Roll No. .....

TCS–501

B. TECH. (CSE) (FIFTH SEMESTER)

END SEMESTER EXAMINATION, Dec., 2022

SYSTEM SOFTWARE

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) Explain the instruction formats and addressing modes of SIC/XE machine architecture. (CO1)

(b) What is system software ? Explain different types of system software. Distinguish the system software with an application software. (CO1)

(c) Explain the following machine dependent features of SIC assembler : (CO1)

(i) Symbol defining statement

(ii) Control Section

2. (a) With an algorithm, explain pass-1 of a 2-pass assembler. (CO2)

P. T. O.

(b) What is relocation ? Illustrate how a modification record is used in relocation of program. (CO2)

(c) Generate the object codes for the following source program : (CO2)

WRREC	START	105D
	CLEAR	X
	LDT	LENGTH
WLOOP	TD	OUTPUT
	JEQ	WLOOP
	LDCH	BUFFER, X
	WD	OUTPUT
	TIXR	T
	JLT	WLOOP
	RSUB	
OUTPUT	BYTE	X '05'
BUFFER	RESB	400
LENGTH	RESB	2
	END	WRREC

MNEMONICS :

CLEAR = B4, LDT = 74, TD = E0, JEQ = 30, LDCH = 50, WD = DC, TIXR = B8, JLT = 38, RSUB = 4C, X = 1, T = 5.

3. (a) Consider the following fragment of SIC program. Apply the load and go assembler and write the values in the memory as shown follows in the place of '?'. Show the symbol table for this program fragment. (OPCODES are given corresponding to mnemonics in the program) :

(CO3, CO6)

End2	START	1000
EOF	BYTE	C'EOF'
THREE	WORD	3
ZERO	WORD	0
RETADR	RESW	1
LENGTH	RESW	1
BUFFER	RESB	4096
FIRST	STL (14)	RETADR
CLOOP	JSUB (48)	REDREC
	LDA (00)	LENGTH
	COMP (28)	ZERO
	JEQ (30)	ENDFIL
	JSUB (48)	WRRREC

	J(3C)	CLOOP
ENDFIL	LDA(00)	EOF
	STA(0C)	BUFFER
	LDA (00)	THREE
	STA (0C)	LENGTH
	JSUB (48)	WRREC
	LDL (08)	RETADR
	RSUB (4C)	
INPUT	BYTE	X'F1'
MAXLEN	WORD	4096
RDREC	LDX (04)	ZERO
	LDA (00)	ZERO
RLOOP	TD(E0)	INPUT
	JEQ (30)	RLOOP
	RD (D8)	INPUT
	COMP (28)	ZERO
	JEQ (30)	EXIT
	STCH (54)	BUFFER, X

Memory :

Memory Address	CONTENTS			
1000	454F4600	00030000	00xxxxx	xxxxxxxx
1010	XXXXXXXX	XXXXXXXX	XXXXXXXX	XXXXXXXX
–	–	–	–	–
–	–	–	–	–
2000	XXXXXXXX	XXXXXXXX	XXXXXXXX	XXXXXXXX
2010	10094820	?	?	202448--
2020	?	?	100F0010	?
2030	48------08	10094C00	?	?
2040	001006E0	20393020	43D82039	?
2050	?	0FXXXXXX	XXXXXXXX	XXXXXXXX

(b) How could an assembler that allows external references avoid the need for an EXTDEF statement ? What would be the advantages and disadvantages of doing this ? (CO3, CO6)

(c) With a neat diagram, explain the structure of a text editor. (CO3, CO6)

4. (a) Briefly explain the machine-independent macro-processor features. (CO4)

(b) Explain the various data structures used in the implementation of a macro-processor. (CO4)

(c) For the following macro definition, expand the macro call statements called in sequence : (CO4)

(i) RDBUFF F1, BUFA, RLEN, 04, 1024

(ii) RDBUFF F2, BUFB, RLNG

RDBUFF	MACRO	&INDEV	&BUFADER, &RECLTH, &EOR, &MAXLTH
		IF	(&EOR NE ‘’)
	&EORCR	SET	1
		ENDIF	
		CLEAR	X
		CLEAR	A
		IF	(&EORCR EQ1)
		LDCH	= X ‘&EOR’
		RMO	A, S
		ENDIF	
		IF	(&MAXLTH EQ ‘’)
		+LDT	#4096
		ELSE	
		+LDT	#&MAXLTH
		ENDIF	

	$LOOP	TD	= X '&INDEV'
		JEQ	$LOOP
		RD	=X '&INDEV'
		STCH	&BUFADR, X
		TIXR	T
		JLT	$LOOP
		STX	&RECLTH
		MEND	

5. (a) Write the structure of a LEX program with an example. Explain parser-lexer communication. (CO5)

(b) Write a YACC program to evaluate an arithmetic expression involving operators +, –, *, /. (CO5)

(c) Explain shift/reduce parsing with an example. (CO5)

970

20.12-2022

Roll No. .....

