Model Question Paper- I

CBCS SCHEME

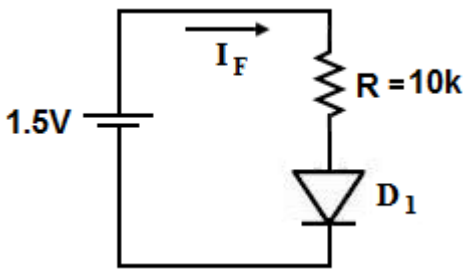
First/ Second Semester B.E Degree Examination,

Fundamentals of Electronics and Communication Engineering(1BECE105/205)

TIME: 03 Hours **Max.Marks:100**

Notes:

1. *Answer any FIVE full questions, choosing at least ONE question from each MODULE*
2. *VTU Formula Hand Book is Permitted*
3. *M: Marks, L: Bloom's level, C: Course outcomes.*

		Module - 1	M	L	C
Q.1	a	What is a diode? Explain the operation of PN junction diode under forward and reverse bias condition.	8	L2	CO1
	b	With circuit diagram explain the operation of full wave bridge rectifier. Draw the input and output waveforms.	8	L2	CO2
	c	Calculate current in the circuit when a silicon diode connected in series with a resistor of 4.7 KΩ is driven by a 15V DC supply.	4	L3	CO1
		OR			
Q.2	a	Explain Zener as voltage regulator under no load and full load conditions.	8	L2	CO1
	b	Explain the operation of half wave rectifier with capacitor filter.	8	L2	CO2
		Calculate I_F for the diode in the given circuit assuming that V_F=0.7 V and r_d=0.What is the current if we consider r_d=0.2Ω. 	4	L3	CO1
		Module – 2			
Q.3	a	Explain input and output characteristics of BJT in common emitter configuration.	8	L2	CO2
	b	Explain various currents and voltages flowing through the BJT transistor.	8	L2	CO2
	c	A transistor has β=150 and I_E =l2mA, Calculate the approximate collector current (I_C) and Base current (I_B).	4	L2	CO2
		OR			
Q.4	a	Explain the construction and characteristics of N-channel JFET.	8	L2	CO2
	b	Explain N-channel enhancement type MOSFET and describe the construction and working.	8	L2	CO2
	c	Define α and β. Determine the relationship between α and β.	4	L2	CO2

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Module – 3					
Q5	a	Explain block diagram of typical Op-Amp.	7	L2	CO2
	b	Explain the working if an Op-Amp as i) Subtractor ii) Voltage follower.	7	L2	CO2
	c	For a summing circuit if $V_1 = +1V$, $V_2 = +3V$ and $V_3 = +2V$ with $R_f = 3K\Omega$, $R_1 = R_2 = R_3 = 2K\Omega$. Determine the output voltage.	6	L3	CO2
OR					
	a	Explain Op-Amp as an inverting and non-inverting amplifier.	7	L2	CO2
	b	Derive the expression for output voltage of an Op-Amp differentiator circuit.	7	L2	CO2
	c	Design an amplifier with a gain of +9 and $R_f = 12\ K\Omega$ using an Op-Amp.	6	L3	CO2
Module – 4					
Q.7	a	With a block diagram explain the basic elements of a communication system.	7	L2	CO3
	b	Explain Amplitude modulation with neat waveforms,	7	L2	CO3
	c	Explain the concept of mobile wireless telephone systems,	6	L2	CO3
OR					
Q.8	a	Explain different communication channels and their characteristics.	7	L2	CO3
	b	With a block diagram, explain superheterodyne receiver,	7	L2	CO3
	c	Explain Phase modulation,	6	L2	CO3
Module – 5					
Q.9	a	State and prove DeMorgan's theorem for three input variables.	6	L3	CO5
	b	Subtract using 1's and 2's complement method. i) $(1001)_2$ from $(1101)_2$ ii) $(1101)_2$ from $(1001)_2$	7	L3	CO4
	c	Simplify the Boolean function to minimum number of literals i) P=(xy+ x'y+yz) ii) P=(x'y+ x(y+z) + y'z')	7	L3	CO4
OR					
Q.10	a	Solve a) $(956.25)_{10} = (\ ?\ )_2 = (\ ?\ )_{16}$ b) $(111000111.010001)_2 = (\ ?\ )_8 = (\ ?\ )_{16}$	6	L3	CO5
	b	Express the Boolean function $F = XY + \overline{X}Z$ in product of maxterm form,	7	L3	CO4
	c	Construct and describe full adder with neat logic diagram and truth table. Implement using basic gates,	7	L3	CO4

