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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
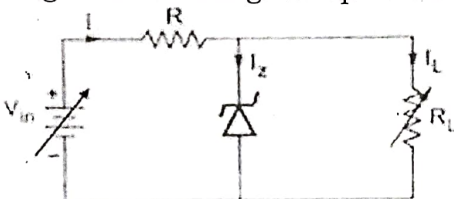
Instructions to candidates:

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 1.8KΩ $V_Z = 9V$ $I_{Z(min)} = 10mA$ $P_{d(max)} = 4.5W$	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

<div align="center">**OR**</div>

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

<div align="center">**OR**</div>

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

<div align="center">**OR**</div>

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