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CAMBRIDGE INSTITUTE OF TECHNOLOGY

K.R. PURAM, BENGALURU-560036

Department of Basic Sciences

Program: B.E. ☒ M.Tech. ☐ Specialization:

Preparatory Examination - Even Semester 2018-19

Sub. Name: Basic Electronics

Sub. Code: 18ELN24

Semester: II

Date: 14-06-2019

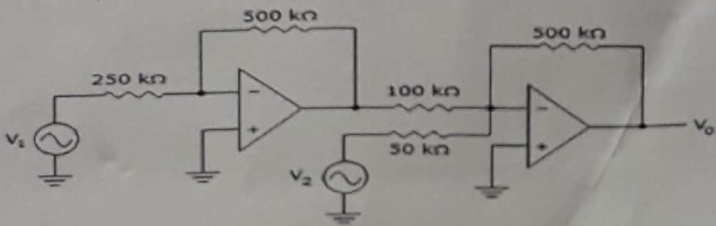
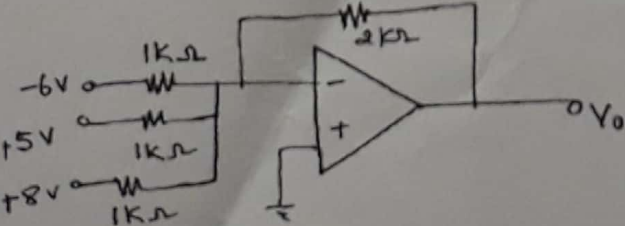
Time: 1:15 PM

Duration: 3 Hours

Max. Marks: 100

[Instructions: Answer any five full questions, choosing one from each module, each full question carries maximum 20 marks]

Sl. No.	QUESTIONS		COs	RBT Levels	Marks
	Module I				
1.	a)	What is PN Junction diode? Define the following diode parameters: i) Knee voltage ii) Forward voltage iii) Reverse breakdown voltage.	CO1	L1	04M
	b)	With the help of circuit diagram and VI characteristics, explain the operation of PN junction diode under forward and reverse bias conditions.	CO1	L2	08M
	c)	For a half wave rectifier, the input is from 30-0-30V transformer. The load and diode forward resistances are 100Ω and 10Ω respectively. Determine the values of I_{dc} , I_{rms} , P_{dc} , P_{ac} and η .	CO1	L3	08M
	OR				
2.	a)	Write the symbol and applications of following semiconductor devices: i) Diode ii) Zener diode iii) LED iv) Photodiode.	CO1	L1	04M
	b)	With the help of circuit diagram and waveforms, explain the operation of full wave bridge rectifier. Derive the equations of V_{rms} and V_{dc} .	CO1	L2	08M
	c)	Explain the following: i) HWR with C-filter ii) IC7805 voltage regulator.	CO1	L3	08M
	Module II				
3.	a)	What is FET and its classification? Write the symbol and constructional details of P-channel JFET and EMOSFET.	CO2	L1	04M
	b)	Explain the construction and operation of N-channel JFET. Also explain its drain and transfer characteristics.	CO2	L2	08M

	c)	What is SCR? Explain its two transistor model and characteristics.	CO2	L3	08M
		OR			
4.	a)	What is phase control application of an SCR.	CO2	L1	04M
	b)	Explain the construction and operation of N-channel EMOSFET. Also explain its drain and transfer characteristics.	CO2	L2	08M
	c)	Explain the following: i) Working and advantages of CMOS. ii) Turn-off methods of SCR.	CO2	L3	08M
		Module III			
5.	a)	What is Voltage follower? List ideal characteristics of an op-amp.	CO3	L1	04M
	b)	Derive the output equation for the following cases: i) Non-inverting amplifier ii) Differentiator	CO3	L2	08M
	c)	i) Explain the Virtual ground concept and CMRR of an op-amp. ii) Determine the output voltage V_o for the following op-amp circuit, if $V_1 = V_2 = 700$ mV.	CO3	L3	08M
					
		OR			
6.	a)	What are the various op-amp input modes? Draw its diagram and respective outputs.	CO3	L1	04M
	b)	Derive the output equation for the following cases: i) Three input inverting adder ii) Integrator.	CO3	L2	08M
	c)	i) An op-amp has a differential voltage gain of 2,500 and a CMRR of 30,000. Determine A_{cm} and express CMRR in dB. ii) Determine the output of the following op-amp Circuit.	CO3	L3	08M
					

Module IV					
7.	a)	What is a transistor? How it act as a switch.	CO4	L1	04M
	b)	i) An amplifier has an input signal of 0.25V and draws 1mA from the source. It delivers 8V to a load at 10mA. Determine the voltage, current and power gains. ii) If $V_{CC}=12V$, $R_C=2K\Omega$, $\beta=100$ and $V_{CE(sat)}=0.2V$, determine the minimum value of I_B required to saturate the transistor and also find the value of R_B if $V_{in}=5V$.	CO4	L2	08M
	c)	Explain the operation of RC phase shift oscillator. Determine the value of f_0 if $R = 1K\Omega$ and $C = 0.1\mu f$.	CO4	L3	08M
OR					
8.	a)	What is Barkhausen's criteria of an oscillator? List the classification of oscillator.	CO4	L1	04M
	b)	i) Explain the operation of Wien's bridge oscillator. ii) How transistor acts as an amplifier.	CO4	L2	08M
	c)	i) Design of RC phase shift oscillator. ii) Discuss the properties of negative feedback amplifier.	CO4	L3	08M
Module V					
9.	a)	Relate the following conversions: i) $(BABA.DABA)_{16} = (?)_8 = (?)_{10}$ ii) $(1111010101.1011)_2 (?)_{10} = (?)_{16}$	CO5	L1	04M
	b)	i) State and prove the De-Morgan's theorem for 3 variables. ii) Perform the $(11110)_2 - (10001)_2$ using 1's and 2's complement method.	CO5	L2	08M
	c)	Construct: i) Half-adder ii) 3X8 Decoder.	CO5	L3	08M
OR					
10.	a)	Write the symbol and truth-table of basic and universal gates.	CO5	L1	04M
	b)	i) Construct 8:1 Multiplexer ii) Implementation of XOR gate using NAND and NOR gates only.	CO5	L2	08M
	c)	i) Implement full-adder logic using two half-adders. ii) Realize $Y = A\bar{B}C + \bar{A}\bar{B}C + \bar{A}\bar{B}\bar{C}$ using basic gates.	CO5	L3	08M