Code No: 156CM **R18**

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
- - -

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]

---ooOoo---