

potential exam questions (CV)

- 1) what are 2-Dimensional motion models? Explain how they can be used for image stitching (10)
- 2) Explain the basic steps involved in choosing compositing surface (10)
- 3) With a neat diagram, explain the projective from:
 - a) 3D to cylindrical coordinates (5) . . . Be prepared for anything
 - b) 3D to spherical coordinates (5) . . . like life itself or mystery
- 4) i) write short notes on the following 2D geometric primitives
 - a) 3D points (2)
 - b) 3D lines (2)
- i) Explain the basic set of 2D planar transformation with neat figure. (6)
- 5) i) Explain the general image processing operator in detail (6).
- ii) Define the following:
 - a) Compositing.
 - b) Matching.
- 6) i) What is bidirectional reflectance distribution function (BRDF)? (4)
- ii) With neat figure, discuss the components into which a typical BRDF is split into (6)
- 7) i) What is Fourier transforms? Discuss about the closed form equations of Fourier transforms in continuous & discrete domains (6)
- ii) Differentiate between discrete & fast Fourier transforms (4).
- 8) i) What is the need for projective reconstruction? (5)
- ii) Briefly discuss why does the essential matrix (E) change into the fundamental matrix (F)? (5)
- 9) Explain Hierarchical motion estimation in detail. (10)
- 10) Explain the various bundle adjustment techniques involved in accurately recovering structure and motion. (10)

- 11) Explain Fourier based assignment in detail with necessary examples. (10)
- 12) a) Explain snakes in detail, what is the main drawback in using snakes? (6)
- b) what is the basic solution to overcome the drawback while using snakes? (4)
- 13) Explain normalized cuts in details with an example. (10)
- 14) Explain the following systems with necessary examples:
- a) scissors (8)
 - b) level sets (8)
- 15) Categorize the various techniques developed for solving pose estimation problem. (10).
- 16) With a neat diagram, illustrate the Aperture problem for different image patches. (10)
- 17) Give the equation for the following and briefly summarize each in few words:
- a) TPR and FPR. (4)
 - b) PPV and Accuracy (ACC). (6)
- 18) Explain the various techniques in edge detection with necessary examples (10).
- 19) What is Hough transform? with a neat figure explain how a 2D line equation is expressed in terms of the normal n & distance d to the origin d . (10)
- 20) (no idea)

Note:

TPR - true positive rate (8) FPR - false positive rate.

PPV - positive predictive value.

Reg. No.

R A 2 0 1 1 0 2 6 0 2 0 0 6 5

B.Tech. DEGREE EXAMINATION, DECEMBER 2022
Fifth Semester

18CSE390T– COMPUTER VISION

(For the candidates admitted from the academic year 2020-2021 and 2021-2022)

Note:

- (i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
- (ii) **Part - B** should be answered in answer booklet.

Time: 2½ Hours

Max. Marks: 75

PART – A (25 × 1 = 25 Marks)

Answer ALL Questions

- | | | |
|----|--|---|
| 1. | Select the sequence of steps involved in computer vision. | Marks BL CO PO |
| | (A) Image acquisition, preprocessing, pattern recognition and decision making | 1 1 1 1 |
| | (B) Image preprocessing, acquisition, pattern recognition and decision making | |
| | (C) Image acquisition, pattern recognition, preprocessing and decision making | |
| | (D) Preprocessing, pattern recognition and decision making | |
| 2. | What is the degree of freedom of an affine transformation in a 2D image? | 1 2 1 2 |
| | (A) 2 | (B) 4 |
| | (C) 6 | (D) 8 |
| 3. | A kernel is said to be separable if, | 1 2 1 2 |
| | (A) $r(x, y, u, v) = r_1(x, u)r_1(y, v)$ | (B) $r(x, y, u, v) = r_1(x, u)r_2(y, v)$ |
| | (C) $r(x, y, u, v) = r_1(x, y)r_2(u, v)$ | (D) $r(x, y, u, v) = r_1(x, y)r_1(u, v)$ |
| 4. | Identify the filter used to invert the blue of an image and remove the extra noise | 1 2 1 3 |
| | (A) Gaussian | (B) Sobel |
| | (C) Weiner | (D) Canny |
| 5. | Indirect illumination is taken into account by the following technique | 1 1 1 1 |
| | (A) Diffuse reflection | (B) Specular reflection |
| | (C) Direct illumination | (D) Global illumination |
| 6. | Which filter is used to find the brightest point in the image? | 1 2 2 2 |
| | (A) Median filter | (B) Max filter |
| | (C) Min filter | (D) Mean filter |
| 7. | Which of the following measures are not used to describe a region in an image? | 1 3 2 2 |
| | (A) Mean and median of gray values | (B) Minimum and maximum of grey values |
| | (C) Number of pixels alone | (D) Number of pixels above and below mean |

