



WALCHAND COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Visharambag, Sangli – 416415

Third Year B.Tech. Information Technology

MSE, EVEN SEMESTER, AY 2023-24

Unix Operating System (6IT321)



MSE

PRN: 21616053

Day & Date: Tuesday, 27/02/2024 Time : 09.00 am to 10.30 am

Max Marks: **30**

IMP: Verify that you have received question papers with correct course code, branch etc.

Instructions

- a) All questions are compulsory.
- b) Writing question number on answer book is compulsory otherwise answers may not be assessed.
- c) Assume suitable data wherever necessary.
- d) Figures to the right of question text indicate full marks.
- e) Mobile phones, smart gadgets and programmable calculators are strictly prohibited.
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Text on the right of marks indicates course outcomes (Only for faculty use)

Marks

CO1

Q1 A) Pid=*fork()*; in this example, What Pid value is returned by *fork* system call to parent and what Pid value by *fork* system call is returned to child? Why? Compare *fork* with *vfork* system calls working? 5

CO1

B) Why data structures of kernel are static? Give the list of static data structures of kernel. What data structure you will replace in implementation of your better OS design for-process, file (inode), buffer cache, region managements, etc. 5

CO1

Q2 A) Draw and elaborate the blocks of file system layout. Which block help to find maximum number files or directory user can create? Which block gives information about state of file system? 5

CO2

B) Enlist the five scenarios of *getblk* algorithm, which scenarios are suffered from race condition? Why? 5

CO2

Q3

Write in short: (2X05=10)

CO3

a) Justify, why various fields of U area required to access during only the process execution only.

10

b) Why there is per user or per process file descriptor table?

c) Kernel is non-preemptive does it means mutual exclusive is there on kernel, if yes or no justify.

d) Why process running in the kernel mode cannot be preempted? Justify?

e) Why free list of buffer in buffer cache is implemented like LRU (Least frequently used), if it is implemented like MFU (most frequently used), what will happen?

.....End of question paper



WALCHAND COLLEGE OF ENGINEERING

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Visharambag, Sangli – 416415

Third Year B.Tech. Electronics Engineering

MSE, EVEN SEMESTER, AY 2023-24

Biomedical Engineering 6OE365



MSE

PRN: 21610053

Day & Date: Monday, 26/02/2024 Time : 09.00 am to 10.30 am

Max Marks: 30

IMP: Verify that you have received question papers with correct course code, branch etc.

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Marks

Q1	A) What is need of isolation amplifier in biomedical instrumentation set-up? Explain optically isolated Isolation amplifier.	6	CO2
	B) Define the following terms 1.EEG 2.EMG 3.ECG 4.ERG	6	CO1
	C) Draw and explain the block diagram of single bedside patient monitoring system	6	CO3
	D) What are EEG signals? Draw the block diagram of EEG machine	6	CO2
	E) What are the types of electrodes used for measurement of bio signal and draw the lead connection circuit diagram of ECG machine.	6	CO3

.....End of question paper



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(Government Aided Autonomous Institute)

Visharambag, Sangli – 416415

Third Year B.Tech. Information Technology

MSE, EVEN SEMESTER, AY 2023-24

Image Processing and Pattern Recognition (6IT322)



MSE

PRN: _____

Day & Date: Wednesday, 28/02/2024

Time : 09.00 am to 10.30 am

Max Marks: **30**

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Marks

Q1 A) Use appropriate values to fill in the blanks. CO1

- i) The size of 3 bit 64×64 image = _____ bytes.
- ii) The screen active window diagonal endpoints are (0,0) and (768,1024).

This results in window aspect ratio = _____

- iii) If Gray-level slicing without background is applied on 3 bit image with cut off $r1=3$ and $r2=5$;

Complete the output image patch at (x, y, z) indicating intensity values of pixels.

Input= {0, 7, 3, 1; 3, 6, 4, 6; 2, 4, 2, 2; 1, 2, 5, 3}

Output= {0, 0, 7, x; 7, 0, 7, 0; 0, 7, 0, 0; 0, 0, y, z}

x= _____ ; y= _____ ; z= _____

5

B) Why Discrete Fourier Transform (DFT) is used in Digital Image Processing? CO2

List and explain its properties.

5

Q2 A) Define following terms w.r.t. raster screen display: CO1

- i) Phosphorescence
- ii) Persistence
- iii) Resolution
- iv) Pixel
- v) Fluorescence

5

- B)** Considering *Image Acquisition* as the basic step; describe fundamental steps that are involved in IPPR.

