

KATHMANDU UNIVERSITY
End Semester Examination
June/July, 2023

11 JUL 2023

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

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

SECTION "B"

[5 Q. × 8 = 40 marks]

Attempt *ANY FIVE* questions. Symbols have their usual meanings. Urgent appropriate assumptions are permissible.

1.
 - a. Draw the layout of a typical electric power system. Explain how electricity gets to your home. [2+2]
 - b. A 25- kVA transformer has 500 turns on the primary and 50 turns on the secondary winding. The primary is connected to 3000 V, 50 Hz supply. Find the full-load primary and secondary currents, the secondary emf and the maximum flux in the core. Neglect leakage drops and no-load primary current. [1+1+1+1]
2.
 - a. You want to know the core loss of the transformer. Explain which test you will perform to know the core loss. [3]
 - b. The primary and secondary windings of a 30 kVA 6000/230 V, 1- phase transformer have resistance of 10 ohm and 0.016 ohm respectively. The reactance of the transformer referred to the primary is 34 ohm. Find the primary voltage required to circulate full-load current when secondary is short circuited. What is the power factor in short circuit? [5]
3.
 - a. Explain the working principle of DC generator. [5]
 - b. A long- shunt compound generator delivers a load current of 50 A at 500 V and has armature, series field resistance of 0.05 ohm, 0.03 ohm and 250 ohm respectively. Calculate the generated voltage and the armature current. Assume no voltage drop in carbon brush contact. [3]
4.
 - a. Starting from the torque equation of the induction motor, derive the condition at maximum torque. [3]
 - b. A 750 kVA, 400 V, 50 Hz, 3 phase alternator delivers 500 kW to a three-phase induction motor at the power factor of 0.8 lagging. Calculate the number of lamps which may be added to the alternator so that the alternator does not overload beyond its capacity. [5]
5.
 - a. Derive an expression for sag in an overhead line conductor supported by towers situated at equal levels. [3]
 - b. Select the most economical and technically adequate voltage level and number of circuits for a transmission line to transmit 300 MW of power over 200 km. [5]

6.

- a. A particular load center with uniformly distributed load of peak demand 40kW has a power factor of 0.8. The distribution transformer has four 3- phase LT feeders at 380V of equal length of 2km each. If the per phase resistance and reactance of LT conductors are 1.1 ohm/km and 0.25 ohm/km, determine: percentage peak power loss and maximum percentage voltage drop in LT feeder. [5]
- b. Explain the active power and frequency control with appropriate illustration. [3]