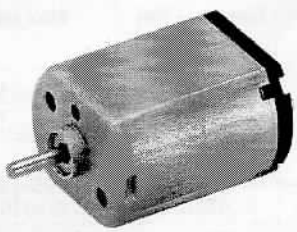
A transistor switch is required for the motor of a robot car to be build by a mechanical engineering student

Type	Motors
Product type	Johnson Motor PMDC flat motors
Typical markets	• consumer electronics • leisure & fitness • distribution
Typical applications	• CD/DVD players • cameras • toys • international catalog distributors • regional distributors • sales partners • value added distribution partners • market specific distributors
Supply	nominal 5 VDC
Pole number	3
Weight	10.4 g

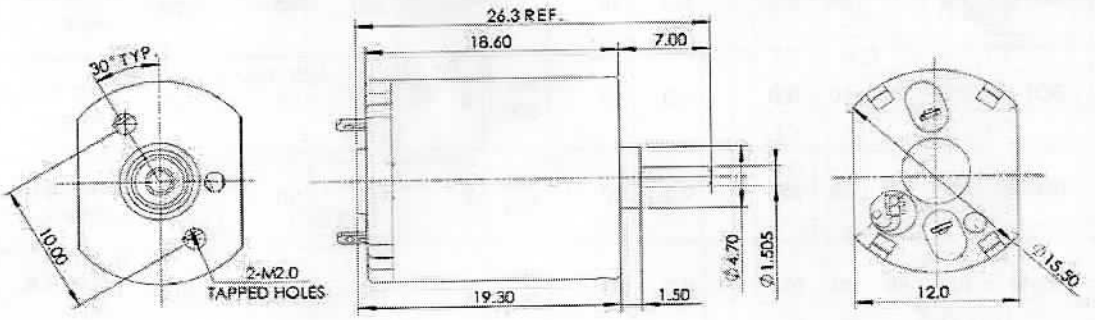


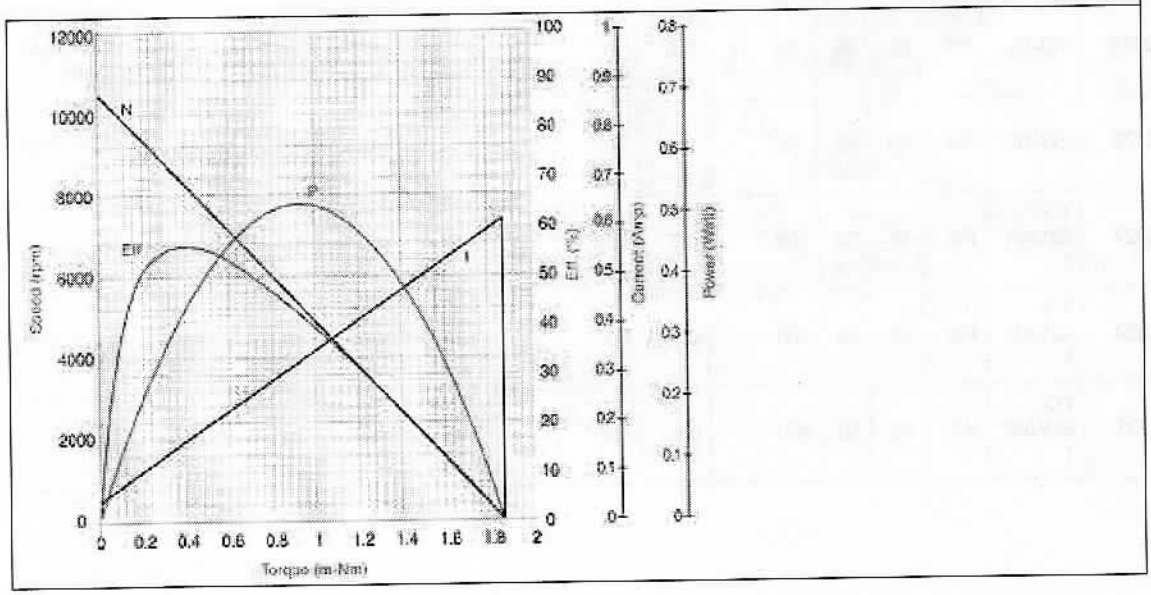
Dimensions

Ø 15.5 x 18.6, flat 12, shaft Ø 1.505 mm

Characteristics

- this compact size motor is designed to have good starting voltage and cogging to fit into both sled and loading applications.





