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BBEE103/203

# First/Second Semester B.E./B.Tech. Degree Supplementary Examination, June/July 2024
## Basic Electronics for EEE Stream

Time: 3 hrs.                Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.*
*      2. VTU Formula Hand Book is permitted.*
*      3. M : Marks , L: Bloom's level , C: Course outcomes.*

| | | | M | L | C |
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| **Module – 1** | | | | | |
| Q.1 | a. | Explain the forward and reverse characteristics of a silicon diode. | 08 | L2 | CO1 |
| | b. | Describe the working of a two diode full wave rectifier with neat circuit diagram and waveforms. | 08 | L2 | CO1 |
| | c. | Explain the working of a capacitor filter for a half wave rectifier with neat circuit diagram and waveforms. | 04 | L2 | CO1 |
| **OR** | | | | | |
| Q.2 | a. | Explain the working of a full wave bridge rectifier with neat circuit diagram and waveforms. | 08 | L2 | CO1 |
| | b. | Illustrate how Zener diode can be used as voltage regulator in load and no load conditions. | 08 | L2 | CO1 |
| | c. | Write a note on ideal, practical and piecewise linear characteristics of a pn junction diode. | 04 | L2 | CO1 |
| **Module – 2** | | | | | |
| Q.3 | a. | Explain the input and output characteristics of a transistor in common Emitter configuration. | 08 | L2 | CO2 |
| | b. | Indicate the various voltages and currents in a transistor circuit and derive $\beta_{dc}$ interms of $\alpha_{dc}$. | 06 | L2 | CO2 |
| | c. | Explain the operating principle of an n channel JFET. | 06 | L2 | CO2 |
| **OR** | | | | | |
| Q.4 | a. | Explain the working of an n-channel enhancement type MOSFET. | 08 | L2 | CO2 |
| | b. | Describe the input and output characteristics of a transistor connected in common base configuration. | 06 | L2 | CO1 |
| | c. | Explain how the DC load line can be constructed with respect to a BJT. | 06 | L2 | CO1 |
| **Module – 3** | | | | | |
| Q.5 | a. | Define the following with respect to an opamp: <br> (i) Slew rate    (ii) CMRR    (iii) Input Offset Voltage | 06 | L2 | CO1 |
| | b. | Explain how an opamp can be used as an integrator and differentiator. | 08 | L2 | CO2 |
| | c. | An opamp inverting amplifier has a feedback resistor of 15 K$\Omega$ and a input resistor of 2K$\Omega$. Calculate the gain of the opamp and the output voltage if it is supplied with an input of 0.75V. | 06 | L3 | CO2 |
| **OR** | | | | | |
| Q.6 | a. | List the characteristics of an ideal opamp. | 06 | L2 | CO1 |
| | b. | Describe how an opamp can be used as a difference amplifier/subtracting circuit. | 08 | L2 | CO2 |
| | c. | Show how an opamp summing circuit can be used to produce an output voltage: $V_0 = -(3V_1 + 3V_2 + 3V_3)$ | 06 | L3 | CO2 |

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| **Module – 4** | | | | | |
| Q.7 | a. | Perform binary subtraction using 2's complement method on the following: (i) $(1101)_2 - (1010)_2$ (ii) $(10101.101)_2 - (01110.111)_2$ | 04 | L3 | CO3 |
| | b. | Perform the following conversions: (i) $(82.25)_{10} = (?)_2$ (ii) $(46)_{10} = (?)_8$ (iii) $(126)_{10} = (?)_{16}$ (iv) $(111011.1001)_2 = (?)_{10}$ | 08 | L3 | CO3 |
| | c. | Simplify the following Boolean functions: i) $(A + \overline{B}C)(\overline{A} + B + \overline{C})(A + \overline{B})$ ii) $A + A\overline{B} + \overline{A}B$ | 08 | L3 | CO3 |
| **OR** | | | | | |
| Q.8 | a. | With neat diagram, explain Half adder. | 02 | L2 | CO3 |
| | b. | Explain how a full adder can be realized using two half adders. | 08 | L2 | CO3 |
| | c. | List the Boolean laws. Also state and prove Demorgan's theorem. | 10 | L2 | CO3 |
| **Module – 5** | | | | | |
| Q.9 | a. | Describe the working of a LVDT with neat diagram. | 08 | L2 | CO5 |
| | b. | Explain the general block diagram of communication system. | 06 | L2 | CO4 |
| | c. | Define modulation. What are the needs of modulation. | 06 | L2 | CO4 |
| **OR** | | | | | |
| Q.10 | a. | Explain the working of potentiometer-type resistive transducer. | 08 | L2 | CO5 |
| | b. | Describe piezo electric transducer. | 06 | L2 | CO5 |
| | c. | Write a short note on photodiodes. | 06 | L2 | CO5 |

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