TCS–502

B. TECH. (CSE/IT) (FIFTH SEMESTER)
END SEMESTER EXAMINATION, Dec., 2022

OPERATING SYSTEMS

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) Suppose you try to enforce mutual exclusion as follows :

Process 1 :	Process 2 :

while (true) {
while (p2_in_crit_sect==true)
;/* do nothing */
p1_in_crit_sect = true;
...critical section...
p1_in_crit_sect = false;
}
	while (true) {
	while (p1_in_crit_sect==true)
	;/* do nothing */
	p2_in_crit_sect = true;
	...critical section...
	p2_in_crit_sect = false;
	}

Does this code always enforce mutual exclusion ? Justify your answer.

P. T. O.

(b) A sequential file is stored in a disk occupying 100 contiguous disk blocks. The disk has an average rotational day of 2.5 ms. The time taken to seek the head of the drive the required cylinder is 25 cm and the time taken to read a block is 0.25 ms. Find the minimum, maximum and average time to search for a record using a linear search process.

(c) At an instant, the resource allocation state in a system is as follows :

4 processes P1-P4

4 resource types : R1-R4

R1 (6 instances), R2 (4 instances), R3 (3 instances), R4 (3 instances)

Snapshot at time T0 :

	Allocation				Request			
	R1	R2	R3	R4	R1	R2	R3	R4
P1	1	1	0	0	5	1	3	2
P2	2	1	1	1	2	1	0	2
P3	0	0	2	1	2	0	0	1
P4	1	1	0	0	5	2	3	3

Run the deadlock detection algorithm and test whether the system is deadlocked or not. If it is, identify the processes that are deadlocked.

2. (a) What is a race condition in critical section ? Explain how a critical section avoids this condition. Explain all conditions that satisfy the solution to critical problem.

(b) The GEU memory architecture design team has a dilemma. The team is considering several different memory configuration variations for an upcoming machine design. Consider the following designs (All memory accesses are in terms of bytes, and all are using paging techniques) :

Characteristic	Design 1	Design 2
Physical Memory Address Width	10 bits	24 bits
Logical Address Width	16 bits	24 bits
Page/Frame size in bytes	8 bytes	16 bytes
Page Table Type	Singe	Double

- For each design, list the maximum number of pages each process can access in logical address space.
- For each design, list the maximum number of frames in physical memory..
- Comment on which design is better in terms of les fragmentation with suitable example.

(c) Consider the following table :

Process	Arrival Time	Burst Time	Priority
1	01	10	3
2	03	07	2
3	04	04	4
4	02	09	1

For each of the following scheduling algorithms, determine the waiting time and turnaround time for each process along with CPU utilization for all jobs :

- Shortest remaining time first (SJFS)
- Priority scheduling (with preemption considering lower the number higher the priority).

3. (a) What is the difference between process and threads ? Explain different types of threads with their advantages and disadvantages.

(b) How many page-faults would occur for the following reference string, for three page frame using LRU and Optimal algorithms :

1, 2, 3, 4, 5, 5, 3, 4, 6, 7, 8, 7, 3, 9, 7, 6, 4, 5, 4, 5, 4, 2

(c) Consider the following snapshot of system :

Process	Allocation				Max			
	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2
P1	1	0	0	0	1	7	5	0
P2	1	3	5	4	2	3	5	6
P3	0	6	3	2	0	6	5	2
P4	0	0	1	4	0	6	5	6

Let the available number of resources be given AVAIL vector as (1, 5, 2, 0). Use Bankers algorithm and answer following :

- What is the "Need Matrix" ?
- Determine whether system is in safe state or not ?

4. (a) What is the cause of thrashing ? How does the system detect thrashing ? Once it detects thrashing, what can the system do to eliminate this problem ?

(b) Consider a memory management system that uses simple paging strategy and employs registers to speed up page lookups. The associative registers have a lookup performance of 50 ns and a hit ratio of 90%. The main-memory-page-table lookup takes 750 ns. Compute the effective memory access time.

(c) A certain moving arm disk storage, with one head, has the following specifications :

- Number of tracks/recording surface = 200
- Disk rotation speed = 2400 rpm
- Track storage capacity = 62,500 bits

Find the average latency of this device is P ms and the data transfer rate is Q bits/sec.

5. (a) Draw and explain seven state diagram of process life cycle. Also list the schedulers used at various transitions with their purposes.

(b) Suppose that a disk drive has 6000 cylinders, numbered 0 to 5999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests, in-order is : 86, 1470, 1913, 1774, 948, 1509, 1022, 1750, 130, 92, 10, 121

Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests, for each of the following disk-scheduling algorithms ?

- C-SCAN
- LOOK

(c) Given below the set of reference string, find the number of frames to be allotted to a process P using working set window algorithm considering window size and working set is 4.

Ref String : 1, 2, 3, 1, 2, 3, 1, 2, 4, 1, 4, 2, 1, 5, 1, 2, 4, 2, 1, 4, 3, 2, 5, 3, 2, 3

Roll No. .....

