

1. The circuit diagram of FIGURE 1 is of a bell indicator circuit.

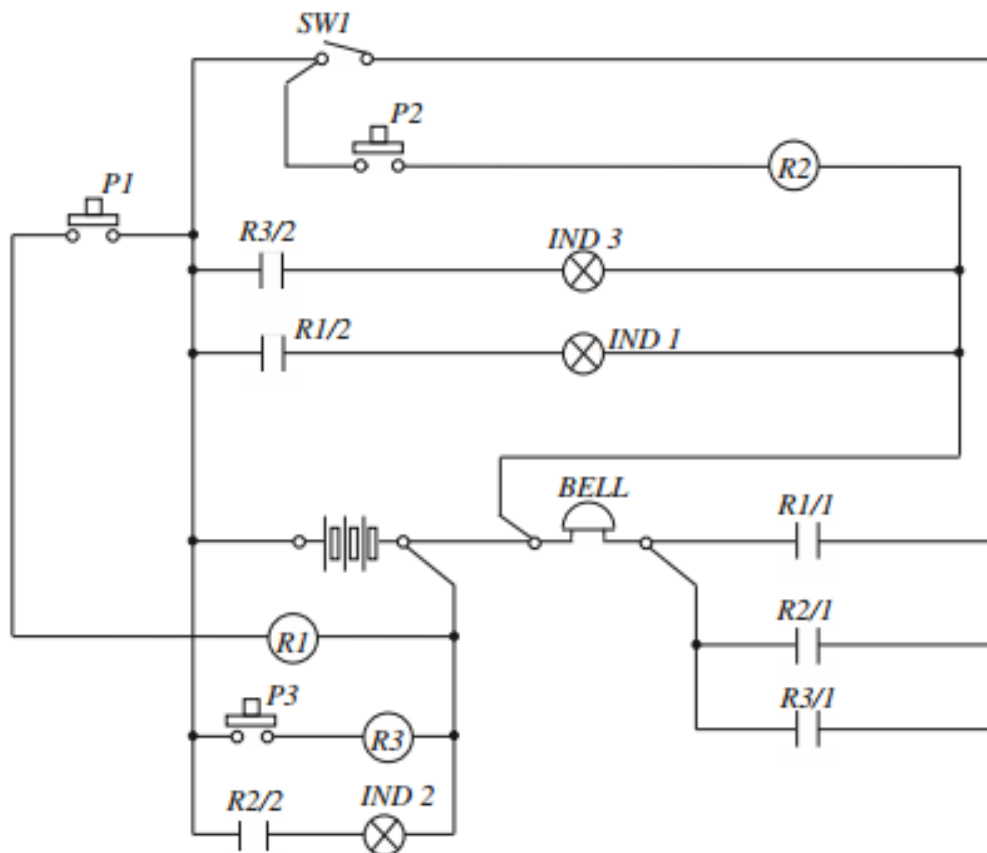


FIG. 1

- (a) Convert this diagram into industrial ladder diagram format (retain all devices).
- (b) (i) Convert the diagram of FIGURE 1 into a suitable PLC ladder diagram having the simplest form.
- (ii) Provide I/O designation charts to show your choice of inputs and outputs.
- (iii) State three benefits obtained by the PLC implementation.

