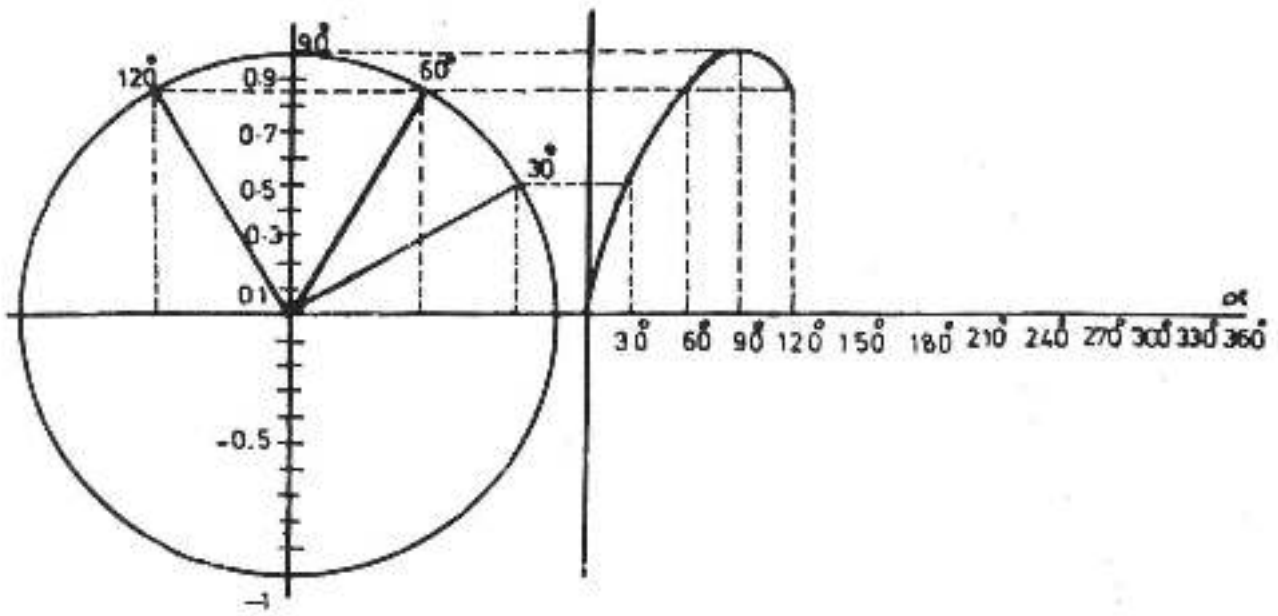
TECHNICAL DRAWING 1

Radio & Television



DEVELOPMENT CELL
FOR SKILLED LABOUR TRAINING
DIRECTORATE OF MANPOWER & TRAINING
GOVERNMENT OF PUNJAB
LAHORE

Price Rs. 15.00

T.T.P. Series No. 88

CONTENTS

Prepared and published by:-

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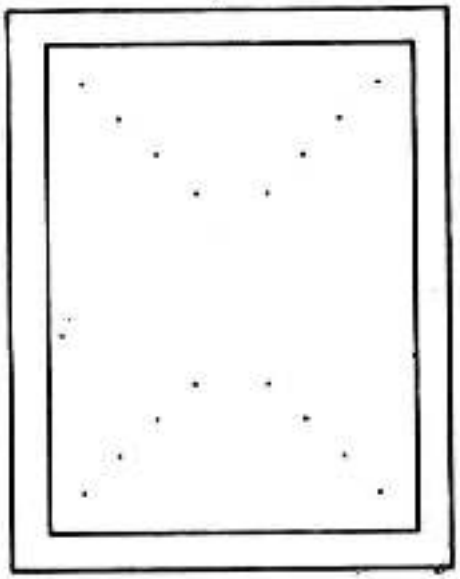
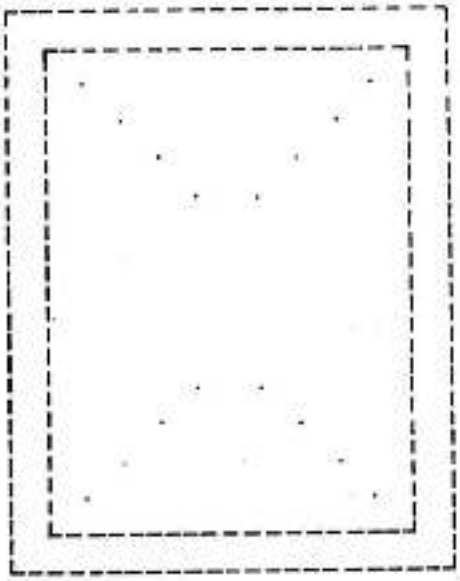
Visible outlines



Invisible outlines



Section lining

Centre lines

Thickness of Lines

o,5 mm: visible outlines
o,3 mm: invisible edges
o,2 mm: centre lines,
dimension lines

Drawing Instruments

pencil No. HB and H
ruler (30 cm, mm-scale)
square set (45° and 60°)
rubber, pencil sharpener

I	H
L	E
F	T
N	M
K	V
W	X
Y	Z
A	J
U	P
R	B
D	C
O	Q
G	S
1	7
4	0
6	9
2	5
3	8

PAK - GERMAN TECHNICAL TRAINING PROGRAMME

k	v
w	x
z	j
y	l
t	tt
f	r
n	h
m	u
c	a
d	q
g	o
p	b
e	s

Drawing No 2

Lettering Exercises

Standard : DIN 17

1st Semester

Material : St 37

Scale 1 : 2,5

Sketching from Models

	Name of symbol	Symbol
1	Simple Conductor	
2	Protective Wire	
3	Connection Point	
4	A.C Source	
5	A.C / D.C Source	
6	Battery With Polarity	
7	Galvanometer	
8	Ampere-meter	
9	Volt-meter	
10	Multi-meter	
11	Watt-meter	

GRAPHICAL SYMBOL FOR DIFFERENT DIAGRAMS

TECHNICAL DRG NO. 4

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Radio & T. V

	Name of symbol	Symbol
12	Fuse	
13	Momentary Contact Opner	
14	Momentary Contact Closer	
15	Single Pole Switch	
16	Double Pole Switch	
17	Lamp	
18	Socket	
19	Heater	
20	Contact Relay	
21	Bell	
22	Ground Connection Point	

	GRAPHICAL SYMBOLS FOR DIFFERENT DIAGRAM	TECHNICAL DRG. NO. 5
	DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME	Radio & T. V

	Name of Symbol	Symbol
1	Antenna	
2	Dipole Antenna	
3	Folded dipole Antenna	
4	Earth	
5	Wiring Connection Point (solder)	
6	Coaxial Cable	
7	Resistor	
8	Resistor with tap	
9	Variable resistance	
10	Voltage dependent resistor (V.D.R)	
11	Negative temperature Coefficient (N.T.C)	

SYMBOL FOR DIFFERENT COMPONENTS

TECHNICAL DRG. NO. 6

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Radio & T.V

	Name of Symbol	Symbol
12	Positive temperature coefficient (P.T.C)	
13	General Capacitor	
14	Trimmer	
15	Variable Capacitor	
16	Electrolyte Capacitor	
17	Inductor coil (General)	
18	Inductor with Iron core	
19	Magnet	
20	Auto transformer	
21	Insulated transformer	
22	Variable transformer	

	SYMBOL FOR DIFFERENT COMPONENTS	TECHNICAL DRG NO. 7
	DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME	Radio & T.V

	Name of Symbol	Symbol
23	Cathode	
24	Directly heated Cathode	
25	Indirectly heated Cathode	
26	Control gird	
27	Supressor gird	
28	Screen gird	
29	Diode	
30	Triode	
31	Tetrode	
32	Cathode ray tube (C R T)	
33	Pentode	

SYMBOL FOR DIFFERENT COMPONENTS

TECHNICAL DRG. NO. 8

	Name of Symbol	Symbol
34	Picture tube	
35	Diode (Semiconductor)	
36	Z. Diode	
37	Tunnel diode	
38	Capacitor diode	
39	Light emitting diode	
40	Photo diode	
41	P.N.P Transistor	
42	N.P.N Transistor	
43	Unijuction Transistor	
44	Field effect transistor P-channel N-channel	

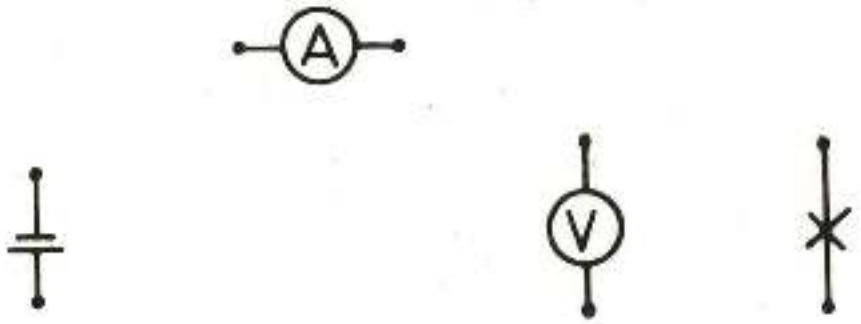
	SYMBOL FOR DIFFERENT COMPONENTS	TECNICAL DRG. NO. 9
	DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME	Radio & T. V

45	Photo cell	
46	Crystal	
47	Loud speaker	
48	Pick up (mono)	
49	Pick up (stereo)	
50	Electrodynamic pick up	
51	Magnetic head	
52	Recording head	
53	Play head	
54	Erasure head	
55	Combination of Recording and Play head	
56	Photo resistor	

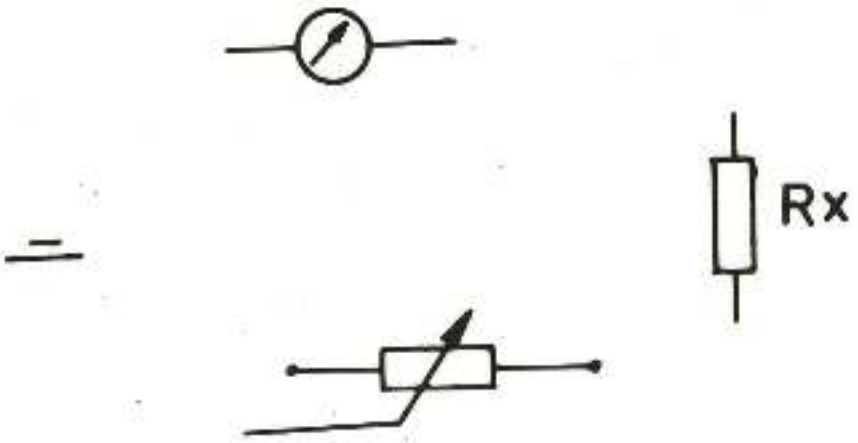
SYMBOL FOR DIFFERENT COMPONENTS

TECHNICAL DRG. NO. 10

COMPLETE THE GIVEN CIRCUIT DIAGRAM.

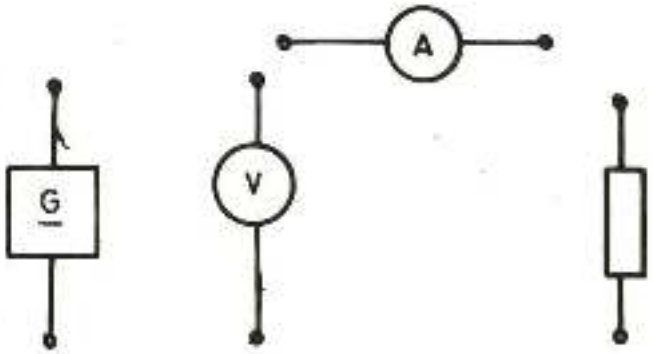


COMPLETE THE GIVEN CIRCUIT DIAGRAM OF OHM-METER.

