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

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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