Align the steps in a sequence that is used for processing, in general.

CO2

5

- Q3 A)** Write short notes on: (Any Two) CO3
- i) Histogram Equalization
Comment on the Process and Purpose
 - ii) Image Formats
Comment on Raster image formats, extension and bit size
 - iii) Image Color Models
Comment on RGB, CMYK and HSI models

10

..... ***End of question paper***



WALCHAND COLLEGE OF ENGINEERING

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Visharambag, Sangli – 416415

Third Year B.Tech. Information Technology

MSE, EVEN SEMESTER, AY 2023-24

Artificial Neural Network (6IT333)



MSE

Day & Date: Friday, 01/03/2024

PRN: _____

Time : 09.00 am to 10:30 am

Max Marks:

30

IMP: Verify that you have received question papers with correct course code, branch etc.

Instructions

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			Marks
Q1	A) Give the significance of activation function in neural network	2	CO1
	B) Write an algorithm for perceptron learning.	3	CO1
	C) Explain McCulloch Pitts neuron model.	5	CO1
Q2	A) List the names of learning rules used for training a network.	2	CO1
	B) Differentiate supervised learning and unsupervised learning.	3	CO1
	C) Train the network using Hebbian learning rule with binary activation function and initial weights $W_0=[1, -1, 0, 0.5]$. three input vectors are $x_1=[1, -2, 1.5, 0]$, $x_2=[1, -0.5, -2, -1.5]$, $x_3=[0, 1, -1, 1.5]$, Assume learning constant $c=1$.	5	CO2
Q3	A) What is training of a neural network and how it is achieved?	2	CO1
	B) Explain any two activation functions in detail.	3	CO1
	C) Perform training steps of network using delta learning rule with input vectors $x_1=[1, -2, 0, -1]$, $x_2=[0, 1.5, -0.5, -1]$, $x_3=[-1, 1, 0.5, -1]$ and initial weights $W_0=[1, -1, 0, 0.5]$. Assume learning constant $c=0.1$ and lambda=1. <i>a₁=1, d₂=-1 → d₃=-1</i>	5	CO2

.....End of question paper



WALCHAND COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Vishwarambag, Sangli – 416415

Third Year ,Information Technology

MSE, EVEN SEMESTER, AY 2023-24

Artificial Intelligence (6IT 323)



MSE

PRN: 21610053

Day & Date: Thursday, 29/02/2024

Time: 9am to 10:30am

Max Marks 30

IMP: Verify that you have received question papers with correct course code, branch etc.

Instructions a) All questions are compulsory.

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Marks

Q1 A) In the Missionary and cannibals problem , L indicates left and R indicates right sides. M1 is missionaries on the left side while C1 indicates the cannibals on the left side,M2 and C2 indicate the same for the right side. Total number of missionaries and cannibals must remain the same as 3 for any valid state so the summation of M1 and M2 and C1 and C2 must be 3 for a valid state. BL indicates boat on the left side while BR indicates a boat on the right side.We can have boat on one side but not at both sides of the river. CO1

4

Check and justify the following states are valid or invalid?

- (i) L(0,0) & R (3,3) & BR. (ii) L(0,1) & R (2,2) & BR. (iii)L(2,0) & R(1,3) & BL.
(iv) L(3,3) & R(0,0) & BL.

B) Solve Crypt arithmetic problem for:-

CO1

$$\begin{array}{r} \text{CROSS} \\ + \text{ROADS} \\ \hline \text{DANGER} \end{array}$$

$$\begin{array}{r} \text{LOGIC} \\ + \text{LOGIC} \\ \hline \text{PROLOG} \end{array}$$

6

Q2 A) What is the Turing Test in AI? Describe it with a diagram. CO2

3

B) Give difference between AI programs and Conventional Programming. CO2

3

- C) Consider 8 puzzle problem, The **h-score** as the **number of misplaced tiles** by comparing the current state and the goal state. Solve the problem using A star (A*) algorithm. Illustrate with the search Tree graph.

CO2

4

Initial State			Goal State		
1	2	3	2	8	1
8		4		4	3
7	6	5	7	6	5

- Q3 A) Explain the concept of scripts in AI and provide an example illustrating its application to visit a bank to withdraw money. (Note: Represent scenes/events in Conceptual dependency/CD forms).

