

Code No: 117HX

**R13**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**

**B. Tech IV Year I Semester Examinations, April/May - 2018**

**SWITCH GEAR AND PROTECTION  
(Electrical and Electronics Engineering)**

**Time: 3 Hours**

**Max. Marks: 75**

**Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

**PART- A**

**(25 Marks)**

- 1.a) Define Arc voltage, restriking voltage and recovery voltage. [2]
- b) What do you mean by resistance switching? [3]
- c) Define relay. List out classification of relays. [2]
- d) What is distance relay? Mention the applications of distance relays. [3]
- e) Define Differential Protection. [2]
- f) Mention the different types of faults occur in generator. [3]
- g) Differentiate unit type protection and non- unit type protection. [2]
- h) What are the effects of ungrounded neutral on system performance? [3]
- i) What is insulation coordination? [2]
- j) What are the causes of over voltages arising on a power system? [3]

**PART-B**

**(50 Marks)**

- 2.a) What is the role of circuit breakers in substations? Explain the specifications of circuit breakers.
- b) In a system of 132kV, the line to ground capacitance is  $0.03\mu\text{F}$  and the inductance is 7H. Determine the voltage appearing across the pole of a Circuit Breaker. If a magnetizing current of 8 amperes (instantaneous value) is interrupted, determine also the value of resistance to be used across the contacts to eliminate the restriking voltage. [5+5]

**OR**

- 3.a) What are the different types of circuit breakers when the arc quenching medium is the criterion? Mention the voltage for which a particular range of circuit breaker is recommended.
- b) Explain the operation and applications of Vacuum Circuit Breakers. [5+5]
- 4.a) Discuss the construction and operation of attracted armature relay
- b) Explain the Operation principle and characteristics of MHO and off set MHO relay. [5+5]

**OR**

- 5.a) Explain the operation of directional over current relay with a neat circuit diagram.
- b) Explain the Impedance relay by means of its characteristic on R-X plane. [5+5]

- 6.a) Explain briefly about stator fault protection in generator  
b) How do you protect transformer against incipient faults? [5+5]

**OR**

- 7.a) Explain the percentage differential protection scheme used for transformers.  
b) A 3 – phase, 2 pole, 33 KV, 8000 KVA alternator has neutral earthed through a resistance of 4 ohms. The machine has current balance protection which operates up on out of balance current exceed 20 % of full load. Determine % of winding protected against earth fault. [5+5]

- 8.a) Explain the principle of operation of a Translay Relay protection for feeders  
b) Explain with the aid of circuit and phasor diagrams the function of a Peter-son coil in a 3-phase system. What are permissible practical deviations from resonance in the tuning of the Peterson coil? [5+5]

**OR**

- 9.a) Explain 3-zone distance protection of a transmission line  
b) Explain with diagram the high impedance bus bar differential protection scheme. [5+5]

- 10.a) Differentiate between a surge diverter and a surge absorber with sketch.  
b) Explain the working of valve type lightning arrester. [5+5]

**OR**

- 11.a) Explain about Zinc-oxide lighting arrester.  
b) Explain Volt-Time characteristics of surge arrester with neat sketch. [5+5]

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