8. In which step of processing, assigning a label to an object based on its descriptor is done? 1 2 2 8
 (A) Object recognition (B) Morphological processing
 (C) Segmentation (D) Representation
9. Gradient magnitude images are more useful in _____. 1 2 2 2
 (A) Point detection (B) Line detection
 (C) Area detection (D) Edge detection
10. Identify the set of connected pixels that lie on the boundary between two regions. 1 3 2 3
 (A) Point (B) Edge
 (C) Color (D) Line
11. Sobel gradient is not good for the detection of _____. 1 1 3 1
 (A) Horizontal lines (B) Vertical lines
 (C) Diagonal lines (D) Edge
12. State the form of control model that adjusts the smooth curve established in the Euclidean plan by moving the curve's point perpendicular. 1 2 3 2
 (A) Snake model (B) Gradient flow model
 (C) Balloon model (D) Geodesic active control models
13. What is said to be evolved from a series of distributed circles towards the final binary segmentation? 1 2 3 2
 (A) Snakes (B) Active contours
 (C) Hough lines (D) Level sets
14. For identifying and classifying the joints in the human body _____ are captured as a set of co-ordinates for each joints. 1 2 3 2
 (A) Keypoints (B) Pairs
 (C) Skeleton (D) Contour
15. State the method which runs a pose detector followed by estimating body joints within the detected bounding boxes. 1 1 3 2
 (A) Top down method (B) Bottom up method
 (C) Level cut method (D) Graph cut method
16. From the given below, select a popular 2D human pose estimation method. 1 1 4 1
 (A) Arpanet (B) Alphapet
 (C) Openpose (D) Close pose
17. Which of the following determines a points 3D position from a set of corresponding image locations and known camera positions? 1 3 4 3
 (A) Level sets (B) Pose estimation
 (C) Triangulation (D) Graph cuts
18. _____ is the process of estimating the 3D structure of a scene from a set of 2D images. 1 1 4 2
- (A) Structure from movement (B) Structure from motion
 (C) Point correspondences (D) Joint correspondences 1 2 4 4
19. What are needed to estimate motion between two or more images? 1 2 4 4
 (A) Error metric (B) Search techniques
 (C) Error metric and sorting (D) Error metric and search techniques
20. In how many operations, does the fast Fourier transform algorithm compute the transform of a $N \times M$ image? 1 3 4 4
 (A) $O(NM)$ (B) $O(N^2M^2)$
 (C) $O(NM \log N)$ (D) $O(NM \log N)$
21. What technique is used to produce today digital maps and satellite photos? 1 1 5 1
 (A) Image alignment (B) Image mosaicking
 (C) Image stitching (D) Image reconstruction
22. Select the example applicable for high level process in computer vision. 1 1 5 1
 (A) Image sharpening (B) Object recognition
 (C) Noise removal (D) Autonomous navigation
23. _____ helps in providing an image based automatic inspection. 1 1 5 3
 (A) Facial recognition (B) 3D reconstruction
 (C) Machine inspection (D) Automotive safety
24. While performing median filtering, on a 3×3 neighborhood having value $(3, 7, 2, 1, 0, 0, 9, 5, 8)$, what is the median value to be given to the pixel under filter? 1 3 5 4
 (A) 0 (B) 2
 (C) 3 (D) 5
25. The process of simultaneously adjusting pose parameters and 3D point locations for a large collection of overlapping image is called _____. 1 1 5 1
 (A) Photo grammetry (B) Bundle adjustment
 (C) Gap closing (D) Mis-registration

PART - B (5 x 10 = 50 Marks)

Answer ALL Questions

- | | | | |
|-------|----|----|----|
| Marks | BL | CO | PO |
|-------|----|----|----|
26. a. Show how 2D transformations are occurring, while an image is formed with suitable examples. 10 2 1 1
 (OR)
 b. Describe the various types of linear filtering techniques available to enhance an image with suitable example. 10 1 1 12
27. a. For an image matching application, illustrate the working principle of SIFT technique. 10 3 2 3
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	(OR)				
b.	For finding lines in an image, illustrate the working of Hough transform algorithm.		10	3	2
28. a.i.	Why active contour is needed?		2	1	3
ii.	How does active contours work?		6	2	3
iii.	List the various active contour models available in practice.		2	1	3
					1
	(OR)				
b.	In the context of human fall detection, explain the working principle of pose estimation and detection method.		10	3	3
29. a.	With appropriate equations, explain the process of bundle adjustments.		10	2	4
b.i.	State the applications of motion model.		4	1	4
ii.	How does hierarchical motion estimation is applied to accelerate the search process?		6	2	4
30. a.	With suitable examples, explain the concept of rotational panoramas.		10	2	5
b.i.	People prefer that the final stitched image is upright rather than twisted or tilted. Justify.		6	3	5
ii.	List the various motion models in computer vision.		4	1	2

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B.Tech. DEGREE EXAMINATION, DECEMBER 2022

Fourth and Fifth Semester

18MAB302T – DISCRETE MATHEMATICS FOR ENGINEERS

(For the candidates admitted from the academic year 2018-2019 to 2021-2022)

Note:(i) Part - A should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

(ii) Part - B should be answered in answer booklet.

Time: 2½ Hours

Max. Marks: 75
Marks BL CO PO**PART – A (25 × 1 = 25 Marks)**

Answer ALL Questions

1. Power set of empty set has exactly _____ subset. 1 1 1 1,2
 (A) Two (B) One
 (C) Zero (D) Three
2. A relation R on set A is said to be partial order relation if 1 1 1 1,2
 (A) R is reflexive, transitive but not symmetric (B) R is symmetric, transitive but not reflexive
 (C) R is irreflexive and (D) R is reflexive, antisymmetric and transitive
3. If R and S be relation on a set A represented by the matrices 1 2 1 1,2
 $M_R = \begin{pmatrix} 0 & 1 & 0 \\ 1 & 1 & 1 \\ 1 & 0 & 0 \end{pmatrix}$ & $M_S = \begin{pmatrix} 0 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 1 & 1 \end{pmatrix}$ then M_{ROS} is
 (A) $\begin{pmatrix} 0 & 1 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$ (B) $\begin{pmatrix} 0 & 1 & 1 \\ 1 & 1 & 1 \\ 0 & 1 & 0 \end{pmatrix}$
 (C) $\begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{pmatrix}$ (D) $\begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$
4. If f and g are onto then the function g of is 1 1 1 1,2
 (A) One-one (B) Many one
 (C) Onto (D) Into
5. Which of the following is not a function? 1 2 1 1,2
 (A) {(1,2),(1,4),(2,5),(3,8)} (B) {(1,2),(2,4),(3,6)}
 (C) {(-1,1),(-2,4),(2,4)} (D) {(1,1),(2,2),(3,3)}
6. In how many ways the letters of the word “STRESS” can be arranged? 1 2 2 1,2
 (A) 360 (B) 720
 (C) 240 (D) 120
7. How many 3 digit numbers can be formed from the digits 2,3,5,6,7 and 9 which are divisible by 5 and none of the digits is repeated. 1 2 2 1,2
 (A) 5 (B) 10
 (C) 20 (D) 15
8. In how many number of ways of arranging 7 persons around a circle? 1 1 2 1,2
 (A) 6! (B) 5!
 (C) 7! (D) 4!

