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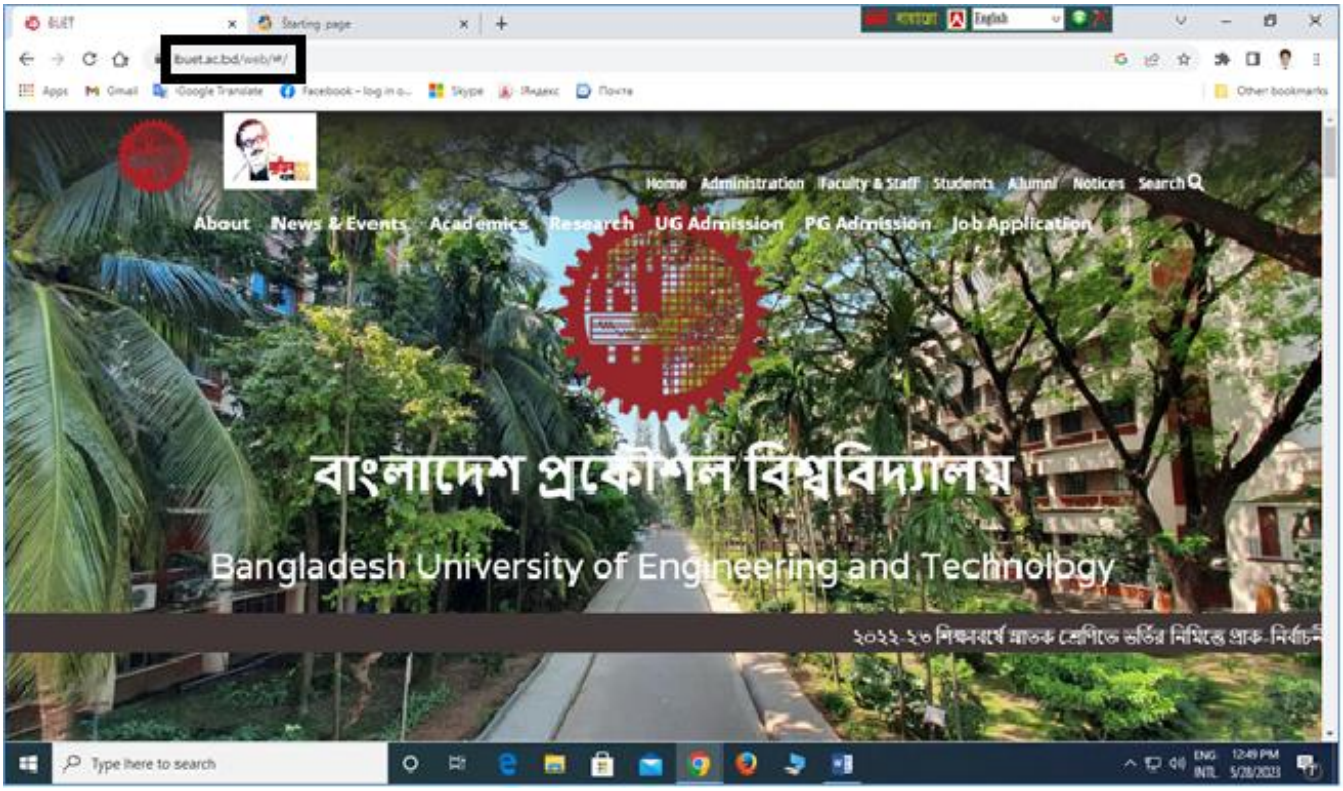
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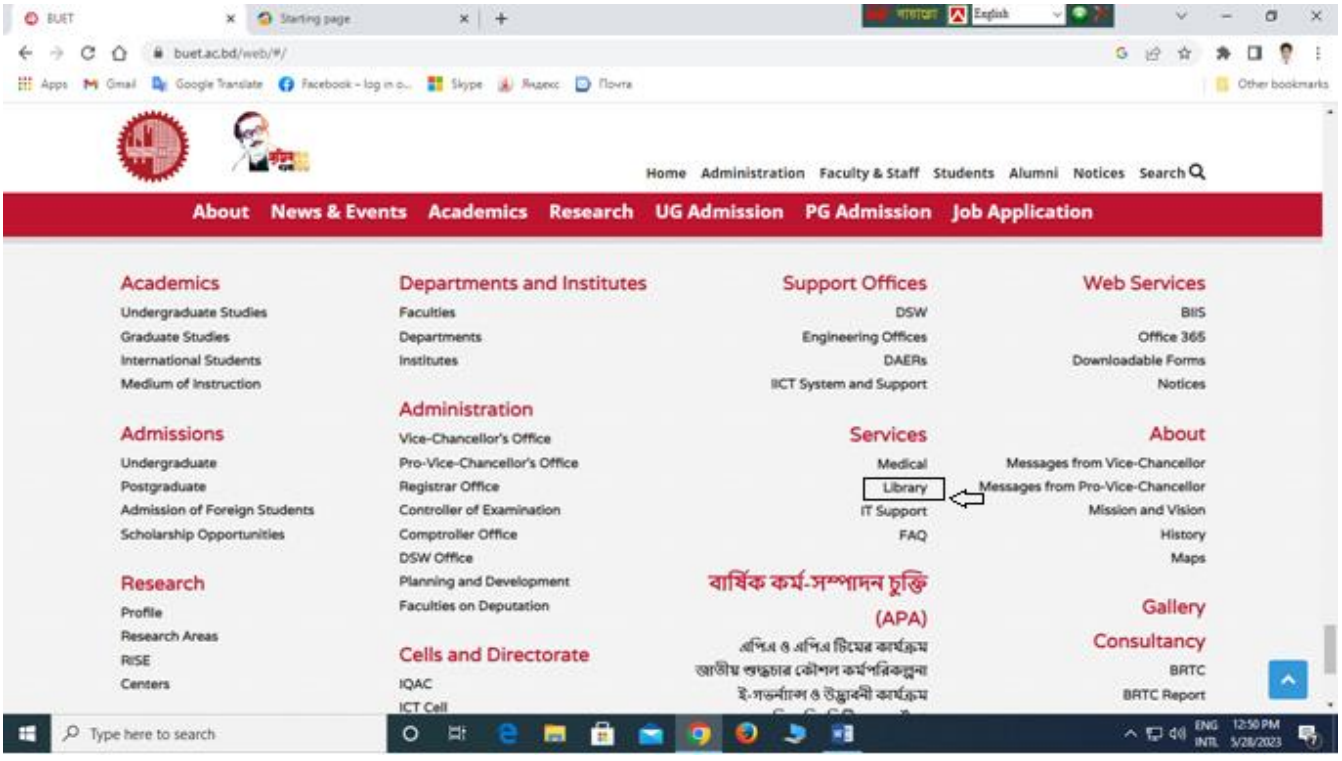
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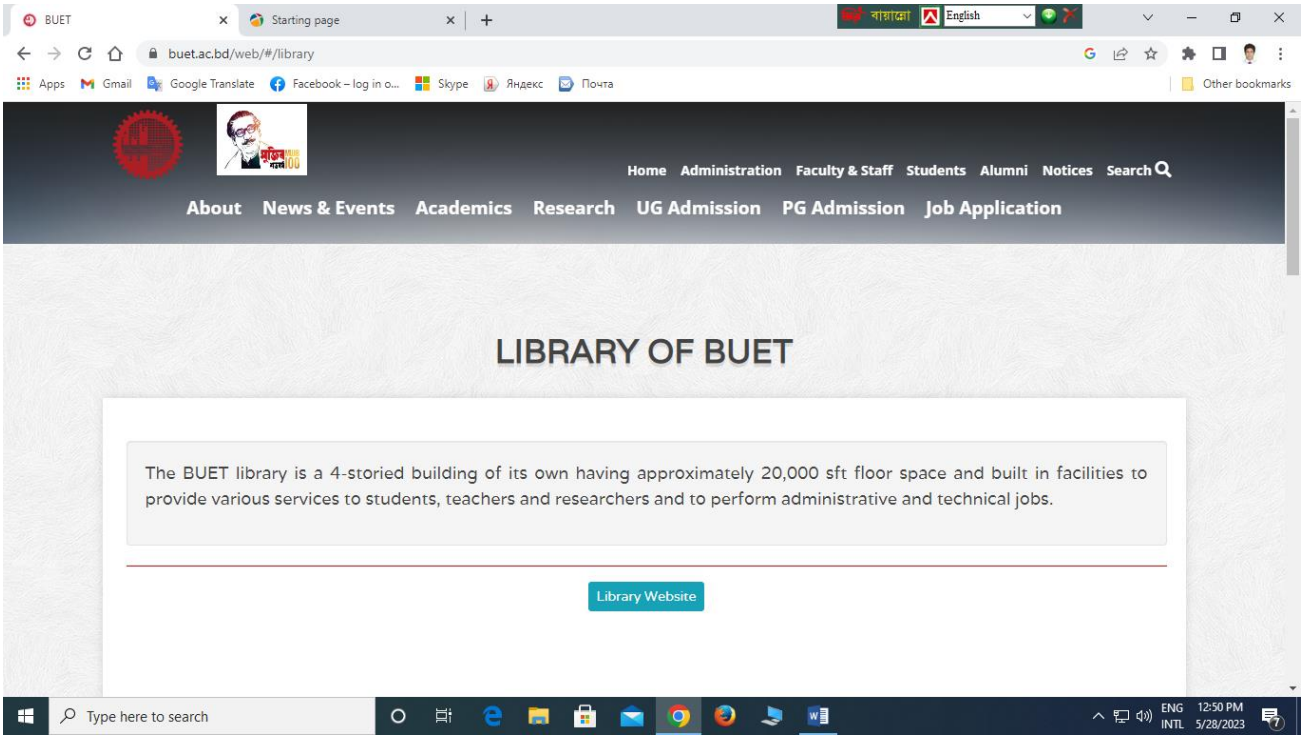
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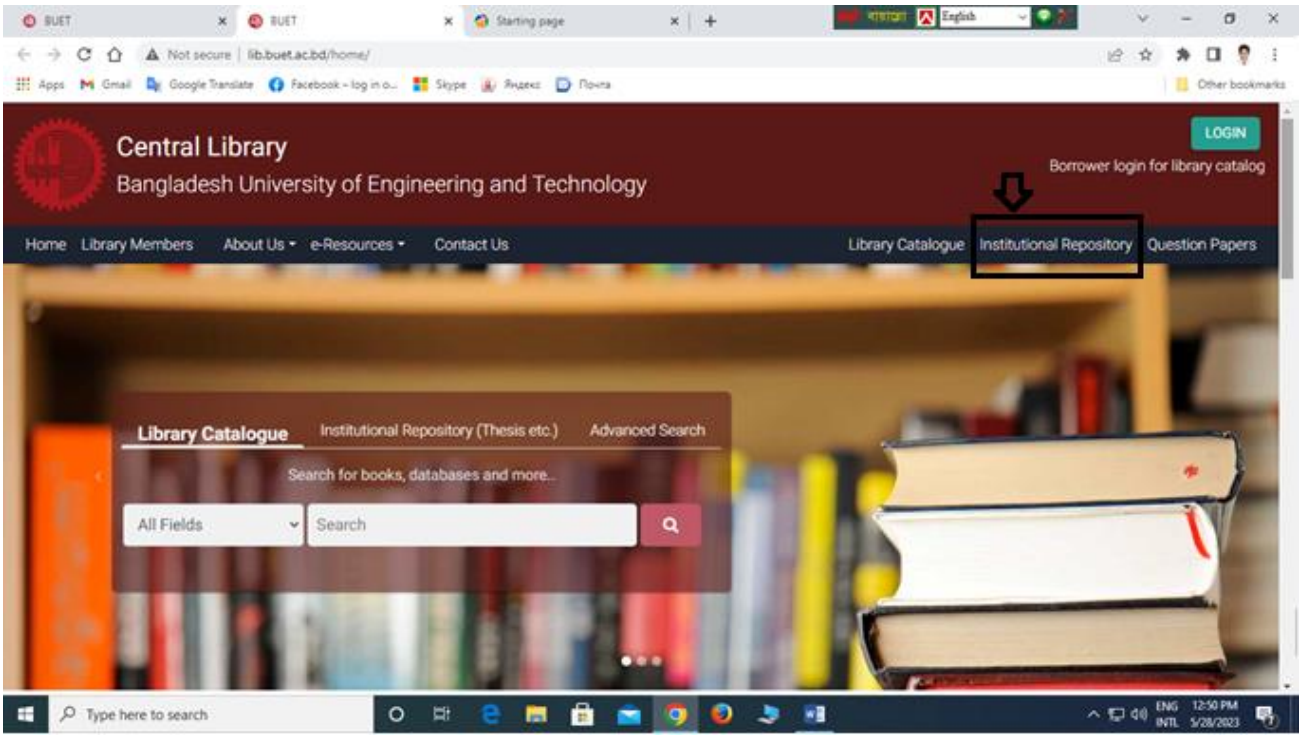
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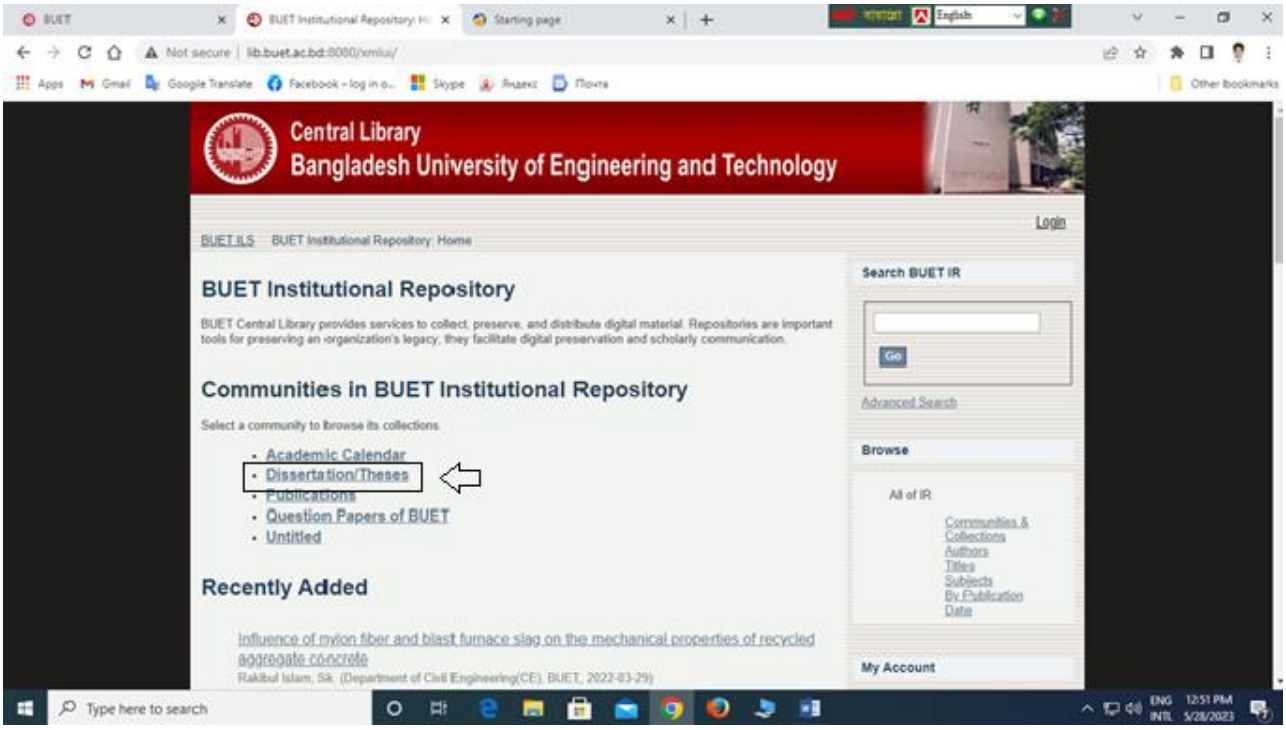

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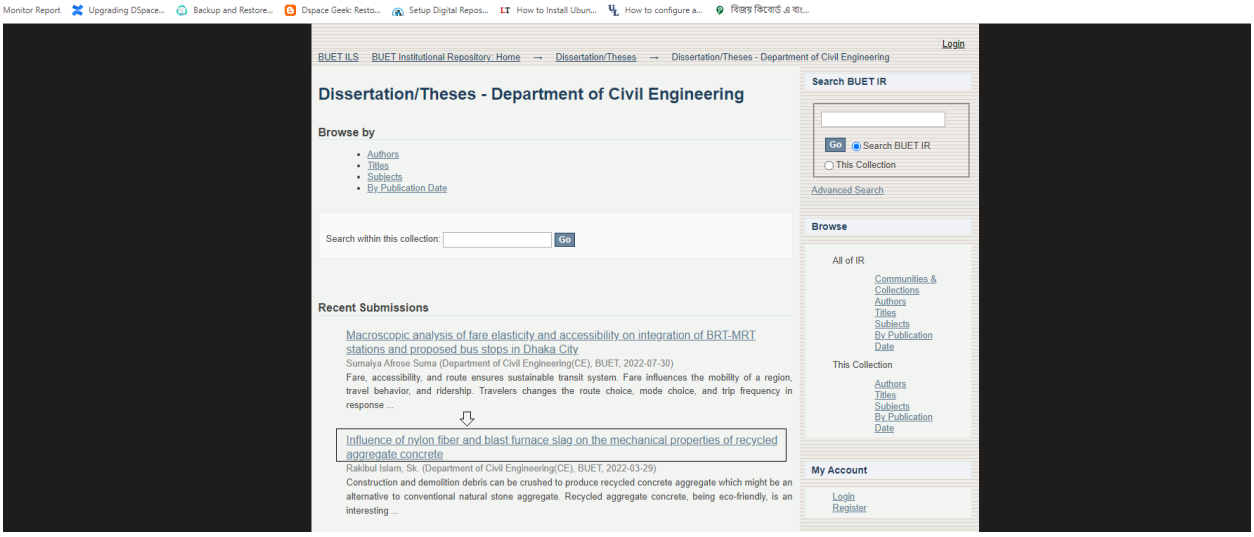
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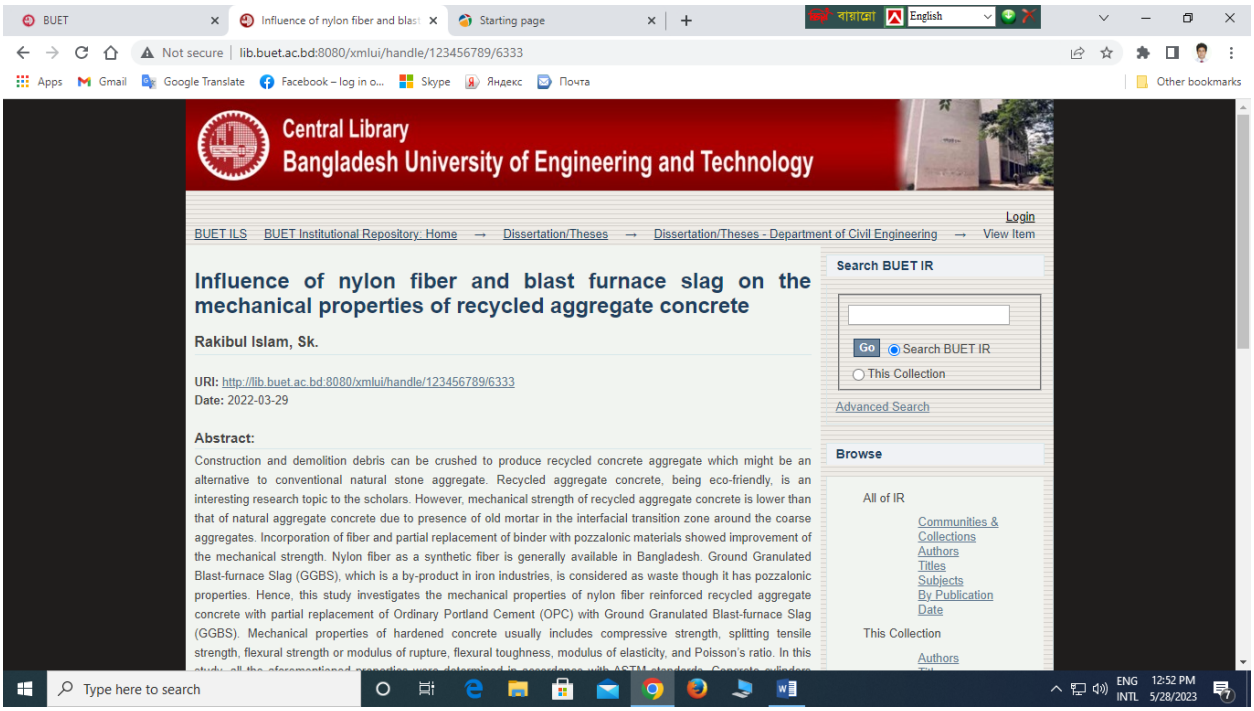
