

19. (a) Prove that the equation $12x^2 + 7xy - 10y^2 + 13x + 45y - 35 = 0$ represents a pair of two straight lines and find the angle between them.

- (b) Calculate the arithmetic mean, median of the frequency distribution given below.

x :	0-10	10-20	20-30	30-40
f :	5	8	3	4

9198/A11

OCTOBER 2010

MATHEMATICS

Time : Three hours

Maximum : 100 marks

PART A — (6 × 5 = 30 marks)

Answer any SIX questions.

1. Evaluate $\lim_{x \rightarrow 1} \frac{\sqrt{1+x} - 1}{x}$.
2. Find $\frac{dy}{dx}$, when $x^3 + 3a xy + y^3 = a^3$.
3. Evaluate $\int \frac{dx}{\sqrt{2x^2 + 3x + 4}}$.
4. Evaluate $\int \frac{dx}{4 + 5 \sin x}$.
5. Prove that the diagonals of a parallelogram bisect each other.
6. Find the inverse of the matrix.

$$A = \begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$$

7. Prove that $x^2 + 9y^2 + 6xy + 4x + 12y - 5 = 0$ represents two parallel straight lines.

8. Find the equation of the circle which passes through the points (3, 4), (3, 6), (-1, 2).

9. Calculate the Arithmetic mean from the following frequency table :

x : 50 48 46 44 42 40

y : 12 14 16 13 11 9

10. Obtain the standard deviation of the following data :

x : 2.0 2.5 3.0 3.5 4.0 4.5 5.0

y : 5 38 65 92 70 40 10

PART B — (4 × 10 = 40 marks)

Answer any FOUR questions.

11. Find the n^{th} derivative of y , when

$$y = \frac{x^2}{(x-1)^2(x+2)}.$$

12. Prove that $\int_0^{\pi/2} \frac{\sin^2 x}{\sin x + \cos x} dx = \frac{1}{\sqrt{2}} \log(\sqrt{2} + 1).$

13. Solve the system of equations ;

$$x + 2y + 3z = 1$$

$$2x + 3y + 2z = 2$$

$$3x + 3y + 4z = 1$$

by matrix method.

14. Solve $(x^2 - y^2)dx + 2xydy = 0$.

15. Solve $\sqrt{p} + \sqrt{q} = 2x$.

16. Obtain the correlation coefficient from the following :

x : 65 66 67 67 68 69 70 72

y : 67 68 65 68 72 72 69 71

PART C — (2 × 15 = 30 marks)

Answer any TWO questions.

17. (a) Find the n^{th} differential coefficient of $x^2 \log x$.

(b) Obtain the equation to the tangent to $y = f(x)$ at (x_1, y_1) .

18. (a) Evaluate $\int_0^{\pi/2} \log \sin x dx$.

(b) Prove that

$$\vec{i} \times (\vec{a} \times \vec{i}) + \vec{j} \times (\vec{a} \times \vec{j}) + \vec{k} \times (\vec{a} \times \vec{k}) = 2\vec{a}.$$

9199/A12

OCTOBER 2010

PROGRAMMING IN C

Time : Three hours

Maximum : 100 marks

PART A — (6 × 5 = 30 marks)

Answer any SIX questions.

1. Explain how a character is read and write with an example.
2. Explain the rules for using “scanf” statement.
3. What are the steps involved in writing a function?
4. Explain the concept of function reference.
5. Explain how a array is declared with suitable example.
6. Explain the rules for pointer operations.
7. Explain how the structure is initialized, give an example.
8. How does a union differ from structure?
9. Explain the two different categories of data files.

10. What will be the output of the following programs

```
main ( )
```

```
{
```

```
    File fp;
```

```
    fp = fopen ("TRIAL.E", "r");
```

```
    fclose (fp)
```

```
}
```

PART B — ($4 \times 10 = 40$ marks)

Answer any FOUR questions.

