Paper / Subject Code: 53601 / Network Security

OK

(2½ hours)

[Total Marks: 75]

N. B.: (1) **All** questions are **compulsory**.
    (2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.
    (3) Answers to the **same question** must be **written together**.
    (4) Numbers to the **right** indicate **marks**.
    (5) Draw **neat labeled diagrams** wherever **necessary**.
    (6) Use of **Non-programmable** calculators is **allowed**.

1.   **Attempt _any two_ of the following:**   10
a.   Write a short note on principles of security.
b.   Explain simple columnar transposition technique with example.
c.   Explain Caesar cipher and modified version of Caesar cipher.
d.   List & explain all possible types of attacks on messages.

2.   **Attempt _any two_ of the following:**   10
a.   Explain Algorithm Types in detail.
b.   Write a short note on DES algorithm.
c.   Explain AES in detail.
d.   Write a short note on RC5 working.

3.   **Attempt _any two_ of the following:**   10
a.   Explain man-in-the-middle attack.
b.   Write a short note on digital signatures.
c.   Write a short note on SHA algorithm.
d.   Write down differences between MD5 and SHA-1.

4.   **Attempt _any two_ of the following:**   10
a.   What are the steps involved in creating digital certificates?
b.   Write a short note on ways of protecting private keys.
c.   What are the PKIX services? Explain in detail.
d.   Write a short note on digital certificate revocation checks.

5.   **Attempt _any two_ of the following:**   10
a.   Write a short note on TCP/IP protocol suite.
b.   What are the types of firewalls?
c.   What are two modes in which IPSec operates?
d.   Write a short note on SSL.

6.   **Attempt _any two_ of the following:**   10
a.   How password authentication mechanism works?
b.   Write a short note on certificate based authentication.
c.   What are the types of biometric authentication?
d.   Explain KDC in detail.

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7. **Attempt _any three_ of the following:**   15
a. Explain following terms :
   1) Cryptography   2) Cryptanalysis   3) Cryptology
   4) Cryptanalyst   5) Brute-force attack.
b. Explain blowfish encryption & decryption in detail.
c. Differentiate between Symmetric & Asymmetric key cryptography.
d. What are the PKCS standards?
e. Write a short note on PGP.
f. What is Mutual Authentication? Explain the implementation ways.

(Time: 2½ hours)

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1. **Attempt** *any three* **of the following:** 15
a. Explain the three aspects of data i) Data at rest ii) Data in motion iii) Data in many forms.
b. List the Big data sources and also explain the challenges of big data.
c. Explain Brewer's theorem along with a neat diagram.
d. How consistency can be implemented at both read and write operation levels explain.
e. List the categories of NoSQL databases. Also explain the ways in which MongoDB is different from SQL.
f. What is NoSQL? Explain the advantages of NoSQL databases.

2. **Attempt** *any three* **of the following:** 15
a. Explain _id, capped collection and Binary JavaScript Object Notation (BSON).
b. What is a polymorphic schema? Explain the various reasons for using a polymorphic schema.
c. How can you create a collection explicitly? Explain about selector and projector with example.
d. What is the use of findOne() method? Briefly explain about explain () function.
e. Explain Master Slave Replication with a neat diagram.
f. Explain the components of a sharded cluster.

3. **Attempt** *any three* **of the following:** 15
a. Write a short note on WiredTiger storage engine.
b. Explain the concept of GridFS – The MongoDB File System.
c. What is sharding? List and explain the sharding limitations.
d. Explain MongoDB limitations from security perspective. Also give an overview about Read and Write limitations.
e. Write a short note on Deployment in MongoDB.
f. What are the tips need to be considered when coding with the MongoDB database.

4. **Attempt** *any three* **of the following:** 15
a. Explain about TimesTen In-Memory Database with a neat diagram.
b. Explain about Solid State Disk.
c. Discuss the oracle 12c In-Memory Database architecture with a neat diagram.
d. What is jQuery? Explain jQuery element selector, id selector and class selector with example.
e. What is an Event? Explain with syntax fadeIn() and fadeOut() jQuery methods.
f. Explain the features supported by jQuery.

[Turn over...

5. Attempt _any three_ of the following: 15

a. What is the use of stringify method? Explain with syntax.

b. Explain the six members of the web storage Interface.

c. Explain the structure of Hypertext Transfer Protocol (HTTP) – Request.

d. Explain the JSON Grammar.

e. Give an overview about JavaScript Object Notation (JSON). Also explain about JSON tokens.

f. Explain about JSON parsing with syntax.

