16117

3 Hours / 100 Marks   Seat No.

Instructions – (1) All Questions are *Compulsory*.

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

1.   **Attempt any <u>FIVE</u> of the following:**   **20**

a) State the different types of faults and their causes.

b) Define current limiting reactor. Also state the types of reactors with neat diagram.

c) A $3\,\phi$ transmission line operating at 11 KV and having resistance of $1\,\Omega$ and reactance of $4\,\Omega$ is connected to the generating station busbar through 6 MVA step up transformer having a reactance of 6%. The busbar are supplied by 10 MVA alternator having 10% reactance. Calculate short circuit KVA if fault occurs at the end of transmission line.

d) Draw the symbols for relay, circuit breakers, isolator, fuse.

e) With neat sketch explain HRC fuse.

f) Explain vertical break isolator with neat sketch.

g) With neat sketch explain arc formation.

Marks

2. **Attempt any <u>FOUR</u> of the following:** **16**

   a) Define:

     (i)   Arc voltage

     (ii) Recovery voltage

     (iii) Restriking voltage

     (iv) RRRV

   b) Draw neat sketch of SF_6 C.B. State its advantages.

   c) Compare Fuse and MCCB. Any four points.

   d) Explain fundamental requirements of protective relaying.

   e) Define:

     (i)   Protective Relay

     (ii) Relay time

     (iii) Pickup current

     (iv) Reset current

   f) Explain attracted armature type relay with neat diagram.

3. **Attempt any <u>FOUR</u> of the following:** **16**

   a) Explain shaded pole type relay with neat diagram.

   b) State advantages and disadvantage of static relay.

   c) Draw neat sketch of induction type directional overcurrent relay.

   d) Explain static over current relay with neat diagram.

   e) Explain microprocessor based over current relay with neat diagram.

   f) State the diff. faults occurs in Alternator.

Marks

4. **Attempt any <u>FOUR</u> of the following:** 16

a) Explain merz price protection used for alternator.

b) Explain balanced earth fault protection used for alternator.

c) A star connected 3 φ 10 mVA, 6.6 kV alternator has per phase reactance of 10%. It is protected by Merz price circulating principle which is set to operate for fault current not less than 175 A. Calculate the value of earthing resistance to be provided in order to ensure that only 10% of the alternator winding remains unprotected.

d) Explain with neat diagram stator interturn protection.

e) State any four protection schemes used for transformer.

f) Draw neat sketch of Buchholz relay.

5. **Attempt any <u>FOUR</u> of the following:** 16

a) Explain with neat diagram earth fault protection used for transformer.

b) State the limitations of merz prize protection scheme used for transformer.

c) A 3 phase transformer of 220/11 kV line volts is connected in Star/Delta. The protective transformers on 220 V side have a current ratio of 600/5. What should be CT ratio on 11 kV side?

d) Draw neat sketch of single phasing preventor.

e) List any 8 faults that may occur in motor.

f) Explain fault bus protection of Bus bar.

6. **Attempt any <u>FOUR</u> of the following:** 16

a) What are the requirements of protection of transmission line.

b) Explain distance protection used for transmission line.

c) Differentiate between equipment earthing and neutral earthing.

d) State causes of over voltages.

e) Explain Rod gap Arrester with neat sketch.

f) What is surge absorber? Write a short note on ferranti surge absorber.

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