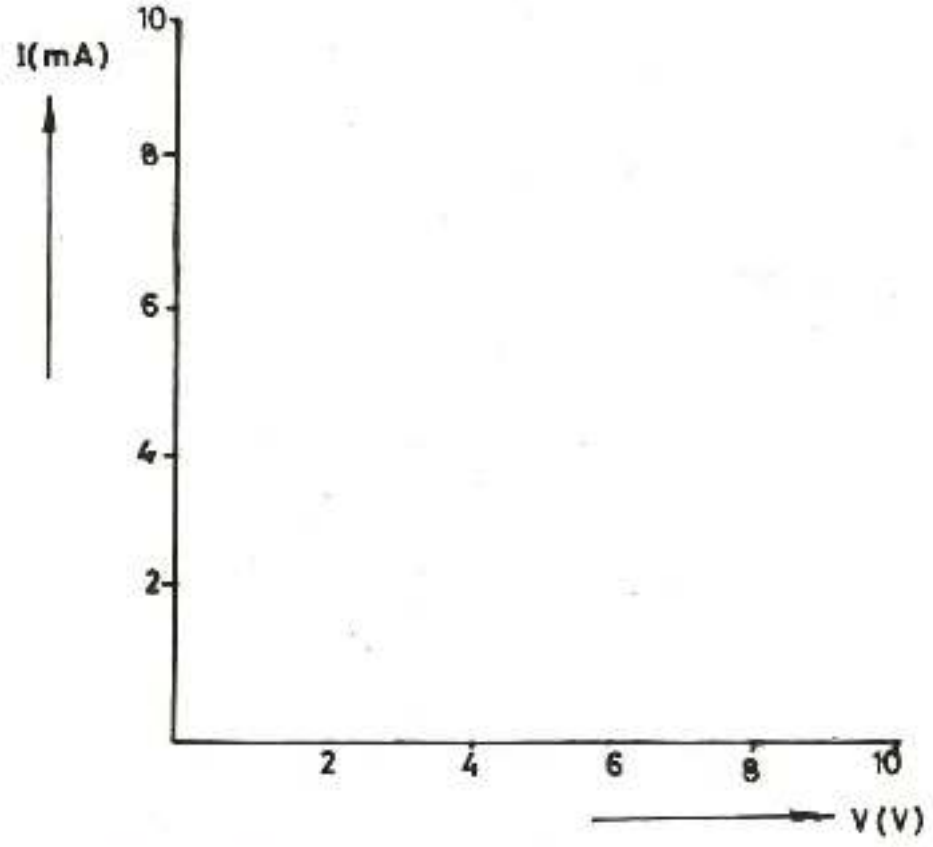


	METER CONNECTIONS	TECHNICAL DRG. NO. 11
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T.V

COMPLETE THE GIVEN CIRCUIT DIAGRAM.



DRAW THE GRAPH ACCORDING TO GIVEN VALUES.

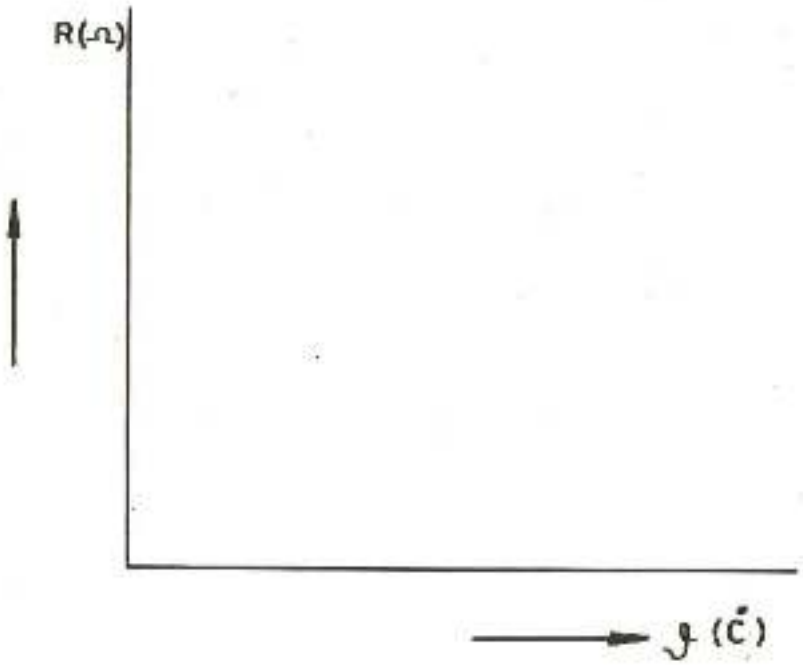


	OHM's LAW (DIAGRAM & GRAPH)	TECHNICAL DRG NO. 12
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T. V

TABLE

ϑ (C°)	22	25	30	35	40	45	50	55
NTC R (Ω)	995	930	787	656	536	448	376	319
PTC R(Ω)	80	83	92	108	135	189	323	644

DRAW THE GRAPH ACCORDING TO ABOVE TABLE'S VALUES



RESISTANCE & TEPERATURE

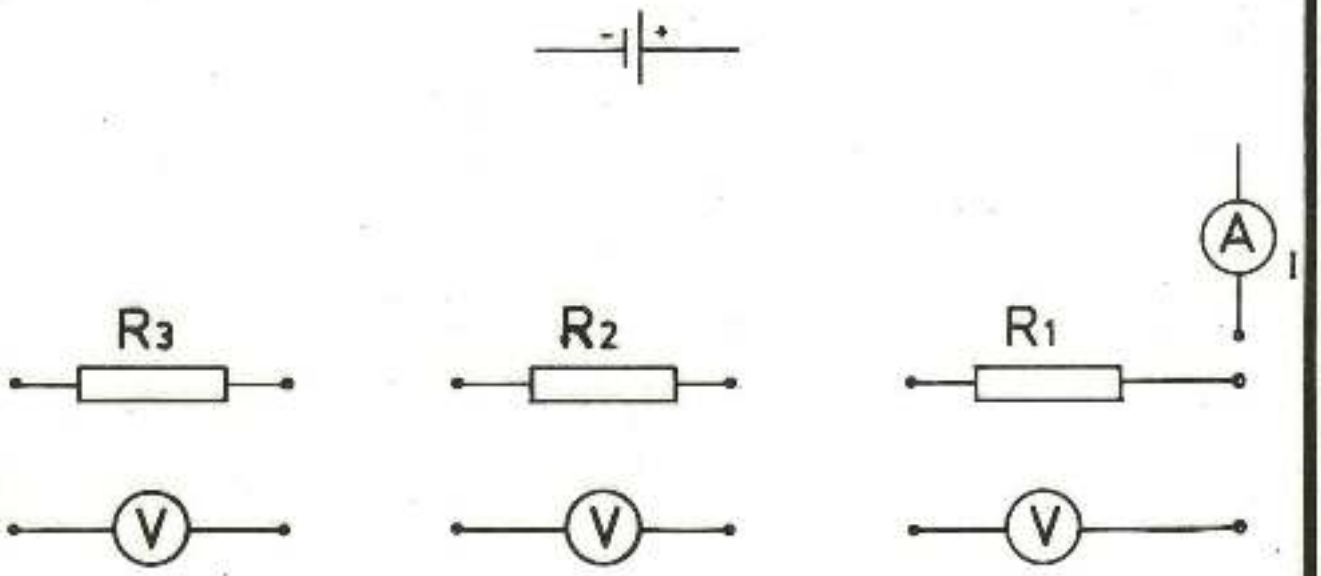
TECHNICAL DRG NO 13

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

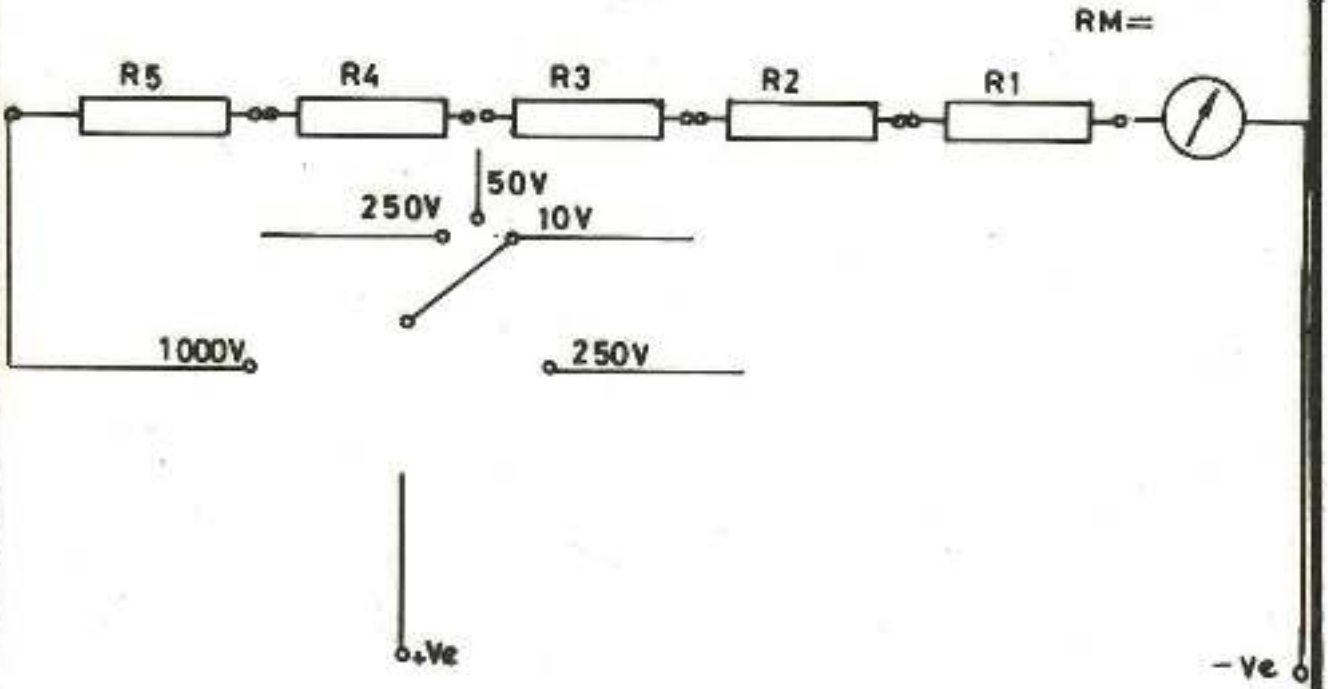
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Radio & T. V

COMPLETE THE GIVEN CIRCUIT DIAGRAM.



COMPLETE THE GIVEN CIRCUIT DIAGRAM



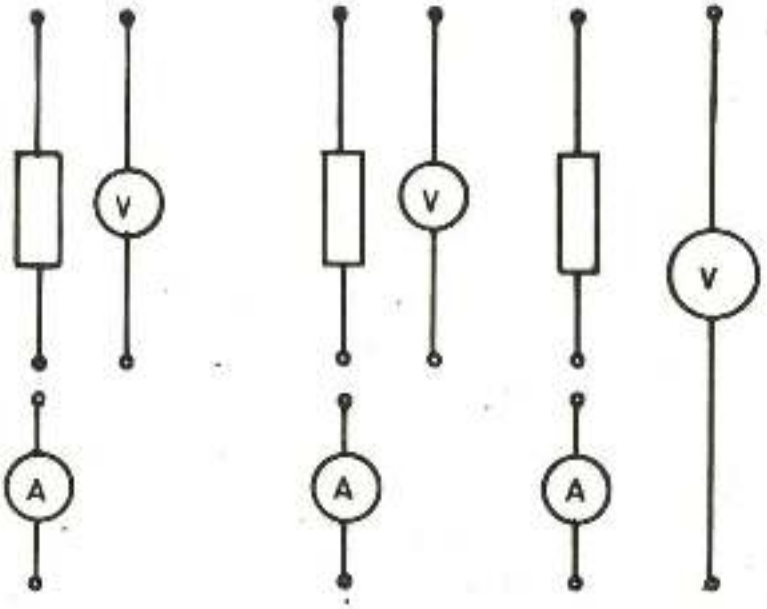
	SERIES CONNECTIONS	TECHNICAL DRG. NO. 14

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

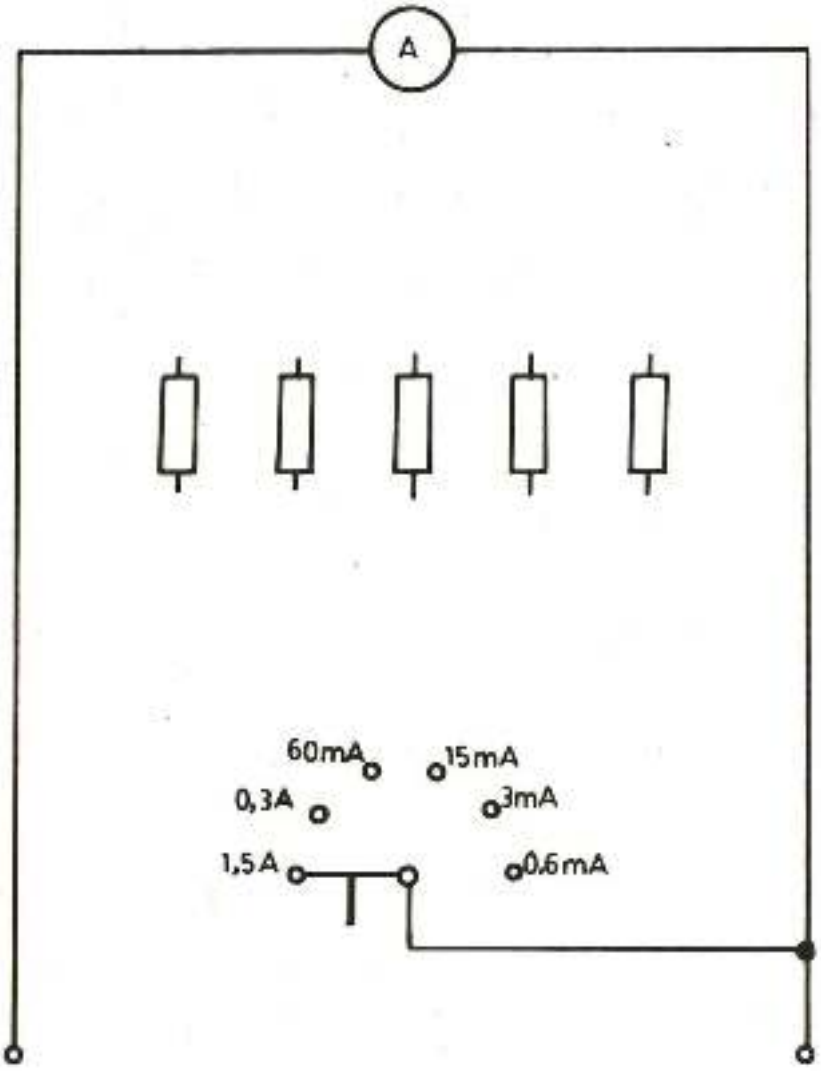
Radio & T.V

COMPLETE THE CIRCUIT DIAGRAM OF PARALLEL CONNECTIONS WITH VOLT AND AMPERE-METER.



