B.SC. ELECTRONICS SYLLABUS UNDER CBCS
SEMESTER – III - W.E.F. 2016-17

SEMESTER – III   PAPER – 3

Digital Electronics

Unit – I (9hrs)

NUMBER SYSTEM AND CODES: Decimal, Binary, Hexadecimal, Octal, BCD, Conversions, Complements (1's, 2's,9's and 10's), Addition, Subtraction, Gray, Excess-3   Code conversion from one to another, ASCII code.

Unit- II (12hrs)

BOOLEAN ALGEBRA AND THEOREMS: Boolean Theorems, De-Morgan's laws. Digital logic gates, Multi level NAND & NOR gates. Standard representation of logic functions (SOP and POS), Minimization Techniques (Karnaugh Map Method: 4,5 variables),don't care condition.

Unit-III (15hrs)

COMBINATIONAL DIGITAL CIRCUITS:

Adders-Half & full adder, Subtractor-Half and full subtractors, Parallel binary adder, Magnitude Comparator, Multiplexers (2:1,4:1,8:1)) and Demultiplexers (1:2,1:4) Encoders(Octal to Binary,Decimal to BCD)- Decoder (Binary to Octal,BCD to Decimal) IC-LOGIC FAMILIES**:** TTL logic, DTL logic, RTL Logic, CMOS Logic families (NAND&NOR Gates),Bi-CMOS inverter

UNIT-IV (14hrs)

SEQUENTIAL DIGITAL CIRCUITS:
Flip Flops: S-R FF , J-K FF, T and D type FFs, Master-Slave FFs, Excitation tables for J-K and T FFs, Shift registers(SISO,SIPO,PISO,PIPO),-shift left register, shift right register, Counters - Asynchronous-Mod16,Mod-10, Down counter,Synchronous-4-bit counter &Ring counter.

UNIT-V (10hrs)

MEMORY DEVICES:
General Memory Operations, ROM, RAM (Static and Dynamic), PROM, EPROM, EEPROM, EAROM, PLA(Programmable logic Array),PAL(Programmable Array Logic. Architecture,combinational logic design using PLAs&PALs).

TEXT BOOKS:

1. M.Morris Mano, " Digital Design " 3rd Edition, PHI, New Delhi.
2. Ronald J. Tocci. "Digital Systems-Principles and Applications" 6/e. PHI. New Delhi. 1999.(UNITS I to IV)
3. G.K.Kharate-Digital electronics-oxford university press
4. S.Salivahana&S.Arivazhagan-Digital circuits and design
5. Fundamentals of Digital Circuits by Anand Kumar

Reference Books :

1. Herbert Taub and Donald Schilling. "Digital Integrated Electronics" . McGraw Hill. 1985.
2. S.K. Bose. "Digital Systems". 2/e. New Age International. 1992.
3. D.K. Anvekar and B.S. Sonade. "Electronic Data Converters : Fundamentals & Applications". TMH. 1994.

4. *Malvino and Leach. " Digital Principles and Applications". TMG Hill Edition.*

(DIGITAL ELECTRONICS LAB)
(Minimum <u>six</u> experiments should be done)
<u>**LAB LIST:**</u>

1. Verification of IC-logic gates
2. Realization of basic gates using discrete components (resistor, diodes & transistor)
3 .Realization of basic gates using Universal gates (NAND & NOR gates)
4. Verify Half adder and full adder using gates
5. Verify Half subtractor and full subtractor using gates.

6. Verify the truth table of RS , JK, T-F/F using NAND gates

7. 4-bit binary parallel adder and subtractor using IC 7483

8. Study of 7490 BCD Counter

> **Lab experiments are to be done on breadboard and simulation software (using multisim) and output values are to be compared and justified for variation**.

B.Sc (Three year) Degree Examinations.
SEMISTER-III ELECTRONICS
Paper-III DIGITAL ELECTRONICS

Time: 3 Hrs   MaxMarks:75
PART-A

Answer any FIVE Questions   5x5 =25Marks.

1. (a) Convert $(3A.2F)_{16}$ in to decimal.
   (b) Convert $(1011.111)_2$ to Octal.

2. Give NOR gate implementation for OR,AND and NOT gates?
3. Simplify the Boolean expressions.

   (i) $Y = A B C + A\overline{B} + A B \overline{C}$

   (ii) $Y = A C D + \overline{A} B C D$

4. Discuss the working of parallel Binary Adder?
5. Explain the working of a 4 : 1 line multiplexer with the help of logic diagram?
6. Describe the working of D Flip-Flop. How it is obtained from the JK Flip-Flop?
7. Draw the logic diagram for 4-bit SIPO shift register and explain its working?
8. How does the architecture of PLA differ from PAL and PROM?

PART-B

Answer ALL Questions   10X5 =50marks.

9. a) Discuss in detail about Binary, Decimal and Hexadecimal number systems. What are the avantages of Decimal and Hex systems over Binary?

(OR)

   b) What is Gray code. Write Gray code for any 4-bit binary number. Give the advantage of Gray code over binary System.

10. a) Discuss about the postulates and theorems of Boolean Algebra?

(OR)

   b) Reduce the following expression using K-map and implement in universal logic? $\sum m(0,1,4,5,6,7,9,11,15)+d(10,14)$

11. a) Explain the working of Half adder and Full adder with the help of logic diagrams and truth tables?

(OR)

   b) Explain the working of TTL NAND gate and CMOS NOR gate?

12. a) Explain the working of Master – Slave JK Flip-Flop .How Race Condition is eliminated in it?

(OR)

b) With the help of logic diagram explain the working of 3- bit asynchronous UP/DOWN Counter?

13. a) Draw the Block diagram of PLA and explain about each stage?

(OR)

b) A 3-input,4-output combinational circuit has the following output functions. Implement the Circuit

$A(x,y,z)=\sum m(1,2,4,6)$ $B(x,y,z)=\sum m(0,1,3,6,7)$ $C(x,y,z)=)=\sum m(1,2,4,6,7)$

$D(x,y,z)= \sum m(1,2,3,5,7)$