

12. ELECTRONICS

Scheme :

Min Pass. Marks : 36

Max. Marks-100

Paper-I	3 hrs.	33
Paper-II	3 hrs.	33
Paper III	3 hrs.	34
Practical Min. Pass. Marks: 18	5 hrs.	50

Paper-I-Communication and Radio Electronics

Note: The paper will be divided into five units. Two questions will be set from each unit. Five questions are required to be attempted in all. The candidate is required to attempt one question from each unit.
Max.Marks : 33 Time: 3 hrs.

Unit-1

Modulation

Need of a carrier frequency, AM, FM, PM, AM side bands, power consideration, Collector and base modulations, SSB transmission FM by reactance variation using Semiconductor devices. The Armstrong FM system. Block diagram of AM and FM transmitters: Merits of FM transmission over AM transmission.

Unit-2

Demodulation:

Demodulation of AM signals, Square law demodulation. Linear envelope detection AGC demodulation of FM signals. Amplitude limiter: Foster seeley frequency discriminator and ratio detector.

Unit-3

Transmission lines and Associated distributive parameters

Propagation of voltage and current waves on the line (Differential equations and their solution). Characteristic impedance. Propagation constant and losses, Reflection coefficient, Standing wave ratio (SWR), resonant $\lambda/4$ and $\lambda/2$ lines

Unit-4

Impedence matching and Radiation of EM Waves

Single stub matching, Smith chart and its uses. Elementary idea of transmission of microwave signal and wave guides. Dipole antenna Radiation resistance and directivity of an antenna. Radiation from a quarter wave monopole or half wave dipole linear arrays. Propagation of EM wave in space. Types of wave propagation through ionosphere, Critical angle ground wave range. Skip distance and skip zone. Different layers in ionosphere

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Unit-5

Radio Receivers and Tape Recorders

AM radio receiving systems. Superheterodyne, FM receivers and their measurements. Stereo transmission and reception. Characteristics of various types of recording tapes. Recording head, Principles of recording playback and erasing tape transport system Hi-Fi and stereophony recording tune-table.

Reference Books suggested

1. Gordon J. King, The Hi-Fi and taperecorder handbook. N Butter-worths, London.
2. G.K. Mithal-Elements of Electronics, Khanna Publishers, Delhi.
3. Handbook of Electronics by Kumar & Gupta-Pragati Prakashan, Meerut.
4. Electromagnetic waves and radiative systems-E.L. Jordan.
5. Electron tube circuits-Sammuel Seeley.

Paper-II : Television Electronics .

Note : The paper will be divided into five units. Two questions will be set from each unit. Five questions are required to be attempted in all. The candidate is required to attempt one question from each unit.

Max. Marks-33

Time : 3 Hrs.

Unit-1

Picture scanning, Broadcast channels, Frequency band and resolution, camera tubes, Block diagram of transmitter and explanation of each block, colour transmission.

Television receiver : Scanning sequence and interlacing, synchronization and blanking.

Unit-2

Block diagram of colour and monochrome receivers and explanation of each block.

Sound system, Transient response of TV receivers.

Mosaic, Exhaust and activation schedule performance tests. Theory of operation, characteristics of the Mosaic, potential distribution of the mosaic. The Mosaic under the influence of a height in age. The formation of the video signal. Line sensitivity.

Black spot performance of the Iconoscope. Limiting sensitivity.

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Syllabus : B.Sc. Part-III

Depth of focus. Pick-ups for motion picture films. The type RCA.
iconoscope.
Limiting sensitivity of pick-up devices. The two sided target.
Low velocity scanning. The orthicon. The image iconoscope multi-
stage. Image multiplier pick-up tubes, signal multiplication image
orthicon. Performance of the image orthicon.

Unit-4

The Isocon. Photoconductive pick-up tubes. The storage tube.
The monoscope. Conclusion.
Requirement of the Kinescope. Construction of the Kinescope
bulbs, round glass tubes, metal tube-bulbs, rectangular tubes. The
electron gun. The fluorescent. Screening procedure. Metal backing
of Kinescope screens. Processing of the Kinescope. Tests and per-
formance. Contrasts. Direct view Kinescope. Projection Kinescope.

Unit-5

Colour signals. Colour addition. Definition of colour TV sig-
nals. I, R- Y. and GY signal, desaturated colours, the transmitted
chrominance signal. Matrix circuits. Colour subcarrier frequency.
Colour synchronization. Colour pleased composite video signal wave-
forms. Vector addition of colour signals. Colour picture-tubes.

