VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
Accredited by NAAC with A++ Grade
B.E. VII-Semester Main & Backlog Examinations, Dec.-2024/Jan-2025.
Cryptography and Network Security (PE-I)
(Common for CSE & AIML)

Time: 3 hours

Max. Marks: 60

*Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Obtain the Cipher text for the following plain text using Caesar Cipher. 'Vasavi College of Engineering, Hyderabad'	2	3	1	1,2
2.	Convert the Given Text "CRYPTOGRAPHY" into cipher text using Rail fence Technique.	2	3	1	1,2
3.	What is the vital advantage of triple DES over traditional DES?	2	1	2	1,2
4.	Illustrate SQL injection vulnerability.	2	1	2	1,2
5.	Given a string S of length N, the task is to find the SHA – 512 Hash value of the given string S. Input S= "Hello World" Output=?	2	3	3	1,2
6.	How Message authentication Functions can be classified into three classes?	2	1	3	1,2
7.	What are the common email threats in real time applications?	2	3	4	1,2
8.	Why PGP is a remarkable phenomenon in real time application software development?	2	1	4	1,2
9.	Identify the protocols which are used to provide IP security?	2	1	5	1,2
10.	Distinguish IDS and IPS.	2	2	5	1,2

Part-B (5×8 = 40 Marks)

11. a)	Find the value of X using Chinese remainder theorem. X= 5(mod23) X=6(mod27) X=5(mod31)	4	3	1	1,2
b)	Outline Symmetric Cipher model and explain What are the requirements of Symmetric Cipher model?	4	1	1	1,2
12. a)	Demonstrate the triple DES and how it can be implemented with different number of keys.	4	2	2	1,2

		M	L	CO	PO
b)	Solve the following: p=31; q=67; e=7; M=413 using RSA algorithm. Find public key and private key and perform encryption and decryption.	4	3	2	1,2
13. a)	Explain how Cipher Based Message Authentication Code (CMAC) is generated? How is it used for verifying data integrity of the received message in a network?	4	2	3	1,2
b)	Alice and Bob use the Diffie–Hellman key exchange technique with a common prime q = 157 and a primitive root a = 5. a. If Alice has a private key XA = 15, find her public key YA. b. If Bob has a private key XB = 27, find his public key YB. c. What is the shared secret key between Alice and Bob?	4	3	3	1,2
14. a)	Describe the operational concept of PGP.	4	1	4	1,2
b)	Define email threat and explain the various real time threats in web applications.	4	3	4	1,2
15. a)	Demonstrate about IEEE 802.11 wireless LAN overview.	4	2	5	1,2
b)	a) Explain the types of Intrusion Detection Systems with real time scenarios.	4	2	5	1,2
16. a)	What is SQL injection? Give the attacker's SQL code injections in login and password fields to gain an unauthorized access to an application. What is the solution to this SQL injection attack?	4	2	1	1,2
b)	Describe a step-by-step process of the Diffie-Hellman key exchange, including the roles of public and private keys in generating the shared secret. Given the prime number p=23 and the base g=5 two parties, A and B, are using the Diffie-Hellman key exchange to compute a shared secret. Party A chooses a private key a=6 and Party B chooses a private key b = 15. Both parties compute their public keys and then use these public keys to compute the shared secret.	4	3	2	1,2
17.	Answer any *two* of the following:				
a)	Alice chooses p = 3119, e1 = 2, d = 127 and calculates e2 = 2127 mod 3119 = 1702. She also chooses r to be 307. She announces e1, e2, and p publicly; she keeps d secret. The following shows how Alice can sign a message. M = 320.solve the question using ElGamal Digital Signature Scheme.	4	3	3	1,2
b)	How SSL is designed to make use of TCP to provide a reliable end-to-end-service. Explain briefly about the architecture for SSL.	4	2	4	1,2
c)	Explain the services provided by IPSec.	4	2	5	1,2

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	22.5%
ii)	Blooms Taxonomy Level – 2	37.5%
iii)	Blooms Taxonomy Level – 3 & 4	40%

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VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
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B.E. VII-Semester Main & Backlog Examinations, Dec.-2024/Jan-2025

Distributed Systems and Cloud Computing

(Common for CSE & AIML)

