Total No. of printed pages = 3

CSE 181602

Roll No. of candidate | | | | | | | | | | |

2022

B.Tech. 6th Semester End-Term Examination

COMPUTER NETWORKS

(New Regulation & New Syllabus)

Full Marks – 70 Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer Question No. 1 and any *four* from the rest.

1. Answer the following (MCQ/ Fill in the blanks) : (10 × 1 = 10)

(i) In Star topology, devices are connected via a centralized network component known as

(a) Bus (b) Hub

(c) Node (d) Client

(ii) In which of the following schemes change or lack of change in the value of voltage determines the value of bit

(a) NRZ-I (b) NRZ-L

(c) Both (a) and (b) (d) None of these

(iii) Amplitude modulation is a technique used for

(a) Analog to Digital Conversion (b) Digital to Analog Conversion

(c) Analog to Analog Conversion (d) Digital to Digital Conversion

(iv) BNC connectors are used with

(a) Satellites (b) Fiber Optic cables

(c) Coaxial Cables (d) Twisted pair cables

(v) Store and forward technique is used in

(a) Message switching (b) Packet switching

(c) Time division multiplexing (d) Both (a) and (b)

[Turn over

(vi) CRC computation is based on

(a) OR operation (b) AND operation

(c) XOR operation (d) NOR operation

(vii) In which of the following protocols, the station senses the channel before trying to use it.

(a) ALOHA (b) CSMA

(c) CDMA (d) None of these

(viii) How many bits are allocated for the host ID in an IP address of Class A?

(a) 8 (b) 24

(c) 48 (d) 16

(ix) In which of the following algorithm, the output rate of burst packets can be of variable rate?

(a) Token bucket (b) Leaky bucket

(c) Both (a) and (b) (d) None of these

(x) TCP exchanges data in the form of

(a) Datagram (b) Packets

(c) Segments (d) Frames

2. (a) Explain ring, star and bus topologies with their advantages and disadvantages. (6)

(b) Write functionalities of different OSI layers? (9)

3. (a) Distinguish between data and signal. Name the advantages of optical fiber over twisted pair and coaxial cable. (2 + 4 = 6)

(b) Compare circuit switching and Packet switching.

A bit word 1011 is to be transmitted. Construct the even parity seven bit Hamming code for this data. (5 + 4 = 9)

4. (a) Explain CSMA / CD? Consider a CSMA / CD LAN running at 1 Gbps over a 1 KM long cable with no repeaters. The signal propagation speed is 200 m/μs. What is the minimum frame size? (5 + 4 = 9)

(b) Explain the mechanism of selective repeat ARQ. (6)

5. (a) A company is granted a site address 201.70.64.0. The company needs six subnets. Design the subnets. (8)

(b) With neat sketch explain connection establishment and release using 3 way handshaking in transport layer. (7)

6. (a) Explain leaky bucket algorithm? Explain DES algorithm. (6 + 6 = 12)

(b) Calculate the throughput of stop and wait flow control mechanism if the frame size is 4800 bits, bit rate is 9600 bps and distance between device is 200 Km, Speed of propagation over the transmission is 200,000 km/s. (3)

7. Write short notes on : (5 × 3 = 15)

(a) FDM

(b) ARP

(c) FTP

(d) Static routing

(e) UDP.

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Roll No. of candidate | | | | | | | | | | |

2022

B.Tech. 6th Semester End-Term Examination

Computer Science and Engineering

SOFTWARE ENGINEERING

(New Regulation & New Syllabus)

Full Marks – 70 Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer Question No.1 and any *four* from the rest.

1. Answer the following questions : (10 × 1 = 10)

(i) What is the first step in the software development lifecycle?

(a) System Design

(b) Coding

(c) System Testing

(d) Preliminary Investigation and Analysis

(ii) What is the major drawback of the Spiral Model?

(a) Higher amount of risk analysis

(b) Doesn't work well for smaller projects

(c) Additional flinctionalitjes are added later on

(d) Strong approval and documentation control

(iii) Software maintenance costs are expensive in contrast to software development.

(a) True (b) False

(iv) What is Software Engineering?

(a) Designing a software

(b) Testing a software

(c) Application of engineering principles to the design a software

(d) None of the above

[Turn over

(v) What is a Functional Requirement?

(a) Specifies the tasks the program must complete

(b) Specifies the tasks the program should not complete

(c) Specifies the tasks the program must not work

(d) All of the above

(vi) What is the full form of the "COCOMO" model?

(a) Cost Constructive Estimation Model

(b) Constructive Cost Estimation Model

(c) Constructive Case Estimation Model

(d) Constructive Cost Estimating Model

(vii) Which of the following document contains the user system requirements?