11. Describe the four basic data types. How could we extend the range of values they represent?
12. Explain the different types of storage variables.
13. Write a C program to reverse the string.
14. Explain two-dimensional arrays with example.
15. Explain array of structure with example.
16. Write a C program to create a file name "Employee.dat", which stores details like name, age and basic salary of the employee.

PART C — ($2 \times 15 = 30$ marks)

Answer any TWO questions.

17. Explain the precedence of arithmetic operators with suitable example.
18. (a) Write a program to count number of vowels, consonants and other characters in a sentence.
(b) Explain string handling functions with examples.
19. (a) Write a C program to demonstrate structure within structure.
(b) Explain Random access to files and the operations of fseek function.

9200/A13

OCTOBER 2010

DIGITAL PRINCIPLES AND APPLICATIONS

Time : Three hours

Maximum : 100 marks

PART A — (6 × 5 = 30 marks)

Answer any SIX questions.

1. Write down the steps to convert octal number to binary number with example.
2. What are weighted codes?
3. Subtract 39 from 54 using 9's complement.
4. Simplify the expression using *K*-map
$$F = A'B'C + A'BC + AB'C + ABC.$$
5. Construct the logic diagram for the Boolean expression $F = xy + y'z$.
6. What is half subtractor?
7. Explain ring counter with neat diagram.
8. What is triggering?

9. Differentiate encoder and decoder.

10. What is PROM?

PART B — (4 × 10 = 40 marks)

Answer any FOUR questions.

11. What are the steps involved to obtain POS?

12. Explain excess – 3 code.

13. Draw the pinout diagram for 743180. Explain.

14. Explain parallel binary adder.

15. Explain octets with suitable example.

16. Explain JK flip flop.

PART C — (2 × 15 = 30 marks)

Answer any TWO questions.

17. (a) Explain the block diagram of computer with neat diagram.

(b) Simplify the following Boolean function using K-map

$$F(w, x, y, z) = \sum(0, 1, 2, 4, 5, 6, 8, 9, 12, 13, 14)$$

18. (a) Explain 10's complement subtraction with suitable example.

(b) Write short notes on PROM.

19. (a) Explain serial in parallel out shift register.

(b) Design mod – 10 counter.

9201/A14

OCTOBER 2010

PC SOFTWARE FOR WINDOWS

Time : Three hours

Maximum : 100 marks

PART A — ($6 \times 5 = 30$ marks)

Answer any SIX questions.

1. Write short note on Multitasking in Windows.
2. Explain Windows GUI.
3. What is the use of page setup in word? Explain.
4. Explain the steps in changing the width and height in a table.
5. List the advantages of using an Spreadsheet.
6. How will you format a work sheet? Explain.
7. Explain the financial functions in Excel.
8. Write a short note on Drawing tools in Excel.

9. Explain the use of combining several files in a publication.

10. How computer viruses are spreading?

PART B — ($4 \times 10 = 40$ marks)

Answer any FOUR questions.

11. Explain the menus in Windows.
12. Explain Spell checking and Clip art in MS-WORD.
13. Explain aligning paragraphs and indenting paragraphs.
14. Write short note on organization of worksheet area.
15. Explain the use of specifying naming range in Excel.
16. List the features of DTP.

PART C — ($2 \times 15 = 30$ marks)

Answer any TWO questions.

17. Explain the common elements of application windows.
18. What is a database? Explain the working of database in a worksheet.
19. Explain the following :
- (a) Symptoms of computer virus.
- (b) E-mail.
-

9202/A15

OCTOBER 2010

SYSTEM SOFTWARE

Time : Three hours

Maximum : 100 marks

PART A — (6 × 5 = 30 marks)

Answer any SIX questions.

1. What are addressing modes?
2. What is meant by mnemonics?
3. Write down any five assembler pseudo instructions.
4. What is an overlay program? Elaborate.
5. What are Bootstrap loaders?
6. What is meant by relocation?
7. Explain the data structure needed for the linking loader.
8. What are macros?
9. Explain about block structured languages.
10. What are interpreters?

PART B — (4 × 10 = 40 marks)

Answer any FOUR questions.