Time: 3 hours

Max. Marks: 60

*Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Briefly explain the complex challenges and risks associated with the cloud computing model, and how might they impact organizational decision-making and strategy? Consider factors like data security, compliance, and vendor reliability in your analysis.	2	2	1	1,2
2.	How do distributed systems contribute to the functionality, scalability, and reliability of cloud computing services, and what is their significance in the context of cloud-based infrastructures?	2	2	1	1, 2
3.	Discuss the key benefits and challenges of virtualization technology in modern computing environments.	2	1	2	1, 2
4.	What role does a cluster manager play in virtualized data center environments, and how does it contribute to the overall efficiency and management of resources? Explain.	2	2	2	1,2
5.	"Containerization and Virtualization are one and same" Justify whether this statement is true or false and analyze and present which is efficient and why?	2	3	3	1,2
6.	What mechanisms does AWS Lambda use to handle failures during event processing?"	2	1	3	1,2
7.	What is HDFS? List the components of Hadoop Distributed File System.	2	1	4	1,2
8.	Identify and analyze any two primary use cases for Google Cloud Bigtable?	2	2	4	1,2
9.	Differentiate multi cloud and federated cloud environments.	2	1	5	1,2
10.	How does the concept of consensus apply to distributed systems? Also analyze a real-world example where the consensus problem plays a critical role.	2	3	5	1,2

Part-B (5 × 8 = 40 Marks)

11. a)	Describe key phases that are involved in the Service Level Agreement (SLA) lifecycle, and discuss how do each of these phases contribute to the overall effectiveness and management of the agreement?	4	2	1	1,2
b)	Identify and Analyze the three key technological advancements that have converged to drive the growth of cloud computing, and how have these technologies been applied in real-world cloud computing scenarios.	4	3	1	1, 2
12. a)	How do full virtualization and para-virtualization differ in terms of architecture and performance? Discuss the advantages and disadvantages of each approach in virtualized environments.	4	2	2	1,2
b)	Explain the different levels of virtualization implementation with a clear diagram, and discuss the specific advantages each level offers in terms of resource management and deployment?	4	2	2	1, 2

(250)

		M	L	CO	PO
a)	Discuss how virtual machines are managed using kubernetes cluster- kubervirt.	4	1	3	1,2
b)	Imagine you are designing a serverless architecture for a large-scale application. Given the requirements for scalability, cost-efficiency, and integration with cloud-native services, how would you decide between using AWS Lambda and Azure Functions, and what are the key differences you need to consider?	4	2	3	1,2
14. a)	Use the following sentences to demonstrate the MapReduce data flow process for the word-count problem. State the five processing stages in a stepwise manner. Hadoop is used for distributed processing MapReduce is used for processing large data sets.	4	3	4	1,2
b)	How would you analyze the architecture of the Google File System (GFS), and what are the key design principles that contribute to its scalability, reliability, and performance?" Explain with a neat illustration.	4	3	4	1,2
15. a)	How can HAProxy be used to scale a web application horizontally? Provide specific examples of how HAProxy distributes traffic across multiple web servers.	4	3	5	1,2
b)	Consider the following trust matrix $$M(t) = \begin{bmatrix} 0 & 0 & 0 & 0.2 & 0.8 \\ 0.4 & 0 & 0 & 0 & 0.5 \\ 0 & 0.6 & 0 & 0 & 0.3 \\ 0 & 0 & 0 & 0 & 0 \\ 0.8 & 0 & 0 & 0.4 & 0 \end{bmatrix}$$ and the global reputation scores of the nodes are represented by a normalized reputation vector, $v(t) = \{0.32, 0.18, 0.09, 0.1, 0.31\}$ at time 't'. Compute, normalized reputation vector, $V(t+1)$, at time 't+1' for the given Peer to Peer system.	4	3	5	1,2
16. a)	Distinguish cloud computing and grid computing by describing the differences in terms of architecture and resource management. Also provide a detailed example of a scenario or application where cloud computing would be more suitable than grid computing and justify your answer.	4	3	1	1, 2
b)	"Is live migration of VM required?" Analyze and present your answer. Also describe the step-by-step procedure of live migration from one host to another with a neat diagram.	4	3	2	1, 2
17.	Answer any *two* of the following:				
a)	Analyze the architecture of the Docker Engine and describe how it facilitates containerization Also discuss about the key components that are responsible for managing containers on a host machine?	4	2	3	1,2
b)	What is the Hadoop distributed file system, and how does it support data storage in a distributed environment? Explain.	4	1	4	1,2
c)	Suppose you are managing a cloud-based infrastructure for a large organization that handles sensitive customer data. Considering the potential risks and compliance requirements, how would you ensure data security in the cloud environment, and what role would Identity and Access Management (IAM) play in protecting access to this data?	4	2	5	1, 2

M : Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	40%
iii)	Blooms Taxonomy Level – 3 & 4	40%

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VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD
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B.E. (C.S.E.) VII-Semester Main & Backlog Examinations, Dec.-2024/Jan-2025
Advanced Databases (PE-II)

