

B.TECH. DEGREE EXAMINATION, MAY 2018**Seventh Semester**

Branch : Computer Science and Engineering/Information Technology

OBJECT ORIENTED MODELING AND DESIGN (RT)

(Old Scheme—Prior to 2010 Admissions)

[Mercy Chance]

Time : Three Hours

Maximum : 100 Marks

Part A*Answer all questions.**Each question carries 4 marks.*

1. Explain abstraction with an example.
2. What is an association class? Give example for a binary association with an association class with multiplicity many to many.
3. Explain concurrency with an example.
4. What is an interaction diagram ? Name the two types of interaction diagram.
5. Define state of an object. Give example for an operation that will alter the state of an object.
6. Highlight the advantages of breaking a system into subsystems.
7. Outline the need for design optimization.
8. What is delegation? When to use delegation ? Give example
9. Present an overview of Jacobson's methodology.
10. Outline the features of unified modeling language.

(10 × 4 = 40 marks)

Part B*Answer all questions.**Each full question carries 12 marks.*

11. What are the key features of the object oriented methodology ? Discuss.

Or

12. (a) Explain abstract class and concrete class with an example. (6 marks)
- (b) What is aggregation ? List the properties of aggregation and explain the same with an example. (6 marks)

Turn over

Explain with an example the use of state diagrams for dynamic modeling.

Or

Model a data flow diagram for a "Library Management System". State the functional requirements you are considering.

Model a use case diagram for an "Automated Teller Machine". State the functional requirements you are considering.

Or

What is system design? List and discuss the activities carried out during system design.

Discuss the process of designing association among objects with examples.

Or

Discuss with an example Jackson structured development.

Model a class diagram for the following scenario :

A women's private limited markets and sells different products. The attributes of product include product code, product name and unit price. Products are grouped into categories. A product belongs to one category. A category can have many products (For example consider the category Cosmetics: the products that will be grouped in to this category include perfumes, powders, skin care creams etc.). The attributes of category include category code and category name. Sales executives in the company are responsible for marketing and selling products to customers residing in different locations. The attributes of sales executive include sales executive id, name, date born, gender and mobile number. The attributes of customer include customer id, name, date born, gender and mobile number. The attributes of location include location code and location name. A sales executive markets and sells only one category in only one location. A location can have many sales executives marketing and selling different categories of products. The products purchased by the customers, the date of purchase and number of units purchased have to be kept track.

Or

What is an implementation model? How to develop an implementation model ? Discuss with an example.

(5 × 12 = 60 marks)

G 1144

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2018

Seventh Semester

Branch : Computer Science and Engineering/Information Technology

COMPUTER GRAPHICS (RT)

(Old Scheme—Prior to 2010 Admissions)

[Mercy Chance]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 4 marks.

1. Outline the difference between raster-scan displays and random-scan displays.
2. Write a note on trackball and spaceball.
3. Appraise the binary region codes assigned to line endpoints according to relative Position with respect to the clipping rectangle in Cohen-Sutherland line clipping algorithm.
4. What is polygon clipping ? Give example.
5. Write a note on perspective projection.
6. Outline how two sets of orthogonal Bezier curves can be used to design an object surface by specifying an input mesh of control points.
7. Write a note on hidden-surface elimination.
8. Outline the classification of visible-surface detection algorithms.
9. Differentiate between Euclidean-geometry methods and fractal-geometry methods.
10. Write a note on animation.

(10 × 4 = 40 marks)

Part B

Answer all questions.

Each full question carries 12 marks.

