1128
B.E. (Electrical and Electronics Engineering)
Fifth Semester
EE-501: Power Systems

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt _five_ questions in all, including Question No. I (Section-A) which is compulsory and selecting two questions from each Section B.-C.

x-x-x

Q.No.	Section-A	Mark
1.	a) What is the approximate rod gap length for a system voltage of 66, 132 & 275 kV?	02
	b) What is the function of directional relay? What are its various types?	02
	c) A three phase circuit breaker is rated at 2000 MVA, 33 kV. Calculate its making current capacity.	02
	d) What is the data required in relay for determination of actual operating time? How it is determined?	02
	e) Where do we apply differential protection principle? Why percentage differential relay is named so?	02
	Section-B	
2.	a) Derive the expression for Restriking voltage transient of circuit breaker. Obtain the expression of RRRV from this derivation.	05
	b) Explain the construction and working of SF6 circuit breaker. Discuss its advantages and limitations.	05
3.	a) A 200 MW. 13.8 kV, 0.9 PF, 50 Hz, three phase star connected generator is protected by an earth fault relay. The relay is set to operate at 10%. And CT ratio is 10000/1. A resistor is used in the neutral circuit of generator to limit the earth fault current to 50% of the normal load current. Determine the value of resistor and the percentage of stator winding protected.	05
	b) Explain the Time Graded protection of Feeders along with its different types.	05
4.	a) A 220 kV, three phase, 50 Hz, 60 km long overhead transmission line has a capacitance of 1.2 µF/km. Determine the inductive reactance and kVA rating of the arc suppression coil suitable for this system to eliminate arcing ground effect.	07
	b) Explain the principle of operation of Rod gap arrestor and Surge absorber for the protection against overvoltage.	03

	Section-C	
5.	a) An 11 kV, 5000 kVA generator is provided with restricted earth fault protection and the percentage of winding protected against earth fault is 80%. Calculate the resistance to be added in neutral to ground if relay trips for 25% out of balance.	07
	b) Explain the negative sequence protection of an alternator.	03
6.	a) A three phase power transformer Delta/Star connected rated as 50 MVA, 132/66 kV is protected by percentage differential relays. The CT ratings on delta and star sides are 300/5 A and 1200/5 A. Calculate (i) the output current at full load (ii) the relay current at full load (iii) minimum relay current setting to permit 50% overload.	06
	b) Explain the concept of primary protection and backup protection in power system with examples.	04
7.	A 30,000 kVA, 11 kV generator with $x_d'' = 20\%$ is connected to a synchronous motor through a transformer. The transformer is rated at 35,000 kVA, 11 kV/6.6 kV with leakage reactance of 10%. The motor is rated at 30,000 kVA, 6.6 kV with sub-transient reactance of 25%. Find the sub-transient current when a symmetrical fault occurs at the terminals of motor using Thevenin's impedance method.	10

x-x-x