of memory in 16-bit CPU. **(02 Marks)**

b. With neat diagram explain 8255 control word format in I/O Mode. Find the control word if PA = out, PB = in, PCO = PC3 = in and PC4 – PC7 = out. Write a program for the 8255 to get data from port A and send it to port B. In addition, data from PCL is sent to the PCU. Use port addresses of 300H – 303H for the 8255 chip. **(08 Marks)**

c. Write an ALP program to toggle all bits of PA and PB of the 8255 chip on the PC trainer. Put a ½ second delay in between "On" and "Off" states. Use INT 16H to exit if there is a key press. **(06 Marks)**

Module-4

7 a. Differentiate between Microprocessor and Microcontroller. **(04 Marks)**

b. With a neat figure, explain briefly 4 major software components of ARM-based embedded system. **(06 Marks)**

c. What is an action taken by the ARM processor when an exception or interrupt occurs? Explain Interrupt Vector (IVT). **(06 Marks)**

OR

8 a. What is pipeline? With a diagram explain three stage pipeline of ARM processor with suitable example. **(04 Marks)**

b. Draw the basic structure of Cpsr. Briefly explain the functions of each field. **(06 Marks)**

c. Explain briefly three Core-extensions that are attached to the ARM processor. **(06 Marks)**

Module-5

9 a. Explain the following instructions of ARM processor with suitable example.
i) RSB ii) BIC iii) UMULL iv) SWP **(08 Marks)**

b. Write an ALP using ARM instructions to generate N Fibonic numbers. **(08 Marks)**

OR

10 a. Explain briefly program status register instructions and co-processor instructions with suitable example. **(08 Marks)**

b. Explain branch instructions with syntax and example. **(04 Marks)**

c. Explain SWAP instruction with syntax and suitable example. **(04 Marks)**

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