SWITCH GEAR & PROTECTIVE DEVICES

TWO MARK QUESTIONS

1. What do you understand by percentage reactance?
2. Define and explain fusing current and breaking capacity?
3. Define Arc voltage, restriking voltage and recovery voltage?
4. What is the rating of circuit breaker?
5. What is pickup current?
6. What is P.S.M.?
7. What is static relay, explain its advantages?
8. Write the name of switch gear Equipment.
9. Define prospective current.
10. Define recovery voltage.
11. Write fundamental requirements of protective relaying.
12. Define T.S.M.
13. Write cause of over voltage.
14. What is fusing current?
15. Why discrimination is a essential features of switchgear?
16. At what voltage outdoor type switchgear equipment is install.
17. State harmful effect of lightning.
18. What is fuse? Write one of its major advantages.
19. Name of quenching medium used circuit breaker.
20. What is Arcing ground?
21. Write short-circuit KVA in terms of Base KVA and percentage of reactance.
22. Why A.C. circuit is more easily interrupted than D.C. circuit?
23. What are the materials used for fuse element?
24. Write difference between fuse and circuit breaker.
25. Write disadvantages of HRC type of fuse.
26. Define short circuit KVA.
27. Write two advantages of static relay over electromechanical type relay.
28. What do you mean by breaking capacity of a CB.
29. Name at least three advantages of vacuum CB.
30. What will be value of pick-up value of relay current if the C.T. ratio is 100: 5 and current setting of 150% & fault current equals to 10 Ka.
31. Where do you find Buchholz relay in a transformer.
32. Which type of relay is referred for medium transmission line fault.
33. A transformer is rated with 500 kVA has reactance of 10%. If the base value of KVA is 20,000 what will be the %X.
34. How the reactors are selected?
35. What are the fuse element materials.
36. What is the shape of current vrs time characteristic in an ordinary fuse and draw.

37. Why insulation are not provided against lightning in power system.
38. What is a distance relay.
39. What will be the value of pic-up value current if the rated sec. current of CT is 5A and current setting is 150%.
40. What are the types of protection?
41. What are the various relays employed for protection of apparatus and transmission lines.
42. What do you mean by IDMT lag relays?
43. What is fusing current and how it is related with diameter of the fuse wire.
44. Show one application of a circuit breaker in a switchyard.
45. What is symmetrical fault?
46. Name any two types of lightning arresters.

FIVE MARK QUESTIONS

1. Why do we use reactor in the power system? Explain the various method of connecting short circuit current limiting reactors in the power system?
2. Explain low resistance method of Arc extinction?
3. Explain difference between fuse & circuit breaker.
4. Describe various steps for calculating the actual relay operating time?
5. Describe the construction and principle of an induction type directional over current relay.
6. Write advantages of Air blast circuit breaker?
7. Explain with neat diagram of merz-price circulating current principle for the protection of alternator?
8. Discuss essential features of switch gear.
9. Write short notes on difference between a fuse and circuit breaker.
10. (i) Define P.S.M.
    (ii) A relay is connected to a 400/5 current transformer and set 150% with a primary fault current of 2400 A calculate plug-setting Multiplier.
11. Explain current differential relay.
12. Write harmful effect of Lightning.
13. What is reactor?
14. Explain plain break oil circuit-breaker.
15. Define and explain P.S.M. and T.S.M.
16. Explain Restriking voltage and recovery voltage.
17. Explain Horn-gap lightning arrester with diagram.
18. Define perspective current and cut-off current.
19. Write the short note of Arc Phenomenon.
20. Explain current differential relay.
21. Explain surge absorber.
22. Explain different type of reactor.
23. Explain C.B.
24. Write neat sketch explain how lightning discharge occurs.
25. With neat sketch explain about cut-off current characteristics relating to HRC type of fuse.

26. Explain with neat diagram the working of a Buchholz relay.
27. With neat sketch explain about restriking and recovery voltage.
28. Explain essential qualities of good protective system.
29. Discuss the arc phenomenon in a CB
30. What are the advantges of a fuse and what are the characteristic of a fuse. Draw the time-current Ch. and discuss about various currnets in fuse .
31. What are the various types of protection in a power system.
32. Explain the resistances switching process in a CB.
33. What are the different types of reactors used in power system ?show them in circuit .
34. With NEAT SKETCH EXPLAIN ABOUT MINIMUM OIL CIRCUIT BREAKER.
35. Discuss the advantages of SF6 CB?
36. What is the base impedance if base voltage =1100V base KVA=10_6
37. What are the characteristics of the fuses, explain in brief .
38. Write short notes on RRRVin brief .
39. Write short notes on current chopping ?
40. What are the difference between a fuse and circuit breaker ?
41. Why a.c. circuit is more easily interrupted then d.c. circuit ?
42. Write the con struction and working of oil cb with neat sketch in brief .
43. Explain whith necessary diagrams the principle of operation of a induction relay .
44. Write briefly about vacuum circuit breaker ?