11. Explain with a diagram the working of a cathode ray tube.

Or

12. Write a detailed note on hardcopy devices.

Turn over

13. Explain with an example the Bresenham's line drawing algorithm.

Or

14. Explain with an example and relevant diagrams two dimensional translation and rotation.

15. What are polygon surfaces ? Give an example for two adjacent polygon surfaces, formed with six edges and five vertices and represent the same using a vertex table, an edge table and a polygon table.-

Or

16. (a) What is a Bezier curve ? Explain the properties of Bezier curves. (6 marks)

(b) What are beta-splines ? Outline the beta-spline continuity conditions. (6 marks)

17. Explain with an example the depth-buffer algorithm for detecting visible surfaces.

Or

18. What is ray tracing ? Outline the steps in the basic ray-tracing algorithm.

19. What is a fractal object ? Appraise the classification of fractals.

Or

20. Explain with an example the self-squaring method for generating fractal objects.

[5 × 12 = 60 marks]

B.TECH. DEGREE EXAMINATION, MAY 2018**Seventh Semester**

Branch : Computer Science and Engineering

THEORY OF COMPUTATION (R)

(Old Scheme—Prior to 2010 Admissions)

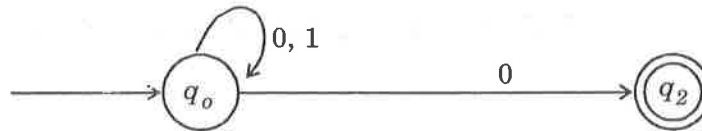
[Mercy Chance]

Time : Three Hours

Maximum : 100 Marks

Part A*Answer all questions.**Each question carries 4 marks.*

1. What are equinumerous sets ? Give example.
2. Define a partial recursive function.
3. Give the difference between a non-deterministic finite automation (NFA) and an NFA with ϵ -transitions.
4. Describe the language accepted by the following NFA :



5. How is a non-deterministic pushdown automaton different from a deterministic pushdown automaton ?
6. Let G be the grammar :

$$S \rightarrow aB \mid bA$$

$$A \rightarrow a \mid aS \mid bAA$$

$$B \rightarrow b \mid bS \mid aBB$$
 Find a leftmost derivation for the string abba using the above grammar G.
7. Give the formal notation of a turing machine and explain each component.
8. What is meant by godelization ?
9. Write a note on complexity classes.
10. What is meant by an intractable problem ? Give an example.

(10 × 4 = 40 marks)

Turn over

Part B

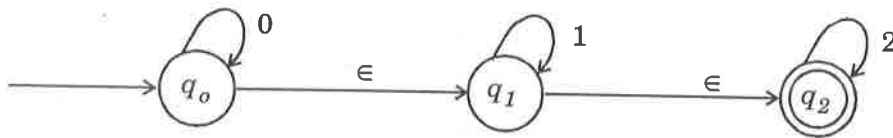
Answer all questions.

Each full question carries 12 marks.

11. Give the difference between computable and non-computable functions. Explain with appropriate examples.

Or

12. State the principle of diagonalization. Elaborate an application that uses the principle of diagonalization.
13. Convert the following non-deterministic finite automaton (NFA) to NFA without ϵ -transitions by eliminating ϵ -transitions.



Or

14. State and prove pumping lemma for regular languages.
15. Write in detail the use of pushdown automata (PDA) in parsing.

Or

16. Consider the pushdown automaton (PDA) $M = (\{q_1, q_2\}; \{0, 1\}, \{R, B, G\}, \delta, q, R, \phi)$ where δ is given by

- 1) $\delta(q_1, 0, R) = \{(q_1, GR)\}$.
- 2) $\delta(q_1, 1, R) = \{(q_1, GR)\}$.
- 3) $\delta(q_1, 0, B) = \{(q_1, BB), (q_2, \epsilon)\}$.
- 4) $\delta(q_1, 0, G) = \{(q_1, BG)\}$.
- 5) $\delta(q_1, 1, B) = \{(q_1, GB)\}$.
- 6) $\delta(q_1, 1, G) = \{(q_1, GG), (q_2, \epsilon)\}$.
- 7) $\delta(q_2, 0, B) = \{(q_2, \epsilon)\}$.
- 8) $\delta(q_2, 1, G) = \{(q_2, \epsilon)\}$.
- 9) $\delta(q_1, \epsilon, R) = \{(q_2, \epsilon)\}$.
- 10) $\delta(q_2, \epsilon, R) = \{(q_2, \epsilon)\}$.

