Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH (CSE)(N)/(IT)(N)/SEM-3/CS-301/2012-13

2012

ANALOG & DIGITAL ELECTRONICS

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

   i) A 2-transistor class *B* power amplifier is commonly called
   a) push-pull b) dual
   c) differential d) none of these.

   ii) A stable multivibrator has
   a) no stable state b) one stable state
   c) two stable states d) none of these.

   iii) Schmitt trigger circuit generates
   a) triangular wave b) square wave
   c) saw tooth wave d) none of these.

   iv) A Wien-bridge oscillator has a frequency
   a) $\frac{1}{2\pi\sqrt{RC}}$ b) $\frac{1}{\sqrt{RC}}$
   c) $\frac{1}{2\pi RC}$ d) none of these.

v) Which of the following oscillators is used at audio frequency ?

a) Crystal oscillator

b) Hartley oscillator

c) RC phase-shift oscillator

d) Colpitts oscillator.

vi) $A + A'B + B'$ is equal to

a) A b) B'

c) 1 d) 0.

vii) Negative feedback in an amplifier is

a) reduced gain

b) increased noise

c) increased frequency & phase

d) reduced bandwidth.

viii) How many minimum NOR gates is required to implement NAND gate ?

a) 3 b) 4

c) 5 d) 2.

ix) The digital logic family which has minimum power dissipation is

a) TTL b) RTL

c) DTL d) CMOS.

x) If the input to T-flip-flop is 100 Hz signal, the final output of the three T-flip-flops is cascade is

a) 1000 Hz b) 500 Hz

c) 300 Hz d) 12·5 Hz.

xi) Which one is the sequential circuit ?

a) Multiplexer b) Decoder

c) Encoder d) Counter.

xii) 8421 is a

a) weighted code b) non-weighted code

c) complementary code d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following $3 \times 5 = 15$

2. Implement Full-adder circuit using two Half-adders. Write the truth table of Half-subtractor. 3 + 2
3. What is Multiplexer ? Why is it called 'data selector' ? Write the important characteristics of digital IC. 2 + 1 + 2
4. Implement the function $F(A,B,C) = \sum m(1,3,5,6)$ using decoder. What is the difference between combinational circuit and sequential circuit ? 3 + 2
5. Draw and explain the operation of Monostable multivibrator using 555 Timer.
6. Draw and explain the Schmitt trigger circuit.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Write truth table, circuit diagram and timing diagram of SR flip-flop using NOR gate.

   b) Convert D flip-flop to JK flip-flop. 8 + 7

8. a) Design a 2-bit Asynchronous up counter using negative edge trigger JK flip-flop and draw timing diagram.

   b) Design a MOD-6 Synchronous counter using JK flip-flop. 6 + 9

9. Write short notes on any *three* of the following : 3×5

   a) Johnson counter

   b) TTL family

   c) Serial input parallel output shift register

   d) BCD adder

   e) 8 : 3 encoder.

10. a) What are the advantages of negative feedback ?
    b) Explain the operation of a phase shift oscillator with circuit diagram.
    c) Derive an expression for its frequency of oscillation.

3 + 6 + 6

11. a) Explain the working of a R-2R Ladder type DAC with a neat circuit diagram.
    b) Explain the working of a successive approximation register (SAR) type ADC. 7 + 8

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