CBCS SCHEME

Sahyadri College of Engineering & Management
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17ELN15/25

First/Second Semester B.E. Degree Examination, Jan./Feb. 2021
Basic Electronics

Time: 3 hrs. Max. Marks: 100

Note : 1. *Answer any FIVE full questions, choosing ONE full question from each module.*
2. *Write neat sketches as and when required.*

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Explain the operation of PN junction diode under forward and reverse bias condition. **(08 Marks)**

b. Explain the working of half wave rectifier with capacitor filter. Explain the role of capacitor filter in the circuit. **(08 Marks)**

c. Differentiate between Avalanche break down and Zener break down. **(04 Marks)**

OR

2 a. Derive the expressions for I_{dc}, V_{dc}, I_{rms}, V_{rms}, Percentage regulation, efficiency 'η' and ripple factor 'γ' for an full wave rectifier. **(08 Marks)**

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

c. For a transistor, $I_E = 1mA$, $I_B = 10\mu A$, determine 'α' and 'β'. **(04 Marks)**

Module-2

3 a. What is Biasing? Explain need of biasing. Give the comparison between various biasing circuits. **(08 Marks)**

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

c. Design the voltage divider bias circuit to operate from 12V supply. The bias conditions are $V_{C\varepsilon} = 3V$, $V_E = 5V$ and $I_C = 1mA$. Assume $V_{BE} = 0.7V$. **(04 Marks)**

OR

4 a. List the various ideal Op – amp characteristics. **(08 Marks)**

b. Explain with a neat circuit diagram, how an Op-amp can be used as subtractor. **(08 Marks)**

c. An Op – amp is used as an inverting amplifier to amplify an input sine wave of amplitude 100m $V_{p\text{-}p}$. The input resistor is $R_1 = 1k\Omega$ and feedback resistance is $R_f = 10k\Omega$. Calculate the voltage gain. **(04 Marks)**

Module-3

5 a. State and prove Demorgan's theorem. **(04 Marks)**

b. Design a full adder circuit and implement it using basic gates. **(08 Marks)**

c. Justify why NAND and NOR gates are called as Universal gates. Realize AND and OR gates using universal gates. **(08 Marks)**

OR

6 a. Convert : i) $(655.70)_8 = (?)_{10} = (?)_{16}$ ii) $(238.20)_{10} = (?)_8 = (?)_2$. **(08 Marks)**

b. Subtract $(111001)_2$ from $(101011)_2$ using 2's Complement method. **(04 Marks)**

c. Show that :

i) $\overline{\overline{AB}+\overline{A}+AB}=0$ ii) $\overline{X}\,\overline{Y}\,\overline{Z}+\overline{X}\,\overline{Y}\,\overline{Z}+\overline{X}\,\overline{Y}+X\,\overline{Y}=\overline{Y}$. **(04 Marks)**

d. Simplify and realize the following using NAND gates $A\,\overline{B}\,\overline{C}+\overline{A}\,\overline{B}\,\overline{C}+\overline{A}\,\overline{B}+\overline{AC}$. **(04 Marks)**

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Module-4

7 a. What is Flip Flop? Distinguish between a latch and a flip flop. **(05 Marks)**

b. With diagram and truth table, explain the operation of NOR latch gate. **(07 Marks)**

c. What is RS flip – flop? With the help of neat circuit diagram, explain its operation, logic symbol and truth table. **(08 Marks)**

OR

8 a. Define and mention the applications of Micro controllers. **(05 Marks)**

b. List the features of 8051 microcontroller. **(07 Marks)**

c. With a block diagram, explain Microcontroller based stepper motor control system. **(08 Marks)**

Module-5

9 a. What is Modulation? Explain the need for modulation. List the different types of modulation technique. **(10 Marks)**

b. Explain the elements of Communication system, with the help of block diagram. **(06 Marks)**

c. The total power content of an AM wave is 2.64 kw at a modulation factor of 80%. Determine the power content of i) Carrier ii) Each side band. **(04 Marks)**

OR

10 a. Define Transducers. Explain the operation of Piezoelectric transducers. **(08 Marks)**

b. Explain the working operation of Resistance Thermometer. **(06 Marks)**

c. Write short note on :
i) Peltier effect ii) Thompson effect iii) Hall effect. **(06 Marks)**

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