CS/B.Tech/(PWE-NEW)/SEM-6/PWE-604/2013

2013

ELECTRICAL EQUIPMENT IN POWER GENERATION, TRANSMISSION AND DISTRIBUTION

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 any *ten* of the following : 10x1 = 10

i) Purging of H_2 gas inside the Turbogenerator is done by

a) Compressed air b) CO_2 gas

c) N_2 gas d) all of these.

ii) The complete bearing is insulated from foundation/end shield to

a) prevent flow of shaft current

b) improve the mechanical strength

c) allow gas passage

d) control the temperature.

iii) At underexcited condition, which part of the generator gets overheated ?

a) Overhang portion of stator winding

b) Overhang portion of rotor winding

c) Retaining ring portion

d) All of these.

iv) Generator shaft seal oil pressure is kept

a) slightly higher than H_2 gas pressure

b) slightly lower than H_2 gas pressure

c) equal to H_2 gas pressure

d) very higher than H_2 gas pressure.

v) In ESP, collecting electode (i.e. collecting plate) is

a) positively charged and earthed

b) negatively charged and earthed

c) earthed only

d) none of these.

vi) In ESP, Electrostatic field is set up by high vottage

a) AC power supply only

b) DC through transformer rectifiers

c) AC and DC both

d) All of these.

vii) The insulating material most commonly used for power cables is

a) PVC b) Paper

c) Rubber d) none of these.

viii) Ferranti effect on long overhead line is experienced when it is

a) lightly loaded

b) heavily loaded

c) on any load

d) none of these.

ix) Indian Electricity Rules (1956) for overhead lines relate to

a) Joints

b) Earthing

c) Protection against lightning

d) all of these.

x) Number of insulator discs for 400kV transmission line is

a) 5 b) 10

c) 21 d) 35.

xi) The objective of Grounding is to ensure

a) safety of operating personnel

b) safety of animal bodies coming in contact

c) discharging of leakage current to earth

d) all of these.

xii) A single phase overhead line consists of two conductors of dia 2 cm with a spacing of 1·5 m between centres. Line voltage for commencing of corona, dielectric strength of air = 21 kV/cm is

a) 105.72 kV b) 100.2 kV

c) 80 kV d) 95 kV.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3x5 = 15

2. a) What is transposition ? How can unequal voltages in three phases be eliminated ? 3

b) What is skin effect ? 2

3. A three phase transmisson line 10 km long has its conductors of 0.5 cm dia spaced at corners of an equilateral traingle of 120 cm side. Find the inductance per phase.

4. Draw and describe a typical schematic diagram of a stator water cooling system.

5. What are the types of sub-stations used in power system ? Explain them briefly.

6. What are the various methods of voltage control in transmission system ? Explain them briefly.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3x15 = 45

7. a) What are the different types of seal oil system ? 5

b) Draw a neat schematic diagram of ring type (radial)

seal oil system, label all the components/equipment of system and explain function of each component. 10

8. Draw and describe the schematic of static excitation system of a turbogenerator. 5 + 10

OR

Draw and describe the schematic diagram of brushless excitation system of a turbogenerator. 5 + 10

9. A 3-phase overhead transmission line is being supported by three disc insulators. The potentials across top unit and middle unit are 9 kV and 11 kV respectively.

Calculate :

a) ratio of capacitance between pin and earth to selfcapacitance of each unit.

b) the line voltage

c) string efficiency.

10. a) Distinguish between a feeder, distributor and service main in a distribution scheme. 5

b) Show that with an increase in working voltage to n times the cross-section of a feeder and a distributor would be reduced to$1/n$ and$1/n^2$ of their respective values. 10

11. a) What do you mean by surge impedance of transmission lines ? 5

b) What do you mean by surge impedance loading of transmission lines ? 3

c) What is done to improve the power transmission capability of lines ? Explain. 7

12. a) Name the various equipment used in a sub-station. 5

b) Briefly describe the construction and function of each equipment used in a sub-station. 10

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