Roll No. .....

TCS–601

B. TECH. (CSE) (SIXTH SEMESTER)

END SEMESTER EXAMINATION, June, 2023

COMPILER DESIGN

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) Discuss the compiler translation for the statement Area_of_Circle=3.14*radius*radius by explaining the output of each phases of compiler. (CO1)

(b) Justify how two-buffer technique improves the performance of lexical analysis over one-buffer technique. If two-buffer technique replaced by three-buffer technique, will it further improve the performance of lexical analysis. (CO1)

(c) List the cousins of compiler and discuss the role of them. (CO1)

P. T. O.

2. (a) Given the grammar **G1** : (CO2)

$S \rightarrow iEtS \mid iEtSeS \mid a$

$E \rightarrow b$

Do the following :

(i) Apply appropriate technique on grammar **G1** to make suitable for Top-Down parsing and label it as **G2**.

(ii) Derive first and follow terms for the grammar **G2**

(iii) Construct LL(1) parsing table for the grammar **G2**

(b) Write short note on the following : (CO2)

(i) Recursive descent parsing vs Non-Recursive descent parsing

(ii) SLR *vs.* CLR parsing technique

(iii) Lexer *vs.* Parser

(c) Given the grammar : (CO2)

$M \rightarrow nQr$

$Q \rightarrow ef \mid g$

Do the following :

(i) Check whether the given grammar is LALR or not

(ii) Parse the input string ngr

3. (a) Write short notes on the following : (CO3)

(i) Syntax Directed Translation

(ii) L-Attribute Evaluation

(iii) S-Attribute Evaluation

(b) Explain the syntax directed definition and construct the syntax tree for the expression A + B – C * D. (CO3)

(c) Elaborate the run time storage manager in compiler design. (CO3)

4. (a) Construct the three address code for the given expression $((a * b) + (c - d) * (- e * -f)) + b$ and represent the generated three address code in Quadruple, Triple and Indirect Triple. (CO4)

   (b) Discuss any *five* types of code optimization techniques with examples. (CO4)

   (c) Consider three two dimensional arrays such as sum[][],a[][] and b[][] each of size 10 * 10. Generate the three address code for the following code segment. Consider $low_1 = 1$, $low_2 = 1$ and width = 4. (CO4)

```
for(i=1;i<n;i++) {
    for (j=1;j<n;j++) {
      sum[i][j]=a[i][j]+b[i][j]
    }
}
```

5. (a) Discuss the major issues of code generator with example. (CO5)

   (b) Construct basic blocks and flow graph for the following three address code. (CO5)

   (i) r =1
   (ii) c =1
   (iii) tl =10 * r
   (iv) t2 = tl + c
   (v) t3 = 8 * 12
   (vi) t4 = t3 – 88
   (vii) a[t4] = 0.0
   (viii) c = c +1
   (ix) if c < = 10 goto (3)
   (x) r = r + 1

(xi) if r < = 10 goto (2)

(xii) r = 1

(xiii) t5 = c – 1

(xiv) t6 = 88 * t5

(xv) a[t6] = 1.0

(xvi) r = r + 1

(xvii) if r < = 10 goto (13)

(c) Develop the targets sequence using code generation algorithm for the following expression : (CO5)

(i) result = (A – B) * (A – C) * (B – C)

(ii) sum = (a – b) + (a + c)

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TCS–604

B. TECH. (SIXTH SEMESTER)

END SEMESTER EXAMINATION, June, 2023

COMPUTER NETWORKS—I

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) A packet has arrived in which the offset value is 100, the value of HLEN is 5, and the value of the total length is 100. What are the numbers of the first byte and the last byte ? (CO3)

(b) Explain the process of multiplexing and Demultiplexing at transport layer using neat and clean diagrams along with the process of client connections with TCP and UDP sockets. (CO2)

(c) (i) Which subnet does this IP (131. 107. 32.1, 255. 255. 224. 0) belong to ? (CO2)

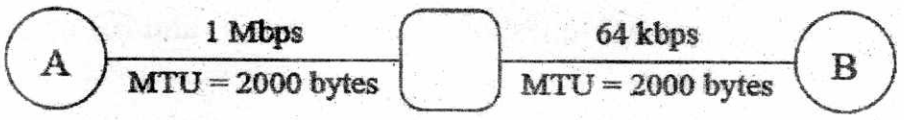
(ii) How many subnets and hosts per subnet can you get from the network 192. 168. 89. 0/28 ?

