Question Paper

Exam Date & Time: 06-Jun-2018 (09:30 AM - 12:30 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES IV SEMESTER B.S. DEGREE MAKE-UP EXAMINATION-MAY/JUNE 2018 DATE: 6 JUNE 2018 TIME: 9.30 AM TO 12.30 PM

Electronic Devices and Computer Interfacing [CS 241 A]

Marks: 100

Duration: 180 mins.

Answer any 5 full questions

1)		A half-wave rectifier has a load resistance of 3.5 k $\boldsymbol{\varrho}$. If the	(10)
	A)	diode forward resistance is $10 m m m m m m m m m m m m m $	
		secondary peak voltage is 15V, calculate: (i) peak, rms and average values of current through load (ii) Output DC power (iii) Rectification efficiency.	
	В)	A bar of pure silicon at 300 K is applied with electric field of 500 V/m, determine (i) Component of current density in the bar due to free electrons (ii) Component of current density in bar due to holes (iii) Total current density in the bar.	(6)
	C)	With help of the Energy band diagram explain how the electrical property of a semiconductor changes when doped with n-type impurity.	(4)
2)	A)	Draw the circuit diagram of RC coupled amplifier and explain the role of each component. Draw and explain its frequency response.	(10)
	B)	A 5V Zener diode is used to regulate the voltage across $500 m{o}$ load when the input is $12V\pm3V$. Determine the	(6)
		range of values for RS given that $I_{ZK} = 1$ mA and $I_{ZM} = 500$ mA.	
	C)	A Ge diode for which the reverse saturation current is 5 μ A	(4)
		has a forward current of 100 mA at 27 ⁰ C. Calculate the forward voltage drop across it.	
3)		For a self-bias circuit using silicon transistor, $R_E = 200 \ \Omega$,	(10)
	A)	$R_1=10K_{\it \Omega}$, $R_2=1K_{\it \Omega}$, $R_C=2K_{\it \Omega}$, $V_{CC}=15$ V and β =	

100. Find I_B , I_C , V_{CE} .

4)

- ^{B)} Sketch the circuit of a bridge rectifier with capacitive filter ⁽⁶⁾ describe its operation. Draw the output voltage waveform of the rectifier.
- ^{C)} Draw and explain the working of photo diodes. ⁽⁴⁾
- An Opamp Schmitt Trigger has all resistors equal to $2k \, \rho$ (10)
 - and capacitor of 0.1µF. Calculate the output frequency.
 Draw the circuit, Voltage at the output and voltage across the capacitor.
 - ^{B)} Give the general expression for the output of op-amp ⁽⁶⁾ difference amplifier circuit with V₁ and V₂ as the inputs. Determine the component values to get an output V₀ = $3V_2 - 2V_1$ for this circuit.
 - Define the following characteristics of OPAMP and mention ⁽⁴⁾ their ideal values
 (i)CMRR (ii) Slew Rate.
- ⁵⁾ Draw and explain the working of a 4 bit R2R DAC. Find the ⁽¹⁰⁾ value for V_0 if the input is 1010. Where 1 is represented by 1V and 0 by 0V.
 - ^{B)} Explain the working of crystal oscillator with relevant circuit⁽¹⁰⁾ and equation.What are the conditions for sustained oscillation?
- ⁶⁾ Draw the internal diagram of IC555 and explain the role of $^{(10)}$ various components.
 - ^{B)} Sketch and explain the VI characteristics of npn transistor ⁽⁶⁾ in common emitter configuration.
 - ^{C)} Design a clipper to clip a sinusoidal voltage of 3V(Peak to ⁽⁴⁾ Peak) at -1V. Consider Ideal diodes.
- Plot the VI characteristics of a TRIAC and explain Latching (10) current and Holding current.
 - ^{B)} Explain the working of half wave rectifier using SCR with ⁽¹⁰⁾ relevant circuit diagram, input and output waveforms with a firing angle of 90^o
- ⁸⁾ Design a 555 astable multivibrator with T= 2ms, having a $^{(10)}$ duty cycle of 0.6. Assume C=1µF.
 - ^{B)} Draw the cross section of P-channel enhancement mode ⁽⁶⁾ MOSFET and label the parts.
 - ^{C)} An Op-amp has inputs V1 = 10 mV and V2 = 8mV. If the ⁽⁴⁾ differential gain is 60 dB and CMRR is 80 dB, calculate

differential output voltage and common mode output voltage.

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