2. The diagram of FIGURE 2 is an extract from an industrial control panel wiring diagram.

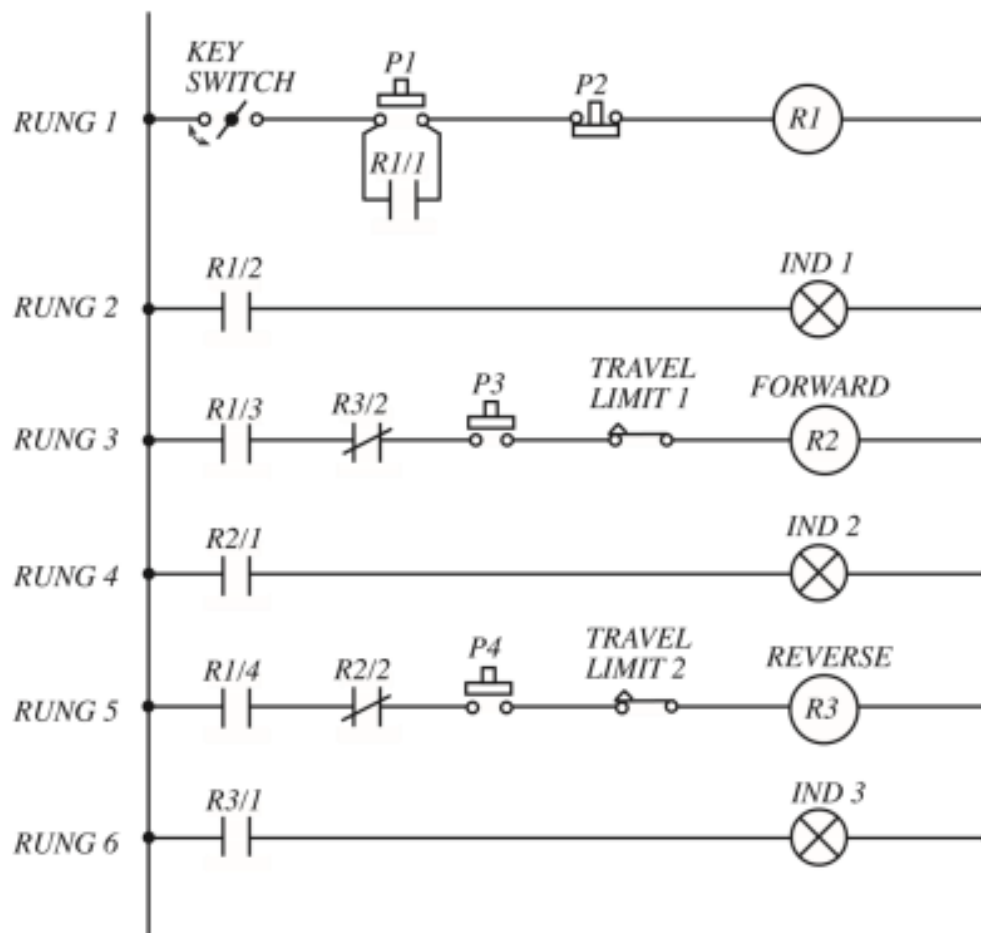


FIG. 2

- (i) Convert the diagram into PLC format.
- (ii) Identify all inputs and outputs by the use of I/O designation charts.
- (iii) With respect to the operation of the circuit:
 - (a) explain the purpose of rung 1

- (b) explain fully the condition of the circuit elements when indicator IND2 is illuminated
 - (c) If indicator IND3 is on, explain what will happen if P3 is operated.
3. Provide a block diagram of a PLC system which contains the following:
- (i) (a) a CPU
 - (b) a system clock
 - (c) a power supply
 - (d) input and output interfaces
 - (e) a keyboard
 - (f) a display device
 - (g) necessary types of memory.

Describe very briefly the function and essential features of each block.

- (ii) Use the diagram shown in FIGURE 3 to briefly explain the fetch/execute cycle of a microprocessor for the instruction 32 00 BC. The instruction is stored in memory locations 1661 to 1663. The op code means 'store the contents of the accumulator in memory address location'. The address given is in the reverse order. The contents of the accumulator are 78H. Indicate the contents of the PC, AS, registers, accumulator and address BC00 after the cycle is completed.

