✅ Experiment-1: Bayesian Network (Q&A)

Question	Answer
What is a Bayesian Network?	A probabilistic graphical model using nodes & directed edges to represent dependencies.
Define Conditional Probability.	**Conditional Probability** is the probability of event **B** occurring given that **event A** has already occurred.
State Bayes' Theorem.	**Bayes' Theorem** gives the probability of event **A** given that **B** has occurred.
What is a DAG?	Directed Acyclic Graph — no cycles.
What is Joint Probability?	Probability of multiple events occurring together.
What is Posterior Probability?	Updated probability after observing evidence.
Define Conditional Independence.	A and C independent given B → P(A,C
Application of Bayesian Networks?	Medical diagnosis, spam detection, weather prediction.

✅ Experiment-2: Cognitive Computing / NLP (Q&A)

Question	Answer
What is Cognitive Computing?	Systems that mimic human thought using AI, ML, NLP.
Define tokenization.	Breaking text into words/sentences.
Define lemmatization.	Converting word to dictionary base form.
What is TF-IDF?	Weighted representation of words' importance in documents.
What is cosine similarity?	Similarity measure between two text vectors.
Rule-based vs Retrieval chatbot?	Rule: predefined patterns. Retrieval: search best response from database.

✅ Experiment-3: Matplotlib & Seaborn / EDA (Q&A)

Question	Answer
What is EDA?	Initial data analysis to understand patterns & anomalies.
Matplotlib vs Seaborn?	Matplotlib = basic plots; Seaborn = statistical & stylish plots.
Histogram use?	Shows data distribution.
Scatter plot use?	Shows relation between two variables.
What is a heatmap?	Visual correlation matrix with colors.
Why visualization in ML?	Understand data patterns & insights before model building.

✅ Experiment-4: Fuzzy Logic (Q&A)

Question	Answer
Define fuzzy logic.	Logic allowing values between 0-1 (degrees of truth).
Membership function?	Function mapping input to degree of membership (0-1).
Union in fuzzy logic?	max(μA, μB)
Intersection?	min(μA, μB)
Complement?	1 − μA
Why fuzzy logic?	Handles vagueness & imprecision in real world.
Example system?	AC controllers, washing machines, car control systems.

✅ Experiment-5: RNN & LSTM (Q&A)

Question	Answer
What is RNN?	Neural network for sequence data with memory.
Problem in RNN?	Vanishing gradient.
What is LSTM?	Advanced RNN with gates for long-term memory.
LSTM Gates?	Input, Forget, Output gates.
Use case?	Text, speech, time series prediction.

Activation functions?	Sigmoid (σ), tanh.
Why LSTM better?	Remembers long-term patterns.

✅ Experiment-6: EDA & Preprocessing for ANN (Q&A)

Question	Answer
Why data preprocessing?	To clean & normalize data for better model accuracy.
Standardization formula?	(x − mean) / std
Why feature scaling?	Ensures equal feature influence in ANN training.
What is correlation matrix?	Table showing relationships between variables.
Why split train/test?	Test model generalization.
Outlier?	Extreme value outside normal range.

✅ Experiment-7: NumPy, Pandas, CSV, Image Data (Q&A)

Question	Answer
What is NumPy array?	Efficient multi-dimensional numerical array.
NumPy vs Pandas?	NumPy = arrays; Pandas = tables with rows/columns.
What is DataFrame?	2D labeled data structure.
CSV meaning?	Comma-Separated Values-flat text table.
How images stored in ML?	As pixel arrays.
Why reshape image array?	Convert 1D data to image matrix & vice-versa.

✅ Experiment-8: Random Forest & AdaBoost (Q&A)

Question	Answer
What is Random Forest?	Ensemble of decision trees using bagging.

What is AdaBoost?	Sequential boosting model focusing on misclassified samples.
Bagging vs Boosting?	Bagging = parallel; Boosting = sequential.
Metric for classification?	Accuracy, Confusion Matrix, ROC-AUC.
Why Random Forest good?	Reduces overfitting, high accuracy.
Why AdaBoost useful?	Improves weak classifiers.