P. T. O.

2. (a) The newest version of the IP protocol, IPv6, does not allow routers to fragment packets. Why do you think the designers wanted to eliminate this capability ? (CO3)

(b) Draw the FSM for the sender side for reliable stop-and-wait protocol considering all error conditions (like packet loss etc). No explanation required. (CO2)

(c) How long does it take for a 3000-byte IP packet to go from host A to host B in the figure below. Assume the overhead of any packet headers is negligible, as is the length of the cables, and assume there is no other traffic. (If you need to make any additional assumptions, state them.) (CO3)



3. (a) (i) When routers generate ICMP messages, to where do they send them ? Along with the ICMP header at the beginning, what additional contextual information do routers include in the messages ? (CO2)

(ii) Are ICMP messages delivered reliably ? If so, briefly explain the mechanism. If not, give a reason why not. (CO1)

(iii) Name two circumstances under which an end-host (and not a router) will send an ICMP message. (CO1)

(b) Consider a network using 8-bit host addresses. Suppose a router uses longest pre-fix matching and has the forwarding table shown ahead. For

each of the four interfaces, give the associated range of destination host addresses and the number of addresses in that range. (CO2)

Prefix Match	Interface
1	0
11	1
111	2
Otherwise	3

(c) An organization is granted a block 125. 238. 0. 0/16. The administrator wants to create 512 subnets : (CO2)

(i) Find the subnet mask required

(ii) Find the number of addresses in each subnet

(iii) Find the first and last allocatable addresses in the 1st subnet

(iv) Find the first and last allocatable addresses in the 14th subnet

4. (a) Shed some light on the process of TCP congestion control using FSM description ? (CO4)

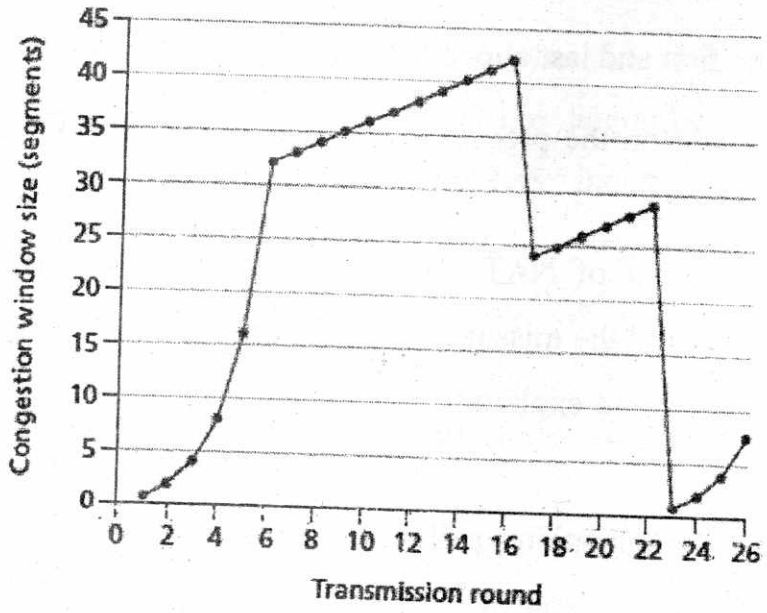
(b) Apply the concept of NAT protocol in Graphic Era Deemed to be University to avoid the miss use Public IP address for accessing Internet in the University and explain the difference between public and private IP address. (CO4)

(c) Explain the application architectures used for developing the applications like Web and Bit Torrent with their suitable protocols. (CO3)

5. (a) Briefly describe TWO possible methods for enabling a smooth transition from IPv4 to IPv6. Briefly comment on their suitability. (CO3)

(b) Suppose that five measured Sample RTT values are 106 ms, 120 ms, 140 ms, 90 ms, and 115 ms. Compute the Estimated RTT after each of these Sample RTT values is obtained, using a value of alpha = 0. 125 and assuming that the value of Estimated RTT was 100 ms just before the first of these 5 samples were obtained. Compute also the DevRTT after each sample is obtained, assuming a value of beta = 0.25 and assuming the value of DevRTT was 5 ms just before the first of these five samples was obtained. Last, Compute the TCP Timeout Interval after each of these samples is obtained. (CO 3)

(c) Consider the figure given below. Assuming TCP Reno is the protocol experiencing the behavior as shown, answer the following questions : (CO 3)



(i) Identify the intervals of time when TCP slow start is operating.

