UNIVERSITI TUN HUSSEIN ONN MALAYSIA

PEPERIKSAAN AKHIR
SEMESTER II
SESI 2008/2009

NAMA MATA PELAJARAN	:	ELEKTRONIK INDUSTRI
KOD MATA PELAJARAN	:	DEK3113
KURSUS	:	3 DEE/DEX
TARIKH PEPERIKSAAN	:	APRIL/MEI 2009
JANGKA MASA	:	2 ½ JAM
ARAHAN	:	JAWAB EMPAT (4) SOALAN SAHAJA DARIPADA ENAM (6) SOALAN.

KERTAS SOALAN INI MENGANDUNGI SEBELAS (11) MUKA SURAT

Q1. (a) State advantages and disadvantages using electromechanical relay.
(3 marks)

(b) Based on Figure Q1 (b):

(i) Explain the operation of Figure Q1 (b) during de-energize and energize state.
(5 marks)

(ii) State an advantage of the system
(2 marks)

(c) (i) Define pole and throw for each switch in term of relay contact form.
(2 marks)

(ii) Labels how many poles or throw as shown in Figure Q1(c).
(4 marks)

(d) Figure Q1 (d), shows one of the method to prolonged the life time for switch of the relay.

(i) Explain the operation of Figure Q1 (d) when transistor in "on" & "off" condition.
(5 marks)

(ii) State and draw three other types of protection circuit available.
(4 marks)

Q2. (a) In a production line, an indicating lamp will be lighted whenever an operator presses a push-button. This is to capture the attention of the line leader whenever they encounter a problem. Here, three stations are simulated using push-button switches PB1, PB2 and PB3 respectively. By referring Figure Q2 (a), you need to design the ladder diagram to fulfill the requirement.

(7 marks)

(b) Figure Q2(b) shows how 3 Axis Robot move the load from original position (shown in the figure) to Box B. There are only 3 sensors available which are up sensor, right sensor and left sensor.. The process flow of moving the load is shown below:

Process flow:

Push Button is pressed → Move down → Grip the load → Move up → Move to the right → Move down → Move to the front → Ungrip the load

It uses 3 different cylinders:

Cylinder A - Double Acting Cylinder (3/2 way valve normally close):
Move down (Y1) and move up robot arm.

Cylinder B - Single Acting Cylinder (3/2 way valve normally close):
Grip (activate Y2) and ungrip the load.

Cylinder C - Single Acting Cylinder (3/2 way valve normally close):
Move to the right (activate Y3) and move to the left robot arm.

Cylinder D - Single Acting Cylinder (3/2 way valve normally close):
Move to the front (activate Y4) and move to the back robot arm.

Assumption:
(1) Time for robot arm to move from up position to down position (or vice versa) is 2 sec.
(2) Time for robot gripper to grip/ungrip the "Load" is 0.5 sec.
(3) Time for robot arm to move from right position to left position (vice versa) is 2 sec.
(4) Time for robot arm to move from back position to front position (vice versa) is 1 sec.

Base on Figure Q2(b):

(i) Draw a grafset diagram for the application.
(4 marks)

(ii) Draw displacement diagram(Cylinder A,B, C,D)
Please include all traveling time in your diagram
(4 marks)

(iii) Draw electric diagram
(10 marks)

Q3. (a) Figure Q3 (a) show a ladder diagram of a system. Write the mnemonic function of the system.
(10 marks)

(b) In a factory, two conveyors were used for apple packaging. When start button is pressed, "box conveyor" start to move. The empty box on

the "box conveyor" will move simultaneously until sensor 2(SE2) detect the presence of empty box. SE2 will cause "box conveyor" to stop. After 1 second the "apple conveyor" will start to move. "Apple conveyor" consisting of row of apple which is arrange accordingly as shown in Figure Q3(b). Sensor1 (SE1) will detect the presence of apple. The apple will fall into the box one by one. After 12 apple has been counted by SE1, "apple conveyor" will stop and it is ready to be pick up by the operator.

