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18ELN14/24

First/Second Semester B.E. Degree Examination, July/August 2021
Basic Electronics

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions.***

1 a. Explain the operation of p–n junction Diode under unbiased condition with a neat diagram. **(08 Marks)**

b. In a full wave rectifier, input is from 30 – 0 – 30V. The load and R_f are 100Ω and 10Ω respectively. Calculate area voltage, efficiency, percentage regulation. **(06 Marks)**

c. Determine I_D, V_1, V_2 and V_0 for the given circuit.

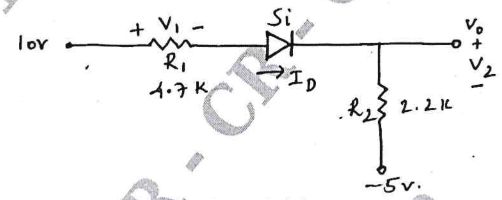

Fig.Q1(c) **(06 Marks)**

2 a. With a neat diagram and waveforms explain the working of a bridge rectifier. **(08 Marks)**

b. Explain the operation of a zener diode with line regulation and load regulation. **(08 Marks)**

c. For a zener regulator shown in Fig.Q2(c), calculate the range of input voltage for which output remain constant. $V_Z = 6.1V$, $I_{Zmin} = 2.5mA$, $I_{Zmax} = 25mA$, $r_Z = 0Ω$.

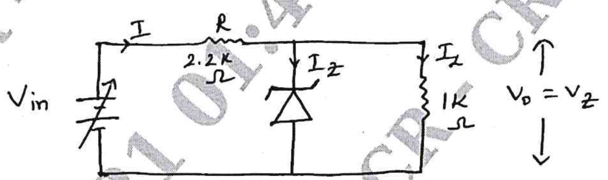

Fig.Q2(c) **(04 Marks)**

3 a. Explain the characteristics of N-channel JFET(Drawn and transfer characteristics). **(12 Marks)**

b. For a N-channel JFET, I_{DSS} = 8mA, V_P = –5V. Find :
i) I_D @ V_{GS} = –2V and –3V
ii) V_{GS} @ I_D = 3mA and 5mA. **(06 Marks)**

c. List out classification of FET with symbols. **(02 Marks)**

4 a. Draw and explain forward and reverse characteristics of an SCR. **(07 Marks)**

b. Sketch the transfer and drain characteristics for an n-channel depletion – type MOSFET for the range of values of V_{GS} = –6V to +1V with I_{DSS} = 8mA, $V_P = V_{GS(off)}$ = –6V. **(08 Marks)**

c. With a neat diagram, explain the 2 transistor model of SCR. **(05 Marks)**

5 a. Explain following with respect to OP-Amp.
i) Virtual ground ii) CMRR iii) Slew rate
iv) Offset voltage v) Matched transistors. **(10 Marks)**

b. Derive the expression for output voltage of an
i) integrator ii) inverting summing amplifier. With a neat circuit diagram. **(10 Marks)**

6 a. Explain the ideal characteristics of on op-Amp. **(08 Marks)**
b. Derive the expression for output voltage of an non inventing amplifier with a neat circuit and waveform. **(08 Marks)**
c. Design an adder circuit using an op-Amp to obtain output expression.
$V_0 = -2(0.1V_1 + 0.5V_2 + 20V_3)$. **(04 Marks)**

7 a. Explain the operation of BJT as an amplifier and as a switch. **(10 Marks)**
b. Draw and explain the operation of a voltage series –ve feedback amplifier and derive an expression for its input impedance. **(10 Marks)**

8 a. Define an oscillator. Explain Brakhausen's criteria for oscillations with block diagram. **(06 Marks)**
b. Derive the expression for frequency of oscillations of Wien bridge oscillator. **(08 Marks)**
c. With a neat diagram, explain the working of RC phase shift oscillator. **(06 Marks)**

9 a. Subtract $(111001)_2$ from $(101011)_2$ using 2's complement method. **(04 Marks)**
b. State and prove Demorgan's theorem for 3 variables. **(04 Marks)**
c. Simplify the following Boolean expression :

i) $A + \bar{A}B = A + B$

ii) $\bar{X}\bar{Y}\bar{Z} + \bar{X}\bar{Y}\bar{Z} + \bar{X}\bar{Y} + X\bar{Y}$

iii) $\overline{\overline{XY + XYZ} + X(Y + X\bar{Y})}$

iv) $ABC + A\bar{B}C + AB\bar{C} + \bar{A}BC$

v) $\overline{\overline{A\bar{B} + ABC} + A(B + A\bar{B})}$

vi) $AB + \overline{AC} + A\bar{B}C(AB + C)$. **(12 Marks)**

10 a. With block diagram and truth table, explain the operation of full ladder using 2 half adder. **(08 Marks)**
b. Explain the operation NOT, AND and OR gates using analogous switch equivalent circuit. **(09 Marks)**
c. Implement Ex – OR gate using only NOR gate. **(03 Marks)**

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