9.	If $\gcd(a,b)=1$, then integers a and b are		1	1	2	1,2			1	1	5	1,2
	(A) Prime	(B) Relatively prime										
	(C) Composite	(D) Even										
10.	If $a = -23$ and $b = 7$ then		1	2	2	1,2			1	1	5	1,2
	(A) $q = 4, r = 5$	(B) $q = -4, r = 5$										
	(C) $q = 4, r = -5$	(D) $q = -4, r = -5$										
11.	The converse of the conditional statement "if it is raining, then I get wet" is		1	1	3	1,2			1	1	5	1,2
	(A) If I get wet then it is raining	(B) If I don't get wet then it is not raining										
	(C) If it is not raining then I don't get wet	(D) If it is raining, then I may not get wet										
12.	$P \rightarrow (P \vee Q)$ is equivalent to		1	2	3	1,2			1	1	5	1,2
	(A) F	(B) T										
	(C) P	(D) $\neg Q$										
13.	Dual of $(P \wedge Q) \vee R$		1	2	3	1,2			1	2	5	1,2
	(A) $(P \wedge Q) \vee R$	(B) $(P \wedge Q) \wedge R$										
	(C) $(P \vee Q) \wedge R$	(D) $(P \vee Q) \vee R$										
14.	The logically equivalent proportion of $P \Leftrightarrow Q$ is		1	1	3	1,2			1	2	5	1,2
	(A) $(P \wedge Q) \vee (P \wedge Q)$	(B) $(P \Rightarrow Q) \wedge (Q \Rightarrow P)$										
	(C) $(P \wedge Q) \vee (Q \Rightarrow P)$	(D) $(P \wedge Q) \Rightarrow (Q \vee P)$										
15.	A premise may be introduced at any point in the derivation is called _____		1	1	3	1,2			1	2	5	1,2
	(A) Rule P	(B) Rule P and T										
	(C) Rule T	(D) Rule CP										
16.	If a,b are the elements of a group G, then $(a \cdot b)^{-1}$		1	1	4	1,2			1	2	5	1,2
	(A) $b^{-1} * a^{-1}$	(B) $b * a$										
	(C) $a^{-1} * b^{-1}$	(D) $a * b$										
17.	If α, β are elements of the symmetric group S_4 given by $\alpha = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 4 & 2 & 1 \end{pmatrix}$ and		1	2	4	1,2			1	2	5	1,2
	$\beta = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 3 & 1 \end{pmatrix}$ then $\alpha\beta$											
	(A) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 1 & 2 & 3 & 4 \end{pmatrix}$	(B) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 1 & 4 & 2 \end{pmatrix}$										
	(C) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 4 & 3 & 2 & 1 \end{pmatrix}$	(D) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 4 & 1 & 2 \end{pmatrix}$										
18.	A ring $(R, +, \cdot)$ with identity is said to be a		1	1	4	1,2			1	2	5	1,2
	(A) Field	(B) Ring										
	(C) Division ring	(D) Semi group										
19.	Minimum distance between the code words $x=1001, y=0100, z=1000$		1	2	4	1,2			1	2	5	1,2
	(A) 1	(B) 2										
	(C) 3	(D) 4										
20.	If the minimum distance between any two code words is atleast 5, then maximum number of errors that can be detected is		1	2	4	1,2			1	2	5	1,2
	(A) 2	(B) 3										
	(C) 4	(D) 5										

21. The degree of pendant vertex.

- (A) 0
(B) 1
(C) 2
(D) 3

22. Graphs that include loops and possibly multiple edges connecting the same pair of vertices is called

- (A) Pseudo graph
(B) Bipartite graph
(C) Complete graph
(D) Directed graph

23. The maximum number of edges in a simple disconnected graph with n vertices and k components is

- (A) $\frac{(n+k)(n+k+1)}{2}$
(B) $\frac{(n+k)(n-k+1)}{2}$
(C) $\frac{(n-k)(n-k+1)}{2}$
(D) $\frac{(n-k)(n+k+1)}{2}$

24. A path in a graph G that includes each vertex exactly once is

- (A) Euler path
(B) Simple path
(C) Hamiltonian path
(D) Cyclic path

25. The chromatic number of the complete bipartite graph $K_{4,3}$

- (A) 2
(B) 3
(C) 6

PART – B (5 × 10 = 50 Marks)
Answer ALL Questions

26. a. If two functions $f: R \rightarrow R$ and $g: R \rightarrow R$ are defined as $f(x) = x^2 - 2$ and $g(x) = x + 4$, analyze whether f and g are injective, surjective and bijective. Also find gof , fog .

(OR)

- b. Applying Warshall's algorithm, find the transitive closure of a relation R
 $R = \{(1,1), (1,3), (1,4), (2,2), (3,4), (4,1)\}$.

27. a.i. In a class of 50 students, 20 students play football and 16 students play hockey. It is found that 10 students play both the games. Compute the number of students who play neither.

- ii. Prove that if 10 points are placed in a 3 cm by 3 cm square then distance between two points must be less than or equal to $\sqrt{2}$ cm apart.

