EE8602 PROCTECTION AND SWITCHGEAR

IMPORTANT QUESTIONS AND QUESTION BANK

2-Marks

UNIT-1 PROTECTION SCHEME

1. Show the need for protective schemes in power system?
2. Differentiate between a short circuit and an overload?
3. Summarize the role of protective relay in a modern power?
4. Define switchgear?
5. What are the causes of faults in a power system?
6. Summarize the functions of isolating switch?
7. Explain surge absorber? Differentiate it from surge diverter?
8. Identify the sources of fault power?
9. Explain the importance of ground wire?
10. What happen if earth wire is not provided in overhead?

Part-B

1. Explain different types of earthing the neutral point of the power system? Formulate an expression for the reactance of the Peterson coil in terms of capacitance of the protected line?
2. Describe in detail about the Peterson coil? List the protective functions?
3. A 132 kV, 3-phase, 50 Hz transmission line 200 km longconsists of three conductors of effective diameter 20 mm arranged in a vertical plane with 4 m spacing and regularly transposed. Find the inductance and kVA rating of the arc suppression coil in the system?
4. A 230 kV, 3-phase, 50 Hz, 200 km transmission line has a capacitance to earth of 0.02 μF/km per phase. Calculate the inductance and kVA rating of the Peterson coil used for earthing the above system?
5. Draw and explain protective zone diagram for a sample power system network ? List the causes of faults in different equipment's in a sample system?
6. Why protection scheme is required in power system with suitable example?
7. Explain different types of protection schemes with suitable diagrams?
8. Why neutral grounding is provided and compare different types of neutral grounding?
9. Determine the inductance of Peterson coil to be connected between the neutral and ground to neutralize having the line to ground capacitance of 0.15μF. If the supply frequency is 50 HZ and the operating voltage is 132KV. Find the KVA rating of the coil the

charging head of overhead line?

10. Draw a explain protective zone diagram for a sample Powersystem networks? List the causes of faults in different equipments in a sample system?
11. Summarize the importance of protective schemes employed in power system? Show the essential qualities of protection?
12. What are the different types of faults? Discuss the consequence of faults on a power system?
13. List the causes of faults in different equipment's in a sample system?
14. Explain in detail about the various methods of overvoltage protection of overhead transmission line?
15. Explain in detail about the need and different methods for neutral grounding with suitable diagram?

UNIT-2 ELECTROMAGNETIC RELAYS

2-MARKS

1. List the basic requirements of basic relays?
2. Summarize the functions of protective relays?
3. Show the different types of electromagnetic relays?
4. Identify the applications of attracted armature type?
5. Define time setting multiplayers in protective relays?
6. What is time graded relay?
7. Discuss the effects of arc resistance?
8. Discuss R-X diagram?
9. Why shading ring is provided in and induction disk relay?
10. What are the applications of over current relay?

Part -B

1. Develop the different inverse time characteristics of over current relays and mention how the characteristics can be achieved in practice for an EM relay?
2. Explain the general working of a relay and derive the fundamental torque equation?
3. Discuss the construction details and principle of operation of induction type directional over current relay?
4. Discuss the construction and principle of operation of non-directional induction-disc relay?
5. Determine plug setting multiplier of a 5 ampere,3 second over current relay having a current setting of 125% and a time setting multiplier of 0.6 connected to supply circuit through a 400/5 current transformer when the circuit carries a fault current of 4000Athrough a 400/5 current transformer when the circuit carries a fault current of 4000A?
6. Describe the operating principle, constructional features and area of applications of directional relay. How do you implement directional feature in the over current relay?

7. Explain the construction details and principle of operation directional induction cup relay? Explain with the help of neat diagram the construction and working of induction type directional power relay?
8. Show the MHO relay characteristic on the R-X diagram. Discuss the range setting of various distance relays placed on a particular location?
9. Show in what way distance protection is superior to over current protection for the protection of transmission line?
10. Explain the principle of working of distance relays? Describe with neat sketches the following types of relay i) Impedance relay (ii) Reactance relay (iii) Mho relay Indicate the difference on RX diagrams and show where each type is suitable?
11. Describe the operating principles and characteristic of impedance, admittance and mho relays?
12. Describe the principle of percentage biased differential relay with necessary diagrams. Also discuss its applications?
13. Explain with suitable diagram the principle of working of transley relay?
14. With neat diagram explain the various types of electromagnetic relays?
15. Describe the construction and principle of operation of non-directional induction type over current relay?

UNIT-3 APPARATUS PROTECTION

2-Marks

1. Justify, Why secondary of transformer should not be opened?
2. For a 132KV system, the reactance and capacitance up to the location of circuit breaker is 3Ω and 0.015μf respectively the frequency of oscillation?
3. Mention the difference between CTs used for protection?
4. Define the term burden on CT?
5. List the application of potential transformer?
6. Discuss the short comings of differential protection scheme as applied to power transformer?
7. Define the term pilot with reference to power line?
8. Show the applications of Buchholz's relay?
9. Explain over fluxing protection of a transformer?
10. List the common faults that occur in a generator?