Note:
Please use all related special function instead of using counter.
Need allocate specific address using CQM1H model.

(15 marks)

Q4. From Figure Q(4), all value R and V is stated as below:

R1=12kΩ , R2=33kΩ , R3 =80kΩ , R4=220kΩ, R5=30kΩ , R6=10 kΩ , R7=12kΩ , R8=63kΩ,
R9=20kΩ , R10=240kΩ , R11= 200kΩ
V1=2 V , V2=4 V , V3=1 V ,V5= 2 V, V8=1 V

a) Name types of all four Op Amp in Figure Q(4) and its function.
(5 marks)

b) Find current flows through R1, R2, R3, R4
(5 marks)

c) Find the values for V4, V6, V7 and Vout
(10 marks)

d) What is the meaning of offset of an Op-Amp and explain how is the offset value effect the performance of the op-amp?
(5 marks)

Q5. (a) Explain how PWM is generated.
(You need to include appropriate diagram in your explanation)
(5 marks)

(b) Explain the concept of PWM in controlling the speed of simple motor.
(5 marks)

(c) An op amp generates the triangular waveform and a comparator produces the PWM output signal. The input waveforms from this circuit are shown in Figure Q5(c) . Sketch and explain in detail, the output of the PWM signal based on the given signal in Figure Q5 (c).
(8 marks)

(d) A 110 hp series motor rated 180A is operating in a chopper circuit from

a 500V dc source. The armature and field inductance is 0.05H at the minimum ratio t1/(t1 + t2) of 0.21. Find the pulse frequency to limit the amplitude of armature current excursion to 10A.

(7 marks)

Q6. (a) Give definition of stepper motor

(4 marks)

(b) Explain the difference between full step and half step of stepper motor. Please inculde operation diagram for each answer

(15 marks)

(c) Calculate the resolution of 4-phase hybrid stepper motor of 3.6 ° step if it operates:

(i) full step
(ii) half step

(6 marks)

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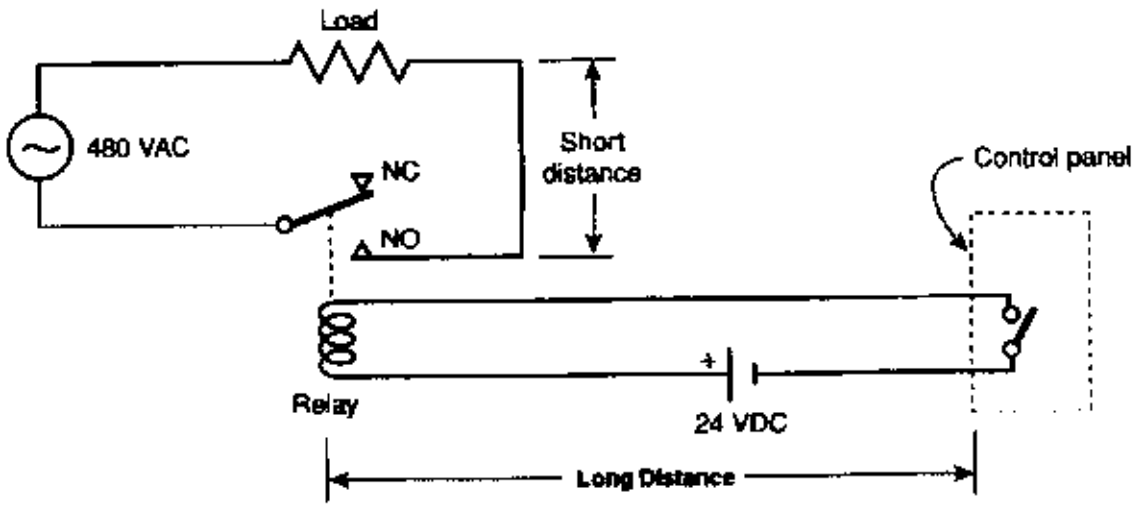