(a) SRD (b) DDD

(c) SDD (d) SRS

(viii) The relationship between a derived class and base class is referred to as

(a) Association (b) Inheritance

(c) Instantiation (d) Polymorphism

(ix) Waterfall model is not suitable for:

(a) Small project (b) Complex project

(c) Acconinodating changes (d) None of the above

(x) Why is Requirements Elicitation a difficult task?

(a) Problem of scope (b) Problem of understandability

(c) Problem of volatility (d) All of the above

2. (a) What is software engineering? Describe the importance of software Engineering.

(4 + 6=10)

(b) Describe briefly about software standards. (5)

3. (a) What do you mean by software development life-cycle (SDLC)? What are the different stages of a SDLC? Discuss briefly about the Spiral model.

(2 + 2 + 5=9)

(b) What I do you mean by requirements specification? Briefly explain about the different approaches followed for requirements specification. (2+4=6)

4. (a) What is a data flow diagram? What are the purposes of using Data Flow diagrams? Give an example with suitable diagrams. (2+2+5=9)

(b) What is the difference between SRS document and design document? What are the contents we should include in the SRS document and design document. (2+4=6)

5. (a) List and explain different types of testing done during the testing phase. (2+8=10)

(b) What is a class and object? Give the diagrams and representation of class and object. (2+3=5)

6. (a) What do you mean by cost estimation in project management? Explain briefly about COCOMO model. (3+7=10)

(b) What is data modeling? What do you mean by cardinality in data modeling? (3+2=5)

7. Write short notes on (any three): (3 × 5 = 15)

(a) Generalization

(b) Evolutionary model

(c) Software metric

(d) Coupling and Cohesion

(e) ER diagram

Total No. of printed pages = 3

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Roll No. of candidate | | | | | | | | | | |

2022

B.Tech. 6th Semester End-Term Examination

IMAGE PROCESSING

(New Regulation and New Syllabus)

Full Marks – 70 Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer question No. 1 and any *four* from the rest.

1. Answer the following: (MCQ/Fill in the blanks) (10 × 1 = 10 marks)

(i) How does picture formation in the eye vary from image formation in a camera?

(a) Fixed focal length

(b) Varying distance between lens and imaging plane

(c) No difference

(d) Variable focal length

(ii) A second order derivative operator can be defined as

(a) Laplacian (b) Gaussian

(c) Histogram (d) None of the above

(iii) In wiener filtering it is assumed that noise and image are

(a) different (b) homogeneous

(c) correlated (d) uncorrelated

(iv) What is the main idea behind grey-level slicing?

(a) For brightening the relevant grey-valued pixels and preserving the background

(b) To give all grey levels of a specific range high value and a low value to all other grey levels.

(c) All of the above

(d) None of the above

[Turn over

(v) If the pixels can not be reconstructed without error mapping is said to be

(a) reversible (b) irreversible

(c) temporal (d) facsimile

(vi) Erosion followed by dilation is called

(a) opening (b) closing

(c) blurring (d) translation

(vii) Example of discontinuity approach in image segmentation is

(a) edge based segmentation (b) boundary based segmentation

(c) region based segmentation (d) Both (a) and (b)

(viii) _____ is the starting pixel of region growing process.

(a) seed pixel (b) base pixel

(c) original pixel (d) image

(ix) The theory of mathematical morphology is based on _____

(a) image size (b) set theory

(c) probability (d) correlation

(x) Which type of Histogram Processing is suited for minute detailed enhancements?

(a) Intensive (b) Local

(c) Global (d) Random

2. (a) Assume you have to process a digital image. What will be the different tools and components of your image processing system? Explain with the help of an example and diagram. (7)

(b) Describe the various types of connectivity between pixels. Give examples. (4)

(c) Explain any two image interpolation techniques. (4)

3. (a) Describe about Inverse 2D Discrete Fourier Transform. (3)

(b) Consider the following 1-D function 'f' and the filter 'w'. (4)

f : 0 0 1 0 1 0 0 0

w : 1 4 2 2 8

Illustrate the 1-D convolution of 'w' with 'f'.

