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14ELN15/25

First Semester B.E. Degree Examination, June/July 2019
Basic Electronics

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast ONE question from each part.***

PART – 1

1 a. Sketch and discuss the forward and reverse characteristics of a silicon diode. **(05 Marks)**

b. Define rms and dc or average value of voltage, peak inverse voltage, ripple factor and conversion efficiency with respect to Half wave rectifier. **(10 Marks)**

c. A full wave rectifier circuit provides peak secondary voltage of 35V, the load resistance $R_L = 1\ k\Omega$, $R_f = 13\Omega$, $R_s = 12\Omega$. Find the dc and rms value of output voltage. Also find the regulation. **(05 Marks)**

2 a. The diode clamping circuit in fig. Q2(a) has ± 10V, 1 kHz square wave input. Calculate the tilt, and draw the output waveform. **(06 Marks)**

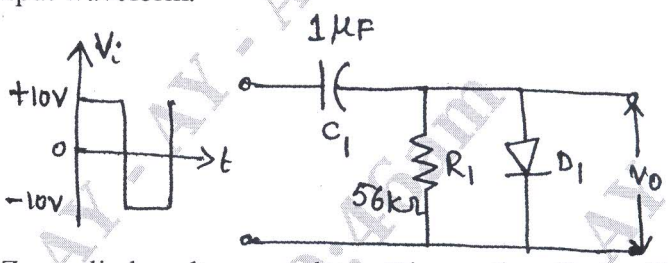

Fig.Q2(a)

b. Sketch and explain Zener diode voltage regulator. Discuss the effects of load current. **(06 Marks)**

c. Explain BJT common emitter configuration with a suitable circuit, to draw the input and output characteristics. **(08 Marks)**

PART – 2

3 a. Explain the operation of Base bias circuit and write the equations for I_B, I_C and V_{CE}. **(04 Marks)**

b. A voltage divider bias circuit has $V_{CC} = 10V$, $R_C = 2.2\ K\Omega$, $R_1 = 82k\Omega$, $R_2 = 18k\Omega$, $R_E = 0.5k\Omega$. Find the 'Q' point and terminal voltages (V_B, V_C, V_E). Draw the load line and locate the operating point. **(08 Marks)**

c. Mention the ideal characteristics of an Op – amp and explain the concept of virtual ground. **(08 Marks)**

4 a. Derive an expression for output voltage of an Non – Inverting summing circuit. Draw the circuit. **(10 Marks)**

b. The two input voltages of an op-amp are 2V and 3V. The common output voltage is 2mV and the difference mode output voltage is 9V. Find CMRR. **(05 Marks)**

c. For a base bias circuit configuration $R_B = 470k\Omega$, $R_C = 2.2k\Omega$ and $V_{CC} = 18V$ and $\beta = 100$. Find I_B, I_C, V_{CE}. **(05 Marks)**

PART – 3

5 a. Convert : i) $(47.8125)_{10} = (?)_2$ ii) $(1011101.1011)_2 = (?)_{16}$ iii) $(BCDE)_{16} = (?)_8 = (?)_{10}$. **(06 Marks)**

b. Subtract i) 101000_2 from 0101111 using one's complement
ii) $(15)_{10} - (18)_{10}$ using 2's complement. **(05 Marks)**

c. State and prove De – Morgan's theorem for two input variables by induction method. **(05 Marks)**

d. Realize 'AND' gate using 'NOR' gate and 'OR' gate by 'NAND' gates only. **(04 Marks)**

6 a. Simplify the following Boolean expressions and implement the same using NOR gates only.
i) $F = \overline{X}\ \overline{Y}\ \overline{Z} + \overline{X}\ \overline{Y}\ \overline{Z} + \overline{X}\ \overline{Y} + X\ \overline{Y}$ ii) $F = (X + Y)(\overline{X} + Z)(\overline{Y} + Z)$. **(07 Marks)**

b. For the given Boolean expression, draw the logic diagram using basic gates.
i) $Y = \overline{AB(C + D)}$ ii) $Z = \overline{X + A\overline{B}}$. **(05 Marks)**

c. Design Full adder using Half address. Write the expressions for SUM and CARRY. Also write the Truth Table. **(08 Marks)**

PART - 4

7 a. Draw NOR gate latch and its truth table. Explain the working of a NOR gate latch. **(04 Marks)**

b. With a block diagram, explain the working of 8085 µp. **(06 Marks)**

c. Explain the working of clocked RS flip – flop. **(05 Marks)**

d. What is Transducer? Compare active and passive transducers. **(05 Marks)**

8 a. Explain the working of LVDT. **(06 Marks)**

b. Define Seebeck effect, Peltier and Thompson effect. **(06 Marks)**

c. What is a microcontroller? List specific features of 8051 architecture. **(06 Marks)**

d. Bring out the differences between peizoelectric and photo electric transducers. **(02 Marks)**

PART - 5

9 a. Derive an expression for AM wave. Write the spectrum. **(06 Marks)**

b. Show that the total power in the modulated wave is 1.5 times the power in carrier. **(06 Marks)**

c. Derive an expression for frequency modulated wave. **(08 Marks)**

10 a. Compare AM and FM. **(05 Marks)**

b. Explain the operation of mobile communication with a block diagram. **(05 Marks)**

c. Write a note on ISDN. **(05 Marks)**

d. What are the advantages and disadvantages of an optical fiber communication? **(05 Marks)**

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