CO3

3

- B) Consider the scenario "Tom is an instance of a dog. Tom caught a cat, Tom is owned by Rashan, Tom is brown in color, Dogs like bones, The dog sat on the mat, A dog is a mammal, A cat is an instance animal, All mammals are animals, Mammals have fur." Represent it with a semantic net diagram.

CO3

3

- C) Explain the following algorithm with a search Tree diagram.

CO3

(i) Beam search algorithm

(ii) Min-Max Algorithm

4

.....End of question paper



WALCHAND COLLEGE OF ENGINEERING

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Visharambag, Sangli – 416415

Third Year B.Tech. Information Technology

ESE , EVEN SEMESTER, AY 2023-24

Artificial Neural Network (6IT333)



ESE

PRN: _____

Day & Date: Tuesday, 21/05/2024

Time : 10.30 am to 12.30 pm

Max Marks:

50

IMP: Verify that you have received question papers with correct course code, branch etc.

Instructions a) All questions are compulsory.

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		Marks
Q1	A) Give the significance of multilayer feed forward neural network.	2 CO3
	B) Explain any two loss functions with mathematical equations.	3 CO1
	C) Write the steps in back propagation algorithm.	5 CO3
	D) Discuss architecture of convolutional neural network.	6 CO3
Q2	A) Give the significance of Long Short Term Memory.	2 CO3
	B) Differentiate supervised learning and unsupervised learning.	3 CO1
	C) Explain gradient descent algorithm.	5 CO1
	D) Elaborate on average pooling and max pooling using example.	6 CO2
Q3	A) List any four applications of deep learning.	2 CO2
	B) Discuss feed forward neural networks.	3 CO3
	C) Explain any two methods used to avoid over fitting.	5 CO3

- D) Obtain new feature map from given input image matrix and filter using convolution.

8 CO2

1	0	0	0	0	1
0	1	0	0	1	0
0	0	1	1	0	0
1	0	0	0	1	0
0	1	0	0	1	0
0	0	1	0	1	0

Input Matrix

1	-1	-1
-1	1	-1
-1	-1	1

Filter

.....End of question paper.....



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Visharambag, Sangli – 416415
Third Year, Information Technology
ESE, EVEN SEMESTER, AY 2023-24
Artificial Intelligence (6IT323)



ESE

PRN:

Day & Date: Friday, 17/05/2024

Time: 10.30 am to 12.30 pm

Max Marks: 50

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Marks

Q1 A) Compare informed search with uninformed search.

3 CO1

B) Identify different problems in hill climbing approaches.

3 CO1

C) Solve following objective questions

CO1

i) Who coined the term “Artificial Intelligence”?

ii) Turing Test was put forth as a simple test that could be used to.....

iii) The 8 puzzle problem has a total of states in its state space.

iv) Domain knowledge is used in which type of searching technique?

4

v) Fringe is a LIFO queue in which type of searching technique?

vi) Is bidirectional search always an optimal algorithm?

vii) For a game tree: Each node has b children and a d-ply look ahead is performed. What is the number of leaf nodes to be examined?

viii) A search algorithm takes _____ as an input and returns _____ as an output.

- Q2**
- A) Design the regressive feed forward ANN consisting of 5 hidden layers for following data. CO1
1. The input contains 748 features.
 2. There are total 'm' training samples.
 3. First hidden layer is with 500 neurons.
 4. Second hidden layer is with 400 neurons.
 5. Third hidden layer is with 250 neurons.
 6. Fourth hidden layer is with 50 neurons.
 7. Fifth hidden layer is with 10 neurons.
- How many Parameters to be learned in given ANN assuming bias for every neuron. 2
- B) What is linear separability in classifications? Specify any 4 problems which are detected as linearly separable and non-linearly separable. Justify it. CO1 4
- C) Implement following logic Gate using Perceptron Learning Algorithm CO2
- | X1 | X2 | y |
|----|----|----|
| 1 | 1 | 1 |
| 1 | -1 | -1 |
| -1 | 1 | -1 |
| -1 | -1 | -1 |
- D) Consider a Perceptron in N dimensional space. Write the equation of the hyper-plane. Also give explanation of hyper-plane, decision rules, and decision regions w.r.t. hyper-plane. CO2 4
- Q3**
- A) Represent following in FOPL symbolic logic: CO2
- i) A drunkard is an enemy of himself.
 - ii) All students like a good teacher.
 - iii) Fruits and vegetables are nutritious.
 - iv) God helps those who help themselves.
- B) Assume the following facts 1. Prasad only likes easy courses. 2. All courses are hard. 3. All courses in data mining department are easy. 4. DM108 is a data mining course. 1) Use resolution to answer the question—"Which course would Prasad like?" 2) Also design clausal form for above question in FOPL using proper axioms, functions, predicates, variables and constants. CO2 4

CO3

- C) Construct semantic net representations of the following-a) Rajesh is Indian, Rajesh is a lecturer. b) Vikram gave his new video CD to his brother-in law.

