INDIRA TECHNICAL INSTITUTE EDUCATION SOCIETY NASHIK

CERTIFICATE COURSE
AUDIO RADIO SERVICING [ARS]

EXAM SCHEME: **THEORY PAPER 100 MARKS – 3 HRS.**
PRACTICAL 100 MARKS – 2 HRS.

[ARS / DEES (ER) – I / DETES - I]

THEORY SYLLABUS

1) BASIC ELECTRONICS: -

a) Concept of AC & DC.
b) C Theory : Peak to Peak, RMS and Average value. Phase and Wavelength. Power factors derivation for XL, XC (study of mathematical formulas, no calculations required)
c) Concept of open and short circuit.
d) HM's Law, Current, Voltage and Resistance relations, Power unit, Power consumption, Simple calculations.

2) ELECTRONIC COMPONENTS & SYMBOLS: -

A) Resistors: -

a) Types of resistors & their ratings: -
Fixed Value: - Carbon, Metal Film, Wire Wound.
Variable: - Carbon, Wire Wound (LOG & LINEAR Controls)
b) Colour code: - Fixed as well as Preset colour code values.
c) Testing of resistors.
d) Use of resistors.
e) Series & Parallel connection of resistors. Simple calculations for series, parallel & series-parallel Combination.
f) Special types of resistors (Symbols, functions & use only) PTC & NTC Thermister, Fuseable Resistor, LDR, VDR.

B) Condenser / Capacitor: -

a) Types of Capacitor & function: -
Fixed Value: - Paper , Polyester, Ceramic, Mica, Styroflex, Tantalum Etc.
Semi variable: - Trimmer. Variable: - Ganged
Electrolytic capacitors.
b) Colour code: - Values, Working Voltage, Tolerance and Temperature co-efficient of Electrostatic capacitors.
c) Number code system.
d) Testing of capacitors.
e) Use of capacitors.
f) Series & Parallel combination of capacitors.

C) Inductors & Transformers: -

a) Definition of self-inductance & mutual inductance.
b) Types of Transformers and their uses.
c) Testing of Transformer & their uses.

D) Loudspeakers & Microphones: -

a) Working principle of a loudspeaker.
b) Construction of a P.M. loudspeaker.
c) Woofers, Midrange / Squawkers and Tweeters.
d) Specification of loudspeaker. (Impendence & Power rating)
e) Testing of loudspeaker.
f) Cross over networks.
g) Different types of microphones and its construction. (Condenser, Crystal & Dynamic microphones)

E) Semiconductors: -

a) Electrical properties of conductors, semiconductors and insulators.
b) **Semiconductor:**
Definition : metals suitable for formation of P-type semiconductor and formation of N-type semiconductor, Types of impurities used for doping N-type and P-type semiconductor. Majority and minority charge carriers.
c) **Diode:**
Junction diode, Point contact diode, Zenar diode, Light emitting diode. Symbol's used for diode.
Forward & Reverse characteristic and properties of diode. Zenar diode reverse characteristic only.
d) **Transistor :**
Types of Transistor: - NPN, PNP. Germanium and silicon. Testing of transistor with help of multi-meter.
e) **Integrated circuits (ICs).**
Introduction, Types of ICs, Merits and Demerits of ICs.

3) POWER SUPPLY: -

a) Working of a Half wave, Full wave and Bridge rectifier.
b) Regulated power supply employing: -
1) Zenar diode, 2) Series pass Transistor, 3) ICs of 78 -- & 79 -- Series.
c) Simple RC filter circuit.

4) BASICS OF TRANSISTOR CIRCUITS: -

a) **Biasing of transistor**: -
Different types of biasing circuits used to bias the transistor. (Fix bias, Potential divider bias, Self bias, Temperature compensated bias) Merits and Demerits of bias circuits.
b) Thermal run-away of transistor. Working of Heat sink.
c) **Classes of amplifier:** -
Study and use of class A amplifier, Class B amplifier and Class C amplifier.
d) **Configuration of amplifier**: -
Study of common base amplifier, common emitter amplifier and common collector amplifier. Definition of Alpha (α) and Beta (β).
e) Study of single stage voltage / current amplifier.
f) **Types of signal couplings methods**: -
R-C coupling, L-C coupling, transformer coupling and direct coupling circuits used in transistor amplifier. Merits and demerits of each coupling circuit. Definition of Gain and Bandwidth.
g) **Signal feedback in the amplifier** :-
Need of signal feed back, +ve feed back & –ve feed back. There effects on the working of the amplifier.

