



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 × 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 × 5 = 15

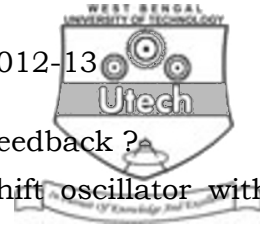
2. Implement Full-adder circuit using two Half-adders. Write the truth table of Half-subtractor.                      3 + 2
3. What is Multiplexer ? Why is it called 'data selector' ? Write the important characteristics of digital IC.                      2 + 1 + 2
4. Implement the function  $F(A,B,C) = \sum m(1,3,5,6)$  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 × 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

=====