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MANIPAL INSTITUTE OF TECHNOLOGY

(A Constituent Institute of Manipal University) Manipal – 576 104



MAX. MARKS: 100

IV SEMESTER B.Tech. (BME) DEGREE MAKE-UP EXAMINATIONS JUNE/ JULY, 2016

SUBJECT: DIGITAL ELECTRONICS (BME 204)

(REVISED CREDIT SYSTEM)

Tuesday, 28th June, 2016: 2.00 to 5.00 pm

TIME: 3 HOURS

	Instructions to Candidates:								
1. 2.	Answe Draw	er any FIVE full questions. labeled diagram wherever necessary							
1.	(a)	Realize and draw a half adder circuit using only minimum number of NAND gates.	06						
	(b)	Draw the circuit of a three input medium speed TTL NAND gate. Explain its operation with truth table.	06						
	(c)	Design and draw the circuit of one digit BCD adder. Explain its operation with an example.	08						
2.	(a)	What is a decoder? Realize a 3×8 line decoder using 2×4 line decoders with active low outputs and active low enable lines.	06						
	(b)	Simplify the following Boolean function using Karnaugh map as well as with MEV technique. $f(A,B,C,D) = \sum 0,2,4,5,6,7,8,10,13,15$	06						
	(c)	Design a 4 bit digital comparator and realize with the logic gates. Explain the operation with an example.	08						
3	(a)	Draw the logic circuit of a JK flip flop with NAND gates. Explain its operation. Also discuss on race around condition.	06						
	(b)	Draw the circuit of MOD-8 Johnson counter. List the legal and illegal count sequences.	06						
	(c)	Design and draw the circuit of a Mod-8 synchronous counter using D flip flops and explain its operation with timing diagram.	08						
4	(a)	Draw a 3 bit shift register and explain its operation as SIPO, and PISO with an example.	06						
	(b)	Write a note on ROM.	06						

(c) For the diode clipping circuit shown in **Fig.Q4c**, assume that $V_R=5$ volts, 08 $V_i = 10 \sin \omega t$ and the diode forward resistance is $R_f=100\Omega$ while $R_r=\infty$ and $V_{\gamma}=0$. Draw to scale the input and output waveforms and label the maximum and minimum values if (i) $R=500\Omega$. (ii) $R=5K\Omega$ (iii) $R=20K\Omega$.



- 5. (a) A symmetrical square wave whose peak to peak amplitude is 5 Volts is applied 10 to a RC low pass circuit whose time constant equals the half period of the square wave. Find and sketch the maximum and minimum values of the output voltage.
 - (b) A limited ramp is applied to a RC high pass circuit shown in **Fig.Q5b**. draw to 10 scale the output waveform for the cases (i) T=RC (ii) T=5RC



- 6. (a) Draw an astable multi-vibrator circuit using transistors. Explain its operation 10 with waveforms and derive the relation of time period T.
 - (b) A fixed biased binary uses Germanium npn transistors with $h_{FEmin} = 50$. The junction saturation voltages are $V_{CEsat}=0.1V$, and $V_{BEsat}=0.3V$. The circuit parameters are $V_{CC}=12V$ olts, $V_{BB}=-6V$ olts, $R_1=22K$, $R_2=100K$, and $R_C=2.7K$. Find the stable state voltages and currents. If I_{CBO} at 25^{0} C is 3μ A and doubles every 10^{0} C, find the maximum temperature at which neither of the transistor is OFF.