EDUCATIONAL RECORD

HEATH ZENITH
Educational Systems

This form is an official transcript indicating your successful completion of an Individual Learning Program and the award of Continuing Education Units. Fill it out completely and return it with your Final Examination answer sheet. Be sure to sign and date this form in the space provided. No Certificate of Achievement or CEU credit can be awarded without this information. Please type or print plainly. Photocopies of this form will NOT be accepted.

Name (full) _____
Address _____
City _____ State _____ Zip _____
Telephone Number (include area code) _____
Social Security Number _____
Course Title _____
Course Number _____
Date of Final Examination _____

I hereby certify that I have fully completed all of the learning activities in this Individual Learning Program and have taken the final examination without the help of another individual.

Signed _____ Date _____

THIS INFORMATION WILL BE FILLED IN BY HEATHKIT CONTINUING EDUCATION

Grade _____
CEU's _____
Date _____
Approval _____

HEATH COMPANY
Benton Harbor,
Michigan 49022

FULL NAME
LAST FIRST MIDDLE

SOCIAL SECURITY NUMBER
(Must be supplied for CEU award.)

Heathkit
ZENITH
Educational Systems

HEATH COMPANY
BENTON HARBOR, MICHIGAN 49022
PHONE 616-982-3200 TLX 72-9421

EDUCATIONAL SURVEY

Dear Customer:

The purpose of this survey is to give you an opportunity to express your opinions and ideas about Heathkit Individual Learning Programs. The information that you provide here will help us to improve our existing programs and give us guidelines for developing new programs of interest to you. This feedback benefits you as well as Heathkit/Zenith Educational Systems.

Please fill out this form and return it to us with your final examination answers and Educational Record form. If you elect not to take the final examination, please use the envelope to return this form.

Douglas M. Bonham
Director, Educational Products

1. What Individual Learning Program did you take? _____ .
   Fill in Model No.

2. What subjects would you like to see covered in future Heathkit Individual Learning Programs? _____
   _____
   _____

3. Was this course provided by your employer?

   ___ Yes
   ___ No

(over)

4. What was your reason for taking this course?

___ Hobby
___ Refresher course
___ Reference
___ Self Improvement
___ Job Improvement
___ Supplement school text
___ Other (please specify):_____

5. How many Heathkit Continuing Education courses have you purchased?

___ 1
___ 2
___ 3
___ more than 3

6. Excluding trainers, how many Heathkit products have you purchased for use with your Heath Continuing Education program (Oscilloscope, Meters, etc.)?

___ 1
___ 2
___ 3
___ more than 3

7. Would you purchase a comprehensive, career-level, home study course that is priced in the $500 to $1000 range?

___ Yes
___ No

8. If you have any additional comments regarding this course of instruction or any of our Heathkit Individual Learning Programs or program ideas, please feel free to comment.

_____
_____
_____
_____
_____

Heathkit
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EXAMINATION ANSWER SHEET

NAME _____ COURSE NUMBER _____

ADDRESS _____ DATE _____

CITY _____ STATE _____ ZIP _____ GRADE _____

IMPORTANT NOTICE

Photo copies of this answer sheet will **not** be graded.

INSTRUCTIONS

1. Read each question in the Final Examination and select the correct answer choice. Place a check adjacent to your answer.

2. Transfer your answers to the opposite side of this answer sheet. Use a pencil to mark an X in the square corresponding to your answer choice. Be careful in transferring your answers. If you should mark the wrong square, erase it completely. Double check this answer sheet against your choices on the Final Examination.

3. Fill in the remainder of this answer sheet. Write your complete name and address in the spaces provided. Be sure to include the course number which appears at the top of the Final Examination.

4. Fill in the Educational Record form and sign it. This form becomes your official transcript. No Certificate of Achievement or CEU credit can be awarded without this form.

5. Fill in the Educational Survey form.

6. Mail this answer sheet, the Educational Record form and the Educational Survey form to Heathkit Continuing Education. Use the enclosed return envelope.

	A	B	C	D
1.	☐	☐	☐	☐
2.	☐	☐	☐	☐
3.	☐	☐	☐	☐
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	A	B	C	D
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96.	☐	☐	☐	☐
97.	☐	☐	☐	☐
98.	☐	☐	☐	☐
99.	☐	☐	☐	☐
100.	☐	☐	☐	☐

Heathkit
ZENITH
Educational Systems

Macro-86 ASSEMBLY LANGUAGE PROGRAMMING

EC-1201

FINAL EXAMINATION

Instructions

The following multiple choice examination is designed to test your understanding of the material presented in this Individual Learning Program. Besides telling us how well you have learned the subject, this exam provides you with a complete review of the program and serves as another learning activity to ensure your understanding of the material.

