U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

May 2023 Semester End Main Examinations

Programme: B.E. **Semester: I**
Branch: Common to all Branches **Duration: 3 hrs.**
Course Code: 22EC1ESBEC **Max Marks: 100**
Course: Basic Electronics **Date: 15.05.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) Derive the expression for Ripple factor and efficiency of Bridge rectifier. **10**

b) What is a Regulated power supply? Explain with block diagram. **05**

c) Design a Zener regulator for following specification: Load current I_L = 30mA output voltage V_0 = 6.1 V, Zener wattage P_z = 400mW, Input voltage V_i= 16±2V and I_{Zmin} = 5 mA. **05**

OR

2 a) A half wave rectifier circuit is supplied from a 230V, 50Hz supply with a step-down ratio of 5:1 to a resistive load of 1kΩ. Diode forward resistance is 50Ω, while transformer secondary resistance is 10Ω. Calculate maximum, average, RMS value of current, DC output voltage, efficiency of rectification and ripple factor. **10**

b) Discuss the impact of using capacitor filter in a Bridge Rectifier with the help of circuit diagram and waveform. **06**

c) Determine the values of maximum and minimum values of Zener diode current for the circuit shown in Figure 1. **04**

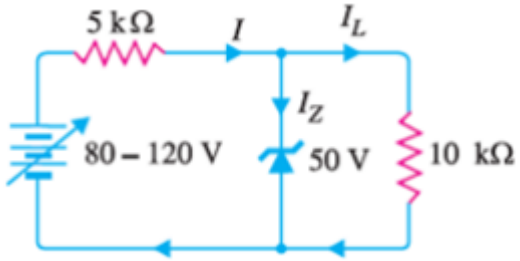

Figure 1

UNIT - II

3 a) A circuit needs to switch ON and OFF an LED. Construct the circuit using BJT and explain the same. **07**

b) Identify the following V-I characteristics shown in Figure 2 and comment on the operation of circuit used to get same. **08**

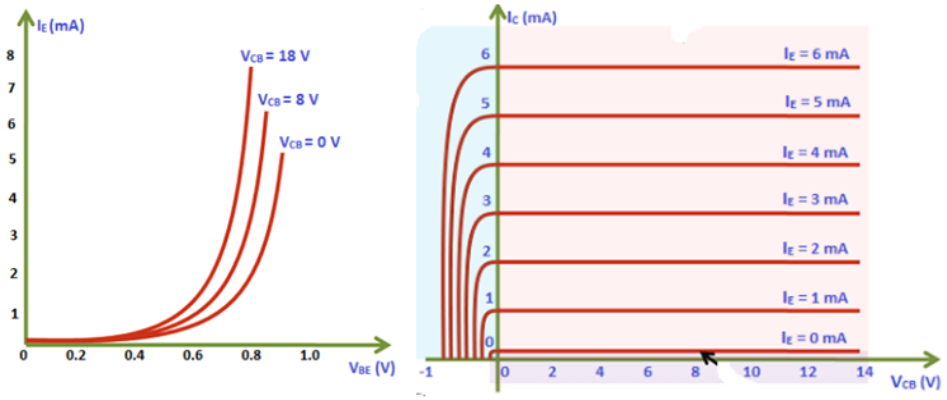

Figure 2

c) An amplifier has a bandwidth of 500 kHz and a voltage gain of 1000. **05**
i) What will be the new bandwidth and gain if 10% negative feedback is introduced?
ii) What is the gain bandwidth product with and without feedback? Comment on the same.

UNIT - III

4 a) Draw the circuit diagram of Hartley oscillator and explain its operation. **06**

b) Design a single op-amp circuit that performs amplified average function with a gain of 5. Draw the circuit diagram and clearly mark all the resistors values. **06**

c) Derive the expression for output voltage of an Op-Amp differentiator with a diagram. When a sine wave of 1V peak at 2kHz is applied to the circuit with the following specification: R_F =1kΩ and C_1=0.47μF, find its output waveform and its output equation. **08**

UNIT - IV

5 a) Design a combinational circuit to implement full adder in terms of logic gates. **06**

b) (i) Simplify $f(W,X,Y,Z) = \bar{W}XY\bar{Z} + XY\bar{Z} + X\bar{Y}\bar{Z} + X\bar{Y}Z$ using Boolean laws and realize using only NAND gates. **08**
(ii) $f(A,B,C) = AB + \bar{A}BC + A\bar{C} + \bar{A}\bar{B}C$ using Boolean laws and realize using only basic gates.

c) Explain the working of SR flip-flop with the help of truth table and circuit. **06**

OR

6 a) Discuss the different states of JK flip-flop with the help of circuit and truth table. **06**

b) Perform the following: (i) Convert the number $(C69.5)_{16}$ to octal **08**
(ii) Convert $(567.42)_8$ to decimal
(iii) Convert $f(A,B,C) = (A + \bar{B})(\bar{A} + C)$ into standard POS
(iv) Prove that AB+C($\overline{A \odot B}$)= AB+BC+CA

c) Discuss the universality of NAND and NOR gates. **06**

UNIT - V

7	a)	A 15KHz audio signal is used to frequency modulate a 100MHz carrier, causing a carrier deviation of 75KHz. Determine Modulation Index and Carrier swing.	**04**
	b)	Discuss the components of a Receiver with relevant diagram and explain each of its function.	**06**
	c)	Discuss in detail concept of cellular telephone system and evolution from 1G to 4G.	**10**

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