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TYBSCIT - V
Nov. 2022

(2½ Hours)

[Total Marks: 75]

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1.   Attempt *any three* of the following: 15
a.   What is a project? What are its characteristics?
b.   State and Explain phases of Project Management Life Cycle.
c.   What do you mean by Project portfolio management? What are its elements?
d.   How do you perform Cost benefit analysis (CBA)?
e.   Draw the diagram of Step Wise approach to planning software projects and explain step 1: Establish project scope and objectives in detail.
f.   Consider the project cash flow estimates for four projects as shown in the table; Negative levels represent expenditure and positive values income. Rank the four projects in order of financial desirability and make a note of your reasons for ranking them in that way. Conclusion should be based on Net profit, and ROI (Return on Investment)

Year	Project 1	Project 2	Project 3	Project 4
0	-100000	-100000	-1000000	-120000
1	20000	20000	300000	30000
2	30000	30000	300000	30000
3	10000	20000	300000	30000
4	20000	20000	300000	30000
5	20000	30000	300000	50000
Net Profit	?	?	?	?
ROI	?	?	?	?

2.   Attempt *any three* of the following: 15
a.   What is Atern/Dynamic Systems Development Method? What are its eight core principles?
b.   What are the Capers Jones Estimating Rules of Thumb?
c.   Explain Water fall Model with the help of diagram.
d.   Explain Scrum. What do you understand by the term 'ceremonies' in a Scrum project?
e.   Discuss the common problem faced during effort estimation.
f.   Write a short note on Albrecht Function Point/IFPUG.

3.   Attempt *any three* of the following: 15
a.   Differentiate between PERT (Program Evaluation Review Techniques) and CPM (Critical Path Method).
b.   Define Risk Management. Explain the different Categories of risk.
c.   State and describe the Burman's priority list in project management.
d.   What are the Boehm's top 10 development risks?

[*Turn over...*

e. Draw CPM and Determine the critical path, the critical activities and the project completion time. for the following activities.

Activity	Predecessor Activity	Duration (Weeks)
A	-	3
B	A	5
C	A	7
D	B	10
E	C	5
F	D,E	4

f. Draw PERT network using precedence network conventions for the project in table. Also show stepwise activities of forward pass and backward pass.

Activity	Duration	Precedents
A	6	-
B	4	-
C	3	A
D	4	B
E	4	B
F	10	-
G	3	E,F
H	2	C,D

4. **Attempt _any three_ of the following:**

a. Define the any three terms following: i) Scheduling Variance ii) Cost Variance iii) Earned Value iv) Schedule performance index v) Cost performance index

b. What is Contract? Explain the advantages and disadvantages of fixed price contracts.

c. Explain general recruitment process.

d. Discuss the factors of job satisfaction given by Oldham-Hackman. Also state the methods of improving motivation.

e. What is Stress? Explain stress management.

f. Describe the Ethical and Professional concern.

15

5. **Attempt _any three_ of the following:**

a. What are the different types of Team Structure?

b. What is CMM (Capability Maturity Model)? What are the various levels of CMM?

c. What is ISO standard? What are the sub-characteristics of Functionality and Reliability of ISO 9126 software qualities?

d. What are the five basic stages of Team Development?

e. What is Testing? Explain Test plan and Test management.

f. What do you mean by Premature Termination? What are the reasons for projects premature termination?

15

25/11/2022

(2½ Hours)

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1. **Attempt _any three_ of the following:**   15
   a. Explain foreach loop with suitable example.
   b. Distinguish between interface and abstract classes.
   c. What is namespace? Describe the System namespace.
   d. What is an assembly? Explain the difference between public and private assembly.
   e. Write a sample C# program to demonstrate class, object and method call. Use comments wherever require.
   f. Define the accessibility modifiers-public, private, protected, internal, and protected internal.

2. **Attempt _any three_ of the following:**   15
   a. What is postback? Explain IsPostBack property with suitable example.
   b. List and describe the various file types used in an ASP.NET application.
   c. What is an event? How is an event handler added?
   d. Write a short note on List controls in ASP.NET.
   e. Explain the need of user control. How is it created and used?
   f. What is the purpose of validation controls? List and explain the use of validation controls available in ASP.NET.

3. **Attempt _any three_ of the following:**   15
   a. Describe the use of multiple catch statements in exception handling using example.
   b. What is QueryString? How to send a name and marks of a student from one page to another using QueryString?
   c. Explain the events in global.asax file with respect to state management.
   d. How the connection between the content page and the master page is established?
   e. What is the theme? Explain how to create and use a theme on a website.
   f. What is URL mapping? How is URL mapping and routing implemented in ASP.NET?

4. **Attempt _any three_ of the following:**   15
   a. Describe the SqlConnection class with an example.
   b. Differentiate between DataSet and DataReader.
   c. Write c# code to insert data in database table. Write comments wherever required.
   d. What is use of data source control? Explain various types of data sources in ASP.NET.
   e. Write a code to display data from a table named Students(RollNo, Name, Marks) and display on grid view control when page is loaded.
   f. Describe (i) ExecuteNonQuery, (ii) ExecuteScalar, and (iii) ExecuteReader.

