

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
(AUTONOMOUS)



(Approved by AICTE, New Delhi & Affiliated to JNTUA, Ananthapuramu)
(Accredited by NAAC with "A+" Grade & ISO 9001 : 2008 Certified Institution)

QUESTION BANK (DESCRIPTIVE)

Subject with Code : Power System Protection (20EE0232)

Course & Branch: B. Tech -EEE

Year & Semester: IV- B. Tech. & I-Semester

Regulation:R20

UNIT –I
CIRCUIT BREAKERS

1	(a)	Explain the principle of ARC extinction.	[L1][CO1][6M]
	(b)	Discuss the different methods of "ARC" extinction	[L1][CO1][6M]
2		Explain Sliepian's theory and energy balance theory	[L1][CO1][12M]
3		What is resistance switching and derive the expression for critical resistance in terms of system inductance and capacitance which gives no transient oscillation ?	[L1][CO1][12M]
4		For a 132kv system, the reactance and capacitance up to the location of a C.B is 3Ω . And 0.015μ F respectively. Calculate the following a) The frequency of transient oscillations. b) The Maximum value of restriking voltage. C)The max value of RRRV.	[L3][CO1][12M]
5		Explain the terms recovery voltage, restriking voltage and RRRV. Derive an expression for restriking voltage in terms of system capacitance and inductance.	[L3][CO1][12M]
6		Write short notes on the following. (i) Resistance switching (ii) Current chopping. (iii) Circuit breaker? Explain its function	[L1][CO1][12M]
7.		Explain the operation of Minimum oil Circuit Breaker with diagram.	[L1][CO2][12M]
8.		With neat sketch, describe the working principle of an axial air blast type circuit breaker	[L2][CO2][12M]
9.		Discuss the operating principle of SF6 circuit breaker, what are its advantages over other types of circuit breakers and for what voltage range it is recommended.	[L1][CO2][12M]
10		Explain the principle and operation of Vacuum Breaker with diagram.	[L1][CO2][12M]

UNIT –II
RELAYS

1	(a)	What is protective relay? Discuss the basic requirements of relay.	[L1][CO3][6M]
	(b)	Explain the constructional details and operation of attracted armatures relay	[L1][CO3][6M]
2	(a)	Explain the significance of primary and back up protection.	[L1][CO3][6M]
	(b)	Classify the various types of the over current relays and give their applications along With characteristics	[L2][CO3][6M]
3		Describe the principle of Reactance relay and explain its characteristics on R-X planes	[L1][CO3][12M]
4		Describe the principle of Impedance relay and explain its characteristics on R-X- planes.	[L2][CO3][12M]
5	(a)	What are the advantages of induction cup relays over induction disc relays? What is the purpose of shading in an induction disc-relay?	[L2][CO3][6M]
	(b)	Explain differential relay in detail	[L2][CO3][6M]
6		Explain the need for static relays. Explain the basic units in a static relay. Enumerate the advantages and disadvantages of static relays .	[L2][CO3][12M]
7	(a)	List the advantages and disadvantages of microprocessor based relays.	[L1][CO3][6M]
	(b)	Explain the working of a static over current relay.	[L1][CO3][6M]
8	(a)	What are the different types of distance relays? Compare their merits and demerits.	[L1][CO3][6M]
	(b)	Discuss the principle of operation of induction cup relay with relevant diagram.	[L1][CO3][6M]
9	(a)	Derive the expression for torque developed in induction relay	[L1][CO3][6M]
	(b)	What is universal torque equation? Using this equation derive the following (i) Impedance relay (ii) reactance relay (iii) Mho relay	[L1][CO3][6M]
10		Explain working of microprocessor based over current relay with suitable diagram.	[L2][CO3][12M]

