

USN



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

Nrb

- 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 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 the 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_o , I_E and β_{dc} for a transistor with $\beta_{dc} = 0.98$ and $I_B = 120 \mu A$. (06 Marks)
 - b. For the base bias circuit with $V_{CC} = 18V$, $R_c = 2.2k\Omega$, $R_B = 470k\Omega$, $\beta_{dc} = 100$ 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 $V_o = 2[0.1V_1 + 0.5V_2 + 2V_3]$, where V_1 , V_2 and V_3 are input voltages. Draw the circuit. (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) $(ABCD.EF)_H = (?)_{10}$

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- 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) Seebeck 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 able. (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 of a telephone system. (08 Marks)
- b. With neat diagram, explain the working of a telephone system. (06 Marks)
- c. An audio frequency signal $10 \sin(2\pi \times 10^3 t)$ is used to amplitude modulate a carrier of 500 kHz . Calculate
 - i) Modulation index. ?-
 - ii) Sideband frequencies.
 - iii) Band width. „AS'
 - iv) Amplitude of each sideband.
 - v) Total power delivered to a load of 600Ω .
 - vi) Transmission efficiency. (06 Marks)