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Question Paper Code	13872
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B.E / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025
 Seventh Semester
Information Technology
20ITEL705 - APPLIED MACHINE LEARNING
 Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)
 Answer ALL Questions

	<i>Marks</i>	<i>K- Level</i>	<i>CO</i>
1. What is tokenization in text preprocessing? (a) Replacing words with numbers (b) Splitting text into individual words or phrases (c) Assigning sentiment scores to text (d) Creating hash values of text	1	K1	CO1
2. What type of data is suitable for sentiment analysis? (a) Numerical data (b) Binary images (c) Textual data expressing opinions (d) Location coordinates	1	K1	CO1
3. Which Python library is commonly used for speech feature extraction like MFCC? (a) OpenCV (b) librosa (c) matplotlib (d) keras	1	K2	CO2
4. What does a synthesizer do? (a) Reduces noise (b) Amplifies signals (c) Generates artificial audio signals (d) Cuts signals into segments	1	K2	CO2
5. If you want to select all data from the year 2023 from a Pandas time series DataFrame, what is the most efficient method? (a) A for loop iterating through each row. (b) A conditional statement <code>df[df['date'] == '2023']</code> . (c) Slicing the DataFrame using <code>df['2023']</code> . (d) Using the <code>.iloc</code> method with specific row numbers.	1	K2	CO3
6. What does a positive correlation coefficient between two time series indicate? (a) When one series increases, the other tends to decrease. (b) There is no relationship between the two series. (c) The two series move in the same direction. (d) The two series are identical.	1	K2	CO3
7. Which of the following is a primary function of a Sobel filter in computer vision? (a) To convert a color image to grayscale. (b) To detect corners in an image. (c) To smooth out noise in an image. (d) To compute the gradient magnitude and direction, often used for edge detection.	1	K2	CO4
8. The Canny Edge Detector is known for its effectiveness due to which key step? (a) Applying a simple threshold to an image. (b) Using a single filter to find edges. (c) Employing a multi-stage algorithm that includes non-maximum suppression and hysteresis thresholding. (d) Converting the image to a binary format before processing	1	K2	CO4
9. What is the purpose of resizing and scaling the input image in a face detection system? (a) To improve the color balance of the image (b) To make the model training easier (c) To speed up detection and normalize different image sizes (d) To increase image resolution	1	K1	CO5

10. Plotting the PCA-transformed data typically helps to: 1 K2 CO6
- Reconstruct the original high-dimensional data
 - Visually inspect separability and patterns in reduced dimensions
 - Identify kernel functions
 - Generate mixing matrices for ICA

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11. Describe how a word cloud visualization represents word frequency in cleaned Twitter data. 2 K2 CO1
12. Differentiate Stemming and Lemmatization. 2 K2 CO1
13. Write the python function in NumPy used to generate sin and cos. 2 K2 CO2
14. Explain why silence removal is often performed in speech signal pre-processing. 2 K2 CO2
15. You have a NumPy array data and a corresponding time array timestamps. Write a line of code to slice and plot the data for a specific period from timestamps '2023-01-01' to '2023-01-31'. 2 K2 CO3
16. Enumerate the working of pd.to_datetime () function in Pandas. 2 K2 CO3
17. Outline the key advantages of using SIFT (Scale-Invariant Feature Transform) features compared to simpler corner detection methods. 2 K2 CO4
18. Name the CV2 function to threshold an image, give example. 2 K1 CO4
19. List the steps in BSS (Blind Source Separation). 2 K1 CO5
20. Name the python library that holds HARR Cascade. 2 K1 CO5
21. Write the baseline assumptions of ICA. 2 K1 CO6
22. Enumerate the mathematical steps involved in calculating PCA. 2 K2 CO6

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23. a) # Sample text data is given 11 K3 CO1
 texts = [
 "I love this product", # Positive
 "This is an amazing item", # Positive
 "Absolutely fantastic experience", # Positive
 "Worst purchase ever", # Negative
 "I hate this", # Negative
 "Terrible and disappointing", # Negative
]
 Apply sentiment analysis with full pipeline code for the given data.
- OR**
- b) Enumerate POS tagging and word categorization on a paragraph of social media text. Demonstrate how tagging enhances feature generation for downstream NLP tasks. 11 K2 CO1
24. a) `cos_wave = 0.5 * np.cos(2 * np.pi * frequency * t)` 11 K3 CO2
 Use the formula to generate and visualize cos waves. Use 440Hz frequency to synthesize sound and save as .wav file.
- OR**
- b) Construct a basic speech synthesizer using sine wave functions in Python. Generate a short music tone by varying amplitude and frequency over time. 11 K3 CO2

25. a) Create a data frame for the following data and plot the time series data for daily sales and split the time data up to 2023-01-03 and plot the splitted data. 11 K3 CO3
 Data = {'date': pd.to_datetime(['2023-01-01', '2023-01-02', '2023-01-03', '2023-01-04', '2023-01-05']), 'sales': [150, 155, 148, 160, 162]}.
- OR**
- b) Calculate the average hourly sales for each day of the week (Monday through Sunday) across the entire sales dataset of your choice. 11 K3 CO3
26. a) Visualize the Oriented FAST and Rotated BRIEF (ORB) descriptor for an image, write the python code. 11 K3 CO4
- OR**
- b) Implement a function that uses Histogram Equalization to automatically correct the contrast of the problematic images. 11 K3 CO4
27. a) Once a face is detected, how would you refine your search to locate the eyes and nose? Explain why it is more efficient to perform this search within the Region of Interest (ROI) of the detected face rather than the entire image. 11 K3 CO5
- OR**
- b) Live video stream is captured, enumerate the preprocessing steps that are necessary before applying a face detector. 11 K3 CO5
28. a) In the context of Independent Component Analysis (ICA), how do independent components differ from principal components? How is ICA applied in face recognition? 11 K2 CO6
- OR**
- b) Discuss the steps involved in converting a five-dimensional face recognition dataset to a two-dimensional dataset using PCA. What are the advantages of this dimensionality reduction? 11 K2 CO6