(2 ¹/₂ Hours)

[Total Marks: 60]

N.B:	 (1) (2) (3) (4) (5) 	All questions are compulsory. Figures to the right indicate full marks. Assume additional data if necessary but state the same clearly. Symbols have their usual meanings and tables have their usual standard design unless stated otherwise. Use of calculators and statistical tables are allowed.	
Q.1	Attempt	any two of the following	(12)
a) b)	Explain Discuss i. CPU ii. Aver iii. I/O d	high level stages of a typical Linux boot process. how the following pairs of scheduling criteria conflict in certain settings. utilization and response time age turnaround time and maximum waiting time levice utilization and CPU utilization	6 6
c) d)	Discuss Conside pointers i. What proc ii. What this iii. How same	in detail features of GRUB. r a variant of the RR scheduling algorithm in which the entries in the ready queue are to the PCBs. t would be the effect of putting two pointers to the same ess in the ready queue? t would be two major advantages and two disadvantages of scheme? would you modify the basic RR algorithm to achieve the e effect without the duplicate pointers?	6 6
Q.2	Attempt	any two of the following	(12)
a)	Conside scale fro suffer fr 1. LRU 2. FIFO 3. Optin 4. Secor	r the following page-replacement algorithms. Rank these algorithms on a five-point om "bad" to "perfect" according to their page-fault rate. Separate those algorithms that om Belady's anomaly from those that do not. Explain your answer. replacement replacement nal replacement id-chance replacement	6
b)	Compar segment i. Exter ii. Inter iii. Abili	e the memory organization schemes of contiguous memory allocation, pure ation, and pure paging with respect to the following issues: rnal fragmentation nal fragmentation ity to share code across processes	6
c)	Why are 1,024 w 1. How 2. How	e page sizes always powers of 2? Consider a logical address space of 64 pages of ords each, mapped onto a physical memory of 32 frames. many bits are there in the logical address? many bits are there in the physical address?	6

d)	Discuss segmentation hardware in detail.	6
Q.3	Attempt any two of the following	(12)
a)	State three advantages of placing functionality in a device controller, rather than in the kernel. State three disadvantages.	6
b)	Consider a file system that uses inodes to represent files. Disk blocks are 8 KB in size, and a pointer to a disk block requires 4 bytes. This file system has 12 direct disk blocks, as well as single, double, and triple indirect disk blocks. What is the maximum size of a file that can be stored in this file system?	6
c)	Consider a system that supports the strategies of contiguous, linked, and indexed allocation. What ariteria should be used in deciding which strategy is best utilized for a particular file?	6
d)	Make a list of six security concerns for a bank's computer system. For each item on your list, state whether this concern relates to physical, human, or operating-system security.	6
Q.4	Attempt any two of the following	(12)
a) b) c) d)	Explain in detail Android Software Stack. What are uses of content provider? Give example. How SMS client app can be developed in Android? What are default restrictions of using SQLite database in Android? How more than one applications can share same SQLite database in same device? Explain your answer.	6 6 6
Q.5	Attempt any two of the following	(12)
a)	The list of all passwords is kept within the operating system. Thus, if a user manages to read this list, password protection is no longer provided. Suggest a scheme that will avoid this problem	6
b) c)	Explain Android activity Life Cycle in detail. Why might a system use interrupt-driven I/O to manage a single serial port and polling I/O to manage a front-end processor, such as a terminal concentrator?	6 6
d)	Given five memory partitions of 100 KB, 500 KB, 200 KB, 300 KB, and 600 KB (in that order), how would the first-fit, best-fit, and worst-fit algorithms place processes of 212 KB, 417 KB, 112 KB, and 426 KB (in that order)? Which algorithm makes the most efficient use of memory?	6

