Reg. No. :

## Question Paper Code: 41355

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

Fifth Semester

Electrical and Electronics Engineering

14UEE505 - PROTECTION AND SWITCH GEAR

(Regulation 2014)

Duration: Three hours                                      Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. When all the three phase are short circuited it gives rise to

    (a) Asymmetrical fault currents          (b) Symmetrical fault current
    (c) Zero current                          (d) None of these

2. The positive, negative and zero sequence impedances of a solidly grounded system under steady state condition always follow the relations

    (a) $Z_1 > Z_2 > Z_0$          (b) $Z_1 < Z_2 < Z_0$          (c) $Z_0 < Z_1 < Z_2$          (d) None of these

3. Most of the relays on service on electric power system are

    (a) Electronic relay                      (b) Electro-mechanical relay
    (c) Thermal relays                        (d) None of these

4. A relay performs the function of

    (a) Fault isolated                        (b) Fault detection
    (c) Fault prevention                      (d) All the above

5. The main function of under voltage protective device generally used with a motor starter is

    (a) To open supply circuit voltage
    (b) To control the motor voltage
    (c) To prevent the opening of the supply circuit
    (d) None of these

6. Differential relays are used to protect the equipment against

    (a) Internal fault                   (b) Reverse current

    (c) Over current                 (d) None of these

7. For which of the following protection from negative sequence current is provided?

    (a) Generator                   (b) Motors

    (c) Transmission line           (d) Transformer

8. Relay can be designed to respond to changes in

    (a) Resistance, reactance or impedance   (b) Voltage and current

    (c) Temperature                (d) all the above

9. If the length of the arc of circuit breaker increases, its resistance

    (a) be extinguished            (b) decreases

    (c) remains same              (d) increases

10. Which of the following CB's is generally used in railway applications?

    (a) Air break CB               (b) Minimum oil CB

    (c)  Bulk oil CB                 (d) $SF_6$ CB

### PART - B (5 x 2 = 10 Marks)

11. List out the types of faults.

12. State the working principle of differential relay.

13. What are the limitations of a Buckhholz relay?

14. What is the function of phase comparators?

15. What are the ratings of circuit breakers?

### PART - C (5 x 16 = 80 Marks)

16. (a) (i)  What are the functions of protective relaying? Narrate about nature and causes of faults. (8)

    (ii) Explain in detail about the resistance grounding with neat sketch. (8)

Or

    (b) (i)  Discuss about the essential qualities of protective relaying. (10)

    (ii) Discuss about the effects of faults. (6)

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17. (a) (i) Describe the operating principle of induction type over current relay with neat diagram. (10)

(ii) Draw and explain the R-X diagram for the modified impedance relay. (6)

Or

(b) Write short note on the following:

(i) Voltage balance relay. (8)

(ii) Under frequency relay. (8)

18. (a) (i) Current transformer of current ratio of 1000 / 5 are used for protection of a star connected 3 phase, 10$MVA$, 6.6 $kV$ alternator. If the relay is set to operates for a minimum current of 0.5 $Amps$. Calculate the percentage of each phase stator winding which is unprotected against earth fault when the machine operates at normal voltage. Assume that star point of alternator is earthed through a resistance of 7.5 Ω. (6)

(ii) Explain in detail how to protect the incipient faults and major faults in a transformer with Buchholz relay with neat diagram. (10)

Or

(b) Illustrate the carrier current protection of transmission lines and current differential protection of alternator. (16)

19. (a) (i) Illustrate the principle operation of a static inverse-time over current relay with neat block diagram. (10)

(ii) Explain in detail about the static differential relay protection for a generator. (6)

Or

(b) (i) List out the advantages of static relay. (6)

(ii) Explain the principle of operation of numerical relay with neat block diagram. (10)

20. (a) (i) Drive the equation for re-striking voltage and RRRV. (10)

(ii) Explain various ARC interruption methods. (6)

Or

(b) (i) Discuss in brief about the problems encountered in DC circuit breakingl. (6)

(ii) Explain the construction and principle operation of minimum oil circuit breaker. (10)

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