

Seat No. : _____

AI-106

April-2015

M.Sc., Sem.-IV

Physics

PHY-509 EA : Microprocessor-II & Microwaves

Time : 3 Hours]

[Max. Marks : 70

Instructions : (1) Attempt **all** questions.

(2) Symbols and technology have their usual meanings.

(3) Scientific calculator may be permitted.

1. (a) What is the importance of 'branch instructions' ? Give classification of the branch instructions. Write a program to load 13 H and A2 H in Registers D and E respectively. Add the numbers. If the sum is greater than FFH, display 01 H at output PORT 0 otherwise display the sum. Draw a flow chart. 7

OR

Assume that register B holds 93 H and the accumulator holds 15 H, illustrate results of the instructions ANA B, ORA B, XRA B and CMA

- (b) Assume the accumulator holds 08 H and CY = 0. Illustrate the accumulator contents after the execution of RRC and RAR twice. 7

OR

Write a program to count continuously in hexadecimal from FFH to 00 H in a system with 0.5 μ s clock period. Use register C to set up one millisecond (ms) delay between each count and display the numbers at one of the output ports.

(T-states of inner loop instructions : 14 and outer loop instructions : 35)

2. (a) Write a program and draw a flow chart to provide the given on/off time to three traffic lights (Green, Yellow, and Red) and two pedestrian signs (WALK and DON'T WALK). The signal lights and signs are turned on/off by the data bits of an output port as shown below :

Lights	Data bits	On time
1. Green	D0	15 seconds
2. Yellow	D2	5 seconds
3. Red	D4	20 seconds
4. WALK	D6	15 seconds
5. DON'T WALK	D7	25 seconds

The traffic and pedestrian flow are in the same direction ; the pedestrian should cross the road when the Green light is on.

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OR

A binary number is stored in memory location BINBYT. Convert the number into BCD, and store each BCD as two unpacked BCD digits in the output buffer. To perform this task, write a main program and two subroutines : one to supply the powers of ten, and the other to perform the conversion.

- (b) A multiplicand is stored in memory location 2050 H and a multiplier is stored in location 2051 H. Write a main program to

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- (i) transfer the two numbers from memory locations to the HL registers
- (ii) store the product in the Output Buffer at 2090 H.

Write a subroutine to

- (i) multiply two unsigned numbers placed in registers H and L
- (ii) return the result in to the HL pair.

OR

Write a program to perform following functions :

- (1) Clear all the flags
- (2) Load 00H in the accumulator, and demonstrate that the Zero flag is not affected by the data transfer instruction.
- (3) Logically OR the accumulator with itself to set zero flag, and display the flag at Port. 1.

3. (a) Describe construction of a multicavity cylindrical magnetron operating in π -mode. Explain how microwaves are generated in this tube. 7

OR

Draw the schematic diagram of two cavity klystron. Explain how velocity modulation and bunching of electrons are achieved.

- (b) Draw schematic diagram of the helix type travelling wave tube. Using circuit and electronic equations obtain the equation for its gain parameter. 7

OR

Describe principle, construction and working of IMPATT diode.

4. (a) Explain, why 'S' parameters are used at microwave frequencies ?

Define 'S' parameters of a two port microwave device ? Describe in brief properties of S-matrix. 7

OR

Differentiate between E-plane tee and H-plane tee. Obtain the scattering matrix for E-plane tee.

(b) What is directional coupler ? What are its types ?

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Draw a two-hole directional coupler and explain its working. For a directional coupler define coupling factor and directivity.

OR

Mention various techniques of measuring unknown frequency at microwave frequency. Describe slotted line method.

5. Answer following questions in brief. (Each question is of **one** mark) :

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- (1) What is Stack pointer ?
- (2) Define counter and time delay.
- (3) List difference between INX B and INR B instructions.
- (4) What is 'Multiple calling of a subroutine' ?
- (5) List the difference between static and dynamic debugging a program.
- (6) What is a 'subroutine' ?
- (7) Define the stack.
- (8) What is Applegate diagram ?
- (9) Define Hull cut off voltage of a magnetron tube.
- (10) What is the function of slow wave structure in TWT ?
- (11) Draw basic structure of magic tee.
- (12) What is Read diode ?
- (13) What is Rat-race junction ?
- (14) What are bolometers ?