TCS–503

B. TECH. (CSE) (FIFTH SEMESTER)

END SEMESTER EXAMINATION, Dec., 2022

DATABASE MANAGEMENT SYSTEMS

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 main characteristics of database approach and show how it's different from traditional database system with suitable example. (CO1)

(b) What is the role of weak entity in E-R diagram ? Also explain how weak entity is converted into strong entity. Explain with an example. (CO1)

(c) Explain roles of DBA. Also show how DBA can assign the privileges to multiple users. Explain with a suitable example. (CO1)

P. T. O.

2. (a) Differentiate between Primary key, Candidate key and Super key. Also Consider the following relation R (A, B, C, D, E) having FDs

$D \rightarrow C$, $CE \rightarrow A$, $D \rightarrow A$, $AE \rightarrow D$

Find the all possible candidate keys. (CO2)

(b) Explain how evaluation engine evaluates SQL query, along with diagram display all the steps, and show execution plan for any query. (CO2)

(c) Draw and E-R diagram for Admission Management System in Graphic Era University by considering all constraints such as participants, cardinality ratio, and so on. Take assumptions as per your requirement. Your ER diagram must capture maximum constraints information. (CO2, CO3)

3. (a) What is the importance of JOIN in database management ? How should data be structured to support JOIN Operations in a one-to-many relationship ? Explain JOIN operations with suitable examples. (CO3)

(b) Consider the below schema and solve the below SQL queries.

Customer (Cust id, cust_name)

Product (Product_id, Product _name, price)

Sale(bill_no, bill_data, cust_id, Product_id, qty_sold)

(i) Create the tables with the appropriate integrity constraints.

(ii) List all the bills for the current date with the customer names and Product numbers.

(iii) List the total Bill details with the quantity sold, price of the product and the final amount

(iv) List the details of the customer who have bought a product which has a price > 20

(v) Give a count of how many products have been bought by each customer. (CO3, CO4)

(c) Consider the following schema :

Suppliers(sid : integer, sname : string, address : string)

Parts(pid : integer, pname : string, color : string)

Catalog(sid : integer, pid : integer, cost : real)

Write the following queries in relational algebra :

(i) Find the names of suppliers who supply some red part.

(ii) Find the sids of suppliers who supply some red or green part.

(iii) Find the sids of suppliers who supply some red part or are at 221 Packer Street.

(iv) Find the sids of suppliers who supply some red part and some green part.

(v) Find the sids of suppliers who supply every part. (CO3, CO4)

4. (a) What is Normalization ? Explain properties of 3NF and BCNF and check the following and find the relation R is in which normal form. Show each and every step. (CO5)

R (V, W, X, Y, Z)

F : {X -> YV, Y -> Z, Z -> Y, VW -> X}

(b) Find the minimal cover or irreducible set for relation R = {A, B, C, D, E, F, G, H} from the following functional dependencies : (CO4, CO5)

$F = \{AC \rightarrow G, D \rightarrow EG, BC \rightarrow D, CG \rightarrow BD, ACD \rightarrow B, CE \rightarrow AG\}$

(c) Consider the Relation R = (A, C, D, E, H) and the below F1 and F2 are the functional dependency sets.

F1 = {A -> C, AC -> D, E -> AD, E -> H},

F2 = {A -> CD, E ->AH}

Check whether F1 and F2 are equivalent or not ? Show each and every step. (CO4, CO5)

5. (a) Discuss the problems of deadlock and starvation, and how these problems can be resolved using the wait-die and would-n-wait protocols. (CO5, CO6)

(b) How does two-phase locking protocol ensures conflict serializability to solve the real time transaction systems problem ? Explain with a suitable example. (CO5, CO6)

(c) Explain utilization of ACID properties in transaction management system, what if your database fails how you will recover it with the help of immediate database modification technique, explain in both single-user and multi-user environments. (CO5, CO6)

970

Roll No. .....

TCS–509

B. TECH. (CSE) (FIFTH SEMESTER)

END SEMESTER EXAMINATION, Dec., 2022

MACHINE LEARNING

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) Explain supervised and unsupervised learning algorithm using some examples. Is clustering considered an unsupervised learning ? Justify. (CO1, CO3)

(b) Write short notes on the following : (CO1, CO3)

(i) K-fold cross validation

(ii) ID3 algorithm

(iii) Reinforcement learning

(c) What is support vector machine ? How do you compute the margin between support vectors ? (CO1, CO3)

P. T. O.

2. (a) The value of independent variable X and dependent value of Y are given below :

X	Y
1	3
2	4
3	6
4	5
5	7

Find the least square regression line $y = ax + b$. Estimate the value of y when x is 7. (CO3, CO4)

(b) What is neural network ? Write the algorithm of back propagation. (CO3, CO4)

(c) Describe bagging and boosting ensemble learning with example. What is random forest ? Random forest is an example of which ensemble learning ? (CO3, CO4)

3. (a) For the given set of points identify cluster using single (min) linkage agglomerative clustering : (CO2, CO3)

