KATHMANDU UNIVERSITY
End Semester Examination
February, 2025

Level : B.E.
Year : III
Time : 2 hrs. 30mins.

27 FEB 2025

Course : CIEG 312
Semester : II
F. M. : 40

SECTION "B"

Missing data may be suitably assumed. Each symbol carries their usual meaning.

1. Discuss the components of electrical power system. [4]

OR

Explain the advantages of interconnected electrical power system taking reference of INPS.

2. a. Explain the working of potential transformer and current transformer. [4]

OR

With the reference to equivalent circuit of a transformer, explain the no load parameters in transformer. [4]

b. A three-phase step down transformer is connected to 3300-volt mains and takes a current of 25 amperes. Calculate the secondary line voltage, line current and output for the following connections: (i) Star-star (ii) Delta-star. The ratio of turns of per phase is 12. Neglect losses.

3. a. Explain the working of DC generator with its construction. [4]

OR

Explain the types of DC motor in reference to field winding. [4]

b. A wave wound armature of an eight-pole generator has 51 slots. Each slot contains 16 conductors. The voltage required to be generated is 300 V. What would be the speed of coupled prime mover if flux per pole is 0.05 Wb. If the armature is rewound as lap wound machine and run by same prime mover, what will be the generated voltage.

OR

A six-pole lap wound armature rotating at 400 rpm is required to generate 240 V. The effective flux per pole is about 0.05 Wb. If the armature has 120 slots, determine the suitable number of conductors per slot and hence determine the actual value of flux required to generate the same voltage.

P.T.O.

4. a. What is excitation system in synchronous generator. Explain static excitation system for synchronous generator. [4]

OR

Derive the emf equation for an alternator. [4]

b. A 500 HP, 3-Phase, 440 V, 50 Hz induction motor has a speed of 950 rpm at full load. The machine has 6 poles. Calculate the slip. How many complete alternations will the rotor emf make per minute.

5. a. Explain different types of distribution system based on connection schemes. [3]

OR

Mention differences between HVDC and HVAC transmission system. [5]

b. At the end of a power distribution system, a feeder supplies three distribution transformers, each one supplying a group of consumers, whose connected loads are given as

Transformer	**Load**	**Demand Factor**	**Diversity factor of group**
Transformer I	25 kW	0.75	1.3
Transformer II	15 kW	0.65	3.0
Transformer III	13 kW	0.50	1.4

If the diversity factor among the transformers is 1.5, then determine the maximum load on the feeder.

OR

In a 33 kV overhead line, there are three units in the string of insulators. If the capacitance between each insulator pin and earth is 11 % of the self-capacitance of each insulator, find:
i) The distribution of voltage over 3 insulators and ii) String efficiency

6 Explain with clear diagram on the real power vs frequency and reactive power vs voltage control in power generating station. [4]