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

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E. **Semester: I / II**
Branch: Common to all Branches **Duration: 3 hrs.**
Course Code: 18EC1ESECE / 18EC2ESECE **Max Marks: 100**
Course: Elements of Electronics Engineering **Date: 19.09.2023**

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) Explain the V-I characteristics of PN junction diode with Shockley's equation. **08**

b) A diode with V_f=0.7V is connected as a half wave rectifier. The load resistance is 600 Ω and the RMS AC input is 24V. Determine the peak output voltage, peak load current and diode reverse voltage. **06**

c) Explain the avalanche and Zener breakdown. **06**

OR

2 a) Derive the expression for Ripple factor and efficiency of Half-wave rectifier. **10**

b) Design a zener regulator for following specification: Load current I_L = 20mA output voltage V_0 = 5 V, Zener wattage Pz = 500mW, Input voltage Vi= 12+2V and I_{Zmin} = 8 mA. **05**

c) Explain the working of Half - Wave Rectifier with circuit diagram and wave form. **05**

UNIT - II

3 a) With a neat diagram, explain the input and output characteristics of a transistor in common emitter configuration. **10**

b) With a neat diagram derive equations for I_C and V_{CE} of voltage divider bias circuit using approximate analysis. Accurately analyze voltage divider bias circuit with supply of 25V, R_C=4.7kΩ, R_E=3.3kΩ, R_1=33kΩ, R_2=12kΩ and β=50 to determine Q-point. **10**

OR

4 a) Deduce the relationship between various Transistor current and also α and β of a transistor. In a common emitter transistor circuit, if β = 100 and IB = 50μA, compute the values of α, I_E and I_C. **10**

b) What is bias stabilization? List causes for bias instability. **10**

UNIT - III

5 a) Describe basic principle of oscillator with a block diagram? **05**

b) Draw the circuit diagram of Hartley oscillator and explain its operation. **05**

c) Explain the working of operational amplifier with a neat block diagram. Design an inverting summer using op-amp with the resistance values of R_f=90KΩ, R_1=1KΩ, R_2=10KΩ and R_3=100kΩ. Calculate its output voltage in terms of its input voltages V_1, V_2 and V_3. **5+5**

UNIT - IV

6 a) State and prove De Morgan's law. **06**

b) Simplify the following Boolean expression using Boolean Laws and Realize using only NAND gates. **10**

i) $f(W,X,Y,Z) = \bar{W}XY\bar{Z} + XY\bar{Z} + X\bar{Y}\bar{Z} + X\bar{Y}Z$

ii) $f(A,B,C) = AB + \bar{A}BC + A\bar{C} + \bar{A}\bar{B}C$

c) Design a two input adder using only NAND gates **04**

UNIT - V

7 a) Explain a digital communication system with a block diagram **10**

b) Briefly explain the concept of Internet of Things (IoT). **10**

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