FIGURE Q1(b)

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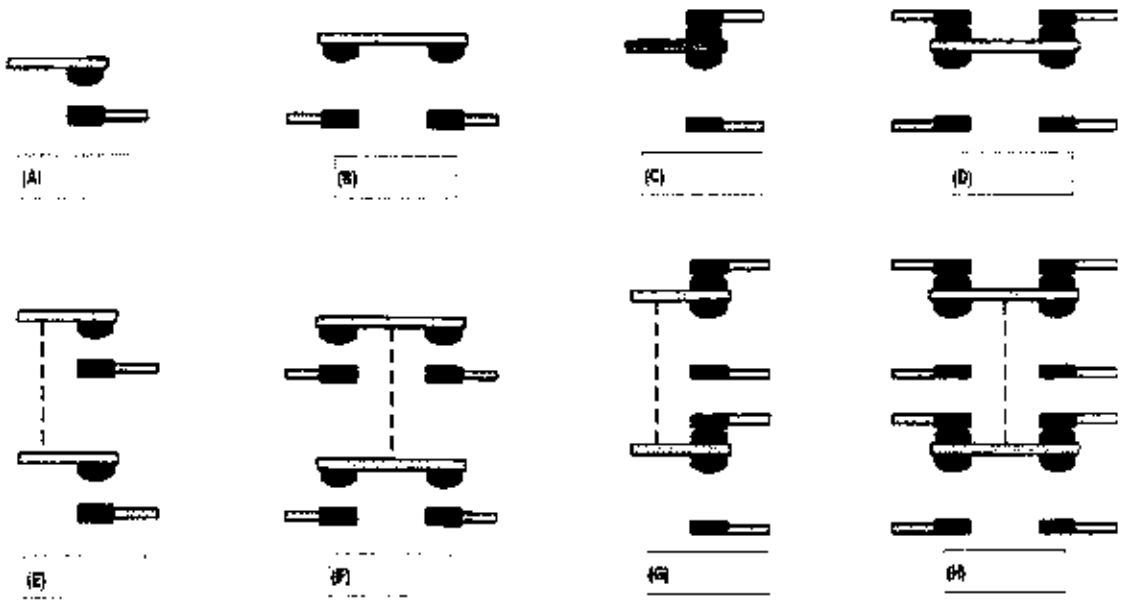

FIGURE Q1(c)

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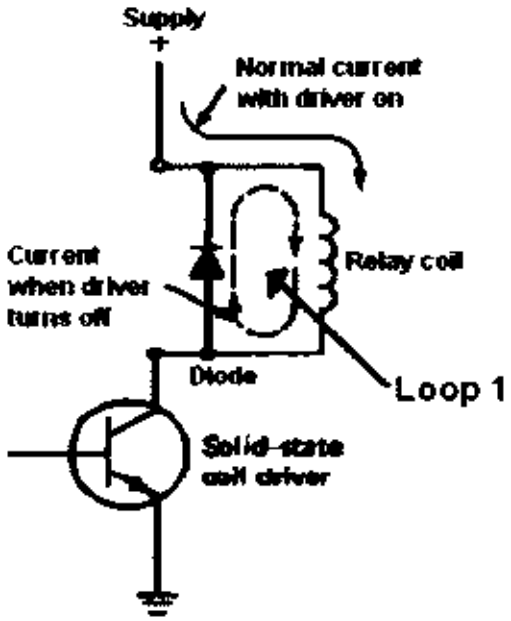

FIGURE Q1(d)

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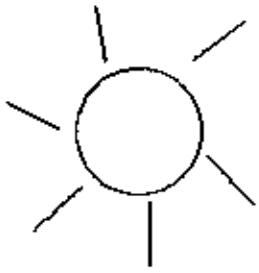