The final exam is optional, and you are not obligated to submit it. However, if you have completed the program, you will no doubt want to receive some recognition for this accomplishment. If you complete the exam and make a passing grade, you will receive an attractive Certificate of Achievement and Continuing Education Units (CEU) of credit. The CEU is a nationally recognized unit of credit that indicates your participation in and satisfactory completion of an adult continuing education course.

The final exam is an "open book" test. This means that you may refer to the text material or the exercises to assist you in obtaining your answers. You may also use any other reference material available to you. However, you may not receive help from another individual. The work must be entirely your own.

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To take the exam, read each question completely and select the best answer. Place a check beside the answer (A, B, C, or D) that you feel is most correct. It is usually a good idea to read the question and each answer twice to be sure you fully understand what is being asked.

When you have answered all the questions, carefully transfer your answers to the Examination Answer Sheet. Place an "X" in the box labeled with your choice (A, B, C, or D). Be sure to fill in your name, address, and course number in the spaces provided.

Use only the answer sheet provided with the course material. Photocopies of this form will not be accepted.

Next, fill out and sign the Educational Record form. The information on this form will be retained at Heath in a transcript file. When your exam is graded, your grade will be recorded and the form signed. You may request a copy of your transcript for transfer of credit to your employer, an institution recognizing the CEU, or for your own use. Send $1.00 for each copy requested to:

Transcript Records
Heathkit/Zenith Educational Systems
PO Box 1288
Benton Harbor, Michigan 49022

Also fill out the Educational Survey form. This form provides us with useful feedback about you and your opinions. This information will help us to improve our present programs and develop new programs based on your needs and interests. Both the Educational Record form and the Educational Survey form must be returned with your Examination Answer Sheet. No certificate can be awarded without them.

Mail the Examination Answer Sheet, the Educational Record form, and the Educational Survey form using the return envelope provided for that purpose. Do not mail this Final Examination, as you will need it later to check your answers.

Your Answer Sheet will be graded and returned to you along with a summary of the correct answers. If you correctly answer 70 percent or more of the exam questions, you will be awarded the Certificate of Achievement and the appropriate Continuing Education Units of Credit.

Examination

1. The instruction MOV AX,BX is an example of:

   A. Immediate addressing.
   B. Register addressing.
   C. Direct addressing.
   D. Base addressing.

2. The binary value 0011110010000111 is generally called a:

   A. Bit.
   B. Byte.
   C. Word.
   D. Doubleword.

3. The 8088 MPU contains _____ general registers that can be used as 8- or 16-bit registers.

   A. 4
   B. 8
   C. 12
   D. 13

4. The 8088 MPU contains _____ control and status flags in its Flag register.

   A. 6
   B. 9
   C. 12
   D. 16

5. The Instruction Pointer points to the:

   A. Top of RAM.
   B. Top of the Stack.
   C. Next instruction to be executed.
   D. Next memory location.

6. The assembler:

   A. Generates the object code.
   B. Translates the object code.
   C. Edits the source code.
   D. Links the object code.

7. The term _____ refers to the instruction mnemonic in a source listing.

   A. Label.
   B. Opcode.
   C. Operand.
   D. Comment.

8. Which of the following must be terminated with a colon in an instruction?

   A. Label.
   B. Opcode.
   C. Operand.
   D. Name.

9. The maximum size of a label is:

   A. Seven letters.
   B. Seven letters and symbols.
   C. Fifteen letters and symbols.
   D. Any number of letters and symbols up to the physical length of the displayed line.

10. The only valid method for determining the physical address of a memory location is add:

   A. The contents of the Data Segment register to the contents of the Instruction Pointer register.
   B. The contents of the Stack Pointer register to the contents of the Code Segment register.
   C. The effective address in the Base Pointer register to the contents of the Stack Segment register.
   D. The effective address in the Base Pointer register to the contents of the Instruction Pointer register.

11. The assembler directive ORG (origin):

    A. Must be used in an EXE program.
    B. Must be used in a COM program.
    C. Cannot be used as an optional assembler directive.
    D. Is used to specify a segment base address.

