2 **(a)** A simple generator consists of a coil with a large number of turns that rotates at a constant rate in a uniform magnetic field, as shown in Fig. 2.1.

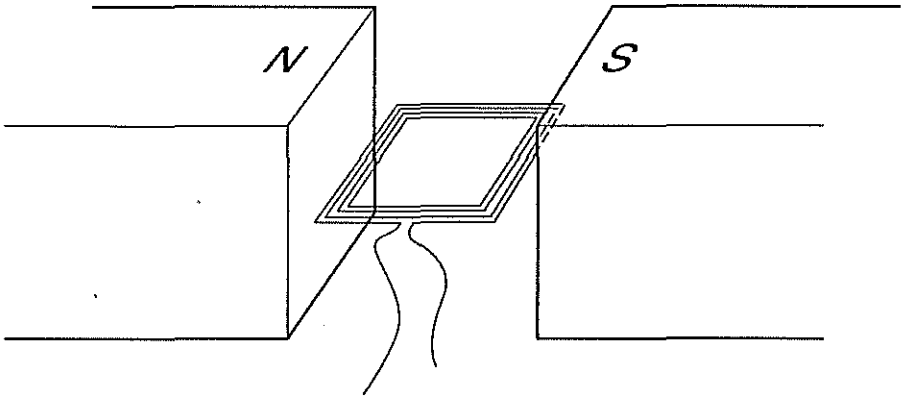

Fig. 2.1

(i) Explain why an e.m.f. is generated when the coil rotates.

.....

.....

.....[2]

(ii) State two factors that affect the magnitude of the maximum e.m.f.

1. .....

2. .....

[2]

(iii) Explain briefly, in words, why the e.m.f. is sinusoidal.

.....

.....

.....[2]

(b) The output from a similar generator is connected to the input of a transformer. The transformer has 30 turns on its primary coil and 600 turns on its secondary coil. The transformer may be considered to be ideal. The input e.m.f. is 72 V r.m.s. The output from the transformer is connected to a resistor of resistance 160 Ω, as shown in Fig. 2.2.

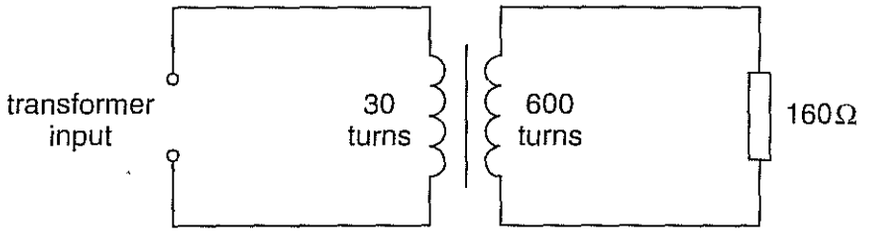

Fig. 2.2

Deduce

(i) the peak input e.m.f.,

peak input e.m.f. = ... V [1]

(ii) the r.m.s. value of the p.d. across the resistor,

r.m.s. p.d. = ... V [1]

(iii) the r.m.s. value of the current in the resistor,

r.m.s. current = ... A [1]

(iv) the mean power dissipated in the resistor,

power = ... W [1]

(v) the r.m.s. value of the current from the generator.

current = ... A [2]