Reg. No.																

Question Paper Code	14705

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2026

Third Semester

Electrical and Electronics Engineering

24EEPC304 - DIGITAL ELECTRONICS

Regulations - 2024

Duration: 3 Hours | Max. Marks: 100

PART – A (i) (MCQ)
(16 × 1 = 16 Marks)
Answer ALL Questions

		Marks	K – Level	CO
1.	Resistor–transistor logic (RTL) is a class of digital circuits built using _____ as the input network and _____ as switching devices. a) Resistors, bipolar junction transistors (BJTs) b) Bipolar junction transistors (BJTs), Resistors c) Capacitors, resistors d) Resistors, capacitors	1	K3	CO1
2.	TTL circuits with "totem-pole" output stage minimize _____ a) The power dissipation in RTL b) The time consumption in RTL c) The speed of transferring rate in RTL d) Propagation delay in RTL	1	K2	CO1
3.	TTL is called transistor–transistor logic because both the logic gating function and the amplifying function are performed by _____ a) Resistors b) Bipolar junction transistors c) One transistor d) Resistors and transistors respectively	1	K1	CO1
4.	The canonical sum of product form of the function y(A,B) = A + B is _____ a) AB + BB + A'A b) AB + AB' + A'B c) BA + BA' + A'B' d) AB' + A'B + A'B'	1	K1	CO2
5.	DeMorgan's theorem states that _____ a) (AB)'=A'+B' b) (A+B)'=A'*B c) A'+B'=A'B' d) (AB)'=A'+B	1	K2	CO2
6.	Product-of-Sums expressions can be implemented using _____ a) 2-level OR-AND logic circuits b) 2-level NOR logic circuits c) 2-level XOR logic circuits d) Both 2-level OR-AND and NOR logic circuits	1	K1	CO2
7.	What is a multiplexer? a) It is a type of decoder which decodes several inputs and gives one output b) A multiplexer is a device which converts many signals into one c) It takes one input and results into many output d) It is a type of encoder which decodes several inputs and gives one output	1	K1	CO3
8.	Which combinational circuit is renowned for selecting a single input from multiple inputs & directing the binary information to output line? a) Data Selector b) Data distributor c) Both data selector and data distributor d) DeMultiplexer	1	K2	CO3
9.	Half-adders have a major limitation in that they cannot _____ a) Accept a carry bit from a present stage b) Accept a carry bit from a next stage c) Accept a carry bit from a previous stage d) Accept a carry bit from the following stages	1	K1	CO3

10.	For realisation of JK flip-flop from SR flip-flop, if J=0 & K=0 then the input is _____		1	K2	CO4
	a) S=0, R=0	b) S=0, R=X			
	c) S=X, R=0	d) S=X, R=X			
11.	A counter circuit is usually constructed of _____		1	K3	CO4
	a) A number of latches connected in cascade form	b) A number of NAND gates connected in cascade form			
	c) A number of flip-flops connected in cascade	d) A number of NOR gates connected in cascade form			
12.	Show the maximum possible range of bit-count specifically in n-bit binary counter consisting of 'n' number of flip-flops?		1	K2	CO4
	a) 0 to 2^n	b) 0 to 2^n + 1			
	c) 0 to 2^n – 1	d) 0 to 2^n+1/2			
13.	Identify the following that best describes EPROMs?		1	K3	CO5
	a) EPROMs can be programmed only once	b) EPROMs can be erased by UV			
	c) EPROMs can be erased by shorting all inputs to the ground	d) EPROMs can be erased electrically			
14.	PLDs with programmable AND and fixed OR arrays are identified as _____?		1	K3	CO5
	a) PAL	b) PLA			
	c) APL	d) PPL			
15.	A vending machine controller is selected as which type of digital circuit?		1	K3	CO6
	a) Combinational Logic Circuit	b) Sequential Logic Circuit			
	c) Only Gates	d) None of the above			
16.	In a 4-state traffic light FSM (NS Green, NS Yellow, EW Green, EW Yellow), select the minimum number of flip-flops required?		1	K3	CO6
	a) 1	b) 2			
	c) 3	d) 4			

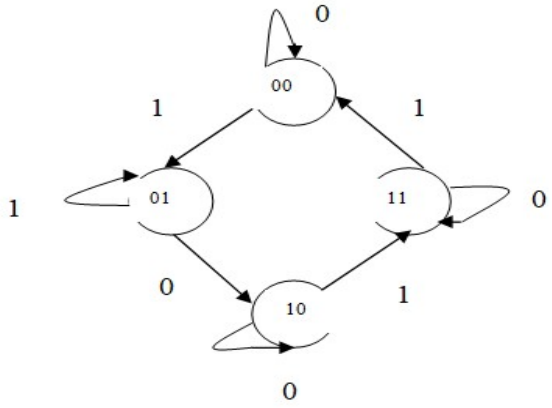
PART – A (ii) (Short Answer Questions)
(6 × 3 = 18 Marks)
Answer ALL Questions

17.	Analyze the major difference between ECL and TTL.	3	K4	CO1
18.	For the given function, examine the Boolean expression in product of maxterm form f(a,b,c)=Σm(2,3,5,6,7).	3	K4	CO2
19.	Inspect why MUX is called data selector.	3	K4	CO3
20.	Construct the race around condition flipflops.	3	K3	CO4
21.	Compare the advantage of PLA over ROM.	3	K3	CO5
22.	Choose the real time examples of Traffic Light Controllers.	3	K2	CO6

PART - B (Descriptive Answer Questions)
(6 × 11 = 66 Marks)
Answer ALL Questions

23.	a)	Construct and develop the NOR gate using TTL logic	11	K3	CO1
		OR			
	b)	Design a TTL logic circuit for a 3 input NAND gate.	11	K3	CO1
24.	a)	Build the following Boolean function in (1) Sum of products and (2) product of sums. F(A,B,C,D) = Σ (0,1,2,5,8,9,10).	11	K3	CO2
		OR			

	b)	Using K map method, solve the following Boolean expression and implement the same using only NAND gates. Represent the same expression using product of sum. $F(a,b,c,d)=\Sigma m(0,2,5,10,13,15) + \Sigma d(7,8)$	*11*	*K3*	*CO2*
25.	a)	Utilize a multiplexer having 3 data select inputs to implement the logic for the function $f= \Sigma m(0,1,2,3,4,10,11,14,15)$.	*11*	*K3*	*CO3*
		OR			
	b)	Develop a full subtractor and realize using logic gates. Also, implement the same using half subtractor.	*11*	*K3*	*CO3*
26.	a)	Analyze synchronous counter using JK flip flops for the sequence given below: 0,1,3,2,6,7,5,4,12,13,15,14,10,11,9,8,0,1,3.	*11*	*K4*	*CO4*
		OR			
	b)	Inspect a synchronous sequential circuit using JK for the given state diagram	*11*	*K4*	*CO4*



27.	a)	Solve the following function using PLA. $F(x,y,z) =\Sigma m(1,2,4,6)$.	*11*	*K3*	*CO5*
		OR			
	b)	Experiment with short notes on SISO & SIPO and draw the output waveforms.	*11*	*K3*	*CO5*
28.	a)	Analyze and build the circuit and function of Traffic Light Controllers.	*11*	*K4*	*CO6*
		OR			
	b)	With the neat diagram, examine the working principle of Automatic vending machine.	*11*	*K4*	*CO6*