(ii) Identify the intervals of time when TCP congestion avoidance is operating.

(iii) After the 16th transmission round, is segment loss detected by a triple duplicate ACK or by a timeout ?

(iv) After the 22nd transmission round, is segment loss detected by a triple duplicate ACK or by a timeout ?

(v) What is the initial value of ssthresh at the first transmission round ?

(vi) What is the value of ssthresh at the 18th transmission round ?

(vii) What is the value of ssthresh at the 24th transmission round ?

(viii) During what transmission round is the 70th segment sent ?

(ix) Assuming a packet loss is detected after the 26th round by the receipt of a triple duplicate ACK, what will be the values of the congestion window size and of ssthresh ?.

(x) Suppose TCP Tahoe is used (instead of TCP Reno), and assume that triple duplicate ACKs are received at the 16th round. What are the ssthresh and the congestion window size at the 19th round ?

Roll No. .....

TCS–611

B. TECH. (SIXTH SEMESTER)

END SEMESTER EXAMINATION, June, 2023

SOFTWARE ENGINEERING

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any ***two*** sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) Discuss the *two* well-known principles used in software engineering to tackle the complexity of development of large applications. (CO1/CO2)

(b) Describe the phases and workflows associated with RUP. What are the advantages of providing static and dynamic views of the software process in RUP ? (CO1/CO2)

(c) Discuss various circumstances, where different life-cycle models are used. Also give the advantages of Spiral model over the Waterfall model. (CO1/CO2)

P. T. O.

2. (a) Explain the ways and means for collecting the software requirements. How are they organized and represented ? (CO2/CO4)

   (b) Describe Requirement Engineering process. Differentiate between user and system requirement with suitable example. (CO2/CO4)

   (c) What do you mean by Data Flow Diagrams (DFD) ? Draw the Data Flow Diagram for online railway reservation process on IRCTC portal. (CO2/CO4)

3. (a) What are the characteristics of a good design ? Describe different types of coupling and cohesion. (CO3/CO6)

   (b) What architectural styles are preferred for the following system ? Why ?

   (i) Networking Data centered Architecture

   (ii) Web based systems– Call and return architecture. (CO3/CO6)

   (c) Analyze ERP software at GEU and design the following models : (CO3/CO6)

   (i) Usecase model to represent student's involvement.

   (ii) Sequence model to represent the semester registration process.

4. (a) What are software testing objectives ? Discuss various levels of testing and their relevance. (CO2/CO4)

   (b) Differentiate between the following : (CO2/CO4)

   (i) Verification and Validation

   (ii) Black box and White box testing

   (c) Elaborate MaCabe's cyclomatic complexity V(G) and discuss how total number of test cases are calculated using this method. (CO2/CO4)

5. (a) Write short notes on the following : (CO1/CO5)

   (i) CASE tools

   (ii) Risk Management

   (b) List various estimation techniques. Discuss the function point analysis method for size estimation. (CO1/CO5)

   (c) Discuss SEI capability maturity model and elaborate key processing areas of each maturity level. (CO1/CO5)

Roll No. .....

TCS–619

B. TECH. (CSE/CE-SPL) (SIXTH SEMESTER)
END SEMESTER EXAMINATION, June, 2023

NETWORK AND SYSTEM SECURITY

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any ***two*** sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) What are the uses of the following general security requirements ? Confidentiality, Availability and Access control.

   (b) Demonstrate the infection procedure of the following malware attacks : Spyware, Rootkit and Ransomware

   (c) Explain the working mechanism of the following firewalls : Circuit-level gateways, Proxy firewalls and Next-generation firewalls.

2. (a) Use a Hill cipher scheme to perform the decryption of "BWAI". The given key value is "DOIT".

   (b) Investigate the signature generation and verification procedures of the Digital Signature Standard (DSS) algorithm.

P. T. O.

(c) Demonstrate the working procedure of authentication tied to ciphertext using a figure. Is it a secure approach ? Provide your view on it.

