Reg. No.															

B.Tech. DEGREE EXAMINATION, DECEMBER 2023

Fourth Semester

18BMC205J – LINEAR AND DIGITAL INTEGRATED CIRCUITS

(For the candidates admitted from the academic year 2020-2021 to 2021-2022)

Note:

(i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

(ii) **Part - B & Part - C** should be answered in answer booklet.

Time: 3 hours

Max. Marks: 100

PART – A (20 × 1 = 20 Marks)

Answer **ALL** Questions

	Marks	BL	CO	PO
1. Voltage follower circuit acts as (A) an amplifier (B) a multiplier (C) an impedance matching circuit (D) an inverter	1	1	1	1,2,3
2. The output of a differentiator when applied with a step input is (A) impulse (B) step (C) ramp (D) sine	1	1	1	1,2,3
3. The clipping level in op-amp is determined by (A) AC supply voltage (B) Control voltage (C) Reference voltage (D) Input voltage	1	1	1	1,2,3
4. The trans resistance amplifier is a (A) Current to voltage converter (B) Voltage to current converter (C) Current controlled current source (D) Voltage controlled current source	1	1	1	1,2,3
5. The feedback signal of basic sine wave oscillator is given as (A) $V_f = A\beta \times V_o$ (B) $V_f = A\beta \times V_i$ (C) $V_f = A\beta \times (V_o / V_i)$ (D) $V_f = A\beta \times (V_i / V_o)$	1	2	1	1,2
6. The number of RC stages are used in the RC phase shift oscillator is ____ (A) Six (B) Two (C) Four (D) Three	1	2	1	1,2
7. An efficient oscillator operates in _____ mode (A) Class A (B) Class B (C) Class C (D) Class AB	1	2	1	1,2
8. The input resistor and feedback resistor of a phase shift oscillator are related by (A) R_f=92 R_1 (B) R_f< 29R_1 (C) R_f>29R_1 (D) R_f=29R_1	1	2	1	1,2

9. The fastest analog to digital converter is ____ type
(A) Successive Approximation (B) Flash
(C) Counter type (D) Dual-slope

10. The resolution of a 4-bit R-2R ladder type D/A converter with a reference voltage of 5V and R=10KΩ is
(A) 62.5μA (B) 31.25 μA
(C) 125 μA (D) 145 μA

11. The resolution of a 0–5 V 6-bit digital-to-analog converter (DAC) is:
(A) 63% (B) 15.6%
(C) 64% (D) 1.56%

12. In a flash analog-to-digital converter, the output of each comparator is connected to an input of a
(A) Multiplexer (B) Demultiplexer
(C) Priority encoder (D) Decoder

13. If A and B are the inputs of a half adder, the carry is given by _____
(A) A AND B (B) A OR B
(C) A XOR B (D) A EX-NOR B

14. The number of outputs present in a BCD decoder is _____
(A) 4 (B) 5
(C) 15 (D) 10

15. If the number of n selected input lines is equal to 2^m then it requires _____ select lines.
(A) 2 (B) m
(C) n (D) 2^n

16. Reflected binary code is also known as _____
(A) BCD code (B) Binary code
(C) ASCII code (D) Gray Code

17. When both inputs of a J-K flip-flop cycle, the output will _____
(A) Be invalid (B) Change
(C) Not change (D) Toggle

18. The maximum possible range of bit-count specifically in n-bit binary counter consisting of 'n' number of flip-flops is _____
(A) 0 to 2^n (B) 0 to $2^n + 1$
(C) 0 to $2^n - 1$ (D) 0 to $2^{n+1/2}$

19. In a 4-bit Johnson counter sequence, there are a total of how many states or bit patterns?
(A) 1 (B) 3
(C) 4 (D) 8

20. Ripple counters are also called _____
(A) SSI counters (B) Asynchronous counters
(C) Synchronous counters (D) VLSI counters

PART – B (5 × 4 = 20 Marks)

Answer **ANY FIVE** Questions

		Marks	BL	CO	PO
21.	Classify summing and scaling amplifier.	4	1	1	1,2,3
22.	Identify the gain equation of inverting amplifier with proper circuit diagram.	4	1	2	1,2,3
23.	List different types of comparators.	4	2	1	1,2
24.	List out the advantages of inverted R-2R ladder type D/A converter over weighted resistor type.	4	3	1	2,4
25.	An 8-bit A/D converter is used for converting 0 to 10V input voltage. Determine the digital output for an input voltage of 4.8V.	4	3	2	2,4
26.	Design a 4:1 Multiplexer using logic gates.	4	4	2	1,2,3,4,5
27.	Explain briefly on different types of Registers.	4	5	1	2,4

PART – C (5 × 12 = 60 Marks)

Answer **ALL** Questions

		Marks	BL	CO	PO
28. a.	Derive the output equation of full wave precision rectifier using op-amp.	12	1	2	1,2,3
	(OR)				
b.	Derive the output equation of (i) Differentiator (ii) Integrator.	12	1	2	1,2,3
29. a.	Explain the working of RC phase shift oscillator with suitable circuit diagram.	12	2	1	1,2
	(OR)				
b.	Design a wide band pass filter having f_L=200HZ, f_H=2 KZ and pass band gain of 4. Find the value of Q of the filter. Assume C=0.1μF.	12	2	2	1,2
30. a.	Design a Successive Approximation Converter for analog voltage V_a=11 V and explain the conversion procedure step by step.	12	3	2	2,4
	(OR)				
b.	Explain the working of flash ADC with suitable circuit diagram.	12	3	1	2,4
31. a.	Design a 4-bit Gray code TO BINARY converter and implement it using logic gates.	12	4	2	1,2,3,4,5
	(OR)				
b.i.	Implement the following Boolean function using 8:1 Mux: F(A,B,C,D)=∑m(0,1,3,4,8,9,15).	12	4	2	1,2,3,4,5
ii.	Design a full subtractor using half subtractors.				
32. a.	Design a Mod 5 ripple counter using T Flip Flop.	12	5	2	2,3,4
	(OR)				
b.	Design a PLA for the Logic Expression. F1=AB+AC'+AB'C' F2=AC+BC+AB	12	5	2	2,4

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