Show the moves made by the PDA for the input 001100.

17. Design a Turing machine that accepts the language $L = \{0^n 1^n \mid n \geq 1\}$.

Or

18. Explain in detail the halting problem of Turing machines. Prove that the problem is undecidable.

19. What are tractable problems? Explain in detail an example of a tractable problem.

Or

20. What are NP-Hard problems? Explain in detail an example of an NP-hard problem.

(5 × 12 = 60 marks)

G 1175

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Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2018

Seventh Semester

Branch : Computer Science and Engineering/Information Technology

WEB TECHNOLOGIES (RT)

(Old Scheme—Prior to 2010 Admissions)

[Mercy Chance]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 4 marks.

1. Outline the features of XML.
2. Write the syntax to create a CDATA section and give an example for the same.
3. What is an XML document type definition ? Give example.
4. "XSL is the bridge between XML and HTML". Elucidate.
5. What is a Java bean ? Outline the advantages of Java beans.
6. Outline how beans communicate with other beans.
7. Present an outline of JSP API.
8. Write the syntax to use a Java bean in a Java Server Page.
9. Present an outline of EJB container's support for persistence.
10. Write a short note on EJB Object interface.

(10 × 4 = 40 marks)

Part B

Answer all questions.

Each full question carries 12 marks.

11. What is an XML document ? Explain with an example the structure of an XML document.

Or

12. (a) Compare the features of HTML and XML.

(6 marks)

Turn over

(b) Explain with an example how entities are inserted in an XML document through entity references.

(6 marks)

13. How an XML document type definition is associated with an XML document ? Explain with an example.

Or

14. Outline with an example how XML data can be displayed in a HTML browser as HTML tables.

15. Explain with an example the steps in creating a Java bean.

Or

16. (a) Appraise the following Java bean characteristics: persistence and introspection. (8 marks)

(b) Present an outline of the primary method of packaging and deploying Java beans.

(4 marks)

17. Create a simple Web page using JSP for a "Banking System". State the functional requirements you are considering.

Or

18. (a) Write a note on scriptlets and explain with a code snippet Java Server Page with scriptlets.

(8 marks)

(b) Write a note on exception handling in JSP. (4 marks)

19. What is a stateless session bean ? Explain with a diagram the life cycle of a stateless session bean.

Or

20. Explain with example home interface for an entity bean with container-managed persistence.

[5 × 12 = 60 marks]

G 1202

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2018

Seventh Semester

Branch : Computer Science and Engineering/Information Technology

MOBILE COMPUTING (Elective-I) (RT)

(Old Scheme—Prior to 2010 Admissions)

[Mercy Chance]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 4 marks.

1. Write a note on location aware services.
2. Outline the functions performed by the data link layer.
3. Write a note on short message Service and enhanced message Service.
4. Present an outline of inter-cell, intra-BSC handover and inter-BSC, intra-MSC handover.
5. Outline the safety and security issues related to wireless local area network.
6. Write a note on wireless ATM.
7. Outline the need for mobile IP.
8. Write a note on snooping TCP.
9. Outline the primary goals of the WAP Forum efforts.
10. Write a note on wireless markup language.

(10 × 4 = 40 marks)

Part B

Answer all questions.

Each full question carries 12 marks.

11. (a) Outline the functions performed by the transport layer and the application layer. (4 marks)
- (b) What is modulation ? Write a note on multi-carrier modulation. (8 marks)

Or

Turn over

12. What are the main reasons for using cellular systems? How space division multiplexing is typically realized and combined with frequency division multiplexing? How does dynamic channel allocation influence the frequencies available in other cells?
13. Explain with a diagram digital enhanced cordless telecommunications system architecture reference model.

