CBCS SCHEME

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17ELN15/25

First/Second Semester B.E. Degree Examination, Dec.2023/Jan.2024
Basic Electronics

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Draw and explain the V-I characteristics for silicon and germanium diode. **(08 Marks)**

b. Define the following diode parameters :
i) Knee voltage
ii) Minimum forward current
iii) Reverse breakdown voltage
iv) Peak inverse voltage. **(08 Marks)**

c. Derive the relationship between α and β. A certain transistor has $\beta = 200$ and base current is 50μA. Determine the collector current and α. **(04 Marks)**

OR

2 a. With a neat diagram, explain the input and output characteristics of a transistor in common emitter configurations. **(08 Marks)**

b. With neat circuit diagram and waveform, explain the working of full wave bridge rectifier. **(08 Marks)**

c. Explain Zener diode voltage regulator circuit. **(04 Marks)**

Module-2

3 a. What is DC load line? Explain with neat circuit the operation of voltage divider bias circuit. **(08 Marks)**

b. Explain the characteristics of an ideal op-amp in detail. **(08 Marks)**

c. Explain the base bias circuit. **(04 Marks)**

OR

4 a. Explain investing and non-inverting optional amplifiers. **(08 Marks)**

b. Explain the inverting summing amplifier with neat circuit diagram. Calculate the output voltage of three input inverting summing amplifier having :
$R_1 = 200K\Omega$ $R_2 = 250K\Omega$ $R_3 = 500K\Omega$ $R_f = 1\ M\Omega$,
$V_1 = -2V$ $V_2 = -1V$ and $V_3 = +3V$. **(08 Marks)**

c. Draw the base bias circuit using a silicon transistor with $\beta = 50$, $R_B = 100K\Omega$. $R_C = 1k\Omega$ and $V_{CC} = 10V$. Find the values of I_C and V_{CE}. **(04 Marks)**

Module-3

5 a. State and prove the De – Morgan's theorem. **(06 Marks)**

b. Explain the full adder circuit with truth table. **(06 Marks)**

c. Convert the following :
$(49.5)_{10} = (?)_{16}$
$(1062.403)_8 = (?)_{10}$
$(642.71)_8 = (?)_2$
$(734)_{10} = (?)_2$ **(08 Marks)**

OR

6 a. Realize AND, OR and NOT gates using universal gates. **(06 Marks)**

b. Simplify the given Boolean equation : $y = (A + \overline{B}) \cdot (CD + E)$ and realize using NAND gates only. **(06 Marks)**

c. Perform the subtraction with the following binary numbers using 1's and 2's compliment method.

i) $(10010)_2 - (10011)_2$

ii) $(11010)_2 - (10000)_2$ **(08 Marks)**

Module-4

7 a. Explain clocked R–S flip-flop and R–S flip-flop with its logic diagram, logic symbol and truth table. **(10 Marks)**

b. Explain the architecture of 8051 microcontroller with block diagram in detail. **(10 Marks)**

OR

8 a. With the help of block diagram, explain the microcontroller based stepper motor control system. **(08 Marks)**

b. Explain NAND gate and NOR gate latch with logic diagram and truth table. **(08 Marks)**

c. Compare microcontroller and micro processor. **(04 Marks)**

Module-5

9 a. Explain the construction and working of LVDT and its applications. **(10 Marks)**

b. Explain elements of communication system with block diagram. **(04 Marks)**

c. List the differences between amplitude modulation and frequency modulation. **(06 Marks)**

OR

10 a. Define amplitude modulation. Derive mathematical expression and draw waveforms. **(08 Marks)**

b. Explain the piezoelectric transducer and photoelectric transducer. **(06 Marks)**

c. Explain the frequency modulation with neat waveforms. **(06 Marks)**

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