3. (a) Describe the encryption and decryption methods of the RSA algorithm with proper explanations and questions.

(b) Explain the following Secure/Multipurpose Internet Mail Extensions (S/MIME) functionalities :

Enveloped data, Signed data and Clear-signed data.

(c) In a Diffie-Hellman key exchange protocol, Alice (Party A) and Bob (Party B) share a prime number of 17 and a primitive root value of 7. The value of Alice's private key is 4 and Bob's private key is 6. Calculate the shared secret key of both Alice and Bob.

4. (a) Design a security protocol for the following given scenario. There is a secure chat application, in which there are two communicating parties, i.e., party A and party B. Party A wants to interact with party B in a secure way. There is a server (S), which acts like an intermediate node between them. Use the mechanism of a public key cryptographic algorithm (i.e., RSA) and establish a session key (SK) between A and B. There should be the mitigation of attacks, like, data disclosure attack, server bypassing attack, MITM attack, impersonation attack and replay attack. Details are given below :

(i) Party A and Server (S) use a shared secret key KAS for their secure communication.

(ii) Party B and Server (S) use a shared secret key KBS for their secure communication.

(c) Demonstrate the working procedure of authentication tied to ciphertext using a figure. Is it a secure approach ? Provide your view on it.

3. (a) Describe the encryption and decryption methods of the RSA algorithm with proper explanations and questions.

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(i) Party A and Server (S) use a shared secret key KAS for their secure communication.

(ii) Party B and Server (S) use a shared secret key KBS for their secure communication.

(iii) Party A uses its random nonce N_1 and party B uses its random nonce N2.

(iv) Server (S) uses random nonce Ns_1 between itself and party B. Furthermore, Server (S) uses random nonce Ns2 between itself and party A.

(v) The public and private keys of party A are pkA, skA. Furthermore, the public and private keys of party B are pkB, skB.

(vi) There should be an exchange of a minimum of six messages. In all exchange messages use timestamp values, like, T1, T2, T3, T4, T5 and T6.

(b) For the given scenario in question 1(a) implement a scyther code and perform its formal security verification.

(c) Demonstrate the working mechanism of SSL handshake protocol. Why do we need SSL-enabled security in online e-commerce applications ?

5. (a) Describe the following Internet Protocol Security (IPSec) documents : Encapsulating Security Payload (ESP), Authentication Header (AH) and Internet Key Exchange (IKE)

(b) Describe the model of network security using a figure. Why is it important to follow the guidelines of this model to design a security scheme ?

(c) Demonstrate the procedure of Wired Equivalent Privacy (WEP) authentication using a figure. What are the security flaws of WEP ?

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TCS–622

B. TECH. (CSE) (SIXTH SEMESTER)

END SEMESTER EXAMINATION, June, 2023

CLOUD COMPUTING TECHNOLOGIES

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) Discuss the leading cloud service providers prevalent in the market. Choose any public cloud service provider and discuss at least three cloud services in detail. (CO3, CO1, CO5)

(b) Explain the various perspectives of cloud computing. What is the difference between traditional computing and cloud computing ? (CO3, CO1, CO5)

(c) Write a short note on 4 services provided by GCP and AWS for any one of the following : (CO3, CO1, CO5)

(i) Infrastructure as a Service

(ii) Platform as a Service

P. T. O.

2. (a) Write short notes on any *two* of the following : (CO1, CO2, CO4)

   (i) Live VM migration

   (ii) Cloud Identity and Access Management

   (iii) Cross VM side channel attack

   (b) Social media websites including Facebook, Instagram, Twitter, Snapchat etc. have accelerated their business expansion and improved its user experience by adopting various cloud based services. Evaluate the role of web development and User Interface (UI) in making social media websites a success. In the same context, discuss the evolution of web. (CO1, CO2, CO4)

   (c) Discuss the approaches to parallel programming and the levels of parallelism. (CO1, CO2, CO4)

3. (a) Every day, at airports, malls, hospitals and on-street locations across the Middle East, car parkers make hundreds of thousands of transactions with NatPark (National Parking Company), one of the region's poineers in the car parking industry and one of the largest operators of parking facilities in the Europe. Evaluate the role, scope and significance of using Open Standards from the perspective of NatPark.

