

Gurudas College (CU)
Internal Examination 2020
B.Sc Semester –IV
Physics Hons (PHSA) Practical
Paper – CC10

Full Marks: 15

Time: 1 Hour

Answer any one question

1. a) Draw the circuit diagram of a voltage regulator using Zener diode.
 b) Write down the expression of limiting resistance (R_s), indicating all terms.
 c) Plot the load regulation curve from the following data.

No. of Obs.	Load Current I_L (mA)	Load Voltage V_L (Volt)
1.	0	5.66
2.	5	5.64
3.	10	5.62
4.	15	5.5
5.	20	5.2
6.	25	4.2
7.	30	3.6

- d) Calculate % regulation from this graph.
 e) Identify the magnitude of No-Load Voltage.

$$4 + 2 + 5 + 3 + 1 = 15$$

2. a) Draw the circuit diagram of a small signal CE voltage amplifier.
 b) Design corresponding circuit parameters considering $h_{fe} = \beta = 100$, $V_{CC} = 15$ Volt and $I_C = 5$ mA.
 c) Draw the transistor characteristic curves from the following data

SET - I		SET - II		SET - III	
$I_B = 40 \mu A$		$I_B = 50 \mu A$		$I_B = 60 \mu A$	
V_{CE} (volt)	I_C (mA)	V_{CE} (volt)	I_C (mA)	V_{CE} (volt)	I_C (mA)
0.00	0.0	0.00	0.0	0.00	0.0
0.04	0.8	0.04	1.2	0.04	1.4
0.08	2.6	0.08	3.6	0.08	3.8
0.12	4.6	0.12	5.6	0.12	6.8
0.16	5.6	0.16	7.2	0.16	8.4
0.20	6.0	0.20	7.6	0.20	9.2
1.0	6.0	1.0	7.7	1.0	9.2
2.0	6.0	2.0	7.8	2.0	9.2
4.0	6.0	4.0	7.8	4.0	9.2
6.0	6.0	6.0	7.8	6.0	9.2
8.0	6.0	8.0	7.8	8.0	9.2

- d) Locate the Q point on the graph.

$$4 + 4 + 6 + 1 = 15$$

3. (a) Plot the following data.

Input Voltage V_i (mV)	Output Voltage V_o (mV)
0.33	- 3.18
0.21	- 2.12
0.09	- 1.02
0.04	- 0.52
- 0.04	0.51
- 0.09	1.06
- 0.20	2.18
- 0.31	3.26

- (b) Find the voltage gain from this graph.
 (c) What kind of amplifier is this?
 (d) Design and draw the corresponding circuit using Operational Amplifier
 (e) Convert the circuit to a unity gain amplifier.

$$4 + 3 + 1 + 4 + 3 = 15$$

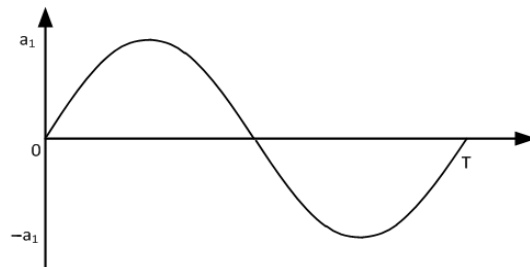
4. (a) Draw the circuit diagram of a non-inverting operational amplifier
 (b) Calculate the output voltage of the circuit for the following input voltages, considering feedback resistance and input resistance $5\text{ K}\Omega$ and $1\text{ K}\Omega$ respectively.

V_i (mV)	0	5	7	9	- 3	- 5	- 7	- 9
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- (c) Plot the data.
 (d) What modifications are required to transform this circuit to a differential amplifier?

$$4 + 3 + 4 + 4 = 15$$

5. (a) Draw the circuit diagram of a non-inverting comparator using OPAMP.
 (b) Explain its function.
 (c) Draw the output waveform for the following input signal with $a_1 = 4\text{ Volt}$, for two different reference voltages $V_R =$ (i) 2 Volt & (ii) 0 volt respectively.



$$4 + 3 + (4 + 4) = 15$$