| Module -1 | | | |
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| **Q. No.** | **Questions** | **Bloom's LL** | **COs** |
| 1. | Define the Following term: (i) Amplifier (ii) Rectifier | L1 | CO1 |
| 2. | List the various types of amplifiers | L1 | CO1 |
| 3. | Define the Following Parameter with respect to amplifier: (i) Gain (ii) input resistance (iii) output resistance | L1 | CO1 |
| 4. | Define the Following term with respect to amplifier:<br>(i) Frequency response (ii) Bandwidth (iii) Phase Shift | L1 | CO1 |
| 5. | Draw the Negative Feedback Amplifier circuit and write the overall gain expression. | L1 | CO1 |
| 6. | Explain half wave rectifier with all RC filter along with waveforms. | L2 | CO1 |
| 7. | Explain half wave rectifier with all LC filter along with waveforms. | L2 | CO1 |
| 8. | Draw the block diagram of regulated power supply and mention the functions of each block | L2 | CO1 |
| 9. | Explain the various types of amplifiers. | L2 | CO1 |
| 10. | Explain the voltage multiplier and interpret the output with the rectifier circuit | L2 | CO1 |
| 11. | Explain the bi-phase Full Wave rectifier using center tapped transformer with input and output waveform | L2 | CO1 |
| 12. | Explain the operation of Full Wave bridge rectifier with input and output waveform | L2 | CO1 |

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| 13. | Illustrate the multistage amplifier with the various coupling device | L2 | CO1 |
| 14. | Explain the following in brief with respect to amplifier (i) Gain (ii) input and output resistance (iii) frequency response (iv) Bandwidth (v) Phase shift (vi) Negative feedback | L2 | CO1 |
| 15. | An amplifier produces an output voltage of 2.5 V for an input of 60 mV. If the input and output currents in this condition are, respectively, 5 mA and 220 mA, determine: (a) the voltage gain (b) current gain | L3 | CO2 |
| 16. | Compute the overall gain of negative feedback amplifier with a suitable block diagram. | L3 | CO2 |
| 17. | Make use of Zener voltage regulator and find the series resistance | L3 | CO1 |
| 18. | A mains transformer having a turn's ratio of 20:1 is connected to a 240 V r.m.s. mains supply. If the secondary output is applied to a half-wave rectifier, determine the peak voltage that will appear across a load. | L3 | CO2 |
| 19. | The R–C smoothing filter in 50 Hz mains operated half-wave rectifier circuit consists of R1 = 150 Ω and C2 = 470 μF. If 0.8 V of ripple appears at the input of the circuit, determine the amount of ripple appearing at the output. | L3 | CO2 |
| 20. | The L–C smoothing filter in 50 Hz mains operated half-wave rectifier circuit consists of L1 = 12 H and C2 = 1,200 μF. If 1.5 V of ripple appears at the input of the circuit, determine the amount of ripple appearing at the output. | L3 | CO2 |
| 21. | A 7.5V Zener diode has a maximum rated power dissipation of 800 mW. If the diode is to be used in a simple regulator circuit to supply a regulated 7.5 V to a load having a resistance of 600Ω, determine a suitable value of series resistor for operation in conjunction with a supply of 12 V. | L3 | CO2 |
| 22. | Determine the voltage gain, input with feedback for Negative feedback amplifier having A = -100, Ri = 10 kΩ for feedback of (a) β=- 0.1 and (b) β = -0.5. | L3 | CO2 |
| 23. | An amplifier produces an output voltage of 2.5 V for an input of 60 mV. If the input and output currents in this condition are, respectively, 5 mA and 220 mA, determine the (i) voltage gain (ii) current gain | L3 | CO2 |
| 24. | A half-wave rectifier is fitted with an R–C and L-C smoothing filter comprising R = 200 Ω and C = 50 μF. If 2 V of 400 Hz ripple appear at the input of the circuit, determine the amount of ripple appearing at the output and discuss the output. | L4 | CO2 |
| 25. | Analyze the output waveform of a half-wave rectifier and discuss how the ripple voltage can be minimized. What role does the filter capacitor play in this process? | L4 | CO1 |