12. The assembler directive _____ can be used to reserve a byte in memory and define the contents of that space.

    A. DUP
    B. DB
    C. DW
    D. DD

13. Every program must end with the _____ directive.

    A. END
    B. ENDM
    C. ENDP
    D. ENDS

14. If the symbol ALPHA is equated to 36H, the instruction MOV AX,ALPHA is an example of:

    A. Immediate addressing.
    B. Register addressing.
    C. Direct addressing.
    D. Base addressing.

15. The term MOD is an example of:

    A. An offset operator.
    B. A macro operator.
    C. A logic operator.
    D. An arithmetic operator.

16. To determine the remainder from an arithmetic operation, use the _____ operator.

    A. –
    B. *
    C. /
    D. MOD

17. The _____ register does not have to be initialized in a program.

    A. CS
    B. DS
    C. ES
    D. SS

18. A short jump is always:

    A. An intersegment jump.
    B. An intrasegment jump.
    C. A conditional jump.
    D. A direct jump.

19. A far jump is always:

    A. An intersegment jump.
    B. An intrasegment jump.
    C. A conditional jump.
    D. A direct jump.

20. Which of the following instruction pairs perform the same operation?

    A. JA/JNB
    B. JNLE/JNG
    C. JNL/JNGE
    D. JB/JNAE

21. After the following two instructions are executed, which jump will be taken?

```
MOV AX,3CH
ADD AX,3CH
```

    A. JS
    B. JP
    C. JNG
    D. JB

22. Which of the following jump instructions does not rely on the condition of the Flag register to determine if the jump is taken?

    A. JNLE
    B. JNZ
    C. JCXZ
    D. JNGE

23. Which of the following loop instructions is not a conditional loop?

    A. LOOP
    B. LOOPE
    C. LOOPNE
    D. LOOPNZ

24. The _____ flag is always tested before a conditional loop is taken.

    A. Carry
    B. Overflow
    C. Sign
    D. Zero

25. Which of the following registers defaults to the stack segment?

    A. BX
    B. BP
    C. SI
    D. DI

26. Which of the following instructions does not modify the contents of the register specified in the operands?

    A. NEG AX
    B. CMP AX,03CH
    C. DEC AX
    D. INC AX

27. Which of the following instructions will complement the Carry flag?

    A. CMC
    B. CMP
    C. STC
    D. CLC

28. The number of loops taken by a loop instruction is determined by the count in the _____ register.

    A. AX
    B. BX
    C. CX
    D. DX

29. You should use the _____ instruction to branch to a subroutine.

    A. JMP
    B. RET
    C. JCXZ
    D. CALL

30. A _____ instruction will cause the Stack Pointer to increment four times.

    A. Near call.
    B. Far call.
    C. Near return.
    D. Far return.

31. The _____ register points to the top of the Stack.

    A. SS
    B. iP
    C. SP
    D. BP

32. Which of the following instructions can be used to load a value into the Flag register?

    A. PUSH
    B. POP
    C. PUSHF
    D. POPF

33. Which of the following instructions causes only the contents of the IP to be saved on the stack?

    A. JMP
    B. CALL
    C. PUSH
    D. RET

34. Assuming a near procedure, which of the following instructions will cause the Stack Pointer register to be incremented six times?

    A. POP
    B. RET 2
    C. RET 4
    D. RET 6

35. Which of the following directives will allow you to combine one source file with another source file during assembly?

    A. EXTRN
    B. PUBLIC
    C. LINK
    D. INCLUDE

36. Which of the following instructions is not a form of register indirect addressing?

    A. MOV AX,BX
    B. MOV AX,[BX]
    C. MOV AX,[SI]+TARGET
    D. MOV AX,[BX+DI]

37. A structure is composed of:

    A. A group of data byte and/or word elements called fields.
    B. A group of data bit-sized field elements within a byte- or word-sized framework.
    C. A sequence of common byte or word data elements.
    D. A table of symbols called field elements.

38. A record is composed of:

    A. A group of data byte and/or word elements called fields.
    B. A group of data bit-sized field elements within a byte- or word-sized framework.
    C. A sequence of common byte or word data elements.
    D. A table of symbols called field elements.

39. Based addressing differs from register indirect addressing in that it uses only the:

    A. BX or BP registers.
    B. SI or DI registers.
    C. BX or BP registers plus a displacement.
    D. SI or DI registers plus a displacement.