   (CO2, CO1, CO4)

   (b) Who all are the stakeholders for cloud computing ecosystem ? As per NIST, discuss the characteristics of cloud computing.

   (CO2, CO1, CO4)

   (c) Alpha Commerce has maintained 99 per-cent or higher uptime and scaled to serve 11,000 merchants in its first four years of operations on AWS. Alpha Commerce offers software for Shopify merchants to help them improve product discoverability and analytics on their e-commerce pages. Analyze the applicability of the Cloud Deployment Models from the perspective of Alpha Commerce. (CO2, CO1, CO4)

4. (a) Trace the evolution of cloud computing over the last three decades along with the discussion of key milestones achieved during this evolution. (CO2, CO3, CO5)

   (b) Define VMM. What is Type-I and Type-2 hypervisors. Elaborate the taxonomy of virtualization techniques in detail. (CO2, CO3, CO5)

   (c) Discuss the different hardware architectural styles for parallel computing. (CO2, CO3, CO5)

5. (a) Discuss the different computing paradigms that led to the evolution of todays cloud computing fundamentals. (CO1, CO2, CO5)

   (b) Dragonfruit Corp. built a scalable, serverless utility monitoring solution on AWS, reducing operating costs by 400–500 per cent, reducing latency, and achieving 90 per cent accurate, real-time energy data. Identify and discuss the advantages and disadvantage of cloud computing from perspective of Oragonfruit Corp assuming it used in-house traditional computing infrastructure before migrating to cloud. (CO1, CO2, CO5)

   (c) Virtualization is considered as the key enabler for cloud computing. According to you, how has virtualization changed the landscape of cloud computing. Critically analyze. (CO1, CO2, CO5)

Roll No. .....

TCS–624

B. TECH. (CSE) (SIXTH SEMESTER)
END SEMESTER EXAMINATION, June, 2023

SECURITY IN SOCIAL NETWORK

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) What are the Pros and Cons of social media ? Explain with the help of an examples. (CO1, CO3)

   (b) Explain the working of Frontend and Backend technologies.(CO1, CO3)

   (c) Discuss the Architecture of Web and working with social media APIs. (CO1, CO3)

2. (a) What are the privacy and security concerns in misinformation on social media Platforms ? (CO3, CO4)

   (b) Explain the concept of Part-of-Speech Tagging. What is the need of this task in NLP ? (CO3, CO4)

   (c) What are the common types of web security attacks ? Explain in detail. (CO3, CO4)

3. (a) How do I keep my social media profile safe ? What are different ways to keep your social media accounts safe from hackers ? (CO2, CO3)

P. T. O.

(b) What is fake news and misinformation ? How To Identify Fake News on social media ? (CO2, CO3)

(c) Suppose we are trying to create a model that can predict the result for the disease that is either a person has that disease or not. So, the confusion matrix for this is given as : (CO2, CO3)

	Actual: No	Actual: Yes
Predicted: No	65	3
Predicted: Yes	8	24

Calculate Accuracy, Precision, Recall, F1-Score und Error rate.

4. (a) What are pretrained models ? Why use a pre-trained model rather than creating your own ? (CO3, CO4)

(b) How do I extract tweets from Twitter ? Write down the steps or algorithm to extract tweets from twitter. (CO3, CO4)

(c) Which neural network is best for text classification ? Explain with the help of an example, is text classification supervised or unsupervised ? (CO3, CO4)

5. (a) Does India need strong data privacy laws ? What type of data needs protection ? (CO5, CO6)

(b) What is deep learning ? Explain its uses, application, and history. (CO5, CO6)

(c) Explain the following : (CO5, CO6)

(i) Tensorflow

(ii) NLTK

(iii) PorterStemmer

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TCS–642

B. TECH. (CSE) (SIXTH SEMESTER)
END SEMESTER EXAMINATION, June, 2023

BIG DATA ANALYTICS

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any ***two*** sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) In the field of cyber security, explain how real-time analytics can be applied to detect and respond to potential security threats, such as network intrusions or malware attacks. (CO1)

(b) Discuss a scenario where graph data analysis is utilized in social media marketing to identify key influencers, track campaign reach and optimize marketing strategies. (CO1)

(c) Describe a scenario where real-time analytics is applied in the context of smart cities to monitor and manage urban infrastructure, such as traffic flow, energy consumption or waste management. (CO1)

