B.K. BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS
A CBSE DAY-CUM-BOYS' RESIDENTIAL SCHOOL

PERIODIC TEST - 01 (2025-26)
ARTIFICIAL INTELLIGENCE (843) / SUBJECT-05
MARKING SCHEME

Class : XII A/B/C **Duration : 60 mins**
Date : 03-07-2025 **Max. Marks : 25**
Admission No.: **Roll No.:**

Section-A
(Answer any 7 out of 10 MCQs)

1. Which Python platform offers GPU and TPU acceleration for faster execution of deep learning models ? 1

   (a) Visual Studio Code (b) Python IDLE **(c) Jupyter Notebook** (d) Google Colab

2. In negative indexing, what index represents the last element of a Numpy array ? 1

   (a) 0 **(b) -1** (c) 1 (d) -2

3. Who introduced the Data Science Methodology, also known as the Foundational Methodology for Data Science ? 1

   (a) Andrew Ng **(b) John Rollins** (c) Geoffrey Hinton (d) Yann LeCun

4. Which of the following is an example of a secondary data source ? 1

   (a) Focus Groups (b) Experiments and Observations **(c) Books, Journals & Research Papers**
   (d) Oral Histories

5. What is the main goal of Computer Vision (CV) ? 1

   (a) To make computers understand spoken languages. (b) To improve internet speed
   (c) To enable computers to see, observe and understand the visual world
   (d) To teach computers how to write poetry.

6. Which preprocessing technique enhances image contrast ? 1

   (a) Noise reduction (b) Histogram equalization (c) Feature extraction (d) Image segmentation

7. Which strategy do supermarkets use to manage stock during festive seasons ? 1

   (a) They reduce product variety to focus on essentials.
   (b) They rely on customer feedback after sales.
   (c) They analyse past shopping trends and track real-time sales data.
   (d) They guess customer preferences based on previous advertisements.

8. Which of the following is a common example of semi-structured data ? 1

   (a) SQL database **(b) XML file** (c) Audio recording (d) Printed document.

9. Which of the following everyday applications is powered by Neural Networks ? 1

   (a) Facial recognition on smart phones (b) Manual calendar entries
   (c) Static road maps without updates (d) Basic text editors without predictive features.

10. What happens when a neural network has more hidden layers ? 1

(a) The network becomes faster but less accurate. (b) The network's learning process becomes simpler. **(c) The learning process becomes deeper and more complex**. (d) The network stops learning altogether.

SECTION – B
(Answer any 6 out of 10 Short Answer Questions)

11. What are some common methods for handling missing data in Pandas, and when should they be used ? 2

Ans: df.isnull() , df.dropna() , df['age'].fillna(0)
You have a small number of missing values, and dropping them won't impact your analysis

12. **Assertion & Reasoning** 2

Assertion (A): The .tail() method displays the first n rows of the DataFrame.
Reasoning (R) : The .tail() method shows the last n rows and by default displays 5 rows if n is not specified.
(a) Both A and R are True (b) A is true but R is false **(c) A is false but R is true.**

13. Differentiate between Train-Test Split and Cross Validation. 2

Ans:

Feature	Train-Test Split	Cross-Validation (K-Fold)
Data split	One-time split (e.g., 80/20)	Multiple splits (k folds)
Number of model runs	1	*k* times
Bias/Variance	Higher variance	Lower variance, better generalization
Speed	Faster	Slower (due to multiple trainings)
Preferred when	Dataset is large, fast evaluation	Dataset is small or for final evaluation

14. What is the main difference between classification and regression problems ? 2

Ans:

Feature	Classification	Regression
Output Type	Categorical/Discrete	Continuous/Numerical
Example Output	"Cat", "Dog", "Yes", "No"	23.5, 1000, -5.4
Evaluation Metrics	Accuracy, Precision, Recall, F1-score	MSE, MAE, RMSE, R^2 Score
Common Algorithms	Logistic Regression, SVM, K-NN	Linear Regression, SVR, Ridge

15. What are the different stages involved in the Computer Vision process ? Explain each type briefly. 2

Ans: Image acquisition, Preprocessing, feature extraction, detection/segmentation, and high-level denoising,

16. List the stages of Preprocessing of computer Vision Process. Briefly describe each type. 2

Ans: Noise reduction, Image Normalization, Resizing Images, Cropping Images, Histogram Equalization.

17. What is Big Data and why does it require special tools and techniques for processing ? 2

Ans: Big Data refers to extremely large and complex sets of data that cannot be easily stored, managed, or processed using traditional data processing tools.It is often described using the 5 Vs: Volume – Huge amount of data, Velocity – Data is generated at high speed, Variety – Comes in many formats (text, images, videos, etc.), Veracity – Data may be uncertain or inconsistent , Value – Useful insights can be drawn from it.
Big Data tools (like Hadoop, Spark, etc.) are used to: Store data across many systems , Process data faster, Analyze different types of data (structured and unstructured),Ensure reliability and accuracy

18. A government wants to predict and prevent traffic congestion in a smart city using big data analytics. (a) What data sources should be considered ? (b) Which characteristics of big data (6Vs) is most relevant in this scenario ? (c) How can machine learning help in predicting traffic patterns ? 2

