17508

11819

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.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. a) **Attempt any <u>THREE</u> of the following:** **12**

(i) Explain current limiting reactor.

(ii) What are causes of faults in power system? State any four harmful effects of faults.

(iii) Define:

(1) Plug setting multiplier

(2) Time setting multiplier

(iv) Explain the phenomenon of lightning.

Marks

b) **Attempt any ONE of the following:** **06**

(i) A station operating at 33kV is divided into section P and Q. Section P consist of 3 generators 15MVA each having reactance of 15% and section Q is ped from grid through a 750 MVA transformer of 8% reactance. The C.B's have each a rupturing capacity 750 MVA. Determine the reactance of the reactor to prevent the breakers being over loaded if a symmetrical short circuit occurs on an out going feeder connected to P.

(ii) A 3ϕ, 66/11/KV star-delta connected transformer is protected by Merz price system. The CT's on L.V. side have a ratio of 400/5. Find the ratio of the CTs on the HV side.

2. Attempt any FOUR of the following : **16**

a) Define:

(i) Arc voltage

(ii) Recovery voltage

(iii) Restriking voltage

(iv) RRRV

b) Explain construction and working of SF_6 circuit breaker.

c) Explain working of surge absorber with neat diagram.

d) Write down difference between equipment earthing and neutral earthing.

Marks

e) The current rating of a relay is 5A, PSM = 1.5, TSM = 0.5, C.T. ratio 500/5, fault current = 6000A. Determine the operating time of the relay at TSM = 1, operating time at various PSM are:

PSM	2	4	5	8	10	20
Operating time in sec	10	5	4	3	2.8	2.4

f) An 11kV, 100MVA alternator is grounded through a resistance of 4Ω. The CTs have a ratio 1000/5. The relay is set to operate when there is an out of balance current of 1A. What percentage of alternator winding will be protected by the percentage differential protection?

3. Attempt any FOUR of the following: **16**

a) Describe the difference between fuse and MCCB.

b) Write down specification and applications of Air blast C.B. and vacuum C.B.

c) How we can use CT and PT for protection purpose?

d) Write down limitation of differential protection of transformer.

e) State and explain the faults occurs in the transformer.

4. a) Attempt any THREE of the following: **12**

(i) How the alternator can be protected from inter-turn fault?

(ii) Explain Horn-gap lightning arrester with neat sketch diagram.

(iii) Describe arc extinction process in brief.

(iv) Explain distance protection of transmission line with neat sketch diagram.

b) Attempt any ONE of the following: **06**

(i) Explain single phase preventer with neat sketch diagram.

(ii) Explain fault bus protection scheme.

Marks

5. Attempt any FOUR of the following: **16**

a) Explain working of ELCB with neat sketch diagram.

b) Explain construction and characteristics of HRC fuse.

c) Explain construction and operation of induction type directional over current relay.

d) Explain operation of μp based relay with block diagram.

e) Describe over current relay with time current characteristic.

f) Explain MHO relay in details.

6. Attempt any FOUR of the following: **16**

a) Explain Buchholz relay with neat labelled diagram.

b) Explain operation of balanced beam type relay.

c) Explain negative phase sequence protection of alternator.

d) Explain over - current protection of transformer.

e) Explain differential protection of busbar.