P. T. O.

2. (a) In the banking industry, discuss a scenario where regression analysis is used to predict customer churn based on historical transaction data, enabling proactive customer retention strategies. (CO2)

   (b) Explain how probability models are used in the field of insurance to assess risk, calculate premiums, and estimate claim probabilities based on historical data and actuarial techniques. (CO2)

   (c) Describe a case where descriptive analytics is applied in the field of supply chain management to optimize inventory levels, streamline logistics and reduce costs. (CO2)

3. (a) Discuss a scenario where data collection techniques, such as surveys or focus groups, are used in market research to gather consumer insights and inform product development decisions. (CO3)

   (b) In the context of healthcare, explain how SQL tools can be used to analyze electronic health records (EHRs) and medical claims data to identify trends, support clinical research and improve patient outcomes. (CO3)

   (c) Discuss a scenario where a NoSQL database, like MongoDB, is employed in the field of IoT (Internet of Things) to store and process sensor data from smart devices for real-time monitoring and analytics. (CO3)

4. (a) Explain how big data analytic databases, such as Apache HBase, are used in the telecommunications industry to analyze call detail records (CDRs) and customer interactions, enabling personalized marketing campaigns and improving customer experience. (CO4)

(b) Describe a case where SQL tools for big data analysis, such as Apache Hive or Apache Impala, are utilized in the advertising industry to analyze user behavior, target specific audiences and measure campaign effectiveness. (CO4)

(c) A social media platform wants to analyze user sentiment in real-time to detect emerging trends and identify potential brand reputation issues. Develop a scenario where real-time sentiment analysis is applied to streaming social media data, enabling the platform to take proactive measures in response to user sentiments and feedback. (CO5)

5. (a) A transportation logistics company wants to optimize its delivery routes and minimize fuel consumption. Explain how the Hadoop Distributed File System (HDFS) and MapReduce can be utilized to process and analyze large volumes of location-based data in order to generate optimal route plans and reduce operational costs. (CO5)

(b) A social media platform wants to analyze user engagement and activity patterns to identify influencers for targetted marketing campaigns. Describe a scenario where Hadoop's MapReduce framework is applied to analyze user interactions, calculate engagement metrics and identify top influencers based on their impact and reach. (CO6)

(c) A retail company wants to analyze customer purchase patterns to optimize its inventory management and predict demand. Compare and contrast Apache Hive and Apache Spark SQL as tools for big data analysis in this scenario, considering factors such as performance, scalability, ease of use and support for complex queries. (CO6)

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TCS–651

B. TECH. (CSE) (SIXTH SEMESTER)
END SEMESTER EXAMINATION, June, 2023

DEVOPS ON CLOUD

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) In terms of development and infrastructure, mention the core operations of DevOps. (CO1, CO3)

   (b) What distinguishes the DevOps methodology from the agile methodology ? (CO1, CO3)

   (c) Describe the use of Source code management system. What are the benefits of using version control ? (CO1, CO3)

2. (a) Explain Audit Trail and the advantages of using Audit Trail plugin in Jenkins. (CO1, CO2, CO3)

   (b) What are the benefits of Automation Testing ? (CO1, CO2, CO3)

   (c) What are the advantages of DevOps regarding Technical aspects ? (CO1, CO2, CO3)

P. T. O.

3. (a) Explain the advantages of scheduling in Jenkins and write down the steps for configuring Poll SCM in Jenkins. (CO1, CO2, CO3)

   (b) Differentiate between Continuous Deployment and Continuous Delivery. (CO1, CO2, CO3)

   (c) Write down the advantages and disadvantages of using selenium, as well as write a code (in any programming language) which can open the link 'https ://www.google.com/' and type 'DevOps' in the search field. (CO1, CO2, CO3)

4. (a) What are Microservices ? Differentiate between virtualization and containerization. (CO2, CO4, CO6)

   (b) Differentiate between type 1 and type 2 hypervisor and write down the prerequisite of installing docker in windows system. (CO2, CO4, CO6)

   (c) Can you state and explain the key elements of continuous testing ? (CO2, CO4, CO6)

5. (a) What is the difference between orchestration and classic automation ? What are some common orchestration solutions ? (CO3, CO5, CO6)