(OR)

- b. Apply Euclidean algorithm, to find $\gcd(1819, 3587)$ and also express the gcd as a linear combination of the given number.

28. a.i. If it rains heavily then travelling will be difficult. If students arrive on time then travelling was not difficult. If they arrive on time, then it did not rain heavily. Check the validity of the conclusion.

- ii. Apply mathematical induction to show that $n! \geq 2^{n-1}$ for $n = 1, 2, \dots$

(OR)

- b. Using indirect method of proof, derive $p \rightarrow \neg s$ from the premises $p \rightarrow (q \vee r)$, $q \rightarrow \neg p$, $s \rightarrow \neg r, p$. 10 4 3 1,2

29. a. Show that the set Q^+ of all positive rational numbers forms an abelian group under the operation * defined by $a * b = \frac{1}{2}ab; a, b \in Q^+$. 10 3 4 1,2

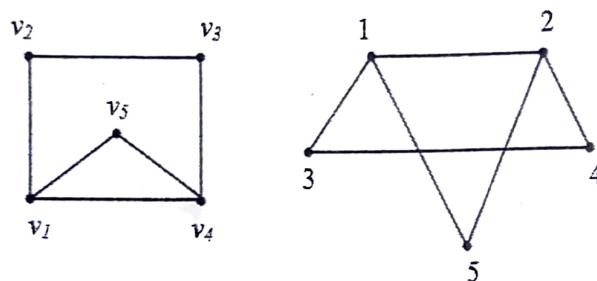
(OR)

- b. Compute the code words generated by the parity check matrix. 10 4 4 1,2

$$H = \begin{pmatrix} 1 & 1 & 1 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

When the encoding function is $e: B^3 \rightarrow B^6$.

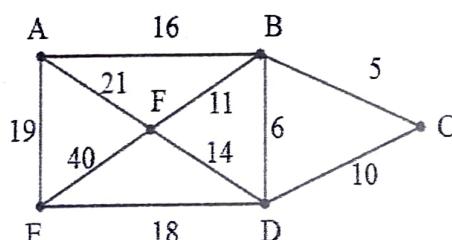
30. a.i. Check whether, the following two graphs are isomorphic. If not give reasons. 5 3 5 1,2



- ii. Prove that the number of edges in a bipartite graph with n vertices is atmost $n^2/4$. 5 3 5 1,2

(OR)

- b. Applying Kruskal's algorithm, to find the minimum spanning tree for the weighted graphs. Also, draw the minimum spanning tree. 10 4 5 1,2



* * * * *

Reg. No.

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B.Tech. DEGREE EXAMINATION, DECEMBER 2022

OPEN BOOK EXAMINATION

Fourth/ Fifth Semester

18CSC301T – FORMAL LANGUAGE AND AUTOMATA

(For the candidates admitted from the academic year 2018-2019 to 2021-2022)

- Specific approved THREE text books (Printed or photocopy) recommended for the course
- Handwritten class notes (certified by the faculty handling the course / head of the department)

Time: 3 Hours

Max. Marks: 100

Answer **FIVE** questions

(Question: No 3 is compulsory)

Marks BL CO PO

1. Abi has red and blue color balls and wanted to play a game. She puts all the balls in a bag and she wanted to pick the balls in the specified order. If she picks the red ball, blue ball, and red ball in a sequence at least once, it is a success.

i. Write a regular expression (RE) for the above scenario. 2 3 1 4

ii. Construct ϵ -NFA for the RE using Thompson's construction method. 4 3 1 4

iii. Convert this ϵ -NFA into deterministic finite automata (DFA) using subset construction method. 8 5 1 6

iv. Minimize the DFA. 4 5 1 6

v. Which of the following are true 1 4 1 2

(A) A language accepted by a DFA (B) A language accepted by a DFA is also accepted by some NFA (C) also accepted by some NFA and but not vice versa

but not vice versa

(D) DFA is 5 tuple but not NFA

vi. A transition from a state to another state without reading any input is allowed in 1 4 1 2

(A) DFA (B) NFA
(C) ϵ -NFA (D) RE

2. Babu has to travel from his office to his home every day. He can use four routes, A, B, C and D. Each month he has to take route A and route D equally, and route B and route C equally. He has to travel in all the routes at least once. In each given duration he needs to take route A first for n number of days followed by taking up route B for m number of days, followed by route C and route D as per the given condition.

i. Construct CFG for the above scenario.

3 3 2 4
3 3 2 4

ii. Construct language for the CFG.

6 5 2 6

iii. Derive the suitable string from the CFG using left most derivation, right most derivation and parse tree.

6 3 2 6

iv. Check whether the grammar is ambiguous or not by taking any string of length at least six.

6 3 2 6

v. Which among the following is not a part of the context free grammar tuple?

1 4 2 2

- (A) Variable (B) Start symbol
(C) End symbol (D) Production

vi. I: context free grammar is a subset of context sensitive grammar.

1 4 2 2

- II: Regular grammars are the most restricted type of grammars.
(A) Both are false (B) Both are true
(C) I is false and II is true (D) II is false and I is true

3. Consider the following grammar

$S \rightarrow NP VP \mid Aux NP VP \mid VP$
 $NP \rightarrow Det Nom$
 $Nom \rightarrow Noun \mid Noun Nom$
 $VP \rightarrow Verb$
 $Verb \rightarrow Verb NP$
 $NP \rightarrow Det \mid this \mid a \mid the$
 $Noun \rightarrow ball \mid flight \mid meal \mid man$
 $Verb \rightarrow book \mid include \mid hit$
 $Aux \rightarrow does$

i. List the terminal and non-terminal symbols.