Reference Books suggested

1. M. Glasford : Fundamentals of television engineering.
2. M. Kive-Television simplified 6th edition.
3. B. Goobi-Basic television principles and servicing.

Paper-III-Electronic Instruments and Measurements.

Note : The paper will be divided into five units. Two questions will
be set from each unit. Five questions are required to be attempted in
all. The candidate is required to attempt one question from each unit.
Max. Marks : 34 Time : 3 hrs.

Unit-1

Measuring and test instruments, Fabrication Technique

AC Voltmeter, ammeter, Ohm meter (Shunt and series type).
Multimeter, Analog and digital voltmeter, Watt meter, Frequency
meter, Q meter, C.R.O. as test instrument.

Fabrication of PN Junction Diode, PNP transistor, Fabrication
of an I.C. transistor. Equivalent circuit, integrated diode. Inte-
grated capacitor, junction capacitor, thin film capacitor. Inte-
grated resistor, Thin film resistor. Three pin regulators. Timing
concept and timer 555.

Unit-2

Power Electronics

Silicon controlled rectifier (SCR), working of SCR, Equivalent circuit of SCR, V-I characteristic of SCR, SCR Half wave and full wave rectifier. Applications of SCR. The triac, Triac construction and operation, Triac characteristics, Application of Triac, The Diac, Application of Diac, Unijunction Transistor (UJT), Equivalent circuit of UJT, Characteristics of UJT, Application of UJT.

Unit-3

Tape Recorder:

Mechanism of Recording, various head of the tape recorder, Record/Play back head, Erase head, High frequency erase head, low frequency erase, Bulk erase, Practical Tape recorder, Tape machines, Fault finding in the tape recorder, Care and maintenance.

Unit-4

Transducer

Classification, Strain gauge, Displacement transducers, capacitive transducers, Photoelectric, Piezoelectric and temperature transducers, Self generating Inductive Transducer, Linear variable Differential Transformer (LVDT),

Unit-5

Thermal and optical transducer

Resistance thermometer: Thermocouple, thermistors and their applications.

Optical transducers—Vacuum phototube, Gasfilled phototube, Photomultiplier tube, Photoconductive cell, Photovoltaic Cell. Various Types of Microphones.

Reference Books Suggested

1. Electronic Circuits—Discrete and Integrated, Shilling and Belon, McGraw Hill.
2. J. Glaser and J. Subak Sharpe, Integrated Circuit Engineering Addison Westley 1978.
3. Principle of Electronics, V.K. Mehta.
4. Basic Electronics & Solid State, B.L. Theraja.
5. Radio & Television, D.G. Goyal and S.K. Mukherjee.

Syllabus : B.Sc. Part-III

Experiments For Practical Work

Note : A candidate has to perform at least sixteen experiments including eight experiments from each section 'A' and 'B'. In practical examination, the candidate will be required to perform two experiments : one from section 'A' and the other from section 'B'. The distribution of Marks will be as follows -

Time duration-5:00 hrs Expts. (Two)-30 (15 for each expt.) marks	
Viva Voce	10 marks
Practical record	10 Marks
Total	50 marks.
	Max. Marks-50

Section-A

1. To design and study free running multivibrator (transistorised) of given frequencies.
2. To design active band pass filter of given cut off frequencies and study its frequency response.
3. To study regulated power supply using a Zener diode and an electronic SCR voltage regulator.
4. To design and study thyatron sawtooth wave generation.
5. To design and study single stage RC coupled transistor amplifier of given cutoff frequencies and mid frequency gain.
6. To design and study UJT sweep circuit.
7. To design and study Hartley oscillator (transistorised) of given frequencies.
8. To design and study pulse coincidence circuit using ICs.
9. To design and study a precision timer circuit using IC 555 chip.
10. To design and study clipping and clamping circuits.

Section-B

1. To study binary adder and subtractor.
2. To study AM signals.
3. To study Darlington pair.
4. To study fourier analysis of square and clipped sine wave.
5. To study Variable reactance modulator.
6. To find out CMRR of differential amplifier.
7. To study the characteristics of SCR.
8. To design and study a precision linear gate using operational amplifier and FET.
9. To find out solutions of simple problems using analog computer.
10. To design and study voltage comparator using operational amplifier.