This question paper contains 4 printed pages]

Roll No. | | | | | | | | | | |

S. No. of Question Paper : 106

Unique Paper Code : 32221303 I

Name of the Paper : Digital Systems and Applications

Name of the Course : B.Sc. (H) Physics CBCS

Semester : III

Duration : 3 Hours Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Question No. 1 is compulsory. Attempt any *four* from the rest.

Attempt *five* questions in all.

(Non-programmable scientific calculators are allowed)

1. Answer any *five* of the following : 3×5

(*a*) Solve 11001 - 11100 using 2's complement method.

(*b*) Reduce the expression given below using Boolean Algebra

$$AB+\overline{AC}+A\overline{B}C(AB+C)$$

(*c*) What is the function of delay line in a C.R.O. ?

P.T.O.

(*d*) Write Boolean expressions for the following circuit :

(*e*) Define what is SSI, MSI, LSI in an IC.

(*f*) Distinguish between synchronous and asynchronous counter.

(*g*) Define ROM, PROM and EPROM.

(*h*) List any *three* functions which a microprocessor performs.

2. (*a*) Explain with an appropriate logic circuit the working of a 4 bit adder subtractor. 7

(*b*) Simplify the expression using K-Map and draw its logic circuit using NAND gates : 8

$$F = \Sigma m(0, 1, 4, 6, 8, 9, 11) + d(2, 7, 13)$$

3. (*a*) Draw the circuit for a monostable multivibrator using IC555 and explain its operation. Derive an expression for the time period of the output waveform. Give *one* application of monostable multivibrator. 8

(*b*) Draw a labelled block diagram of CRO. What is the function of time-base circuit in CRO. How is the CRO used for frequency determination ? 7

4. (*a*) What are decoders ? Draw and explain the working of a 3 to 8 line decoder. 6

(*b*) Draw the circuit of a 4 bit shift left register with parallel loading and explain its working. 5

(*c*) What do you understand by parity ? Describe a method for generating odd parity. 4

5. (*a*) What is a flip flop ? Explain the working of RS flip flop. How the racing condition is avoided in a J K master slave flip flop ? 8

(*b*) Design an asynchronous decade counter. Explain the working of a ring counter as a periodic switch. 7

6. (*a*) What is the function of the following : 4

(*i*) Program counter

(*ii*) Stack Pointer.

(*b*) Describe different addressing modes available in 8085 microprocessor. Give *one* example of each addressing mode. 5

P.T.O.

(*c*) Describe the various flags used in 8085 microprocessor and show their bit position. What is the mnemonic of an instruction that uses AC flag. 6

7. (*a*) Write a program to add the two hex numbers : A5, 98. Store the sum in memory location 200AH and carry in 200BH. 4

(*b*) Write the classification of instructions for 8085 μP. Explain briefly different instructions of the branch group. 5

(*c*) How is de-multiplexing of address and data buses done in 8085 μP ? Explain with the help of timing diagram. 6