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Abstract:
Construction and demolition debris can be crushed to produce recycled concrete aggregate which might be an alternative to conventional natural stone aggregate. Recycled aggregate concrete, being eco-friendly, is an interesting research topic to the scholars. However, mechanical strength of recycled aggregate concrete is lower than that of natural aggregate concrete due to presence of old mortar in the interfacial transition zone around the coarse aggregates. Incorporation of fiber and partial replacement of binder with pozzalonic materials showed improvement of the mechanical strength. Nylon fiber as a synthetic fiber is generally available in Bangladesh. Ground Granulated Blast-furnace Slag (GGBS), which is a by-product in iron industries, is considered as waste though it has pozzalonic properties. Hence, this study investigates the mechanical properties of nylon fiber reinforced recycled aggregate concrete with partial replacement of Ordinary Portland Cement (OPC) with Ground Granulated Blast-furnace Slag (GGBS). Mechanical properties of hardened concrete usually includes compressive strength, splitting tensile strength, flexural strength or modulus of rupture, flexural toughness, modulus of elasticity, and Poisson's ratio. In this
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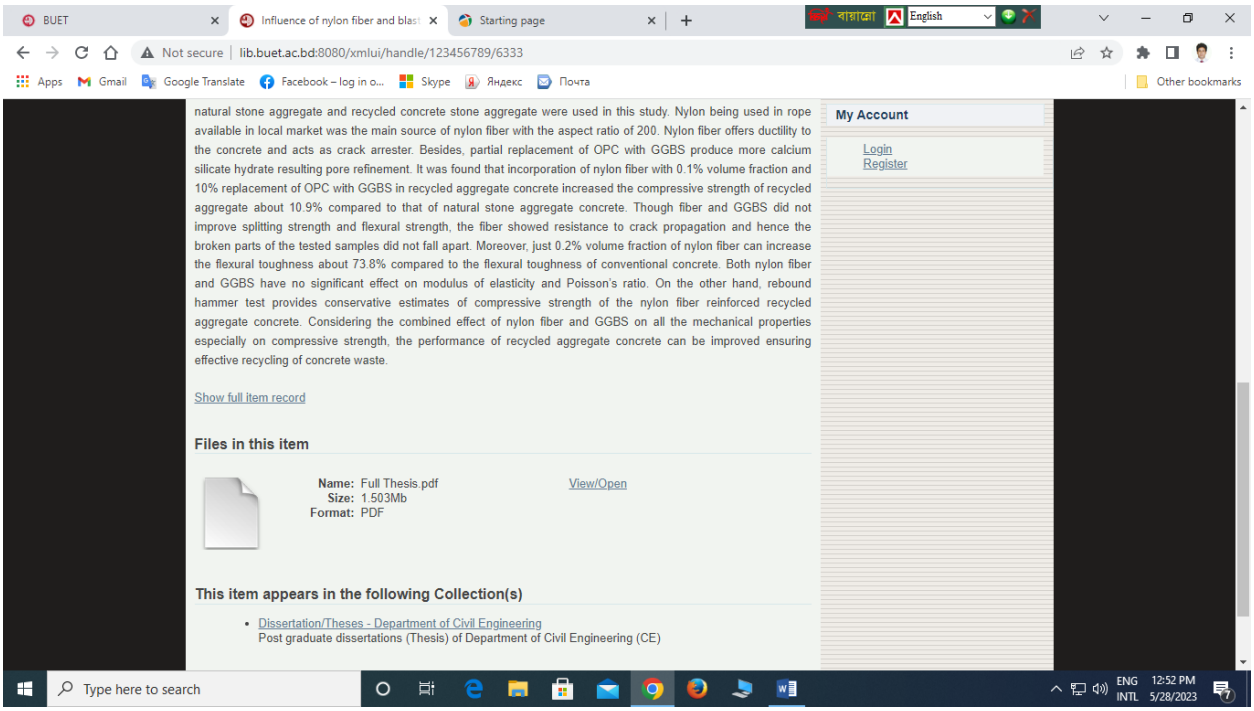