Part-B

1. Compare CT & PT. What are the applications of CT & PT?
2. An 11 kV, 200MVA alternator is provided with differential protection. The % of winding to be protected against phase to

ground fault is 85 % The relay is set to operate when there is 20% out of balance current. Determine the value of the resistance to be placed in the neutral to ground connection

3. A 3 phase transformer having line voltage ratio of 0.4 kV/11 kV is connected in star delta and protective transformer on 400 v side have a current ratio of500/5.what must be the ratio of the protective transformer on the 11kV side?
4. Classify different protection schemes normally used for protection of a power transformer from internal faults? Discuss one of them in brief?
5. Explain the Merz-price circulation current scheme of protection used for power transformer?
6. A 3 phase transformer having line voltage ratio of 440 V / 11 kV is connected in star – delta. The protection transformer on the LV side has a ratio of 500 / 5. Estimate the ratio of the protection transformer connected on HV side?
7. Discuss the principle of percentage biased differential protection with necessary diagrams. Also discuss its applications?
8. Describe the differential pilot wire method of protection of feeder?
9. Describe the types of protective schemes employed for the protection of field winding and loss excitation of alternator?
10. Describe the types of protective schemes employed for the protection of Busbar?
11. Explain the types of protective schemes employed for the protection of Transmission line?
12. Show the different types of feeder and the protective schemes employed for the protection of feeder?
13. Give a brief account on the protection of generator using differential and biased differential protection scheme?
14. Give a brief account on the faults and protection of Transformer?
15. A star connected 3-phase,20MVA,11KV Alternator has a per phase reactance of 0.75 ohms/phase .It is protected by Merz price circulating current principle which is to operate for fault currents not less than 175A. Formulate the value of earthing resistance to be provided in order to ensure only 10% of the alternator winding remains unprotected?

UNIT-4 STACTIC RELAYS AND NUMERICAL PROTECTION

2-Marks

1. What are the basic circuits used in static relays?
2. Give the advantages of static relays?
3. Compose the problems arising in differential protection in power transformer and how are they overcome?
4. Show the Duality between Amplitude and Phase Comparators?
5. Explain Comparator and its type?
6. Explain the function of Synthesis of Mho Relay Using Static Phase

Comparator?
7. Define static relay?
8. Explain the function of Synthesis of Simple Impedance Relay using Amplitude Comparator?
9. Define Amplitude Comparator and Phase Comparator?
10. Define the definite time over-current relay?

Part-B

1. Describe the construction, working principle and operation of static over current relay?
2. Discuss the Synthesis of Various Distance Relays Using Static Comparators?
3. Explain with neat block diagram of the function of Synthesis of Mho Relay Using Static Phase Comparator?
4. Explain with neat block diagram of the function of Synthesis of Reactance Relay Using Cosine-type Phase Comparator?
5. Distinguish briefly about the Phase Comparators and write its Types?
6. Compose the problems arising in differential protection in power transformer and how are they overcome?
7. Explain with neat block diagram of the function of Synthesis of Simple Impedance Relay Using Amplitude Comparator?
8. Discuss with Neat Block diagram of different methods of Numerical Distance Protection of Transmission Line?
9. Assess the factors cause spill current on external fault in case of transformer Differential protection?
10. Derive the characteristics equation for the phase comparator and amplitude comparator?
11. Explain with neat block diagram the operation of statics relay and list the advantages and disadvantages?
12. Discuss the coincidence principle used in phase operators?
13. Define the over current protection and explain its types?
14. Discuss the various semiconductor devices used in the static relay?
15. Compare static relay with electromagnetic relays? Explain the advantages of Numerical relays?

UNIT-5 CIRCUIT BREAKERS

2-Marks

1. What is meant by MCB?
2. Differentiate A.C. and D.C. circuit breaking?
3. Discuss the arc phenomenon in a circuit breaker?
4. Define the term “rate of rise of recovery voltage?
5. Explain recovery voltage?
6. Explain resistance switching?
7. Explain current chopping?
8. Discuss the different methods of arc extinction?
9. Explain the rating of a circuit breaking?

10. Give the advantage of SF6 circuit breaker over Air blast circuit breaker?

Part-B

1. Define the principle of arc extinction. What are the methods of arc extinction? Describe them in detail.?
2. Give the reason of using SF6 circuit breaker?
3. Describe the construction and principle of operation of AIR Blast circuit breaker?
4. Discuss with neat sketch, the construction and working of minimum oil circuit breaker. Also gives its merits and demerits?
5. Describe the constructional details of SF6 circuit breaker and its operation. Give its advantages and disadvantages?
6. Describe the principle constructional features of all types of air blast CB. Give its advantages and disadvantages?
7. Explain the construction, working principle, operation and application of Vaccum circuit breakers?
8. Explain working principle and construction of MCB and Compare the different types of circuit Breaker used for power system protection MCCB?
9. Compare the different types of circuit Breaker used for power system protection?
10. What are the different methods of testing of circuit breaker? Describe the method which is more suitable for testing the large capacity circuit breakers. Also discuss the merits and demerits of the method?
11. Explain how arc initiated and sustained when the circuit breaker contacts break?
12. Explain in detail the various methods of arc extinction in circuit breaker?
13. Explain Resistance switching for arc extinction in circuit breakers?
14. Explain the arc interruption methods used in circuit breakers?
15. A circuit breaker is rated as 1500 A, 1000 MVA, 3 second, 3 phase oil circuit breaker. Find rated making current.?