   (b) How is Docker different from other container technologies ? (CO3, CO5, CO6)

   (c) What is Docker image ? How would you write the syntax for the creation of a docker image ? (CO3, CO5, CO6)

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TCS–671

B. TECH. (CSE) (SIXTH SEMESTER)
END SEMESTER EXAMINATION, June, 2023

BIG DATA STORAGE AND PROCESSING

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) Imagine you are a social media analyst. Describe a scenario where analyzing Big Data can help identify trends, sentiments and user behavior to develop targeted marketing campaigns. (CO1)

(b) Suppose you work for a transportation company. Analyze the challenges faced in managing and analyzing the vast amount of data collected from GPS devices installed in the fleet vehicles. (CO1)

(c) Design a data analysis strategy for a financial institution that aims to detect fraudulent activities in real-time using Big Data techniques. Outline the steps involved and the necessary technologies. (CO1)

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2. (a) In an energy company, describe a scenario where HDFS can be used to store and process smart meter data to optimize energy consumption and detect anomalies. (CO2)

   (b) Suppose you are a data scientist working for a healthcare provider. Analyze the limitations of HDFS in handling sensitive patient data and propose strategies to ensure data privacy and security. (CO2)

   (c) Evaluate the suitability of HDFS for a media streaming platform that needs to process and distribute large video files. Consider factors such as data locality, fault tolerance and scalability. (CO3)

3. (a) In an e-commerce company, describe a scenario where Hadoop I/O techniques, such as Avro serizliation and file compression, can be applied to optimize the storage and analysis of customer transaction data. (CO3)

   (b) Analyze the role of MapReduce in processing log data generated by web servers to extract valuable insights, such as user behavior patterns and website performance metrics. (CO3)

   (c) Design a MapReduce job to analyze customer purchasing patterns in a retail business. Specify the input data format, the map and reduce functions and the expected output format. (CO3)

4. (a) You are a system administrator responsible for setting up a Hadoop cluster for a research institution. Describe the key steps involved in installing and configuring a distributed Hadoop environment. (CO4)

   (b) Compare and contrast the advantages and disadvantages of standalone, pseudo-distributed and fully distributed Hadoop cluster configurations. Analyze the use cases where each configuration is most suitable. (CO4)

(c) Evaluate the performance and scalability of a distributed Hadoop cluster in processing large-scale data compared to a standalone setup. Consider factors such as data locality, parallel processing and resource utilization. (CO5)

5. (a) Suppose you are a data engineer working for a gaming company. Explain how a NoSQL database, like Cassandra, can be used to store and analyze user gameplay data for personalized gaming experiences. (CO5)

(b) Analyze the architecture of HBase and its suitability for storing and retrieving time-series data, such as stock market tick data or IoT sensor readings. (CO6)

(c) Design a schema for a NoSQL database to store and query sensor data from a smart city infrastructure. Consider the data model, indexing strategy and the ability to handle high write and read loads. (CO6)

Roll No. .....

TCS–691

B. TECH. (CSE) (SIXTH SEMESTER)

END SEMESTER EXAMINATION, June, 2023

IMAGE PROCESSING AND COMPUTER VISION

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) What is the purpose of image acquisition and filtering in image processing and computer vision ? Provide an example of an imaging device used in this process. Also Provide an example of an application of image filtering. (CO1, CO2)

(b) How contrast enhancement works in image processing ? Which method is effectively works for contrast enhancement in between histogram equalization and contrast stretching ? Explain and justify your answer ? (CO1, CO2)

(c) How image subtraction and image averaging are used to enhance the image ? Explain with a suitable example. (CO1, CO2)

P. T. O.

2. (a) Draw the model of Image degradation/Restoration process. How image restoration algorithms can utilized in wavelet domain ? (CO2, CO3)

   (b) Explain how preprocessing techniques, such as noise reduction filters, can be applied before image segmentation to mitigate the impact of noise. Provide an example of a specific noise reduction method and demonstrate its effect on the quality of segmented images. (CO2, CO3)

   (c) Explain the process of CT image reconstruction. Discuss the steps involved, including data acquisition, back projection, and filtering, to reconstruct a high-quality CT image. (CO2, CO3)

3. (a) Explain the concept of thresholding in image segmentation. Discuss different thresholding techniques, such as global thresholding and Otsu's thresholding, and their applications in segmenting images based on intensity or color information. (CO3, CO4)

