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Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Eighth Semester

Branch : Electrical and Electronics Engineering

SWITCHGEAR AND PROTECTION (E)

(Old Scheme - Prior to 2010 Admissions)

[Supplementary/Mercy Chance]



Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 4 marks.

1. Write a note on circuit breaker rating.
2. Discuss the properties of SF₆ gas. Highlight the properties which makes it one of the best arcquenching medium.
- ~~3. Explain the concept of busbar rating with a neat diagram.~~
4. Explain the working of induction relay.
5. Explain the protection against failure of excitation on generators.
6. Explain how the incipient fault protection is possible in transformer.
7. Explain the differential protection scheme in transmission line.
8. Explain the protection of parallel feeders.
9. Explain the use of ground wires in overhead transmission line.
10. Explain the surge impedance and velocity of propagation.

(10 × 4 = 40 marks)

Part B

Answer all questions.

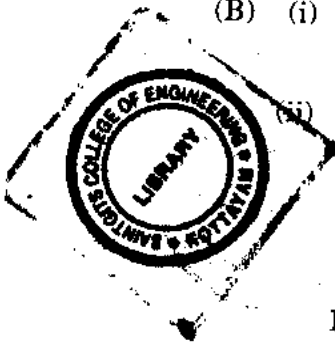
Each full question carries 12 marks.

11. (A) (i) With the help of one line diagram of a typical power system, explain why the power system is divided into different protective zones. Give the reasons for overlapping adjacent zones of protection.
- (ii) Derive the expression of re-striking voltage and RRRV of a circuit breaker.

(6 + 6 = 12 marks)

Or

Turn over



(B) (i) With the help of neat sketch, explain the construction, principle of operation and working of an Air blast Circuit breaker with its merits and demerits.

(ii) In a short circuit test on a circuit breaker the following readings were obtained on single frequency constraint :

(a) Time to reach the peak re-striking, $50 \mu\text{s}$.

(b) The peak re-striking voltage, 100 kV.

Determine the average RRRV and frequency of oscillations.

(7 + 5 = 12 marks)

12. (A) Classify and give brief explanation of the protective relays based on :

(i) Technology used/construction.

(ii) Actuating quantity.

(iii) Time/PSM characteristics.

(12 marks)

Or

(B) (i) With a neat diagram, explain the block diagram of static impedance relay.

(ii) Explain with sketches the negative phase sequence relay.

(6 + 6 = 12 marks)

13. (A) (i) With sketches, explain the stator inter turn protection of alternator.

(ii) A 3 phase, 11 kV, 15 MVA star connected alternator is protected by the current balancing system of protection. If the ratio of the C.T's is 1200/5, the minimum operating current of the relay is 0.7 A and the neutral point earthing is 5.5Ω , calculate the percentage of each phase of stator winding which is unprotected against earth faults when the machine is operating at normal voltages.

(6 + 6 = 12 marks)

Or

(B) (i) With the help of a neat diagram, explain the core balance leakage protection of transformer.

(ii) A 120 MVA, delta/star connected, 11/220 kV transformer is to be protected by percentage differential scheme. C.Ts used are 5000/5 and 400/1 respectively. Draw the sketch of complete scheme.

(5 + 7 = 12 marks)

14. (A) Explain the protection scheme of (i) Ring main feeder ; and (ii) Radial feeder.

(12 marks)

Or

- (B) (i) Explain why distance protection is superior to other types of protection for an overhead line.
- (ii) What are the advantages and disadvantages of pilot wire protection in transmission line?

(7 + 5 = 12 marks)

15. (A) (i) What is horn gap arrester? Explain how it works. What is the purpose of inserting a resistance between horn gap arrester and line?
- (ii) What are the causes of over voltages in an electrical system?

(7 + 5 = 12 marks)

Or

- (B) Starting from fundamentals, derive the expressions for voltage and current waves propagated on long transmission line.

(12 marks)

[5 × 12 = 60 marks]