Q.P. Code: 21861

			(2 1/2	e Hours)	[Total Marks: 60	
N.B:	 (1) (2) (3) (4) (5) 	All questions are Figures to the rig Assume addition Symbols have the unless stated othe Use of calculator	compulsory ht indicate fu al data if near ir usual mear rwise. s and statistic	7 <u>.</u> Ill marks. cessary but state nings and tables cal tables are all e	the same clearly. have their usual standard design wed.	
Q.1	Attem	npt <u>any two</u> of the f	ollowing			(12)
a) b)	List ar Do as 1) 2) 3)	nd explain different p directed: Develop DFA ov and middle 1. Develop regular of middle bb and en State the advanta	hases of comp er {0,1,2} acc expression ov ding with cc ges of Gramn	iler. cepting all string er {a,b,c} acceptor starting with contained on the starting with contained on the starting with contained on the start of t	s starting with 0 ending with 2 ting all strings starting with aa ec and ending with aa.	6 6
c)	Define rules g E→E-	e the term Gramma given below: +E E→E*E	r. Parse the st $E \rightarrow (E)$	tring id+(id*id) E→id	with the help of production	6
d)	Develop S \rightarrow AI A \rightarrow aA B \rightarrow bA	op Predictive Parsing 3 S→ε AB A→ε A	Table for the	following gramma	ar and Parse the string "ababb".	6
Q.2	Attem	pt any two of the f	ollowing			(12)
a)	Const parser 0 0 a 5 0 F 3 0 T 2 0 E 1 0 E 1 0 E 1	ruct the parsing tab * moves. * 7 * a 5 * 7 F 10 + 6 + 6 a 5 + 6 F 3	le, string and	productions of t	he grammar using the given	6

Accept

0 E 1

 $0 \to 1 + 6 \to 9$

Q.P. Code: 21861

b)	Check whether following grammar is in SLR or not $S \rightarrow PP$ $P \rightarrow pP$ $P \rightarrow d$	6
c)	In order to construct $LR(0)$ parsing table there is a need of Action and Goto sections in the parsing table. Explain the rules for constructing the same	6
d)	Consider the following Production Rules and compute LR(0) item sets for the same. $S \rightarrow aABe$ $A \rightarrow Abc \mid b$ $B \rightarrow d$	6
Q.3	Attempt any two of the following	(12)
a)	 Translate the following expressions into Quadruples, Triples and three-address code. a) (a+b)*(c+d)+(a+b+c) b) a+(b*c)/(-b*-c+d) 	6
b)	Consider the following syntax directed translation scheme for desk calculator; give a parse tree for expression 93*3+44\$ using above and write the moves.	6

production	Semantic action
S->A\$	{print A.val}
A->A+A	A.val=A(1).val+A(2).val
A->A*A	A.val=A(1).val*A(2).val
A->(A)	A.val=A(1).val
A->I	{A.val=I(1).val}
A->Idigit	{I.val=10*I.val+LEXVAL}
I->digit	{I.val=LEXVAL}

c)	What is the need of stack and discuss the concept of stack frame in tiger compiler.	6
d)	What are activation records with respect to tiger compiler? Explain in brief.	6
Q.4	Attempt any two of the following	(12)
a)	Convert the following code into flowgraph: 1) C=1 2) Goto 5 3) M=1 4) C=B*3 5) B=B+1 6) if C <=20 goto 3	6
b)	Explain machine dependent and machine independent optimization techniques.	6
c)	Describe the process of creating basic block.	6
d)	What is a data flow analysis? State different types of data flow analysis problems.	6

Q.5	Attempt any two of the following	(12)
a)	Compute Follow() for the following production rules. 1) $S \rightarrow A\$B \A $A \rightarrow \#B B\#$ $B \rightarrow \$A \#$	6
	2) $S \rightarrow (P) a ^{A}$ $P \rightarrow P, S S$ 3) $S \rightarrow iCtSS' a$	
	$S' \rightarrow eS \mid \varepsilon$ $C \rightarrow b$	
b) c)	Write a short note on LR(1) parsing. What is a symbol table in tiger compiler? Discuss the functions performed by Symbol Table.	6 6
d)	Define the following terms or process: 1) dead code elimination 2) strength reduction	6

(2 ¹/₂ Hours)

[Total Marks: 60

- **N.B:** (1) <u>All questions are compulsory.</u>
 - (2) Figures to the **right** indicate full marks.
 - (3) Assume additional data if necessary but state the same clearly.
 - (4) Symbols have their usual meanings and tables have their usual standard design unless stated otherwise.
 - (5) Use of **calculators** and statistical tables are **allowed**.