5) AUDIO AMPLIFIER: -

a) Single Transformer & Transformer less push-pull out-put amplifier.
b) Driver and pre amplifier circuits (Full audio amplifier circuit).
c) Stereo amplifier circuits. (Discrete component's and IC circuits).
d) Intercom circuits and its servicing (one master & two slave).

e) Simple audio tape recorder circuits.
(Head pre amplifier and main amplifier with record - play back switch).
f) P.A. system (Block diagram).
g) IC audio amplifier circuit employing ICs: TBA 810, etc.

6) AUDIO EQUIPMENT: -

a) Principle of magnetic recoding. Eddy current and Hysterics losses. Magnetic tape, Tape coating material.
b) **Audio Heads**: - Working principle and construction of audio heads. Importance of head gap, Alignment & cores of Audio.
c) **Tape Mechanism**: - Study of different tape recorders & tape deck mechanisms.
d) **CD Player: -**
1) Block diagram of audio CD player. 2) Working of CD player mechanism.
3) Merits & demerits of CD. 4) Fault finding in CD player.

7) OSCILLATORS: -

Principle of oscillators. L-C oscillator, Hartley & Colppitt oscillators.

8) CONCEPT OF MODULATION / TRANSMISSION: -

a) Amplitude modulation (AM).
b) Frequency modulation (FM).
c) Block diagram of AM and FM transmitter.
d) Pulse modulation (PM).
e) Wave propagation (DSB, SSB).

9) SUPERHETRODYNE RECEIVER: -

a) Block diagram of super heterodyne (AM, FM mono/stereo & AM/FM) receiver with waveform.
b) Converter stage amplifier (Single band & Multi band).
c) Antenna (Ferrite, Loop & Telescope).
d) I.F. amplifier basic circuit.
e) Detector circuit, RF filters circuit.
f) AGC/AVC circuit.
g) Study of the equipment used in IF and RF alignment procedure.
h) Alignment procedure of IF and RF circuit.
i) Study of AM/FM receiver.
j) Advantages and disadvantages of FM receiver.
k) Study of FM mike.

10) FAULT FINDING PROCEDURE: -

Study of various test to locate the fault in given Tape recorder and Transistor receiver circuit.

GUIDELINES FOR QUESTION PAPER SETTERS - ARS / DEES (ER) – I / DETES – I

There will be total 6 Compulsory questions. Q 1 is objective question and asks on full syllabus.

			Marks
Q No.1	A)	Fill in the blanks.	(05)
	B)	Match the following.	(05)
	C)	Write short answer.(answers should not be more than 2 lines)	(10)
Q No.2	A)	Topic 2A, 2B & 2C.	(08)
	B)	Topic 2D & Topic 2E.	(08)
Q No.3	A)	Topic 4a. 4b, 4c.	(04)
	B)	Topic 4d, 4e, 4f, 4g.	(04)
	C)	Topic 6a, 6b, 6c.	(04)

	D)	Topic 6d.	(04)
Q No.4	A)	Topic 5.	(08)
	B)	Topic 9.	(08)
Q No.5	A)	Topic 1, 3 & 7.	(08)
	B)	Topic 8.	(08)
Q No.6	From the given circuit diagram & related to Topic No. 10.		
	A)	Topic No. 10.	(08)
	B)	Topic No. 10.	(08)

PRACTICAL EXAMINATION FOR: - ARS / DEES (ER) – I / DETES – I

Each candidate will have to locate three faults out of which one must be in audio equipments & two faults from radio receiver. Each fault will give 08 marks to locate fault and draw the circuits. 12 marks for write up. The write up indicate the logical method of located faults.

Journal / Term work 20 Marks.
(Journal should contain minimum 50 recommended experiments)
Oral examination 20 Marks.

RECOMMENDED BOOKS FOR REFERENCE

Basic Radio & Television	S.P. Sharma.
Fundamental of Electrical Engg. & Electronics	B.L. Theraja.
Servicing Transistor Radio	R.C.Vijay
Tape Recorder Servicing	R.C.Vijay
Basic Radio Vol. I,II & V.	Marvin Tapper
Modern CD Player	BPB