

TYBSc IT Sem IV
NOV-2024

(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 three of the following:** 15
 - a. What are the different V's of big data?
 - b. What are two facts about big data?
 - c. Explain the 4 categories of NoSQL databases.
 - d. What is the difference between SQL database and MongoDB?
 - e. What are NRW notations? How read and writes implemented in NoSQL databases?
 - f. What is CAP theorem in NoSQL?

2. **Attempt any three of the following:** 15
 - a. Does MongoDB support polymorphism? Justify your answer.
 - b. Explain MapReduce concept and its application in MongoDB.
 - c. Write MongoDB queries to create, drop and manage indexes.
 - d. Consider a MongoDB database that has collection "students" with a given schema:


```
{
    _id: 1,
    Name: "Full Name",
    Age: 18,
    Gender: "M",
    Class: "TYIT",
    Gradepoints: 10
  }
```

 Write MongoDB queries for following:
 - i. find all students who are younger than 17 (Age < 17)
 - ii. find out all of the students with Gradepoints >= 8
 - iii. find all students who belong to either class TYIT or SYIT
 - iv. find out all students whose gender is either "M" or they belong to class TYIT or SYIT and whose age is less than or equal to 16
 - v. find all students with names starting with "St" or "Te" and whose class begins with "TY"
 - e. Explain the process of election for selecting a primary member in replica set.
 - f. What is sharding? List and explain sharding components.

3. Attempt any three of the following: 15
- What is the WiredTiger storage engine in MongoDB?
 - Explain limitations of BSON document in MongoDB.
 - Explain Namespace (.ns File) in MMAPv1 storage engine of MongoDB.
 - What is GridFS in MongoDB?
 - Explain limitations of sharding in MongoDB.
 - Design a schema for social networking website in MongoDB database.
4. Attempt any three of the following: 15
- Explain Spark architecture with neat diagram.
 - Write a short note on VoltDB database's partitioning.
 - Write a jQuery to demonstrate slideUp(), slideDown () and slideToggle() methods.
 - What is event propagation in jQuery?
 - What is DOM in jQuery? How it works?
 - Write a short note on disk economics.
5. Attempt any three of the following: 15
- Explain six structural character tokens in JSON.
 - What is document.cookie? Explain functions of setCookie() and getCookie () methods.
 - List and explain various data types in JSON.
 - Write a short note on JSONP.
 - Describe members of Web Storage API.
 - Write a short note on JSON.stringify() method.
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1. Attempt any three of the following: 15
 - a. Explain the JDBC Statement object and the various types available.
 - b. Provide a short overview on the Deployment Descriptor file and its elements.
 - c. Write a brief note on JDBC drivers, outlining their types and benefits.
 - d. Describe the various types of containers in Java Enterprise Edition.
 - e. Explain the servlet application lifecycle and include a relevant diagram.
 - f. What advantages do Servlets offer over CGI?

2. Attempt any three of the following: 15
 - a. What are Sessions? Which methods are used in tracking a Session?
 - b. Summarize non-blocking I/O and its main features.
 - c. Explain Cookie class with its any four methods.
 - d. Distinguish between persistent cookies and session cookies.
 - e. Define Request Dispatcher interface. List its two methods.
 - f. Write a program to upload a file using servlet.

3. Attempt any three of the following: 15
 - a. Describe the lifecycle of a JSP with suitable diagram.
 - b. Describe five JSTL function tags, including their syntax.
 - c. List the name of JSP implicit objects. Explain any three in detail.
 - d. Compare JSP and servlets, highlighting their differences.
 - e. What are JSP directives? Describe the different types of directives with examples.
 - f. Describe five JSP action elements, including appropriate code examples.

4. Attempt any three of the following: 15
 - a. Describe the basics of performing a lookup in JNDI.
 - b. Write a note on package EJB JAR and WAR module.
 - c. What are the advantages of using Enterprise Java Beans?
 - d. How Message Driven Bean works? Explain its lifecycle.

- e. Describe the lifecycle of an interceptor.
- f. Provide an overview of Enterprise Bean Architecture.

