Mansoura University
Faculty of Engineering
Dept. of Electrical Engineering

BME Program
Electrical Power
Course Code: FCR141

Time Allowed: 2 Hours *Total Marks: 50 Mark*

Final Exam, 28/12/2018

FIRST QUESTION (15 MARKS)

1-1) فى ضوء دراستك للمقرر ومع زيادة الطلب على الطاقة من صغار المستثمرين فى المناطق الصحراوية والنائية، فى رايك ما هو نوع محطة القوى التى يمكن انشائها موضحا سبب اختيارك لهذا النوع و مميزاتها وعيوبها. [5 Marks]

2-1) من خلال دراستك للمنهج: أذكر طريقتان مختلفتان لانتاج البخارمن محطات توليد الطاقة الكهربية موضحا مميزات وعيوب كل طريقة؟ [5 Marks]

3-1) عرف منظومة القوى الكهربية مع ذكر عناصرها بالتفصيل؟ [5 Marks]

SECOND QUESTION (10 MARKS)

2-1) A Y-Y three phase system has positive sequence and supply voltage of 220 V. if the phase voltage of the load is $V_{AN} = 180\angle -2.7°$, line impedance of 1+j2 Ω, calculate power loss in the line and impedance of the load. [5 Marks]

2-2) A 50-kVA, 4400/220 V transformer has $R_1 = 3.45\ \Omega$, $R_2 = 0.009\ \Omega$, $X_1 = 5.2\ \Omega$ and $X_2 = 0.015\ \Omega$. Calculate for the transformer **total Cu loss using equivalent resistances as referred to each side.** [5 Marks]

THIRD QUESTION (3+2+4 MARKS)

3-a) Explain with a diagram the construction of a dc machine.

3-b) Draw speed–torque-current characteristics for separate, shunt and series motors and compare between them.

3-c) A series-connected dc motor has an armature resistance of 0.4Ω and field winding resistance of 1.4Ω. In driving a certain load, where the output shaft power and output shaft torque are 3450W and 27Nm respectively. from a voltage source of V = 220V. The efficiency of this motor is 80 %. Find (i) the motor current, (ii) the speed (iii) power developed and (iv) the rotational loss.

Fourth Question (4 + 3 Marks)

4-a) Explain the construction, advantages, disadvantages and applications of Permanent-Magnet DC Motor

4-b) A stepper motor has a step angle of 2.5°, determine (i) resolution (ii) number of steps required for the shaft to make 20 revolutions (iii) shaft speed, if the stepping frequency is 3600 pps.

Fifth Question (3 + 2 + 4 Marks)

5-a) Explain the principle of operation of the 3 phase induction motor and showing why cannot run at the synchronous speed?

5-b) Compare between transformer and induction motor.

5-c) A 480-V, 60 Hz, 50-hp, three phase induction motor is drawing 70A at 0.9 PF lagging. The stator copper losses are 2 kW, and the rotor copper losses are 600W. The friction and windage losses are 500 W, the core losses are 1700W, and the stray losses are negligible. Find the following quantities: (i) The air-gap power (ii) The power converted (iii) The output power (iv)The efficiency of the motor.

With Our Best Wishes

Dr. Abdelfattah Eladl

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