

Code No: 156CM**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B. Tech III Year II Semester Examinations, February/March - 2022****POWER SYSTEM PROTECTION
(Electrical and Electronics Engineering)****Time: 3 hours****Max. Marks: 75****Answer any five questions
All questions carry equal marks**

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- 1.a) Discuss the construction and operation of attracted armature relay.
- b) Derive the Universal Torque equation of a relay. [8+7]
- 2.a) Explain the operation of a directional over current relay with a neat circuit diagram.
- b) With a neat sketch, describe the difference between definite characteristic and inverse characteristic of relays. [8+7]
- 3.a) Explain with a diagram, the application of the Merz-Price circulating current system to the protection of alternators.
- b) An 11kV, 100MVA generator is provided with differential scheme of protection. The percentage of the generator winding to be protected against phase to ground fault is 80%. The relay is said to operate when there is 15% out of balance current. Determine the value of resistance to be placed in the neutral to ground connection. [8+7]
- 4.a) What is the need of static relays for power system protection? What are the advantages of static relays over Electromagnetic relays?
- b) Explain directional over current static relays with neat block diagram. [7+8]
- 5.a) Explain the terms recovery voltage, restriking voltage and RRRV. Derive an expression for restriking voltage in terms of system capacitance and inductance.
- b) Explain about the working of vacuum circuit breakers and give its advantages. [8+7]
- 6.a) What are the essential qualities of protection? Compare primary and backup protection.
- b) Explain the operational principle of thermal relays. [7+8]
7. Discuss biased differential protection for transformers. [15]
8. Explain the effect of:
 - a) Arc resistance
 - b) Power swings
 - c) Line length
 - d) Source impedance on the performance of distance relays. [15]

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