Or

14. What is broadcasting? Write a note on digital audio broadcasting and digital video broadcasting.
15. (a) Write a note on the two different basic transmission technologies can be used to set up wireless local area networks. (6 marks)
- (b) Outline with a diagram Bluetooth piconet and a Bluetooth scatternet. (6 marks)

Or

16. Explain with a diagram the architectural model for location management in wireless ATM.
17. What is tunneling? Explain with an example how tunneling works in general and especially for mobile IP.

Or

18. What is indirect TCP? How indirect TCP works? Outline the advantages and disadvantages of indirect TCP.
19. What is WAP? Explain with a diagram the components and interface of the WAP 1.x architecture.

Or

20. (a) What is HTTP? What problems of HTTP can wireless session protocol solve? Why are these solutions especially needed in wireless mobile environments? (8 marks)
- (b) Outline the advantages of using HTML. (4 marks)

[5 × 12 = 60 marks]

G 1702

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Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2018

Seventh Semester

Branch : Computer Science and Engineering

CS 010 701—WEB TECHNOLOGIES (CS)

(New Scheme—2010 Admission onwards)

[Improvement / Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 3 marks.

1. What is a web browser ? Give example.
2. Outline the purpose of XML Namespaces.
3. Create an array in Perl to store five names.
4. What are cookies ?
5. When to use Rails ?

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. How to specify table borders in CSS ? Give example.
7. What is a DTD ? Explain with an example.
8. Write a Perl program to accept three numbers, find the greatest and print the result.
9. How to create a session in PHP ? Explain with an example.
10. Write a note on model-view-controller design pattern Rails uses.

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions

Each question carries 12 marks.

11. Illustrate with an example the steps in creating a Web page using XHTML.

Or

12. Appraise the features of cascading style sheets.

13. What is XML ? Explain with an example XML document structure.

Or

14. What is an XML schema ? Develop an XML schema for a "Library Management System". State the functional requirements you are considering.

15. (a) Explain with an example Hashes in Perl. (6 marks)

(b) Write a Perl program to accept two square matrices, add them and print the result. (6 marks)

Or

16. Explain with an example how Common Gateway Interface can be used for interfacing external programs with information servers on the Internet.

17. (a) What is a PHP code block ? Explain with an example. (6 marks)

(b) Write a PHP program to check whether a given number is a prime number or not and print the result. (6 marks)

Or

18. (a) Write a PHP program to sort an array of 'n' numbers in ascending order. (6 marks)

(b) Write a note on pattern matching in PHP. (6 marks)

19. Explain with a simple example the Rails framework for building Web applications.

Or

20. Write a detailed note on Asynchronous JavaScript and XML.

[5 × 12 = 60 marks]

G 1717

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2018

Seventh Semester

Branch : Computer Science and Engineering

CS 010 702—COMPILER CONSTRUCTION (CS)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 3 marks.

1. What is panic mode error recovery in a lexical analyzer ?
2. What is operator precedence parser ?
3. Define an annotated parse tree. Give example.
4. Mention the key problem encountered in top-down parsing.
5. Differentiate register descriptor and address descriptor.

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Define context free grammar. List down the rules and steps involved in the construction of a parse tree for a context free grammar with example.
7. Describe the conflicts that occur during shift reduce parsing.
8. Differentiate static versus dynamic storage allocation.
9. Describe the algorithm for partitioning a given three address code into basic blocks.
10. Illustrate the different operations possible in a symbol table with example.

(5 × 5 = 25 marks)

Part C

Answer all questions.

Each full question carries 12 marks.

11. (a) Name and describe the two parts of the lexical analysis portion of a compiler. Discuss the importance of the two parts.

(6 marks)

Turn over

- (b) Define tokens, patterns and lexemes. Give examples for **each from programming languages.**
(6 marks)

Or

12. Draw and explain the different phases of a compiler showing **the inputs into and outputs from each phase.**
13. Explain with examples about the elimination of left recursion **and left factoring.**

Or

14. Show that the following grammar in SLR(1) :

$$S \rightarrow SA|A$$

$$A \rightarrow a$$

15. Explain the various methods used for accessing non-local data.

Or

16. What is Syntax Directed Definition (SDD) ? Detail the two **important classes of SDD's and their translation with examples.**
17. Explain the various intermediate code representation techniques. **Represent the following high level language statement using three address code, quadruples and triples**

```
do
{
    i = i + 1;
} while (a[i] < v);
```

Or

18. Explain about the different machine independent optimizations.
19. Write above the various challenges in the design of code generator.

