Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – SUMMER 2022

Subject Code:3170908 Date:01/06/2022

Subject Name:Switchgear And Protection

Time:02:30 PM TO 05:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Define following qualities of a protective relay: (i) Sensitivity (ii) Selectivity (iii) Discrimination	**03**
	(b)	Explain following terms with reference to Circuit Breaker: (i) Breaking Current (ii) Making Current	**04**
	(c)	Draw and explain basic tripping mechanism of relay.	**07**
Q.2	**(a)**	Define the terms 'Plug Setting Multiplier'. An IDMT type overcurrent relay is used to protect a feeder through a 600/1A CT. The relay has a plug setting of 125%. Find the Plug Setting Multiplier, if a fault current of 6000A flows through the feeder.	**03**
	(b)	Explain the operating characteristic of percentage biased differential relay.	**04**
	(c)	Draw a schematic diagram of primary protection zone of various equipments. Also explain the difference between primary and back-up protection.	**07**
		OR	
	(c)	With a neat sketch, explain working of induction disc type relay.	**07**
Q.3	**(a)**	Enumerate the superiority of distance relay for the protection of transmission line.	**03**
	(b)	Explain restricted earth fault protection of three phase transformer.	**04**
	(c)	Give comparison of Simple Impedance relay, Reactance relay and MHO relay.	**07**
		OR	
Q.3	**(a)**	Describe different abnormalities in the transformer.	**03**
	(b)	Define under reach and over reach of distance relay.	**04**
	(c)	With a neat diagram, explain working of Buchholz relay.	**07**
Q.4	**(a)**	Explain protection of generator against unbalanced loading.	**03**
	(b)	Compare measuring CT & protective CT.	**04**
	(c)	Classify various types of faults and abnormal condition in Induction motors and protections used for them.	**07**
		OR	
Q.4	**(a)**	Explain the effect of CT saturation on busbar protection.	**03**
	(b)	Describe protection against loss of excitation in generator.	**04**
	(c)	A 200 MW, 13.8 kV, 0.9 PF, 50 Hz, 3-ϕ, Y-connected generator is protected by earth-fault relay. The relay is set to operate at 10%. The CT ratio is 10,000/1 A. A resistor is used in the neutral circuit of the generator to limit the earth-fault current to 50% of the normal load current. Determine the value of the resistor and percentage of stator winding protected.	**07**
Q.5	**(a)**	Define the following: (i) CT ratio error, (ii) CT phase angle error, (iii) CT Burden	**03**
	(b)	Discuss Recovery Rate Theory (Slepian's Theory) and Energy Balance Theory (Cassie's Theory) for arc extinction in Circuit breaker.	**04**
	(c)	With the help of schematic diagram, discuss various components of numerical relay.	**07**

OR

Q.5	**(a)**	Define: (i) Re-striking voltage (ii) Recovery voltage (iii) RRRV	**03**
	(b)	Compare Electromagnetic type PT & Capacitive type PT	**04**
	(c)	With a neat sketch, Describe SF6 Circuit Breaker.	**07**

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