Department of Electronics & Communication Engineering

Date: 12/12/2024	**Test - 2**	**Max. Marks: 50**
Semester: I	**UG**	**Duration: $1\frac{1}{2}$ Hrs**
Course: Principles of Electronics Engineering		**Code: EC113ATC**

S No		Questions	M	BT	CO
1.	a	Draw the circuit of an RC phase shift oscillator using a transistor in the common emitter configuration as an amplifier, and explain its operation. Determine the 'C', if frequency of oscillation f=100Hz ,R=3.3KΩ and the collector resistance, R_C=5KΩ.	06	3	1
	b	State and illustrate Barkhausen's criterion for sustained oscillations.	04	1	2
2.	a	Draw a circuit and calculate the values of different resistors of a summer circuit using two ideal op-amp to get $v_o = v_1+3v_2+5v_3-7v_4-9v_5-11v_6$, where v_1, v_2, v_3, v_4, v_5 and v_6 are the available inputs.	06	2	1
	b	Draw the circuit diagram for integrator using an op-amp, Derive the expression for output voltage.	04	3	2
3.	a	List at least eight important characteristics of ideal op-amp and indicate their typical practical values. Write the Pin configuration of op amp(741).	06	3	2
	b	A logic circuit has two inputs P and Q and an output Y. The output is False when either of the two inputs are False but not both. Write the logic expression and realize using NAND gates only.	04	2	1
4.	a	Write the truth table for SUM and CARRYOUT of a full adder. From the truth table, obtain the logic expressions for the same and then realize the full adder using 2 half adders.	06	3	1
	b	Perform Subtraction using 1's complement and 2's complement $(11010)_2 - (10000)_2$	04	2	2
5.	a	Convert the following: i. 3456_{10} to the binary system ii. $3A4_{16}$ to the decimal number. iii. 1011_2 to octal number system. iv. 542_8 to the hexadecimal number system	06	3	3
	b	Simplify the logic expression using K-map: $Y(W,X,Y,Z) = \Sigma m(1,2,3,5,7,11,13)$	04	3	3

BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

Marks Distribution	Particulars		CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
	Test	Max Marks	16	18	10	-	4	14	28	-	-	-

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NBA Accredited (UG - 6 Years)

Department of Electronics & Communication Engineering

Date: 5/11/2024	**Test - 1**	**Max. Marks: 50**
Semester: I	**UG**	**Duration: 1 $\frac{1}{2}$ Hrs**
Course: Principles of Electronics Engineering		**Code: EC113AT**

QNo.	Questions	M	BT	CO
1a.	With necessary circuit and waveform, explain the working of a bridge rectifier with capacitive filter.	6M	L1	CO2
b.	A DC power supply drops from 18V to 17.95V when the AC source voltage falls by 10%. The output also falls from 18V to 17.9V when the load is increased from 0 to maximum. Calculate load and line Regulation	4M	L1	CO1
2a.	Design a Zener regulator and draw the circuit for given specifications: V_{in} varies from 22 V to 28 V, R_L varies from 50 Ω to 500 Ω, $V_Z = 12$ V, $I_{Z(min)} = 10$ mA, and $P_{d(max)} = 6$ W.	6M	L3	CO2
b.	Distinguish between Avalanche breakdown and Zener breakdown in diodes.	4M	L1	CO1
3a.	An amplifier has a gain of 40dB, bandwidth of 300KHz, distortion of 15%, input impedance of 10KΩ and Output impedance of 10KΩ, If Voltage series negative feedback of 3.9% is given to this amplifier, calculate the Gain, Z_{in}, Z_o, BW *and* distortion of the amplifier with negative feedback.	6M	L2	CO3
b.	Draw the frequency response of an RC coupled amplifier and the effect of capacitors.	4M	L1	CO2
4a.	A full wave bridge rectifier drives a load resistance of 150 Ω in parallel with a filter capacitor, C. If the ac input to the rectifier is 50sin628t, calculate the capacitor value needed so that the ripple factor is 1.5 %. Also determine the output DC voltage, peak to peak ripple voltage and the load regulation.	6M	L3	CO3
b.	Draw the DC power supply block diagram and explain each components.	4M	L2	CO2
5a.	With respect to common emitter configuration, explain three regions of operations of a bipolar junction transistor. Draw input and output characteristics for the same.	6M	L2	CO2
b.	Three amplifiers stages are working in cascade with 0.04V peak to peak input, providing 160V peak to peak output. If the voltage gain of the first stage is 15 and the input to the third stage is 10V peak to peak, Find i. Overall voltage gain ii. Voltage gain of the second and third stages iii. Input voltage to the second stage	4M	L1	CO2

BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

Marks Distribution	Particulars		CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
	Test	Max Marks	8	30	12		22	16	12	-	-	-

EC113ATC

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RV COLLEGE OF ENGINEERING®

(An Autonomous Institution Affiliated to VTU)

I Semester B. E. Regular / Supplementary Examinations Feb/Mar-2025

PRINCIPLES OF ELECTRONICS ENGINEERING

Time: 03 Hours *Maximum Marks: 100*

Instructions to candidates:

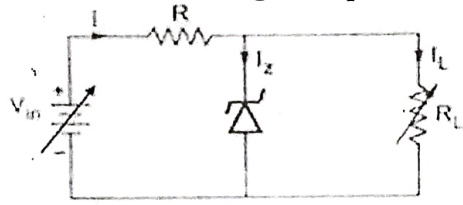
1. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
2. Answer FIVE full questions from Part B. In Part B question number 2 is compulsory. Answer any one full question from 3 and 4, 5 and 6, 7 and 8 & 9 and 10.

PART-A

			M	BT	CO
1	1.1	In a regulated DC power supply the output voltage drops from $12V$ to $11.8V$ when the input voltage reduces by 10%. The line regulation is _____.	01	1	1
	1.2	The input to a full wave bridge rectifier with a filter of $100\mu F$ is $100 \sin 314t$ and the load resistance of 900Ω. The DC output voltage is _____.	01	1	2
	1.3	An NPN transistor has $I_{CO} = 25nA$, $I_B = 0$, $V_{CE} = 4V$ and $I_C = 20\mu A$.The value of β is _____.	01	2	2
	1.4	Three amplifiers with voltage gain of 20, 100 and 2000 are connected in cascade, the overall gain in dB = _____.	01	1	2
	1.5	The Slew rate of an $Op-Amp$ is $3V/\mu sec$ with a peak value of voltage as $2V$. Calculate the maximum output frequency so that the output is not distorted.	01	1	2
	1.6	In a RC phase shift oscillator circuit using an ideal voltage amplifier with $C = 0.01\mu F$ and $R = 2K\Omega$. The frequency of oscillation is _____ KHz.	01	2	2
	1.7	An op-Amp has a differential gain of $86dB$ and Common mode gain of $20dB$. The $CMRR$ in dB is _____.	01	1	1
	1.8	A non-inverting amplifier using an op-amp has $R_i = 10K\Omega$ and $R_f = 40K\Omega$. The closed loop gain is _____.	01	1	1
	1.9	In a 3 variable $K-map$, if all the cells contain $1's$ then the output is _____.	01	1	1
	1.10	The minimized form of logic expression: $A'B'C' + A'BC' + A'BC + ABC'$ is _____.	01	2	2
	1.11	If one of the input to a $2-input\ EX-NOR$ gate is connected to 0, then it can be used as _____.	01	1	1
	1.12	The Hexadecimal equivalent of $(536)_8$ is _____.	01	1	1
	1.13	The total power delivered by an amplitude modulated wave is $2640W$. If the modulation index = 0.8, the power in each side bands = _____ W.	01	1	2
	1.14	In a voltage follower circuit, the op-amp is ideal in all respect except that it has a finite gain of 400. The % error in the gain of the voltage follower with respect to its ideal value is equal to _____.	01	2	2
	1.15	An audio signal of $2KHz$ is used to amplitude modulate the carrier of $600KHz$. The bandwidth required is _____ KHz.	01	1	1

