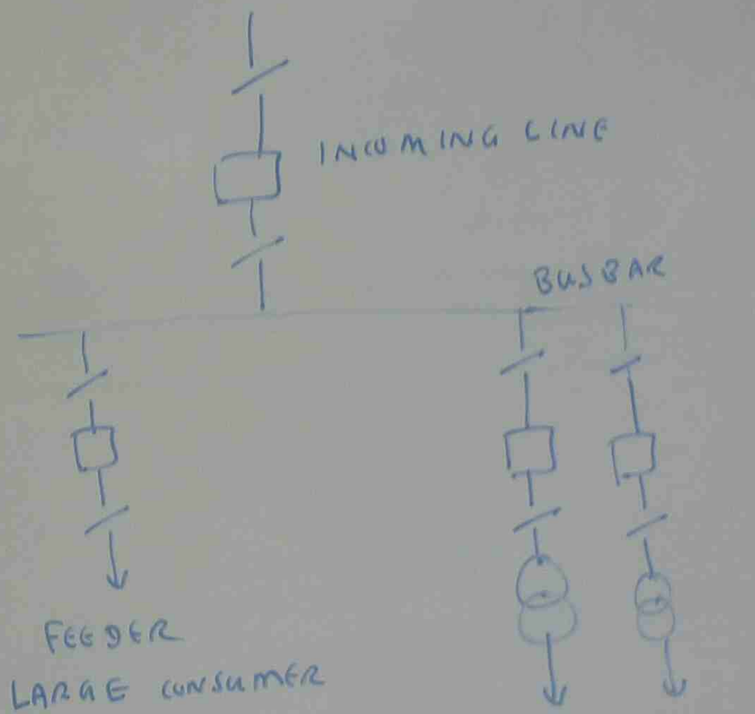
POWER SYSTEM CONTROL EQUIPMENTS

GO38

Q1

SUB STATION & DISTRIBUTION SYSTEM.



Q1

MAIN FEEDER

THE FEEDER C
WHERE THE S

Q1

SECTION ALISING

THE ACT OF
THE CREATION
APART

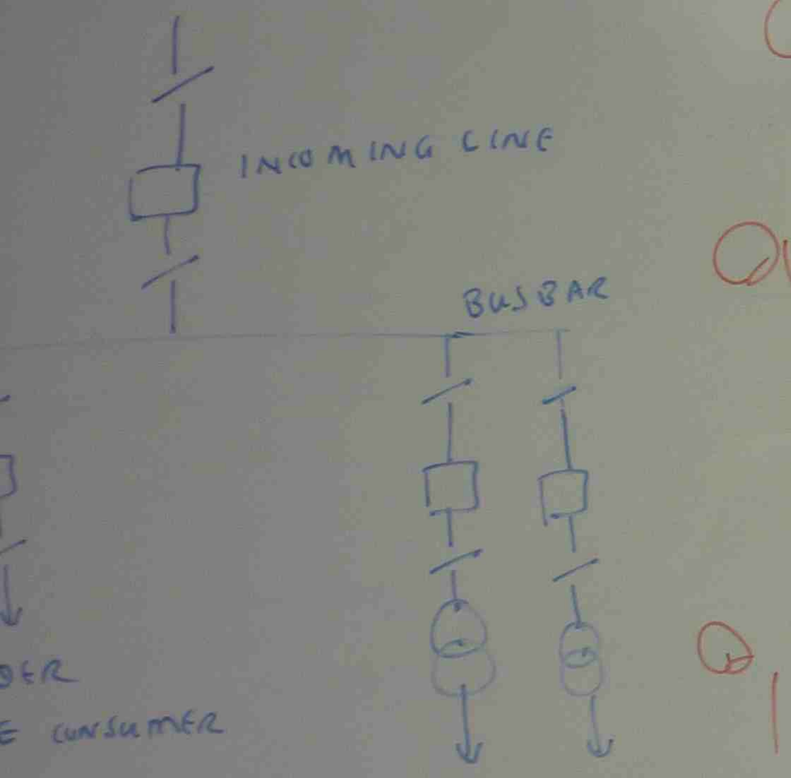
RECLOSER

AUTOMATIC
THE POWER
TROUBLE

OPERATING VO

THE

SYSTEM CONTROL EQUIPMENTS



MAIN FEEDER

Q1 THE FEEDER CABLE RUNS TO CROSS CONNECT POINT IN THE NETWORK WHERE THE SECOND FAULTY CABLE FEEDS ARE CONNECTED.

Q1 SECTIONALISING

THE ACT OF DIVIDING (OR) PARTITIONING, SEPARATION BY THE CREATION OF A BOUNDARY THAT DIVIDES OR KEEPS APART

RECLOSER

AUTOMATIC, HIGH VOLTAGE ELECTRIC SWITCH. IT SHUTS OFF THE POWER WHEN TROUBLE OCCURS. THEN RECLOSES WHERE TROUBLE IS CLEAR OFF.

