



Time Allowed: 2 Hours

Total Marks: 50 Mark

Final Exam, 17/12/2017

FIRST QUESTION (15 MARKS)

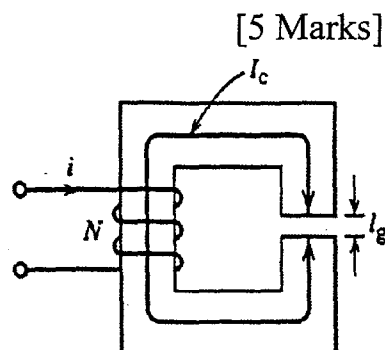
- (1-1) من خلال دراستك للمنهج: أذكر طريقتان مختلفتان لإنتاج البخار من محطات توليد الطاقة الكهربائية موضحا مميزات وعيوب كل طريقة؟ [5 Marks]
- (2-1) في ضوء دراستك للمقرر ومع زيادة الطلب على الطاقة من صغار المستثمرين في المناطق الصحراوية والناحية، في رأيك ما هو نوع محطة القوى التي يمكن انشائها موضحا سبب اختيارك لهذا النوع و مميزاتا وعيوبها. [5 Marks]
- (3-1) عرف منظومة القوى الكهربائية مع ذكر عناصرها بالتفصيل؟ [5 Marks]

SECOND QUESTION (10 MARKS)

- 2-1) A 10 kVA, 50 Hz, 2300/230 V single-phase transformer has $R_1=3.96\Omega$, $R_2=0.0396\Omega$, $X_1=15.8\Omega$, $X_2=0.158\Omega$. The transformer delivers half rated kVA at 0.8 power factor lagging to a load on the low voltage side. Find the high voltage side voltage necessary to maintain 230 V across the load terminals [5 Marks]
- 2-2) Two parallel balanced loads are connected to 240 kV star connected source. The first load draws 30 kW at 0.6 power factor lag while load 2 draws 45 kVAR at 0.8 power factor lag. Assuming positive sequence, Find the total apparent power and total current absorbed by the combined load? [5 Marks]

THIRD QUESTION (10 MARKS)

- 3.1) Discuss the methods used to reduce the eddy current losses. [5 Marks]
- 3.2) For the magnetic circuit of figure, $N=400$ turns, Mean core length $l_c=50$ cm, Air gap length $l_g=1.0$ mm, Cross-sectional area $A_c = A_g = 15$ cm², Relative permeability of core $\mu_r = 3000$, and $i=1.0$ A. Find
- (a) Flux and flux density in the air gap.
- (b) Inductance of the coil. [5 Marks]



FOURTH QUESTION (15 MARKS)

4.1) Explain the methods of DC motor speed control. [5 Marks]

4.2) A dc shunt generator (20 kW, 200 V, 1800 r.p.m.) has $R_a=0.1 \Omega$, $R_{fw}=150 \Omega$. Assume that $E_a = V_t$ at no load. Data for the magnetization curve at 1800 rpm are:

I_f (A)	0.0	0.125	0.25	0.5	0.625	0.75	0.875	1.0	1.25	1.5
E_a (V)	5	33.5	67	134	160	175	190	200	214	223

The machine is self-excited.

- (a) Determine the maximum generated voltage.
- (b) At full-load condition, $V_t = V_t$ (rated), $I_a = I_a$ (rated), $I_f = 1.25$ A. Determine the value of the field control resistance (R_{fc}).
- (c) Determine the electromagnetic power and torque developed at full-load condition.
- (d) Determine the maximum and short circuit value of the armature current.
- (e) Estimate the critical value of shunt field resistance at 1800 r.p.m. [10 Marks]

With Our Best Wishes

Dr. Abdelfattah Eladl