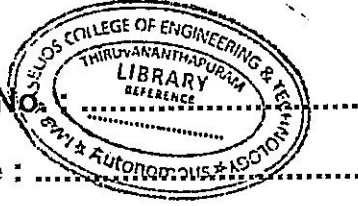


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M – 6274

Reg. No.

Name :



Sixth Semester B.Tech. Degree Examination, December 2021

08.605 — POWER SYSTEM ENGINEERING II (E)

(2008 Scheme)

Time : 3 Hours

Max. Marks : 100

PART – A

Answer **all** questions.

1. Two generating stations having short circuit capacities of 1200 MVA and 800 MVA, operating at 11 kV are linked by an interconnecting cable having a reactance of 0.5 ohm per phase. Determine the short circuit capacity of each station with interconnection.
2. Determine the symmetrical components of $V_A = 230 \angle 0^\circ$ A, $V_B = 220 \angle -120^\circ$ A and $V_C = 210 \angle -240^\circ$ A.
3. Show that positive and negative sequence currents are equal in magnitude but out of phase by 180 degree in a line-to-line fault.
4. What do you mean by discrimination? Discuss about the discrimination between two fuses.
5. Explain the terms Restriking voltage and RRRV.
6. A circuit breaker interrupts the magnetising current of a 100 MVA transformer at 220 kV. The magnetising current of the transformer is 5% of the full load current. Determine the maximum voltage which may appear across the gap of the breaker when the magnetising current is interrupted at 50% of its peak value. The stray capacitance is 2500 μ F. The inductance is 20 H.

P.T.O.



7. What is the difficulty in the development of HVDC circuit breaker?
8. Discuss the protection employed against loss of excitation of an alternator.
9. What is Buchholz relay? For what types of faults is it employed?
10. What do you understand by field suppression of alternator?

(10 × 4 = 40 Marks)

PART – B

Answer **one** full questions from each module.

Module – 1

11. (a) Two synchronous motors are connected to the bus of large system through a short transmission line shown in Fig. 11 (a). The ratings of the various components are:

Motor (each) : 1 MVA, 440 V, 0.1 pu transient reactance

Line : 0.05 Ω (reactance)

Large system: Short-circuit MVA at its bus at 440 V is 8.

When the motors are operating at 400 V, calculate the short circuit current (symmetrical) fed into a three-phase fault at motor bus. 10

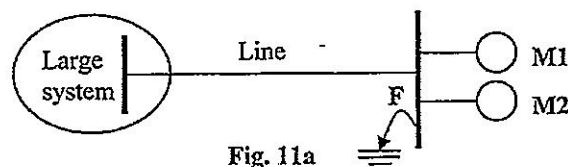
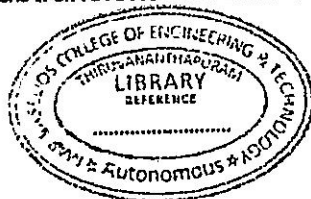


Fig. 11a

- (b) A synchronous generator and motor are rated 30,000 kVA, 13.2 kV and both have subtransient reactances of 20%. The line connecting them has a reactance of 10% on the base of the machine ratings. The motor is drawing 20,000 kW at 0.8 p.f. leading and a terminal voltage of 12.8 kV when a symmetrical three-phase fault occurs at the motor terminals. Find the subtransient currents in the generator, the motor, and the fault. 10



OR



12. (a) Derive the relationship for fault currents in terms of symmetrical components when there is a Double line-to-ground (DLG) fault. Also draw a diagram showing interconnection of sequence networks for DLG fault. **12**
- (b) Show that for a three phase transmission line the sequence networks (positive, negative and zero) are not decoupled if the mutual impedance between the lines is not equal. **8**

Module – 2

13. (a) Describe the construction and operation of the HRC cartridge fuse. What are its advantages and disadvantages? **10**
- (b) Enumerate various types of ratings of a circuit breaker. Discuss the breaking capacity, making capacity and short-time current rating of circuit breakers. **10**

OR

14. (a) In a 220 kV system, the reactance and capacitance up to the location of circuit breaker is 8 ohm and 0.03 μ F, respectively. A resistance of 600 ohms is connected across the contacts of the circuit breaker. Determine the critical resistance which will give no transient oscillation and the value of resistance which will give damped frequency of oscillation at one-fourth of the natural frequency of oscillation. **10**
- (b) Describe the construction, operating principle and application of SF₆ circuit breaker. **10**

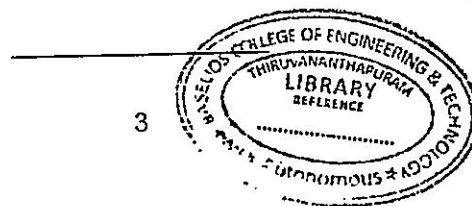
Module – 3

15. (a) Describe with a neat sketch, the percentage differential protection of a modern alternator. **10**
- (b) What is magnetising inrush current? What measures are taken to distinguish between the fault current and magnetising inrush current? Discuss the protective scheme which protects the transformer against faults but does not operate in case of magnetising inrush current. **10**

OR

16. (a) Describe the realisation of impedance relay using a microprocessor. **10**
- (b) Discuss about any two methods of neutral earthing. **10**

(3 × 20 = 60 Marks)



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