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

Autonomous Institute Affiliated to VTU

August 2023 Semester End Make-Up Examinations

Programme: B.E.   Semester: I
Branch: Common to all Branches   Duration: 3 hrs.
Course Code: 22EC1ESIEL   Max Marks: 100
Course: Introduction to Electronics Engineering   Date: 14.08.2023

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 working of Full - Wave Bi-Phase Rectifier with capacitor filter with the help of circuit diagram and wave form. **06**

   b) With a neat diagram, explain the basic working of an NPN transistor. Deduce the relationship between various Transistor current and also α and β of a transistor. In a common emitter transistor circuit, if $\beta = 100$ and $I_B = 50\mu A$, compute the values of α, I_E and I_C. **10**

   c) If a 9 V zener diode is to be used in a simple shunt regulator circuit to supply a load having a nominal resistance of 300 Ω, determine the maximum value of series resistor for operation in conjunction with a supply of 15 V. **04**

OR

2 a) Explain voltage regulator circuit using Zener diode. **06**

   b) What is Regulated power supply? Explain with a neat block diagram. **10**
   The following data were obtained during a load test carried out on a d.c. power supply:
   Output voltage (no-load) = 8.5 V; Output voltage (800 mA load) = 8.1 V
   Determine the output resistance of the power supply and estimate the output voltage at a load current of 400 mA.
   Output voltage (a.c. input: 230 V) = 15 V, Output voltage (a.c. input: 190 V) = 14.6 V.
   Determine the regulation of the power supply and estimate the output voltage when the input voltage is 245 V.

   c) A half-wave rectifier is fitted with an R–C smoothing filter comprising R = 200 Ω and C = 50 μF. If 2 V of 400 Hz ripple appear at the input of the circuit, determine the amount of ripple appearing at the output. **04**

UNIT - II

3 a) What is an Oscillator and mention conditions for Oscillations. **04**

   b) State the characteristics of an Ideal Op-Amp. How do the characteristics of a practical Op-Amp differ from those of the ideal Op-Amp. **06**

c) Calculate the output voltage of the circuit shown in figure, if $V_1 = -0.2V$ and $V_2 = 0V$. **06**
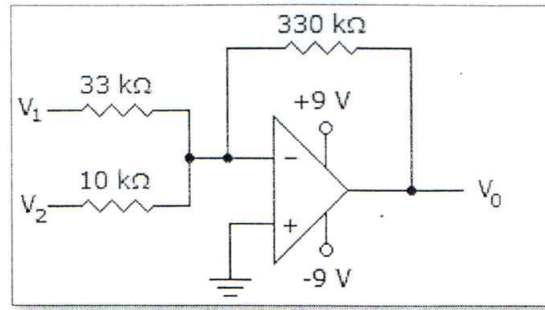
d) The parameters of a crystal fitted in a crystal oscillator are as follows: $L = 0.4H$, $C = 0.08pF$, $C_M = 1pF$ and $R = 6k\Omega$. Determine **04**

(i) The series resonant frequency
(ii) The parallel resonant frequency

UNIT - III

4 a) State and prove duality theorem. **05**

b) If the variables A, B and C can take only the values 0 and 1, prove the following identities of Boolean algebra **10**

i. $\bar{A}BC + A\bar{B}\bar{C} + ABC + AB\bar{C} = BC + A\bar{C}$
ii. $AB + C(\overline{A \odot B}) = AB + BC + CA$
iii. $\bar{X}\bar{Y}Z + \bar{X}Y\bar{Z} + \bar{X}Y\bar{Z} = \bar{X}(\bar{Y} + \bar{Z})$
iv. $\bar{A}B\bar{C} + B\overline{CD} + AD = AD + B\bar{C}$

c) Design a circuit that has three bit binary input and a single output(Z) specified as follows: **05**

$Z = 0$; when the input is less than $(5)_{10}$
$Z = 1$; otherwise

OR

5 a) State and prove De Morgan's law. **05**

b) Perform the following **10**
(i) $(1A0.65)_{16} = (\ )_2 = (\ )_{10}$; (ii) $(876.02)_{10} = (\ )_{16} = (\ )_8$

c) The rocket motor of an air-launched missile with three inputs (launch, Unsafe-height and target-lock), will operate if and only if any two inputs are high. Design a suitable logic circuit with minimum logic gates. **05**

UNIT - IV

6 a) Differentiate between Microprocessor and Microcontroller. **05**

b) Define transducers and give the classification of transducers with examples. **05**

c) To display 2022 in a seven-segment, how many 7-segment displays are required? And also write the Binary and hexadecimal equivalent code for each. **10**

UNIT - V

7   a)   Explain the different types of modulation techniques with relevant   **08**
          Waveforms. Mention the modulation index of AM and FM wave.

    b)   The initial SNR measured at the transmitter was 20 dB. In order to combat the   **06**
          channel conditions, the signal power was doubled prior to transmission. What
          is the new SNR at the transmitter?

    c)   Discuss the components of a Transmitter with relevant diagram and explain   **06**
          each of its function.

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