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SE-8280

B. E. III (Sem. V) (Elect.) Examination

May / June – 2011

Switchgear

Time : 3 Hours] [Total Marks : 75

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. 3 (Sem. 5) (Elect.)**

Name of the Subject :

☛ **Switchgear**

☛Subject Code No. : **8 2 8 0** ☛Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

1) Attempt all question.
2) Figure to the right indicates full marks.
3) Scientific calculator up to Casio-100D, 100MS series is permitted.

Section I

Q-1 **(a)** **Do as Directed:** **(08)**

1. State: Types of circuit-breakers.
2. Classify: Methods of Arc Extinction.
3. Classify: Oil circuit-breakers.
4. Define: The Electric Arc
5. Define: Rated Making Capacity in case of circuit-breaker.
6. Define: Recovery Voltage in case of circuit-breaker.
7. Define: Restriking Voltage in case of circuit-breaker.
8. State: Types of Arc interruption Theories.

(b) What are the essential properties of the arc? Distinguish between the static and dynamic characteristics. **(3)**

(c) Explain in Details: Current Chopping phenomena. **(4)**

Q-2 **(a)** Calculate: The RRRV of a 220 kV circuit breaker with earthed neutral. The short-circuit test data obtained as follows:
The current broken is symmetrical and thy restriking voltage has an oscillatory frequency of 15 kHz. The power factor of the fault is 0.2. Assume the short circuit to be an earth fault. **(5)**

(b) Explain Slepian's theory of arc interruption and discuss its limitations. How energy balance theory does explains the process of arc interruption. **(5)**

OR

Q-2 **(a)** Derive the mathematical expression for Restriking voltage transient. **(5)**

(b) Explain the physics of arc phenomena. On what factor does the arc phenomenon depend? **(5)**

Q-3 **Attempt any three:** (15)

1. Write short Note on Arc control devices in oil circuit breakers.
2. In connection with switchgear clearly explain the significance of the term RRRV. Derive expression for RRRV and find out maximum value of RRRV.
3. What are the merits and de-merits of air-blast circuit breakers over bulk oil circuit breakers?
4. Write short note: Duties of Circuit breaker.

Section II

Q-4 (a) **Do as Directed:** (10)

1. What is Viscous Flow in case of vacuum?
2. List out: Essential parts of a SF_6 circuit breaker.
3. State: Any two desirable properties of a vacuum circuit breaker contact material.
4. Define: Vacuum.
5. List out: Tests included in the Routine tests.
6. Classify: Testing of circuit breaker.
7. State: The types of Short-circuit testing stations.
8. List out: Equipments used in testing station.
9. State: Methods of indirect testing.
10. Classify: The Dielectric tests.

(b) Enumerate: Desirable properties of contact material in case of a vacuum circuit breaker (05)

Q-5 (a) What are the possible applications of vacuum circuit breaker? (05)
Point out the main limitations which have prevented their widespread use.

(b) What are the advantages of laboratory type testing station? (05)
Describe short-circuit testing stations.

OR

Q-5 (a) Give the properties of SF_6 gas that make it more useful for circuit breaking. (05)
How does the electronegative nature of SF_6 contribute towards its high dielectric strength?

(b) What are the different tests carried out to prove the ability of a circuit breaker? (05)
State the difference between type tests and routine tests.

Q-6 **Attempt any two:** (10)

1. Enumerate the chief requirements of the contact material for a vacuum circuit breaker.
2. Write short note: Quenching properties of SF_6 gas.
3. Write short note: The Voltage injection type Synthetic testing of circuit breaker.
4. Write short note: The Current injection type Synthetic testing of circuit breaker.