Cleat orientation mapping is critical to determine the maximum principal compressive horizontal stress ($S_{1}$) direction for Coal Bed methane Exploration (CBM) exploration and exploitation, which in turn controls the direction of maximum gas or water flow though coal beds. A database of in-situ stress measurements from underground coalmines exists for several of the world’s coalfield for world stress map project; though no systematic in-situ stress and permeability measurement had been carried out in Jharia coalfield, India. In this paper collected cleat orientation data from underground and open cast coal mines have been used to determine the in-situ stress orientation pattern of Jharia coalfield. A methodology is proposed for estimation of permeability for a macro-cleat system of coal from well log derived porosity and from known cleat spacing from Jharia coalfield. The coal seams in Jharia coalfield generally show low permeability in the range of 0.5 to 3 md. Confidential well test data from this area also supports the permeability values. From the field study it is found that the face and butt cleat azimuths are towards NW-SE and NE-SW respectively. The cleat orientations are correlated with the previous lineament map well as with the average permeability contour map to infer the orientation of $S_{1}$. The cleat orientation is further validated from the previous fracture analysis from FMI log in Parbatpur area located southern part of the Jharia coalfield. The major coal seams under the study area exhibit directional permeability, with the maximum permeability oriented parallel to the face cleat orientation.