Q. P. Code: 38166

(2 ½ Hours) **[Total Marks: 60]**

N.B: (1) **All questions are compulsory.**
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(3) **Assume additional data if necessary** but state the same clearly.
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(5) Use of **calculators** and statistical tables are **allowed**.

Q.1	Attempt **any two** of the following	**(12)**
a)	What are the five states that a process can be in? Describe the meaning of each one briefly.	**6**
b)	What is the fundamental difference between a process and a thread?	**6**
c)	Write a short note on monolithic and micro kernels.	**6**
d)	Five jobs are waiting to be run. Their expected run times are 9, 6, 3, 5, and 2. In what order should they be run to minimize average response time?	**6**
Q.2	Attempt **any two** of the following	**(12)**
a)	If FIFO page replacement is used with four page frames and eight pages, how many page faults will occur with the reference string 0 1 7 2 3 2 7 1 0 3 if the four frames are initially empty? Compare this problem for LRU.	**6**
b)	What is the difference between a physical address and a virtual address?	**6**
c)	Explain the difference between internal fragmentation and external fragmentation. Which one occurs in paging systems? Which one occurs in systems using pure segmentation?	**6**
d)	Write a short note on Linux Memory Management.	**6**
Q.3	Attempt **any two** of the following	**(12)**
a)	What is the difference between a hard link and a symbolic link? Give an advantage of each one.	**6**
b)	Write a short note on Deadlock.	**6**
c)	Explain what DMA is and why it is used.	**6**
d)	Write a short note on Terminals.	**6**
Q.4	Attempt **any two** of the following	**(12)**
a)	Explain Android Software Stack.	**6**
b)	Write a short note on Telephony Manager.	**6**
c)	Explain Android Activity Lifecycle.	**6**
d)	Write a short note on Location Manager.	**6**
Q.5	Attempt **any two** of the following	**(12)**
a)	What is a race condition? Explain with example.	**6**

b) Consider a swapping system in which memory consists of the following hole sizes in memory order: 10 KB, 4 KB, 20 KB, 18 KB, 7 KB, 9 KB, 12 KB, and 15 KB. Which hole is taken for successive segment requests of **6**
(a) 12 KB
(b) 10 KB
(c) 9 KB
for first fit? Now repeat the question for best fit, worst fit, and next fit.

c) Can a system be in a state that is neither deadlocked nor safe? If so, give an example. If not, prove that all states are either deadlocked or safe. **6**

d) Write a short note on SQLite. **6**

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Q.1 Attempt **any two** of the following **(12)**

a) Explain the structure of a compiler with suitable illustration. **6**

b) Define regular expression. Draw the transition diagram representing the regular expression: **6**
i. ab*+(ab*c)
ii. a*b*c*

c) What is minimization of DFA? Explain the steps of minimization with suitable example. **6**

d) What is meant by top-down parsing? Consider the following production of the CFG. **6**

$X \rightarrow bab \mid bY$
$Y \rightarrow d \mid cY$

Show the parsing actions to recognize string: **bcd**

Q.2 Attempt **any two** of the following **(12)**

a) Explain the general structure of LR parsers. Explain the different types of probable actions that the parser would take during parsing of any string. **6**

b) What are ambiguous grammars? Explain the concept of ambiguous grammar with the help of suitable example. **6**

c) Consider the grammar rules for simple expressions once again. Compute the LR(0) parsing table and GOTO graph for the following: **6**
$E \rightarrow E + T$
$E \rightarrow T$
$T \rightarrow (E)$
$T \rightarrow id$

d) Write a note on LALR parsers. **6**

Q.3 Attempt **any two** of the following **(12)**

a) Write a note on Syntax-Directed Translation Scheme used by modern compilers. **6**

b) What is intermediate representation? What are its benefits? Give any one form of intermediate representation for the expression: **a*b/c+a*b+c** **6**

c) What is activation record? Explain the activation record management for recursive calls. **6**

d) What are basic blocks? How do you identify them? Find the basic blocks from the following sequence of code. **6**

```
    w = ...
    y = ...
    z = ...
L1: x = y + z
    v = w + x
    ...
    if ... goto L1
```

