NARULA INSTITUTE OF TECHNOLOGY
An Autonomous Institute under MAKAUT

B.TECH./ IT /ODD/SEM–III/IT302//2021-2022
PAPER TYPE: REGULAR
YEAR: 2022

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)

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

SL. NO.	Question	Marks	CO
(i)	The Boolean expression for a 3-input AND gate is _____ a)X = AB b)X = ABC c)X = A + B + C d) X = AB + C	1	CO2
(ii)	The NOR logic gate is the same as the operation of the _____ gate with an inverter connected to the output. a) OR b) AND c) NAND d) none of the above	1	CO2
(iii)	Number of select inputs required to design1:16 Demultiplexer is a)2 b)3 c)4 d)6	1	CO3
(iv)	Number of bits required to assign binary roll numbers to a class of 60 students a) 5 b) 6 c) 7 d) 8	1	CO2
(v)	Which of the following expressions is in the sum-of-products form? a) (A + B)(C + D) b) (AB)(CD) c) AB(CD) d) AB + CD	1	CO2
(vi)	Power conversion efficiency of transformer coupled class-A power amplifier is a) 33.33%	1	CO1

b) 25%
c) 50%
d) d) 85%

(vii)	Pulse width of monostable multivibrator is a) 1.5 RC b)1.1 RC c) 2.4 RC d) 3.8 RC	1	CO1
(viii)	If both inputs of an S-R flip-flop are low, what will happen when the clock goes HIGH? a) An invalid state will exist b) No change will occur in the output c) The output will toggle. d) The output will reset.	1	CO3
(ix)	If an input is activated by a signal transition, it is _____. a) edge-triggered b) toggle triggered c) clock triggered d) noise triggered	1	CO3
(x)	Which of the following logic is the fastest? a) TTL b) MOS c) ECL d) CMOS	1	CO5
(xi)	The number of flip flops required for a MOD-16 Ring Counter is a) 4 b) 8 c) 12 d) 16	1	CO4
(xii)	The value of negative feedback fraction is always ……. a) Less than 1 b) More than 1 c) Equal to 1 d) None of the above	1	CO1

GROUP – B

(Short Answer Type Questions)
Answer any three from the following: 3×5=15

SL. NO.			Marks	CO
2.	(a)	What do you mean by Universal Gate? Implement a NOT gate using any Universal Gate.	3	CO2
	(b)	Define the Barkhausen criterion for oscillation	2	CO1
3.		Design a Full Adder circuit using 2 half adder.	5	CO2
4.		Draw and explain table. R-2R Digital-to-Analogue Converter	5	CO4
5.		Draw the circuit diagram of class A power amplifier and derive its power conversion efficiency.	5	CO1
6.	(a)	Perform the following conversion $(1101.11)_2 = (\ )_{10}$	2	CO2
	(b)	Perform the following conversion $(4C.25)_{16} = (\ )_8$	3	CO2

GROUP – C
(Long Answer Type Questions)

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

SL. NO.			Marks	CO No.
7.	(a)	What is the need of Parity Generator and Checker circuit?	2	CO3
	(b)	Design a 3-bit priority generator circuit.	8	CO3
	(c)	What is the need of Priority Encoder Circuit and explain how it works?	5	CO3
8.	(a)	Design a Full Adder circuit using a 3 to 8 Decoder	5	CO2
	(b)	Why De-Multiplexer is also known as Data Distributor? Design a 8 X 1 Multiplexer using two 4 X 1 Multiplexer and a basic logic gate.	1+4	CO2
	(c)	Implement the following Boolean function $F(A,B,C,D)= \sum (0,1,3,4,8,9,15)$ using a 8 : 1 Multiplexer	5	
9.	(a)	Draw and explain the State diagram for S-R flip flop	2	CO3
	(b)	What is shift register? Mention the types of different shift registers.	1+2	CO4
	(c)	Draw and explain a Serial In- Parallel Out (SIPO) left shift register.	5	CO4
	(d)	Design a MOD-6 ripple counter and explain its operation with necessary state table	5	CO4
10.	(a)	Draw the internal diagram of a 555 timer circuit.	5	CO1

	(b)	Draw the circuit diagram of Monostable Multivibrator using IC-555 timer.	5	CO1
	(c)	Draw the circuit diagram of RC phase shift oscillator using BJT and explain its operation.	5	CO1
11.		Write short notes on any three of the following		
	(a)	Successive approximation ADC	5	CO4
	(b)	Single bit Comparator circuit	5	CO2
	(c)	Schmitt Trigger	5	CO1
	(d)	Master Slave flip flop	5	CO3
	(e)	Positive Vs negative feedback	5	CO1