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CONFIDENTIAL

SET A

UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION

JANUARY 2011 SESSION

SUBJECT CODE	:	FED 20202
SUBJECT TITLE	:	MOTOR STARTER & DRIVES
LEVEL	:	DIPLOMA
TIME / DURATION	:	8.00pm – 10.00pm (2 HOURS)
DATE	:	13 MAY 2011

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 three (3) questions only.
6. Answer all questions in English.

THERE ARE 5 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 40 marks)

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

Question 1

(a) Draw the following symbols:-

i. contactor (2 marks)

ii. thermal overload relay (2 marks)

iii. isolator (2 marks)

iv. circuit breaker (2 marks)

v. stop and start button (2 marks)

(b) Explain briefly the following terms :-

i. short circuit current (2 marks)

ii. overload current (2 marks)

iii. single phasing (2 marks)

iv. stalling (2 marks)

v. earth leakage current (2 marks)

Question 2.

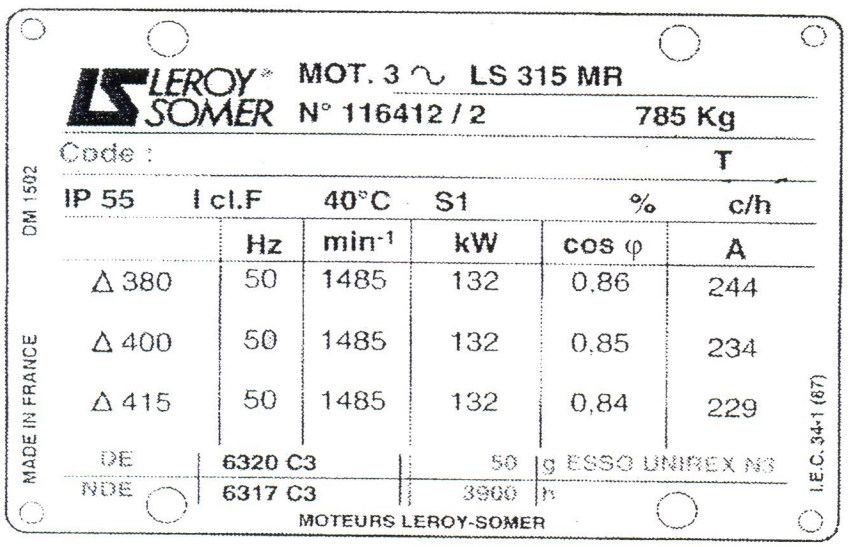

Figure 1: induction motor name plate

A conveyor system uses a 415 V induction motor as its main actuator and is connected in delta as stated at the name plate in **Figure 1**

Calculate :

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

(5 marks)

(b) The efficiency of the motor

(5 marks)

(c) The torque produced by the motor.

(5 marks)

(d) The speed of the rotor at a frequency of 50Hz if the slip is 5% with 4 poles.

(5 marks)

SECTION B (Total: 60marks)

INSTRUCTION : ANSWER THREE (3) QUESTIONS ONLY

Please use the answer booklet provided.

Question 3

(a) Name the two types of a Time Delay Relay and draw their symbols

(4 marks)

(b) With the aid of a diagram , explain the operation of a Normally Open Time to Close (N.O.T.C) contact of a time delay relay (use an indicator light as a load)

(8 marks)

(c) With the aid of a diagram, explain the operation of a Normally Open Time to Open (N.O.T.O) contact of a time delay relay (use an indicator light as a load)

(8 marks)

Question 4

(a) From **Figure 2**, design the control circuit and provide three indicator lights for:
H1 – to show the incoming supply is ON
H2 – to show the motor is running
H3 – to show if there is an overload in the motor

(5 marks)

(b) Explain the operation of the control circuit in question 2(a)

(10 marks)

(c) When the start button is pressed the motor does not run, list down three possible faults and the remedy for each fault

(5 marks)

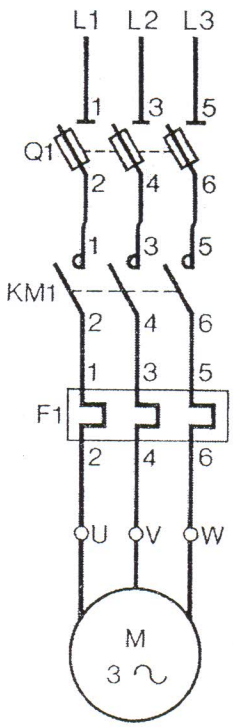

Figure 2 : Power Circuit

Question 5

There are several different methods for providing reduced –voltage starting for electric motors. One of them is an Auto-transformer method. **Figure 3** shows the power circuit for this starter and the starting sequence for this motor is as follows :-

Motor Stop	- contacts KM1, KM2 and KM3 open
Press Start –Button	- KM1 and KM2 contacts close
After a Time-Delay	- KM1 contact open
	- KM2 contact open and KM3 contact close
Press Stop-Button	- KM3 contact open and motor stop

i. Design and explain the operation of the circuit

(16 marks)

ii. How does the auto-transformer serve to reduce the voltage to motor during starting

(4 marks)

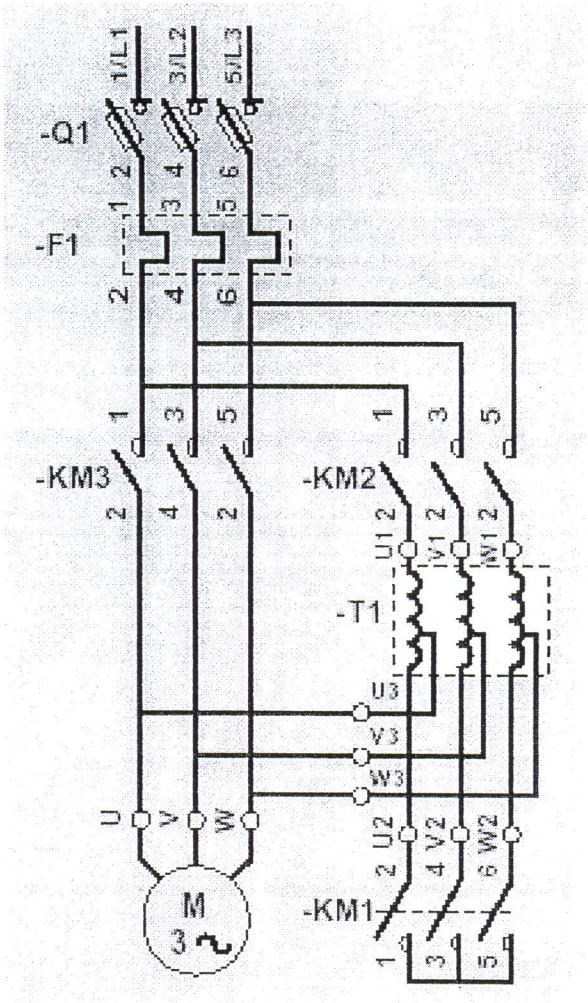

Figure 3 : Power Circuit of an Auto-Transformer Starter

Question 6

(a) Draw the general block diagram for an AC drives

(3 marks)

(b) Name the two categories of an AC drives and state their differences

(4 marks)

(c) Explain briefly the operation of Pulse- Width Modulation (PWM) AC drives

(8 marks)

(d) State the advantages and the disadvantages of the PWM AC drives compared to PAM AC drives

(5 marks)