Objects	X	Y
P1	1	4
P2	2	8
P3	5	10
P4	12	18
P5	14	28

(b) Why do we need to association rule learning in Machine Learning ? Explain the following with examples : (CO2, CO3)

(i) Support

(ii) Confidence

(iii) Lift

(c) Explain the Apriori algorithm to find the frequent item set. Consider the dataset shown in table below where min support is 2. Apply Apriori algorithm on the following dataset to find frequent item set : (CO2, CO3)

Transaction ID	Item Bought
1	{a, d, e}
2	{a, b, c, e}
3	{a, b, d, e}
4	{a, c, d, e}
5	{b, c, e}
6	{b, d, e}
7	{c, d}
8	{a, b, c}
9	{a, d, e}
10	{a, b, e}

4. (a) Consider the following training set having three different attributes namely X1, X2, X3 : (CO3, CO4)

X1	X2	X3	Class
–1	1	1	Negative
5	1	0	Positive
0	2	1	Negative
–4	–1	0	Negative
0	0	1	Positive
9	2	1	Positive
2	2	0	Negative

Using the K-nearest algorithm (kNN) algorithm with K = 3, classify the following points :

(i) (1, 1, 2)

(ii) (2, 1, 1)

(iii) (0, 0, 0)

(b) Explain K-means algorithm. What is silhouette analysis and how is it performed ? (CO3, CO4)

(c) Explain Principal Component Analysis (PCA). Consider the two-dimensional pattern (1, 1), (1, 2), (4, 4), (5, 5). Use the PCA to transform the pattern (4, 4). (CO3, CO4)

5. (a) What is do you mean by Convolution Neural Network ? Why do we prefer convolution neural networks over artificial neural network for image data as input ? (CO5, CO6)

(b) Explain the learning of word embedding using Word2Vec model with the help of block diagram. Write an algorithm to answer analogies using word vectors. (CO5, CO6)

(c) Write the short notes on the following deep learning tools : (CO5, CO6)

(i) TensorFlow

(ii) PyTorch

(iii) Keras

Roll No. .....

TCS–521

B. TECH. (FIFTH SEMESTER)

END SEMESTER EXAMINATION, Dec., 2022

USER INTERFACE 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) Define User Interface. Explain its two essential components. Describe the various factors of user interface design that needs to be considered by human computer interaction designs. (CO1)

(b) List and explain the characteristics of graphical user interface. (CO1)

(c) What are the four basic operations of CRUD ? How are CRUD operations performed in MongoDB ? (CO2)

2. (a) List the difference diversities that challenge the interactive system designers. (CO1)

P. T. O.

(b) List some software tools useful for user interface design. What is the command used to import external libraries NodeJS ? (CO4)

(c) What are the advantages of NOSQL. What is the difference between NOSQL and RDBMS ? (CO3)

3. (a) Explain the four pillars of design with neat diagram. (CO1)

(b) Explain with example the different between JSON format and XML format. (CO4)

(c) What is Node.js ? Where can you use it ? How does Node.js work ? (CO3)

4. (a) Explain the principles of wed user interface design. (CO2)

(b) What are ACID and BASIC property of RDBMS and NOSQL ? (CO4)

(c) Define, compare and use the four types of NoSQL Databases (Document oriented, Key Value Column-oriented and Graph). (CO3)

5. (a) Write short note on Legal Issues of user interface. How human diversity affects the user interface design process ? (CO6)

(b) Explain different stages of software development methodology. (CO6)

(c) How does a collection differ from a table in MongoDB ? What are the modules in Node.js ? (CO5)

Roll No. .....

TCS–523

B. TECH. (CSE) (FIFTH SEMESTER)

END SEMESTER EXAMINATION, Dec., 2022

BIG DATA AND MACHINE LEARNING USING PYTHON

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) List and explain perspectives and issues in Machine Learning. (CO1, CO3)

(b) Distinguish between overfitting and underfitting. How can it affect model generalization ? (CO1, CO3)

(c) What are the different methods for measuring classifier performance ? (CO1, CO3)

2. (a) Explain Ensemble Learning and its types. (CO3, CO4)

P. T. O.

(b) What is a decision tree and discuss the use of decision tree for classification purpose with an example. (CO3, CO4)

(c) Use the K-means algorithm and Euclidean distance to cluster the following example into 2 clusters : (CO3, CO4)

Height	Weight
185	72
170	56
168	60
179	68
182	72
188	77
180	71
180	70
183	84
180	88
180	67
177	76

3. (a) Explain Naïve Bayes Classifier with an example. (CO2, CO3)

(b) Compare K-means clustering with Hierarchical Clustering Techniques. (CO2, CO3)

(c) Explain the Eclat Algorithm to find the item set. Consider the dataset shown in table below where min support is 50%. Apply Eclat Algorithm on the following dataset to find item sets. (CO2, CO3)

Transaction ID	Item Set
T1	1, 2, 5
T2	2, 4
T3	2, 3
T4	1, 2, 4
T5	1, 3
T6	2, 3
T7	1, 3
T8	1, 2, 3, 5
T9	1, 2, 3

4. (a) What is deep learning ? Explain its uses, application, and history. (CO3, CO4)

(b) Explain PCA and its process with their applications. (CO3, CO4)

(c) Describe the concept on density-based clustering (DBSCAN). (CO3, CO4)

5. (a) What is Big Data ? Write down the characteristics of Big Data Applications. (CO5, CO6)

(b) Explain in detail about Nature of Data and its applications. (CO5, CO6)

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

1. HDFS
2. MapReduce
3. YARN

60

Roll No. .....

