Abrikosov vortices in a type-II superconducting film subjected to strong magnetic field B with hexagonal array of nanoholes of the density n_{pin} form a vortex crystal. We considered instability, melting and dynamics of such vortex crystal carrying the transport current. The critical current for the case of the matching field ($f = 1, f = B/(\Phi_0 n_{pin})$).) was studied analytically using a variational method in the framework of Ginzburg-Landau equations. The critical current in this case and the spring elastic constant were analytically calculated. It was shown numerically that the crystal melting and transition to the resistive state occurs as a coherent depinning of the single vortex lines-dislocations. For a system with interstitial vortices, $f > 1$, the mechanism of depinning depends on the current direction with respect to the pinning array. It was found that slightly above the critical current the trajectories of the moving vortices are not straight, but rather acquire a snake - like shape enveloping the system of pins. In contrast to $f = 1$, the transition to a resistive state is not coherent and is going through formation of "snake - like" vortex trajectories. The vortex depinning is closely associated with the appearance of a strongly varying electric field. We calculated the electric fields accompanying vortex crystal melting and found the voltage-current characteristics.