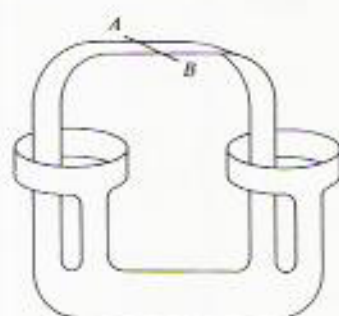


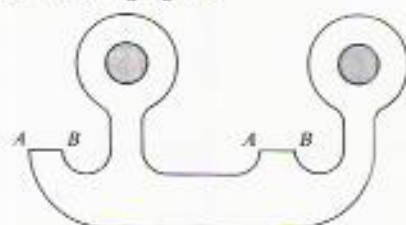
Part II Geometric Topology

Question 9

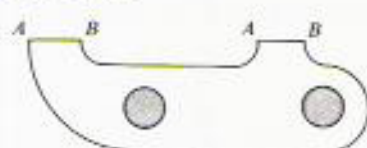
(i)



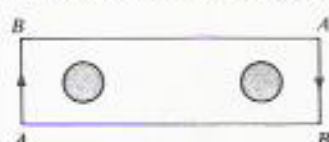
Cut (for example) at AB . Retracting the arms and flattening the cylinders into annuli gives the following figure.



Pulling the 'holes' inside gives



and this is now recognizable as a Möbius band with two holes in it.



$\beta(M^2) = 1$; $\chi(M^2) = 0$; so $\beta(S) = 3$, $\chi(S) = -2$. S is non-orientable.

(ii)



Cutting, for example, at AB , retracting the severed ends, and rejoining them outside the link, gives the following.

