Code: 13A02602 **R13**

B.Tech III Year II Semester (R13) Regular & Supplementary Examinations May/June 2017

POWER SYSTEM PROTECTION

(Electrical & Electronics Engineering)

Time: 3 hours Max. Marks: 70

PART - A

(Compulsory Question)

*****

1 Answer the following: (10 X 02 = 20 Marks)

(a) What is "Sensitivity" and "Selectivity" of a relay?

(b) What is distance protection?

(c) List out the common types of generator faults.

(d) What is inter-turn fault protection?

(e) What is unit type protection?

(f) What are the main elements of current carrier protection?

(g) What is meant by making capacity of a circuit breaker?

(h) What is current chopping?

(i) What is meant by voltage surge?

(j) What is the advantage of oxide film arrester?

PART - B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

2 What is universal torque equation? Using this equation derive the impedance relay and reactance relay characteristics and indicate clearly the zones of operation and no-operation.

OR

3 What is comparator? Explain with phasor diagrams, characteristics of multi-input comparators.

UNIT - II

4 Describe various protection schemes of an alternator for different faults and abnormal running conditions.

OR

5 (a) What is magnetic inrush current?

(b) A 3-phase $\Delta - Y$ connected 30 mVA, 33/11 kV transformer is protected by a simple differential relaying scheme the CT ratio on the primary side is 500 : 5 and that on the secondary side is 2000 : 5. Sketch the CT connection diagram for the relay scheme. Also calculate the relay current setting for fault drawing up to 200% of rated current.

UNIT - III

6 Explain the zonal protection scheme for feeder. Describe the reactance relay characteristics for 3-zoneprotection. Also draw the contact circuit for the same.

OR

7 Describe the principle of bus-bar protection based on voltage differential systems. How does it overcome the problems of saturation of CT's?

UNIT - IV

8 Explain current chopping phenomenon associated with air blast circuit breaker and explain the working of an air blast circuit breaker with the help of suitable circuit diagrams.

OR

9 (a) Write short notes on capacitive current breaking.

(b) A 50 Hz, 11 kV, 3-phase alternator with earthed neutral has a resistance of 6 ohms per phase and is connected to a bus bar through a circuit breaker. The distributed capacitance up to circuit breaker between phase and neutral is 0.02 μF. Determine: (i) Peak restriking voltage across the contacts of the breaker. (ii) Frequency of oscillations (iii) The average rate of rise of restriking voltage up to the first peak.

UNIT - V

10 (a) What is voltage surge? Draw typical lightning voltage surge.

(b) Discuss the causes of over voltages.

OR

11 Describe the construction, principle of operation and applications of: (i) Rod gaps. (ii) Expulsion gaps. (iii) Value type lightning arresters.

*****