Ans: (a) To analyze traffic, the following data sources can be used: Traffic sensors on roads and highways, GPS data from vehicles and mobile phones, CCTV camera feeds from traffic signals, Social media updates (e.g., posts about traffic jams)
(b) Velocity is most relevant because traffic decisions must be made quickly.
(c) 1. Analyzing Historical Traffic Data, ML studies past traffic records (speed, time, location) to detect patterns. Algorithms used: Linear Regression – Predicts future traffic volume based on time. Decision Trees – Finds which conditions (time, weather, etc.) lead to traffic jams.
2. Real-Time Traffic Prediction -ML uses live data from GPS, traffic sensors, and CCTV to forecast congestion instantly. Algorithms used: K-Nearest Neighbors (KNN) – Compares current traffic with similar past patterns. Random Forest – Combines many decision trees for accurate real-time predictions.
3. Detecting Accidents and Sudden Delays - ML can detect unusual drops in speed or vehicle movement, indicating an accident. Algorithms used: Anomaly Detection Models – Identify abnormal traffic behavior. Support Vector Machines (SVM) – Classify whether traffic is normal or abnormal.

19. Define a Neural Network. Name the different types and describe each type. 2

Ans: A **Neural Network** is a set of algorithms designed to recognize patterns, just like the human brain. It is made up of **layers of connected nodes (also called neurons)** that process data and learn from it. • **Input Layer** – Takes in raw data, • **Hidden Layer(s)** – Processes data through mathematical functions, • **Output Layer** – Produces the final result (like a prediction or classification)

20. What are the three main layers of a Convolutional Neural Network (CNN) ? Explain any two. 2

Ans: A Convolutional Neural Network (CNN) is a type of neural network especially designed for image and video processing.
It has three main layers: **Convolutional Layer** - Detects patterns like edges, colors, shapes, or textures in an image**. Pooling Layer** - Reduces the size of the feature map to make the network faster and less complex. **Fully Connected Layer** -Acts like a regular neural network.

SECTION – C
(Answer any 2 out of 4 Long Answer Questions)

21. Can you identify and explain at least two real-life scenarios where linear regression is applied ? 3

Ans: **Scenario 01**: A real estate company wants to predict house prices based on features like square footage, number of bedrooms, location rating, and age of the property.
How Linear Regression Helps:
Independent Variables (X): Size of the house, number of rooms, location score, etc.
Dependent Variable (Y): Price of the house.
Why Linear Regression:
It helps establish a relationship between house features and the selling price.
The model can be used to predict prices of new houses based on historical data.
2. Forecasting Sales Based on Advertising Spend.
Scenario 02:
A company wants to understand how its advertising budget affects sales revenue.
How Linear Regression Helps:
Independent Variables (X): Spending on TV, radio, newspaper ads.
Dependent Variable (Y): Sales revenue.
Why Linear Regression:
It helps identify which medium of advertising is most effective.
The business can optimize budget allocation for maximum return on investment (ROI).

22. To predict the demand for different grocery items and to avoid running out of stock or overstocking for the supermarket, let's consider the analytical approach and consider the following questions: 3

(a) What type of analytics is being used ?
Predictive Analytics

(b) What approach should we use ? Regression Approach
(Predicting sales numbers based on past data).

(c) Which algorithm is best suited for demand prediction ?
Linear Regression – It predicts demand based on past sales.

23. Discuss various career opportunities in the field of Bid Data Analytics and their key roles. 3

Ans: Big Data Analytics is a fast-growing field with many exciting career opportunities. Professionals in this field work with large sets of data to help businesses make smart decisions.1. Data Analyst -Key Roles: Collects, cleans, and interprets data. Helps businesses understand trends and make data-driven decisions.
2. Data Scientist -Key Roles: Builds predictive models using machine learning.Works with advanced tools like Python, R, and TensorFlow.
3. Big Data Engineer - Key Roles: Designs and manages systems to handle massive data. Works with tools like Hadoop, Spark, and NoSQL databases. Ensures fast and reliable data processing.
4. Data Architect - Key Roles: Plans and builds the entire data infrastructure. Decides how data will be stored, accessed, and secured. Works closely with engineers and database teams.
5. Machine Learning Engineer - Key Roles: Creates ML models that learn from data and make predictions.
6. Business Intelligence (BI) Analyst - Key Roles: Uses data to improve business performance. Builds dashboards and reports using BI tools like Tableau, Power BI.

24. What are some societal impacts of Neural Networks, and how can the associated risks be addresses ? 3

Ans: Positive Impacts: Healthcare Improvement : Used in diagnosis, drug discovery, and personalized treatment. Better Services and Automation - Used in virtual assistants (like Siri, Alexa), self-driving cars, and smart devices. Financial and Security Use Helps banks in fraud detection and credit scoring. Education and Personalization Adaptive learning platforms
Negative Impacts / Risks: Job Displacement, Bias and Discrimination, Privacy Concerns, Lack of Transparency, Deepfakes and Misinformation
Risk Solutions - Job Loss- Upskill workers in AI, data science, and digital skills. Bias in Data- Use diverse and clean training data; audit algorithms regularly. Privacy Issues-Follow data protection laws (like GDPR), use encryption and consent-based sharing. Lack of Transparency- Develop explainable AI (XAI) models and demand accountability. Misuse (e.g., deepfakes) - Create laws against misuse, use AI to detect fake content

******* BEST OF LUCK *******