

**FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2011**

(CCSS)

Physics—Core Course

PH 5 B12—ELECTRONICS (Analog and Digital)

Three Hours

Maximum : 30 Weightage

**Section A**

12 Objective Type Questions, in bunches of four questions.  
Each bunch carries a weightage of 1.

1. Which of the following materials is not a semi conductor ?
  - (a) Silicon.
  - (b) Germanium.
  - (c) Gallium Arsenide.
  - (d) Gallium Nitride.
2. A 1000 kHz carrier wave is modulated by an audio signal of frequency range 100-5000 Hz. Then the width of the channel is kHz is :
  - (a) 10.
  - (b) 20.
  - (c) 30.
  - (d) 40.
3. Applying DeMorgan's theorem to the expression  $\overline{ABC}$ , we get :
  - (a)  $\bar{A} + \bar{B} + \bar{C}$ .
  - (b)  $\overline{A + B + C}$ .
  - (c)  $\bar{A} + \bar{B} + CC$ .
  - (d)  $A(B + C)$ .
4. How many inputs must a full adder have ?
  - (a) 4.
  - (b) 2.
  - (c) 5.
  - (d) 3.
5. The bandwidth of a CE amplifier \_\_\_\_\_ with negative feedback.
6. The number of clock pulses required to load a serial 5-bit shift register completely is \_\_\_\_\_.
7. The 8 bit binary equivalent of  $(187)_2$  is \_\_\_\_\_.
8.  $AC + ABC = AC$  is \_\_\_\_\_ (True/False).
9. What is a truth table ?

Turn over

10. Name the circuit which starts oscillations in a Hartely oscillator.
11. What is CMRR of an OP-Amp ?
12. What is the ratio of the power in sidebands to the total power in AM when  $m = 1$  ?

( $12 \times \frac{1}{4} = 3$  weigh)

### Section B

Answer all questions, each has weightage 1.

13. Define 'ripple factor' of a rectifier.
14. Define  $\alpha$  of a transistor. Give the relation between  $\alpha$  and  $\beta$  of a transistor.
15. What is a Power amplifier ?
16. What is pulse code modulation ?
17. Convert the following decimal in to binary (a)  $(123.88)_{10}$  ; (b)  $(100.01)_{10}$  ; (c)  $(225)_{10}$ .
18. What are the different number systems. Give example.
19. Draw the diagram and truth table of a two input exclusive OR gate.
20. What is a class A amplifier ?
21. What is an LED ? Mention any two uses.

( $9 \times 1 = 9$  weigh)

### Section C

Answer any five, each has weightage 2.

22. Explain the working of a capacitor input filter.
23. Draw the response of a CE transistor amplifier. Explain different regions.
24. Circuit below uses Silicon transistor of  $h_{FE} = 125$ .  $I_{C_{sat}} = 6.1$  mA. If the input waveform shown in figure (ii), draw the output wave form. Explain the reason.

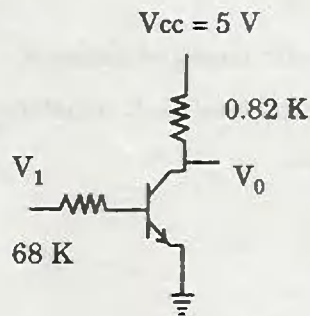


Fig (i)

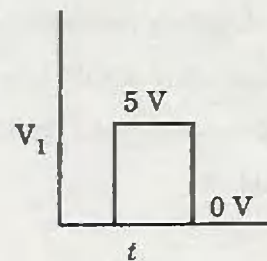


Fig (ii)

25. With the help of a diagram explain the working of a full adder circuit.
26. The following readings were obtained experimentally from a FET :

$V_{GS}$	...	0V	0V	-0.2 V
$V_{DS}$	...	7V	15V	15V
$I_0$	...	10 mA	10.25 mA	9.6 MA

Determine a.c. resistance, transconductance and amplification factor.

27. Prove the Boolean identity :—

$$(A + B)(A + \bar{B})(\bar{A} + C) = AC.$$

28. With the help of a diagram explain the action of an OP-Amp integrator. Obtain the expression for the voltage gain.

(5 × 2 = 10 weightage)

#### Section D

Answer any two, each has weightage 4.

29. With the help of a neat diagram, explain the action of a bridge rectifier. Derive the Expression for ripples factor and efficiency of the bridge rectifier circuit.
30. What is the Bark hausen criterion for oscillations in an amplifier ? With the help of a neat diagram, explain the working of a phase shift oscillator. Write down an expression for its frequency.
31. What are flip-flops ? Using block diagrams, distinguish the actions of an RS, D and JK Master slave flip-flops.

(2 × 4 = 8 weightage)