

TEACHING & EXAMINATION SCHEME
For the Examination – 2015
ELECTRONICS

B.Sc. Part - I

THEORY

			Pd/W (45mts.)	Exam. Hours	Max. Marks 150
Elec. 101	Paper I	Circuit Elements and Networks	2	3	50
Elec. 102	Paper II	Semiconductor Devices	2	3	50
Elec. 103	Paper III	Thermionic Devices and measuring Instruments	2	3	50
PRACTICAL			6	5	75
Total					225

B.Sc. Part -I

PAPER I

CIRCUIT ELEMENTS AND NETWORKS

Note: The question paper for the examination will be divided in three parts i.e., Section – A, Section – B and Section – C.

Section – A: Will consist of 10 compulsory questions. There will be two questions from each unit and answer of each question shall be limited upto 30 words. Each question will carry 1 mark.

Section – B: Will consist of 10 questions. Two questions from each unit will be set and students will answer one question from each Unit. Answer of each question shall be limited upto 250 words. Each question carry 3.5 marks.

Section – C: Will consist of total 05 questions. The paper setter will set one question from each Unit and students will answer any 03 questions and answer of each question shall be limited upto 500 words. Each question will carry 7.5 marks.

UNIT 1:

Circuit elements: Types of resistors and their rating, inductance, types of inductors, mutual – inductance, transformer principle, types of transformers, capacitance, types of capacitors, LR, RC and RLC circuits, phasor diagrams, series and parallel resonance circuits, Quality factor.

UNIT 2 :

Networks analysis I : Kirchoff's Laws, superposition theorem, Thevenin's theorem, voltage source equivalent circuit, Norton's theorem, current source equivalent circuit, maximum power transfer theorem.

Unit 3:

Network analysis II : Network definitions, mesh and node circuit analysis, reduction of a complicated circuit into T and π equivalents, conversion between T and π configurations.

UNIT 4 :

Coupled circuits : Coupled circuits and impedance transformation, inductive coupled circuits, equivalent circuits for transformer, tuned coupled circuits, two terminal pair networks, ladder network and characteristics impedance.

UNIT 5 :

Filters: Characteristics impedance of symmetrical T and π networks, constant – k type low, high, band pass and band elimination filters, cascading of filters, attenuators.

PAPERS II SEMICONDUCTOR DEVICES

Note: The question paper for the examination will be divided in three parts i.e., Section – A, Section – B and Section – C.

Section – A: Will consist of 10 compulsory questions. There will be two questions from each unit and answer of each question shall be limited upto 30 words. Each question will carry 1 mark.

Section – B: Will consist of 10 questions. Two questions from each unit will be set and students will answer one question from each Unit. Answer of each question shall be limited upto 250 words. Each question carry 3.5 marks.

Section – C: Will consist of total 05 questions. The paper setter will set one question from each Unit and students will answer any 03 questions and answer of each question shall be limited upto 500 words. Each question will carry 7.5 marks.

UNIT 1 :

Semiconductors: Energy bands in metals, insulators and semiconductors, intrinsic semiconductors, mobility and conductivity, extrinsic semiconductors - n type and p type, carrier concentration, conductivity, Fermi levels, Hall effect, generation and recombination of carriers, life time, photoconductivity, diffusion, continuity equation.

UNIT 2 :

Semiconductor diodes :Space charge region and potential barrier, Current - voltage equation, forward and reverse bias characteristics, d.c. and a.c resistance, Space Charge and diffusion capacitances, varactor diode, Zener diode, tunnel diode and their characteristics, metal- semiconductor contact

UNIT 3 :

Transistor characteristics: Bipolar junction transistors, NPN and PNP transistors and their characteristics in CB, CE and CC configurations, α , β and hybrid parameters, simple CE amplifier and its graphical analysis, fabrication of IC components.

UNIT 4:

Field effect transistors: Junction field effect transistors (JFET) and MOSFET and their characteristics, comparison between p channel and n channel MOSFET, Comparison between BJT and FETs, Silicon controlled rectifier (SCR), Diac, Triac and UJT and their characteristics.

UNIT 5:

Optoelectronics devices : Photoconductivity cells, PN photodiodes, PIN photodiodes, Avalanche photodiode, simple applications of photodiodes, optocoupler, photovoltaic effect, solar cell, LED and Phototransistors, basic concept of laser, semiconductor lasers and LCD.

PAPERS III

THERMIONIC DEVICES AND MEASURING INSTRUMENTS

Note: The question paper for the examination will be divided in three parts i.e., Section – A, Section – B and Section – C.

Section – A: Will consist of 10 compulsory questions. There will be two questions from each unit and answer of each question shall be limited upto 30 words. Each question will carry 1 mark.

Section – B: Will consist of 10 questions. Two questions from each unit will be set and students will answer one question from each Unit. Answer of each question shall be limited upto 250 words. Each question carry 3.5 marks.

Section – C: Will consist of total 05 questions. The paper setter will set one question from each Unit and students will answer any 03 questions and answer of each question shall be limited upto 500 words. Each question will carry 7.5 marks.

UNIT 1 :

Thermionic emissions : types of cathode materials, vacuum diode and its characteristics, space charge, triode and its characteristics and parameters, tetrode, pentode and their characteristics, V-R tubes and thyatron.

UNIT 2 :

Cathode ray oscilloscope : Construction of CRT, deflection sensitivity of tube, block diagram of CRO, various controls and their operation, details of X and Y sections, horizontal sweep section, synchronization of sweep, triggered sweep, measurement of voltage, current, frequency and phase angle using CRO, basic idea about dual trace CRO.

UNIT 3 :

Power supplies : Half wave and full wave rectification, voltage regulation. Ripple factor, use of inductor, capacitor, L and π type filters, voltage regulation circuit using zener diode

UNIT 4 :

Measuring instruments I : D' Arsonval galvanometer, galvanometer sensitivity, D.C. ammeter, voltmeter, voltmeter sensitivity, d.c. multimeter rectifier type instruments, electro-dynamometer, wattmeter, transducers, variable resistance, piezoelectric and pyroelectric transducers

UNIT 5 :

Measuring instruments II : A.C. bridge, balance conditions, Comparison bridges, Maxwell bridge, Hay bridge, Schering bridge, Wien bridge, impedance bridges, Q-meter

Books Suggested :

Millman & Halkias : Integrated Electronics (TMH)

Grob : Basic Electronics Mcgraw Hill 1985

Mottershead : Electronics, Devices and Circuits PHI, 1984

Ryder : Networks, Lines and Fields PHI 1983

Helfrick & Cooper : Modern Electronic Instrumentation & Measurement Techniques, PHI.

EXPERIMENTS FOR PRACTICAL WORK

1. Design and study of constant voltage source
2. Design and study of constant current source
3. Construction of DC Multimeter
4. Construction of AC Multimeter
5. Measurement of impedance by impedance bridge
6. Frequency response of series resonance circuits
7. Frequency response of parallel resonance circuits
8. Semiconductor Diode Characteristics
9. Zener Diode Characteristics
10. Transistor characteristics in CB mode
11. Transistor characteristics in CE mode
12. FET Characteristics
13. Single Stage BJT amplifier
14. Photocell characteristics
15. Maximum power transfer from source to load using reactive circuit
16. Single Stage Triode amplifier
17. UJT Characteristics
18. Voltage regulation by Zener Diode
19. Phase diagram and phase angles of RC circuits using CRO.
20. Characteristics of Thyatron
21. Characteristics of triode
22. Single stage FET amplifier.
23. DIAC characteristics.