

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2017

Subject Code: 2170908

Date: 07/11/2017

Subject Name: Switch Gear and Protection

Time: 10:30 AM TO 01:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

MARKS

- Q.1**
- | | | |
|-------|---|-----------|
| (a) | Define the following term: | 03 |
| (I) | Relay pick up | 04 |
| (II) | Fault clearing time | 07 |
| (III) | Reach of the relay | |
| (b) | Explain primary and back-up protection. | |
| (c) | Explain induction disc type electromagnetic relay with torque equation. | |

- Q.2**
- | | | |
|-----|--|-----------|
| (a) | Differentiate DMT and IDMT over current relay. | 03 |
| (b) | Write and explain drawback of over current relay. | 04 |
| (c) | The current rating of an over current relay is 5 A. The relay has a plug setting of 150 % and time multiplier setting of 0.4. The CT ratio is 400/5. Determine the operating time of the relay for a fault current of 6000 A. At TMS=1, operating time at various PSM are given in following table : | 07 |

PSM	:	2	4	5	8	10	20
Operating time	:	10	5	4	3	2.8	2.4
In seconds							

OR

- | | | |
|-----|--|-----------|
| (c) | How to measure the magnetization curve of CT in laboratory. Why magnetization curve is important in selection of CT? | 07 |
|-----|--|-----------|

- Q.3**
- | | | |
|-----|---|-----------|
| (a) | Explain simple differential relay. | 03 |
| (b) | Write and explain drawback of simple differential relay. | 04 |
| (c) | Write short note on percentage differential protection of Delta/Star power transformer. | 07 |

OR

- Q.3**
- | | | |
|-----|--|-----------|
| (a) | Draw the block diagram of numerical relay. | 03 |
| (b) | Explain inrush phenomenon in transformer. | 04 |
| (c) | Write short note on gas operated relay. | 07 |

- Q.4**
- | | | |
|-----|--|-----------|
| (a) | Compare Reactance relay with Mho relay. | 03 |
| (b) | Explain 3-stepped distance protection. | 04 |
| (c) | Write short note on air blast circuit breaker. | 07 |

OR

- Q.4**
- | | | |
|-----|--|-----------|
| (a) | Explain the line trap units for carrier-aided protection of transmission line. | 03 |
| (b) | Compare protective CT with measuring CT. | 04 |
| (c) | Explain phase comparison relaying (unit scheme). | 07 |

- Q.5** (a) Describe protection against loss of excitation in generator. **03**
(b) Explain following with respect to induction motor protection: **04**
(a) Single phasing (b) ground fault
(c) The neutral of a 3-phase, 20 MVA, 11 KV alternator is earthed through a resistance of 5 ohm. The relay is set to operate when there is an out of balance current of 1.5 A. The CT's have a ratio of 1000/5. What % of the winding is protected against an earth fault? **07**
What should be the minimum value of the earthing resistance to protect 90 % of the winding?

OR

- Q.5** (a) Compare air break circuit breaker with vacuum circuit breaker. **03**
(b) Explain Following with reference to Circuit Breaker: **04**
(a) Breaking Current (b) Making Current
(c) Explain puffer-type SF₆ circuit breaker. **07**