5. Attempt any three of the following:

15

- a. Describe the architecture of Hibernate, including a relevant diagram.
 - b. Explain different JPQL functions.
 - c. What is impedance mismatch? How can it be resolved?
 - d. Write a note on Java Persistent API.
 - e. What is Hibernate? Describe its key features.
 - f. Explain the basic concepts of Java Persistence API and describe its key components.
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TYBScIT Sem V [Reg]
NOV-2024

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1. Attempt any three of the following:

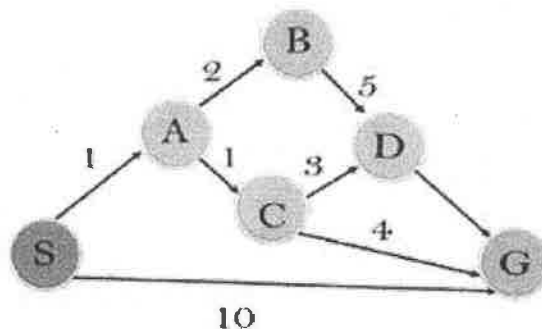
15

- What is AI? List the disciplines that contributed ideas, viewpoints, and techniques to AI.
- What are the various application areas of AI? Explain.
- Give the PEAS description for the taxi's task environment.
- What are Fully observable, partially observable and unobservable task environments? Explain.
- Explain Model-based reflex agents.
- What are the components of learning agents? Explain.

2. Attempt any three of the following:

15

- What are the various components of a problem? Explain.
- Explain Depth limited search with an example.
- What is Hill-climbing search? What are the variants of hill climbing?
- Given the graph with $f(n)$ and $h(n)$ where S is the Start node and G is the goal node. Apply A* algorithm and find out the best path.



State	$h(n)$
S	5
A	3
B	4
C	2
D	6
G	0

- How does learning happens in online search? Explain.
- Write a short note on Simulated Annealing.

5. Attempt any three of the following:
- Explain the concept of designing kits.
 - What is the design process of PCB? Explain.
 - Discuss the various certification issue for the IOT product.
 - What do you mean by CROWDSOURCING?
 - Describe the Human cost.
 - Define the term "THE OPEN INTERNET OF THINGS DEFINITION".
-

TY BSc IT Sem II (Reg)
NOV. 2024

(2½ Hours)

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1. Attempt any three of the following: 15

- a. Write down the steps for: add a new User and Groups, modify its properties and view Groups via user manager application.
- b. List and Explain duties of Linux system administration.
- c. Explain two ways to gain administrative privileges using **su** and **sudo** command.
- d. How to manage packages on RHEL using both YUM and PackageKit Suit.
- e. Explain adding, enabling, disabling YUM repository.
- f. Describe installing package, package group and removing a package.

2. Attempt any three of the following: 15

- a. Write down the steps to establish a wireless connection for mobile broadband.
- b. Explain different kinds of partition in Linux.
- c. Describe different types of file system and its properties.
- d. Write a short note on ETH Tool.
- e. Explain Network Configuration and Interface configuration files.
- f. How to create Logical Volume with three different parts.

3. Attempt any three of the following: 15

- a. Discuss the steps to install and configure VNC Server.
- b. Write short note on MTA, MDA and MUA.
- c. Explain all the steps to set up a Samba server.
- d. What is the concept of APACHE HTTP Server? explain in brief.
- e. Explain Mail Access Protocol.
- f. What is DNS Server and explain its Nameserver zone with BIND.

4. Attempt any three of the following: 15

- a. Explain **ps** and **top** command with their options.
- b. Write down the steps to run the Net-snmp package.
- c. Explain the basic configuration of RSYSLOG file.
- d. How to install CRON and ANCRON daemons.
- e. Explain the working with Queue in Rsyslog.

f. Discuss the following commands:

- a. lsblk
- b. lsblk -l
- c. blkid
- d. findmnt
- e. findmnt -l

5. Attempt any three of the following:

15

- a. Write down the steps to allow basic services through the firewall using system-config-firewall.
 - b. What is tables, chains, and rule? How is rule composed? explain in brief.
 - c. Explain the configuration of NAT.
 - d. Write the steps for creating, exchanging, and managing GPG keys.
 - e. What are the elements of bash shell? Write one example in bash shell with executing script.
 - f. How to create and manage certificate using openssl command-line utility.
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TYBSc IT Sem II (Reg)
NOV. 2024

(2½ Hours)

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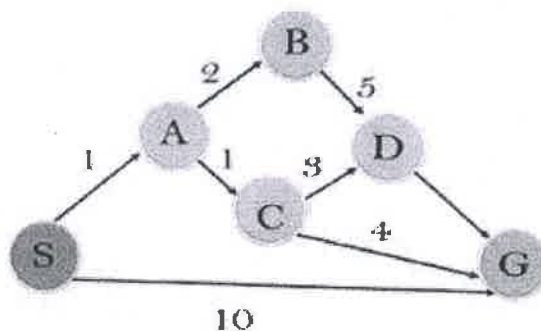
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2. Attempt **any three** of the following:

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- What are the various components of a problem? Explain.
- Explain Depth limited search with an example.
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- Given the graph with $f(n)$ and $h(n)$ where S is the Start node and G is the goal node. Apply A* algorithm and find out the best path.