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		Module - 1	M	L	C
Q.1	a	With appropriate circuit diagram, explain the DC load line analysis of a semiconductor diode.	7	L2	CO1
	b	With relevant diagrams explain ideal, practical and piecewise linear characteristic of a PN junction diode.	8	L2	CO1
	c	What is Filter? Explain the types of filters.	5	L2	CO1
		OR			
Q.2	a	With the circuit diagram explain the operation of center tapped full wave rectifier. Draw the input and output waveforms.	8	L2	CO1
	b	Explain the operation of Zener diode along with its characteristics.	7	L2	CO1
	c	Calculate the forward and reverse resistances offered by a silicon diode with I_F = 100mA, V_F = 0.75V and V_R = 50V, I_R = 1μA.	5	L2	CO1
		Module – 2			
Q.3	a	Explain input and output characteristics of the common Base configuration.	8	L2	CO2
	b	Explain depletion type MOSFET and describe the construction and working.	7	L2	CO2
	c	Calculate α_{dc} and β_{dc} for the transistor if I_C = 1mA and I_B = 25μA. Determine the new base current to give I_C = 5mA.	5	L3	CO2
		OR			
Q.4	a	With neat circuit diagram, explain DC line concept of a transistor amplifier to fix the Q point.	8	L2	CO2
	b	Explain the construction and characteristics of P-channel JFET.	7	L2	CO2
	c	Calculate I_C and I_E for a transistor that has α_{dc} = 0.98 and I_B = 100μA. determine the value of β_{dc} for the transistor.	5	L3	CO2

		Module – 3			
Q5	a	Briefly discuss the ideal characteristics of the Op-Amp.	7	L2	CO2
	b	Derive the expression of voltage Gain of a i) Non inverting Op-Amp. ii) Inverting Op-Amp.	6	L2	CO2
	c	For an op-amp given the figure find the output voltage v_{o1} and v_{o2}	7	L3	CO2

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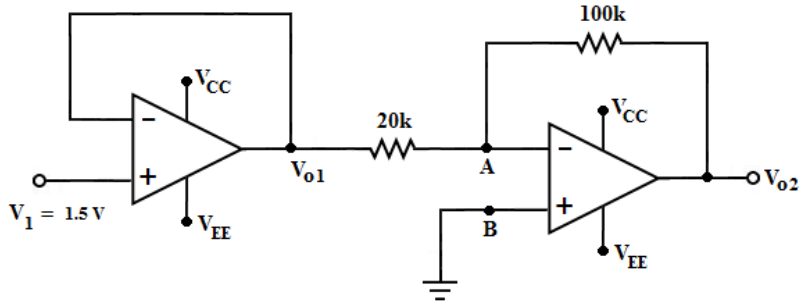
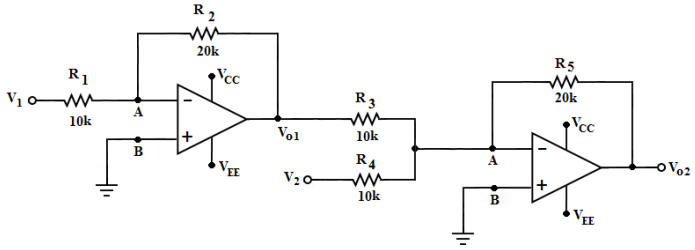
					
		OR			
Q.6	a	Derive the expression for output voltage of an Op-Amp Integrator circuit.	7	L2	CO2
	b	Define Op Amp Parameters. Gain, CMRR, Slew rate, input resistance.	6	L2	CO2
	c	Find an output voltage expression for the given circuit. 	7	L3	CO2
		Module – 4			
Q.7	a	Explain frequency modulation with neat waveforms.	10	L2	CO3
	b	Explain wireline, fiber optic and wireless electromagnetic communication channels.	10	L2	CO3
		OR			
Q.8	a	Describe the process of AM radio broadcasting with a neat block diagram.	10	L2	CO3
	b	What is modulation? Need for modulation and different modulation schemes.	10	L2	CO3
		Module – 5			
Q.9	a	Explain SOP & POS with examples.	6	L2	CO4
	b	Simplify the following Boolean functions: i)$(A + \overline{B}C)(\overline{A} + B + \overline{C})(A + \overline{B})$ ii)$A + A\overline{B} + \overline{A}B$	6	L3	CO5
	c	Solve a) (A156.25)16 = (?)2 = (?)8 b) (10011.110101)8 = (?)2 = (?)10	8	L3	CO5
		OR			
Q.10	a	Explain NAND and NOR gate called as universal gates.	6	L2	CO4
	b	Implement the following expression using logic gates $Y = A + C\overline{B} + \overline{A}BC$ $F = \overline{xy + \overline{x}z}$	6	L3	CO5
	c	Explain how a full adder can be reconfigured using two half adders. Draw the circuit.	8	L3	CO5