6th Sem./ Electrical Engineering /2022(S)
EET601 Switchgear & Protective Devices

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

a. What are the switchgear equipments?
b. What are the causes of over voltages?
c. Define relay and circuit breaker.
d. What are the types of faults in a power system?
e. Define short-circuit kVA.
f. Why do we use reactors in a power system?
g. Write down the operating principle of circuit breaker.
h. Define pick-up current and plug setting multiplier.
i. Write down the important faults in on an alternator.
j. What is surge absorber?

2. *6 x 5*

a. What is a voltage surge? What are the causes of over voltages?
b. Write down a short note on instantaneous over current relay.
c. Write down the various methods of connecting short-circuit current limiting reactors in the power systems.
d. Define (i) current rating of fuse element (ii)fusing factor(iii)cut-off current(iv)fusing current (v)breaking capacity of a fuse.
e. Define (i) arc voltage(ii)restriking voltage(iii)recovery voltage(iv)current chopping(v)making capacity of a circuit breaker.
f. Discuss the fundamental requirements of protective relay.
g Explain low resistance method of arc extinction.

3 Define lightning arrestor and describe types of lightning arrestor. 10

4 Describe the construction & principle of operation of an induction type directional over current relay with a neat diagram. 10

5 Give a brief classification of circuit breakers. Discuss the construction details and operation of low oil circuit breaker. 10

6 Define lightning. What are the types of lightning strokes. Also state the harmful effects of lightning. 10

7 Explain Merz-price voltage balance system for protection of feeders. 10

6th Sem. /ELECT./EEE/ ELECT(I & C)/EME / 2022(S)
TH-2 Switchgear and Protective Devices

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

a. Define(i) TSM(ii) Symmetrical fault

b. State any two important faults that occur on an alternator.

c. What is the use of distance relay?

d. What are the factors on which RRRV (rate of rise of restriking voltage) in circuit breaker depends?

e. What are the desirable characteristics of fuse element?

f. State any two advantages of static relay.

g. A fuse wire of circular cross-section has a radius of 0·8 mm. The wire blows off at a current of 8A. Calculate the radius of the wire that will blow off at a current of 1A.

h. What is the function of surge absorber?

i. Define(i) Short circuit kVA (ii) Recovery voltage

j. Write any two advantages of valve type lightning arrester.

2. Answer **Any Six** Questions 6 x 5

a. What steps to be taken for the maintenance of oil circuit breakers?

b. Write a short note on High voltage fuses.

c. A 3-phase, 20 MVA, 10 kV alternator has internal reactance of 5% and negligible resistance. Find the external reactance per phase to be connected in series with the alternator so that steady current on short-circuit does not exceed 8 times the full load current.

d. Explain the protection of switchgear against lightning using overhead ground wires briefly.

e. Write a brief note on plain break oil circuit breaker with a neat diagram.

f. How time-graded protection of a radial feeder can be achieved using definite time relays and inverse time relays?

g Describe about the Earth fault or Leakage protection of 3 phase transformer.

3	Explain about the construction and operation of Buchholz relay in transformer with neat diagram.	10
4	With the help of neat diagram, describe the construction, working of Vacuum circuit breakers and also write its advantages.	10
5	Write a brief note on i) Horn-gap arrester ii) Percentage differential relay.	10
6	Explain about the construction and operation of Induction type Directional power relay with a neat diagram	10
7	Describe the differential protection of Alternators using Merz-Price circulating scheme in details.	10

6TH. SEM./ELE./ ELE. & MECH./ELE. AND ETC./EE(I & C)/ 2024(S)

Th-2 Switchgear & Protective Device

Full Marks: 80 **Time- 3 Hrs**

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks & Use Calculator

1. Answer **All** questions 2 x 10
   a. Define Plug Setting Multiplier.
   b. What is Symmetrical Fault?
   c. Write the formula of percentage reactance in terms of Base KVA.
   d. Define Restriking Voltage and recovery voltage?
   e. Why earth wire is provided in overhead transmission line?
   f. Define Fuse & write at least two desirable characteristics of fuse.
   g. What is fusing factor?
   h. Name the type of relay used to protect the long distance transmission line.
   i. What are the devices that commonly used for protection against lightning surges?
   j. Define Short Circuit KVA.

2. Answer **Any Six** Questions *6 x 5*
   a. What is lightning Arrestor and explain how horn Gap arrestor is protecting the system against lightning?
   b. Describe the construction & working principle of Induction type non-directional over current relay.
   c. Explain types of reactor used in transmission system to limit the short circuit current.
   d. Describe the different method of Arc Extinction of Circuit Breaker.
   e. Describe different types of bus bar arrangement system used in substation.
   f. Write the difference between fuse and circuit breaker.
   g Write short notes on differential Relay.

3 Describe the construction details & operation of induction type over current relay. 10

4 Explain transformer protection using differential protection method (Merz-Price Protection). 10

5 Describe the construction details & operation of Vacuum Circuit Breaker With merit and demerit. 10

6 The section bus-bars A and B are linked by a bus bar reactor rated at 5000KVA with 10% reactance. On bus-bar A, there are two generators each of 10,000 KVA with 10% reactance and on B, two generators each of 8000 KVA with 12% reactance. Find the steady MVA fed into a dead short circuit between all phases on B with bus-bar reactor in the circuit. 10

7 Write short note on 5+5
   a) Static Relay
   b) IDMT Relay