(i) Ways to measure the speed of motor in rpm.

Ans)

1. Use a stop-watch to calculate the time required for one full rotation, say t seconds. Then speed will be 60/t rpm.

2. Calculate DELAY for a given voltage level v Volts. DELAY is the time taken for each step by motor, implemented in code.

DELAY can be calculated by computing the average T states used in running the code for each step. This involves adding T states used for each instruction -

MVI - 7/10 T

LDA - 13 T states etc.

An approximate formula for calculating DELAY = 14\*(2+d)\*d/3.072\*106

Speed then can be calculated as 60/(DELAY\*100) rpm.

(ii) 1500 rpm.

(iii) The motor rotates at full possible speed.

(iv) For the motor available it was 3.6 degrees. But there are stepper motors with resolution 1.8 degrees.

(v) Graph next page

(vi) for anticlockwise rotation replace create another instance of the code and replace RRC with RLC. Keep a check on converted digital value of input voltage. If it is greated than v2, run RLC module, else run RRC module.