Q.1	Attempt any two of the following	
a)	Explain the annotations @WebResult and @WebMethod used in JAX-WS with an example.	6
b)	Explain the concept of Service Endpoint Interface and Service Implementation Bean with a simple example.	6
c)	Explain the structure of WSDL.	6
d)	Write a WebService with a @WebMethod to accept a number that returns sum of its digits. With @WebResult the return variable name should be made "Sum".	6
Q.2	Attempt any two of the following	(12)
a)	Explain Soap request and Soap response messages with an example.	6
b)	Explain the steps in handler framework in SOAP web services.	6
c)	Explain the different techniques for SOAP attachments.	6
d)	Explain SOAP Faults from the Application and Handler Levels.	6
Q.3	Attempt any two of the following	(12)
a)	Explain the concept of JAX- RS	6
b)	Differentiate between SOAP and REST web services.	6
c)	What are REST web services? What is the role of http methods in its implementation?	6
d)	Explain the concept of WS-Security.	6
Q.4	Attempt any two of the following	(12)
a)	Explain the various cloud computing services.	6
b)	Explain the concept of Availability zone in AWS.	6
c)	Explain the concept of Elastic Block Storage	6

d)	Write a short note on Amazon Virtual Private Cloud.	6
Q.5	Attempt any two of the following	(12)
a) b) c)	Write a short note on Web services. Explain the four basic patterns of operations supported by WSDL. Explain the concept of User authentication and authorization.	6 6 6
d)	Write a short note on Elastic Load Balancing.	6

Q.P. Code: 50672

	(2 ¹ / ₂ Hours) [Total marks: (60
N. B.: (((2) (2) (2) (2) (2) (2) (2) (2) (2) (All questions are compulsory Figures to the right indicate full marks. Assume additional data if necessary but state the same clearly. Symbols have their usual meanings unless stated otherwise. Use of calculators and statistical tables is allowed. 	
Q.1	Attempt any two of the following.	(12)
a) b) c) d)	Define computer crime. List and explain various types of computer criminals. Briefly describe various goals of security. Compare between Trojan horse, Virus and Trapdoor. Write a note on protected objects and methods of protection.	6 6 6
Q.2	Attempt any two of the following	(12)
a) b) c) d)	List and explain different types of network layer attacks. Lists and explain different types of intrusion detection system Write note on implementing network security using SSL/TLS. Explain the network authentication using Kerberos protocol.	6 6 6
Q.3	Attempt any two of the following	(12)
a) b) c) d)	Why is authentication a point of major concern with cloud technology implementations? Discuss about various Cloud Authentication issues. What are the cloud storage and application issues? List and explain them. Write a note on Virtualization System Vulnerabilities. What are public and private clouds? Compare between public and private cloud security concerns.	6 6 6
Q.4	Attempt any two of the following	(12)
a) b) c) d)	Discuss the measures of security implemented by GSM network. Write a note on Mobile application security. Explain various types of Attacks in 802.11 Networks. Write a note on Bluetooth Scanning and Reconnaissance.	6 6 6
Q.5	Attempt any two of the following	(12)
a) b)	Describe about attacking and exploiting Bluetooth networks. What is Cellular Jamming? How does it become a serious security concern? Explain	6 6
c) d)	Briefly describe about attacks in Zigbee networks. What is access control list? How it is used for implement security? Explain.	6 6

	(2 ¹ / ₂ hours) [Total marks: 60]	
N. B.:	(1) All questions are compulsory	
	(2) Figures to the right indicate full marks .	
Q1.	Attempt the following (any Two) (12))
(A)	What is meant by strategic information? State and explain the need and of characteristics of strategic information.	5
(B)	State various applications of Business Intelligence. 00	5
(C)	What is meant by data pre-processing? Explain why it is one of the important 0 of the step in data mining?	5
(D)	Describe Equal Depth Binning method. Apply the Equal Depth Binning 00 method on the following sorted data among three bins. 4, 8, 9, 9, 21, 21, 24, 25, 26, 28, 30, 34	5
Q2.	Attempt the following (any Two) (12))
(A)	State various components of architecture of data warehouse. Explain the role of metadata in data warehouse.	5
(B)	What is Enterprise Warehouse? Explain how it is different from data mart. 00	5
(C)	State and explain any three transformation rules with suitable example that can be applied in ETL process.	5
(D)	Write a short note on virtual warehouse. 00	5
Q3.	Attempt the following (any Two) (12))
(A)	Compare between dimension table and fact table. State their characteristics. 00	5
(B)	What is a data cube? Explain the concept of data cube with appropriate 0 example.	5
(C)	Explain following operations in brief: 00 i. Drill down ii. Roll up	5
(D)	Write a note on Star Schema. What are its benefits? 00	5
Q4.	Attempt the following (any Two) (12))
(A)	Define data mining. Explain how it is different from normal query processing. 00	5
(B)	Define following terms with suitable example 00 i. Support ii. Confidence	5

(C) Consider a hash function: $h(x) = N \mod 3$. Apply the hash function to the **06** following data and construct hash tree.