3 4 2 2

ii. Check if the above grammar could generate the string "the man hit the ball".

4 3 2 4

iii. Simplify the grammar.

7 3 2 4

iv. Convert the above CFG to Chomsky normal form (CNF).

4 3 2 4

v. How many productions in the CFG are already in CNF?

1 4 2 2

- (A) 16 (B) 12
(C) 4 (D) 13

vi. The given productions are type _____ grammar.

1 4 2 2

- (A) 0 (B) 1
(C) 2 (D) 3

4. The school organized a children's day celebration event for all its students.

The students participated in various games of the events. One such game is picking the color flowers from the pool. The student has to pick the flowers in the order specified. The one who is picking all the flowers in the specified order at the earliest is the winner. The colored flowers are red, green, violet and yellow.

3 3 2 4

Case (i) : First they should pick 'n' number of red flowers then 'm' number of green flowers then '2 m' number of violet flowers and at least '3 n' number of yellow flowers.

Case (ii) : First they should pick 'n' number of red flowers then '4 n' number of green flowers.

i. Write the language for both the cases using set former.

5 4 3 2
8 3 3 4

ii. Construction of PDA for both the cases.

5 3 3 4

iii. Check whether one red flower followed by 4 green flowers can be picked using instantaneous description in case (ii)'s PDA?

1 4 3 2

iv. What can be inferred from the PDAs constructed for the given scenario?

- (A) The PDA constructed for case (B) The PDAs constructed for case (i) is non deterministic and case (ii) are deterministic
(C) The PDA constructed for case (D) The PDAs constructed for case (ii) is non deterministic (i) and (ii) are non-deterministic

v. What can be said about the language accepted by a PDA with 121 stack elements?

- (A) Regular (B) Context free
(C) Recursive (D) Nothing can be inferred

5. Goutham wants to reduce his weight he decides to join in gym and tries to use tread mill and cycle. If he used thread mill for the first 'n' number of days he has to use cycle for the next '2n' number of days.

2 3 3 4

i. Construct context free grammar for the above scenario.

6 3 3 4

ii. Convert the CFG into PDA.

4 3 3 4

iii. Show the instantaneous description for using tread mill 2 times and using cycle 4 times.

6 3 3 4

iv. Check whether the language $L = \{a^n b^m c^n d^m \mid n, m \geq 1\}$ is not a CLF using pumping Lemma.

1 4 3 2

v. A push down automaton employs _____ data structure..

- (A) Queue (B) Linked list
(C) Hash table (D) Stack

1 4 3 2

vi. The language generated for the given scenario is _____.

- (A) Regular (B) Context free language
(C) Context sensitive language (D) Recursively enumerable language

1 4 3 2

6. Case (i): Nandhini and Vanathi wanted to play a word (string) game, and the string can be made up of 2 symbols. One has to tell a string, and the other one has to check whether that string and its reverse are same.

Case (ii): There are totally P number of students. Each student has to sell q tickets for an event. How many tickets are sold altogether?

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- 8 3 4 4
- i. Construct a turing machine for case (i).
- 10 3 4 4
- ii. Construct a turing machine without using subroutine for the case (ii).
- 1 4 4 2
- iii. Turing machine is more powerful than:
- | | |
|----------------------|------------------------|
| (A) Finite automata | (B) Push down automata |
| (C) Both (A) and (B) | (D) None of these |
- 1 4 4 2
- iv. Initially the tape head is pointing the
- | | |
|---|--|
| (A) Rightmost cell that holds the input | (B) Leftmost cell that holds the input |
| (C) Middle cell that holds the input | (D) None of the above |
7. Adhitya and Arulmozhi wanted to play a game. One has to tell a binary number, and the other one has to check whether that number is divisible by 2. If it is divisible by 2, it is assumed as success.
- 4 3 5 4
- i. Construct a turing machine for the above scenario.
- 8 3 5 4
- ii. Convert the above turing machine into modified post correspondence problem (MPCP). Show the ID and MPCP solution for the input string “100”.
- 6 3 5 4
- iii. Write the code for the above turing machine.
- 1 4 5 2
- iv. Which of the following statements are false?
- | | |
|---|--|
| (A) Every recursive language is recursively enumerable | (B) Recursively enumerable language may not be recursive |
| (C) Recursive languages may not be recursively enumerable | (D) None of the mentioned |
- 1 4 5 2
- v. If a problem has no algorithm to answer it, we call it _____.
- | | |
|------------------|---------------------------|
| (A) Decidable | (B) Solved |
| (C) Recognizable | (D) None of the mentioned |

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B.Tech. DEGREE EXAMINATION, DECEMBER 2022

Fourth and Fifth Semester

18ECO133T – SENSORS AND TRANSDUCERS

(For the candidates admitted from the academic year 2020-2021 and 2021 -2022)

Note:

- (i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
(ii) **Part - B** should be answered in answer booklet.

Time: 2½ Hours

Max. Marks: 75

PART - A ($25 \times 1 = 25$ Marks)