TCS–527

B. TECH. (FIFTH SEMESTER)

END SEMESTER EXAMINATION, Dec., 2022

APPLIED MACHINE LEARNING

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) Explain the difference between supervised and unsupervised learning by taking suitable example. (CO1)

(b) Differentiate between feature selection and feature extraction. What is the situation in which feature selection becomes an expensive task ? (CO1)

(c) Apply PCA (Principal Component Analysis) algorithm to reduce the following 2-dimensional data to 1-dimension : (CO1)

P1 (1, 3), P (5, 2), P3 (5, 5), P4 (1, 2)

P. T. O.

2. (a) Differentiate between the following : (CO2)

   (i) Precision and Recall

   (ii) Sensitivity and Specificity

   (b) Calculate MAE (Mean Absolute Error), MSE (Mean Squared Error) and R-Squared error for the given set of observations : (CO2)

X	Y	Expected Output	Actual Output
1	1	5	4
3	2	12	15
5	1	13	16
3	1	9	11
2	3	13	7

   (c) Differentiate between overfitting and underfitting. Which algorithms suffer from overfitting and how it can be overcome ? (CO2)

3. (a) Which machine learning algorithm is known as Lazy Learner ? Explain K-nearest neighbour classification algorithm using a suitable example. (CO3)

   (b) Explain the steps required and termination criteria in any classification algorithm using a suitable example. (CO3)

   (c) Explain decision tree classification algorithm. Illustrate "information gain" and "gain ratio" which can be used as splitting criteria. (CO3)

4. (a) Apply K-mean clustering (use Euclidean distance) on the following data, where number of clusters is 2 : (CO4)

   (1, 2), (2, 1), (3, 3), (7, 9), (6, 8), (9, 9), (3, 4)

(b) Use Hierarchical clustering (single link technique with Euclidean distance) on the following data : (CO4)

A (1, 1), B (6, 7), C (8, 5), D (2, 3), E (5, 8)

Also, draw the dendogram for the same.

(c) Explain DBSCAN clustering algorithm and why it is considered to be a good algorithm for handling the outliers. (CO4)

5. (a) Why is data visualization important in any machine learning project ? Explain by considering a scenario where "insurance taken/not taken" is to be predicted on the basis of "age" and "annual income" of an employee. (CO5, CO6)

(b) Differentiate between histogram and line chart by taking a suitable example. Calculate mean, median and mode for the given set of data values : (CO5, CO6)

550 cm, 450 cm, 160 cm, 450 cm, 300 cm and 220 cm.

(c) Explain any *five* Python machine learning /deep learning libraries along with their usage and *two* methods. (CO5, CO6)

110

Roll No. .....

TCS–549

B. TECH. (CSE) (FIFTH SEMESTER)

END SEMESTER EXAMINATION, Dec., 2022

DATA SCIENCE VISUALIZATION WITH TABLEAU SPECIALIZATION

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) Grafana is the provider of an open-source data visualization platform. Visualizations include heat maps, histograms, graphs, and geo-maps. Supports multiple databases including InfluxDB and Cloudwatch among others. It provides APIs and libraries for accessing different types of dashboards. Explore the eight hats of data visualization design from the perspective of Grafana. (CO1)

(b) Devo is a provider of visual data analytics platforms for enterprises. It provides real-time analytics and insight for IT operations, security

P. T. O.

analytics, business analytics, customer insight, and log management. It allows users to collect real-time streaming data captured from applications, infrastructure, IoT devices, logs, and historical data sources. The platform can build correlations, generate reports and visualize data in the form of charts or graphs, and analyze trends in the data. Apply the emerging technologies to design a framework for Devo and justify the role of visualization in that framework. (CO1)

(c) Arcadia Data builds unified visual analytics and a BI platform for big data. The Arcadia Converged analytics platform unifies visual exploration and back-end data analytics in one integrated enterprise platform that runs natively on a Hadoop cluster. It converges the visual, analytics, and data layers to provide accelerated access to all of the data stored in Hadoop, and support net-new analytics on granular datasets. Recommend the methodology for analyzing data to prepare for interactives. (CO1)

2. (a) Abeja provides business analytics solutions for multiple industries. It enables businesses with image recognition and machine learning technologies for object tracking, face detection, and attribution analysis. Design the methodology for data visualization of Abeja. (CO1)