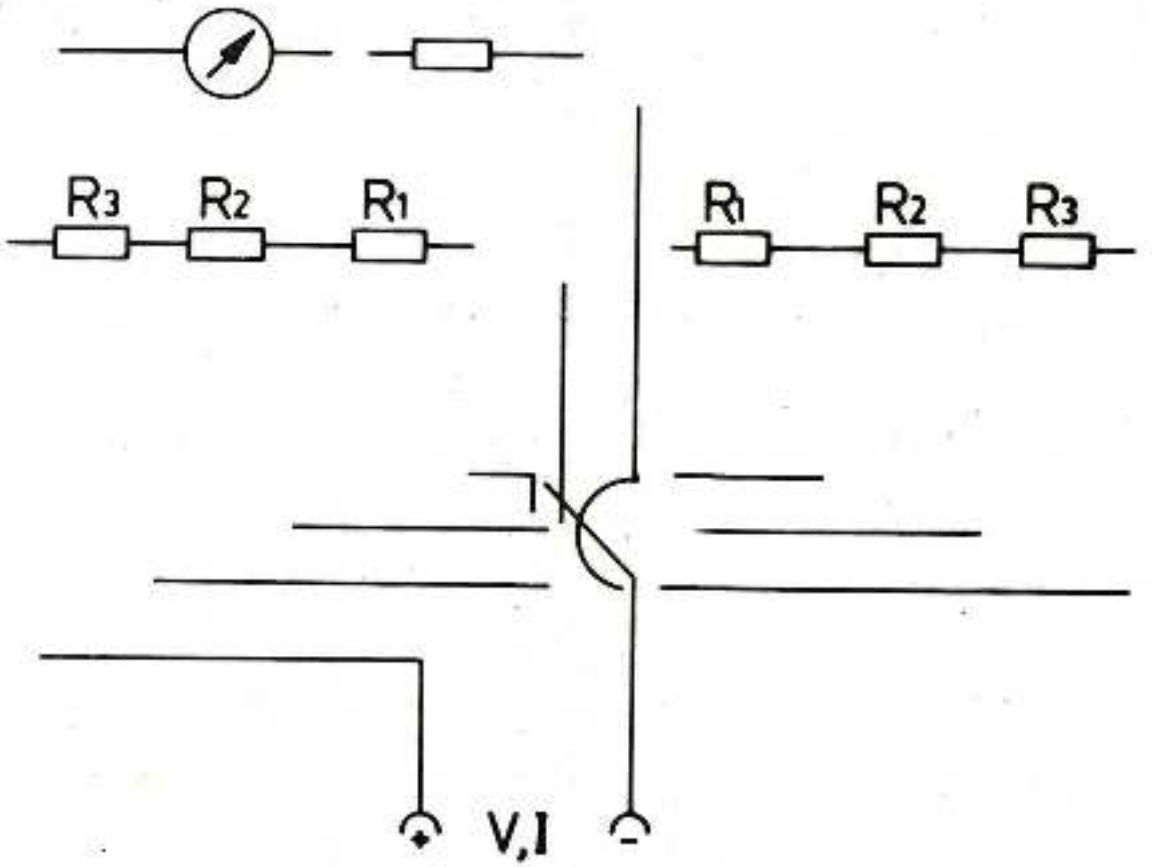
	PARALLEL CONNECTIONS	TECHNICAL DRG. NO. 15
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T.V

COMPLETE THE GIVEN CIRCUIT DIAGRAM OF MULTIRANGE AMPERE-METER.



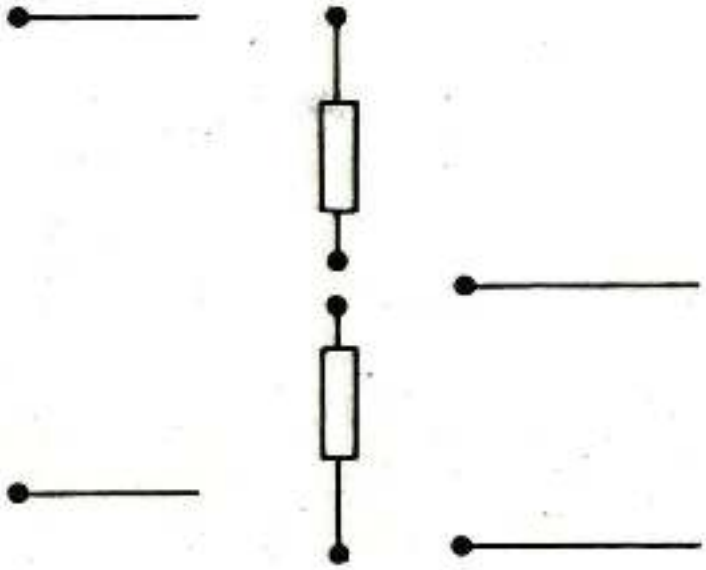
	MULTIRANGE AMPERE - METER	TECHNICAL DRG. NO. 16
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T. V

COMPLETE THE INTERNAL CONNECTIONS OF MULTIMETER.

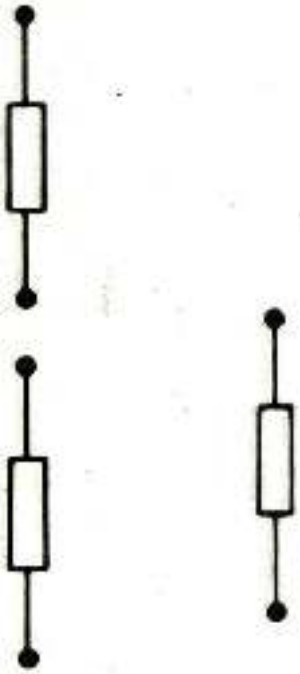


	INTERNAL CONNECTION OF MULTIMETER	TECHNICAL DRG. NO. 17
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING MAK-GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T. V

COMPLETE CONSTANT VOLTAGE DEVIDER.



COMPLETE THE CIRCUIT OF VARIABLE VOLTAGE DEVIDER.

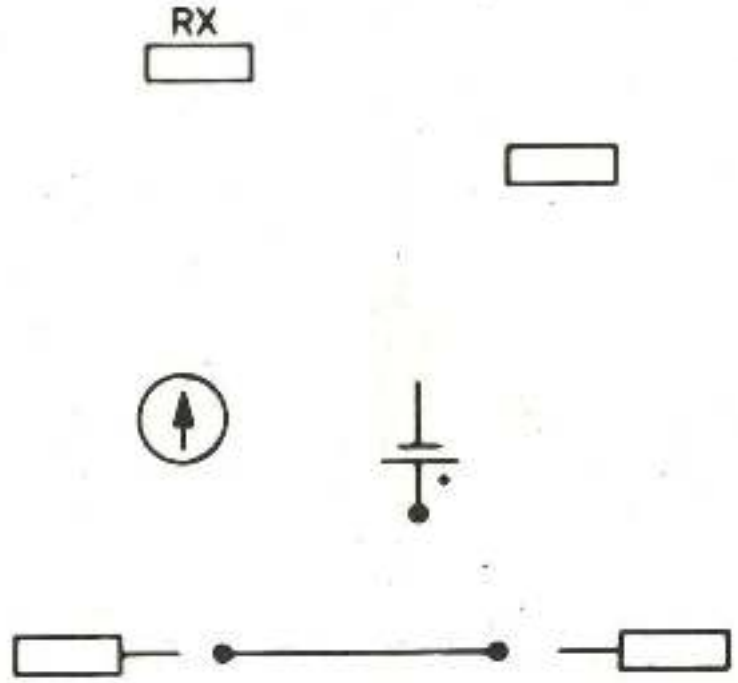


	VOLTAGE DEVIDER	TECHNICAL DRG. NO. 18
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T.V

DRAW THE VARIABLE VOLTAGE DEVIDER WITH LOAD.

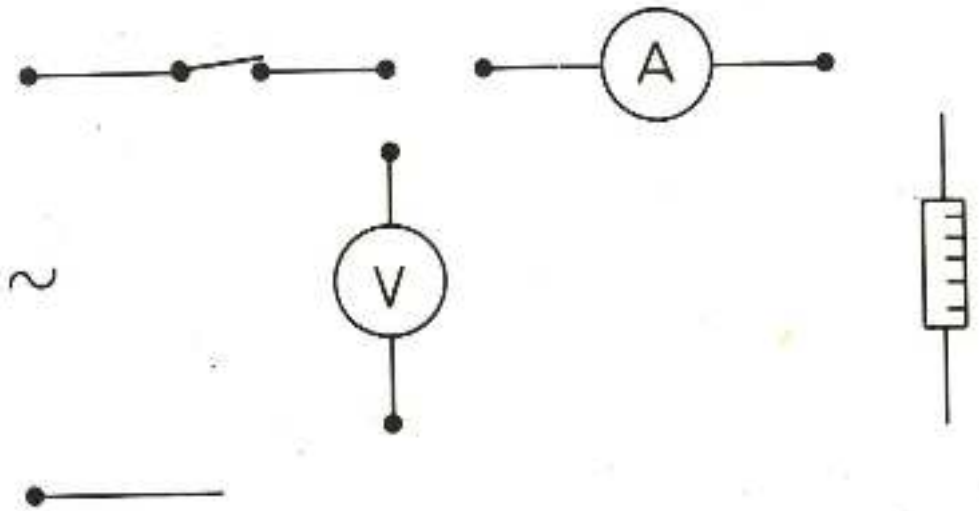
	VOLTAGE DEVIDER	TECHNICAL DRG NO. 19
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T.V

COMPLETE THE CIRCUIT DIAGRAM OF WHEATSTONE BRIDGE.



	BRIDGE CIRCUIT	TECHNICAL DRG NO. 20
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T.V

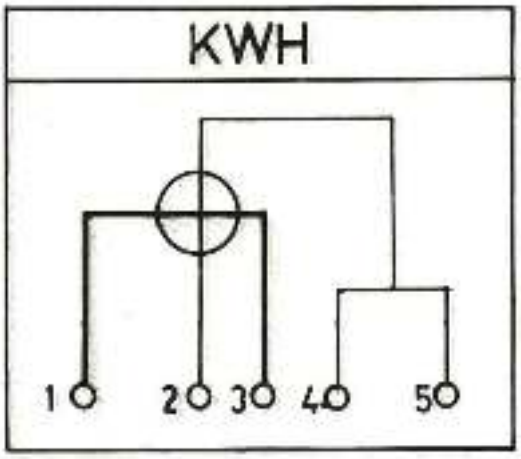
COMPLETE THE CIRCUIT DIAGRAM OF INDIRECT MEASUREMENT.

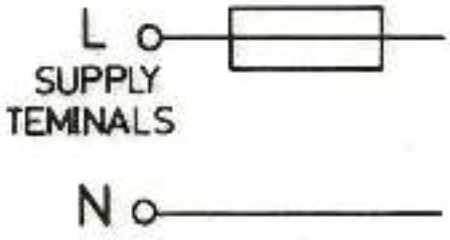


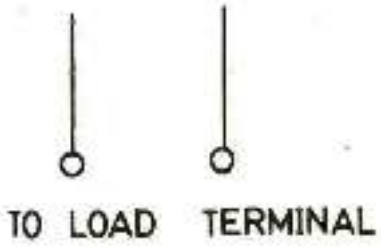
COMPLETE THE CIRCUIT DIAGRAM OF DIRECT MEASUREMENT.

	MEASUREMENT OF ELECTRICAL POWER	TECHINICAL DRG. NO. 21
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T.V

COMPLETE THE CONNECTIONS OF ENERGY-METER.

