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Code No. : 18632 (A) N/O

**VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD**

*Accredited by NAAC with A++ Grade*

**B.E. (I.T.) VIII-Semester Main & Backlog Examinations, May-2023**

**Computer Vision (PE-VI)**

Time: 3 hours

Max. Marks: 60

*Note: Answer all questions from Part-A and any FIVE from Part-B*

**Part-A (10 × 2 = 20 Marks)**

Q. No.	Stem of the question	M	L	CO	PO
1.	Define types of 2D image transformations.	2	1	1	1
2.	What are the key components of the photometric image formation model?	2	1	1	1
3.	What is the mathematical basis of PCA?	2	1	2	1
4.	Given a signal, how would you use Fourier Transform to obtain its frequency-domain representation?	2	1	2	1
5.	What is the definition of mean shift segmentation, and how does it work?	2	1	3	1
6.	How does k-means clustering differ from hierarchical clustering?	2	2	3	1
7.	Differentiate between image classification and object detection with example.	2	2	4	1
8.	Given a trained CNN for image classification, what metrics evaluate its performance?	2	1	4	1
9.	Differentiate Face detection and Face recognition?	2	2	5	1
10.	Identify different types of gestures typically used in real time application?	2	3	5	1
<b>Part-B (5 × 8 = 40 Marks)</b>					
11. a)	i) Draw a neat diagram for pin hole camera image formation.	4	3	1	1
	ii) Identify some of the limitations of the pinhole camera model not applicable in modern times.				
b)	What are some of the challenges in replicating the human visual system in a camera, and how to solve these challenges to improve the camera's performance?	4	3	1	1
12. a)	What are some common algorithms for detecting edges and lines in digital images?	4	1	2	1
b)	You are working on a medical imaging project where you need to segment the tumor regions from CT scans to aid in diagnosis and treatment planning. Analyze the use of split and merge algorithm to achieve this goal.	4	4	2	2

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13. a)	Given a dataset, how would you use a mode finding algorithm to identify the mode(s)?	4	2	3	1
b)	You are working on a spam filtering project where you need to classify emails as spam or not spam. Is Naive Bayes classifier appropriate to achieve this and analyze what challenges might arise in implementing such a system?	4	4	3	2
14. a)	Analyze why bias is added as an additional parameter in ANN. Explain with the help of a neuron diagram.	4	4	4	1
b)	You are working on an autonomous driving project where the vehicle needs to identify and understand the scene and context in real-time to make decisions. Demonstrate how can you use computer vision techniques to achieve this goal and what challenges might arise in implementing such a system?	4	2	4	1
15. a)	Define the concept of VQA and apply this in bridging the gap between computer vision and natural language processing.	4	3	5	1
b)	Consider a case where the face is covered with mask. Will the biometric work in such a case. Explain any one DL model which can be used for such problem.	4	3	5	2
16. a)	i) Analyze the strengths and weaknesses of different geometric primitives and transformations. ii) How they can be applied in different contexts?	4	4	1	1
b)	Compare and contrast the advantages and disadvantages of the Fourier Transform, Windowed Fourier Transform, and Wavelets for different types of signals and applications.	4	3	2	1
17.	Answer any <i>two</i> of the following:				
a)	Compare and contrast a Density based algorithm and hierarchical methods of clustering.	4	3	3	1
b)	Apply any two Neural Network Architectures for Object Detection.	4	3	4	1
c)	Identify the limitations of face detection models in real-world scenarios?	4	3	5	1

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level - 1	20%
ii)	Blooms Taxonomy Level - 2	35%
iii)	Blooms Taxonomy Level - 3 & 4	45%

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