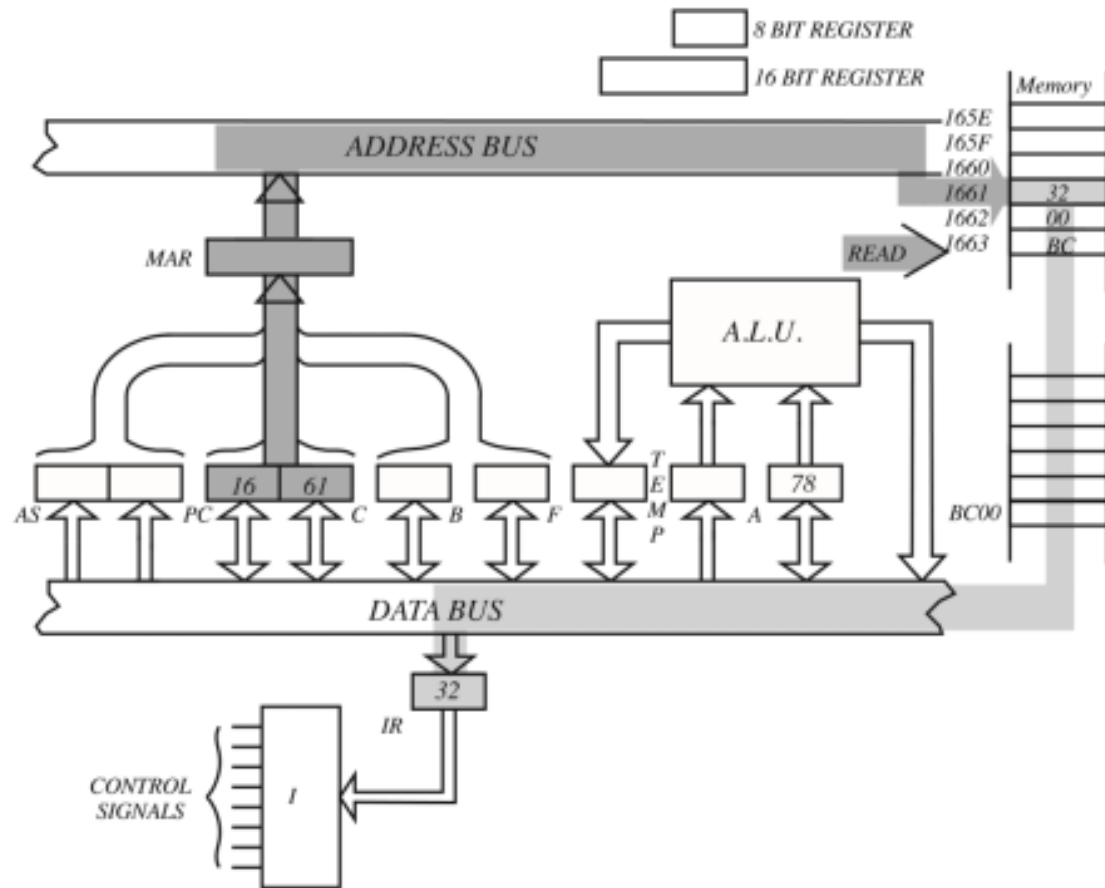


FIG. 3

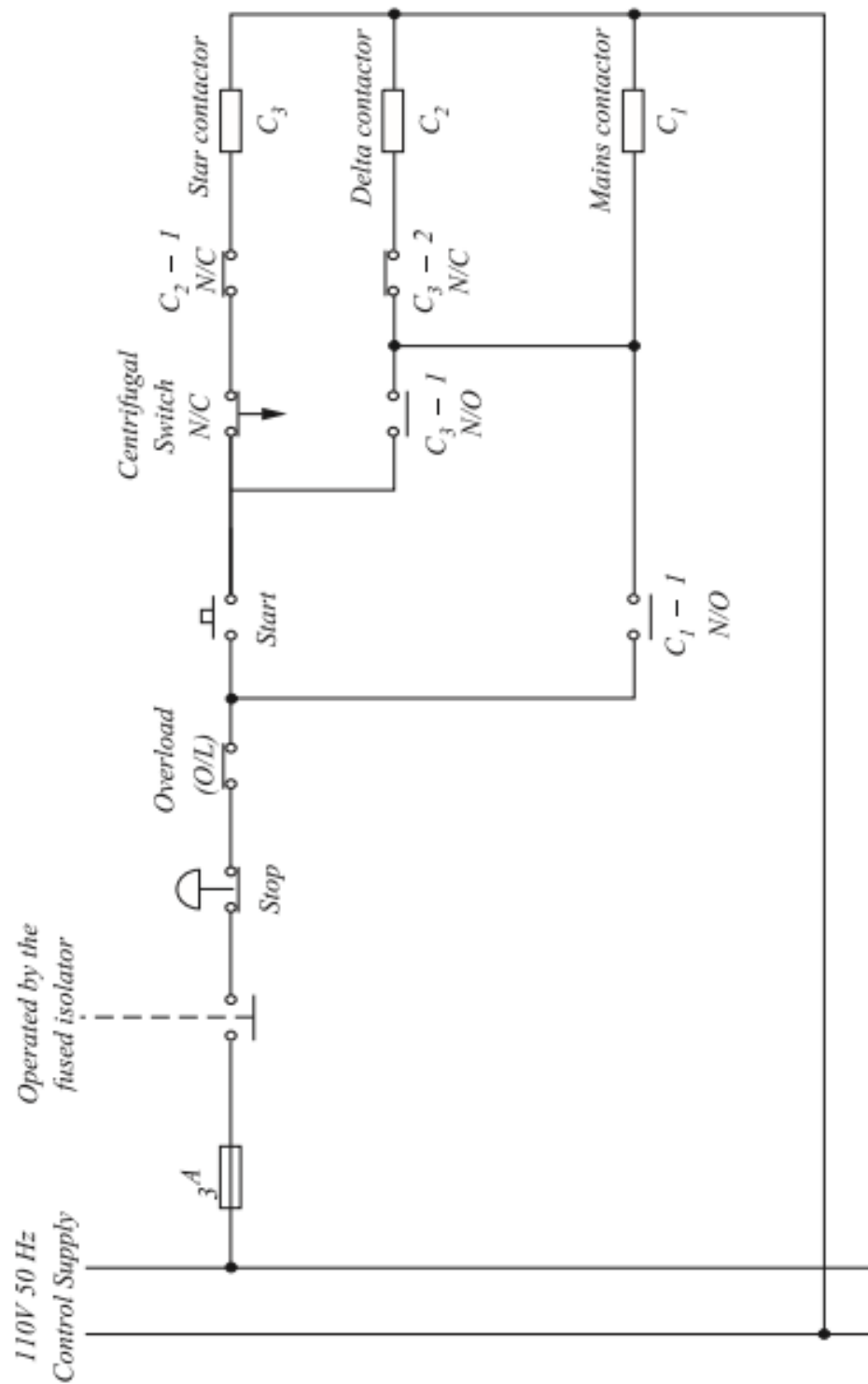


FIG. 5