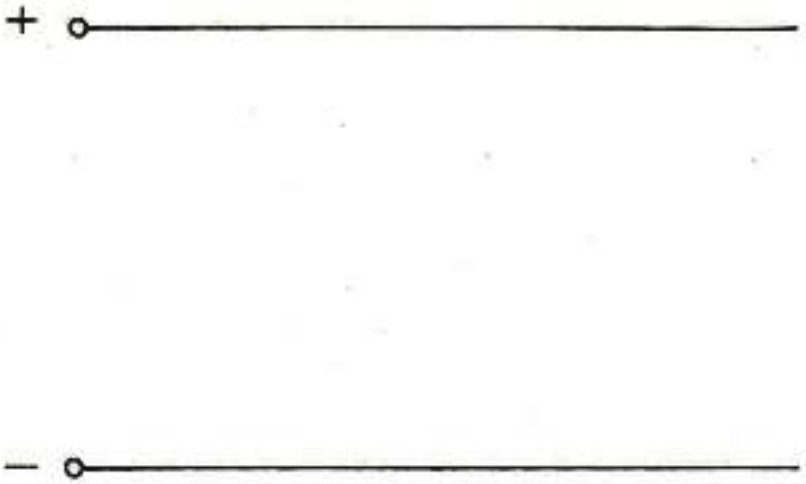




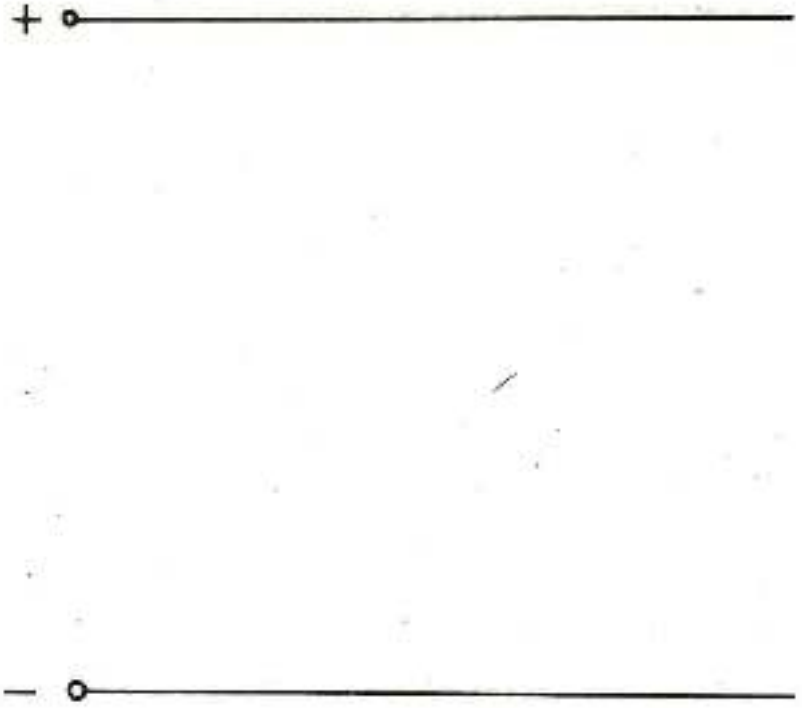


	CONNECTION OF ENERGY-METER	TECHNICAL-DRG NO. 22
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T.V

DRAW THE CONNECTIONS OF CELLS TO PROVIDE DIFFERENT VOLTAGES.



DRAW CONNECTIONS OF CELLS FOR INCREASING CURRENT (CELLS IN PARALLEL)



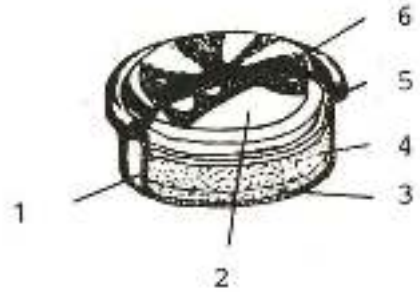
	CONNECTION OF CELLS	TECHNICAL DRG. NO. 23
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T-V

DRAW THE SECTIONAL DRAWING OF DTY CELL.

1. POSITIVE TERMINAL
2. PASTE
3. SAND
4. WOODEN DUST
5. CARBON ROD FOR POSITIVE PLATE
6. PASTE FOR ALLUMINIUM CHLORIDE
7. THIN PAPER
8. ZINC PLATE FOR NEGATIVE TERMINAL

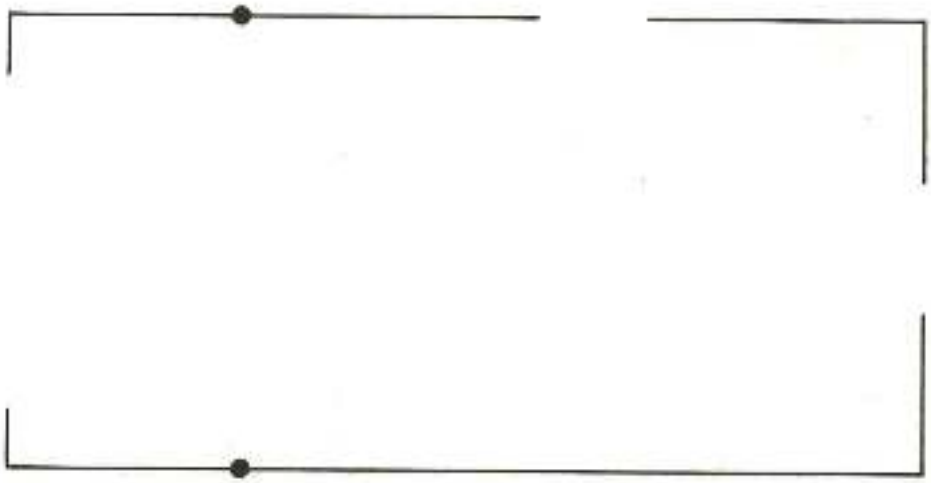
WRITE DOWN THE NAMES OF DIFFERENT PARTS OF MERCURY CELL.

1.
2.
3.
4.
5.
6.

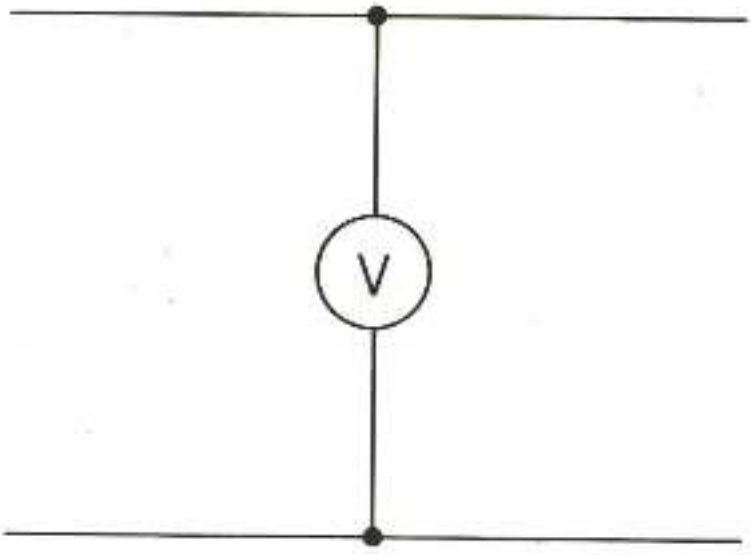


	DRY & MERCURY CELL	TECHNICAL DRG NO. 24
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T. V

COMPLETE THE CIRCUIT DIAGRAM FOR DETERMINING OF R_i ACCORDING TO MEASURING METHOD WITH LOAD RESISTOR.

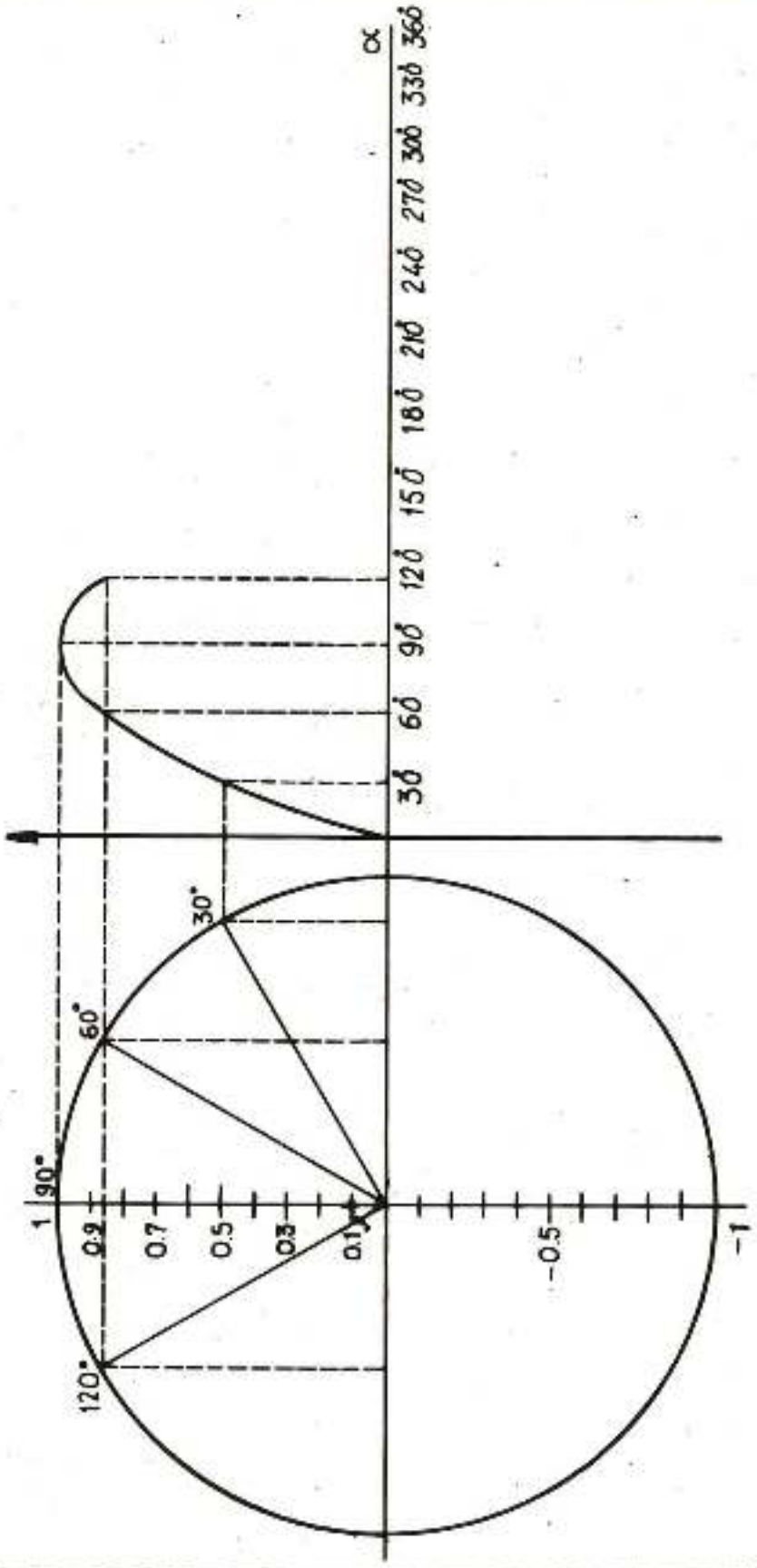


COMPLETE THE CIRCUIT DIAGRAM FOR E/2 MEASURING METHOD.



	MEASUREMENT OF INTERNAL RESISTANCE	TECHNICAL DRG NO 25
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T·V

COMPLETE THE SINE CURVE OF AC VOLTAGE.



