



# 17508

15162

3 Hours / 100 Marks

Seat No.

--	--	--	--	--	--	--	--

- Instructions :**
- (1) *All questions are compulsory.*
  - (2) *Illustrate your answers with neat sketches wherever necessary.*
  - (3) *Figures to the **right** indicate **full** marks.*
  - (4) *Assume suitable data, **if necessary**.*
  - (5) *Use of Non-programmable Electronic Pocket Calculator is **permissible**.*
  - (6) *Mobile Phone, Pager and any other Electronic Communication devices are **not** permissible in Examination Hall.*

**Marks**

1. A) Attempt **any three** of the following : **(3×4=12)**
- a) State different causes of over voltages in an electrical power system.
  - b) State function with their symbol :
    - i) Circuit-breaker
    - ii) Lightning arrester
    - iii) Earthing switch
    - iv) Potential transformer
  - c) Define :
    - i) Pick-up current
    - ii) Relay time
    - iii) Plug-setting multiplier
    - iv) Reset current
  - d) Give any four properties of SF<sub>6</sub> gas.
- B) Attempt **any one** of the following : **(1×6=6)**
- a) Two 11 KV, 3- $\phi$ , 3000 KVA generators having reactance of 15% operates in parallel. The generator supply power to a transmission line through a 6000 KVA transformer of ratio 11/22 KV and having leakage reactance of 5%. Calculate fault current and fault KVA on H.T. side of a transformer.
  - b) A three phase, 33/6.6 KV, star-delta connected transformer is protected by Mertz-Price circulating current system. If the C.T.'s on low voltage side have ratio of 300/5 A. Determine ratio of CT's on high voltage side. Draw a neat diagram and indicate the given values at appropriate places.
2. Attempt **any four** of the following : **(4×4=16)**
- a) Explain with neat diagram expulsion type lightning arrester.
  - b) Compare equipment earthing and neutral earthing.
  - c) Discuss the time-graded over current protection for ring main system.
  - d) Draw neat sketch of single phase preventer for 3- $\phi$  induction motor.

**P.T.O.**



- e) State any four faults occur in power transformer and protection required.
- f) A 3-phase, 2-pole, 11 KV, 10000 KVA alternator has neutral earthed through a resistance of  $7\ \Omega$ . The machine has current balance protection which operates upon out of balance current exceeds 20% of full load. Determine percentage of winding protected against earth fault.

3. Attempt **any four** of the following : (4×4=16)

- a) What do you mean by 'Insulation co-ordination'? State its importance.
- b) List any eight faults occur in 3- $\phi$  I.M.
- c) Explain construction of H.R.C. fuse.
- d) Explain operation of solenoid type relay.
- e) Draw a neat diagram and explain distance protection for transmission line.

4. A) Attempt **any three** of the following : (3×3=12)

- a) What is ELCB ? Describe its working.
- b) State eight advantages of static relays.
- c) Explain negative phase sequence protection of alternator.
- d) Draw neat sketch of Buchholz relay.

B) Attempt **any one** of the following : (1×6=6)

- a) Draw neat sketch of minimum oil circuit breaker.
- b) Explain microprocessor based over current relay.

5. Attempt **any four** of the following : (4×4=16)

- a) What is function current limiting reactor, give classification according to their arrangements ?
- b) Define the following terms :
 

i) Arc voltage	ii) Recovery voltage
iii) Restriking voltage	iv) RRRV
- c) Draw neat circuit diagram of induction type over current relay and label its different parts.
- d) State the protective devices used for the protection of alternator against :
 

i) Over voltage	ii) Over speed
iii) Motoring	iv) Rotor over heating
- e) State the protective devices used for the protection of transformer against :
 

i) High voltage surges due to lightning	ii) Saturation of magnetic field
iii) Faults in tap changer	iv) Decomposition of oil

6. Attempt **any four** of the following : (4×4=16)

- a) Explain fault bus protection of bus-bar.
  - b) What are fundamental requirements of protective relaying ?
  - c) Write any four safety precautions while using C.T. and P.T.
  - d) State eight advantages of VCB.
  - e) Explain voltage differential relay.
  - f) Explain the limitations of differential protection of transformer.
-