Model Optimization and Tuning Phase Template

Date	20 August 2025
Team ID	Sneha S
Project Title	mushroom
Maximum Marks	10 Marks

Model Optimization and Tuning Phase

The Model Optimization and Tuning Phase involves refining neural network models for peak performance. It includes optimized model code, fine-tuning hyperparameters, comparing performance metrics, and justifying the final model selection for enhanced predictive accuracy and efficiency.

Hyperparameter Tuning Documentation (8 Marks):

Model	Tuned Hyperparameters
CNN with BatchNormalization	**Learning Rate:** Tried 0.001, 0.0005, 0.0001; best at 0.0005 for stable convergence. **Batch Size:** Compared 16, 32, 64; 32 balanced speed and accuracy. **Epochs:** Grid search from 10–30; best validation accuracy (~95 %) at **20 epochs**. **Dropout Rate:** Tested 0.3, 0.5; **0.5** minimized overfitting. **Augmentation Strength:** Rotation ±20°, width/height shift ±10 %, zoom 0.2; tuned to avoid under/over-augmentation.

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
CNN with BatchNormalization	Chosen for its **high accuracy (~95 %)**, **fast training**, and **smaller parameter count**, which make it efficient to deploy on limited hardware (e.g., edge devices). Model 2 was slightly more accurate but significantly heavier and slower, offering little practical gain for the added complexity.