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14ELN15/25

First / Second Semester B.E. Degree Examination, June / July 2015
Basic Electronics

Time: 3 hrs. Max. Marks:100

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

PART - A

1 a. Draw and explain V – I characteristics of a Germanium Diode. **(05 Marks)**

b. Find the value of the series resistance R, required to drive a forward current of 1.25mA through a Germanium diode from a 4.5V battery. Write the circuit diagram showing all the value. **(04 Marks)**

c. With neat diagram, explain the working of a half wave rectifier along with relevant waveforms. **(07 Marks)**

d. Discuss in brief clipping circuit. Explain the working of a positive clipper with neat circuit diagram and relevant waveforms. **(04 Marks)**

2 a. Explain the working of a full wave rectifier using 2 diodes with neat diagram. Also derive the expressions for I_{dc} and I_{rms} of a full wave rectifier. **(10 Marks)**

b. Discuss in brief clamping circuit. Explain working of a negative clamper. **(04 Marks)**

c. Distinguish between Zener and Avalanche breakdown. **(06 Marks)**

PART - B

3 a. Calculate the value of I_C, I_E and β_{dc} for a transistor with $\alpha_{dc} = 0.98$ and $I_B = 120\mu A$. **(06 Marks)**

b. For the base bias circuit, $V_{cc} = 18V$, $R_c = 2.2K\Omega$, , $R_B = 470k\Omega$, $h_{fe} = 100$ and $V_{BE} = 0.7V$. Find I_B, I_C and V_{CE}. Draw the DC load line and indicate the Q point. **(08 Marks)**

c. Discuss the ideal characteristics of an operational amplifier. **(06 Marks)**

4 a. Explain the voltage follower circuit using operational amplifier. Mention its important properties. **(05 Marks)**

b. Design an adder circuit using Op – amp to obtain an output voltage of $V_0 = 2[0.1V_1 + 0.5V_2 + 2V_3]$, where V_1, V_2 and V_3 are input voltages. Draw the circuit diagram. **(08 Marks)**

c. Design a voltage divider bias circuit to operate from a 12V supply with $V_{CE} = 3V$, $V_E = 5V$ and $I_C = 1mA$, $V_{BE} = 0.7V$. **(07 Marks)**

PART - C

5 a. With the help of a diode switching circuit and truth table explain the operation of an AND gate and OR gate. **(06 Marks)**

b. State and prove Demorgan's theorem for three variables. **(06 Marks)**

c. With truth table and logical expressions, give the design of a full adder circuit. Realize the circuit using i) Basic gates and ii) NAND gates. **(08 Marks)**

6 a. Perform the following conversions :

i) $(1234.56)_8 = (?)_{10}$ ii) $(10110101001.101011)_2 = (?)_{16}$ iii) $(988.86)_{10} = (?)_2$

iv) $(532.65)_{10} = (?)_{16}$ v) $(ABCD.EF)_H = (?)_8$. **(05 Marks)**

b. i) Subtract $(1000.01)_2$ from $(1011.10)_2$ using 1's and 2's complement method.
ii) Add $(7AB.67)_{16}$ with $(15C.71)_{16}$. **(05 Marks)**

c. Design a half adder circuit and realize using Basic gates and NAND gates. **(05 Marks)**

d. What are Universal gates? Realise AND and OR gate using Universal gates. **(05 Marks)**

PART - D

7 a. Distinguish between a Latch and flipflop. **(04 Marks)**

b. Explain i) See beck effect ii) Peltier effect and iii) Thomson effect. **(06 Marks)**

c. Explain the architecture of 8085 microprocessor, with neat diagram. **(10 Marks)**

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

b. List the difference between a microprocessor and micro controller. **(08 Marks)**

c. Explain the working of a R – S flipflop with relevant circuit and truth table. **(06 Marks)**

PART - E

9 a. What is Modulation? Mention some of the need for modulation in communication system. **(06 Marks)**

b. Give the comparison between AM and FM. **(08 Marks)**

c. With block diagram, explain the working of a cellular mobile communication system. **(06 Marks)**

10 a. Define Amplitude modulation and derive the expression for AM wave with relevant waveforms. Draw the frequency spectrum. **(08 Marks)**

b. With neat diagram, explain the working of a telephone system. **(06 Marks)**

c. An audio frequency signal $10 \sin (2\pi \times 500)t$ is used to amplitude modulate a carrier of $50 \sin(2\pi \times 10^5 t)$. Calculate
i) Modulation index.
ii) Sideband frequencies.
iii) Band width.
iv) Amplitude of each sideband.
v) Total power delivered to a load of 600Ω.
vi) Transmission efficiency. **(06 Marks)**

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