Q.4 Attempt **any two** of the following **(12)**

a) What is meant by loop invariant computation? How are they useful in optimizing code? Give example. **6**

b) What is dead code elimination? Give example. **6**

c) Write a note on various optimizing transformations used by compiler. **6**

d) Briefly describe the optimizations Based on Data-Flow Analysis. **6**

Q.5 Attempt **any two** of the following **(12)**

a) What are precedence parsers? Consider the precedence matrix for the CFG with productions **6**

$$S \rightarrow aSSb \mid c$$

$$precedence\ matrix = \begin{array}{c|cccc} & S & a & b & c \\ S & \doteq & \lessdot & \doteq & \lessdot \\ a & \doteq & \lessdot & 0 & \lessdot \\ b & \cdot> & \cdot> & \cdot> & \cdot> \\ c & \cdot> & \cdot> & \cdot> & \cdot> \end{array}$$

Find if the input string **aaccbcb** is recognized by the above grammar. Show step-by-step parsing process using precedence relations from the table above..

b) Write a note on types of LR parsers. **6**

c) Write a note on symbol table management in tiger compiler. Give example. **6**

d) Write a note on **6**

i. Reducible flow graphs

ii. Dominators

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Q.1	Attempt **any two** of the following	**(12)**
a)	Write a SOAP Web service that that checks whether the three digit number passed as parameter is an Armstrong number. (An Armstrong number of three digits is an integer such that the sum of the cubes of its digits is equal to the number itself. For example, $3^3+7^3+1^3=371$)	**6**
b)	Explain the basic steps for creating a Web service and client.	**6**
c)	What are web services? Explain the terms SOAP, WSDL and UDDI.	**6**
d)	Explain the advantages and disadvantages of RPC Style WSDL	**6**
Q.2	Attempt **any two** of the following	**(12)**
a)	Explain the structure of a SOAP Message.	**6**
b)	Explain the steps in handler framework in SOAP web services.	**6**
c)	Write a simple SOAP request Message and SOAP response message for a web service operation GetMarks() that sends a parameter RollNo and returns the total marks of the student.	**6**
d)	Explain the run time order of execution of SOAP handlers and Logical handlers.	**6**
Q.3	Attempt **any two** of the following	**(12)**
a)	Explain the concept of JAX-RS with any three annotations used in it.	**6**

b)	Differentiate between SOAP and REST web services.	**6**
c)	Write a short note on interoperability between Java platform and WCF.	**6**
d)	Explain the various HTTP verbs and CRUD operations in REST with an example.	**6**

Q.4 Attempt **any two** of the following **(12)**

a)	Write a short note on Amazon Virtual Private Cloud.	**6**
b)	Explain the significance of Availability zone	**6**
c)	Explain the various services in Amazon Cloud.	**6**
d)	What is cloud computing? Explain the concept of private, public and hybrid cloud.	**6**

Q.5 Attempt **any two** of the following **(12)**

a)	Write a short note on Amazon Elastic Map Reduce.	**6**
b)	Explain the concept of SOAP Message Context.	**6**
c)	Explain the concept of User authentication and authorization.	**6**
d)	Write a java application that publishes a sample web service at " http://127.0.0.1:3220/ws1".	**6**

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Q.1 Attempt **any two** of the following **(12)**

a) Explain the role of Operating System in protecting objects and implementing computer security. Also list various protected objects. **6**
b) Explain how segmentation helps in implementing security. State the advantages of using segmentation. What are its security benefits? **6**
c) What are non-malicious programs? How do they sometime pose security threat? List such non-malicious programs. **6**
d) List and explain various security requirements of a typical databases system. **6**

Q.2 Attempt **any two** of the following **(12)**

a) Write a note on IP-spoofing based attacks. **6**
b) Write note on DMZ. How are they used in implementing security? **6**
c) List and explain various types of intrusion detection Systems. **6**
d) What is SSL? How they work? Explain. **6**

Q.3 Attempt **any two** of the following **(12)**

a) List various threats are associated with cloud data services. **6**
b) Write a note on ESX and ESXi security features. **6**
c) Briefly outline the importance of cloud security management and standards. **6**
d) Explain why security is important in cloud based applications. Give suitable example. **6**

Q.4 Attempt **any two** of the following **(12)**

a) Write a note on Zigbee security attack. **6**
b) List and briefly explain various security threats to mobile applications and devices. **6**
c) Compare between GSM and UMTS security features. **6**
d) Explain with suitable example the eavesdropping on Bluetooth devices. **6**

Q.5 Attempt **any two** of the following **(12)**

a) What is meant by Data Sensitivity in databases? List various types of data sensitivities. Explain any one. **6**
b) Write a note on Security Strategies in firewall. **6**
c) Write a note on importance of backup and recovery in in cloud security. **6**
d) What is VoIP? State and explain various VoIP issues. **6**

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(4) Mixing of sub-questions is not allowed.