OPERATING VOLTAGE

THE DESIGN VOLTAGE RANGE WITH TOLERANCE

Q1

BOOSTER

TO

BIL

Q2 BIL

THE

LIGH

TO H

BIL

WITHS

T IN THE NETWORK

CONNECTED.

EPARATION BY

DES OR. KEEPS

H. IT SHUTS OFF

RECLOSES WHERE

H TOLERANCE

01

BOOSTER

TO BOOST THE VOLTAGE LEVEL THAT FALLS UNDER DESIGNED LEVEL.

BIL (BASIC INSULATION LEVEL)

02 BIL IS BASIC INSULATION LEVEL (BASIC IMPULSE LEVEL) WHICH IMPLIES THE LIMIT UP TO WHICH AN INSULATOR COULD WITHSTAND IMPULSE DUE TO LIGHTNING STRIKES. IMPULSE IS GENERATED ON THE INSULATION DUE TO HIGH VOLTAGE SURGES AND SPIKES DUE TO LIGHTNING STRIKES. BIL IS GENERALLY MUCH HIGHER AS COMPARED TO POWER FREQUENCY WITHSTAND VOLTAGE.

SUBST

03 T

POWER &
CONTROL

- DISTRI
TRANSFO
- BOOSTE
TRANS
- VOLTAGE
REGU
- P.F CO

SUB

04

—
—
—
—

L.

HICH IMPLIES

MPULSE DUE TO

NSULATION DUE

G STRIKES.

OWER FREQUENCY

SUBSTATION EQUIPMENTS

03

POWER & VOLTAGE CONTROL

- DISTRIBUTION TRANSFORMERS
- BOOSTER TRANSFORMERS
- VOLTAGE REGULATOR
- P.F CORRECTION

CONTROL CIRCUITS

- AUXILIARY CIRCUITS
- PROTECTION EQUIPMENTS
- CIRCUIT BREAKER
- RECLOSER
- RELAY SYSTEMS

BUS BAR

- POWER DISTRIBUTION
- SECTIONALIZING SWITCH
- AUTOMATIC SECTIONALIZER

GROUNDING

- SUB STATION ELECTRICAL GROUND

METERING

REVENUE METER
POWER FACTOR
DEMAND METER
ELECTRONIC METERING

05

IM PORTAN

- TRANSfor

AIR CIRC

POLARITY

TRANS

SURGE

INTERR

ELECTR

ARC

SUBSTATION OPERATION

04

- CONTROL | PROTECTION
- H.V SWITCH GEAR
- PROTECTION SETTING
- BLACK OUT PLAN
- TESTING SECONDARY EQUIPMENTS
- RELAY | TRANSFORMERS CHARACTERISTICS TEST
- REGULAR MAINTENANCE WORK

Q5

IMPORTANT AUXILIARY SYSTEM

- TRANSFORMER COOLING — TRANSFORMER OIL TESTING
  FILTERING
  - FORCED OIL COOLING
  - FORCED AIR COOLING

AIR CIRCUIT BREAKING - AIR COMPRESSOR OPERATION
AIR PRESSURE
AIR RESERVOIR

POLARITY TESTING FOR PARALLEL OPERATION of TRANSFORMERS.

SURGE (OR) LIGHTNING ARRESTER - DISCHARGE HIGH VOLTAGE SPIKES TO GROUND.

INTERRUPT CONTROL CIRCUIT - STORAGE CIRCUIT FOR STORING AND OUTPUTTING A REFERENCE TIME FOR ERROR DETECTING CIRCUIT.

ELECTRIC ARC EXTINGUISHING

ARC → RADIATION, IONIZING
ARC = HIGH-TEMPERATURE ELECTRON COLLISION

ARC INTERRUPTION ←
- HIGH RESISTANCE METHOD
- COOLING ARC
- REDUCING C.S.A OF ARC
- SPLITTING ARC
- DE IONIZING
  - LENGTHENING GAP
  - HIGH PRESSURE

Q1 SKETCH THE
EXPLAIN T
(a) MAIN FEEDER (b)
(c) BOOSTER

Q2 WHAT IS

Q3 SKETCH THE O

Q4 WHAT ARE
FUNCTIONS?

Q5 WHAT AR
IN SUB

TING
- FORCED OIL COOLING
- FORCED AIR COOLING

THE

ULT FOR
LENCE
IRCUIT.

OTION ←
- HIGH RESISTANCE METHOD
- COOLING ARC
- REDUCING C.S.A OF ARC
- SPLITTING ARC
- DE IONIZING
  - LENGTHENING GAP
  - HIGH PRESSURE

Q1 SKETCH THE OVER VIEW OF SUBSTATION AND EXPLAIN THE FOLLOWINGS

(a) MAIN FEEDER (b) SECTIONALIZING (c) RE-CLOSER (d) OPERATING VOLTAGE

(e) BOOSTER

Q2 WHAT IS BIL?

