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**University Examinations 2014/2015**

FIRST YEAR, SECOND SEMESTER EXAMINATION FOR DIPLOMA IN ELECTRICAL ENGINEERING

**EEE 2200: ELECTRICAL ENGINEERING PRINCIPLES III**

**DATE: AUGUST, 2015 TIME: 1½ HOURS**

**INSTRUCTIONS:** *Answer question* ***one*** *and any other* ***two*** *questions*

**QUESTION ONE – 30 MARKS**

1. Explain why a transformer should never be operated on d.c supply. (2 Marks)
2. State three ways of minimizing energy losses in a transformer. (3 Marks)
3. A 5KVA, 200/400V , single phase transformer has a secondary terminal voltage of 353.6 volts when loaded. Determine the regulation of the transformer. (2 Marks)
4. The maximum flux density in the core of a 416/2000 volts, 50 Hz single phase transformer is 1.6T. If the emf per turn is 8volts, determine;
5. Primary turns (1 Mark)
6. Secondary turns (1 Mark)
7. Maximum flux in the core (2 Marks)
8. Area of the core ( 2 Marks)
9. A three phase transformer has 500 primary turns and 50 secondary turns. If the supply voltage is 2.4 kV, find the secondary line voltage on no-load when the windings are connected.
10. Star-delta (2 Marks)
11. Delta – Star (2 Marks)
12. Explain the following terms as applied to illumination.
13. Utilization factor (1 Mark)
14. Maintenance factor (1 Mark)
15. The efficiency of a lamp is stated as 45 lumen per watt.
16. What does this mean?
17. What is the MSCP of the lamp if its intake is 500watts? (3 Marks)
18. State three properties of a well designed lighting scheme. (3 Marks)
19. A stair case is lighted by 5 metre of tubular lamps arranged in a continuous line and placed along the top of the case. Determine the illumination produced on a horizontal surface 1.5m below the lamp in a position directly underneath the centre of the 5m length of the lamp on the assumption that in tubular lamp emits 1900 lm per meter run. Neglect the effect of any reflector which may be used. (4 Marks)

**QUESTION TWO (15 MARKS)**

1. Explain briefly the working of a transformer on load. (4 Marks)
2. A 6600/400V single phase transformer takes a no-load current of 0.6A and the core loss is 500W.

Determine;

1. The value of working current (2 Marks)
2. The value of magnetizing current (1 Mark)
3. The power factor of the transformer. (1 Mark)
4. A single phase transformer has 250 turns on the primary and 800 turns on the secondary. Its no-load current is 5A at a power factor of 0.2 lagging. Assume the volt drop in the windings is negligible, determine the primary current and power factor when the secondary current is 110 A at a power factor of 0.80 lagging. (7 Marks)

**QUESTION THREE (15 MARKS)**

1. Explain briefly any three types of lighting schemes. (3 Marks)
2. State four factors that affect the coefficient of utilization. (4 Marks)
3. The illumination in an office 30m x 10m is to have a value of 560 lux and is to be provided with a number of 300w filament lamps. If the coefficient of utilization is 0.5 and depreciation factor 0.9, determine the number of lamps required. The efficiency of each lamp is 15 lm/w. (3 Marks)
4. Two lamps A and B of 250 candela and 450 candela respectively are situated 150m apart. The height of A above the ground is 10m and that of B is 20m. If a photometer is placed at the center line joining to the two lamp posts, calculate its reading. (5 Marks)

**QUESTION FOUR (15 MARKS)**

A 100 kVA,50 Hz , single phase transformer has a full load copper loss of 2500 watts and an iron loss of 1000W. If the power factor of the load is 0.85, determine;

1. The efficiency of the transformer;
2. On full load (5 Marks)
3. On half load (6 Marks)
4. The output kVA at which the efficiency of the transformer is a maximum. (4 Marks)