TEN MARK QUESTIONS

1. With neat sketch explain about HRC type of fuse?
2. The plant capacity of a 3-phase generating station consists of two 10,000 kVA generators of reactance 12% each and one 5000 kVA generator of reactance 18%. The generators are connected to the station busbars from which load is taken through three 5000 kVA step-up transformers each having a reactance of 5%. Determine the maximum fault MVA which the circuit breakers on (1) Low voltage side and (ii) High voltage side may have to deal with.
3. Discuss the constructional details and operation of a typical low oil circuit breaker?
4. With neat sketch explain constructional and operating details of vacuum circuit breaker.
5. Describe the construction and working of Buchhloz relay.
6. What is lighting? Describe the mechanism of lighting discharge ?
7. Discuss the construction and working principle of a valve type arrester ?
8. The bus-bars of a power station are in two sections P and Q separated by a reactor. Connected in section P are two 15 MVA generator of 12% reactance each and to Q one 8 MVA generator of 10% reactance. The reactor is rated at 10 MVA and 15% reactance. Feeders are connected to bus bar P through transformers, each rated 5 MVA and 4% reactance. Determine the maximum short circuit MVA with which circuit breakers on the outgoing side of the transformer have to deai.
9. Explain H.R.C. catridge fuse.
10. Explain SF6 circuit breaker
11. Explain induction type non-directional overcurrent relay, with circuit diagram.
12. Explain Buchholz relay with diagram.
13. Explain Horn-gap lightning arrester with its advantages and limitation.

14. A 3-phase, 30 MVA, 33kV alternator has internal reactance of 4% and negligible resistance. Find the value of external reactance per phase to be connected in series with the alternator so that steady current on short circuit does not exceed 10 times the full-load current.

15. Explain with figure H.R.C. fuse.

16. Explain SF6 circuit-breaker.

17. Explain induction type directional power relay.

18. Explain differential protection of alternators with circuit diagram.

19. Explain valve-type lightning arrester with figure.

20. Explain H.R.C. fuse with tripping.

21. Explain plain brake oil circuit-breaker

22. Explain basic operation on Induction relay.

23. Explain valve type arrester.

24. State advantages of static relay.

25. A generating station has three section bus-bars connected with a tie-bar through 6% reactors rated at 5000 kVA. Each generator is of 5000 kVA with 12% reactance and is connected to one section of bus-bars. Find the total steady input to a dead short-circuit between the lines on one of the sections of bus-bar (i) with reactors and (ii) without reeactors.

26. With neat sketch explain about HRC typeOF FUSE?

27. With neat sketch explain about minimum oil circuit- breakers.

28. Explain induction type directional over current relay.

29. Explain earth-fault protection for transformer.

30. Explain valve type arrester.

31. A 3-phase transmission line operating at 10 kV and having a resistance of 1 ohm and reactance of 4 ohm is connected to the generating station bus bars through 5 MVA step up transforme having a reactance of 5%. The bus bars ar supplied by a 10 MVA alternator having 10% reactance. Calculate the short-circuit kVA fed t symmetrical fault between phases if it occurs (1) at the load end of transmission line. (Ii) at the high voltage terminals of the transformer.

32. With neat sketch explain about feeder reactors.

33. With neat sketch explain about minimum oil circuit breaker.

34. What are the types of reactors used in substation as per locations? Explain relative advantages. [8 3.(a) Write disadvantages of HRC type of fuses.

35. Explain the working of a sulphur hexafluoride circuit breaker with neat diagram.

36. A 3-f transmission line operating at 11 kV and having resistance of 1W and reactance of 4W is connected to the generating station bus bars through 5 MVA step up transformer, having a reactance of 5%. The bus bars are supplied by a 10 MVA alternator having 10% reactance. Calculate the short-circuit kVA fed to symmetrical fault between phases if it occurs. (1) At the load end of transmission line (ii) At the high voltage terminals of the transformers.

37. Describe with neat diagram protection of transformer by differential relay.

38. What ae the harmful effects of lightning, explain the working of horn gap lightning arrester.

39. Write short notes on any two:(i) IDMT Relay (ii) Differential Protection of alternator (iii) Vaccuum Circuit Breaker.

40. With neat sketch explain the operation of an oil CB. & discuss the types of oil CB.

41. Explain what do you understand by (i) rated symmetrical breaking current (ii) making capacity (iii) Short time over current rating. The 3 oil CB has the following data. Operating voltage = 11 kV. Restriking capacity = 500 MVA ,Normal Current = 500 A time = 3 sec.

42. What are the advantages of a fuse explain?

43. Discuss the lightning phenomenon in power system.

44. A 100 MVA generator with 10% reactance and 200 MVA generator with 8% reactance (own bases) are connected in series with two CB A and B. There are two bases. The fault level in bus-1 is to be restricted to 1500 MVA. Calculate on 100 MVA base (i) The reactance of bus reactor X.

45. State and explain the various important components common to most of the circuit breaker and their function. Show the components.

46. Explain with diagram the protection by current differential relay.

47. What ae the harmful effects of lightning, explain the working of hom gap lightning Barrester.

48. Explain the working of a sulphur hexafluoride circuit breaker with neat diagram.