11. Explain SIC/XE machine structure in detail.
12. Explain about single pass assemblers.
13. Write a note on linkers.
14. Write in detail about machine dependent linker features.
15. Discuss loader design options in detail.
16. Elaborate on Interactive debugging systems.

PART C — (2 × 15 = 30 mark)

Answer any TWO questions.

17. Explain two pass assembler in detail.
18. Discuss about machine dependent loader features.
19. Discuss in detail about editors.

9203/A16

OCTOBER 2010

COBOL PROGRAMMING

Time : Three hours

Maximum : 100 marks

PART A — (6 × 5 = 30 marks)

Answer any SIX questions.

1. What is the use of COMPUTE verb?
2. What are A and B margins? Explain with an example.
3. Explain various types of picture clauses.
4. Write a COBOL program to find the largest of three given numbers.
5. Describe the rules of SEARCH verb.
6. Differentiate MOVE CORRESPONDING from MOVE.
7. Explain in detail about File- Control paragraph.

8. Explain the general format of a REPORT.
9. What are main activities of personnel management?
10. Write the use of word processing facilities.

PART B — (4 × 10 = 40 marks)

Answer any FOUR questions.

11. Write a COBOL program to find simple and compound interest.
12. What are the different divisions in COBOL? What is the purpose of each division?
13. Explain editing picture characters with suitable examples.
14. Explain in detail the FILE SECTION REPORT clause with an example program.
15. Write the benefits of using computers in production planning and control.
16. Write a COBOL program to add the individual digits of a given N digit integer. Also check whether it is Palindrome or not.

PART C — (2 × 15 = 30 marks)

Answer any TWO questions.

17. (a) Discuss in detail about the structure of COBOL program with example.
(b) Differentiate between STOP and END statements.
18. (a) Discuss in detail about the various arithmetic operations in COBOL.
(b) Differentiate between RENAMES and REDEFINES clauses.
19. The inventory master file contains the following types of data for each item held in inventory :

Filed Name	Part Number	Part Name	Quantity
Filed Size	5	15	5
Nature	Numeric	Alphanumeric	Numeric

Write a program to sort this file on Part Number.

9204/A21

OCTOBER 2010

DISCRETE MATHEMATICS

Time : Three hours

Maximum : 100 marks

PART A — ($6 \times 5 = 30$ marks)

Answer any SIX questions.

1. Define binary relation and give two examples.
2. Write the properties of functions with examples.
3. Define tautology and contradiction.
4. Construct truth table for $(P \wedge Q) \vee (\neg P \wedge \neg Q)$.
5. Explain the problem to tower of Hanoi.
6. Write any two applications of recurrence relations.
7. Define sub graph with example.
8. Prove that in a simple graph, the number of odd degree vertices is always even.
9. Define least upper bound and greatest lower bound with example.
10. Define modular lattice with example.

PART B — ($4 \times 10 = 40$ marks)

Answer any FOUR questions.

11. Define equivalence relation and give an example.
12. Construct truth table for the formula :
 $(P \wedge Q) \vee (\neg P \wedge Q) \vee (P \wedge \neg Q) \vee (\neg P \wedge \neg Q)$.
13. Explain the four types of normal forms with example.
14. Prove that a tree with n vertices has $n - 1$ edges.
15. Explain any two type of matrix representation of graphs.
16. Prove that every chain is a distributive lattices.

PART C — ($2 \times 15 = 30$ marks)

Answer any TWO questions.

17. (a) Let $R = \{(x, 2x/x \in I)\}$ and $S = \{(x, 7x/x \in I)\}$
find
 $R \circ S, S \circ R, R \circ R, R \circ S \circ R, S \circ R \circ S, R \circ R \circ R$.
- (b) Define recursion with example.

18. (a) Prove that $(\exists x)M(x)$ follows logically from the premises $(x) (H(x) \rightarrow M(x))$ and $(\exists x)H(x)$.
- (b) Explain travelling salesman problem.
19. Explain the applications of Boolean algebra to switching theory.