(b) UberMedia is a cross-screen mobile audience platform that leverages social signals, interests, and location history that enables advertisers to reach consumers when they are most receptive. Its cross-screen mobile advertising platform (Uberads) uses social signals and location history for user-intent-based ad targeting. Design visualizations that represent the relationships contained in complex data sets and adapt them to highlight the ideas you want to communicate. (CO2)

(c) Katana Graph is an Al-based graphical storage engine software solution provider. The features of the solution are graph processing & analytics, graph analytics, graph processing, etc. It also provides program tools for massive-scale data, graph pattern mining, unstructured data, etc. Analysis of the importance of Editorial Focus in the perspective of Katana Graph. (CO2)

3. (a) Smart healthcare is a health service system that uses technology such as wearable devices, IoT, and mobile internet to dynamically access information, connect people, materials, and institutions related to healthcare, and then actively manage and intelligently respond to medical ecosystem needs. Choose the optimal Graph/Chart to visualize the health condition of each patient and justify the reason to choose. (CO3)

(b) Seequent Develops provides data visualization software for the earth and geological data. The software product of the company has use cases in multiple applications including road and rail tunnel construction, groundwater detection and management, geothermal exploration, resource evaluation, and subterranean storage of spent nuclear fuel. Refine the editorial focus of the visualization tool from the perspective of Sequent Develops. (CO3)

(c) CodeCoda is an innovative global IT and BPO services, solutions, and provider, in one of the fastest-growing industries worldwide. It was founded by IT Veterans to provide a stable way of working for themselves and being true to their understanding of true customer dedication and technical excellence. Identify the Charts/Graphs/Maps that are useful to visualize for CodeCoda. (CO3)

4. (a) SPEC INDIA is an ISO/JEC 27001 : 2013 company with 30+ years of established experience. It specializes in Custom Software Development, Web & Mobile App Development, BI & Analytics Solutions, Automation & Security Testing, Legacy Software Migration, Product Engineering, and IoT Solutions. Identify the statistical analysis needed to validate the trends present in data visualizations. (CO4)

(b) Facebook analytics are the data and tools you need to track your brand's performance on the world's most popular social network. Design a methodology for social data analysis. (CO5)

(c) CapTech is a national IT management consulting firm that will change the way you look at technology and data. It bridges the gap between business and technology for some of the world's most successful companies. It delivers Transformation, Customer Engagement, Data & Analytics, and Custom IT solutions for America's leading Fortune 500 and government agencies. CapTech can use Tableau, Microsoft Power BI, WEKA, or Excel to analyze the data. Compare and contrast all these data visualization tools from the perspective of CapTech. (CO5)

5. (a) QBurst is an app solutions and consulting company that develops web and mobile applications. QBurst has 850+ employees comprising mobile app developers, designers, UX engineers, quality assurance specialists, business analysts, and project management professionals. It has built its expertise in mobile application development over 10 years. QBurst is uploading the user data to an online platform and analysis with Tableau. Evaluate the dimensions and measures of user data.

(CO5)

(b) Broscorp's agile team of skilled professionals can build custom software that increases productivity and help businesses to grow. It gathered professionals with diverse skill sets who deliver great results that outperform the expectations of customers. Critically evaluate visualizations from the perspective of Broscorp and suggest improvements and refinements in visualization. (CO6)

(c) N-iX is a European software development service company that helps businesses across the globe expand their engineering capabilities and develop successful software products. Founded in 2002, N-iX has come a long way and increased its presence in six countries spanning Europe and the US. Use leading open-source arid commercial software packages (Tableau) to create and publish visualizations that enable clear interpretations of big, complex, and real-world data. (CO6)

60

Roll No. .....

TCS–552

B. TECH. (FIFTH SEMESTER)

END SEMESTER EXAMINATION, Dec., 2022

CLOUD BASED APPLICATION DEVELOPMENT AND MANAGEMENT

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) Midtrans and AWS collaborate to develop Pojok Usaha—a centralized online portal featuring over 30 products and services—to drive digital transformation for Indonesian SMBs and simplify application and procurement of cloud services. Midtrans provides an e-payment gateway platform used by more than 500,000 businesses. Evaluate Data Intensive Computing with suitable case study of above-mentioned organization. (CO1)

P. T. O.

(b) Content analytics provider smartocto accelerated its time to market and deployed a predictive editorial analytics solution, Smartify in less than 3 months by using Amazon SageMaker. Evaluate Grid Computing with suitable case study of above-mentioned organization. (CO1)

(c) BNS Group reduced infrastructure costs by 50 percent and gained access to the AWS ISV sales and client network by migrating to AWS. BNS Group is an Australian ISV offering enterprise SMS and fax server solutions to public and private sector clients. Evaluate Client-Server Computing with suitable case study of above-mentioned organization. (CO1)

2. (a) Lyell Immunopharma is automating GxP compliance for its environments and applications with Rapid Q, an automated validation solution built on AWS. Evaluate Amazon Web Compute Services with suitable challenges of above-mentioned organization. (CO2)

