CBCS SCHEME

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17ELN15/25

First/Second Semester B.E. Degree Examination, Feb./Mar. 2022
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 VI – characteristics of a PN-junction diode. **(08 Marks)**

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

c. Derive the relationship between α and β. Also calculate the value of α and β value of a transistor if $I_B = 100\mu A$ and $I_C = 2\mu A$. **(04 Marks)**

OR

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

b. With neat diagram and wave forms, explain the working of a halfwave rectifier. **(08 Marks)**

c. Define : i) Zener breakdown ii) Avalanche breakdown. **(04 Marks)**

Module-2

3 a. What is op-Amp? List the characteristics of an ideal op-amp. **(06 Marks)**

b. For the base bias circuit for npn transistor, find I_β, I_C and V_{CE} if $R_C = 2K\Omega$, $R_B = 220K\Omega$, $\beta = 60$, $V_{BE} = 0.7V$ and $V_{CC} = 18V$. **(06 Marks)**

c. Explain with neat circuit diagram op-amp integrator. **(08 Marks)**

OR

4 a. With neat circuit diagram, explain the voltage divider bias circuit. **(06 Marks)**

b. Find the output voltage of a three input adder circuit in which $R_1 = R_2 = R_3 = 4K\Omega$ and feedback resistance $R_F = 6K\Omega$ and given that $V_1 = -4V$, $V_2 = -2V$ and $V_3 = 3V$. **(05 Marks)**

c. Explain briefly non-inverting, inverting and voltage follower circuit using operation amplifier. **(09 Marks)**

Module-3

5 a. Convert the following :

i) $(69)_{10} = (?)_2$ ii) $(101010101)_2 = (?)_{10}$ iii) $(FA876)_{16} = (?)_2$

iv) $(867)_{10} = (?)_8$ v) $(57345)_{10} = (?)_{16}$ vi) $(BCDE)_{16} = (?)_8$. **(09 Marks)**

b. State and prove De – Morgan's theorem for 2 variables with truth table. **(06 Marks)**

c. Realize AND, OR, NOT using universal gates. **(05 Marks)**

OR

6 a. Explain half adder. Design the full adder circuit by using two half adder circuits. **(08 Marks)**

b. Simplify the following :

i) $Y = \overline{A}\overline{B}\overline{C}D + \overline{A}B\overline{C}D + A\overline{B}\overline{C}D + A\overline{B}CD$

ii) $Y = AB + AC + BD + CD$. **(06 Marks)**

c. Perform the following :

i) $(22 - 17)$ by using 2's complement method

ii) $(11010110)_2 - (01000101)_2$ by using 1's complement method. **(06 Marks)**

Module-4

7 a. What is the flip-flop? Explain with circuit diagram and truth table NOR gated SR – flip-flop. (08 Marks)

b. Explain the architecture of 8051 microcontroller. (12 Marks)

OR

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

b. With the diagram and truth table explain NAND gate latch. (06 Marks)

c. Explain the register banks of 8051 microcontroller. (06 Marks)

Module-5

9 a. Explain the communication system with neat block diagram. (08 Marks)

b. Explain the construction and working operation of linear variable differential transducer's. (06 Marks)

c. A 500W 1MHz carrier is amplitude modulated with a sinusoidal signal of 1KHz, the depth of modulation is 60%. Calculate the Bandwidth and power in the side band, sideband frequencies and total power in the modulated wave. (06 Marks)

OR

10 a. Define modulation. Derive the mathematical expression for the amplitude modulation and the wave forms. (08 Marks)

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

c. What is transducer? Explain active transducer and passive transducer. (06 Marks)

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