Time: **3 hours**   Max. Marks: **60**

*Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Why Persistent Programming Languages are advantageous over languages with Embedded SQL?	2	1	1	1,2
2.	Create type Department as (name varchar (20), head ref (Person) scope people); create table departments of Department; Write SQL query to find the names and addresses of the heads of all departments.	2	2	1	1,2
3.	Write the DTD statement which specifies that the element **course** has an attribute of type **dept_name,** and a value must be present for this attribute.	2	1	2	1,2
4.	<university> <course courseid="CS-101" deptname="Comp.Sci"> <title> Intro. to Computer Science </title> <credits>4</credits> </course> <course courseid="BIO-301" deptname="Biology" > <title> Genetics </title> <credits> 5 </credits> </course> </university> For the above XML data, write the XPath expression that returns the course identifiers of courses with credits >= 3	2	2	2	1,2
5.	Compute the number of disk seeks to search in a relation with b_r blocks and having the primary B+ index file with height h. Searching is on the equality on the key attribute.	2	2	3	1,2
6.	How many different join orders are possible for the expression $r_1 \bowtie r_2 \bowtie \ldots \bowtie r_6$	2	2	3	1,2
7.	Define fragmentation transparency and replication transparency in distributed databases	2	1	4	1,2
8.	Draw any two architectures used in parallel processing.	2	1	4	1,2
9.	What are the basic components in video-on-demand system?	2	1	5	1,2
10.	What are tunable parameters to tune the database system?	2	1	5	1,2

Part-B (5 × 8 = 40 Marks)

11. a)	Consider the below non-1NF relation and apply the unnesting to the attributes author_array and keyword. Write SQL query and write the result.	4	3	1	1,2

title	author_array	publisher (name, branch)	keyword_set
Compilers	[Smith, Jones]	(McGraw-Hill, New York)	{parsing, analysis}
Networks	[Jones, Frick]	(Oxford, London)	{Internet, Web}

b)	Explain Object-relational mapping system with an example.	4	2	1	1,2
12. a)	Explain the methods for storing XML Data in relational databases.	4	2	2	1,2
b)	bookstore>	4	3	2	1,2

```
bookstore>
    <book category="web">
    <title lang="en">Learning XML</title>
    <author>Erik T. Ray</author>
    <year>2003</year>
    <price>39.95</price>
    </book>
</bookstore>
```
Draw the Tree model for the above XML data.

13. a)	Consider the below query. Transform it by i) Pushing Selection operations. ii) Pushing Projection operations	4	3	3	1,2

$$\Pi_{name,\ title}(\sigma_{dept\_name=\ 'Music'}(instructor \bowtie (teaches \bowtie \Pi_{course\_id,\ title}(course))))$$

b)	Let relations r1(A, B,C) and r2(C, D, E) have the following properties: r1 has 20,000 tuples, r2 has 45,000 tuples, 25 tuples of r1 fit on one block, and 30 tuples of r2 fit on one block. Calculate the number of block transfers and block seeks for the merge-join algorithm	4	3	3	1,2
14. a)	Explain deadlock handling approaches in distributive databases.	4	2	4	1,2
b)	Discuss what form of parallelism (interquery, interoperation, or intraoperation) is likely to be the most important for the following tasks? i) Increasing a throughput of a system with many small queries. ii) Increasing a throughput of a system with few large queries, when the number of disks and processors is large.	4	2	4	1,2
15. a)	Why performance tuning is needed in database systems? Explain briefly approaches for tuning of transactions.	4	2	5	1,2
b)	(a)Construct k-d tree for the given three-dimensional spatial data. { (1,2,3) , (1,4,1) , (2,1,3), (2,3,4), (3,4,1), (4, 1,5) , (5,2,3) , (6,3,4) }. The maximum number of points in a leaf node has been set to 1.	4	3	5	1,2

16. a)	Explain array and multiset types in SQL?	4	2	1	1,2
b)	Demonstrate the process of Nesting by considering the below flat book relation? Provide Example Queries for the process of nesting.	4	3	2	1,2

title	author	pub_name	pub_branch	keyword
Compilers	Smith	McGraw-Hill	New York	parsing
Compilers	Jones	McGraw-Hill	New York	parsing
Compilers	Smith	McGraw-Hill	New York	analysis
Compilers	Jones	McGraw-Hill	New York	analysis
Networks	Jones	Oxford	London	Internet
Networks	Frick	Oxford	London	Internet
Networks	Jones	Oxford	London	Web
Networks	Frick	Oxford	London	Web

17.	Answer any *two* of the following:				
a)	Estimate the size of the results of the following: i) $\sigma_{A=a}(r)$ ii) $\sigma_{A \leq v}(r)$.	4	3	3	1,2
b)	Explain the 2-phase commit protocol in distributive databases.	4	2	4	1,2
c)	Suppose you have a relation containing the x,y coordinates and names of restaurants. Suppose also that the only queries that will be asked are of the following form: The query specifies a point, and asks if there is a restaurant exactly at that point. Which type of index would be preferable, R-tree or B-Tree? Why?	4	3	5	1,2

M : Marks;   L: Bloom's Taxonomy Level;   CO; Course Outcome;   PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	37.5%
iii)	Blooms Taxonomy Level – 3 & 4	42.5%

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