

Code No: 137SD

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, March - 2021

SWITCH GEAR AND PROTECTION
(Electrical and Electronics Engineering)

Time: 3 Hours

Max. Marks: 75

Answer any Five Questions
All Questions Carry Equal Marks

- 1.a) Discuss the reasons for arc formation in circuit breakers and enlist the methods of arc extinction.
- b) A 3 phase alternator has the line voltage of 11 KV. The generator is connected to a circuit breaker. The inductive reactance up to the circuit breaker is 5Ω per phase. The distributed capacitance up to circuit breaker between phase and neutral is $0.01\mu\text{F}$. Determine the following:
- i) Peak restriking voltage across the circuit breaker ii) Frequency of restriking voltage transient iii) Average rate of restriking voltage up to peak restriking voltage and iv) Maximum R.R.R.V [7+8]
- 2.a) Explain the principle of operation of an air blast circuit breaker. What are the advantages and disadvantages of using air as the arc quenching medium?
- b) Explain the phenomenon of current chopping and its effects on circuit interruption. [8+7]
- 3.a) Define and explain the following terms as applied to protective relaying:
- i) Pick – up value ii) Current setting iii) Plug – setting multiplier
iv) Time – setting multiplier
- b) Derive the equation for torque developed in an induction relay. [8+7]
- 4.a) What is an IDMT characteristic? Explain how this is achieved in practice.
- b) Explain clearly the basic principle of operation of a differential relay. [7+8]
- 5.a) Describe schemes of protection for an alternator against inter – turn faults.
- b) A star connected, 3 – phase, 10 MVA, 6.6 KV alternator is protected by circulating protection, the star point being earthed via a resistance r . Estimate the value of earthing resistor if 85% of the stator winding is protected against earth faults. Assume an earth fault setting of 20%. Neglect the impedance of the alternator winding. [8+7]
- 6.a) Describe the differential protection of bus-bar protection.
- b) A 3-phase transformer having line voltage ratio of 0.4KV/11KV is connected in star-delta and protective transformers on the 400V side have a current ratio of 500/5 .What must be the ratio of the protective transformers on 11KV side? [8+7]
- 7.a) What is neutral grounding? What are the advantages of neutral grounding?
- b) Explain, What is resistance grounding? [8+7]
- 8.a) What is standard Impulse Test wave? Explain in brief.
- b) Explain the construction, principle and working of a Zinc Oxide Lighting arrester. [7+8]