CS/B.Tech/PWE (OLD)/SEM-6/PWE-603/2013

2013

ELECTRICAL EQUIPMENT IN POWER STATION

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following :

$10 \times 1 = 10$

i) The advantage of star connected supply system is that

a) Line current is equal to phase current.

b) Two level voltage can be used

c) Phase sequence can easily be done

d) It is a simple arrangement.

ii) The rotor of a turbo-alternator is made cylindrical in order to reduce

a) Eddy current loss b) hysteresis loss

c) Windage loss d) Stray copper loss.

iii) In static excitation system at the time of initial voltage build up the supply from

a) Generator terminal itself

b) Auxiliary supply source

c) Pilot excitor

d) AVR.

iv) Retaining ring or endring ring are used

a) For feeding DC to field winding of rotor

b) To prevent gas leakage from generator

c) To hold rotor over hang winding in position

d) To dampen double frequency effect.

v) Seal oil supply to sealing rings is provided by

a) Expansion tank b) Main oil tank

c) Hydraulic tank d) Damper tank.

vi) A transformer has a turns ratio of 1:10 and a resistance of 5000 Ω is connected across the secondary terminals. The resistance offered to the current flowing in the primary will be

a) 50 Ω b) 500 Ω

c) 5000 Ω d) 50 k Ω.

vii) The advantage of using short pitched winding in an alternator is that

a) Reduces hormonics in generated emf

b) Saves copper used in the winding.

c) Gives better shape to the wave forms

d) All of these.

viii) When two alternators are running in parallel, if prime mover of one of the alternators is removed, the alternator will

a) Stop running

b) Run as a synchronous motor

c) Run as a generator

d) None of these.

ix) The rotor of a 3-phase Induction motor always runs at

a) Synchronous spead

b) Less than synchronous speed

c) More than synchronous speed

d) None of these.

x) Buchholz relay is

a) Current actuated relay

b) Gas actuated relay

c) Oil actuated relay

d) None of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Differentiate between UAT and GT along with ratings.

3. Explain the different methods of cooling of transformer.

4. Explain with diagram why OLTC'S are placed in HV winding of a power transformer. Give a brief diagram and explain the operational procedure.

5. Heavy duty Squirrel cage Induction motors are extensively selected for power station drives. Justify the statement. Mention few application of such single speed motors for variable speed drives in power station.

6. Describe the features of different types of transformer used in power plant.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Explain with neat diagram of stator water couling system (swcs) of an alternator and mention how the strategic parameters are maintained with in defined limits. 7

b) Explain concept of direct and indirect cooling stator and rotor winding of an alternator. 4

c) Describe gas purging sequence before an alternator is identified for major overhauling. 4

8. a) Explain functional detail of vital mounting and fittings of a power transformer.

b) Give reasoning why transformer is rated in MVA not in MW.

c) 2 single phase transformer with equal turns have impedances of (0.5 + j3) Ω and 0.6 + j 10.Ω with respect to secondary. If they operate in parallel, determine how

they will share a total load 100 kw at 0.8 pf lagging.

9. a) Define RRRV. 2

b) Explain with a neat diagram, the principle and working of an SF_6 circuit breaker. 8

c) List out the advantages of SF_6 circuit breaker over the others. 5

10. a) Explain why it is required to give dc excitation to an alternator. 2

b) Explain with a block diagram the static excitation system employed in a power plant. 8

c) Explain the role of AVR in an excitation system. 5

11. a) Why is it required to provide auxiliary supply for a thermal power station ? 3

b) Broadly classify the auxiliaries in a power plant. 4

c) Why is DC supply required in a power plant ? 2

d) Explain the different components of a dc system. 6

12. a) Explin the function of modern excitation system and automatic voltage regulator (AVR) 5

b) Explain with a neat diagram the arrangement of typical brushless excitation system employed in modern units. Also give reasons for selecting main exciter with rotating armature and static field. 6 + 2

c) What are the limitations of a conventional DC exciter of AC exciter. 2

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