

END TERM EXAMINATION

SIXTH SEMESTER [B.TECH] MAY-JUNE 2017

Paper Code: ETEE-302

Subject: Power System-II

Time: 3 Hours

Maximum Marks: 75

Note: Attempt any five questions including Q.no.1 which is compulsory.
Assume missing data if any.

- Q1 (a) Explain the difference between a CT used for instrumentation and CT used for protection.
(b) What is switching resistance?
(c) Differentiate between surge diverter and surge absorber.
(d) Why neutral of the transformer in a distribution substation must be earthed?
(e) Define PSM and TMS in IDMT relay.
(f) Explain recovery rate theory in circuit breakers.
(g) What are the protective devices employed for the protection of an alternator against (i) vibration, (ii) overspeed, (iii) motoring?
(h) Draw impedance relay characteristic.
(i) Mention advantages of SF₆ circuit breakers.
(j) How does grounding affects relay applications? (2.5x10=25)
- Q2 (a) Explain various types of Phase comparators. (4.5)
(b) For what type of protective relay will you recommend (i) an induction disc type (ii) induction cup type construction? What measures are taken to minimize the overrun of the disc? (4)
(c) The rated secondary current of a CT is 5 A. The plug setting of a relay is 3.75 A. The power consumption of the relay at this plug setting is 4 VA. Calculate the effective VA burden on the CT. (4)
- Q3 (a) Explain induction disc relay with the help of neat diagram and derive expression for produced force. (4.5)
(b) Classify and explain various types of current transformers. (4)
(c) Discuss how an amplitude comparator can be converted to a phase comparator and vice versa. (4)
- Q4 (a) A 11 kV, 100 MVA generator is provided with differential scheme of protection. The percentage of the generator winding to be protected against phase to ground is 82%. The relay is set to operate when there is 14% out of balance current. Determine the value of the resistance to be placed in the natural to ground connection. (4.5)
(b) Draw the schematic and explain the protection of rotor against earth fault. (4)
(c) What is Buchholz relay? Which equipment is protected by it? For what types of faults is it employed? Discuss its working principle. (4)
- Q5 (a) A three-phase, 132kV/33 kV star-delta connected power transformer is protected by differential protection scheme. Determine the ratio of the CTs on the HV side of the transformer, if that on the LV side is 300/5. How are the CT secondaries connected? (4.5)
(b) Discuss the type of protection required for stator Inter-turn faults. (4)
(c) Mention the condition which results in high severe overheating of the rotor. Explain protection of rotor against such overheating. (4)

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- Q6 (a) What is carrier current protection? For what voltage range is it used for the protection of transmission lines? What are its merits and demerits? With neat sketch, discuss the phase comparison scheme of carrier current protection? (7.5)
- (b) What are the causes of overvoltages arising on a power system? Why is it necessary to protect the lines and other equipment of the power system against overvoltage? (5)
- Q7 (a) Write short notes on the following: (7.5)
- (i) Expulsion type lightning arrester
- (ii) Rod Gap
- (iii) Ferranti surge absorber
- (b) Discuss how (i) an electromechanically and (ii) a static MHO relay is realized. Explain its characteristics on the R-X diagram. (5)
- Q8 (a) Describe with neat sketches the working of the cross-jet explosion pot of an oil circuit breaker. Compare its merits and demerits with other types of arc control devices comparison scheme of carrier current protection? (6.5)
- (b) A circuit breaker interrupts the magnetizing current of a 100 MVA transformer at 220 kV. The magnetizing current of the transformer is 4% of the full load current. Determine the maximum voltage which may appear across the gap of the breaker when the magnetizing current is interrupted at 53% of its peak value. The stray capacitance is 2500 μ F. The inductance is 30H. (6)
- Q9 (a) Explain the terms: restriking voltage, recovery voltage and RRRV. Derive expression for restriking voltage and RRRV in terms of system voltage, inductance and capacitance. What measures are taken to reduce them. (6.5)
- (b) Classify and explain the various types of Fuses. (6)

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