The motor will be running at 5V DC and at maximum power, therefore the transistor should be able to switch on the load current at maximum power. (i.e. find from the data sheet of the motor what is the RPM, torque and current of the motor at maximum power)

Select an appropriate transistor and design the switching circuit.

Assignment 7

General QBasic Programming

Student Name:

_____

Course Number:

_____

Assessment

	MEM14082A	MEM6008A	MEM23051A	MEM30025A
Max	**5**	**10**	**5**	**5**
Marks				

Note: The program can be in any programming language chosen by the student. Marking criteria for the program

1. **The program produces the result required**
2. **The program is user-friendly. That means clear instructions for users on inputs and clear labelling of outputs.**
3. **Concise. For example, repetitive tasks should be handled by looping, etc.**

Write a QBasic program for the marked one of the following tasks. The program would be judged on the following.

- **Accuracy of output**
- **User-friendliness**
- **Effectiveness and efficiency of program code.**

1. For a DC circuit, the voltage supply (V) in V, resistance (R) in Ω and current flow (I) in A are related by Ohm's law V=I*R. Write a program to find any one of the three values (V, I & R) for a circuit if the values of the other two are known.
2. For a DC circuit, the Power (P) in W, voltage (V) in V and current flow (I) in A are related by the formula P = I*V. Write a program to find any one of the three values (V, I & R) for a circuit if the values of the other two are known.
3. Write a program that allows the user to convert temperature from Celcuis to Fahrenheit and also from Fahrenheit to Celcius. The conversion formula is given as $C = (F - 32) * \frac{5}{9}$, where F is temperature in Fahrenheit and C is temperature is Celcuis.
4. The time constant of a electronic timing circuit is given by the formula: $\tau = R * C$. Where τ is time constant in seconds (s) , R is resistance in ohms (Ω) and C is capacitance in Farad (F). It is generally accepted that 5τ is the time required to fully charge a capacitor practically. Write a program to allow the user to specify the time (in seconds) for delay required, and the user also specify value of either R or C. Then the program will output the necessary value in order to complete an RC circuit that satisfies the requirement in time delay.
5. For a DC circuit with 2 resistors, R_1 and R_2, in series, the equivalent resistance R_T is given by the formula $R_T = R_1 + R_2$. IF R_1 and R_2, in parallel, the equivalent resistance R_T is given by the formula $\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$. Or the formula can be re-written as $R_T = \frac{R_1 R_2}{R_1 + R_2}$. Write a program to output R_T when R_1 and R_2 are known.
6. An input voltage V_{in} (V) is to be divided into 2 parts by 2 resistors R_1 (Ω) and R_2 (Ω) connected in series with the power supply. The voltage output V_1 and V_2 are given by the formulae $V_1 = V_{in} \frac{R_1}{R_1 + R_2}$ and $V_2 = V_{in} \frac{R_2}{R_1 + R_2}$. Write a program which accepts input of V_{in}, R_1 and R_2. The program will produce the value V_1 of and V_2.
7. An input voltage V_{in} (V) is to be divided into 2 parts by 2 resistors R_1 (Ω) and R_2 (Ω) connected in series with the power supply. The voltage output V_1 and V_2 are given by the formulae $V_1 = V_{in} \frac{R_1}{R_1 + R_2}$ and $V_2 = V_{in} \frac{R_2}{R_1 + R_2}$. Write a program which accepts input of V_{in}, and V_2 required. The program will produce the value of R_1 and R_2 so as to produced the required voltage V_2). The following formulae may be useful $\frac{V_1}{V_2} = \frac{R_1}{R_2}$, $V_{in} = V_1 + V_2$)

Programming Listing:

Answer only question #7.