Q1. **Attempt the following (any Two):** **(12)**

(A) State the need and importance of BI in today's business environment.

(B) What is binning? Discuss different types of binning with an example.

(C) Discuss KDD process model in detail.

(D) Define and explain following
1. Redundant values.
2. Outliers

Q2. **Attempt the following (any Two):** **(12)**

(A) Discuss logical architecture of data warehouse and its components with neat labelled diagram.

(B) Differentiate between Data Warehouse and Data Mart.

(C) Explain in detail data staging components.

(D) What is ETL? Elaborate on number of activities performed under the same.

Q3. **Attempt the following (any Two):** **(12)**

(A) What is OLAP? How does it differ from OLTP?

(B) What is star schema? Explain fact table and dimention table with an example.

(C) What is the need behind creating a cube? How Drill down and roll up operations helps in Business intelligence..

(D) Discuss dimensional modelling in detail.

Q4. **Attempt the following (any Two):** **(12)**

(A) Define support, confidence, and Lift with examples?

(B) Briefly explain various steps of data mining process.

(C) Given the following transaction data:

Transaction ID	Items
1001	{Jacket, Boots}
1002	{Milk, Cheese, Bread, Shoes}
1003	{Cloth, Bread}
1004	{Milk, Bread, Shoes, GreetingCard, Pork, Apple, Soup}
1005	{Bread, Milk, Cheese, Shoes, Beef}
1006	{Jacket, Bread, SkiPants}

What are the supports and confidences of the following two rules?

a. Rule1: Milk → Bread
b. Rule2: Bread → Milk

(D) State and explain Apriori Algorithm in detail.

Q5. **Attempt the following (any Two):** **(12)**

(A) Explain Discretization. State and explain techniques of discretization.

(B) Define data ? Explain different types of data with example.

(C) Define slice and dice with an example.

(D) Draw FP tree for the given transaction table.

TID	Items
1	{A,B}
2	{B,C,D}
3	{A,C,D,E}
4	{A,D,E}
5	{A,B,C}
6	{A,B,C,D}
7	{B,C}
8	{A,B,C}
9	{A,B,D}
10	{B,C,E}

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Q1.		**Attempt the following (any Two)**	**(12)**
	(A)	What are reducible and irreducible errors in the estimation of a function connecting input-output data? Which is easier to manage? Briefly explain.	
	(B)	What do you mean by 'variance-bias trade-off'? Briefly explain.	
	(C)	Compare performance of linear regression with k-nearest neighbours.	
	(D)	'Quadratic Discriminant Analysis (QDA) serves as a compromise between the non-parametric KNN method and the linear LDA and logistic regression approaches'. Comment.	
Q2.		**Attempt the following (any Two)**	**(12)**
	(A)	Discuss Leave-One-Out Cross-Validation approach resampling.	
	(B)	Briefly explain bootstrap method.	
	(C)	What is backward stepwise selection? Briefly explain.	
	(D)	Why does Ridge Regression Improve over Least Squares? Explain.	
Q3.		**Attempt the following (any Two)**	**(12)**
	(A)	What is polynomial regression? Briefly explain.	
	(B)	Discuss the advantages and disadvantages of using Generalised Additive Models (GAM) over other models.	
	(C)	What is cost complexity pruning? Briefly explain.	
	(D)	Write a note on bagging.	

Q4. **Attempt the following (any Two)** **(12)**

(A) Define following:

(i) Hyper plane

(ii) Separating Hyper plane

(iii) Maximal margin hype plane

(B) Distinguish the following:

(i) Kernel

(ii) Polynomial Kernel

(iii) Radial Kernel

(C) What is principal component analysis? Briefly explain.

(D) Briefly discuss hierarchical clustering using an example.

Q5. **Attempt the following (any Two)** **(12)**

(A) Distinguish between forward selection and backward selection.

(B) Which is better among Lasso and Ridge regression as a resampling method? Justify.

(C) Write a note on boosting.

(D) 'Support vector machine is an extension of support vector classifier'. Justify.