40. Which is an example of based index addressing?

    A. ADD [SI + DI] + NUM1,CX
    B. MOV AX,[BX + BP] + TABLE
    C. INC WORD PTR [BP + DI] + TABLE
    D. MOV DATA,[BX + BP].FONT

41. Which of the following ASCII Adjust instructions is used prior to the mathematical operation?

    A. AAA
    B. AAS
    C. AAM
    D. AAD

42. Which of the following instructions is used to perform a byte translation?

    A. LAHF
    B. SAHF
    C. XLAT
    D. XCHG

43. Which of the following is not considered a bit manipulation instruction?

    A. NOT
    B. XOR
    C. TEST
    D. NEG

44. Which of the following logical instructions does not affect the Flag register?

    A. NOT
    B. OR
    C. XOR
    D. TEST

45. Which of the following instruction combinations perform the same operation?

    A. SHR/SAR
    B. SHL/SAL
    C. ROR/RCR
    D. ROL/RCL

46. Which segment register contents cannot be modified directly with program code?

    A. CS
    B. DS
    C. ES
    D. SS

47. The minimum number of segments that must be defined in a COM program is:

A. 1
B. 2
C. 3
D. 4

48. The minimum number of segments that must be defined in an EXE program is:

A. 1
B. 2
C. 3
D. 4

49. The default segment align-type is:

A. BYTE
B. WORD
C. PARA
D. PAGE

50. The segment combine-type _____ must be used in the code segment statement when the code segment is part of a GROUP.

A. STACK
B. PUBLIC
C. COMMON
D. AT

51. The variable port address for an input or output instruction is found by default in the _____ register.

A. AX
B. BX
C. CX
D. DX

52. The maximum number of fixed I/O ports is:

A. 64
B. 128
C. 256
D. 512

53. Which interrupt has the highest priority?

A. Divide error.
B. NMI
C. INTR
D. Single-step.

54. Which of the following interrupts will only generate a Type 4 interrupt if the Overflow flag is set?

A. INTR
B. INTO
C. INT
D. INT 4

55. Which of the following interrupts is ignored when the Interrupt flag is cleared?

A. NMI
B. INTO
C. INTR
D. INT 32

56. Which of the following string operations does not transfer any of the string elements?

A. MOVS
B. LODS
C. STOS
D. SCAS

57. Which of the following registers is used to specify the number of times a string instruction is repeated?

A. BX
B. CX
C. DX
D. AX

58. Which of the following instructions is a conditional string instruction?

A. CMPSB
B. REP SCAS
C. REPZ CMPS
D. SCASB

59. The SI register is incremented after each string operation when:

A. DF is cleared.
B. DF is set.
C. TF is cleared.
D. TF is set.

60. Which of the following flags is used to terminate a conditional string operation?

A. TF
B. ZF
C. IF
D. OF

61. The _____ instruction would be used to load the appropriate segment and index registers with the physical address of the destination string location in memory.

A. LEA
B. LDS
C. LES
D. DD

62. A procedure is identified by its beginning procedure directive statement and its ending _____ directive.

A. END
B. ENDS
C. ENDM
D. ENDP

63. The maximum memory size a GROUP can occupy is:

A. 1K byte
B. 16K bytes
C. 64K bytes
D. 1M byte

64. The conditional directive _____ will evaluate true if its expression is not zero.

A. IF
B. IF1
C. IFDEF
D. IFDIF

65. The conditional directive _____ will evaluate true during pass one of the assembler.

A. IF
B. IF1
C. IFDEF
D. IFDIF

66. The conditional directive _____ will evaluate true if its symbol has been defined.

A. IF
B. IF1
C. IFDEF
D. IFDIF

67. The conditional directive _____ will evaluate true if its first argument doesn't agree with its second argument.

A. IF
B. IF1
C. IFDEF
D. IFDIF

68. Which of the following macro directives can be called?

A. MACRO
B. REPT
C. IRP
D. IRPC

69. The end of a conditional macro directive is identified by the directive:

A. END
B. ENDM
C. ENDIF
D. EXITM

70. The directive _____ allows you to exit a macro before its end.

A. END
B. ENDM
C. ENDIF
D. EXITM

71. The macro directive _____ contains one dummy parameter followed by a set of parameters that must be enclosed with a pair of angle brackets.

A. MACRO
B. REPT
C. IRP
D. IRPC

72. The macro directive _____ is used to create unique names or labels within a macro expansion.

A. PURGE
B. LOCAL
C. REPT
D. IRPC

73. The macro operator _____ is used to concatenate text or symbols.

A. !
B. <>
C. %
D. &

74. The directive _____ is used to begin a new numbering sequence in an assembler listing.

A. PAGE
B. SUBTTL
C. PAGE+
D. TITLE

75. The directive _____ can be used to create a message during program assembly.

A. PAGE
B. SUBTTL
C. %OUT
D. TITLE