(c) Explain the smoothing of images in frequency domain using

(i) Ideal low pass filters and

(ii) Butterworth low pass filters

(iii) Gaussian Low pass Filters. Also explain what is ringing effect. (8)

4. (a) Given a 3-bit image of size 32 × 32 pixels having intensity distribution as shown in the table given below, where the intensity levels are in the range 0-7. Apply histogram equalization technique and find the transfer function T(r) which relates input image intensity level r_k to output image intensity level s_k. (5+5 = 10)

Intensity Level	Number of Pixels
$r_0 = 0$	76
$r_1 = 1$	344
$r_2 = 2$	211
$r_3 = 3$	103
$r_4 = 4$	57
$r_5 = 5$	127
$r_6 = 6$	47
$r_7 = 7$	59

(b) What is spatial filtering? Why are smoothing spatial filters used? (5)

5. (a) What is the effect of Homomorphic Filtering while enhancing an image? Explain. (5)

(b) Various NGOs are working to restore the classical images and paintings. What are the issues involved in restoration of the existing images which may not be in very good condition. (5)

(c) An information source produces sequences of independent symbols A, B, C, D, E, F, G with corresponding probability 1/3, 1/27, 1/3, 1/9, 1/9, 1/27 and 1/27. Construct a binary code using Huffman coding algorithm. (5)

6. (a) Define the term image coding and its need/Name various image coding techniques and compare and contrast the transform coding from predictive coding technique. (3+4+3 = 10)

(b) Compare erosion and dilation with an example. (5)

7. (a) What is wavelet? How can they be used for image compression? (4)

(b) Explain the concept of Hit or Miss Transformation. (4)

(c) What is thresholding? Describe in brief the various thresholding methods for image segmentation. (7)

Total No. of printed pages = 4

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Roll No. of candidate | | | | | | | | | | |

2022

B.Tech. 6th Semester End-Term Examination

COMPILER DESIGN

(New Regulation & New Syllabus)

Full Marks – 70 Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer question No. 1 and any *four* from the rest.

1. Answer the following (MCQ/ Fill in the blanks) : (10 × 1 = 10)

(i) Match the following according to input to the compiler phase that processes it.

A	Syntax Tree	I	Code Generator
B	Character Stream	II	Syntax Analyzer
C	Intermediate Representation	III	Semantic Analyzer
D	Token Stream	IV	Lexical Analyzer

(a) $A \rightarrow II, B \rightarrow III, C \rightarrow IV, D \rightarrow I$ (b) $A \rightarrow II, B \rightarrow I, C \rightarrow III, D \rightarrow IV$

(c) $A \rightarrow III, B \rightarrow IV, C \rightarrow I, D \rightarrow II$ (d) $A \rightarrow I, B \rightarrow IV, C \rightarrow II, D \rightarrow III$

(ii) Which of the following is not an intermediate code form?

(a) Syntax tree (b) Three address code

(c) quadruples (d) Postfix Notation

(iii) Consider the following C program

```
int main ( )
    {
    Integer X;
    return 0;
    }
```

Which of the following phases in a seven-phase C compiler will throw an error?

(a) Lexical Analyzer

(b) Machine Dependent Optimizer

(c) Semantic Analyzer

(d) Syntax Analyzer

(iv) Which of the following errors can a compiler check?

(a) Syntax Error

(b) Both Logical and Syntax Error

(c) Logical Error

(d) Compiler cannot check errors

(v) What is/are the applications of regular expression?

(a) Designing compilers

(b) Simulating sequential circuits

(c) Developing text editors

(d) All of the above

(vi) The function _____ is automatically generated by the flex when it is provided with a ./ file

(a) flex ( ) (b) yylex ( )

(c) lex ( ) (d) ninlex ( )

(vii) Consider the production of the grammar $S \rightarrow AA$ $A \rightarrow aa$ $A \rightarrow bb$ Describe the language specified by the production grammar.

(a) L = {aaaa, aabb, bbaa, bbbb}

(b) L = {abab, abaa, aaab, baaa}

(c) L = {aaab, baba, bbaa, bbbb}

(d) L = {aaaa, abab, bbaa, aaab}

(viii) The number of tokens in the following C-code statements are

```
switch (inputValue)
{
case 1 : a = b*c;
break;
default: a = a++;
break;
}
```

(a) 27 (b) 28

(c) 24 (d) 26

(ix) Consider the following grammar $S \rightarrow p \mid pq \mid pqr$

Choosing the correct statement for the grammar is _____

(a) LL(2) (b) LL(4)

(c) LL(1) (d) LL(3)

(x) Consider the augmented grammar given below:

$S' \rightarrow S$

$S \rightarrow < L > \mid id$

$L \rightarrow L, S \mid S$

Let $I_0 = CLOSURE(\{[S' \rightarrow S]\})$, the number of items in the set GOTO$(I_0, <)$ is _____

2. (a) Explain the basic task of a lexical analyzer in the analysis phase of a compiler. (7)

(b) (i) Write the rules for computing FIRST(X) and FOLLOW(A). (4+2+2=8)

(ii) Eliminate the left recursion of the grammar $E \rightarrow E + E \mid E * E \mid a \mid b$

(iii) Eliminate the ambiguity concerning the dangling else grammar.