| Module -2 | | | |
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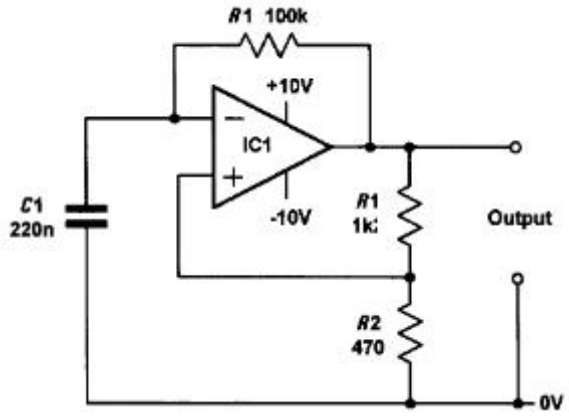
| **Q. No.** | **Questions** | **Bloom's LL** | **COs** |
| 1 | Define operational amplifier and how it can work as a comparator. | L1 | CO1 |
| 2 | What is an Oscillator? List the conditions for sustained oscillations. | L1 | CO1 |
| 3 | Mention the ideal and practical characteristics of Op-Amp. | L1 | CO1 |
| 4 | Summarize the applications of Op-Amp as (i) Voltage follower (ii) Differentiator and (iii) Integrator (iv) Comparator (v) Summing amplifier | L2 | CO1 |
| 5 | Explain the operation of three-stage ladder RC network oscillator with neat circuit diagram. | L2 | CO1 |
| 6 | Explain Wein bridge oscillator with a neat circuit diagram | L2 | CO1 |
| 7 | Explain crystal-controlled oscillator. | L2 | CO1 |
| 8 | A perfect rectangular pulse is applied to the input of an operational amplifier. If it takes 8 µs for the output voltage to change from -10 V to +10 V, determine the slew rate of the device. | L3 | CO2 |
| 9 | Construct the circuit of an inverting amplifier based on an operational amplifier. Label your circuit and identify the components that determine the closed-loop voltage gain. | L3 | CO1 |
| 10 | An operational amplifier with negative feedback applied produces an output of 1.5 V when an input of 7.5 mV is present. Determine the closed-loop voltage gain. | L3 | CO2 |
| 11 | With block diagram explain the positive feedback and write the equation for overall gain. | L3 | CO1 |
| 12 | An amplifier with a gain of 8 has 10% of its output fed back to the input. Determine the gain of the stage (a) with negative feedback, (b) with positive feedback. | L3 | CO2 |
| 13 | Determine the periodic time and frequency of the output signal produced by the oscillator circuit shown in below figure.   | L3 | CO1 |
| 14 | Determine the peak-peak voltage developed across C1 in the oscillator circuit shown below. | L3 | CO1 |

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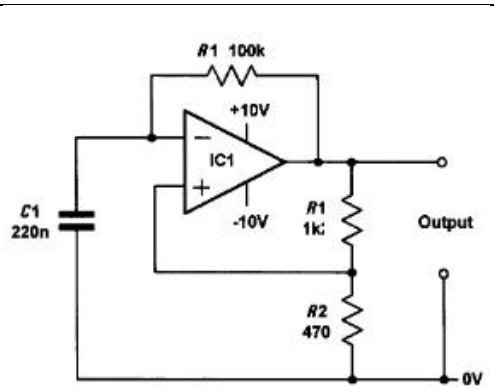
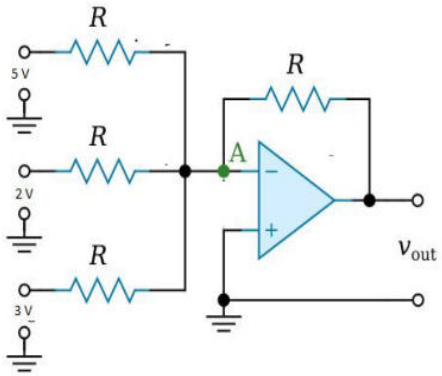
| |  | | |
| 15 | Build a comparator using Op-amp and explain the operation with suitable waveforms. | L3 | CO1 |
| 16 | During measurements on an operational amplifier under open-loop conditions, an output voltage of 12 V is produced by an input voltage of 1 mV. Determine the open-loop voltage gain expressed in dB. | L3 | CO1 |
| 17 | An operational amplifier has an input resistance of 10MΩ. Determine the input current when an input voltage of 6 mV is present. | L3 | CO1 |
| 18 | Estimate the value of output voltage for the summing amplifier shown below.<br>  | L5 | CO1 |
| 19 | Explain the single stage astable oscillator with a neat diagram and also compute the Time constant. | L2 | CO1 |