Marks BL CO PO

Answer ALL Questions

8. Piezoelectric transducer consists of _____
 (A) Copper rod (B) Aluminum wire
 (C) Gold crystal (D) Quartz crystal
9. Name the sensor used to measure the distance between the vehicle and other objects in its environment.
 (A) Ultrasonic sensor (B) Tactile sensor
 (C) Motion sensor (D) Pressure sensor
10. Sounds of frequency higher than 20,000 Hz which are inaudible to normal human ear are called
 (A) Noise (B) Frequency
 (C) Ultrasonic (D) Amplitude
11. Identify the thermocouple type with the highest temperature limit from those listed here
 (A) Type J (B) Type K
 (C) Type S (D) Type T
12. Name the suitable material for a thermocouple
 (A) Brass (B) Gold
 (C) Platinum (D) Silver
13. Pyroelectric thermal sensor comprises of _____ material.
 (A) Ferro magnetic (B) Ferro mechanical
 (C) Ferro electrical (D) Ferro ceramic
14. Semiconductor devices are used to manufacture the thermal sensors because of _____
 (A) Electrical effect (B) Magnetic effect
 (C) Thermal effect (D) Mechanical effect
15. Identify the material used in magneto-resistive sensor
 (A) Bismuth (B) Antimonide
 (C) Both bismuth and antimonide (D) Copper
16. The change of the magnetization of a material when subjected to a mechanical stress is called
 (A) Hall effect (B) Matteucci effect
 (C) Villari effect (D) Wiedemann effect
17. The 'Eddy current' forces the current flowing through the interior of a material to move to its surface level is referred as
 (A) Skin effect (B) Matteucci effect
 (C) Villari effect (D) Wiedemann effect
18. Squid refers to which of the following
 (A) Sensitive magnetometer used to measure extremely subtle magnetic fields
 (B) Sensitive magnetometer used to measure crude magnetic fields
 (C) Sensitive magnetometer used to measure extremely crude magnetic fields
 (D) Sensitive magnetometer used to measure subtle magnetic fields
19. A load cell is a _____
 (A) Strain gauge (B) Photovoltaic cell
 (C) Thermistor (D) Pressure pick up
20. MEMS stands for the following abbreviation
 (A) Micro electrical mechanical system (B) Micro electro mechanical system
 (C) Mini electro mechanical (D) Mini electrical mechanical system
21. Name the method used for the measurement of flow rate of liquid
 (A) Conveyor based methods (B) Bourdon tube
 (C) Coriolis method (D) Thermal mass flow measurement
22. _____ is a very effective device used for detecting the rotating speed of a washing machine drum.
 (A) Hall effect sensor (B) Bio sensor
 (C) Thermistor (D) Thermo EMF sensor
23. Name of sensor used for frost detection in refrigerators
 (A) Phototransistor (B) Thermistor
 (C) Photo diode-led assembly (D) Photovoltaic cell
24. Magnetic sensors are widely used in
 (A) Electronic gadgets in (B) VCR camera entertainment
 (C) Oven (D) Dishwasher
25. Which of the following flow measuring element is inherently linear and requires no signal characterization anywhere in the loop?
 (A) Venturi (B) Orifice plate
 (C) Pitot tube (D) Turbine

PART - B (5 x 10 = 50 Marks)

Answer ALL Questions

26. a. Explain about the working of strain gauge and explain its various types. Derive the expression for the gauge factor.
- (OR)
- b. Discuss in detail about various types of errors associated in measurement and how these errors can be minimized.
27. a. With necessary equations and diagram discuss in detail about the inductive sensors.

(OR)

- b. With necessary equations deduce the characteristics transfer matrix equation for electromagnetic transducers. 10 3 2 4
28. a. Discuss in detail about the various types of thermo couples based on material used and temperature of operation. 10 2 3 3
- (OR)**
- b. Explain the construction and working of pyroelectric thermal sensors. 10 3 4 3
29. a. List out the fabrication steps of thin film and thick film technology. 10 1 4 3
- (OR)**
- b. Discuss the need of nanosensors and explain proximity nanosensors with neat sketch. 10 2 4 3
30. a. Discuss in detail about the flow measurement with neat sketch. 10 2 6 3
- (OR)**
- b. List out the methods to measure hydrostatic pressure. Explain any two with neat diagram. 10 3 5 1

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Reg. No. R A 2 0 1 1 0 2 6 0 2 0 8 6 5

B.Tech. DEGREE EXAMINATION, DECEMBER 2022
Fifth Semester

18CSC302J – COMPUTER NETWORKS

(For the candidates admitted from the academic year 2018-2019 to 2021-2022)

Note:

- (i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
(ii) **Part - B** should be answered in answer booklet.

Time: 2½ Hours

Max. Marks: 75

PART - A ($25 \times 1 = 25$ Marks)

Marks BL CO PO

Answer ALL Questions

9. SCTP offers _____ service.
 (A) Full duplex
 (B) Half duplex
 (C) Simplex
 (D) None of the above
10. Beyond IP, UDP provides additional services such as
 (A) Routing and switching
 (B) Sending and receiving packets
 (C) Multiplexing and demultiplexing
 (D) Demultiplexing and error checking
11. In the network, HTTP resources are located by
 (A) Uniform resource identifier
 (B) Unique resource locator
 (C) Unique resource identifier
 (D) Union resource locator
12. All telnet operations are sent as
 (A) 4 bits
 (B) 8 bits
 (C) 16 bits
 (D) 32 bits
13. _____ architecture, FTP is built on
 (A) P2P
 (B) Client-server
 (C) Data centric
 (D) Service oriented
14. HTTP client requests by establishing a _____ connection to a particular port on the server.
 (A) User datagram protocol
 (B) Transmission control protocol
 (C) Border gateway protocol
 (D) Domain host control protocol
15. In the process of fetching a webpage from a server, the HTTP request/response takes _____ RTTs.
 (A) 2
 (B) 4
 (C) 1
 (D) 3
16. The size of an IP address in IPv6 is _____
 (A) 4 bytes
 (B) 128 bits
 (C) 8 bytes
 (D) 100 bits
17. Which among the following features is present in IPv6 but not in IPv4?
 (A) Fragmentation
 (B) Header checksum
 (C) Options
 (D) Any cast address
18. Consider a CIDR network address 194.24.0.0/21. The last address in this network will be
 (A) 194.24.7.255
 (B) 194.24.11.255
 (C) 194.23.7.255
 (D) 194.24.7.250
19. IPv6 does not use _____ type of address.
 (A) Unicast
 (B) Broadcast
 (C) Multicast
 (D) Both (A) and (C)
20. Suppose two IPv6 nodes want to interoperate using IPv6 datagrams, but they are connected to each other by intervening IPv4 routers. The best solution here is _____.
 (A) Use dual-stack approach
 (B) Tunneling
 (C) No solution
 (D) Replace the system
21. The link necessarily begins and ends with this phase. During the _____ phase, the LCP automat will be in initial or starting states.
 (A) Link-termination phase
 (B) Link establishment phase
 (C) Authentication phase
 (D) Link dead phase
22. The high-bit-rate digital subscriber line (HDSL) uses two twisted pairs to achieve
 (A) Full duplex transmission
 (B) Half duplex transmission
 (C) Encoding
 (D) Decoding
23. DSLAM stands for
 (A) Decoder subscriber line access mode
 (B) Decoder subscription language mode
 (C) Digital subscriber language (D) Digital subscriber line access multiplexer
24. The second generation of cable network is called _____.
 (A) Traditional cable TV
 (B) Hybrid fiber-coaxial (HFC) network
 (C) DSL technology
 (D) Community antenna TV
25. Which protocol does the PPP protocol provider for handling the capabilities of the connection/ link on the network?
 (A) LCP
 (B) NCP
 (C) Both LCP and NCP
 (D) TCP

