is an open set in $\mathbb{R}$ then $f^{-1}(E)$ is an open set in $\mathbb{R}^d$. The collection $M = \{ H \subseteq \mathbb{R} : f^{-1}(H)$ is a Borel set in $\mathbb{R}^d \}$ is a σ-field because inverse images preserve set operations:

$$f^{-1}(\mathbb{R} \setminus H) = f^{-1}(\mathbb{R}) \setminus f^{-1}(H),$$
$$f^{-1}\left(\bigcup_n H_n\right) = \bigcup_n f^{-1}(H_n).$$

Now the Borel σ-field is generated by the open sets of the space – $\mathbb{R}$ or $\mathbb{R}^d$. As $f^{-1}(E)$ is open whenever E is open the σ-field M contains the open sets of $\mathbb{R}$ and therefore contains also the Borel σ-field. So a continuous function $f : \mathbb{R}^d \to \mathbb{R}$ is such that $f^{-1}(F)$ is a Borel set in $\mathbb{R}^d$ whenever F is a Borel set in $\mathbb{R}$ (f is measurable). As a consequence $f(\Delta B) : \Omega \to \mathbb{R}$ is 'measurable' because if F is a Borel set in $\mathbb{R}$, $f(\Delta B)^{-1}(F) = \Delta B^{-1}(f^{-1}(F))$ and ΔB is a measurable function $: \Omega \to \mathbb{R}$. Ok now take $f(x_1, \dots, x_d) = x_i x_j$. This is continuous. So $f(\Delta B) = \Delta B^i \Delta B^j$ is measurable $(\Omega \to \mathbb{R})$. But we know that $\Delta B^{-1}(H)$ is independent of $\mathcal{F}_s$ for every Borel set H in $\mathbb{R}^d$. In particular $\Delta B^{-1}(f^{-1}(F))$ is independent of $\mathcal{F}_s$ for every Borel set F in $\mathbb{R}$. So $f(\Delta B) = \Delta B^i \Delta B^j$ is independent of $\mathcal{F}_s$. Consequently

$$M^{\mathbb{P}}_s(\Delta B^i \Delta B^j) = \mathbb{E}(\Delta B^i \Delta B^j) I_\Omega \qquad \Delta B^i \Delta B^j \text{ indep of } \mathcal{F}_s$$

$$= \mathbb{E}(\Delta B^i)\mathbb{E}(\Delta B^j) I_\Omega \qquad \Delta B^i \text{ indep of } \Delta B^j$$

$$= 0$$

Now because
$$B^i_t B^j_t = B^i_s B^j_s + B^i_s(B^j_t - B^j_s) + B^j_s(B^i_t - B^i_s) + (B^i_t - B^i_s)(B^j_t - B^j_s)$$