(b) Sterling Auxiliaries is an international manufacturer of surfactants and industrial chemicals based in India. To meet its go-live timeline and improve system performance, the company upgraded its on-premises SAP R/3 system to SAP S/4HANA on AWS. Evaluate Google App Engine Cost Model deploy possibility with suitable case study of above mentioned organization. (CO2)

(c) India-based ALTBalaji is a subscription-based video on demand (SVOD) platform that produces original over-the-top (OTT) media content. To broadcast live streams of its Indian reality show Lock Upp, the company chose to build its live streaming infrastructure on AWS. Evaluate Microsoft Azure Database Services deploy ability with suitable case study of above-mentioned organization. (CO2)

3. (a) Space technology company Axelspace built an event-based, custom data pipeline on AWS, helping it optimize costs, free its development teams from infrastructure maintenance, and deliver data faster. Evaluate Market-Oriented Cloud Computing Services with suitable case study of above mentioned organization. (CO3)

(b) Veolia Australia and New Zealand migrated 34 applications to AWS to improve agility in development and project delivery, while integrating data for higher visibility across the business. Evaluate Cloud Federation Stack services with suitable case study of above-mentioned organization. (CO3)

(c) Technology company Bazaarvoice reduced machine learning inference costs by 82 percent and accelerated content delivery by using the ML capabilities of Amazon SageMaker Serverless Inference. Evaluate Third Party Cloud Services with suitable case study of above-mentioned organization. (CO3)

4. (a) Tokenize Xchange (Tokenize) is a Singapore-based digital exchange platform that facilitates the trading of over 100 cryptocurrencies. Tokenize is fully built and deployed on Amazon Web Services (AWS) and automatically scales storage and compute capacities based on transaction volumes and active concurrent users. Evaluate Multi-tier Application Deployment challenges of above-mentioned organization. (CO4)

(b) Discover how the US Army TATRC worked with Deloitte to create a cloud-based telehealth application that connects patients and clinicians with a push of a button. Evaluate the Cloud Management deployment challenges of above-mentioned organization. (CO4)

(c) HBO Max, Warner Media's direct-to-consumer platform offering best-in-class quality entertainment, uses Amazon Web Services (AWS) to scale. Evaluate Cloud Policy and Governance techniques in above-mentioned organization. (CO4)

5. (a) Baker Hughes migrated its computational fluid dynamics applications to AWS, cutting gas turbine design cycle time, saving 40 percent on HPC costs, and reducing its carbon footprint by 99 percent. Evaluate GitHub Repository challenges in above-mentioned organization. (CO5/CO6)

(b) Learn from travel and hospitality companies including Priceline, Traventia, and Best Western that are using modern contact center solutions built on Amazon Web Services (AWS). Evaluate AWS IoT FleetWise implementation process with suitable case study of above-mentioned organization. (CO5/CO6)

(c) Credit safe migrated on-premises systems to AWS to improve scalability, reliability, and availability. This has eliminated years of technical debt and improved ways of working while eliminating risk. Evaluate Azure Sphere deployment challenges with suitable case study in above-mentioned organization. (CO5/CO6)

100

Roll No. .....

TCS–571

B. TECH. (CSE) (FIFTH SEMESTER)
END SEMESTER EXAMINATION, Dec., 2022

BIG DATA VISUALIZATION

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) Hardcastle is headquartered in New York, with Development Centers in Pune (India) and London. Their primary focus is the agile development of Geospatial, Software Development, Data Analytics and mobile Application. We reduce development risk by offering rapid time-to-market while delivering standards-based software code that can be transitioned to an internal team anytime. Explore the eight hats of data visualization design from the perspective of Hardcastle. (CO1)

(b) Redian Software Global is leading software development company offering cutting-edge solutions for banking, finance, insurance, healthcare, travel, education, and retail. It is delighted to have delivered 500+ successful projects and 300 global clients. Apply the emerging technologies to design a framework for Redian Software Global and justify the role of visualization in that framework. (CO1)

P. T. O.

(c) Since 2011, DICEUS has cooperated with enterprises and technology businesses to deliver high-quality software solutions. For over a decade, we managed to accomplish more than 100 projects and help the customers achieve their goals. Recommend the methodology for analyzing data to prepare for interactives. (CO1)

2. (a) Successive Technologies is next-gen technology consulting services company purpose-built for the speed of modern business. We transform businesses across all touch-points of customer experience with our digital transformation solutions. Design the methodology for data visualization of Successive Technologies. (CO1)

(b) NEX Softsys is a technological partner for global enterprises and startups, with the mission of empowering industries through excellence through integrated IT solutions. Since 2009, we have provided innovative software and data-based solutions to many companies, attending various countries, including the USA, Australia, Asia, Africa and Europe. Design visualizations that represent the relationships contained in complex data sets and adapt them to highlight the ideas you want to communicate. (CO2)

(c) Beyond Key has been providing software services to clients around the world since 2005, including those in the United States, Canada, United Kingdom, Europe, and Australia with over 270+ in-house, Microsoft Certified developers, Quality Assurance Experts, Analyst and visualizers. Analysis of the importance of Editorial Focus in the perspective of Beyond Key. (CO2)