PART - B (5 × 10 = 50 Marks)

Answer ALL Questions

26. a. With the neat sketch, explain TCP 3-way handshake process in detail.
- 10 3 1 2
- (OR)
- b. Consider a network scenario and explain the functions of ARP and RARP protocols with its frame formats.
- 10 4 1 3
27. a.i. Compare the TCP header and the UDP header. List the field in the TCP header that are missing from UDP header. Give the reason for the absence.
- 5 4 2 2
- ii. Suppose a TCP connection is transferring a file of 5000 bytes. The first byte is numbered 10,001. What are the sequence numbers from each segment if data are sent in five segments, each carrying 1000 bytes?
- 5 3 2 3

(OR)

b.	Explain the types of byte ordering with one example problem.	10	4	2	2
28. a.i.	Illustrate the six main states of a DHCP client with a neat diagram.	5	3	3	3
ii.	Integrate the DHCP message format in detail.	5	4	3	2
	(OR)				
b.	Explain the architecture of E-mail with any two scenarios.	10	3	3	2
29. a.i.	Show the unabbreviated colon hex notation for the following IPv6 addresses.	4	4	4	2
	(1) An address with 64 0s followed by 64 1s				
	(2) An address with 128 0s				
	(3) An address with 128 alternative 1s and 0s				
	(4) An address with 128 1s				
ii.	Interpret the three addressing types of IPv6.	6	4	4	2
	(OR)				
b.	What are global unicast addresses? Outline the three levels of hierarchy of global unicast address with a neat sketch.	10	3	5	3
30. a.i.	Define PPP.	2	3	6	2
ii.	Draw the PPP frame format and explain each fields in detail.	4	3	6	2
iii.	Write short notes on various protocols of PPP.	4	4	6	3
	(OR)				
b.i.	Explain the architecture of an ATM network in detail with a neat diagram.	5	3	6	3
ii.	Organize the various ATM layers and explain.	5	4	6	2

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Reg. No. RA2011026020065

B.Tech. DEGREE EXAMINATION, DECEMBER 2022
Fifth Semester

18CSE388T – ARTIFICIAL NEURAL NETWORKS

(For the candidates admitted from the academic year 2018-2019 to 2021-2022)

Note:

- (i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
- (ii) **Part - B** should be answered in answer booklet.

Time: 2½ Hours

Max. Marks: 75

PART – A (25 × 1 = 25 Marks)

Answer ALL Questions

- | | Marks | BL | CO | PO |
|--|-------|----|----|----|
| 1. Which among the following is not an advantage of the brain over computer? | 1 | 2 | 1 | 1 |
| (A) Numerical computation only (B) Matching patterns only
(C) Self-learning capability only (D) Both numerical computation and matching pattern | | | | |
| 2. Fukushima introduces _____ to recognize handwritten characters. | 1 | 1 | 1 | 1 |
| (A) Self-organizing feature maps (B) Neocognitron
(C) Quants (D) Soft computing | | | | |
| 3. _____ is responsible for sending commands to muscles. | 1 | 1 | 1 | 1 |
| (A) Peripheral nervous system (B) Cortex of the brain
(C) Central nervous system (D) Both peripheral and central nervous system | | | | |
| 4. Interbrain is also called as | 1 | 1 | 1 | 1 |
| (A) Cerebrum (B) Cerebellum
(C) Spinal cord (D) Diencephalon | | | | |
| 5. The membrane potential of neuron in resting state is _____. | 1 | 1 | 1 | 1 |
| (A) -70 mV (B) 70 mV
(C) 85 mV (D) -85 mV | | | | |
| 6. How is the input to a neuron accumulated? | 1 | 2 | 2 | 2 |
| (A) Propagation function (B) Activation function
(C) Threshold (D) Output function | | | | |
| 7. The sigmoid activation function $f(t)$ is defined as | 1 | 1 | 2 | 2 |
| (A) $\frac{1}{\exp(t) + \exp(-t)}$ (B) $t \exp(-t)$
(C) $\frac{1}{1 + \exp(t)}$ (D) $\frac{1}{1 + \exp(-t)}$ | | | | |