DEVELOPMENT OF SINE CURVE

TECHNICAL DRG NO 26

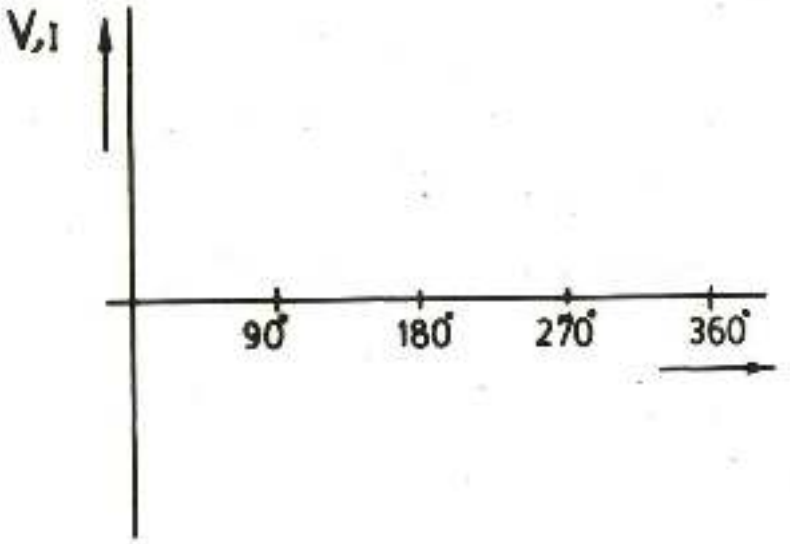
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Radio & T. V

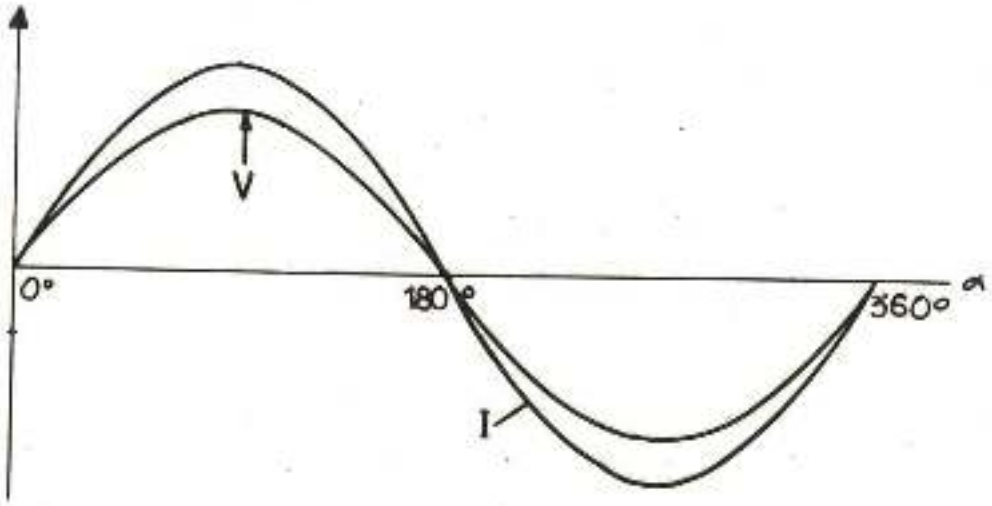
DEVELOP THE VECTOR DIAGRAM OF AC VOLTAGE.

DEVELOP THE LINE DIAGRAM OF AC VOLTAGE.

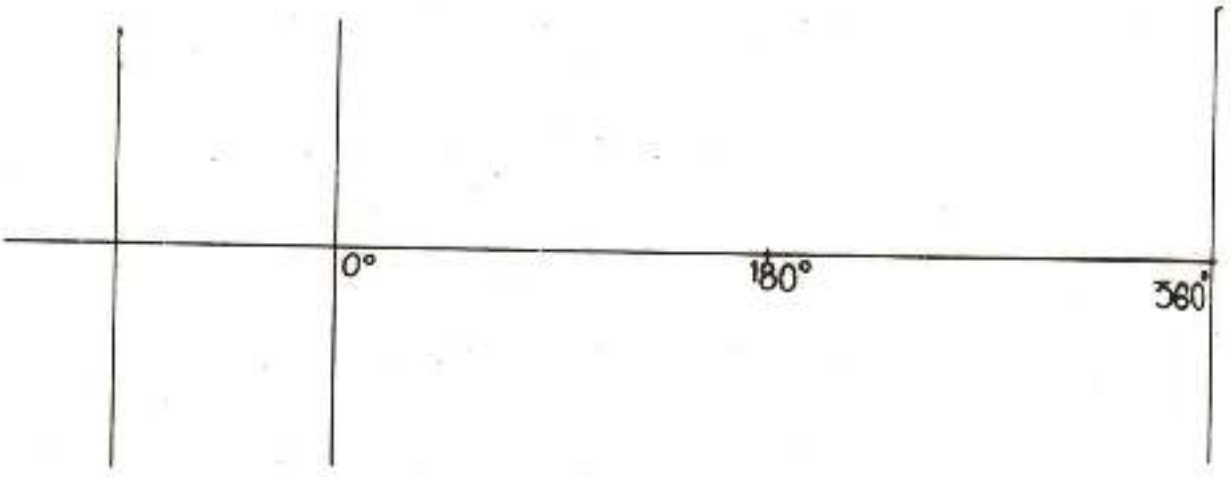


	VECTOR AND LINE DIAGRAM	TECHNICAL DRG. NO. 27
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T.V

COMPLETE POWER CURVE FROM V & I.



COMPLETE THE LINE DIAGRAM OF VOLTAGE AND CURRENT.

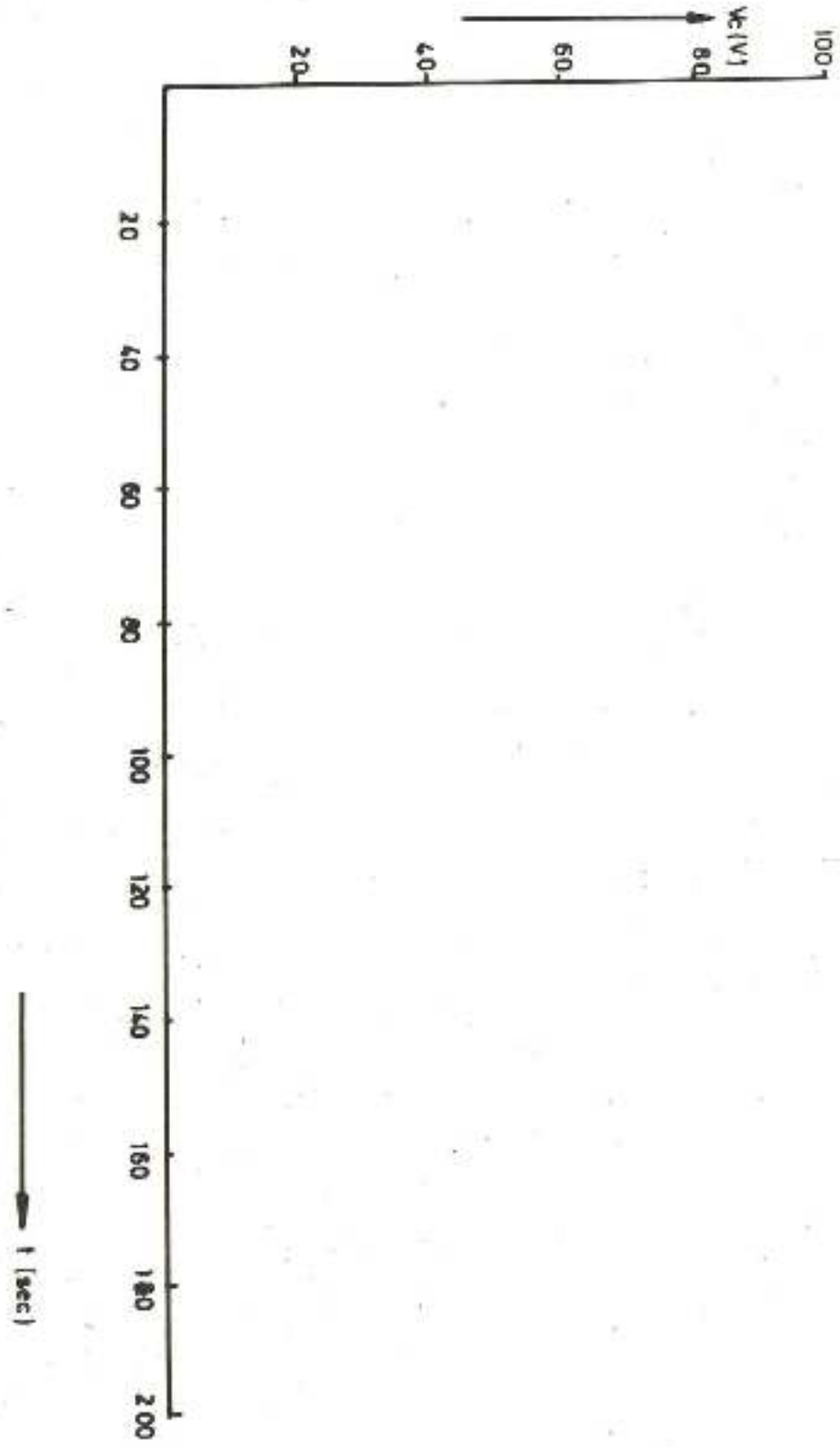


	POWER CURVE V & I (OHMIC LOAD)	TECHNICAL DRG. NO. 28
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T.V

DRAW SERIES CONNECTIONS OF CAPACITORS.

DRAW PARALLEL CONNECTIONS OF CAPACITORS.

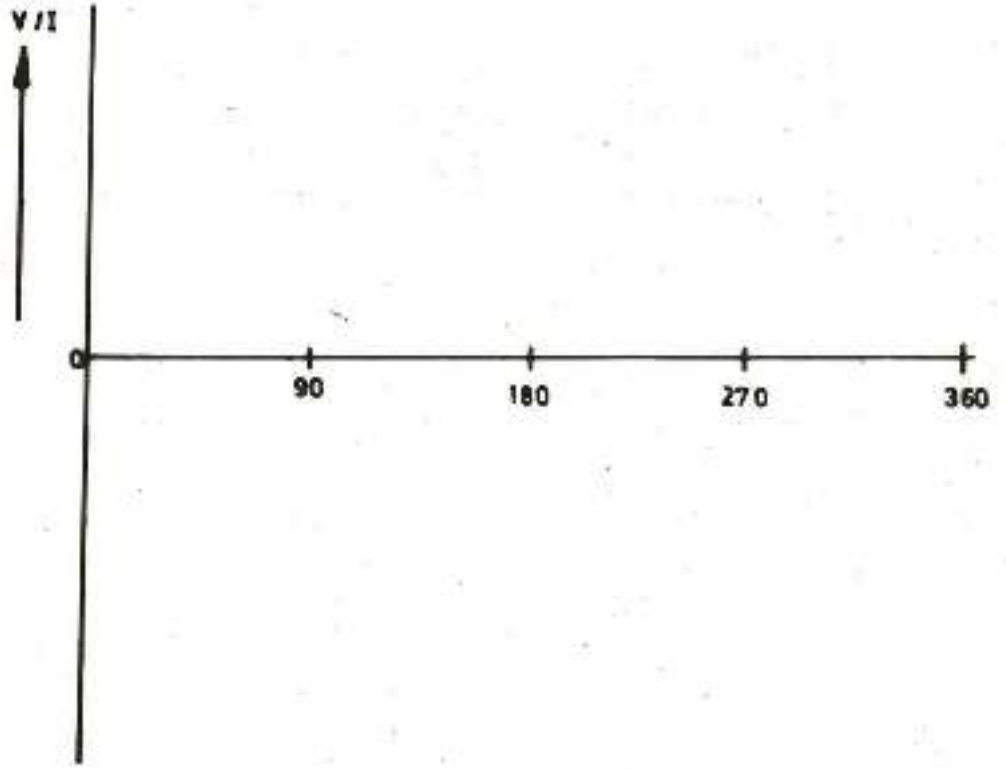
	CONNECTIONS OF CAPACITORS	TECHNICAL DRG. NO. 29
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T. V



DRAW THE CURVE OF CHARGING AND DISCHARGING OF CAPACITOR.

	CURVE OF CAPACITORS	TECHNICAL DRG. NO, 30
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T. V

DRAW LINE DIAGRAM OF VOLTAGE AND CURRENT IN CAPACITOR.

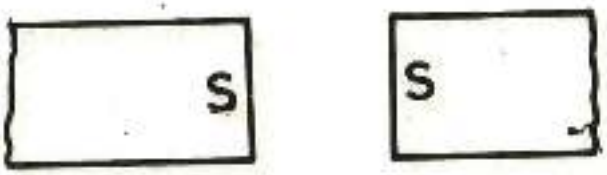


DRAW VECTOR DIAGRAM OF VOLTAGE AND CURRENT IN CAPACITOR.

