

Depth.

Roll No. : .....

Total No. of Pages : 3

## MCA-T302/O

MCA (IIIrd Semester) Examination, 2021

### DISIGN AND ANALYSIS OF ALGORITHMS

*Time Allowed : 1½ Hours*

*Maximum Marks : 80*

#### Part-A

[Marks : 30]

**Note** :- Answer all questions (50 words each). All questions carry equal marks.

#### Part-B

[Marks : 50]

**Note** :- Answer any two questions (250 words each). All questions carry equal marks.

#### Part-A

1. Answer the following :

- (i) Define Omega ( $\Omega$ ) notation.
- (ii) What is structured programming ?
- (iii) Write recurrence relation for Merge sort.

MCA-T302/O

( 1 )

SN-2479 P.T.O.

- (iv) Differentiate between DFS and BFS.
- (v) Define 0/1 knapsack problem.
- (vi) How branch and bound is better than backtracking ?
- (vii) What is LU decomposition ?
- (viii) What is disjoint set ?
- (ix) Give definition of NFA (Non-deterministic Finite Automata).
- (x) Write steps to find inversion of Matrix.

### **Part-B**

- 2. Discuss various order notation in brief.
- 3. Solve the following recurrence :

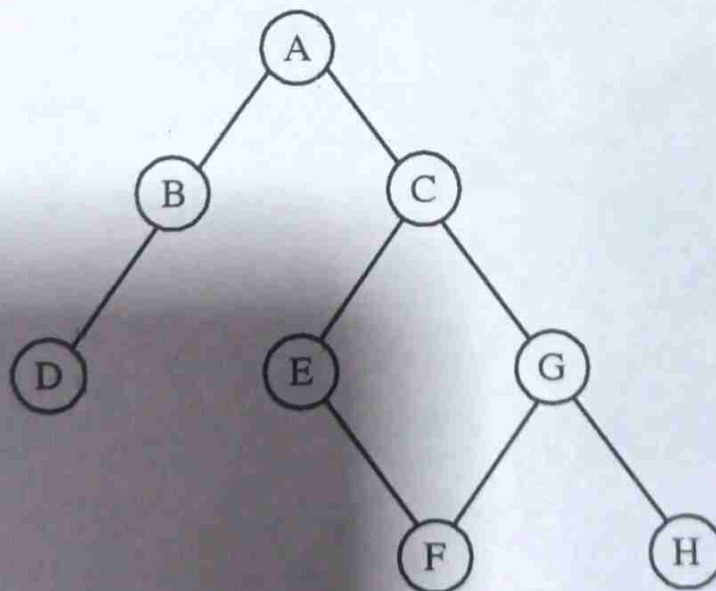
$$T(n) = \begin{cases} T(n/2) + k, & n \geq 2 \\ k, & n = 1 \end{cases}$$

- 4. Multiply the following  $2n$  bit numbers using divide and conquer technique :

$$A = 1011 \text{ and } B = 0110$$

- 5. What is minimum spanning tree ? Give suitable example to find the same using prim's algorithm.

6. Discuss sum of subsets problem with the help of example.
7. Differentiate between dynamic programming with divide and conquer method.
8. Write Strassen's algorithm and analyze it.
9. Write disjoint set UNION-FIND algorithm and discuss.
10. Write an algorithm for quick sort and do analyze it.
11. Find the DFS (Depth First Search) of the following graph. Also write an algorithm for it :



# **MCA-T201**

## **MCA (IInd Semester) Examination, 2021 DESIGN AND ANALYSIS OF ALGORITHMS**

*Time Allowed : 1½ Hours*

*Maximum Marks : 80*

### **Part-A [Marks : 30]**

**Note :-** Answer all questions (**50** words each). All questions carry equal marks.

### **Part-B [Marks : 50]**

**Note :-** Answer any *two* questions (**250** words each). All questions carry equal marks.

### **Part-A**

1. Answer the following questions :

- (i) List the names of Order Notation.
- (ii) What do you understand by Analyzing an Algorithm ?

- (iii) Define Greedy Method.
- (iv) Differentiate between DFS and BFS.
- (v) Write principle of Optimality.
- (vi) Write down names of problems that can be solved using backtracking.
- (vii) Give the recurrence relation for Strassen's matrix multiplication.
- (viii) Give the syntax and meaning of FIND and DELETE operations.
- (ix) What do you understand by Knapsack Problem ?
- (x) Define the term Minimum Spanning Tree.