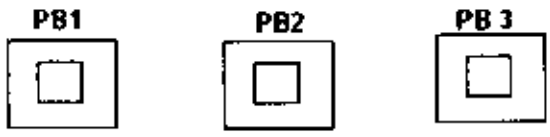

FIGURE Q2(a)

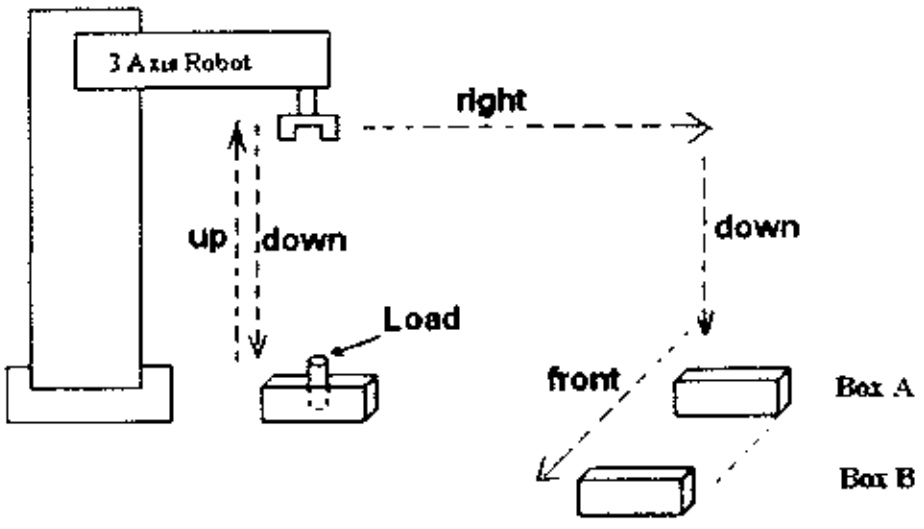

FIGURE Q2(b)

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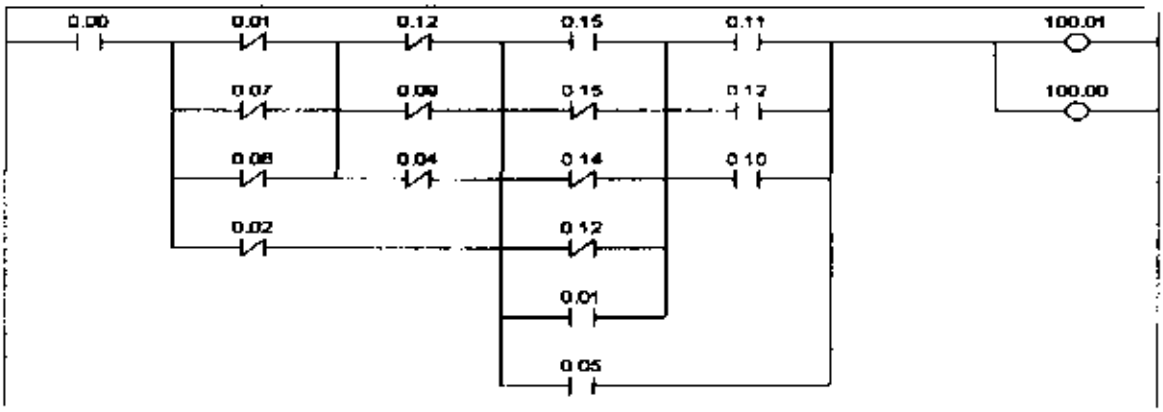

FIGURE Q3(a)