Q3 SKETCH THE OUT LINES OF SUB STATION EQUIPMENTS

Q4 WHAT ARE THE MAIN ASPECTS OF SUBSTATION OPERATION FUNCTIONS?

Q5 WHAT ARE THE IMPORTANT AUXILIARY SYSTEMS IN SUBSTATION AND EXPLAIN ANY THREE OF THEM.

SUBSTATION GROUNDING

GROUND RESISTANCE

THE RESISTANCE SEEN BY THE GROUNDING CONDUCTOR OF AN ELECTRICAL SYSTEM

SOIL RESISTIVITY

A FUNCTION OF SOIL MOISTURE AND THE CONCENTRATION OF IONIC SOLUBLE SALTS AND IS CONSIDERED TO BE MOST COMPREHENSIVE INDICATOR OF A SOIL CORROSIVITY.

- THE LOWER THE RESISTIVITY, THE HIGHER THE CORROSIVITY

SOIL RESISTIVITY (Ω-cm)	CORROSIVITY RATING
> 20,000	ESSENTIALLY NON CORROSIVE
10,000 TO 20,000	MILDLY CORROSIVE
5000 TO 10,000	MODERATELY CORROSIVE
3000 TO 5000	CORROSIVE
1000 TO 3000	HIGHLY CORROSIVE

SOIL RESISTIVITY (Ω-cm)	CORROSIVITY RATING
< 1000	EXTREMELY CORROSIVE

PRACTICAL

THURSDAY

BALANCED

POWER

07

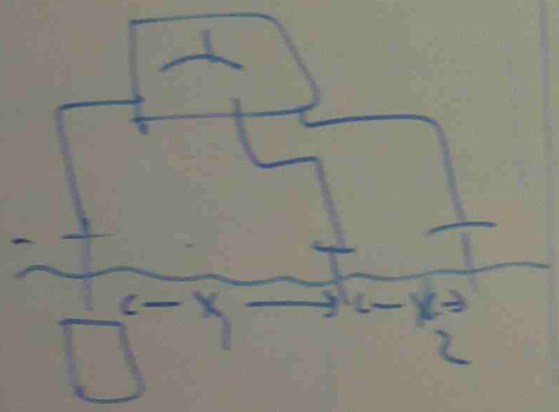
Types of PROTECTION UTILIZED IN SUB STATION

- ELECTRICAL RACEWAYS → TO SAVE THE ULTAL CABLE NETWORK FROM CORROSION & DESTRUCTION
- SUB STATION GROUNDING → LIGHTNING / SURGE PROTECTION
- VOLTAGE REGULATOR → TO MAINTAIN CONSTANT VOLTAGE LEVEL
- CIRCUIT BREAKER → TO INTERRUPT THE CIRCUIT
- INSTRUMENT TRANSFORMER → POTENTIAL TRANSFORMER (PT)
  CURRENT TRANSFORMER (CT)
  TO REDUCE SYSTEM VOLTAGE / CURRENT.

RELAYING
- DIFFERENTIAL — TRANSFORMER PROTECTION
- PILOT PROTECTION
- VOLTAGE SURGE DIVERTER
- MICROWAVE RELAYING
- STABILITY CONTROL

UTILIZES HIGH VOLTAGE DIRECT CURRENT FOR TRIP CIRCUIT

CIRCUIT BREAKER
- OIL CIRCUIT BREAKER
- AIR CIRCUIT BREAKER
- VACUUM INTERRUPTER / SF_6-CB
- FUSE



08

FROM CORROSION

EVEL

(PT)

CT)

AE / CURRENT.

TILIZES HIGH

OLTAGE DIRECT

CURRENT

OR TRIP CIRCUIT

- CB

Q 8

WIDE AREA MONITORING & CONTROL SYSTEM

- EMERGENCY OPERATION FUNCTION
- LOCATE THE FAULT
- VERIFY THAT PROTECTION HAS OPERATED CORRECTLY TO CORRECT THE FAULT
- SHED THE LOAD TO ENSURE THAT FAULT DOES NOT CAUSE AN OVER LOAD OF UN AFFECTED LINES
- MANUALLY RE-ROUTE POWER TO RESTORE SERVICE TO SUBSCRIBERS
- DISPATCH CREWS AND EMERGENCY TEAM TO FIX THE FAULT
- CAPTURE FAULT RECORDINGS SO THE ENGINEERS CAN LATER ANALYZE THE CAUSE OF THE FAULT.

Q 6 HOW DOES SOIL RESISTIVITY AFFECT THE CORROSION?

Q 7 WHAT ARE THE TYPES OF PROTECTION UTILIZED IN SUBSTATION?

Q 8 EXPLAIN WIDE AREA MONITORING & CONTROL SYSTEM

Q 5

IMPORTANT

- TRANSFORME

AIR CIRCUIT

POLARITY T
TRANSFOR

SURGE (OR
HIG

INTERRUP

ELECTRIC

ARC