### **Part-B**

- 2. How best case and worst case analysis is related to the lower bound and upper bound ?
- 3. Write an algorithm for binary search and do its analysis.
- 4. Write an algorithm for merge sort and analyze it.
- 5. Write Kruskal's Algorithm.



6. Differentiate between Backtracking and Branch and Bound Method.
7. What do you mean by N-queen Problem ?
8. Do analyze recurrence relation of matrix multiplication using Strassen's Approach.
9. Discuss the importance of set operations as data structure.
10. Discuss asymptotic notations in brief.
11. How problems are solved using divide and conquer method ?

Roll No. : .....

Total No. of Pages : 4

## **MCA-T403**

**M.C.A. (IVth Semester) Examination, 2021**

### **SOFTWARE ENGINEERING**

*Time Allowed : 1½ Hours*

*Maximum Marks : 80*

#### **Part-A**

**[Marks : 30]**

**Note :-** Answer all questions (50 words each). All questions carry equal marks.

#### **Part-B**

**[Marks : 50]**

**Note :-** Answer any two questions (250 words each). All questions carry equal marks.

#### **Part-A**

1. (i) List down the name of different software process models ? With a neat diagram, explain the prototyping model of software development process.
- (ii) Define project management concepts.
- (iii) What is risk management in Software Engineering ?

- (iv) Write down the full form of Model.
- (v) Define SCM Process. Define elicitation for software with a neat diagram.
- (vi) Software Requirements Specification generated as the output of Requirement Analysis. Explain the properties and outlines of the SRS.
- (vii) Explain alpha testing and beta testing.
- (viii) Define the term Abstraction in Software Engineering.
- (ix) Define Software Risk.
- (x) Explain the role of testing in Software Development.

### Part-B

2. With a neat diagram, explain the concurrent development model of software development process.
3. Define the following points :
  - (i) Management spectrum
  - (ii) Software characteristics
  - (iii) Spiral model of software development process

MCA-T403

( 2 )

SN-2019

- (i) What are empirical techniques in Software Engineering ?
- (ii) Describe the COCOMO model in detail for s/w cost estimation.
- (iii) What is Software Project Estimation ?
- (iv) Define the following points :
  - (i) Size Oriented Metrics
  - (ii) Function Oriented Metrics
  - (iii) Risk Refinement
  - (iv) Risk Mitigation
- (v) What is the difference between Quality Assurance (QA) and Quality Control (QC) ?
- (vi) Define Software Quality Assurance and also write down the benefits of Software Quality Assurance (SQA).
- (vii) What are the characteristics of Good SRS Document ?
- (viii) What are the contents of SRS with an example ?
- (ix) Discuss in brief the structure of SRS with an example.
- (x) Explain the role of functional independence, coupling and cohesion with respect to modular design.

MCA-T403

( 3 )

SN-2019 P.T.O.



9. Write short notes on the following :

- (i) Alpha Testing
- (ii) Beta Testing
- (iii) Accepting Testing
- (iv) Stress Testing

10. The project team developing a new system is experienced in the domain. Although the new project is fairly large, it is not expected to vary much from applications that have been developed by this team in the past. Which process model would be appropriate for this type of development ?

- (i) Prototyping Model
- (ii) Waterfall Model
- (iii) Spiral Model

Justify your answer. Also explaining why other models not chosen by you are unsuitable ?

11. Define the terms Quality, Quality plan and Quality metric. Discuss in brief the various function oriented metrics and six oriented metrics used for evaluating software quality.

Depth

Roll No. : .....

Total No. of Pages : 4

## MCA-T203

MCA (II Semester) Examination, 2022

### SOFTWARE ENGINEERING

*Time Allowed : 1½ Hours*

*Maximum Marks : 80*

#### PART-A

[Marks : 30]

**Note:** Answer all questions (50 words each). All questions carry equal marks.

#### PART-B

[Marks : 50]

**Note:** Answer any two questions (250 words each). All questions carry equal marks.

#### PART-A

1.
  - (i) Define Software Engineering.
  - (ii) List various Software Process Models?
  - (iii) What is Risk?
  - (iv) Differentiate between Metrics and Indicators.
  - (v) List a few empirical estimation models.
  - (vi) List various software configuration items?
  - (vii) What do you understand by requirements elicitation?

- (viii) Differentiate between Cohesion and Coupling.
- (ix) List the basic design principles.
- (x) What is software crisis?

