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Printed	Pages—4					EEC309
(Followin	g Paper ID	and Roll N	lo. to be	filled in	your Ai	nswer Book)
PAPER	ID:0321	Roll No	· []	<u> </u>		
	-	B	. Tech.			
(SEM	, III) ODD (SEMEST	ER THI	EORYE	EXAMI	NATION
		.20	010-11		÷	
A	NALOG 2	AND DIO	GITAL	ELEC	TRON	ICS
Time : 3	Hours				Total 1	Marks : 100
Note :	Attempt all	questions.	All que	stions ca	arry equa	al marks.
1. Atte	empt any fo	ir parts of	the foll	owing :		(5×4=20)
" (a)	Explain th	e operation	n of a LÌ	ED with	the help	ofnecessary
•	dìagrams.	List the m	naterials	used fo	or constr	ucting LED
	Give the a	dvantages	and dis	advanta	ges of L	ED.
(b)	Explain the forward and reverse characteristics of a Tunnel					
	diode and explain the tunneling operation.					
(c)	Explain the characteristics of a varactor diode and mention					
	how it can	be used in	1 a resor	nant circ	uit. Also	list some of
	the application	ations of th	ne varac	tor diod	e.	

- (d) Explain the construction, operation and I-V characteristics of a Schottky diode. Also give its equivalent circuit diagram and circuit symbol.
- (e) With the help of a neatly labeled circuit diagram explain the switching operation of a transistor. Also give the switching waveforms.

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- (f) Define and explain the following terms in case of a photo detector :
 - (i) Responsivity
 - (ii) Quantum Efficiency
 - (iii) Directivity
 - (iv) Dark Current.
- 2. Attempt any **two** parts of the following : (10×2=20)
 - (a) Why h-parameters could not be used for high frequency analysis of the transistors? Give the hybrid-π equivalent circuit of a Bipolar Junction Transistor, explaining the significance of the terms appearing in the circuit. Define the following f_α, f_β and f_T and derive the relationship between f_α and f_β.
 - (b) Give the high frequency small-signal circuit of a MOSFET with load resistance showing the effect of Miller capacitance. Also derive an expression for the Miller Capacitance and cut-off frequency (f_T).
 - (c) What are the general properties of Negative feedback ? And explain how negative feedbacks can be used for input resistance, output resistance, and bandwidth stability.
- 3. Attempt any two parts of the following : (10×2=20)
 - (a) Explain the Barkhausen criteria for oscillators. And also derive the necessary conditions required for oscillations.
 What are the factors on the basis of which oscillators are classified ?

- (b) Design an RC phase shift oscillators using BJT for a frequency of 1 kHz. The stability factor $S \le 8$. Given that $V_{cc} = 10$ V. The transistor has h-parameters as follows -- $h_{re} = 1k\Omega$, $h_{fe} = 50$, $h_{re} = h_{ce} = 0$.
- (c) Explain the operation of a Wien-Bridge oscillator and derive the necessary condition for oscillation. Give the equivalent circuit of a crystal and give the advantages of a crystal oscillator.
- 4. Attempt any four parts of the following :

(5×4=20)

- (a) Define combinational circuit. Realize the following expression f (A, B, C) = Σm (0, 2, 4, 6) using a 4 : 1 multiplexer.
- (b) Explain the difference between Latch and Flip-Flop.
 Explain how a D Flip-Flop is obtained from a JK
 * Flip-Flop.
- (c) Design a 3-bit Bi-Directional Shift resistor using JK
 Flip-Flop.
- (d) What is a universal shift register ? Explain its operation with the help of a logic diagram showing all the necessary signals.
- (e) Differentiate between synchronous and asynchronous counter. Give the logic diagram of a BCD counter.
- (f) Explain the operation of a Johnson counter using D Flip-Flop.
- 5. Attempt any four parts of the following :
- (5×4=20)
- (a) Give the circuit diagram of a Non-inverting Schmitt Trigger and derive the expression for Hystersis voltage.

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- (b) Explain the operation of a Astable Multivibrator circuit using an Op-Amp. Also derive the expression for cut off frequency.
- (c) Give the functional block diagram of timer IC 555 and explain how it can be used to obtain a Monostable Multivibrator.
- (d) Distinguish between A/D and D/A converters. Explain the operation of any one of them.
- (e) Give the circuit diagram of a sample and hold circuit and explain its operation.
- (f) Explain the procedure for obtaining a 32 × 4 memory using 16 × 4 memory chips. Also show the necessary circuit diagram.

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