Marking Guide

2a. CS = 1000H and IP = 2000H ii. CS = 2000H and IP = 0200H iii. CS = 3000H and IP = ABCDH iv. CS = 4000H and IP = 5000H v. CS = 1000H and IP = 2BDEH

Formulae: EA = (CS X 10) + IP

i. 1000 X 10 + 2000H = 12000H ii. 2000 X 10 + 0200H = 20200H iii. 3000 X 10 + ABCDH = 3ABCDH iv. 4000 X 10 + 5000H = 45000H v. 1000 X 10 + 2BDEH = 12BDEH (1 marks each)

1. d

0 0 1 0 0 1 0 0 0 1 1 0

Overflow Direction Interrupt Trap Sign Zero Auxiliary Parity Carry

2b. Register Addressing: the source/destination operand is a CPU register. e.g. MOV BX, AX; (2 marks)

Immediate (Literal) Addressing: The operand is a part of the instruction fetched from memory. E.g. MOV AX, 25; (1 marks)

Direct Addressing: The address of the operand is part of the instruction fetched from memory. In this mode the address is written in square brackets [address H] while H means that the address is written in Hexadecimal numbering system. E.g. MOV AX, [0025H]

(1 mark)

Register Indirect Addressing: The address of the operand is contained in a CPU register. E.g. MOV BX, [AX]; (1 mark)

Base (Displacement) Addressing: The address is computed within the CPU by adding a value contained in a register to a base or displacement value. The base or displacement value is part of the instruction fetched from memory. E.g. MOV AX, [BX + 7]; (1 mark)

Indexed Addressing: The address is computed within the CPU by adding values contained in two CPU registers. E.g. MOV AX, [BX + SI]; (1 mark)

3a. 8086-P4 programming model

(5 marks)

b. TI: The TI bit selects either the Global descriptor table (TI = 0 ) or the local descriptor table (TI = 1). (2 marks)

RPL: The requested privilege level (RPL) requests the access privilege level of a memory segment. The highest privilege level is 00 and the lowest is 11. If the requested privilege level matches or is higher in priority than the privilege level set by the access rights byte, access is granted. (2 marks)

Selector: The 13-bit selector chooses one of the 8192 descriptors from the selected descriptor table. (1 mark)

3c.

s

4a. G: The G bit, or granularity bit: If G = 0, segments can be 1 byte to 1MB in length (i.e. 00000H to FFFFFH). If G = 1, the value of the limit is multiplied by 4K bytes, segments can be 4KB to 4GB in length.

Base Address: The base address portion of the descriptor indicates the starting location of the memory segment.

Segment Limit: The segment limit contains the last offset address found in a segment.

DPL: Descriptor’s Privilege Level.

AV: The AV bit, in the 80386 and above descriptor, is used by some operating systems to indicate that the segment is available (AV =1) or not available (AV=0).

b. Start address = Base address = 01000000H (2 marks)

End address = Base + Limit = 01000000H + 0FFFFH = 0100FFFFH (3 marks)