3

CO2

- D) Consider the following knowledge base:

- 1] The-humidity-is-high or the-sky-is-cloudy.
- 2] If the-sky-is-cloudy then it-will-rain.
- 3] If the-humidity-is-high then it-is-hot.
- 4] it-is-not-hot.

3

And the goal: it-will-rain. Prove by resolution theorem that the goal is derivable from the knowledge base

CO3

- Q4 A) We have three blocks: A, B, and C. The initial state is as : Block A is on the table. Block B is on block A. Block C is on the table. Our goal is to stack block C on top of block B. Apply the GSP algorithm and give plan and actions.

4

- B) Draw Architecture diagram of Expert Systems.

4 CO3

- C) Fill other Inference rule names. (Refer Name of first rule show in Table).

CO3

Rules of Inference	Tautology	Name
$p, p \rightarrow q, \therefore q$, $p, p \rightarrow q, \therefore q$	$(p \wedge (p \rightarrow q)) \rightarrow q$, $(p \wedge (p \rightarrow q)) \rightarrow q$	<u>Modus Ponens</u>
$\neg q, p \rightarrow q, \therefore \neg p$	$(\neg q \wedge (p \rightarrow q)) \rightarrow \neg p$	
$p \rightarrow q, q \rightarrow r, \therefore p \rightarrow r$	$((p \rightarrow q) \wedge (q \rightarrow r)) \rightarrow (p \rightarrow r)$	
$\neg p, p \vee q, \therefore q$	$(\neg p \wedge (p \vee q)) \rightarrow q$	
$p, \therefore (p \vee q)$	$p \rightarrow (p \vee q)$	
$(p \wedge q) \rightarrow r, \therefore p \rightarrow (q \rightarrow r)$	$((p \wedge q) \rightarrow r) \rightarrow (p \rightarrow (q \rightarrow r))$	
$p \vee q, \neg p \vee r, \therefore q \vee r$	$((p \vee q) \wedge (\neg p \vee r)) \rightarrow (q \vee r)$	

4

.....End of question paper

WALCHAND COLLEGE OF ENGINEERING



(Government Aided Autonomous Institute)

Visharambag, Sangli – 416415



Third Year B.Tech. Information Technology

ESE , EVEN SEMESTER, AY 2023-24

Image Processing and Pattern Recognition (6IT322)

ESE

PRN: 21610053

Day & Date: Wednesday, 15/05/2024

Time : 10.30 am to 12.30 pm

Max Marks:

50

IMP: Verify that you have received question papers with correct course code, branch etc.

- Instructio**n
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Marks

- Q1** A) List 3x3 masks for detecting diagonal edges using: CO2
 i) Prewitt ii) Sobel 4
- B) Describe various steps in Canny edge detection algorithm 4 CO2
- Q2** A) Compare morphological processing operations: Dilation and Erosion CO2
 4
- B) Solve following:
 If X and Y are input and output 3 bit image patches of size 4x4 each. The change in intensities is observed at the receiver due to noisy communication channel. If image patch Y is containing the noise, then calculate the quality of the output image patch Y; w.r.t. input image patch X in terms of PSNR value. CO3
 4
 $X = \{3, 2, 1, 2; 3, 3, 2, 2; 2, 5, 6, 6; 4, 0, 0, 6\}$
 $Y = \{3, 2, 7, 2; 3, 3, 2, 0; 2, 5, 7, 6; 4, 0, 0, 0\}$
 Comment on the output image quality, in general?
- Q3** A) A triangle ABC is rotated through 90 degree anticlockwise about the origin of the standard coordinate system to get triangle A'B'C'. If triangle points are given as A=(3, -1), B=(4, 1), C=(2, 1); then find transformed points A'B'C' CO3
 4

B) If pattern classification results into predicted classes as:

CO3

		Predicted Class	
		P	N
Actual Class	P	True Positives (TP)	False Negatives (FN)
	N	False Positives (FP)	True Negatives (TN)

TP=20; TN=37; FP=33; FN= 10;

Then fill in the following blanks with appropriate values for classification.