[_Turn over..._

5. **Attempt _any three_ of the following:** 15
a. Write a code to save employee data as empId, empName, empDept, and empDesignation data in an XML file.
b. What is XML? List and explain the various XML classes.
c. What do you mean by "authentication"? Describe its various types of authentication.
d. Explain the use of UpdateProgress control in AJAX.
e. What is use of timer control? Write the steps with appropriate code to create an application to display real-time timing (clock) on an asp.net web page
f. What are the benefits using Ajax? Explain UpdatePanel and ScriptManager.

Paper / Subject Code: 53704 / Artificial Intelligence

(2½ Hours)

[Total Marks: 75]

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1. **Attempt _any three_ of the following:**   15
a. Explain Artificial Intelligence with Turing Test approach.
b. Describe the contribution of Philosophy and Mathematics to Artificial Intelligence.
c. State the relationship between agents and environment.
d. What is PEAS description? Explain with two suitable examples.
e. Explain following task environments:
    i) Single Agent vs. Multiagent
    ii) Episodic vs. Sequential
f. Describe the structure of Utility based Agent.

2. **Attempt _any three_ of the following:**   15
a. Describe the problem formulation of Vacuum World problem.
b. Explain following terms:
    i) State Space of problem   ii) Path in State Space
    iii) Goal Test   iv) Path Cost
    v) Optimal Solution to problem
c. Give the outline of Breadth First Search algorithm with respect to Artificial Intelligence.
d. With the Local Search algorithm, explain the following concepts:
    i) Shoulder   ii) Global Maximum   iii) Local Maximum
e. Illustrate Hill Climbing algorithm using 8 queen problem.
f. Explain the mechanism of Genetic Algorithm.

3. **Attempt _any three_ of the following:**   15
a. Explain Minimax algorithm in detail.
b. Describe the technique of Alpha-Beta Pruning.
c. Write a short note on Kriegspiel's Partially observable chess.
d. What is knowledge based agent? Explain its importance in problem solving techniques.
e. Write a short note on Wumpus world problem.
f. Explain Forward-Chaining algorithm for Propositional definite Clauses.

4. **Attempt _any three_ of the following:**   15
a. What is meant by First Order Logic? Explain syntax and semantics of First Order Logic.
b. Write a short note on Universal and Existential quantifier with suitable example.
c. Explain the steps of Knowledge Engineering projects in First Order Logic.
d. Write a short note on Unification Process.
e. Explain Datalog used in first order definite clause.
f. Describe Backward-Chaining algorithm for First Order definite Clauses.

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[Turn over...

5. **Attempt _any three_ of the following:**   15
a. Explain Planning Domain Definition Language description for an Air Cargo planning problem.
b. Describe Forward (Progression) State-Space Search algorithm with an example.
c. Explain hierarchical planning.
d. Write a short note on Sensorless Planning Problem.
e. What are events? Explain its importance.
f. What is semantic network? Show the semantic network representation with a suitable example.

Paper / Subject Code: 53706 / Enterprise Java

(2½ Hours)

[Total Marks: 75]

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1.   Attempt *any three* of the following: 15
   a. What is an enterprise application? What is the enterprise edition of Java?
   b. Define Java EE containers with the various Java Container types.
   c. Explain the life cycle of a servlet application.
   d. Write a short note on javax.Servlet.Servlet package.
   e. What is a JDBC Statement object? Explain its 3 types.
   f. List and explain each of the four JDBC driver types.

2.   Attempt *any three* of the following: 15
   a. Explain two methods of RequestDispatcher interface.
   b. Where are cookies used? Describe any four important methods of cookie class.
   c. What is a session? Explain Session Management Rules.
   d. What is Non-Blocking I/O? How it works?
   e. Write a servlet code to download a file.
   f. Which things needs to be carefully checked and understood while writing file uploading code in servlet?

3.   Attempt *any three* of the following: 15
   a. What is the use of Java Server Pages? Give the difference between JSP and Servlets.
   b. Explain Life Cycle of a JSP Page.
   c. What are directives in JSP? Explain its types.
   d. Give an explanation of the jsp:useBean action tag's attributes and usage.
   e. Write a short note on <JSP:plugin> Action.
   f. What exactly is JSTL? Describe XPath in detail.

4.   Attempt *any three* of the following: 15
   a. What is EJB? Explain its advantages.
   b. Write a detailed note on the type of Session beans.
   c. Write a short note on Remote and Local Interfaces.
   d. Describe message-driven beans characteristics.
   e. What is a naming service?
   f. Write a note on DataSource Resource Definition in Java EE 7.