## PART-B

### Smart City Project

A smart city is a technologically modern urban area that uses different types of electronic methods and sensors to collect specific data. Information gained from that data is used to manage assets, resources and services efficiently. In return, that data is used to improve operations across the city. This includes data collected from citizens, devices, buildings and assets that is processed and analysed to monitor and manage traffic and transportation systems, power plants, utilities, water supply networks, waste, Criminal investigations, information systems, schools, libraries, hospitals, and other community services. Smart cities are defined as smart both in the ways in which their governments harness technology as well as in how they monitor, analyze, plan, and govern the city.

The smart city concept integrates information and communication technology (ICT), and various physical devices connected to the Internet of things (IoT) network to optimize the efficiency of city operations and services and connect to citizens. Smart city technology allows city

MCA-T 203

(2)

officials to interact directly with both community and city infrastructure and to monitor what is happening in the city and how the city is evolving. ICT is used to enhance quality, performance and interactivity of urban services, to reduce costs and resource consumption and to increase contact between citizens and government. Smart city applications are developed to manage urban flows and allow for real-time responses. A smart city may therefore be more prepared to respond to challenges than one with a conventional "transactional" relationship with its citizens. Yet, the term itself remains unclear in its specifics and therefore, open to many interpretations.

Assume that you are given the task of implementing the software solution for the above mentioned Smart City Project. Answer the following questions in reference to the above smart City Project.

2. Describe the best software Process Model for this scenario giving suitable justification.
3. Discuss the Management Spectrum in context of this Smart City Project.
4. List and explain various types of Process and Project Metrics suitable for this project.
5. What are the suitable estimates for this Project?
6. Prepare a Software Quality Assurance Plan for this Project.

MCA-T 203

(3)



7. Explain the role of Software Configuration Management in context of this project.
8. Explain various Design Concepts which will be applicable in this project.
9. Explain the significance of modular design in the context.

---X---



Roll No. : .....

Total No. of Pages : 2

## **MCA-T202**

M.C.A. (II Semester) Examination, 2022

### **JAVA PROGRAMMING**

*Time Allowed : 1½ Hours*

*Maximum Marks : 80*

#### **Part-A [Marks : 30]**

**Note:** Answer all questions (50 words each). All questions carry equal marks.

#### **Part-B [Marks : 50]**

**Note:** Answer any two questions (250 words each). All questions carry equal marks.

#### **Part-A**

1. Answer the following questions:
  - (i) How constructor is created in Java?
  - (ii) What is Polymorphism?
  - (iii) Define Multithreading.
  - (iv) What is Access Control?
  - (v) Difference between package and interface.

T-202

(1)

P.T.O.

- (vi) What are exceptions?
- (vii) Define thread priority.
- (viii) Why Java is platform independent?
- (ix) Define Servlet life cycle.
- (x) What is Servlet and its types?

### **Part-B**

2. Explain the basic concepts of object oriented programming.
3. Explain constructors and destructors in Java with examples.
4. Elucidate 'exception handling' in Java with neat example.
5. Discuss in detail packages and interfaces.
6. Discuss the four types of JDBC driver with suitable diagram.
7. How to define a package? How to access, import a package? Explain with an example.
8. Explain servlet life cycle with an example.
9. Explain the following:
  - (i) Web components
  - (ii) HTTP methods

# MCA-T202

M.C.A. (IInd Semester) Examination, 2021

## JAVA PROGRAMMING

*Time Allowed : 1½ Hours*

*Maximum Marks : 80*

### Part-A [Marks : 30]

**Note :-** Answer all questions (**50** words each). All questions carry equal marks.

### Part-B [Marks : 50]

**Note :-** Answer any *two* questions (**250** words each). All questions carry equal marks.

### Part-A

1. (i) What is Encapsulation ?
- (ii) Define Abstract Classes.
- (iii) What do you mean by AWT and Swings ?
- (iv) What is JDBC ?

- (v) Write any *two* Applet tag.
- (vi) Define Synchronization.
- (vii) What is Servlet API ?
- (viii) What do you mean by Inheritance ?
- (ix) What is Multithreading ?
- (x) What do you mean by attributes in Servlet ?

### **Part-B**

- 2. Explain overview of OOPS concepts.
- 3. Describe about structure of a Java program with an example.
- 4. Elucidate 'exception handling' in Java with neat example.
- 5. Explain the following :
  - (a) Types of statement objects
  - (b) Web components
- 6. Explain enterprise architecture style in J2EE platform.
- 7. How do applets differ from application programs ?  
Explain with an example.