State	$h(n)$
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D	6
G	0

- How does learning happens in online search? Explain.
- Write a short note on Simulated Annealing.

3. Attempt any three of the following: 15
- Explain the min-max algorithm working with an example.
 - What are the elements used in defining the game formally? Explain.
 - Covert the following into First order logic.
 - All birds fly.
 - Every man respects his parent.
 - Some boys play hockey.
 - Not all students like both AI and LA.
 - Only one student failed in SPM subject.
 - Define Wumpus world problem in terms of first order logic.
 - Write alpha beta pruning algorithm.
 - Explain Bayes theorem with an example.
4. Attempt any three of the following: 15
- Differentiate between forward and backward chaining.
 - What is first order logic? Explain the different elements used in First order logic.
 - What is Unification? Find the most general unifier (MGU) for the following:
Find the MGU of $A(x, f(g(x)), a)$ and $A(b, y, z)$
 - Differentiate between propositional logic and first order Logic.
 - Define Artificial Neural Network. Explain the architecture of it.
 - What are the different types of Artificial Neural Networks. Explain.
5. Attempt any three of the following: 15
- Write PDDL description for the following Spare tire problem:
Consider the problem of changing a flat tire. The goal is to have a good spare tire properly mounted onto the car's axle, where the initial state has a flat tire on the axle and a good spare tire in the trunk. There are just four actions: removing the spare from the trunk, removing the flat tire from the axle, putting the spare on the axle, and leaving the car unattended overnight.
We assume that the car is parked in a particularly bad neighborhood, so that the effect of leaving it overnight is that the tires disappear.
 - Write a short note on mutual exclusion.
 - Write an algorithm for GraphPlan.
 - Explain state space search for planning.
 - How to solve scheduling problems? Explain.
 - Write a short note on Generative AI.

TYBSc IT sem II (Reg)

NOV. 2024

(2½ Hours)

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1. Attempt any three of the following: 15
 - a. Explain various components of CLR (Common Language Runtime) in detail.
 - b. What is meant by Boxing and Unboxing? Explain it with reference to value type and reference type.
 - c. Write a short note on Jagged Array supported by Dotnet Framework.
 - d. Write a short note on namespace in .NET
 - e. In .NET framework, what are the sealed classes and sealed methods? Why are they used?
 - f. Compare and contrast between public assembly and private assembly.

2. Attempt any three of the following: 15
 - a. Explain the concept of layer architecture of ASP.NET.
 - b. Explain importance of Global.asax file in ASP.NET applications.
 - c. Differentiate between List Box and Drop-Down Lists. List and explain any three common properties of these controls.
 - d. How Ad Rotator component of ASP.NET is helpful to earn revenue? Explain it with demonstration.
 - e. Explain how SiteMapPath control is used in ASP.NET application.
 - f. What are the uses of autopostback and runat properties of ASP.NET web controls?

3. Attempt any three of the following: 15
 - a. Why exception handling is required? Write syntax for exception handling?
 - b. What is state management? Explain Application state management of ASP.NET applications.
 - c. Explain relation between content page and master page.
 - d. What is meant by Cookies? Explain how it is created and used in ASP.NET application.
 - e. What is user-defined exception? Explain with example.
 - f. Various common HTTP status codes and messages are generated during ASP.NET tracing mechanism, Explain each of these HTTP status code.

4. Attempt any three of the following: 15
 - a. Write a short note on ADO.NET architecture.
 - b. Explain following ADO.NET objects.
 (i) Connection (ii) Command (iii) Adapter

- c. Explain various types of data sources available in ASP.NET.
- d. Write a C# code to which display all records from employee table in GridView from database stored in MS SQLServer.
- e. With the help of C# code, explain how ListView control can be used to populate data from the table stored in database.
- f. What is meant by DataBinding? Explain different types of DataBinding in ASP.NET applications.