| | **Module -3 Boolean Algebra and Logic Circuits, Combinational logic** | | |
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| ***Q. No.*** | ***Questions*** | ***Bloom's LL*** | ***COs*** |
| 1. | Subtract using 2's and 10's Complement method for the following<br>i) (101110100-10100100)2 ii) $(8751 - 9432)_{10}$ | L3 | CO2 |
| 2. | Subtract the complement method for the following<br>i) $(4456.65 - 3434.74)_{10}$ using 10's complement<br>ii) $(10110 - 11010)_2$ using 2's complement | L3 | CO2 |
| 3. | Convert the following numbers to their equivalent number and show the steps.<br>(i) $(10110001101011.11110010)_2 = (?)_8$ | L3 | CO2 |

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| | (ii) $(10110.011)_2 = (?)_{10}$<br>(iii) $(864.952)_{10} = (?)_8$ | | |
| 4. | Convert the following and show the steps.<br>i) $(10110011010111.111100110)_2 = (?)_{16}$<br>ii) $(111101.011)_2 = (?)_{10}$<br>iii) $(2835.815)_{10} = (?)_8$ | L3 | CO2 |
| 5. | Convert the following and show the steps.<br>i) $(981.6875)_{10} = (?)_2$<br>ii) $(10110001101011.11110010)_2 = (?)_{16}$<br>iii) $(675.897)_2 = (?)_2$ | L3 | CO2 |
| 6. | State and Prove De-morgan's theorem for two input variables | L2 | CO2 |
| 7. | Analyze and prove De-Morgan's Theorem for 3 variables with its truth table and logic diagram | L4 | CO2 |
| 8. | Classify the following laws of Boolean Algebra with examples<br>i) Commutative Law ii) Distributive Law iii) Associative Law | L4 | CO2 |
| 9. | Categorize the following laws of Boolean Algebra with examples<br>i) Distributive Law ii) Absorption Law iii) Associative Law | L4 | CO2 |
| 10. | Express the following using Canonical form.<br>i) F1 = A + $\bar{B}$C in a minterms form<br>ii) F2 = (X+$\bar{Y}$) (X+Z) in a max terms form | L2 | CO2 |
| 11. | Simplify the following expressions using Boolean algebra and also draw the logic diagram<br>i) F1= $(A + \overline{BC})(\bar{A}B + \bar{C})$<br>ii) F2= $(\overline{A + B})(\bar{A} + \bar{C})(\bar{B} + C)$ | L4 | CO2 |
| 12. | Simplify the following Boolean expression and prove LHS= RHS by using the truth table.<br>i) $(X + Y)(X + Z) = X + YZ$<br>ii) $XY + XZ + Y\bar{Z} = XZ + Y\bar{Z}$ | L4 | CO2 |
| 13. | Construct Half Adder and Obtain the expression for Sum and carry | L3 | CO2 |
| 14. | Construct the Full Adder with its logic diagram and deduce the expression for Sum and carry, with its truth table, logic diagram. | L3 | CO2 |
| 15. | Construct Full adder with two half adders, write the equation for Sum, and Carry with its truth table and draw its logic diagram | L3 | CO2 |
| 16. | Examine the clocked SR flip-flop with a logic diagram, truth table and Characteristic table and Equation. | L4 | CO2 |
| 17. | Examine the D flip-flop with a logic diagram, truth table and Characteristic table and Equation. | L4 | CO2 |
| 18. | Construct the clocked JK flip flop with logic diagram, truth table and Characteristic table and Equation. | L4 | CO2 |
| 19. | Construct the clocked T flip-flop with a logic diagram, truth table and Characteristic table and Equation. | L4 | CO2 |
| 20. | Explain the NOR & NAND based latch. | L2 | CO2 |