3. (a) Discuss a Syntax-Directed Translation scheme with an example. (7)

(b) Differentiate following (4+4=8)

(i) Inherited attributes and synthesized attributes

(ii) Top down parsing and bottom up parsing

4. (a) Construct an SLR parsing table for the following grammar: (9)

$R \rightarrow R \mid R$

$R \rightarrow RR \mid R^* \mid (R) \mid a \mid b$

(b) Compare and contrast SLR with LALR. (6)

5. (a) Show the following grammar is LALR(1) (9)

$S \rightarrow Aa \mid bAc \mid dc \mid bda$

$A \rightarrow d$

(b) What do you mean by kernel and non-kernel items? Give examples. (6)

6. (a) Explain how a peephole optimization technique is locally effective to improve the target code. (9)

(b) Construct a DAG for the expression: $a + a * (b - c) + (b - c) * d$ (6)

7. (a) Generate three-address code of the following C assignment statements then Convert your three-address code into machine code. You may use as many registers as you need. $x = a/(b+c) - d*(e+f)$; (9)

(b) What is the role of the symbol table in the compilation process? Explain in brief. (6)

Total No. of printed pages = 3

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Roll No. of candidate | | | | | | | | | | |

2022

B.Tech. 6th Semester End-Term Examination

Computer Science and Engineering

DATA MINING

(New Regulation & New Syllabus)

Full Marks – 70 Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer Question No.1 is compulsory and any *four* from the rest.

1. Answer the following :(MCQ/Fill in the blanks) (10 × 1 = 10)

(i) Finding of hidden structure in unlabeled data is called

(a) Supervised learning (b) Unsupervised learning

(c) Reinforcement learning (d) none of the above

(ii) Which one of the following refers to the binary attribute?

(a) This takes only two values: 0 and 1

(b) The natural environment of a certain species

(c) Systems that can be used without knowledge of internal operations

(d) All of the above

(iii) Which of the following refers to the steps of the knowledge discovery process, in which the several data sources are combined?

(a) Data selection (b) Data cleaning

(c) Data transformation (d) Data integration

(iv) _____ is data about data

(a) Minidata (b) Microdata

(c) Metadata (d) Multidata

(v) Removing duplicate records is a process called

(a) Pruning (b) Cleansing

(c) Cleaning (d) Recovery

[Turn over

(vi) Which of the following statement is true about the classification:

(a) it is a measure of accuracy

(b) It is a subdivision of a set

(c) It is the task of assigning a classification

(d) None of the above

(vii) What does OLTP stand for:

(a) Offline Transaction Processing

(b) Online Transaction Processing

(c) Outline Traffic Processing

(d) None of the above

(viii) Which is needed by K-means clustering?

(a) Defined distance metric

(b) Number of clusters

(c) Initial guess as to cluster centroids

(d) All of the above

(ix) A ———— allows data to be modeled and viewed in multiple Dimensions.

(x) Web data is ————

(a) Structured data (b) Un-structured data

(c) Only text data (d) Binary data

2. (a) What is data mining? Briefly explain about various data mining tasks. Also mention the key challenges of data mining. (3 + 3 + 4 = 10)

(b) What do you mean by data repository? What are the different types of data repositories? (2 + 3 = 5)

3. (a) What do you mean by similarity measure? Briefly explain about at least two measures. (3 + 3 = 6)

(b) Given two objects, x (22, 1,42) and y (20,0, 36), in d-dimensional space (3 × 3 = 9)

(i) Compute the Euclidean distance between the two objects.

(ii) Compute the Manhattan distance between the two objects.

(iii) Compute the Minkowski distance between the two objects, using p = 3.

4. (a) What do you mean by association rule mining? (3)

(b) Define the following: (3 + 2 = 5)

(i) Support and confidence

(ii) Frequent itemset

(c) Explain Apriori algorithms for generating frequent item sets using candidate generation for the following transaction dataset: (7)

Transaction	List of Items
T1	I1, I2, I3
T2	I2, I3, I4
T3	I4, I5
T4	I1, I2, I4
T5	I1, I2, I3, I5
I6	I1, I2, I3, I4

Where support = 50% and Confidence = 60%

5. (a) What do you mean by cluster Analysis? What are the different approaches for cluster analysis? (3 + 3 = 6)

(b) Discuss any one of the following clustering algorithms with a suitable example: (9)

(i) K-Means

(ii) BIRCH

(iii) DBSCAN

6. (a) What is an outlier? Mention about the various schemes for handling outliers. (3+3=6)

(b) How classification is performed in data mining? Explain them with suitable examples in brief. (3+6=9)