

**COLLEGE OF ENGINEERING, PUNE**  
(An Autonomous Institute of Government of Maharashtra)  
**End Semester Examination**

**(IE 214) Digital Techniques**

**Programme: S. Y. B. Tech (Instrumentation and Control)**

Year: 2011-12

Duration: 3 hrs

Semester: I

Max. Marks: 50

**Instructions:**

1. Solve any five questions.
2. Not to attempt more than five questions, otherwise least marks of five questions will be considered for final counting.
3. Assume suitable data if necessary.
4. Each question carries equal marks.
5. Figures to right indicate full marks.
6. Draw neat figures wherever required.
7. Use of non-programmable calculator is allowed.

Q. 1

- A. Design a synchronous sequential circuit with following requirements:
- i. Single input X and single output Y
  - ii. Output must go high only when number of bit changes are 2 in a 3-bit input word (e.g.:- in 101 there are two bit changes. Thus if 101 is 3-bit input word input, output must go high).
  - iii. Output should go low if number of bit changes is either 0 or 1. (e.g.:- In 111 there are no bit changes and in 110 there is only 1 bit change. Thus for these inputs, output must be low).
  - iv. When a new 3-bit word comes, circuit must reset.
  - v. Circuit must wait for one clock cycle before new word comes.

[6]

- B. Design a sequence generator to generate the following sequence using shift register:

-----1 1 0 1 0 1 1-----

[4]

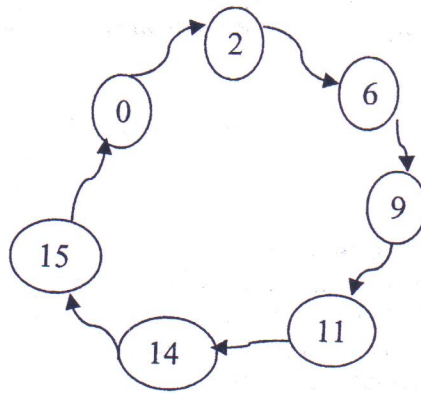
Q. 2

- A. Draw and explain the circuit diagram of ring counter. Also state its practical application.

[4]

- B. Design and realize a synchronous counter using J-K flip-flop which will go through the following sequence count:

0- 2- 6- 9- 11-14- 15- 0.



[6]

Q. 3

- A. What is Hamming code? How is the Hamming code word tested and corrected? Construct Hamming code for BCD 0111, use even and odd parity.

[5]

- B. Design and realize BCD to gray code converter.

[5]

Q. 4

- A. How will you interface TTL to CMOS ICs and Vice Versa? Elaborate.

[6]

- B. Compare SOP and POS.

[2]

- C. State and prove Demorgan's Theorems.

[2]

Q. 5

- A. Design and realize 4-bit binary multiplier.

[6]

- B. List and explain at least four practical applications of Multiplexers.

[4]

Q. 6

- A. What are different types of DAC's? Explain any one detail. What are different specifications of DAC's? Explain [5]
- B. Draw and explain in brief architecture of CPLD. [3]
- C. Find the resolution of 8-bit and 10-bit ADC for analog input range of 0-12V. If application demands accuracy of +/- 50mV which ADC will you prefer among these two? [2]

Q. 7

- A. What are typical features of Microprocessors? Draw and explain in brief architecture of Microprocessor. [5]
- B. Design a full adder using ROM, PAL and PLA. [5]

-----**Best of Luck**-----