UNIT –III

PROTECTION OF GENERATORS & TRANSFORMERS

1	(a)	Describe the protection of the stator windings of 3-phase alternator against turn-to-turn faults.	[L1][CO4][6M]
	(b)	Calculate the required value of neutral resistance for a 3-phase 11kv alternator so as to protect 70% of the winding against earth-fault by a relay with pick-up current of 1A. The neutral CT has a ratio of 250/5.	[L3][CO4][6M]
2	(a)	Explain protection of generators in abnormal conditions	[L2][CO4][6M]
	(b)	Explain internal faults inside the transformer	[L2][CO4][6M]
3	(a)	Enumerate the relaying schemes, which are employed for the protection of a modern alternator?	[L1][CO3][6M]
	(b)	An 11kv, 1000 MVA generator is provided with differential scheme of protection. The percentage of generator winding to be protected against phase to ground fault is 80%, the relay is set to be operate when there is a 15% out of balance current determine the value of resistance to be placed in neutral to ground connection?	[L3][CO4][6M]
4	(a)	Explain a scheme of protection for failure of alternator excitation.	[L1][CO4][6M]
	(b)	Discuss the different types of transformer faults. What are various protective schemes available for transformers?	[L1][CO4][6M]
5	(a)	Describe the protection of the stator windings of 3-phase alternator against turn-to-turn faults.	[L1][CO4][6M]
	(b)	Calculate the required value of neutral resistance for a 3-phase 11kv alternator so as to protect 70% of the winding against earth-fault by a relay with pick-up current of 1 A. The neutral CT has a ratio of 250/5.	[L3][CO4][6M]
6		A 6.6 kV, 4000 kVA star connected alternator with a transient reactance of 2Ω /phase And negligible resistance, is protected by a circulating current protective system. The alternator neutral is earthed through a resistor of 7.5Ω . The relays are set to operate when there is an out of balance current of 1 A in the secondary windings of the 500/5 current Transformers. what percentage of each phase winding is protected against an earth fault?	[L3][CO4][6M]
7	(a)	Discuss the percentage differential protection scheme of a transformer?	[L1][CO3][6M]
	(b)	Explain the working principle of buch-holtz relay with neat diagram?	[L1][CO3][6M]
8	(a)	Discuss earth fault protection for transformers.	[L3][CO4][6M]
	(b)	A 3-phase transformer rated for 33kV/6.6kV is connected star-delta and the Protecting current transformer on the low voltage side have a ratio of 400/5. Determine the ratio of the current transformer on the HV side.	[L2][CO4][6M]
9		The neutral point of a 3-phase, 20MVA, 11kV alternator is earthed through a resistance of 5Ω , the relay is set to operate when there is an out of balance current of 1.5 A. The C.T.s has a ratio of 1000/5. What percentage of winding is protected against an earth fault and what should be the Minimum value of earthing resistance to protect 90% of the winding.	[L3][CO4][6M]
10		Explain the significance for the protection of transformers and explain the Buchholz relay protection with neat block diagram.	[L1][CO4][12M]

UNIT-IV
PROTECTION OF FEEDERS & LINES

1	(a)	Elaborate on various methods for protection of feeders.	[L1][CO5][6M]
	(b)	What is the importance of bus-bar protection? What are the requirements of protection of lines?	[L1][CO5][6M]
2	(a)	Explain in detail about the time graded and current graded system.	[L1][CO5][6M]
	(b)	Explain the construction and principle of operation of a translay relay	[L1][CO5][6M]
3	(a)	Explain in detail about the Merz price voltage balanced system with a neat single line diagram.	[L1][CO5][6M]
	(b)	Describe in detail the protection of parallel feeder and ring mains.	[L1][CO5][6M]
4		Draw the schematic diagram of the carrier current protection scheme of lines. Also explain its working principle.	[L3][CO5][12M]
5		Explain about the over current protection of bus bars with relevant connection diagram	[L1][CO5][12M]
6		Explain over-current protection of feeders. How is the protection system graded with respect to the time of operation of relays for a radial feeder	[L1][CO5][12M]
7		With neat Diagram Explain the Three zone distance protection in 3-Phase transmission line.	[L3][CO5][12M]
8		Write short notes on the following: (i) Fault bus protection (ii) Translay scheme.	[L1][CO5][12M]
9	(a)	Discuss the importance of Bus bar protection.	[L1][CO5][6M]
	(b)	What is back-up protection of bus bar?	[L1][CO5][6M]
10		Describe the principle of bus -bar protection based on voltage differential systems. How does it Overcome the problems of saturation of CT's?	[L1][CO5][12M]

UNIT-V
PROTECTION AGAINST OVER VOLTAGES AND
GROUNDING

1	(a)	Discuss the phenomena of a lightning stroke.	[L1][CO6][6M]
	(b)	Explain the working of valve type lightning arrester.	[L1][CO6][6M]
2		Write short notes on the following: (a) Causes of over voltages in power systems. (b) Basic impulse level and its significance.	[L1][CO6][12M]
3	(a)	What is lightening? Describe the mechanism of lightning discharge by drawing suitable diagrams	[L1][CO6][6M]
	(b)	List out the types of lightning arresters and write its advantages in a protection system. Explain, with a neat sketch, the working of Zinc-Oxide lightning arrester	[L1][CO6][6M]
4	(a)	Explain and sketch neat diagram of valve type lightning arrester.	[L1][CO6][6M]
	(b)	Enumerate the basic concepts of insulation coordination.	[L1][CO6][6M]
5	(a)	Explain the differences between equipment grounding and system grounding?	[L1][CO6][6M]
	(b)	Discuss the advantages and disadvantages of overhead ground wires	[L1][CO6][6M]
6	(a)	With a neat diagram explain the operation of any one type of lightning arrester.	[L3][CO6][6M]
	(b)	Discuss and compare the various methods of neutral earthing explain.	[L2][CO6][6M]
7	(a)	Briefly explain the various methods of overvoltage protection of overhead transmission line.	[L1][CO6][6M]
	(b)	What is horn gap arrester? Explain how it works. What is the purpose of inserting a Resistance between horn gap arrester and the line?	[L1][CO6][6M]
8		Explain the term insulation coordination. Describe the construction of volt -time curve and terminology associated with impulse testing.	[L1][CO6][12M]
9	(a)	What is voltage surge? Draw typical lightning voltage surge.	[L3][CO6][6M]
	(b)	Describe the construction & principle of operation of valve type lightning arrester.	[L1][CO6][6M]
10		What are the causes of over voltages arising on power system? Why is it necessary to protect the lines and other equipment of the power system against over voltages ?	[L1][CO6][12M]

Prepared by R.S. SAI PRAVEEN KUMAR