Model Development Phase Template

Project Title	**Uncovering the Hidden Treasures of the Mushroom Kingdom: A Classification Analysis**
Maximum Marks	10 Marks

Initial Model Training Code, Model Validation and Evaluation Report

Initial Model Training Code

```
base_model = InceptionV3(weights="imagenet", include_top=False, input_shape=(img_size[0], img_size[1], 3))

# Build transfer learning model
model5 = Sequential()
model5.add(base_model)
model5.add(GlobalAveragePooling2D())
model5.add(Dense(100, activation="relu"))
model5.add(BatchNormalization())
model5.add(Dropout(0.5))
model5.add(Dense(100, activation="relu"))
model5.add(BatchNormalization())
model5.add(Dropout(0.5))
model5.add(Dense(3, activation="softmax"))

# Freeze the pre-trained layers
for layer in base_model.layers:
    layer.trainable = False

# Compile the model
optimizer = Adam(learning_rate=0.001)
model5.compile(
    optimizer=optimizer,
    loss="categorical_crossentropy",
    metrics=["accuracy"]
)

# Early stopping
early_stop = EarlyStopping(
    monitor="val_loss",
    patience=5
)


# Training
history100 = model5.fit(train_data, epochs=50, validation_data=test_data, callbacks=[early_stop])
```

Model Validation and Evaluation Report

Model	Summary	Training and Validation Performance Metrics
Model 1 (InceptionV3 + Custom Layers)	**Layer Summary:** • InceptionV3 base model • GlobalAveragePooling2D • Dense(100, relu) • BatchNormalization • Dropout(0.5) • Dense(3, softmax) **Total Parameters:** 2,311,305 **Trainable Parameters:** 2,304,505 **Non-trainable Parameters:** 6,800	**Training Accuracy**: 83.42% **Validation Accuracy**: 88.36% Training converged well with slight overfitting mitigated by dropout and batch normalization.