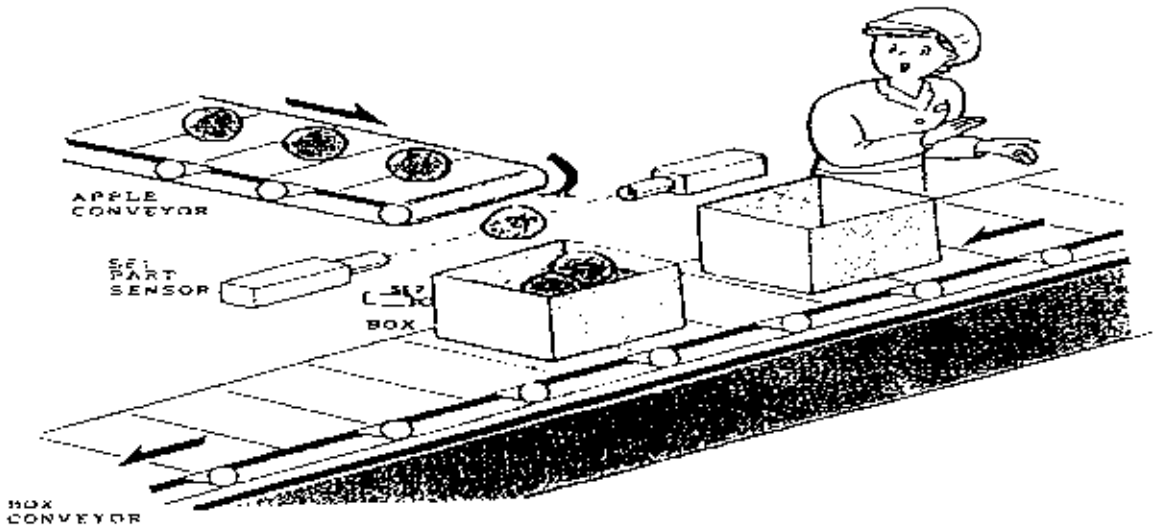

Figure Q3(b)

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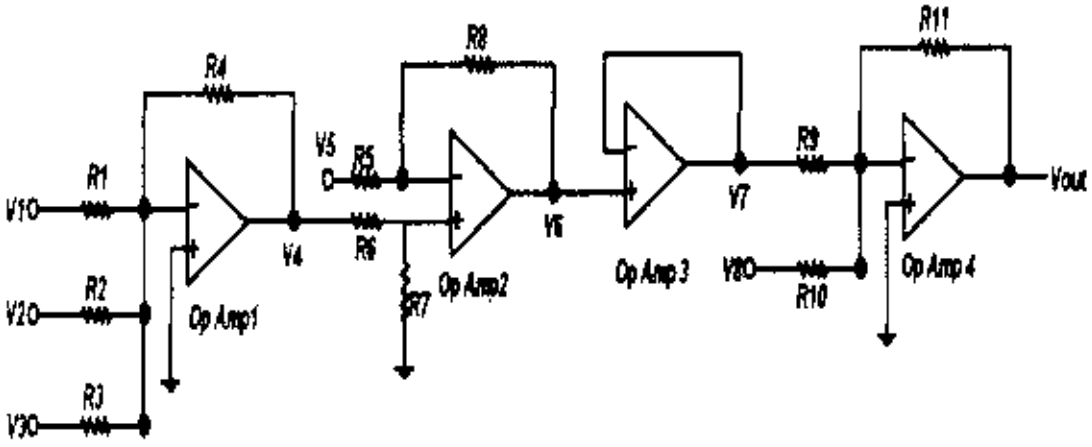

Figure Q4

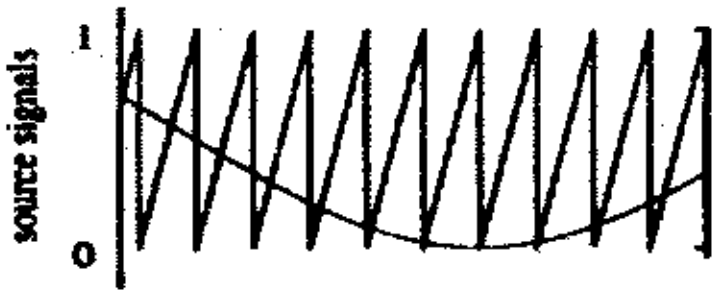

Figure Q5(c)(i)