5.   Attempt *any three* of the following: 15
   a. Explain following:
      i) JOIN condition Using ON ii) Entity Listeners Using CDI
   b. Where Does Java Persistence API Fit In?
   c. Why is there a need for Object Relational Mapping (ORM)?
   d. Write a short note on Functions in JPQL and Downcasting in JPQL.
   e. What is Hibernate? Explain the features of Hibernate.
   f. Explain the components of Hibernate configuration.

(2½ Hours)

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1.   Attempt *any three* of the following: 15
a.   Define and explain Internet of Things and Ubiquitous Computing.
b.   "Any sufficiently advance technology in indistinguishable from magic." Discuss.
c.   What is calm and ambient technology? Explain with example.
d.   "Be conservative in what you do; be liberal in what you accept from others". Explain.
e.   Define protocol. Explain the following application layer protocols:
        i) HTTPS   ii) SMTP   iii) FTP   iv) POP3   v) IMAP
f.   Discuss the following IOT device use at Dos Liverpool.
        i) Central Heating System.   ii) Doorbot

2.   Attempt *any three* of the following: 15
a.   How can we decide between the cost and ease of prototyping?
b.   Discuss the merits and demerits of mixing open source and close source.
c.   Explain the transition from prototype to production.
d.   With the help of an example explain the process of Scaling up the electronics.
e.   Explain the following with respect to prototyping embedded devices: Processor
     Speed, RAM, Networking, Power Consumption and physical size and form factor.
f.   Compare Raspberry Pi and Arduino.

3.   Attempt *any three* of the following: 15
a.   Explain the sketch, iterate and explore process in prototyping.
b.   What are the features that need to be considered while choosing a laser cutter?
c.   Explain the use of repurposing /recycling in prototyping IoT devices.
d.   What is an API? What do you mean by mashing up API?
e.   What are the legalities associated with scrapping?
f.   Explain HTML5 web socket

4.   Attempt *any three* of the following: 15
a.   Define business model. Explain different factors in the definition.
b.   With the help of the diagram explain business model canvas.
c.   Explain government funding for IoT projects.
d.   How can we make optimum use of RAM while writing code for embedded devices?
e.   With the help of examples compare stack and heap .
f.   Explain in detail the process of debugging the code for embedded devices.

5.   Attempt *any three* of the following: 15
a.   How are printed circuit board are designed? Explain.
b.   Write a short note on mass-producing the case and other fixtures.
c.   What is the important of certification? Why it is required?
d.   Explain privacy with respect to IOT devices in detail.
e.   Discuss the environmental issues associated with IOT devices.
f.   What is cautious optimism? Explain.

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1.   **Attempt *any three* of the following:**   15
a.   Explain the duties of Linux system administrator in creating and managing users.
b.   Write a short note on bash.
c.   Discuss the difference between piping and redirection with the help of an example.
d.   With the help of an example, write the steps to mount a device in Linux.
e.   List the differences between hard and symbolic links.
f.   Explain the steps to create and manage your own repository in yum.

2.   **Attempt *any three* of the following:**   15
a.   Explain the different kinds of partitions in linux and their characteristics.
b.   Discuss the steps to create a swap file.
c.   What are runlevels in Linux? Explain the commands used to manage services.
d.   Discuss the steps to configure key based SSH authentication.
e.   Elaborate what basic permissions are and how they are applied to files and directories in linux.
f.   Explain the user information configuration file.

3.   **Attempt *any three* of the following:**   15
a.   State the steps to setup a firewall that allows SSH packets.
b.   What are modules in a firewall? Explain the limit module.
c.   Explain how to create and manage certificates with openssl.
d.   List the steps to encrypt, share and decrypt files using GPG.
e.   With the help of an example, explain exporting and mounting of NFS share.
f.   Discuss the steps to setup a Samba server.

4.   **Attempt *any three* of the following:**   15
A.   Write a short note on cache-only nameserver.
B.   Explain the DHCP server configuration.
C.   Discuss the role of MUA, MTA, and MDA in the email process.
D.   Explain the various parameters for secure internet configuration of Postfix server.
E.   State the steps to setup virtual hosts in Apache.
F.   Explain how the DirectoryIndex, Options, AllowOverride, and Order directives in Apache.

5.   **Attempt *any three* of the following:**   15
a.   Discuss the various ways in which a shell script can be executed.
b.   Write a shell script to add ten users, remove their passwords and add them to the group students. Use for loop.
c.   Explain the steps to setup a quorum disk.
d.   Discuss the steps to setup fencing.
e.   Explain the steps to perform an automated installation using a kickstart file.
f.   List the steps to configure DHCP for PXE boot.

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