

KATHMANDU UNIVERSITY
End Semester Examination
August/September, 2017

Mark Scored:

Level : B. E.

Year : II

Exam Roll No. :

Time: 30 min

Course : EEEG 215

Semester : II

F. M. : 10

Registration No.:

Date

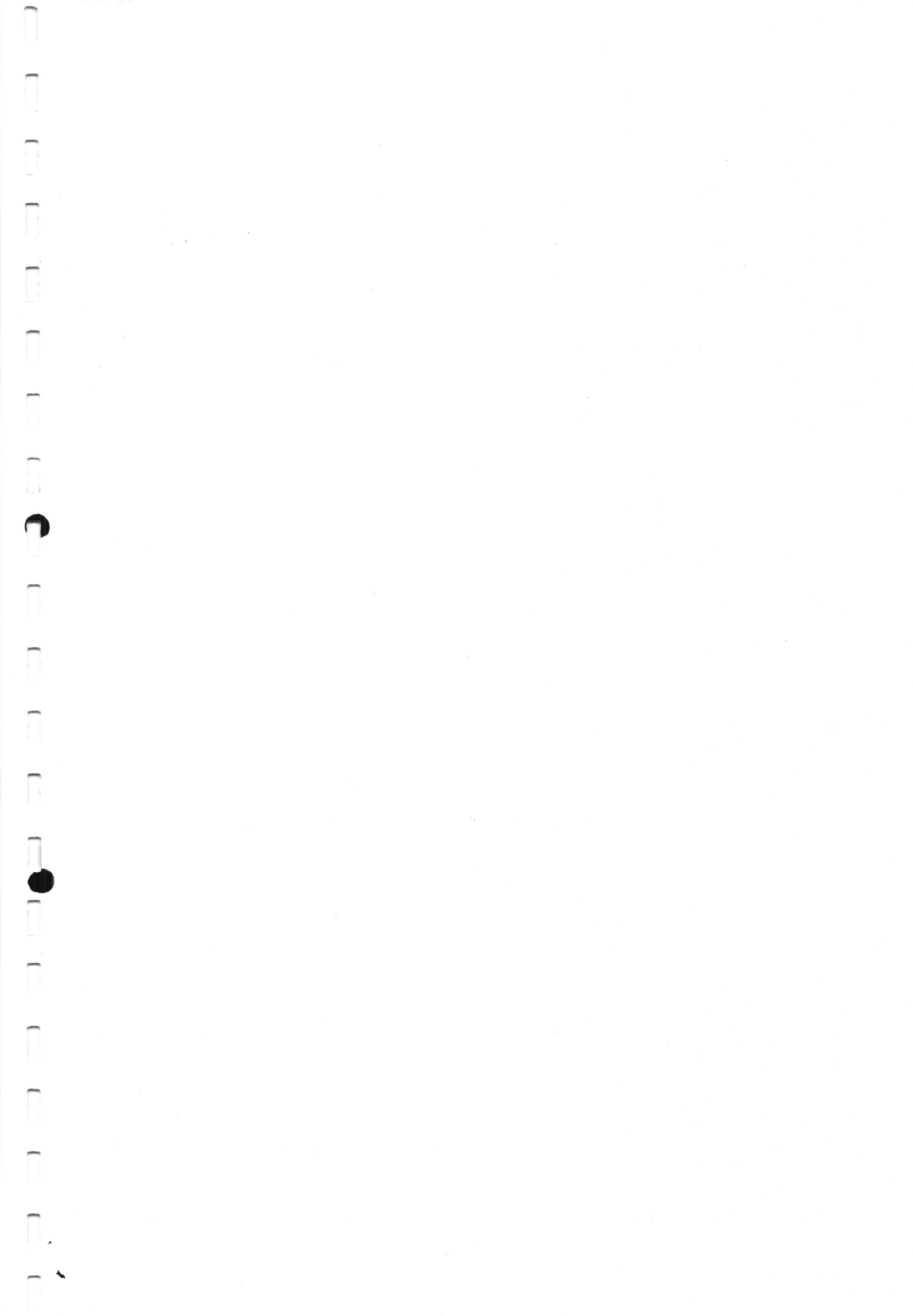
SEP 04 2017

SECTION "A"

[20Q. × 0.5= 10 marks]

Choose the most appropriate answer.

