

**BACHELOR OF TECHNOLOGY (C.B.C.S.) (2014 COURSE)**

**B.Tech.Sem - VI ELECTRICAL : WINTER- 2022**

**SUBJECT : SWITCHGEAR & PROTECTION**

Day : Thursday

Time : 10:00 AM-01:00 PM

Date : 24-11-2022

W-13326-2022

Max. Marks : 60

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- 1) All questions are **COMPULSORY**.
  - 2) Figures to the right indicate **FULL** marks.
  - 3) Draw neat and labeled diagram **WHEREVER** necessary.
  - 4) Assume suitable data if necessary.
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- Q.1** a) Explain the construction and working of HRC fuse along with its characteristics. Also state its applications. [06]  
b) A 3-phase, 5000kVA, 6.6kV generator having 12% sub-transient reactance. A 3-phase short circuit occurs at its terminals, calculate short circuit MVA and short circuit current. [04]

**OR**

- a) With neat diagram explain the construction and working of contactor. [06]  
b) Explain the various essential qualities of protections required in power systems. [04]

- Q.2** a) Explain: i) Plug Setting Multiplier ii) Time Multiplier Setting. [04]  
b) Draw and explain the trip circuit of circuit breaker. [06]

**OR**

Explain the construction and working of watt-hour meter type induction type relay. Also derive its torque equation. [10]

- Q.3** a) Explain the rotor earth fault protection in case of alternator. [04]  
b) Explain the causes of failures in 3 phase induction motor. [06]

**OR**

Describe with the help of a neat diagram the connections of differential protection of a star – delta transformer. A 3 phase, 33kV/6.6kV, Star/Delta power transformer is protected by differential protection. The CTs on LV side have a current ratio of 300/5. What must be the current ratio of the CTs on HV side and how should be connected? [10]

- Q.4** With neat diagram explain the differential protection and high impedance differential protection of bus bar. [10]

**OR**

With neat diagram explain the time graded protection of transmission line. [10]

- Q.5** Describe the various causes of internal over voltages on power systems. [10]

**OR**

What are the various draw backs of ungrounded system? How to overcome such drawbacks in power system protection? [10]

- Q.6** Explain in detail how substations are classified. [10]

**OR**

What are the different types of busbar arrangements used in substations? Explain with diagram. [10]