8. Explain package and interfaces in Java.
9. Explain constructors and destructors in Java.
10. Explain servlet life cycle with an example.
11. Write short notes on the following :
  - (a) JDBC and AWT
  - (b) Overview of Servlet

Roll No. : .....

Total No. of Pages : 2

# MCA-E 206-2

M.C.A (II Semester) Examination, 2022

## CLOUD COMPUTING

Time Allowed : 1½ Hours

Maximum Marks : 80

### Part-A [Marks : 30]

**Note:** Answer all questions (50 words each). All questions carry equal marks.

### Part-B [Marks : 50]

**Note:** Answer any two questions (250 words each). All questions carry equal marks.

### Part-A

1.
  - (i) What is network virtualization?
  - (ii) What is storage virtualization?
  - (iii) Describe some of the provided by Microsoft Azure.
  - (iv) What is (a) Macie (b) Sage Maker?
  - (v) What is third party cloud services?
  - (vi) What are the goals of disaster recovery and how they are achieved?

- (vii) What is HDFS and how it works?
- (viii) Discuss about any two storage networking technologies in cloud.
- (ix) Explain the on-demand computing and differentiate between the types of hypervisors.
- (x) What is XaaS? What is monetizing data in cloud environment?

### Part-B

2. Differentiate between Type I and type 2 hypervisor.
3. Differentiate between grid, cluster and cloud computing in a pointwise manner.
4. Describe any four services provided by amazon EC2.
5. What do you mean by Social Network Analysis? How Cloud Computing can help in analysis?
6. Define SLA? What are the parameters to measure SLA?
7. What is Federated cloud? List any three technologies that aid in federation of clouds.
8. List some major differences in SAN and NAS.
9. Why security is essential in cloud environment? How it is achieved?

---X---

# **MCA-T304**

**M.C.A. (IIIrd Semester) Examination, 2021-22**

## **CLOUD COMPUTING**

### **Paper-IV**

*Time Allowed : 1½ Hours*

*Maximum Marks : 80*

#### **Part-A**

**[Marks : 30]**

**Note :-** Answer all questions (50 words each). All questions carry equal marks.

#### **Part-B**

**[Marks : 50]**

**Note :-** Answer any two questions (250 words each). All questions carry equal marks.

#### **Part-A**

1. (i) Define Cloud Computing.
- (ii) What is Virtualization ?
- (iii) Name few vendors in cloud computing.
- (iv) What is Data Analysis ?

MCA-T304

( 1 )

**S-330** P.T.O.



- (v) What is meant by cloud security ?
- (vi) What is service level agreement ?
- (vii) Define FCIP.
- (viii) Define HDFS.
- (ix) What is private and public clouds ?
- (x) Define Google App Engine.

### Part-B

2. (a) Discuss the layers and service models in cloud computing. 3x10=30
- (b) Discuss the types of hypervisor.
3. Write short notes on the following : 15+10=25
  - (a) Cloud reference models
  - (b) Cloud computing architecture
4. (a) Discuss the major vendors and their offerings in cloud computing. 13+12=25
- (b) Write a note on Amazon Web Services. 15+10=25
5. (a) Explain cloud applications and satellite image processing. 15+10=25
- (b) Write a note on social networking. 15+10=25

MCA-T304

( 2 )

S-330

6. (a) Discuss risks and approaches of migration into cloud. 13+12=25
- (b) Explain elastic load balancing and auto scaling.
7. Write short notes on the following :
  - (a) Third party cloud services
  - (b) Cloud security
  - (c) Server consolidation and placement policies 10+5+10=25
8. Discuss the hybrid storage networking technologies. 25
9. (a) Discuss the techniques for big data processing. 15+10=25
- (b) Discuss the Hadoop Distributed File System (HDFS).

MCA-T304

( 3 )

S-330

Roll No. : .....

Total No. of Pages : 3

## **MCA-E405-2**

**M.C.A. (IVth Semester) Examination, 2021**

### **CLOUD COMPUTING**

*Time Allowed : 1½ Hours*

*Maximum Marks : 80*

#### **Part-A**

**[Marks : 30]**

**Note** :- Answer all questions (50 words each). All questions carry equal marks.

#### **Part-B**

**[Marks : 50]**

**Note** :- Answer any two questions (250 words each). All questions carry equal marks.

#### **Part-A**

1. (i) What is Cloud Computing ? List major advantages of cloud computing.
- (ii) Explain the on-demand computing and types of hypervisors.

