Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 7 – EXAMINATION – SUMMER 2026

Subject Code: 2170908 **Date: 03/06/2026**

Subject Name: Switch Gear 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.**

Q.1	**(a)**	Discuss various zones of protection for a modern power system. Explain primary and back-up protection.	**03**
	(b)	Write and explain difference between measurement CT & protective CT.	**04**
	(c)	Define following terms (i) Reliability (ii) Selectivity (iii) Discrimination (iv) PSM (v) Burden (vi) Under reach and Over reach of relay (vii) Relay pick up.	**07**
Q.2	**(a)**	Explain in brief, how the percentage differential relay overcomes the drawbacks of simple differential relay.	**03**
	(b)	Give classification of different types of relays.	**04**
	(c)	For Impedance, Mho and Reactance relay, explain the effect of power swing with help of suitable relay characteristic diagram.	**07**
		OR	
	(c)	Explain construction and working principle of induction cup type electromagnetic relays. Derive an expression for torque produced by induction type relay.	**07**
Q.3	**(a)**	Draw the block diagram of numerical relay.	**03**
	(b)	Enlist all Arc interruption theories and explain any one of them in detail.	**04**
	(c)	Explain construction and working of SF_6 circuit breaker.	**07**
		OR	
Q.3	**(a)**	Compare Reactance relay with Mho relay.	**03**
	(b)	Explain 3-stepped distance protection.	**04**
	(c)	Explain Transformer Differential protection scheme with necessary diagram.	**07**
Q.4	**(a)**	What is the need of Carrier aided protection scheme.	**03**
	(b)	Explain inrush phenomenon in transformer.	**04**
	(c)	Draw and explain protection of generator against unbalanced loading.	**07**
		OR	
Q.4	**(a)**	Describe protection against loss of excitation in generator.	**03**
	(b)	Explain why the first ground fault on the rotor does not cause any damage while a second fault can be catastrophic.	**04**
	(c)	Explain REF protection of power transformer.	**07**
Q.5			

	(a)	Define following terms (i) Recovery voltage (ii) Re-striking voltage (iii) RRRV.	**03**
	(b)	Enlist various faults & abnormal operation conditions of Induction Motor.	**04**
	(c)	Explain any one Feeder protection scheme in detail with suitable schematic diagram.	**07**
		OR	
Q.5	**(a)**	Why can the secondary of a protection CT not to be open circuited?	**03**
	(b)	Why is protection of an induction motor against reversal of phase sequence required?	**04**
	(c)	Write short note on gas operated relay.	**07**

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