5. Attempt any three of the following:

15

- a. Write a short note on Windows based and Form based authentication of ASP.NET application.
 - b. What do you mean by Impersonation in ASP.NET? Explain.
 - c. What is meant by NuGet Application? Why it is used in web based application?
 - d. What is meant by Bootstrap application? Explain various features of Bootstrap.
 - e. Write a short note on the following AJAX components.
(i) ScriptManager (ii) UpdatePanel
 - f. With demonstration, explain how AJAX based application is created using Timer control.
-

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1. Attempt any three of the following: 15

- Define and explain the Internet of Things.
- List and explain the roles of people making IOT.
- Discuss the issue of Privacy in Internet of Things.
- What is manufactured normalcy field? Explain.
- What is DNS? How does it work?
- Define protocol. Explain the following application layer protocols: HTTP, HTTPS, SMTP and FTP.

2. Attempt any three of the following: 15

- What is sketching? Explain its role in prototyping.
- Discuss the tradeoffs between cost versus ease of prototyping.
- Discuss the Disadvantages of Open Source.
- With the help of an example explain the process of scaling up the electronics.
- Explain the following with respect to prototyping embedded devices: Processor Speed, RAM, Networking and Power Consumption.
- What are sensors and actuators explain in brief.

3. Attempt any three of the following: 15

- When choosing a laser cutter which two main features should be considered?
- List and explain non-digital methods or traditional techniques used while prototyping a physical form of a device.
- Explain the concept of repurposing/recycling with respect to prototyping physical design.
- What is Clockodillo? Explain how to solve the security issues of an API by Clockodillo?
- Define JSON and Remote Procedure Calls.
- Explain the designing a web application for Humans.

4. Attempt any three of the following: 15

- Define Memory Management. List and explain the types of Memory.
- Give the difference between Stack and Heap.
- Discuss the concept of debugging in detail.
- What do you mean by Venture Capital? Explain.
- Explain the concept of "From craft to mass production".
- Describe the hobby project and open source.

5. Attempt any three of the following:
- a. Explain the concept of designing kits.
 - b. What is the design process of PCB? Explain.
 - c. Discuss the various certification issue for the IOT product.
 - d. What do you mean by CROWDSOURCING?
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T4BSc IT Sem V [Regular]

NOV. 2024

(2½ Hours)

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1. Attempt any three of the following: 15
 - a. What is project charter in software project management? What are the elements of project charter.
 - b. Define business case. Specify the content of business case document.
 - c. What is project portfolio management. Explain the key aspects of project portfolio management.
 - d. Define the following terms:
 i) Net profit ii) Return of Investment iii) Payback period iv) Net present value
 v) Internal rate of return
 - e. Explain the change control process.
 - f. Discuss in brief about risk evaluation and management.
2. Attempt any three of the following: 15
 - a. What is Waterfall model? Explain with advantages and disadvantages.
 - b. State Capers Jones rules of thumb for software estimation.
 - c. Write a note on COCOMO II model.
 - d. What is a work breakdown structure (wbs)? Explain.
 - e. Explain the five major components of Albrecht Function Point Analysis.
 - f. Write notes on Spiral Model.
3. Attempt any three of the following: 15
 - a. Draw AOA Network and calculate total project duration. Show critical critical path. Calculate EST, EFT, LST.

Activity	Duration days
1-2	4
2-3	5
2-4	7
2-5	4
3-10	15
4-6	7
4-7	Dummy
5-10	10
6-8	6
7-8	7
8-9	12
9-10	10

- b. Describe Monte Carlo simulation.
 - c. Explain Boehm's top ten software project risks and the different strategies for reducing it.
 - d. Write notes on risk identification process.
 - e. Explain Boehm's top ten risks and counter measure.
 - f. Explain the nature of resources and their scheduling.
4. Attempt any three of the following: 15
- a. Describe the Monitoring and Controlling process for software projects.
 - b. What is fixed price contract? List the advantages and disadvantages of fixed price contract.
 - c. Explain Taylor's model of motivation.
 - d. What is meant by software configuration management? Explain the two principle activities of configuration management.
 - e. Explain in detail Old-Hackman job satisfaction Model.
 - f. What is stress? Explain the causes of organizational stress.
5. Attempt any three of the following: 15
- a. Enumerate McCall's Quality Criteria.
 - b. Explain different leadership styles.
 - c. Discuss Boehm's Quality Model.
 - d. What are the steps of conducting a post implementation project review?
 - e. Discuss in brief Matrix organization.
 - f. Write short note on Project Closeout Report.
-

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