UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JANUARY 2010 SESSION

SUBJECT CODE : FED 20202
SUBJECT TITLE : MOTOR STARTER & DRIVES
LEVEL : DIPLOMA
TIME / DURATION : 08.00 pm – 10.00 pm
(2 HOURS)
DATE : 29 APRIL 2010

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. Please write your answers on the answer booklet provided.
4. Answers should be written in blue or black ink except for sketching, graphic and illustration.
5. This question paper consists of TWO (2) sections. Section A and B. Answer all questions in Section A. For Section B, answer one (1) question only.
6. Answer all questions in English.
7. Graph paper is appended.

THERE ARE 5 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.
SECTION A (Total: 65 marks)

INSTRUCTION: Answer ALL questions.
Please use the answer booklet provided.

Question 1

(a) The constitution of automatic installation consists of control circuit and power circuit. Describe what is:

   (8 marks)

   i. The control circuit
   ii. The power circuit

(b) Briefly explain:

   (9 marks)

   i. The main characteristic of Induction Motor
   ii. The basic construction of Induction Motor.
   iii. The principle operation of Induction Motor

(c) List down five starting methods in Motor Control Technology.

(5 marks)

(d) Explain briefly the main purpose to have a motor starter

(2 marks)

Question 2.

(a) Briefly explain the components in the Motor Starter as listed below:

   (9 marks)

   i. Thermal Overload Relay
   ii. Contactor
   iii. Time Delay Relay

(b) Draw the symbol of each of the components in Question 2a

(6 marks)
Question 3

A conveyor system uses a 415 V induction motor as its main actuator, is connected in delta. Figure 1 shows the nameplate of an induction motor.

![Nameplate Image]

Figure 1

Determine:

(a) The electrical power, $P_e$, of the motor. (9 marks)

(b) The efficiency of the motor. (5 marks)

(c) The torque produced by the motor. (7 marks)

(d) The motor is coupled with three phase 415 V, 50 Hz and builds in with 4 poles. The slip has been measured equal to 5 %, compute the speed of the rotor, $N_r$. (5 marks)
SECTION B (Total: 35 marks)

INSTRUCTION: ANSWER ONE (1) QUESTION ONLY

Please use the answer booklet provided.

Question 1

(a) Draw the control circuit and power circuit of a Star-Delta Starter. Use the indicator pilot light to indicate the operation of the system:

- RED indicator: Overload Current
- GREEN indicator: supply on
- YELLOW indicator: Motor run in star
- ORANGE indicator: motor run in delta

(15 marks)

(b) Explain the operation of the control circuit and the power circuit

(10 marks)

(c) States the advantages and disadvantages of Star-Delta starting methods compared to other starters

(10 marks)
Question 2

The conveyor system in Figure 2 needs to be conducted by two operators (A and B), stationed at both ends of the conveyor. The function of the conveyor is to transfer full loaded carton box by operator A from zone A and zone B, and vice versa. Three phase Induction motor is used to actuate the system.

![Diagram of conveyor system](image)

*Figure 2*

**System Operation:**

- Press Start Button A, the conveyor will move the fully loaded carton box towards Zone B.
- Once the carton box reached at point B, the operator B will push the Stop Button B and the conveyor will stop, and he will pull up the full carton box.
- Then, operator B will replace it with empty carton box, to be return back to operator A by pressing the Start Button B.
- Operator A will do the same thing to stop the conveyor by pressing the Stop Button A when the empty carton box reached at point A and empty carton box will reload.
- The process will rotate sequentially as mention above.
(a) Choose the motor starting method for the system in Figure 2, and design the control circuit and power circuit for that system.

(15 marks)

Use indicator lights to indicate the operation of the system:

- RED indicator: Overload current
- GREEN indicator: Forward direction
- YELLOW indicator: Reverse direction
- ORANGE indicator: Stop the system

(b) Explain the operation of control circuit and power circuit in Question (a)

(10 marks)

(c) List down the advantages and disadvantages of the starting method that you have choose in question (a) compared to other starters

(10 marks)

END OF QUESTION