	1.16	The value of intermediate frequency in super heterodyne receiver is _____ KHz.	01	1	1
	1.17	Convert the binary number $(1010101)_2$ to octal.	01	1	1
	1.18	The device which converts energy from one form to another form is called _____.	01	1	1
	1.19	Differentiate between Sensors and Transducers.	02	1	2

PART-B

2	a	A full wave bridge rectifier drives a load resistance of 150Ω in parallel with a filter capacitor C. If the ac input to the rectifier is $150V$ at $100Hz$, calculate the capacitor value needed so that the ripple factor is 2%. Determine the output dc voltage, peak to peak ripple voltage and the load regulation.	05	2	2
	b	Briefly explain the three regions of operation of a BJT. Draw and explain the input and output characteristics of a BJT in Common Emitter Configuration.	05	1	1
	c	Design the Zener Regulator for the given specifications:  V_{in} varies from $12V$ to $18V$ R_L varies from 225Ω to $1.8K\Omega$ $V_Z = 9V$ $I_{Z(\min)} = 10mA$ $P_{d(\max)} = 4.5W$	06	3	4
3	a	Explain the operation of RC phase shift oscillator with a circuit diagram and also calculate the frequency of oscillation if $R = 5K\Omega$ and $C = 0.01\mu F$.	08	1	1
	b	Draw the circuit and design the values of a summer circuit using 2 ideal op-amps to get an output voltage $V_0 = V_1 - 2V_2 - 4V_3 + 6V_4 + 8V_5$ where V_1,V_2,V_3, V_4 and V_5 are the available input voltages.	08	3	4
		OR			
4	a	Draw the circuit of an integrator using an op-amp and derive the expression for the output voltage.	08	1	1
	b	An amplifier has a gain of 50 dB. The bandwidth of 250KHz, distortion of 12%, an input impedance of 30KΩ, and an output impedance of 2KΩ. If the voltage series negative feedback of 2.9% is given to this amplifier, calculate the gain, input impedance, output impedance, bandwidth, and distortion of the amplifier with negative feedback.	08	2	3
5	a	Write the truth table for "SUM" and "$CARRYOUT$" of a full adder. From the truth table, obtain the expressions for the same and realize the full adder using 2 half adders.	08	2	1

	b	Simplify the logic expression using K map and implement the logic circuit using NAND Gate. $F = \sum m(0,1,2,3,,5,7,8,9,,10,12,13)$	08	3	3
		OR			
6	a	Simplify the following expression and realize using basic gates i) $Y = (A + B)(A + B)(A + B)$ ii) $Y = XY + XYZ + XY\bar{Z} + \bar{X}YZ$	06	1	2
	b	Subtract the given number using $2's$ complement method i) $(9)_{10} - (7)_{10}$ ii) $(3)_{10} - (6)_{10}$	04	2	2
	c	Perform the following: i) Convert $(475.25)_8$ to its decimal equivalent ii) Convert $(3509)_{10}$ to its hexadecimal equivalent	06	1	2
7	a	Differentiate between *RISC* and *CISC* architecture.	08	1	2
	b	A carrier of $2MHz$ has $1KW$ of its power amplitude modulated with a sinusoidal signal of $2KHz$. The depth of modulation is 60%. Calculate the sideband frequencies, the signal bandwidth, the power in the sidebands and total power in the modulated wave.	08	2	3
		OR			
8	a	With the help of a block diagram, explain the working of super heterodyne receiver.	08	1	1
	b	Differentiate between Harvard and $Von - Neumann\ CPU$ architecture.	08	1	1
9	a	Explain the working principle of the following sensors and mention its applications. i) Humidity sensor ii) Ultrasonic sensor.	08	2	1
	b	Biomedical sensors are widely used to monitor various parameters of the human body. Mention any such 4 parameters of human body for which Biomedical sensors can be used, also mention the details of the sensors used for measuring these parameters.	08	1	2
		OR			
10	a	Explain the following with examples: i) Active sensor ii) Passive sensor	08	2	1
	b	Describe i) Piezo-electric Transducer ii) Hall Effect transducer.	08	1	1