

# Proposed Syllabus

2008-09

## 'Electronics' Syllabus Session 2007-08

### B.Sc. Part-I

#### **Paper- I (Analog Electronics)**

##### **1- Introduction to Semiconductors:**

No. of Lectures

6

Energy band diagram for conductor, semiconductor and insulator, intrinsic and extrinsic semiconductors, n-type and p-type semiconductors.

##### **2- Junction Diodes:**

6

PN junction diode, Depletion layer, Barrier potential, Forward and reverse bias characteristics, storage and transition capacitances, Zener diode, Varactor diode, Photo diode, LED, LCD. Half-wave and Full-wave Rectifiers and Filters.

##### **3- Bipolar Junction Transistor:**

6

Construction and working of transistor characteristics, basic configurations and biasing, h-parameters, Photo-transistor.

##### **4- Amplifiers:**

10

CB, CE and CC Amplifiers, characteristics, load line, operating point, thermal runaway, biasing for stabilization of operating point, different terms such as signal, source, input, output, voltage gain, current gain, power gain, input impedance and output impedance, Amplifier classifications, RC coupled common-emitter amplifier, Feedback in amplifiers, effect of negative feedback on amplifier performance, cascading of stages.

##### **5- JFET and MOSFET:**

6

Principle of operation, Characteristics, n-channel and p-channel FETs, pinch-off voltage, Depletion and Enhancement modes of operation, MOS switch and CMOS switch.

##### **6- Oscillator:**

6

Positive feedback, Barkhausen Criteria, Phase shift Oscillator, Wein bridge oscillator, Hartley and Colpitts oscillators, crystal oscillator - Circuits, working (expression only) and applications.

##### **7- Power supplies:**

8

Need for regulation, Zener regulated power supply, series and shunt regulated power supplies, three terminal ICs power supply, line and load regulation, block diagram of IC 723, Switching mode power supply (SMPS) - design principle and application.

#### **Paper-II (Digital Electronics)**

##### **1- Number System and Codes:**

No. of Lectures

6

Decimal, Binary, Octal, Hexadecimal number systems and their Interconversions One's complement two's complement, Binary addition, Subtraction, Multiplication and Division, BCD, Excess-3, Gray and ASCII codes.

##### **2- Logic Gates:**

4

Positive and negative logic, AND, OR, NOT, NAND, NOR, EX-OR and EX-NOR gates, Universal gates, Symbols and truth tables, Venn diagrams.

##### **3- Boolean Algebra:**

10

Laws and theorems of Boolean Algebra, De-Morgan's Theorems, Standard SOP and POS simplifications, Equivalence between AND-OR and NAND-NAND networks, Equivalence between OR- AND and NOR-NOR networks, K-map, Simplification by K-map technique.

##### **4- Logic Families:**

8

RTL, DTL, TTL and CMOS parameters like power dissipation, Speed, Supply requirements. Logic levels, Fan-in, Fan-out, Noise margin, Noise immunity and I/O characteristics.

##### **5- Combinational logic circuits:**

10

Half adder, Full adder, Half subtractor and Full subtractor, Binary adders, BCD adders, Two's complement adder and subtractor, Parallel and Serial adders, Encoders, Decoders, 7 segment decoder and display, LCD display, Alphanumeric display, Multiplexers and Demultiplexers.

##### **6- Sequential Circuits:**

8

S-R, J-K, MS-JK, D and T type Flip-Flops, Registers and Counters (Data register, Shift register, Synchronous and Asynchronous counters, Ring counter, Twisted ring counter, Ripple counter, up and down counter, Decade counter, Non-sequential counter).

##### **7- A/D and D/A Converter:**

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Basic D/A converter, R-2R ladder method, A/D converter, comparator method.

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**Paper-III**  
**(Electronic Components and Circuits)**

No. of Lectures

**1- Resistors, Capacitors and Inductors:**

6

Symbols and colour codes, Carbon, Metal-film and wire wound resistors, linear and logarithmic potentiometers, Thermistors, Al<sub>N</sub>, Paper, Mica, Polystyrene, Electrolytic and Tantalum capacitors, Equivalent circuit, Charging and discharging curves, Time constant, Air core, Iron core and ferrite core inductors, Choking coil, Frequency response of inductors, Coupling.

**2-Transformer and relays:**

6

Principle, Construction and working, Single phase, Auto mains and isolation transformers, Frequency dependence of audio, IF and RF transformers, Design of mains transformers. Reed and electromagnetic relays and their specification, Rating and application areas.

**3- Filters and attenuators:**

10

Filters- Circuits, Working principle, Ideal and approximate frequency response of High pass, Low pass, Band pass and band rejection filters. T and  $\pi$  section filters and their equivalence, Cut-off frequencies and their expressions, Characteristic impedance, Practical determination of input and output impedance, Elementary idea of active filters, Attenuators-principle, circuit, L-section, T and  $\pi$ -section attenuators, Attenuation factor, Design of an L type attenuator for a given load resistance and given attenuation.

**4- Network Theorems:**

6

Kirchoffs current and voltage laws, Maximum power transfer theorem, Thevenin, and Norton theorems, superposition and reciprocity theorems.

**5- Tuned Circuits:**

6

Series and parallel RLC circuits, Resonance, Spectral response, Resonant frequency, Q- factor, Few typical applications of tuned circuits in electronics.

**6-Waveshaping Circuits:**

6

Integration and differentiation using RC circuits, Clippers: Negative, Positive and combinational clipping, Clampers: Negative and Positive clampers.

**7- Operational amplifier and its applications:**

10

Characteristics of an ideal OP-amp, Equivalent circuit, Inverting and non-inverting inputs, Virtual ground, Parameters such as input impedance, Output impedance, Open loop gain, Differential gain, Common mode gain, CMRR, Offset voltage, Offset null, Slew rate, Input offset current, Input bias current, Frequency response of an Op-amp, Inverting and non-inverting amplifiers, Summing and Difference amplifiers, Voltage follower, Comparator, Linear Integrator and differentiator. Schmidt trigger.

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Paper III

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