

GURU NANAK INSTITUTE OF TECHNOLOGY
An Autonomous Institute under MAKAUT
2020-2021
ANALOG AND DIGITAL ELECTRONICS
IT302

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)

Answer any **ten** from the following, choosing the correct alternative of each question: **10×1=10**

			Marks	CO No
1	(i)	The circuits of NOR based S-R latch classified as asynchronous sequential circuits, why?	1	CO4
		a) Because of inverted outputs		
		b) Because of triggering functionality		
		c) Because of cross-coupled connection		
		d) Because of inverted outputs & triggering functionality		
	(ii)	Gray code representation of 14 is 1010	1	CO2
		a) 1100		
		b) 1001		
		c) 1110		
		d) 1111		
	(iii)	One example of the use of an S-R flip-flop is as _____	1	CO4
		a) Transition pulse generator		
		b) Racer		
		c) Switch debouncer		
		d) Astable oscillator		
	(iv)	The octal number (651.124) ₈ is equivalent to _____	1	CO4
		a) (1A9.2A) ₁₆		
		b) (1B0.10) ₁₆		
		c) (1A8.A3) ₁₆		
		d) (1B0.B0) ₁₆		
	(v)	A decoder with an enable input can be used as _____	1	CO4
		a) Encoder		
		b) Parity generator		
		c) Multiplexer		
		d) De-Multiplexer		
	(vi)	In ECL the fanout capability is _____	1	CO3
		a) High		
		b) Low		
		c) Zero		
		d) Sometimes high and sometimes low		

B. TECH/IT/ODD/SEM-111/IT302/R18/2020-2021

- | | | | |
|--------|---|---|-----|
| (vii) | D/A converters are generally | 1 | CO3 |
| | a) Weighted resistor network | | |
| | b) Binary ladder network | | |
| | c) Either (a) or (b) | | |
| | d) Neither (a) nor (b) | | |
| (viii) | One multiplexer can take the place of _____ | 1 | CO4 |
| | a) Several SSI logic gates | | |
| | b) Combinational logic circuits | | |
| | c) Several Ex-NOR gates | | |
| | d) Several SSI logic gates or combinational logic circuits | | |
| (ix) | 3 bits full adder contains _____ | 1 | CO4 |
| | a) 3 combinational inputs | | |
| | b) 4 combinational inputs | | |
| | c) 6 combinational inputs | | |
| | d) 8 combinational inputs | | |
| (x) | Which coupling is generally employed in power amplifier?
Transformer | 1 | CO1 |
| | a) RC | | |
| | b) Direct | | |
| | c) Impedance | | |
| | d) | | |
| (xi) | The power amplifier with highest collector efficiency | 1 | CO1 |
| | a) C | | |
| | b) A | | |
| | c) B | | |
| | d) AB | | |
| (xii) | Low efficiency of a power amplifier results in | 1 | CO1 |
| | a) Low forward bias | | |
| | b) Less battery consumption | | |
| | c) More battery consumption | | |
| | d) None of the above | | |

GROUP – B

(Short Answer Type Questions)

Answer any *three* from the following: **3×5=15**

- | | | Marks | CO No |
|----|---|-------|-------|
| 2. | a) Subtract : (10101) ₂ from (11110) ₂ using 2's complement method. | 3 | CO2 |
| | b) Subtract (3270) ₁₀ from (72552) ₁₀ using 10's complement method. | 2 | CO2 |
| 3. | Simplify the Boolean function with K-Map:
$F = A'B'C' + B'CD' + A'BCD' + AB'C'$ | 5 | CO2 |
| 4. | Convert SR Flip Flop to JK Flip Flop | 5 | CO4 |
| 5. | Implement the Boolean function with a multiplexer: | 5 | CO1 |

$$F(A,B,C) = \sum(1,3,5,6)$$

- | | | | | |
|----|-----|--|---|-----|
| 6. | (a) | Explain operation of Astable multivibrator using 555 timer IC. | 5 | CO3 |
|----|-----|--|---|-----|

**GROUP – C
(Long Answer Type Questions)**

Answer any *three* from the following: **3×15=45**

			Marks	CO No
7.	(a)	Simplify the following Boolean function by using the tabulation method: $F = \sum (0, 1, 2, 8, 10, 11, 14, 15)$	10	CO2
	(b)	Design a 16:1 MUX using 4:1 MUX	5	CO4
8.	(a)	Design a Mod-8 asynchronous up-down counter	10	CO4
	(b)	Design a 4 bit Self-Correcting Ring Counter	5	CO4
9.	(a)	Realize the function $F(A,B,C,D) = \sum (0,1,3,6,7,9,10,11,14)$ using 8 to 1 MUX.	10	CO2
	(b)	Draw and explain Master Slave flip flop	5	CO4
10.	(a)	A class A power amplifier with a direct coupled load has a collector efficiency of 30 % and delivers a power input of 10 W. Find (i) The DC power input (ii) The power dissipation of full output (iii) The desirable power dissipation rating of the BJT	5	CO1
	(b)	Compute the efficiency of a class B amplifier	5	CO1
	(c)	Determine the maximum and minimum frequency of oscillations of a Wein Bridge Oscillator circuit having a resistor of 10K Ω and a variable capacitor of 1 nF to 1000nF	5	CO1
11.	Write Short Notes on any <i>three</i>		3x5	
	(a)	Explain operation of 4 bit Parallel Adder	5	CO3
	(b)	R-2R ladder type DAC	5	CO3
	(c)	Explain AND, OR, NOR logic by TTL	5	CO3
	(d)	Schmitt Trigger Circuit	5	CO1
	(e)	4 bit comparator	5	CO4