Or

- 20.. Write a note on the following :

- (a) Cross compilers. (6 marks)
- (b) Incremental compilers. (6 marks)

[5 × 12 = 60 marks]

G 1732

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2018

Seventh Semester

Branch : Computer Science and Engineering

CS 010 703—COMPUTER GRAPHICS (CS)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 3 marks.

1. Distinguish between raster scan displays and random scan displays.
2. What is point clipping ? Give example.
3. How two sets of orthogonal Bezier curves can be used to design an object surface by specifying an input mesh of control points ?
4. State the visible-surface detection problem.
5. What is texture mapping ?

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Outline the working of a scanner.
7. Write the steps in the Bresenham's line drawing algorithm.
8. What are beta-splines ? State the beta-spline continuity conditions.
9. Write a note on perspective projections.
10. What is Gouraud shading ? Discuss.

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions

Each full question carries 12 marks.

11. Explain with relevant diagrams the working of random-scan displays.

Or

12. What is an input device? Write a note on any three input devices.

13. Illustrate the Bresenham's circle drawing algorithm with an example.

Or

14. Illustrate the Cohen-Sutherland line clipping algorithm with an example.

15. What are polygon surfaces? Give an example for two adjacent polygon surfaces, formed with six edges and five vertices and represent the same using a vertex table, an edge table and a polygon table.

Or

16. (a) Explain with an example interpolation splines and approximation splines. (6 marks)

(b) Explain the properties of Bezier curves. (6 marks)

17. Explain the scan-line method for visible-surface detection with an example.

Or

18. Explain the depth-buffer method for visible-surface detection with an example.

19. Write a note on the following :

(a) Phong shading. (6 marks)

(b) Fast Phong shading. (6 marks)

Or

20. What is a fractal? Write a detailed note on self-squaring fractals.

[5 × 12 = 60 marks]

G 1746

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2018

Seventh Semester

Branch : Computer Science and Engineering

CS 010 704—OBJECT ORIENTED MODELING AND DESIGN (CS)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 3 marks.

1. Define an object. Identify the probable attributes that will be modeled in a Library database for the object BOOK.
2. Outline with an example a query operation and an update operation.
3. Define cohesion and coupling.
4. Present an outline of Jacobson methodology.
5. Outline the purpose of modeling a deployment diagram.

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Explain generalization and specialization with an example.
7. Outline the relation of dynamic model to class model.
8. Appraise why modelers often iterate and revise the analysis model.
9. Name the diagrams of Booch method.
10. "A component represents a modular, deployable, and replaceable part of a system that encapsulates implementation and exposes a set of interfaces". Elucidate with an example.

(5 × 5 = 25 marks)

Part C

Answer all questions.

Each question carries 12 marks.

11. Explain with a diagram the object oriented system development life cycle.

Or

Turn over

12. (a) Explain with an example overriding for extension and overriding for restriction. (8 marks)
(b) Explain with an example a candidate key and outline the properties of a candidate key. (4 marks)
13. Model a state chart diagram for an Automated Teller Machine (ATM). State the functional requirements you are considering.

Or

14. Model a data flow diagram for a "Banking System". State the functional requirements you are considering.
15. What are concurrent tasks? Explain with an example the process of defining concurrent tasks.

Or

16. (a) Outline the guidelines that characterize the kind of data that is stored in a relational database. (6 marks)
(b) Outline the guidelines that characterize the kind of data that is stored in a file and not in a relational database. (6 marks)
17. What is design optimization ? Appraise with an example the design optimization process.

Or

18. Present an outline of Rumbaugh's object modeling technique.
19. Model a class diagram for a "Railway Reservation System". State the functional requirements you are considering.