   (b) Discuss the limitations or potential challenges associated with using spatial filtering for image smoothness. Explain situations where spatial filtering may lead to an desired artifacts or loss of important details. Provide examples and techniques to overcome these challenges. (CO3, CO4)

   (c) Describe the process by calculating second-order derivatives for the given data : 15 0 15 7 2 2 0 21 12 17. Show the step-by-step calculations and provide the resulting values. (CO3, CO4)

4. (a) If a video contains significant blurriness, what will be the impact on the results of the background subtraction technique ? Provide an

explanation and demonstrate the potential consequences using a hypothetical video scenario. Justify your answer with a suitable example. (CO4, CO5)

(b) Design and discuss a framework using deep learning approach to develop automatic activity recognition for traffic management. Also discuss, how can the system detect and analyze activities to optimize signal timings, adapt lane configurations, or control traffic lights to reduce congestion and improve overall traffic efficiency ? (CO4, CO5)

(c) Explain coding system requirement for image compression by determining the Huffman codes for each pixel intensity of below given image Matrix. (CO4, CO5)

$$\begin{bmatrix} 0 & 1 & 1 & 2 \\ 2 & 5 & 5 & 4 \\ 6 & 7 & 6 & 2 \\ 4 & 6 & 5 & 0 \end{bmatrix}.$$

5. (a) Consider a 5 × 5 grayscale image with pixel intensities ranging from 0 to 255, apply k-means clustering with k = 3. Initialize the cluster centers as [50, 100, 150], and provide the final cluster centroids after convergence. (CO5, CO6)

(b) Discuss the significance of the convolutional layer in a Convolutional Neural Network (CNN). How does it contribute to both feature extraction and dimensionality reduction ? (CO5, CO6)

(c) Let A be an input image and B is a structure element as given follows. Perform the Erosion and Dilation operations on input image, and also

discuss what will be the impact on the results after applying Erosion and Dilation. (CO5, CO6)

A =

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

B =

1	0	0
1	1	0
0	0	1

Roll No. .....

TCS–693

B. TECH. (CSE) (SIXTH SEMESTER)
END SEMESTER EXAMINATION, June, 2023

FULL STACK WEB DEVELOPMENT

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) Write the PHP script to show, global and static scope of a variable and write PHP script to sort the given associative array in descending order according to key. (CO1, CO2)

(b) Write JavaScript to validate the following fields of the above registration page : (CO1, CO2)

(i) Name (Name should contains alphabets and the length should not be less than 6 characters).

(ii) Password (Password should not be less, than 6 characters length).

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(iii) E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com) Phone number (Phone number should contain 10 digits only).

(c) Create an HTML table with data about books and use CSS to style the table with alternating row colors and a fixed header row. (CO1, CO2)

2. (a) Write PHP script to implement super global variable $_GET, $_POST and $_REQUEST in PHP form handling. (CO2, CO3)

(b) Write code to create an HTML page to explain input and output using a calculator with the use of various predefined functions and objects in JavaScript. (CO2, CO3)

(c) Write a PHP program to demonstrate the variable function gettype(), settype(), isset() and unset(). (CO2, CO3)

3. (a) Write a PHP program to upload image to the server using HTML and PHP. (CO3, CO4)

(b) Write a PHP program to implement explode(), implode, compact and extract(). (CO3, CO4)

(c) Use CSS to create a grid of images with a hover effect that enlarges the images and displays a caption. (CO3, CO4)

4. (a) Write a PHP program to upload registration form into database and write a PHP program to display the registration form from the database. (CO4, CO5)

(b) Write a JavaScript function that takes an array of numbers as an argument and returns the sum of all the even numbers in the array.

(CO4, CO5)

(c) Write a PHP program for creating and manipulating : (CO4, CO5)

(i) Indexed array

(ii) Associative array

(iii) Multidimensional array

5. (a) Write simple PHP program to : (CO5)

(i) Set cookies and read it

(ii) Demonstrate session management

(b) Write a JavaScript function that takes an array of numbers as input and returns a new array with the numbers sorted in descending order.

(CO5)

(c) Write a Java-Script to create a button that, when clicked displays an alert with random no generated between 1 and 10. (CO5)