	LINE DIAGRAM OF V & I IN CAPACITORS	TECHNICAL DRG. NO. 31
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T-V

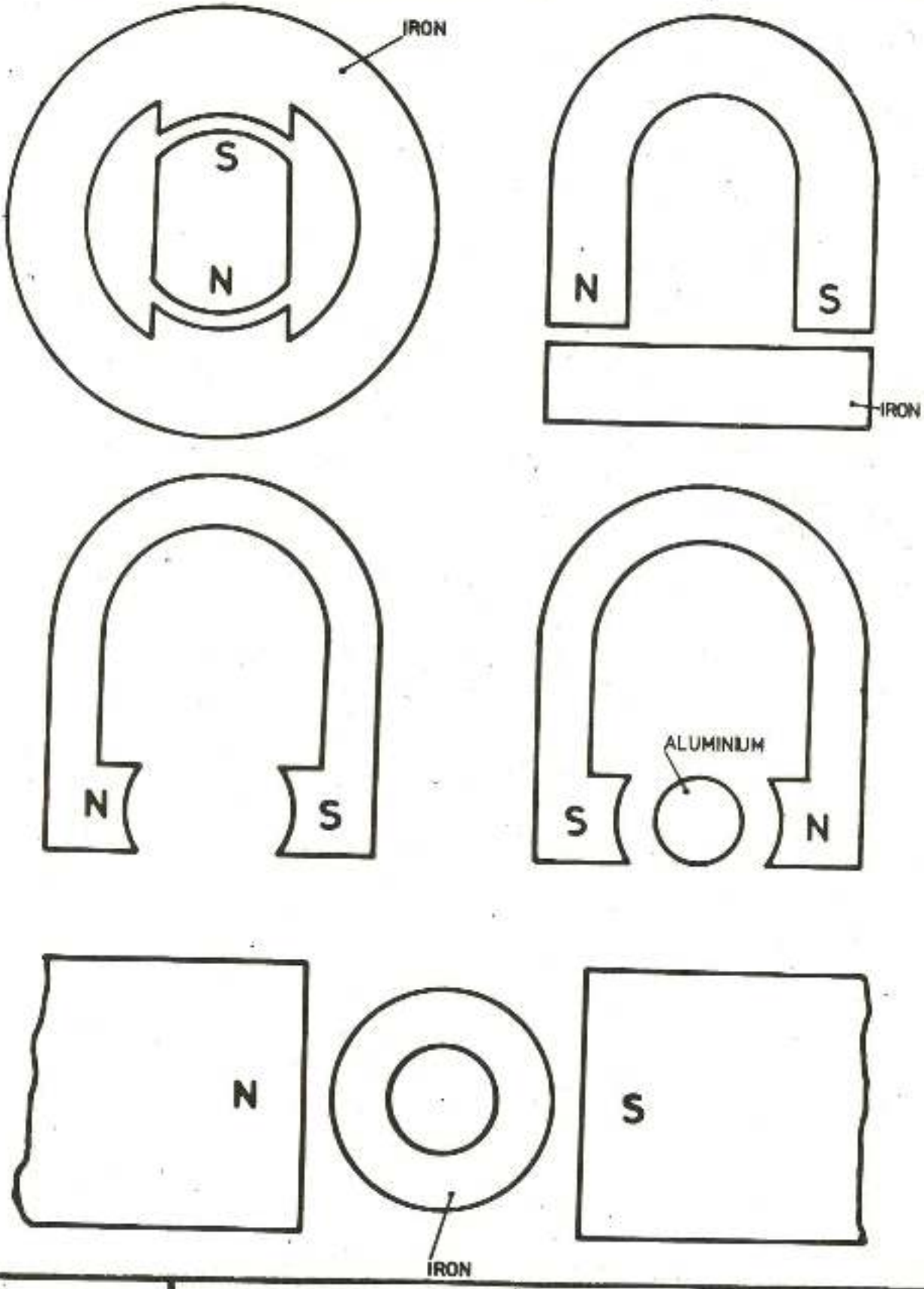
DRAW MAGNETIC LINES OF FORCES OF A PERMANENT MAGNET.

DRAW MAGNETIC LINES OF FORCES OF A PERMANENT MAGNET.



	MAGNETIC LINES OF FORCES OF PERMANENT MAGNET	TECHNICAL DRG NO 32
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T. V

PLOT THE MAGNETIC LINES OF FORCES, GENERATED BY THE MAGNETS.



MAGNETIC LINES OF FORCES OF PERMANENT MAGNET

TECHNICAL DRG NO. 33

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

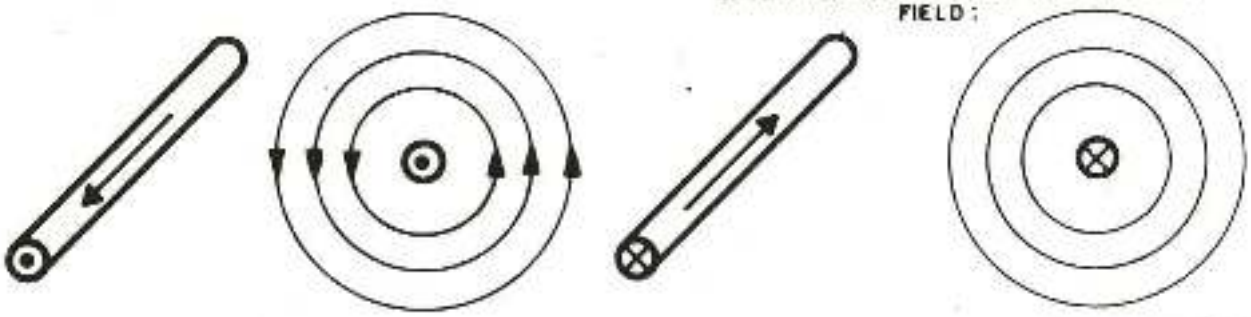
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

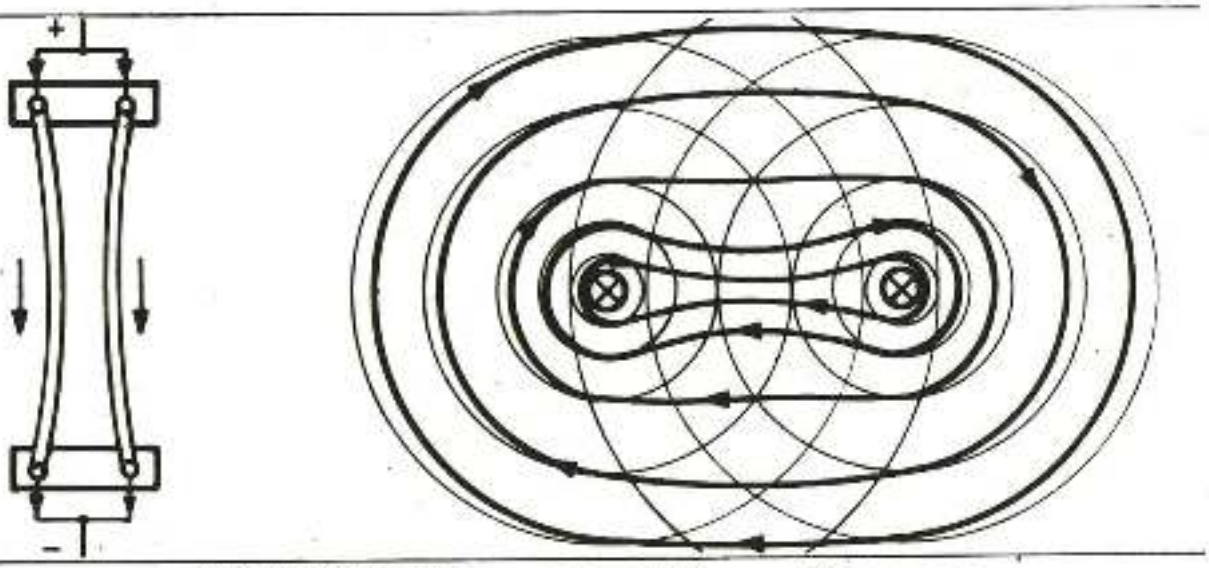
Radio & T.V

PLOT THE MAGNTIC LINES OF FORCES

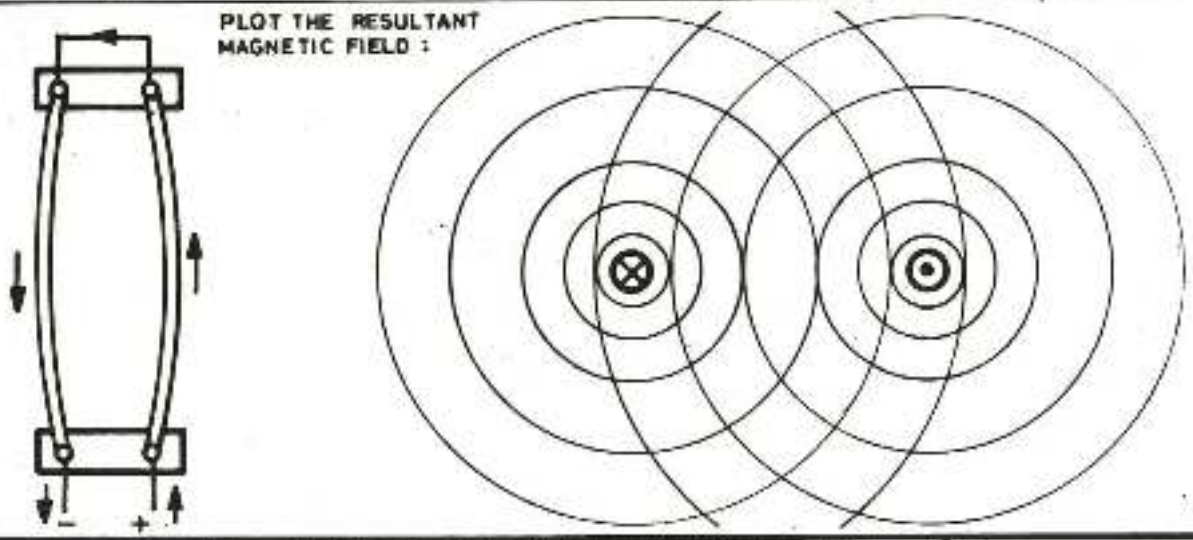
Around a current carrying conductor there is a magnetic field. The magnetic lines of forces have the shape of concentric circles:
The direction of the magnetic lines of forces depends upon the direction of the current.
Equal direction of current in parallel conductors effects attraction; opposite direction of current in parallel conductors effects repulsion

ENTER THE DIRECTION OF THE MAGNETIC FIELD:





PLOT THE RESULTANT MAGNETIC FIELD:



MAGNETIC LINES OF FORCES
OF A CURRENT CARRYING CONDUCTOR

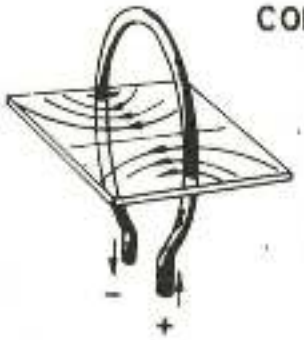
TECHNICAL DRG. No. 34

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

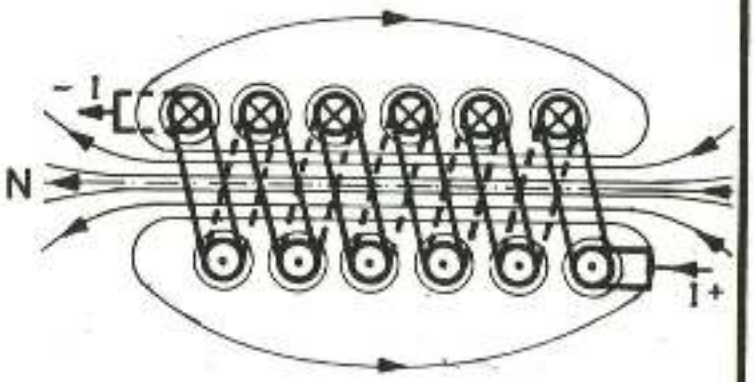
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Radio & T.V

