



Seat No. : _____

TB-115

M.Sc. Semester - IV

April-2013

509 – PHYSICS

(Microprocessor II and Microwaves)

Time : 3 Hours]

[Max. Marks : 70

- Instructions :**
- (1) Attempt **all** questions.
 - (2) Symbols and terminology have their usual meanings.
 - (3) Scientific calculator may be permitted.

1. (a) A set of current readings is stored in memory locations starting at 2050H. The end of the data string is indicated by the data byte A1H. Add the set of readings. The answer may be larger than FFH. Store answer in the memory location 2070H and 2071H. 7

OR

Write a program to perform various functions and verify the output.

- (i) Load the number 90 H in register B.
- (ii) Load the number 81H in register C.
- (iii) Logically AND contents of register C and B.
- (iv) Display the answer at output PORT 01.

Write status of S, Z and CY flags.

- (b) Write a program to count from 0 to 9 with a one-second delay between each count. At the count of 9, the counter should reset itself to 0 and repeat the sequence continuously. Use register pair HL to set up the delay, and display each count at one of the output ports. Assume the clock frequency of the microcomputer is 1 MHz. (No of T-states: outer loop 45, Inner loop 24) 7

OR

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

(No of T-states: outer loop 35, Inner loop 14)

2. (a) 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. 7

OR

A BCD number between 0 and 99 is stored in an R/W memory location called the Input Buffer (INBUF). Write a main program and a conversion subroutine (BCDBIN) to convert the BCD number into its equivalent binary number. Store the result in a memory location defined as the OUTPUT Buffer (OUTBUF).

- (b) 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. 7

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 I.

3. (a) Draw the schematic diagram of two cavity klystron. Explain how velocity modulation and bunching of electrons are achieved. 7

OR

Obtain equation for bunching parameter of the reflex klystron.

- (b) Obtain electronic equation for helix type travelling wave tube. 7

OR

What is Read diode ? Describe its principle, construction and working.

4. (a) What are scattering coefficients of a microwave device ? Define them. Obtain the scattering matrix for H-plane tee. 7

OR

What are E-and H-plane tees ? Explain their structures and operation.

- (b) Describe construction and operation of Faraday rotation isolator. 7

OR

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

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

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- (i) List similarity between CALL-RET and PUSH-POP instructions.
 - (ii) What is Stack pointer ?
 - (iii) Define counter and time delay.
 - (iv) Explain CMC and STC instructions.
 - (v) List difference between CMP R/M and CPI 8-bit instructions.
 - (vi) What is 'Nesting' ?
 - (vii) List the difference between static and dynamic debugging a program' ?
 - (viii) What is skin effect ?
 - (ix) What are the main parts of magnetron tube ?
 - (x) State two main differences between O-type and M-type tubes.
 - (xi) Give structure of Rat-race junction.
 - (xii) What is Gunn effect ?
 - (xiii) Define coupling factor of a directional coupler.
 - (xiv) What is bolometer ?
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