

**Machine Design II (MDP-303)**

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The figure below shows the constructional drawing of an Electrical Hand Drill. The drill capacity varies from 0.5 to 8 mm drilled diameters. This hand drill is designed for two output speeds (850 and 1500 rpm). The power required to operate the drill is 200 Watts, while the electric motor is running at 9000 rpm. The reduction ratio between the motor shaft and the intermediate shaft is 4.

Requirements:

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| 1. Full design of the output 850 rpm spur gear set   | 30% |
| 2. Preliminary design of the output shaft  | 10% |
| 3. Preliminary design of the output shaft bearings<br>(Use one deep groove ball bearing, and the other needle bearing as shown in figure). | 15% |
| 4. Constructional Drawing of the 2 steps gear unit only.   | 45% |

*(Assume any missing data)*