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| 21. | Write the symbol and truth table for 2 input NAND, NOR, XOR and XNOR | L1 | CO2 |
| 22. | Write the symbol and truth table for 2 input AND, OR and NOT | L1 | CO2 |

| ***Module -4*** | | | |
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| ***Q. No.*** | ***Questions*** | ***Bloom's LL*** | ***COs*** |
| 1. | Discuss the Major applications areas of embedded systems with an example | L2 | CO3 |
| 2. | Mention some of the major applications of embedded systems with an example. | L2 | CO3 |
| 3. | Define Embedded Systems. Classify embedded systems in detail. | L2 | CO3 |
| 4. | Classify embedded systems based on generation and deterministic behavior. | L2 | CO3 |
| 5. | Compare Embedded and general computing systems | L4 | CO3 |
| 6. | Compare RISC and CISC processor | L4 | CO3 |
| 7. | Distinguish between microprocessor and microcontroller | L4 | CO3 |
| 8. | Comprehend the elements of embedded system with a neat diagram. **(OR)** Explain the elements of the embedded system with a neat block diagram. | L2 | CO3 |
| 9. | Classify the various embedded system units and communication protocols in automotive applications. | L4 | CO3 |
| 10. | Explain the operation of the washing machine with a functional block diagram **(OR)** Investigate the operation of the washing machine using a functional block diagram. | L2 | CO3 |
| 11. | Discuss the Key Players of the Automotive Embedded Market in detail | L2 | CO3 |
| 12. | Discuss the key players in the automotive embedded market in silicon and tool and platform providers. | L2 | CO3 |
| 13. | Discuss the different types of communication protocols employed in automotive domains | L2 | CO3 |

| ***Module -5*** | | | |
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| ***Q. No.*** | ***Questions*** | ***Bloom's LL*** | ***COs*** |
| 1 | Explain the Modern communication system with a neat block diagram (OR) Explain the Elements of communication system in detail | L2 | CO4 |
| 2 | What is Modulation? Explain the need of Modulation | L2 | CO4 |

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| 3 | Discuss the block diagram of Analog Transmitter section | L2 | CO4 |
| 4 | Sketch the waveform for Amplitude Modulation and discuss | L3 | CO4 |
| 5 | Discuss the block diagram of Analog Receiver section | L2 | CO4 |
| 6 | Sketch the waveform for Frequency Modulation and discuss | L3 | CO4 |
| 7 | Explain the different types of channels used in the communication system with an example. | L2 | CO4 |
| 8 | What Multiplexing? Explain the different types of multiplexing in the analog communication | L2 | CO4 |
| 9 | Discuss the followings with respect to communication (i) Noise (ii) Multiplexing (iii) Transducer | L2 | CO4 |
| 10 | Analyze various digital modulation techniques used in digital communication and sketch the waveforms. | L4 | CO4 |
| 11 | Analyze the various radio propagation based on ground, sky, and space waves. | L4 | CO4 |
| 12 | Explain and sketch the waveform for AM and FM waveforms. | L2 | CO4 |
| 13 | Sketch the waveform for digital modulation techniques for the massage data stream 11001100 | L3 | CO4 |
| 14 | List the advantages of digital communication over analog communication. | L4 | CO4 |
| 15 | Discuss the various types of multiple access (FDMA, TDMA, and CDMA) in digital communication. | L2 | CO4 |
| 16 | Define the followings (i) Communication (ii) Frequency modulation (iii) Amplitude modulation | L1 | CO4 |

Note:

1. Questions shall be framed by consolidating comprehensively from the following sources
   - Exercise problems of text books/ references
   - Previous year question VTU exam Question paper. (Mark the year/exam beside the question)
   - Questions by Experts during Interview/Academic Audit
   - Internet sources/ other Universities examination question papers.
   - Own / experience.
   - Gate questions mentioning the year.
2. Questions shall follow all the Bloom's learning levels with appropriate action verbs
3. There shall be a total of minimum 50 questions considering minimum 10 questions from each module, of which, 3 questions each at L1 and L2, 2 questions at L3, 1 question each at L4 and L5/L6.
4. Ensure the coverage of all COs.