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# CS/B.Tech(CSE/IT)(N)/SEM-3/CS-301/2011-12 2011

# **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	:
					$10 \times 1 = 1$	10

i) Maximum efficiency of transformer coupled class A power amplifier is

a) 78.5%

b) 50%

c) 25%

d) 100%.

ii) A 2-transistor class B power amplifier is commonly called

- a) push-pull
- b) dual
- c) differential
- d) none of these.
- iii) Class C amplifiers are used as
  - a) AF amplifiers
- b) detectors
- c) RF amplifiers
- d) none of these.

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# CS/B.Tech(CSE/IT)(N)/SEM-3/CS-301/2011-12 iv) A bistable multivibrator circuit has

iv)	A bistable multivibrator circuit has							
	a)	two unstable states	b)	two stable states				
	c)	quasi-stable states	d)	none of these.				
v)	A Wien-bridge oscillator has a frequency							
	a)	$1/2\pi\sqrt{RC}$	b)	$1/\sqrt{RC}$				
	c)	$1/2\pi$ RC	d)	none of these.				
vi)	Whi	ch of the following o	scilla	ators is used at audio				
	frequency?							
	a)	a) Crystal Oscillators						
	b)	b) Wien-bridge Oscillator						
	c) RC Phase-shift Oscillator							
	d) Colpitt's Oscillator.							
vii)	The minimum no. of NAND gates required to design one							
	full adder circuit is							
	a)	6	b)	5				
	c)	10	d)	9.				
viii)	The race-around condition does not occur in flip-flop							
	a)	J-K	b)	Master Slave				
	c)	T	d)	None of these.				
ix)	The decimal equivalent of ( $1111100100$ ) $_2$ is							
	a)	998	b)	568				
	c)	996	d)	None of these.				
x)	The J-K flip-flop has							
	a)	no stable state	b)	two stable states				

d) none of these.

c) one stable state



- The decimal equivalent of ( A0F9.0EB )  $_{16}^{\circ}$ xi)
  - 44297.0967 a)
- 67902.8796 b)
- 41209.0572 c)
- d) none of these.
- xii) How many full adders are required to construct m bit parallel adder?
  - m/2a)

m-1

c) m d) m + 1.

#### **GROUP - B**

## (Short Answer Type Questions)

Answer any three of the following.

- $3 \times 5 = 15$
- 2. Simplify the following Boolean function into
  - i) Sum of product form
  - Product of sum form: ii)

$$F(A, B, C, D) = \Sigma(0, 1, 2, 5, 8, 9, 10).$$
  $2\frac{1}{2} + 2\frac{1}{2}$ 

3. Implement the following using

8:1 MUX, 
$$F(A, B, C, D) = \Sigma(0, 2, 4, 6)$$
.

- 4. Explain the operation of successive approximation ADC with diagram.
- 5. Draw and explain the operation of astable multivibrator using 555 Timer.
- 6. Define upper threshold, lower threshold, hysteresis voltage and centre voltage related to a Schmitt trigger circuit.

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## (Long Answer Type Questions)

Answer any three of the following.

 $3 \times 15 = 45$ 

- 7. a) Design an asynchronous 3-bit up-down counter using J-K flip-flop which counts up when external signal M = 1 and counts down when M = 0.
  - b) With a neat circuit diagram, explain the operation of a 4-bit Johnson counter implemented using *D* flip-flop.

7 + 8

- 8. a) Design full subtractor uisng 4 : 1 multiplexers. 6
  - b) Describe the operation of a bidirectional universal shift register
     ( with parallel load ) with a neat diagram.
- 9. a) Draw the circuit diagram of a transformer coupled Class *A* power amplifiers and explain its operation.
  - b) Calculate the total efficiency of this amplifier.
  - c) What is cross-over distortion found in Class *B* power amplifiers? How it can be eliminated? 5 + 4 + 6
- 10. a) What are the conditions necessary for the generation of oscillation?
  - b) Explain the operation of a Wien Bridge oscillator using Opamp with a circuit diagram.
  - c) Derive an expression for its frequency of oscillation.

4 + 6 + 5

11. Write short notes on any *three* of the following :

 $3 \times 5$ 

- a) Ring Counter
- b) Odd Parity Generator and Checker
- c) BCD adder
- d) R-2R ladder DAC.
- e) CMOS Logic family
- f) Data lock-out in a counter.

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