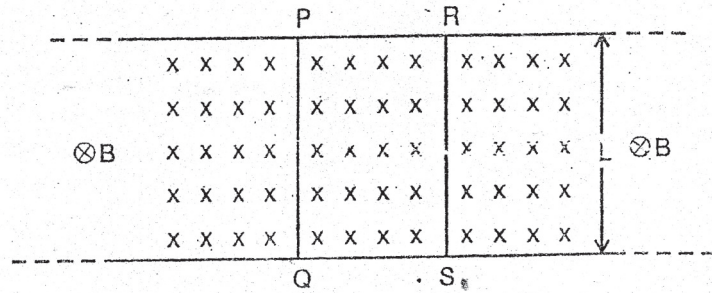


1993 A/L Structured Essay Question No (04)

04. Two conducting wires PQ and RS each having length L and resistance r make contact with two smooth parallel conducting rails of negligible resistance. The plane of the wire is normal to a uniform magnetic field of flux density B as shown in the figure. The wire PQ is pulled with a uniform velocity V to the left.



- (a) (i) Show in the figure given, the direction of the induced current in PQ.
 (ii) Write down an expression for the induced current. (2 lines)
- (b) Give the magnitude of the force which is required to keep the wire in motion in terms of the symbols given. (one line)
- (c) (i) If the wire RS is also moved with the same velocity V to the left what will be the induced current in the loop PQSR? (one line)
 (ii) Explain your answer. (2 lines)
 (iii) What is the magnitude of the total force required to maintain the motion of the wires. (one line)
- (d) (i) If RS is now moved to the right with uniform velocity V in addition to the motion of PQ as stated above what will be the induced current in the loop PQSR? (2 lines)
 (ii) Write down an expression for the total mechanical power required to maintain the wires in motion. (one line)
 (iii) In what form this power finally appears in the system. (one line)