COIL OF 1 TURN

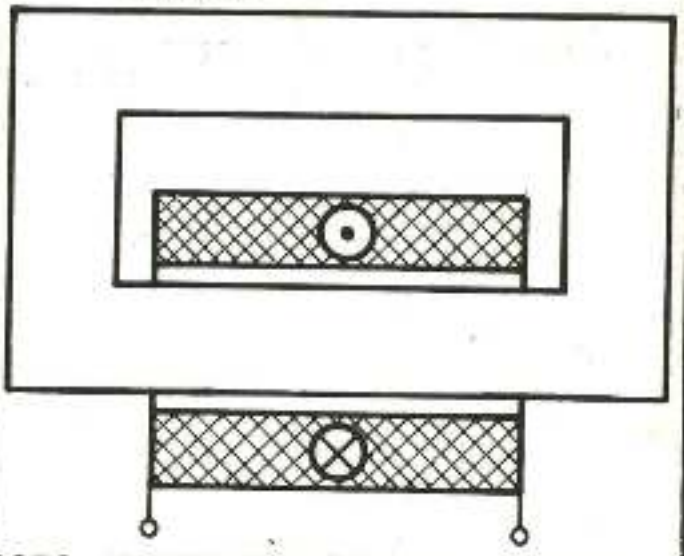


COIL OF 6 TURNS



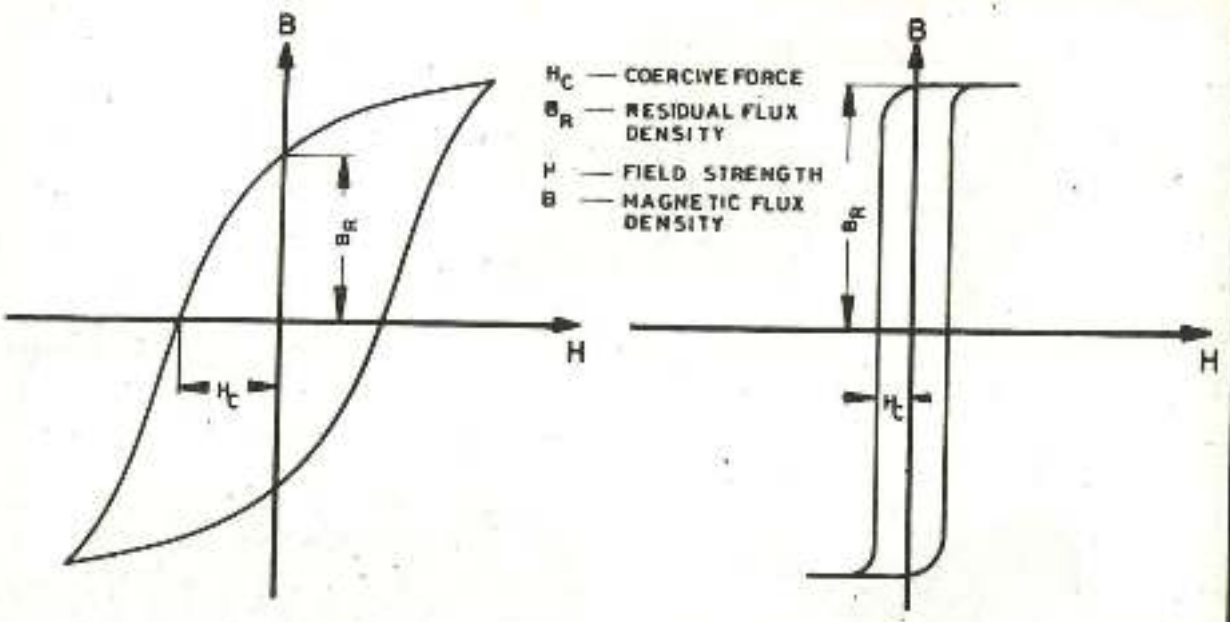
The internal magnetic field of a coil is a homogeneous field as a result of the magnetic lines of forces of all turns.

IRON CORE

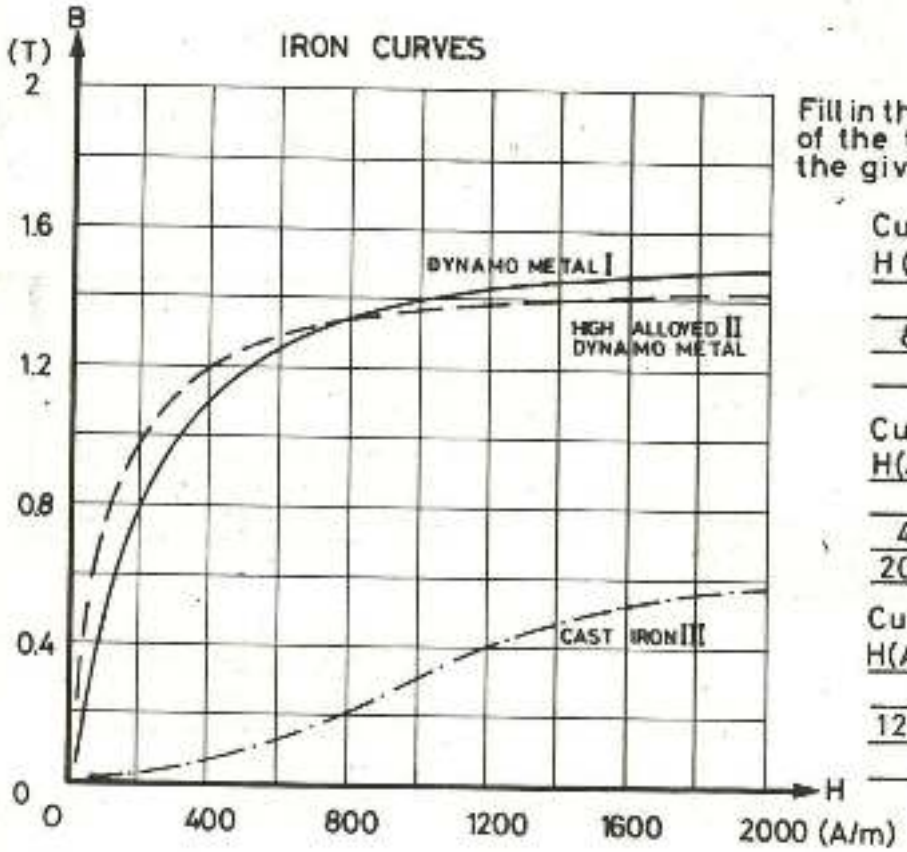


PLOT THE MAGNETIC LINES OF FORCES GENERATED BY THE CURRENT CARRYING COIL!

	MAGNETIC LINES OF FORCES OF A CURRENT CARRYING COIL	TECHNICAL DRG No. 35
	DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME	Radio & T. V



MAGNETIC HYSTERESIS LOOP



Fill in the missing values of the table according to the given iron curves

Curve I

H (A/m)	B(T)
	1.4
800	
	0.8

Curve II

H(A/m)	B(T)
	1.4
400	
2000	

Curve III

H(A/m)	B(T)
	0.2
1200	
	0.5

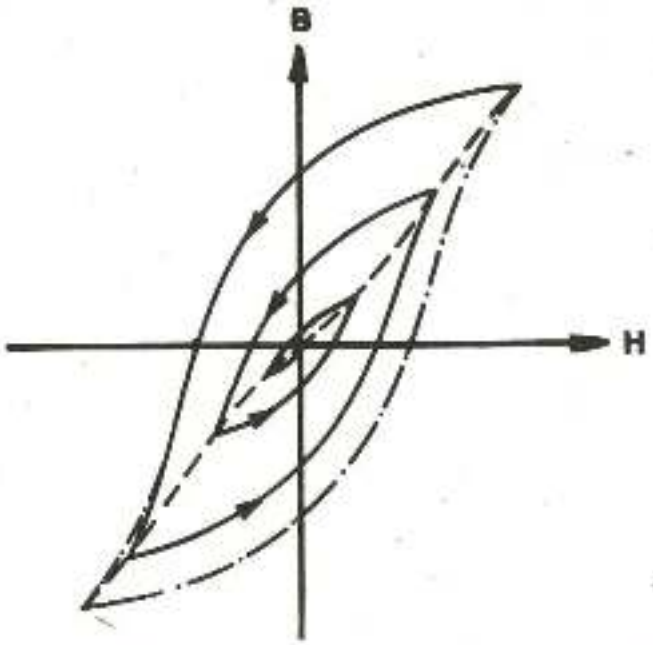
MAGNETIZING CURVES

TECHNICAL DRG. No. 36

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

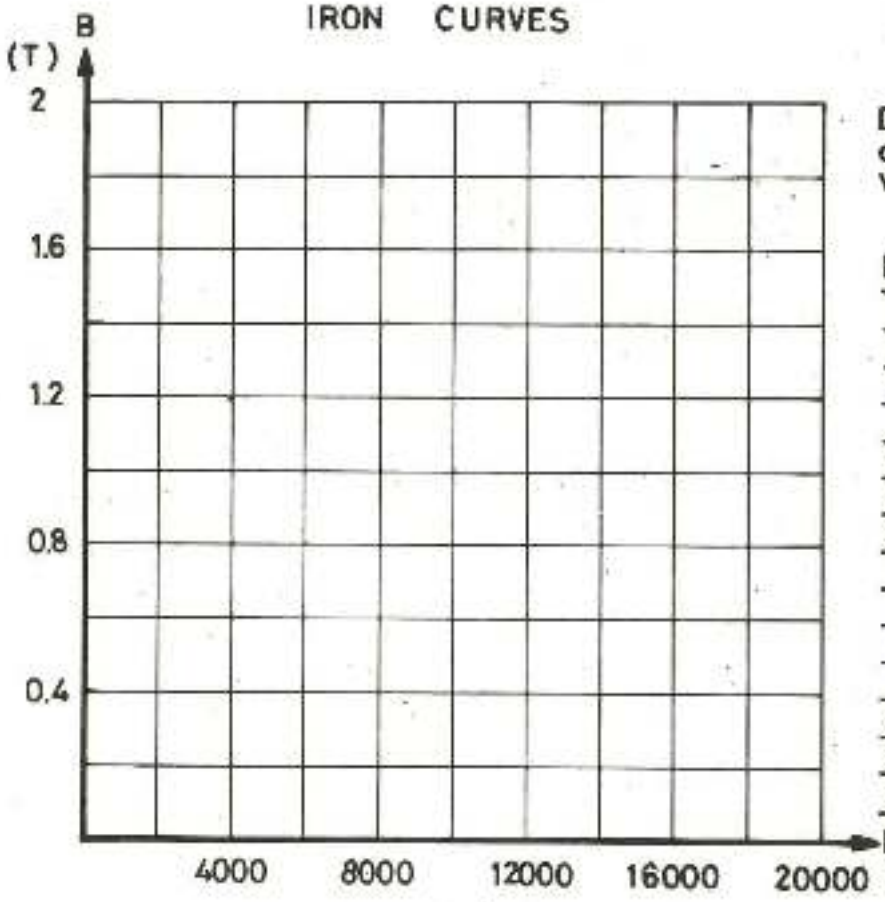
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Radio & T. V



MAGNETIC HYSTERESIS LOOP OF DEMAGNETIZATION

IRON CURVES



Draw the iron curves according to the given values in the table :

	H(A/m)	B(T)
dynamo metal	1000	1.35
	2000	1.5
	4000	1.6
	8000	1.7
	11000	176
	14000	1.8
	20000	1.85
cast iron	1000	0.3
	2000	0.6
	4000	0.75
	7500	0.9
	11000	1
	15000	1.1
	20000	1.2

MAGNETIZING CURVES

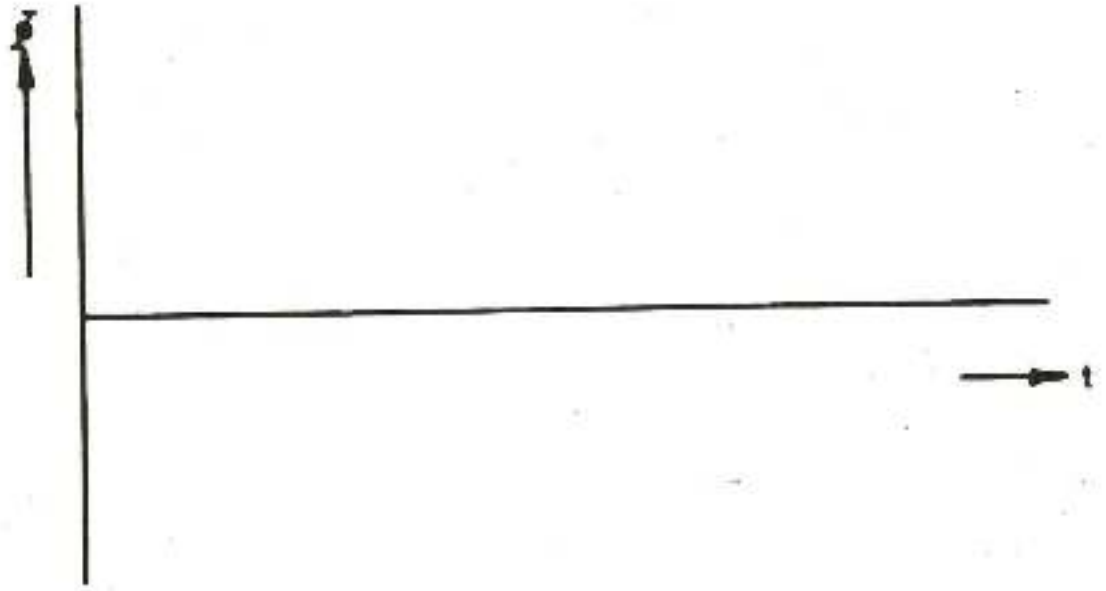
TECHNICAL DRG. No. 37

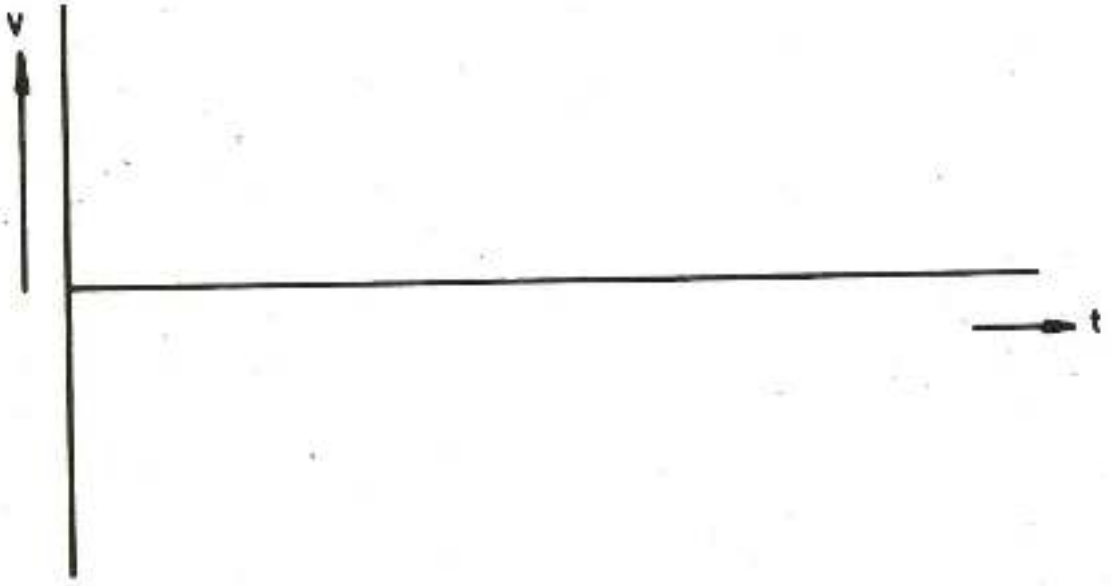
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Radio & T. V

DRAW THE PRESENTATION OF MAGNETIC FLUX AND INDUCED VOLTAGE.