MCA-E405-2

( 1 )

**SN-2021** P.T.O.

- (iii) Describe at least *three* services provided by Amazon Amazon EC2.
- (iv) Describe at least *three* services provided by Microsoft Microsoft Azure.
- (v) What is the role of Business Continuity and Disaster Recovery in cloud ?
- (vi) What is third party cloud services ?
- (vii) What is HDFS and how it works ?
- (viii) Discuss about any *two* storage network technologies in cloud.
- (ix) What is XaaS ?
- (x) What are the different features of cloud I/O computing ?

### Part-B

2. Explain the concept of virtualization. Discuss different type of virtualization. Discuss cloud.
3. What are the different Deployment models of cloud computing ?

10. List some of the services provided by Microsoft Azure. Describe some of the services provided by Microsoft Azure.
11. What is the need of server consolidation and placement policies in cloud environment ?
12. Why security is essential in cloud environment ? How is it achieved ?
13. How is it achieved ?
14. List some major differences in SAN and NAS. How the big data processing is carried out by Hadoop ?
15. List major cloud vendors and discuss their offerings in detail.
16. Discuss about any *two* cloud applications in detail.

Depth

Roll No. : .....

Total No. of Pages : 4

## MCA-T204

MCA (IInd Semester) Examination, 2021

### COMPUTER NETWORKS

*Time Allowed : 1½ Hours*

*Maximum Marks : 80*

#### Part-A

[Marks : 30]

**Note** :- Answer all questions (50 words each). All questions carry equal marks.

#### Part-B

[Marks : 50]

**Note** :- Answer any two questions (250 words each). All questions carry equal marks.

#### Part-A

1. (i) What is Protocol ? What are the key features of a protocol ?
- (ii) Explain LAN, MAN, WAN networks.
- (iii) What is Encoding ? Explain Manchester and Differential Manchester with an example bit stream 01001100011.

MCA-T204

( 1 )

SN-2461 P.T.O.



- (iv) List the different categories of cables used for communication.
- (v) What is Circuit Switching mode of communication ?
- (vi) What is Space Division switching ?
- (vii) What is a Bridge ? How is it better than Hub ?
- (viii) What is a Router ? How is it better than Switch and Bridge and Hubs ?
- (ix) What is the significance/meaning of "802" in IEEE 802 standards ?
- (x) What is Bandwidth ? Give the Shannon capacity formula with its explanation.

### Part-B

2. What are the various Design issues for the layers in networking ? What are the *four* generic architectural components of a public communications network ? Define each term.

MCA-T204

( 2 )

SN-2461

3. Draw the OSI and TCP/IP Reference Model and relate them in detail with diagram. What are the advantages of using Digital Signals over Analog signal ?
4. What are Transmission Impairments ? List some major Impairments. Explain the sliding window protocol used for data communication with an example.
5. Differentiate between asynchronous and synchronous Mode of transmission. Explain the working of Go back-N ARQ mechanism.
6. Explain Time Division Multiplexing. Compare it with Space Division Multiplexing.
7. Differentiate between in channel and common channel signalling.
8. What are the difference between L2 and L3 switches ?

MCA-T204

( 3 )

SN-2461 P.T.O.

9. What is ATM ? What were the aim behind ATM design ? List all the IEEE 802 standards and explain at least five of them.

10. Explain in detail working of CSMA/CD.

11. Explain how encoding schemes (NRZ-L NRZ-I, Pseudoternary, Manchester and Differential Manchester) differs with a suitable example of 01001100011 as bit stream.

Explain rules for encoding schemes HDB3 and draw signal for 1100000000110000010 as bit stream.

MCA (II Semester) Examination, 2022

**COMPUTER NETWORKS**

*Time Allowed : 1½ Hours*

*Maximum Marks : 80*

**Part-A [Marks : 30]**

**Note:** Answer all questions (50 words each). All questions carry equal marks.

**Part-B [Marks : 50]**

**Note:** Answer any two questions (250 words each). All questions carry equal marks.

**Part-A**

1. (i) Differentiate among LAN, MAN and WAN networks.  
Explain with suitable diagram and example.
- (ii) List at least two devices and two protocols used in each of the OSI Model.
- (iii) Which Protocol is used by traceroute and ping utilities?
- (iv) Which is better 5GHz or 2.4GHz wireless channel? Justify your answer.