8. How many output neurons are present in a multi-layer perceptron?
 (A) As many as the number of classes/categories
 (B) As many as the number of inputs
 (C) Single only
 (D) Infinitely many
9. What is true of the bias neuron?
 (A) Each layer has single bias
 (B) It is optional
 (C) Each layer has 2 bias neurons
 (D) There are infinitely many bias neurons
10. What can be said about generalization?
 (A) An indication of a good learner
 (B) Ability to solve unknown problem of same class
 (C) An important benefit of learning
 (D) Ability to work better in training data
11. Which of the following is not an example of an unsupervised neural network?
 (A) Self-organizing map
 (B) HEBB network
 (C) Both (A) and (B)
 (D) Back propagation network
12. Which Boolean operation on two variables can be represented by a single perceptron layer?
 (i) X1 AND X2 (ii) X1 OR X2
 (iii) X1 NOR X2 (iv) X1 XOR X2
 (A) (iv) only
 (B) (iii) and (iv) only
 (C) (i), (ii) and (iii) only
 (D) (i), (ii) (iii) and (iv)
13. What are the general tasks that are performed with backpropagation algorithm?
 (A) Pattern mapping
 (B) Function approximation
 (C) Prediction
 (D) All given choices
14. What is delta rule used for?
 (A) Updating weights connections
 (B) Updating outputs
 (C) Updating inputs
 (D) Updating number of neurons
15. For the error function $J(\theta)=3\theta^2+4\theta+2$, starting at $\theta=2$, what would be the best value (from the options given) to update the θ to (in the next couple of steps).
 (A) $\theta = 3$
 (B) $\theta = -1$
 (C) $\theta = -5$
 (D) $\theta = 10$
16. In which type of neural network, the data is grouped based on its distance from a center point?
 (A) Convolutional neural network
 (B) Recurrent neural network
 (C) Modular neural network
 (D) Radial basis functions neural network

17. What is the purpose of pseudo-inverse for RBFNN?
 (A) Compute initial weights when number of examples is equal to number of RBF neurons
 (B) Compute initial weights when number of examples lesser than number of RBF neurons
 (C) Compute initial weights when number of examples greater than number of RBF neurons
 (D) Adjustment of weights
18. Which neural network has one context layer per information processing layer
 (A) Elman networks
 (B) Jordon networks
 (C) All recurrent neural networks
 (D) RBF neural networks
19. If the aim is to obtain the optimal set of weights using genetic algorithm, what does each chromosome stand for?
 (A) A particular neural network
 (B) A particular assignment of neural network weights
 (C) A particular mutation
 (D) A particular crossing over (Recombination)
20. Which technique is least suitable to determine cluster centers and widths in RBFNN
 (A) SOM
 (B) k-means clustering
 (C) Gradient descent
 (D) Fixed selection of centers and widths with even spacing
21. Why does SOM network stiffen with the passage of time?
 (A) Because learning rates and neighborhoods are decreased over time
 (B) Because training examples get exhausted
 (C) Because no new neurons are added
 (D) Because no weight adjustment happens in SOM
22. What is the main benefit of ART network?
 (A) Unsupervised learning
 (B) Attain both stability and plasticity
 (C) Attain stability without plasticity
 (D) Attain plasticity without stability
23. Which of the following is incorrect about self-organizing maps?
 (A) Clustering by SOMs is in principle similar to the k-means method
 (B) It does not involve neural networks
 (C) The data points are initially assigned to the nodes at random
 (D) It starts by defining a number of nodes
24. The bidirectional associative memory is similar in principle to?
 (A) HEBB learning model
 (B) Boltzman model
 (C) Dapert model
 (D) Hopfield model
25. SOM and ART
 (A) Both are examples of unsupervised learning
 (B) Only SOM is example of unsupervised learning
 (C) Only ART is an example of unsupervised learning
 (D) Neither are examples of unsupervised learning

PART – B ($5 \times 10 = 50$ Marks)

Answer ALL Questions

	Marks	BL	CO	PO
26. a. Briefly characterize the four development phases of neural networks and give expressive examples for each phase.	10	4	1	1
(OR)				
b. With neat sketch explain the components of a neuron.	10	4	1	1
27. a.i. Briefly explain the design of bias neuron.	4	2	2	2
ii. Discuss the effect of the bias neuron in an example neural network.	6	4	2	2
(OR)				
b.i. What are linear and non-linear activation functions? Give examples.	4	2	2	1
ii. Discuss and differentiate sigmoid, TANH and RELU activation functions.	6	4	2	1
28. a.i. Explain Hebbian learning rule with implementation of AND gate.	7	3	3	2
ii. Explain the strategy to divide the set of training samples.	3	2	2	1
(OR)				
b.i. Provide a comparison between Single Layer Perceptron (SLP) and Multilayer Perceptron (MLP).	5	4	3	2
ii. Explain the application of delta rule to SLP and MLP.	5	3	3	2
29. a. A manufacturing company has collected a large amount of data in the form of pairs of real valued input and output vectors, and wants you to build a system that will predict the outputs of new inputs. Design an appropriate radial basis function (RBF) network for them. Explain what will be computed at each layer.	10	3	4	2
(OR)				
b. Describe in detail the similarities and differences between multi-layer perceptron (MLP) and radial basis function (RBF) network.	10	4	4	2
30. a.i. List the steps in the training of weights of a self organizing map.	3	4	4	2
ii. What are the main benefits of adaptive resonance theory over self – organizing maps? State the reason for this benefit.	7	4	4	2
(OR)				
b. An insurance company with several thousands of customers has decided to analyse its customers in order to understand better why they buy the policy. The company collected data about its customers for the last 2 years. Each customer's profile was stored electronically in a database and fed into a data warehouse, where it was assessed on 50 parameters, discuss how a self-organizing map (SOM) could be used for this analysis. Why would the results, produced by an SOM, be particularly useful of the reports presented to strategic managers?	10	3	4	2

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