1. In a transformer the energy is conveyed from primary to secondary
 - a. Through cooling coil.
 - b. Through air.
 - c. By the flux.
 - d. By conduction.
2. A transformer core is laminated to
 - a. Reduce hysteresis loss.
 - b. Reduce eddy current loss.
 - c. Reduce copper loss.
 - d. Reduce interference loss.
3. No load test on a transformer is carried out to determine
 - a. Copper loss.
 - b. Magnetizing current.
 - c. Efficiency of transformer.
 - d. Magnetizing current and loss.
4. Power transformers are generally designed to have maximum efficiency around
 - a. No-load.
 - b. Half load.
 - c. Full load.
 - d. 10% overload.
5. In a DC generator, armature reaction results in
 - a. Demagnetization of the centres of poles.
 - b. Magnetization of interpoles.
 - c. Demagnetization of the leading pole tip and magnetization of the trailing pole tip.
 - d. Magnetization of the leading pole tip and demagnetization of the trailing pole tip.
6. The following methods help in reducing armature reaction effect in a D.C
 - a. Interpoles.
 - b. Compensating windings.
 - c. Interpoles and compensating windings both.
 - d. Interpoles, compensating windings and dummy coils.
7. The following component of a D.C generator plays vital role in providing direct current from the D.C generator
 - a. Dummy coils.
 - b. Equilizer rings.
 - c. Commutator.
 - d. Slip rings.
8. In a D.C generator, the polarity of interpoles is
 - a. Same as that of main pole ahead.
 - b. Same as that of immediately preceding pole.
 - c. Opposite that of main pole ahead.
 - d. Neutral as these poles do not play part in generating emf.



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

Course : EEG 215
Semester : II
F. M. : 40

SECTION "B"
[5 Q × 8=40 marks]

Attempt ANY FIVE questions. Assume any suitable data if required.

- 1 a. A 10 kVA, 200/400 V, 50 Hz single phase transformer gave the following test results:

Open Circuit test:	200 V	1.3 A	120 W	LV side
Short Circuit test:	22 V	30 A	200 W	HV side

Calculate,

- (i) magnetizing current and the component corresponding to core loss at normal frequency and voltage.
(ii) magnetizing branch impedances percentage.
(iii) voltage regulation when supplying full load at 0.8 p.f leading and
Also obtain the equivalent circuit as referred to low voltage side.

[1+1+1+1=4]

- b. Explain how two-winding transformer of a given VA rating when connected as an autotransformer can handle higher VA i.e. $(VA)_{\text{auto}} > (VA)_{\text{TW}}$. [4]

- 2 a. The doubly excited magnetic field system has coil self and mutual inductances of
 $L_{11} = L_{22} = 2 + 2\cos\theta$
 $L_{12} = \cos\theta$
where, ' θ ' is the angle between the axes of the coils. The coils are connected in series and carry a current of $\sqrt{2}I\sin\omega t$. Derive an expression for the time average torque as a function of θ . [4]
- b. Two single phase transformers with equal voltage ratios have impedances of $(0.619 + j3.503) \Omega$ and $(0.7 + j1.31) \Omega$ with respect to secondary. If they operate in parallel, how will they share a load of 5000 kW at p.f 0.65 lagging? [4]

- 3 a. Explain the phenomenon of armature reaction in a D.C generator. [4]
- b. A 250V, 14.9 kW, 8 pole dc series motor has single turn coils. The armature is wave wound with 94 commutator segments. If the brushes are given a lead of 2 commutator segments at full load, calculate (i) total armature reaction ampere-turn per pole (ii) demagnetizing and cross-magnetizing ampere-turns per pole. Assume an efficiency of 80%. [2+2=4]

- 4 a. A 20kW, 250V dc shunt generator has armature and field resistance of 0.1Ω and 125Ω respectively. Calculate the total armature power when running (i) as generator delivering 20 kW output (ii) as a motor taking 20 kW input. [2+2=4]
- b. A 100 kW, 500V shunt generator was run as a motor on no load at its rated speed and voltage. The total current taken was 9.5A including a shunt field current of 2.5 A. The resistance of armature circuit is 0.1Ω . Calculate the efficiency of generator at (i) half full load (ii) $3/8^{\text{th}}$ of full load [2+2=4]

- 5 a. Explain torque-slip characteristic of an induction motor. [4]
b. A 400-V, 50 Hz, 50-hp, three phase induction motor is drawing 60A at 0.85 PF lagging. The stator copper losses are 2 kW, and the rotor copper losses are 700 W. The friction and windage losses are 600 W, the core losses are 1800 W, and the stray losses are negligible. Calculate (i) air-gap power (ii) power converted (iii) output power and (iv) efficiency of the motor. [1+1+1+1=4]
- 6 a. Explain the working principle of a synchronous motor. [4]
b. Explain how a single phase induction motor can be made self-starting by converting single phase supply into two phase supply through use of additional winding. [4]