 $\{2,9,8\}$ $\{5,6,5\}$ $\{1,4,6\}$ $\{5,7,6\}$ $\{9,3,2\}$ $\{4,7,1\}$ $\{2,7,4\}$

(D) Find all frequent patterns in the following database using FP- growth 06 algorithm. Take minimum support value as 30%.

Transaction ID	Items
T1	E,A, B,C
T2	A, B, C, D
T3	C,D, B
T4	A, B, D
T5	A, B, E, D
T6	A, B, D
T7	C, D
T8	E, C, D

Q5. Attempt the following (any Two)

(12)

(A) What do you mean by noisy data? What are the various reasons of data 06 becoming noisy? Explain various mechanism to handle noisy data.

(B) Explain in detail data extraction mechanism in data warehouse. 06

- (C) What is Snowflakes schema? Explain with suitable illustration. 06
- (D) State the formula for calculating Lift in Association rule. What is its 06 significance? Explain.

(2 ¹/₂ Hours)

All questions are compulsory.

N.B:

(1)

[Total Marks: 60

	(2	2) Figures to the right indicate full marks.				
	(3	Assume additional data if necessary but state the same clearly.				
	(4	4) Symbols have their usual meanings and tables have their usual standard	design			
		unless stated otherwise.				
	(2	5) Use of calculators and statistical tables are allowed .				
Q.1		Attempt any two of the following	(12)			
	a)	Describe three real-life applications in which regression might be useful. Describe the response, as well as the predictors. Is the goal of each application inference or prediction? Explain your answer.	6			
	b)	Write down the difference between Linear Discriminant Analysis and Quadratic Discriminant Analysis.	6			
	c)	Explain how ROC curves are generated. Give one example.	6			
	d)	Compare linear regression with K Nearest neighbor method.	6			
Q.2		Attempt any two of the following	(12)			
	a)	In what way we choose the best model? Explain the factors needed for that.	6			
	b)	Why dimension reduction is necessary? Explain any one method for dimension reduction.	6			
	c)	Write a short note on the following terms:1] Re-sampling2] Model assessment3] Model selection	6			
	d)	How ridge regression improves over least square? Explain.	6			
Q.3		Attempt any two of the following	(12)			
	a)	Explain GAMs for classification problem.	6			
	b)	Explain classification tree in detail with diagram.	6			
	c)	Write down advantages and disadvantages of trees.	6			
	d)	Compare Bagging, Boosting and random forest methods.	6			

[Turn Over]

Q.4		Attempt any two of the following	(12)
	a)	Explain the maximal margin classifier and hyper plane in SVM with diagram.	6
	b) What do you mean by unsupervised learning? Write down K means clustering algorithm.		
	c) Write down the four most commonly typed linkages in hierarchical clustering.		
	d) Explain principal component analysis in detail.		6
Q.5		Attempt any two of the following	
	a)	How we assess model accuracy? Explain in detail.	6
	b)	How Lasso is better than ridge regression? Explain.	6
	 c) Explain the three tuning parameters of Boosting. d) Following are the n observation in p=2 dimension for a toy data set 		

Observation	X1	X2	Y
1	3	4	Red
2	2	2	Red
3	4	4	Red
4	1	4	Red
5	2	1	Blue
6	4	3	Blue
7	4	1	Blue

Write down the equation for optimal separating hyper plane. Draw the optimal separating hyper plane. Describe the classification rule for the maximal margin classifier. It should be something along the lines of "Classify to Red if $\beta 0 +\beta 1X1 +\beta 2X2 > 0$, and classify to Blue otherwise." Provide the values for $\beta 0$, $\beta 1$, and $\beta 2$.