

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**PDDC - SEMESTER-VII EXAMINATION – WINTER 2015**

**Subject Code: X70901****Date: 09/12/2015****Subject Name: POWER SYSTEM PROTECTION****Time: 10:30pm to 01:00pm****Total Marks: 70****Instructions:**

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

- Q.1** (a) Explain the role of protection in a power system. Describe the essential features of a protective relay. **07**
- (b) For what type of protection will you recommend (i) induction disc type (ii) induction cup type construction? What measures are taken to minimize the overrun of the disc? Derive an expression for torque produced by an induction relay. **07**
- Q.2** (a) Describe with a neat sketch the operating principle of an inverse type over current relay. How plug setting control the pick up current of such a relay? **07**
- (b) Explain the terms: (i) Plug setting Multiplier (ii) Time setting Multiplier with reference to IDMT relays. What are their significances in relay operation? **07**
- OR**
- (b) Discuss the necessary circuit diagram a typical directional over current relay. Draw with necessary phasor diagrams (i) 30 degree connection (ii) 90 degree connection. **07**
- Q.3** (a) What is universal torque equation? Using this equation derive the following characteristics: (i) Impedance relay (ii) Reactance relay (iii) mho relay. **07**
- (b) Discuss with help of neat diagram the theory and principle of operation of the induction cup type mho relay. What are the merits of mho relay and where is it used? **07**
- OR**
- Q.3** (a) What is carrier aided distance protection? What are its different types? Discuss the permissive under reach tripping scheme of protection. **07**
- (b) What is carrier blocking scheme? Discuss its merits and demerits over other types of carrier aided distance protection. **07**
- Q.4** (a) Why biased differential relay is preferred over a simple differential relay? Make a list of applications of a biased differential relay. **07**
- (b) What do you mean by field suppression of an alternator? How is it achieved? **07**
- OR**
- Q.4** (a) What type of protective system is employed for the protection of the field winding of the alternator against ground faults? **07**
- (b) Discuss the protection employed against loss of excitation of an alternator. **07**
- Q.5** (a) What is buchholz relay? Discuss its working principle and construction. **07**
- (b) Discuss a protective scheme for the protection of parallel feeders and ring main system. **07**
- OR**
- Q.5** (a) What are the advantages and disadvantages of Numerical relay. **07**
- (b) Explain with help of block diagram construction of Numerical relay. **07**

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