M 6156

Reg. No. : .....

Name : .....

VI Semester B.Sc. Degree (CCSS – Reg./Supple./Improv.) Examination, May 2014

CORE COURSE IN PHYSICS

6B14 PHY : Digital Electronics

Time : 3 Hours Max. Weightage : 30

Instructions : *Choose correct answer from Section **A**. **Each** bunch carries a wt. of **1**.*
*Answer **any six** from Sec. **B**. **Each** carries a wt. of **1**.*
*Answer **any nine** from Sec. **C**. Each carries a wt. of **2**.*
*Answer **any one** from Sec. **D**. **Each** carries a wt. of **4**.*

SECTION – A

Choose the correct answer. **Each** bunch carries a weighage of **1**.

1. 1) The decimal equivalent of binary number 10101 is
   a) 18 b) 32 c) 21 d) 28
   2) The 2's complement of 10011 is
   a) 01100 b) 01101 c) 01111 d) 1100
   3) The ASCII code for character 'A' is
   a) 4A b) 41 c) 3A d) 33
   4) The hexadecimal equivalent of octal 132 is
   a) 3A b) 3B c) 5A d) 5C

2. 1) $A.(\overline{A}+B) =$
   a) $\overline{A}B$ b) $A + B$ c) $\overline{A} + B$ d) AB
   2) A four variable Boolean expression gives an output 1.
   For A = 0, B = 1, C = 1 and D = 0.
   The Boolean equation is
   a) A.B + C.D b) (A + B) (C + D)
   c) (A.B.C) d) None of these

P.T.O.

3) A carrier of 100 V, 10 KHz is modulated by a 50 V, 1000 Hz sine wave. The modulation factor is
   a) 50% b) Over modulation
   c) 2% d) 10%

4) As the modulation level is increased, the carrier power is
   a) Increased b) Decreased
   c) Remains the same d) Depends on the frequency of carrier

(2×1=2)

SECTION – B

Answer **any six**. **Each** carries a wt. of **1**. **(1 each)**

3. Add + 5 and –7 in 2's complement binary.
4. Convert decimal 1449 to hexadecimal.
5. Write the Boolean equation and logic circuit of an EX-OR gate.
6. Apply De Morgans principle to simplify the boolean equation $\overline{A\overline{B} + C}$.
7. Sketch the circuit of a half adder.
8. What do you mean by over modulation ?
9. Draw the frequency spectrum of an amplitude modulated wave.
10. What is meant by demodulation ? **(6×1=6)**

SECTION – C

Answer **any nine**. **Each** carries a wt. of **2**. **(2 each)**

11. Perform the following arithmetic operations on signed binary numbers.
    a) Add + 39 and –22.
    b) Subtract –21 from +39.
12. Explain De Morgan's theorems.
13. Simplify the following Boolean equations.
    a) $(\overline{A} + B)(A + B)$
    b) $ABC + A\overline{B}C + AB\overline{C}$.

14. Realise the logic expression $Y = (A + B)(\overline{A} + C)(B + D)$ using basic gates.
15. Show the realisation of OR gate and AND gate using NAND gates.
16. Draw a truth table for the Boolean equation Y = (A + B)C.
17. Show the implementation of a 4 bit parallel adder using full adders.
18. Sketch the block diagram of an amplitude modulator.
19. What is the need for modulation in communication system ?
20. An audio signal of 1 KHz is used to modulate a carrier of 500 KHz. Determine the side bands and band width.
21. Explain any two advantages of frequency modulation over amplitude modulation.
22. What do you mean by pulse modulation ? **(9×2=18)**

SECTION – D

Answer **any one**. **Each** carries a wt. of **4**. **(4 each)**

23. A three input digital circuit gives a high output for the following input logic

A	B	C
0	0	0
0	0	1
0	1	0
1	0	0
1	1	1

    Draw a K-map for the truth table and obtain a minimised Boolean expression.

24. With the help of necessary diagrams, explain the demodulation of an amplitude modulated signal. **(1×4=4)**
