

CBCS SCHEME



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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.

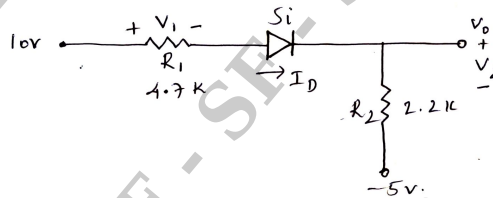


Fig.Q1(c)

(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. $V_Z = 6.1V$, $I_{Zmin} = 2.5mA$, $I_{Zmax} = 25mA$, $r_Z = 0\Omega$.

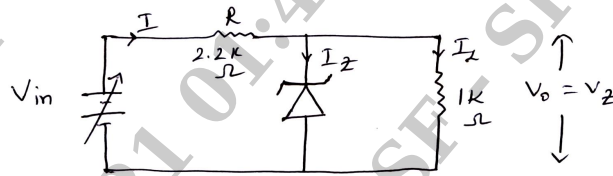


Fig.Q2(c)

(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)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.



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- 6 a. Explain the ideal characteristics of an op-Amp. (08 Marks)
b. Derive the expression for output voltage of a non-inverting 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 Barkhausen'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 De Morgan's theorem for 3 variables. (04 Marks)
c. Simplify the following Boolean expression :
i) $A + \overline{AB} = A + B$
ii) $\overline{XYZ} + \overline{X}YZ + \overline{XY} + X\overline{Y}$
iii) $\overline{\overline{XY} + XYZ + X(Y + XY)}$
iv) $ABC + \overline{A}\overline{B}C + \overline{A}B\overline{C} + \overline{A}BC$
v) $\overline{\overline{A}B + ABC} + A(B + \overline{A}B)$
vi) $AB + \overline{AC} + \overline{A}B\overline{C}(AB + C)$. (12 Marks)
- 10 a. With block diagram and truth table, explain the operation of full adder using 2 half adders. (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)