MCA-T204

(1)

P.T.O.



- (v) What is Bandwidth? Give the Shannon capacity formula with its explanation.
- (vi) How Manchester and differential Manchester encoding solve the problem of synchronization?
- (vii) Which is better mode of communication circuit or packet switching? Justify your answer.
- (viii) What is a Switch? How it is better than Hub?
- (ix) What is a Router? List its major functionalities.
- (x) What is the significance or meaning of "802" in IEEE 802 standards?

### Part-B

2. What are the four generic architectural components of a public communications network? Define each of them.
3. What are the various design issues for the layers in networking?
4. Digital audio is sampled at a rate of 44,100 samples per second. What is the range of frequencies that can be captured?
5. What is the difference between single mode and multimode fiber? Explain with suitable diagrams.

6. Draw suitable diagram for (NRZ-L, NRZ-1, Pseudoternary, Manchester and differential Manchester, HDB3 and B8ZS for bit stream 110000 0000 0000 0000 11 000011.
7. List some error detection techniques. How many errors can an "n bit" CRC detect? If a message 11001001 is to be transmitted using the CRC polynomial  $X^3 + 1$  to protect it from errors. Calculate the message to be transmitted.
8. List some of the IEEE 802 standards and explain at least five of them.
9. Explain in detail the differences in headers of IPv4 and IPv6 which makes IPv6 more suitable for implementing the modern networks.

-----X-----



Roll No. : .....

Total No. of Pages : 3

## **MCA-T205**

**MCA (IInd Semester) Examination, 2021**

**COMPUTER ARCHITECTURE**

*Time Allowed : 1½ Hours*

*Maximum Marks : 80*

### **Part-A**

**[Marks : 30]**

**Note :-** Answer all questions (**50** words each). All questions carry equal marks.

### **Part-B**

**[Marks : 50]**

**Note :-** Answer any *two* questions (**250** words each). All questions carry equal marks.

### **Part-A**

1. (i) Write steps involved in program execution.
- (ii) What is Accumulator ?
- (iii) What is the main difference between RISC and CISC ?

- (iv) What is the problem in ripple carry addition.
- (v) What is the basic idea used while designing look ahead carry adder ?
- (vi) What is the main difference between combinational and sequential circuits ?
- (vii) What is the role of a control unit in hardware ?
- (viii) What is stored in control memory ?
- (ix) What is TLB ?
- (x) What is pre-emptive memory allocation ?

### Part-B

2. What do you understand by instruction formats ?  
Write instruction formats of MIPS RX000 processor.
3. Give overall organization of ARM6.
4. Give overall organization of ARM6.
5. Write algorithm/HDL description of two's complement multiplier. Draw its data path.
6. Write non-restoring division algorithm for unsigned integers. Illustrate the same.

MCA-T205

( 2 )

SN-2462

MCA-T205

( 3 )

SN-2462

Depth

Roll No. : .....

Total No. of Pages : 4

## MCA-T205

M.C.A. (II Semester) Examination, 2022

### COMPUTER ARCHITECTURE

Time Allowed : 1½ Hours

Maximum Marks : 80

#### Part-A

[Marks : 30]

**Note:** Answer **all** questions (50 words each). All questions carry equal marks.

#### Part-B

[Marks : 50]

**Note:** Answer **any two** questions (250 words each). All questions carry equal marks.

#### Part-A

1.
  - (i) What is Fetch and Decode of an instruction?
  - (ii) What is the role of PC in a processor?
  - (iii) What is an addressing mode?
  - (iv) How carry is computed in a look ahead carry adder?

MCAT-205

(1)

P.T.O.

- (v) How sum and carry out is computed in a half adder?
- (vi) How overflow could occur in an addition operation?
- (vii) What are the contents of a control word?
- (viii) What is microprogrammed control?
- (ix) What is the access time of a memory?
- (x) What is the role of MAR in accessing data from memory?

### Part-B

- 2. Draw diagram of a typical CPU with general register organisation.
- 3. Describe IEEE 754 floating point number format.
- 4. Give design of a 4 bit carry look ahead adder.
- 5. Write and demonstrate booth algorithm for multiplication.
- 6. Give hard wired control design for gcd processor.
- 7. Describe microprogrammed control in detail.
- 8. Give 1-bit storage circuit of a static and a dynamic RAM.
- 9. Describe working of a 2D RAM.

—x—