The current research investigated the green synthesis of Silver nanoparticles utilizing two different non-gilled mushrooms i.e., *Ganoderma* sp. (NF-56) and *Fomes* sp. (FN-65). Identity of these mushrooms was confirmed by their morpho-anatomical characters. Silver nanoparticles were synthesized from both fungal taxa and its confirmed by physicochemical characterization in the current research. Silver nanoparticles (AgNPs) of *Ganoderma* sp. (NF-56) and *Fomes* sp. (FN-65) showed surface plasmon resonance with a maximum absoroption band at 436 and 438 nm, respectively. SEM analysis demonstrated spherical shape of synthesized AgNPs. FTIR analysis identified the presence of alcohols, phenols, carbonyl group as a key molecules in reduction and stabilization of synthesized AgNPs. The antimicrobial activity of synthesized Silver nanoparticles was performed against four pathogenic bacteria using agar well diffusion method. Readings of zone of inhibition were taken in triplet and were recorded. AgNPs of *Ganoderma* sp. (NF-56) showed highest zone of 3.6 ± 0.2 against *E. coli* at concentration 150 µg/ml while the AgNPs of *Fomes* sp. (FN-65) showed highest zone of 3.26 ± 0.2516 against *B. aureus* at conc. Of 75 µg/ml. Two-way ANOVA revealed significant interaction ($p>0.04$) between varieties and treatments on inhibition zones. Additionaly, the antioxidant potential of synthesized AgNPs was calculated using DPPH activity. The output elaborated the importance of the non-gilled mushrooms in the eco-friendly synthesis of silver nanoparticles with potential application in antimicrobial as well as antioxidant activities.