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natural stone aggregate and recycled concrete stone aggregate were used in this study. Nylon being used in rope available in local market was the main source of nylon fiber with the aspect ratio of 200. Nylon fiber offers ductility to the concrete and acts as crack arrester. Besides, partial replacement of OPC with GGBS produce more calcium silicate hydrate resulting pore refinement. It was found that incorporation of nylon fiber with 0.1% volume fraction and 10% replacement of OPC with GGBS in recycled aggregate concrete increased the compressive strength of recycled aggregate about 10.9% compared to that of natural stone aggregate concrete. Though fiber and GGBS did not improve splitting strength and flexural strength, the fiber showed resistance to crack propagation and hence the broken parts of the tested samples did not fall apart. Moreover, just 0.2% volume fraction of nylon fiber can increase the flexural toughness about 73.8% compared to the flexural toughness of conventional concrete. Both nylon fiber and GGBS have no significant effect on modulus of elasticity and Poisson's ratio. On the other hand, rebound hammer test provides conservative estimates of compressive strength of the nylon fiber reinforced recycled aggregate concrete. Considering the combined effect of nylon fiber and GGBS on all the mechanical properties especially on compressive strength, the performance of recycled aggregate concrete can be improved ensuring effective recycling of concrete waste.
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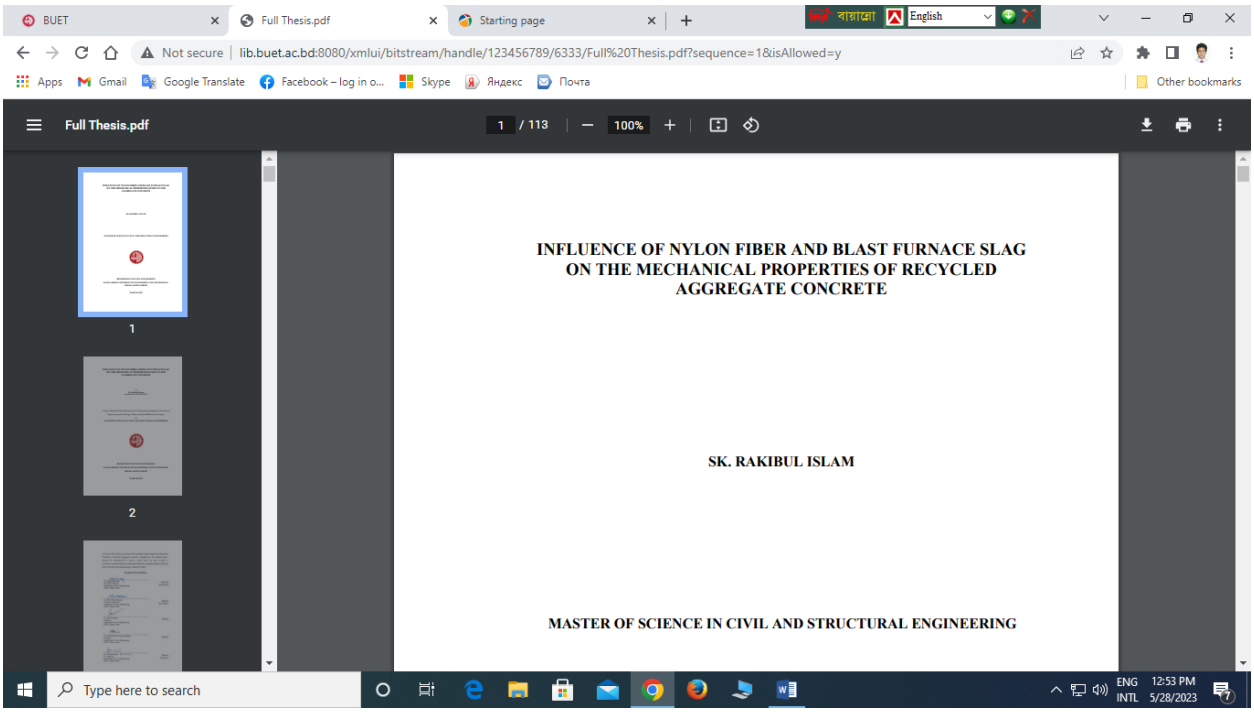
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SK. RAKIBUL ISLAM
MASTER OF SCIENCE IN CIVIL AND STRUCTURAL ENGINEERING
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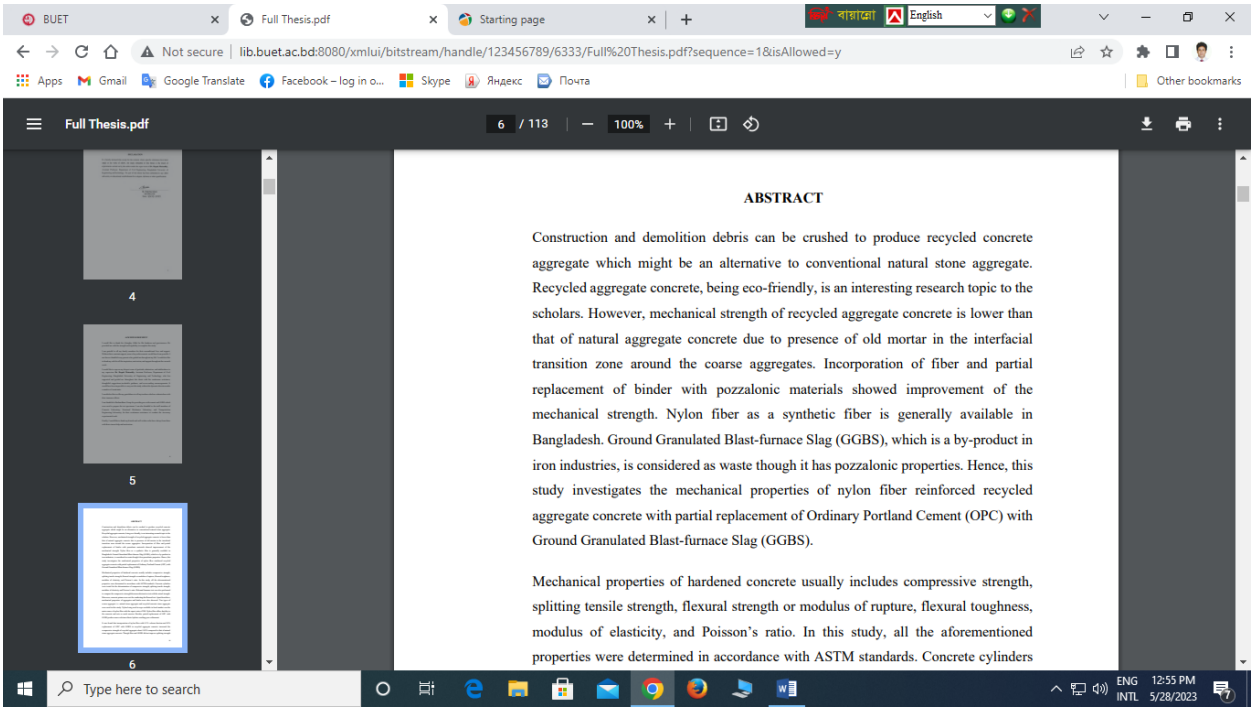
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Construction and demolition debris can be crushed to produce recycled concrete aggregate which might be an alternative to conventional natural stone aggregate. Recycled aggregate concrete, being eco-friendly, is an interesting research topic to the scholars. However, mechanical strength of recycled aggregate concrete is lower than that of natural aggregate concrete due to presence of old mortar in the interfacial transition zone around the coarse aggregates. Incorporation of fiber and partial replacement of binder with pozzalonic materials showed improvement of the mechanical strength. Nylon fiber as a synthetic fiber is generally available in Bangladesh. Ground Granulated Blast-furnace Slag (GGBS), which is a by-product in iron industries, is considered as waste though it has pozzalonic properties. Hence, this study investigates the mechanical properties of nylon fiber reinforced recycled aggregate concrete with partial replacement of Ordinary Portland Cement (OPC) with Ground Granulated Blast-furnace Slag (GGBS).
Mechanical properties of hardened concrete usually includes compressive strength, splitting tensile strength, flexural strength or modulus of rupture, flexural toughness, modulus of elasticity, and Poisson's ratio. In this study, all the aforementioned properties were determined in accordance with ASTM standards. Concrete cylinders
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