- i) Precision = _____ 4
- ii) Recall (Sensitivity) = _____
- iii) Specificity = _____
- iv) Accuracy = _____

Q4 A) Using Suitable examples, explain 4-connectivity, 8-connectivity and m-connectivity in pixel adjacency. 4 CO3

B) What are Butterworth low pass and Butterworth high pass filters? 4 CO2

Q5 A) Write short notes on: (Any Three) 18 CO1

- i) Basic Components of a Pattern Recognition System
Comment on system components, pattern recognition approaches, feature selection & extraction
- ii) Discrete Wavelet Transform in Image processing
Comment on Basis function, multi-resolution property, advantages and disadvantages
- iii) Discrete Fourier Transform in Image processing
Comment on Basis function, 1D/2D transform and properties of DFT
- iv) Aliasing
Comment on quantization, Nyquist sampling frequency, aliasing effects and antialiasing techniques

.....End of question paper



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Visharambag, Sangli – 416415

Third Year B.Tech. Electronics Engineering

ESE , EVEN SEMESTER, AY 2023-24

Biomedical Engineering (6OE365)



ESE

PRN: 21610053

Day & Date: Thursday, 09/05/2024

Time : 10.30 am to 12.30 pm

Max Marks: **50**

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Marks

Q1	A) How X-rays are generated, explain with X-ray machine block diagram.	6	CO2
	B) Explain ultrasonography machine with block diagram.	6	CO3
	C) Explain CT scan machine. What are the scanning modes are used in CT machine	6	CO3
	D) What is need of dialyzer machine? What are the types of membranes used in the dialysis process?	6	CO3
	E) What are the common Imaging modalities .Explain NMRI system	6	CO2
Q2	A) What are the types of pace maker? Explain any one type of pace maker system	6	CO2
	B) What is the Laser Application in Biomedical Field .How to generate Laser beam.	6	CO3
	C) Write short notes on :(any two) a) Endoscopy b) Biotelemetry systems c) Thermography	8	CO3

.....End of question paper



WALCHAND COLLEGE OF ENGINEERING

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Visharambag, Sangli - 416415

Final Year B.Tech. Information Technology

ESE , EVEN SEMESTER, AY 2023-24

Unix Operating System (6IT321)

PRN: _____



ESE

Day & Date: Thursday, 11/05/2024

Time : 10.30 am to 12.30 pm

Max Marks: **50**

IMP: Verify that you have received question papers with correct course code, branch etc.

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Marks

Q1 A) What system calls are supported by kernel for processing environment? How kernel uses these system calls for processing? **5 CO1**

B) With block diagram, explain System Kernel and enlist the responsibilities of process control subsystem and file subsystem. **5 CO2**

Q2 A) For the following sequence system calls, draw the files subsystem data structure entries with correct counts and name of files. **CO3**

Parent: { fd1=open("etc/password", R);
fd2= open ("hari.c", W);
pid=fork(); //Child
fd3 = open("etc/password", W);
fd4=open("etc/password", R); }

5

B) State advantages and disadvantages of buffer cache. **5 CO1**

Q3 A) Write in short (2*5=10) **CO3**

a. Which kernel data structures describe the state of a process?

b. Is the signal to be handle by a process is optional, if yes, why it is made optional to process to handle the signal?

c. Define zombie state. Why it is designed in lifecycle of process? **10**

d. When a process terminates, the kernel performs clean-up, assigns any children of the exiting process to be adopted by *init*, and sends the death of a child signal to the parent process. Why?

e. What are the advantages to kernel in maintaining the U-area in the system?

Q4 A) Draw the nine state transition diagram and show when the signals are handled and checked? Why signals are handled and checked on those transitions only? **5 CO2**

B) What is system level context of a process? Explain the contents of static, dynamic parts. (Draw diagrams if necessary) **5 CO2**

Q5 A) What are the functions carried out by *exit* (algorithm) system call? Why *exit* system call is designed in kernel for process termination? **5 CO3**

B) How many signals are there in system V UNIX? Give the correspondence between pid and set of process in *kill* system call for sending the signal. **5 CO3**

.....End of question paper.....