ANALOG & DIGITAL ELECTRONICS

Course No: PH-218
3-1-0-8

Course Instructor:

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Room No: #305

Department of Physics,
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Prerequisite (Nil)
Syllabus for Analog Electronics

1. **P-N Junctions**: Diode theory, forward and reverse-biased junctions, reverse-bias breakdown, load line analysis, diode applications - Limiters, clippers, clampers, voltage multipliers, half wave & full wave rectification, Special purpose diodes - Zener diode, Varactor, light emitting diodes, Laser diodes.

2. **Bipolar Junction Transistors (BJT)**: Transistor fundamentals, transistor configurations, DC operating point, BJT characteristics & parameters, fixed bias, emitter bias with and without emitter resistance, analysis of above circuits and their design, variation of operating point and its stability.

3. **Field-Effect Transistors (FET)**: JFET- current-voltage characteristics, effects in real devices, high-frequency and high-speed issues.

5. Feedback & Oscillator Circuits: Effect of positive and negative feedbacks, basic feedback topologies & their properties, Analysis of practical feedback amplifiers, Sinusodial Oscillators (RC, LC and Crystal), Multivibrators, The 555 timer.

Syllabus for Digital Electronics

7. **Number Systems:** Decimal, binary, octal, hexadecimal number system and conversion, binary weighted codes, signed numbers, 1s and 2s complement codes, Binary arithmetic

8. **Boolean Algebra:** Binary logic functions, Boolean laws, truth tables, associative and distributive properties, DeMorgans theorems, realization of switching functions using logic gates

9. **Combinational Logic:** Switching equations, canonical logic forms, sum of product & product of sums, Karnaugh maps, two, three and four variable Karnaugh maps, simplification of expressions, Quine-McCluskey minimization technique, mixed logic combinational circuits, multiple output functions.

10. **Analysis & design of Combinational Logic:** Introduction to combinational circuits, code conversions, decoder, encoder, priority encoder, multiplexers as function generators, binary adder, subtractor, BCD adder, Binary comparator, arithmetic logic units
11. Sequential Logic: Sequential circuits, flip-flops, clocked and edge triggered flipflops, timing specifications, asynchronous and synchronous counters, counter design with state equations, Registers, serial in serial out shift registers, tristate register, timing considerations.


13. Programmable Logic: Programmable logic devices, programmable read only memory, programmable logic arrays and programmable array logic, Design using PLA, field programmable gate arrays.

14. Digital integrated circuits: Logic levels, propagation delay time, power dissipation fan-out and fan-in, noise margin, logic families and their characteristics TTL, LSTTL CMOS and ECL integrated circuits and their performance comparison, open collector and tristate gates and buffers.
**Texts:**


**References:**


Lecture Schedule

Room No: 4212

Lectures:
Monday: 10:00 - 10:55 Hrs
Tuesday: 11:00 - 11:55 Hrs
Friday: 09:00 - 09:55 Hrs

Tutorial:
Thursday: 8.00 - 8.55 Hrs
Evaluation Strategy

Grading will be based on the following:

Random Quiz's - 5 (10 marks)
Best of three will be counted

Informed Quiz - 2 (10 marks each)

Mid semester examination (30 marks)
End semester examination (40 marks)

Minimum 75% attendance compulsory (institutional requirement: your attendance is your responsibility!)