NEW SCHEME

EE63

USN ☐☐☐☐☐☐☐☐☐☐

Sixth Semester B.E. Degree Examination, July/August 2005

Electrical & Electronics Engineering

Switchgear and Protection

Time: 3 hrs.]

[Max.Marks : 100

Note: *1. Answer any FIVE full questions.*
2. Any missing data may be suitably assumed.

1. (a) Define the following terms as applied to circuit breakers.

    i)   Restriking voltage ii) RRRV iii) Recovery voltage.   **(6 Marks)**

  (b) Describe principle of resistance switching and derive an expression for value of critical resistance Rc where L and C are inductance and capacitance per phase of system respectively upto circuit breaker location point.   **(10 Marks)**

  (c) In a 220 KV system, the reactance and capacitance upto the location of circuit breaker is 6 ohms and $0.02\mu f$ respectively. Calculate value of critical resistance for suppressing transient oscillations.   **(4 Marks)**

2. (a) With a neat diagram explain operation of vacuum circuit breakers. State the advantages of vacuum circuit breakers.   **(10 Marks)**

  (b) Describe principle of operation of DC circuit breakers.   **(6 Marks)**

  (c) In a 132 KV system, the inductance and capacitance per phase upto location of circuit breaker is 10H and 0.02μ f respectively. Circuit breaker interrupts a magnetizing current of 15 Amp (rms) due to current chopping. Determine the maximum voltage which appears across contacts of circuit breaker.

        (4 Marks)

3. (a) With a neat sketch explain synthetic testing (parallel current injection method) of circuit breakers.   **(8 Marks)**

  (b) Define the following with reference to protection system.

    i)   Sensitivity ii) Reliability iii) Selectivity   **(6 Marks)**

  (c) Explain principle of operation of directional over current relay with neat sketch.   **(6 Marks)**

4. (a) Describe principles of differential protection.   **(5 Marks)**

  (b) With neat diagram explain brief zones of protection in typical power system.   **(5 Marks)**

  (c) Explain differential scheme for bus bar protection. What can be drawback of the scheme and how this can be overcome.   **(10 Marks)**

5. (a) Describe principle of 3 zones distance protection for transmission lines.
(8 Marks)

(b) Explain principles of operation of impedance relays. (6 Marks)

(c) State different protective schemes provided for protection of generators.
(6 Marks)

6. (a) Explain a protection scheme provided against stator internal faults of a generator.
(10 Marks)

(b) Describe protection of motors against unbalance and single phasing.
(10 Marks)

7. (a) What are different types of faults that are encountered by power transformers in service.
(6 Marks)

(b) Describe harmonic restraint relay provided to protect power transformers against magnetizing in rush current.
(8 Marks)

(c) Briefly describe Buchholz relay protection for power transformer. (6 Marks)

8. Write short notes on :

a) Testing of circuit breakers

b) principles of power system protection

c) Reactance relay

d) Carrier aided distance protection
(4×5=20 Marks)

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