3. (a) Smart healthcare is a health service system that uses technology such as wearable devices, IoT, and mobile internet to dynamically access information, connect people, materials, and institutions related to healthcare, and then actively manage and intelligently respond to medical ecosystem needs. Choose the optimal Graph/Chart to visualize the health condition of each patient and justify the reason to choose. (CO3)

(b) Altar.io is an Award-Winning Product & Software Development Company committed to providing end-to-end IT services in Web, Mobile & Cloud. From inception, UXI/UI design, and development to Software deployment. Altar has successfully helped worldwide entrepreneurs and Business Leaders disrupt their industries. Refine the editorial focus of the visualization tool from the perspective of Altar.io. (CO3)

(c) Intellias is a trusted technology partner to top-tier organizations and digital natives helping them accelerate their pace of sustainable digitalization. For over 20 years Intellias has been building mission-critical projects and delivering measurable outcomes that meet our clients' business needs. Identify the Charts/Graphs/Maps that are useful to visualize for Intellias. (CO3)

4. (a) Fayrix is a specialist software development company that has successfully set the seal on over 250 projects, within the course of the last 12 years. Having onboard a skilled team of engineers numbering over 1,500, the company is headquartered in Israel with 8 R&D centers located in Russia and Eastern Europe. Identify the statistical analysis needed to validate the trends present in data visualizations. (CO4)

(b) Facebook analytics are the data and tools you need to track your brand's performance on the world's most popular social network. Design a methodology for social data analysis. (CO5)

(c) OrbitSoft is a successful high-tech development company with about 20 years of experience. During this time, we created hundreds of different projects for more than 1000 clients all over the world. We provide our clients with a full-cycle development service. OrbitSoft can use Tableau, Microsoft Power BI, WEKA, or Excel to analyze the data. Compare and contrast all these data visualization tools from the perspective of OrbitSoft. (CO5)

5. (a) Aegis Softtech, since 2003, provides information technology, offshore consulting, mobile solutions and outsourcing development services to increase organizations productivity with lower operational costs. Company is flexible in approach and works in a encouraging environment with creative thinking. Aegis Softtech is uploading the user data to an online platform and analysis with Tableau. Evaluate the Dimensions and Measures of user data. (CO5)

(b) ThirdEye Data leverages Artificial Intelligence & Big Data technologies to build AT applications for enterprises worldwide. ThirdEye is a Silicon Valley based one-stop-shop for Data Sciences, Analytics & Engineering services and products. Critically evaluate visualizations from the perspective of ThirdEye Data leverages and suggest improvements and refinements in visualization. (CO6)

(c) DATAFOREST is a Data Engineering and Web Product Development agency focused on data-driven solutions. We apply Data Science and AT techniques combined with expertise in Business Automation, large-scale Data Analysis, and Advanced Software Engineering to improve performance outcomes for organizations and create added value for their customers and shareholders. Use leading open-source and commercial software packages (Tableau) to create and publish visualizations that enable clear interpretations of big, complex, and real-world data. (CO6)

Roll No. .....

TCS–591

B. TECH. (CSE/CE) (FIFTH SEMESTER)

END SEMESTER EXAMINATION, Dec., 2022

COMPUTER 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) Describe following techniques of vulnerability detection and analysis : model checking, fault injection and dynamic taint. (CO3)

(b) Describe following malware programs : (CO3)

Spyware, virus and hardware trojan.

(c) How would you compare reflected and stored cross-site scripting (XSS) attacks ? Write down a few solutions available for XSS attacks. (CO3)

P. T. O.

2. (a) Why secure sockets layer (SSL) is required ? Describe the procedure of SSL record protocol using a figure. (CO5)

(b) Explain the various components of the android architecture ? Write down the differences between android security model and iOS security model. (CO5)

(c) How ransomware attacks can exploit the security of an online system. What are the devastating effects of ransomware attacks ? (CO5)

3. (a) Differentiate between access control and authentication mechanisms. Where the mandatory access control mechanism is applicable ? (CO6)

(b) Describe the various components of the supervisory control and data acquisition (SCADA) systems. Why do we need security in SCADA-based critical infrastructures ? (CO6)

(c) Investigate the procedure of exploitation of heart bleed attack using some programming examples. (CO6)

4. (a) What is fuzzing ? How would you compare the following fuzzing techniques, "mutation-based fuzzer" and "generation-based fuzzer" ? (CO4)

(b) By which methods, the confidentiality and integrity properties can be achieved in a secure communication happening through the transport layer security. (CO4)

(c) Explain the procedure of exploitation of race condition vulnerability using a programming example. How can we prevent this attack ? (CO4)

5. (a) Why do we need encryptions in android-based smartphones. How would you compare the following mechanisms of data encryption in android operating system, "file-based encryption" and "full-disk encryption" ? (CO2)

(b) Demonstrate the working mechanism of the shelishock attack through some programming examples. (CO2)

(c) Investigate the procedure of sensitive data extraction through the steps of side channel attack. Use figures in your answer. (CO2)

150