# CURRICULUM DEVELOPMENT PLAN: Dr. Monika Bassi
# B.Sc. (H) PHYSICS, Second Year, Semester IV CBCS
# (2021-2022, Even Semester)
# No. of Periods per week = 4

| Name of Paper & Code | Allocation of Lectures | Month wise schedule followed by the Department | Tutorial/assignment/ Presentation etc. |
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| **CC-X: Analog Systems and Applications (32221403)** | | | |
| 1. **Semiconductor Diodes:** P and N type semiconductors. Energy Level Diagram. Conductivity and Mobility, Concept of Drift velocity.PN Junction Fabrication (Simple Idea). Barrier Formation in PN Junction Diode. Derivation for Barrier Potential, Barrier Width and Current for abrupt Junction. Equation of continuity, Current Flow Mechanism in Forward and Reverse Biased Diode. | 9 | January | • Syllabus Overview<br>• Reference Books<br>• Problem solving<br>• Two assignments<br>• Previous years Question Papers' problems<br>• Students' difficulties |
| 2. **Two-terminal Devices and their Applications**: (1) Rectifier Diode: Half-wave Rectifiers. Centre-tapped and Bridge Full-wave Rectifiers, Calculation of Ripple Factor and Rectification Efficiency, C-filter, (2) Zener Diode and Voltage Regulation.Principle, structure and characteristics of (1) LED, (2) Photodiodeand (3) Solar Cell, Qualitative idea of Schottky diode and Tunnel diode. | 7 | February | • Problem solving<br>• Assignments<br>• Students' difficulties<br>• Class Test<br>• Previous years Question Papers' problems |
| 3. **Bipolar Junction Transistors**: n-p-n and p-n-p Transistors. I-V characteristics of CBand CE Configurations.Active, Cutoff and Saturation Regions. Current gains α and β. Relations between α and β. Load Line analysis of Transistors. DC Load line and Q-point. Physical Mechanism of Current Flow. | 6 | February | • Derivations<br>• Related Problems<br>• Assignment<br>• Students' difficulties<br>• Revision<br>• Previous years Question Papers' problems |

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| 4. **Amplifiers:** Transistor Biasing and Stabilization Circuits. Fixed Bias and Voltage Divider Bias. Transistor as 2-port Network.h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. Input and Output Impedance. Current, Voltage and Power Gains. Classification of Class A, B & C Amplifiers. | 10 | February-March | • Derivations<br>• Related Problems<br>• Students' difficulties<br>• Assignments<br>• Previous years Question Papers' problems |
| 5. **Coupled Amplifier: Two stage** RC-coupled amplifier and its frequency response. | 4 | March | • Derivations<br>• Related Problems<br>• Students' difficulties<br>• Previous years Question Papers' problems |
| 6. **Feedback in Amplifiers:** Positive and Negative Feedback. Effect of negative feedback on Input Impedance, Output Impedance, Gain, Stability, Distortion and Noise. | 4 | March | • Derivations<br>• Related Problems<br>• Assignment<br>• Students' difficulties<br>• Previous years Question Papers' problems<br>• Revision session |
| 7. **Sinusoidal Oscillators:** Barkhausen's Criterion for self-sustained oscillations. RC Phase shift oscillator, determination of Frequency.Hartley &Colpitts oscillators. | 4 | March | • Derivations<br>• Related problems<br>• Revisions<br>• Practice Examinations<br>• Discussion of Practice Examinations and last year Examination Papers |
| **8. Operational Amplifiers (Black Box approach):** Characteristics of an Ideal and Practical Op-Amp. (IC 741) Open-loop and Closed-loop Gain. Frequency Response. CMRR. Slew Rate and concept of Virtual ground. | 4 | January | • Derivations<br>• Related problems<br>• Revisions<br>• Practice Examinations<br>• Discussion of Practice Examinations and last |

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| | | | year Examination Papers |
| 9. **Applications of Op-Amps:** (1) Inverting and non-inverting amplifiers, (2) Adder, (3) Subtractor, (4) Differentiator, (5) Integrator, (6) Log amplifier, (7) Comparator and Zero crossing detector (8) Wein bridge oscillator. | 9 | April | • Derivations<br>• Related problems<br>• Revisions<br>• Practice Examinations<br>• Class Test<br>• Discussion of Practice Examinations and last year Examination Papers |
| 10. **Conversion:** D/A Resistive networks (Weighted and R-2R Ladder). Accuracy and Resolution. | 3 | April | • Derivations<br>• Related problems<br>• Revisions<br>• Practice Examinations<br>• Discussion of Practice Examinations and last year Examination Papers<br>Tips for Final exams |