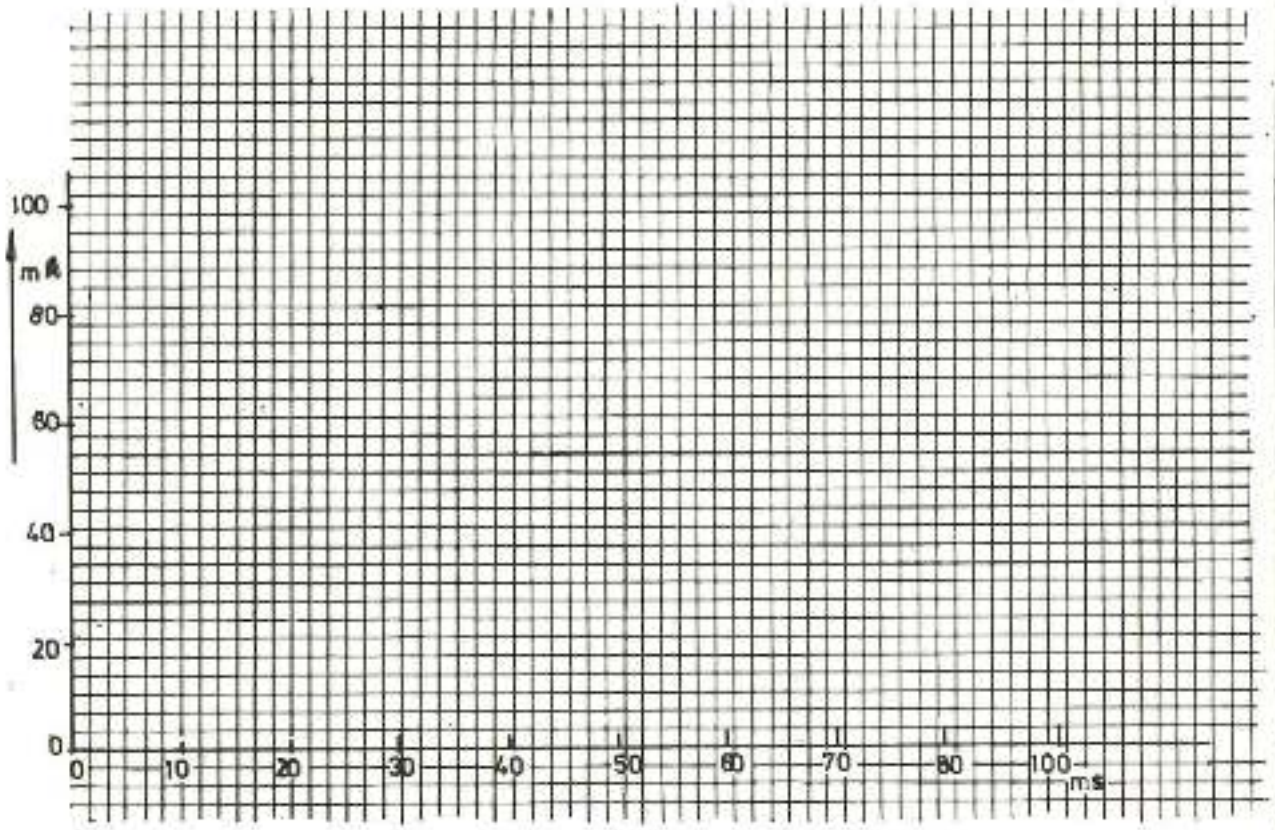


	SELF INDUCTION VOLTAGE	TECHNICAL DRG. NO 38
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T.V

COMPLETE THE GIVEN DIAGRAM (PRESENTATION OF APPLIED VOLTAGE, MAGNETIC FLUX LINES AND SELF INDUCTION VOLTAGE).

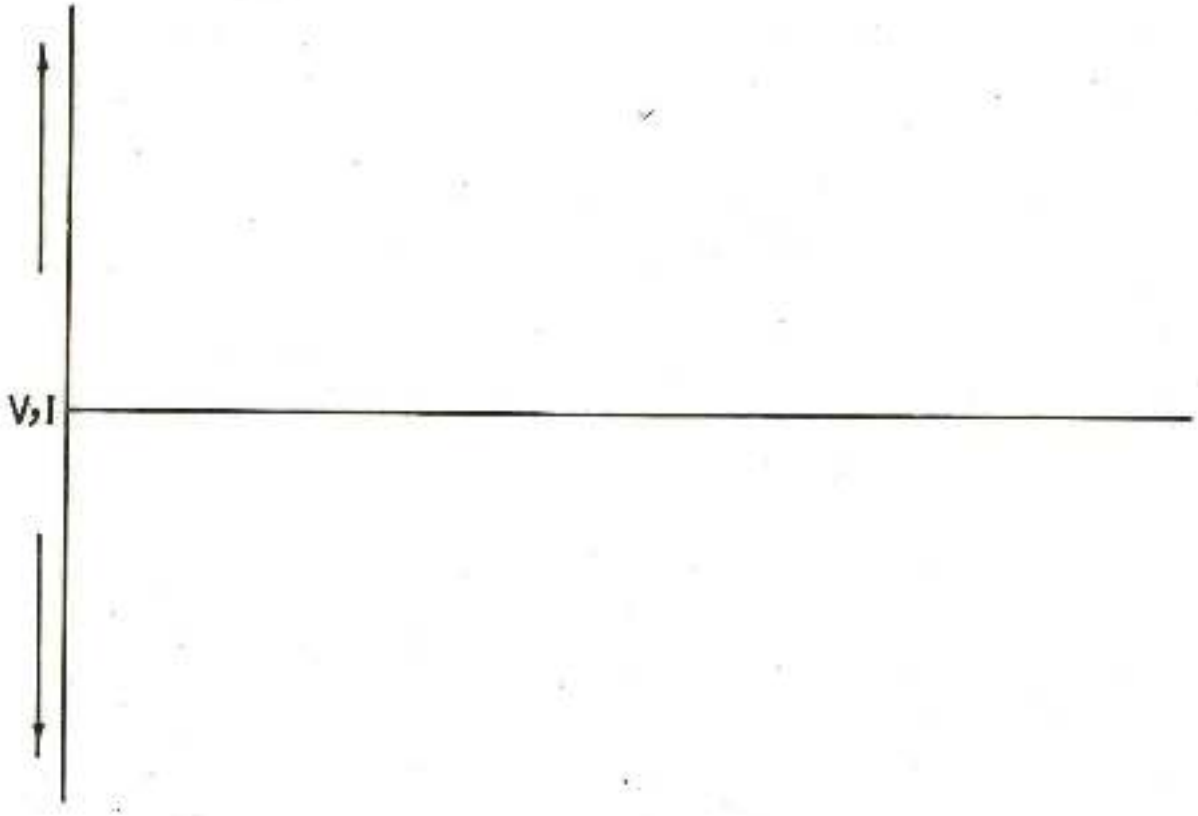
	SELF INDUCTION VOLTAGE	TECHNICAL DRG NO. 39
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T-V

DRAW CURVE OF VOLTAGE AND CURRENT AS FUNCTION OF TIME
BY ON - OFF OPERATION REPRESENTATION OF τ



	BEHAVIOUR OF DIRECT CURRENT IN COIL	TECHNICAL DRG. NO. 40
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T-V

DRAW LINE DIAGRAM OF VOLTAGE AND CURRENT OF COIL IN AC.



DRAW VECTOR DIAGRAM OF VOLTAGE AND CURRENT OF COIL IN AC.

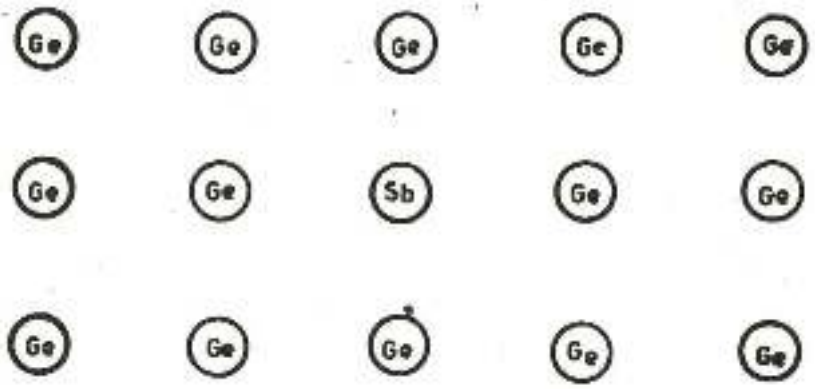
	CURVE OF V & I IN AC	TECHNICAL DRG. NO. 41
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T.V

DRAW CIRCUIT OF TAPPED TRANSFORMER.

DRAW CIRCUIT WITH SINGLE PHASE TRANSFORMER.

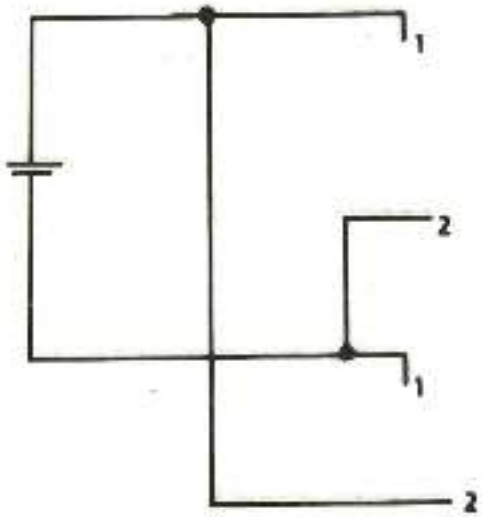
DRAW CIRCUIT WITH AUTO TRANSFORMER FOR VOLTAGE SUPPLY OF RECTIFIER.

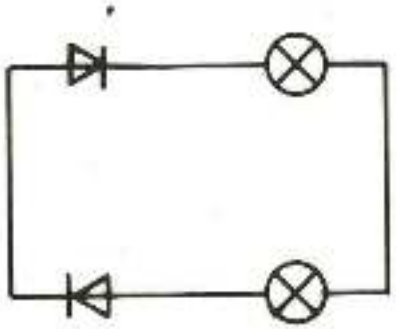
DRAW THE STRUCTURE OF SEMICONDUCTOR FOR N-TYPE DOPING.



DRAW THE STRUCTURE OF SEMICONDUCTOR FOR P-TYPE DOPING.

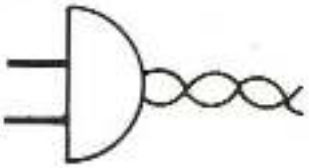
COMPLETE THE CIRCUIT DIAGRAM OF DIODE USED AS ELECTRONIC SWITCH.

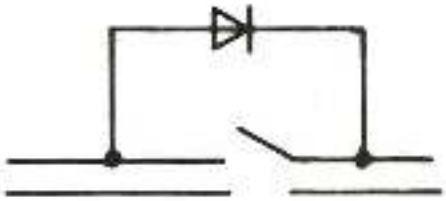




	DIODE AS ÉLCTRONIC SWITCH	TECHNICAL DRG NO. 44
	DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME	Radio & T. V

COMPLETE THE CIRCUIT DIAGRAM OF DIODE USED AS POWER LIMITER FOR SOLDERING IRON.





	DIODE AS POWER LIMITER	TECHNICAL DRG NO. 45
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		Radio & T-V