Or

20. Model a use case diagram for an Automated Teller Machine (ATM). State the, functional requirements you are considering.

(5 × 12 = 60 marks)

G 1759

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2018

Seventh Semester

Branch : Computer Science and Engineering

CS 010 705—PRINCIPLES OF PROGRAMMING LANGUAGES (CS)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 3 marks

1. Write a short note on virtual computers
2. What is type checking ? Give example.
3. Outline with an example compound assignment operator.
4. Define a subprogram and a subprogram call.
5. Name three widely used programming languages that do not allow nested subprograms.

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks

6. Write a note on procedure-oriented programming.
7. Explain user-defined enumeration types with an example.
8. Appraise the design issues for selection structures.
9. Write a note on overloaded subprograms.
10. What is the difference between an activation record and an activation record instance ? Why are the return address, dynamic link, and parameters placed in the bottom of the activation record ?

(5 × 5 = 25 marks)

Part C

Answer all questions.

Each full question carries 12 marks.

11. What is object oriented programming ? Outline the features of object oriented programming paradigm.

Or

Turn over

12. (a) Present an overview of the influence of **computer architecture and programming design methodologies** on language design. (6 marks)
- (b) Explain with an example **static binding and dynamic binding**. (6 marks)
13. (a) Explain with an example the sources of **ambiguity in operations**. (6 marks)
- (b) Appraise with an example **type equivalence and equality of data objects**. (6 marks)

Or

14. (a) What is **static scope**? Explain with an example how **static scopes can be created inside program units**. (6 marks)
- (b) Write a note on **virtualization**. (6 marks)
15. (a) Explain with an example how programmers can alter the **precedence and associativity rules** of arithmetic expressions. (4 marks)
- (b) Explain with an example **referential transparency and side effects with respect to operand evaluation order**. (8 marks)

Or

16. (a) Explain with an example **logically controlled loops**. (6 marks)
- (b) What are **guarded commands**? Explain with an example. (6 marks)
17. What is **parameter passing**? Explain with an example **pass-by-value-result and pass-by-reference**.

Or

18. (a) Outline with an example **user-defined overloaded operators**. (6 marks)
- (b) Write a note on **coroutines** and outline with an example **quasi-concurrency**. (6 marks)
19. Outline with a simple example implementing subprograms with **stack-dynamic local variables**.

Or

20. What is **exception handling**? Explain with an example **exception handling in Java**.

[5 × 12 = 60 marks]

G 1787

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL/MAY 2018

Seventh Semester

Branch : Computer Science and Engineering

CS 010 706 L06—CLIENT SERVER ARCHITECTURE AND APPLICATIONS

(Elective I) (CS)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 3 marks.

1. Define a client and a server.
2. Define a process and a thread.
3. Write a note on multiple processor systems.
4. Present an outline of preemptive systems.
5. Define portability.

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Outline heterogeneous computing with an example.
7. Write a note on client / server interactions in the form of transactions.
8. Present an outline of multiprogramming vs. multitasking.
9. Outline a critical section with an example.
10. Present an outline of security threats in a client server environment.

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions.

Each question carries 12 marks.

11. (a) Outline the *three* tier client server architecture with a diagram. (6 marks)
(b) Write a note on thin client and fat client architectures. (6 marks)

Or

12. What is distributed computing ? Outline the issues and challenges in distributed computing.
13. Outline the issues to be considered while designing a client server computing environment.

Or

14. Outline with an example client server interaction using messages.
15. What is a network operating system ? Outline the features of Novell NetWare operating system.

Or

16. "While developing server applications the major focus is on software", why ? Elucidate with an example.
17. What is a semaphore ? Outline with an example semaphore operations.

Or

18. Discuss semaphore implementation in Novell NetWare operating system.
19. Outline shared memory and message passing models inter process communication.

Or

20. Outline the issues to be addressed for implementing secure client / server communications. (5 × 12 = 60 marks)