9205/A22

OCTOBER 2010

PROGRAMMING IN C++

Time : Three hours

Maximum : 100 marks

PART A — (6 × 5 = 30 marks)

Answer any SIX questions.

1. Describe the use of scope access operator (::) and reference operator (&).
2. Write a program to use break and continue.
3. What does function prototype mean? Is it compulsory?
4. Describe rules for operator overloading.
5. What is parameterized constructor? Explain with example.
6. What are static members? Explain.
7. Write a program in C++ to pick out the biggest number among the given three numbers.
8. Explain member variable and member function with example.

9. What is hybrid inheritance? Explain.
10. Explain the concept of virtual base classes.

PART B — ($4 \times 10 = 40$ marks)

Answer any FOUR questions.

11. What do you mean by overloading of constructors? Explain.
12. Describe the use of public, private, and protected access specifiers.
13. With an example, explain how array of objects can be created and used.
14. Explain the concept of reference arguments with an example.
15. What is the necessity of virtual function?
16. Explain the control structures in C++ with example.

PART C — ($2 \times 15 = 30$ marks)

Answer any TWO questions.

17. Discuss the basic concepts of object oriented programming.
18. Explain the different types of inheritance with suitable examples.

19. Write notes on the following :

- (a) Inline function
- (b) Constructor overloading
- (c) Virtual base class.
-

PART B — ($4 \times 10 = 40$ marks)

Answer any FOUR questions.

11. Define equivalence relation and give an example.
12. Construct truth table for the formula :
 $(P \wedge Q) \vee (\neg P \wedge Q) \vee (P \wedge \neg Q) \vee (\neg P \wedge \neg Q)$.
13. Explain the four types of normal forms with example.
14. Prove that a tree with n vertices has $n - 1$ edges.
15. Explain any two type of matrix representation of graphs.
16. Prove that every chain is a distributive lattices.

PART C — ($2 \times 15 = 30$ marks)

Answer any TWO questions.

17. (a) Let $R = \{(x, 2x/x \in I)\}$ and $S = \{(x, 7x/x \in I)\}$
find
 $R \circ S, S \circ R, R \circ R, R \circ S \circ R, S \circ R \circ S, R \circ R \circ R$.
- (b) Define recursion with example.

18. (a) Prove that $(\exists x)M(x)$ follows logically from the premises $(x) (H(x) \rightarrow M(x))$ and $(\exists x)H(x)$.
- (b) Explain travelling salesman problem.
19. Explain the applications of Boolean algebra to switching theory.

COMPUTER GRAPHICS

Time : Three hours

Maximum : 100 marks

PART A — ($6 \times 5 = 30$ marks)

Answer any SIX questions.

1. What is a parallel line? Explain.
2. Write short notes on pixels and frame buffer.
3. Explain the functions of any two display devices.
4. Write short notes on normalized device coordinates.
5. What is concave polygon? Explain.
6. How to enter an absolute polygon into the display file? Explain.
7. Explain the rotation transformation matrix.
8. Explain display procedure in detail.
9. Explain midpoint subdivision algorithm.
10. Explain the concept of multiple windowing.

PART B — ($4 \times 10 = 40$ marks)

Answer any FOUR questions.

11. Briefly explain about Random scan system.
12. Explain the concept of character generation.
13. Explain polygon interfacing algorithm.
14. Explain the inside test performed in polygon.
15. Write short notes on various 3D transformation.
16. Write short notes on line clipping.

PART C — ($2 \times 15 = 30$ marks)

Answer any TWO questions.

17. Briefly explain the vector generation algorithm for generating straight lines.
 18. Discuss in detail the polygon insertion algorithm.
 19. Explain Cohen - Sutherland algorithm for clipping lines.
-

OPERATING SYSTEMS

Time : Three hours

Maximum : 100 marks

PART A — ($6 \times 5 = 30$ marks)

Answer any SIX questions.

1. What is an operating system? Explain about early operating system in detail.
2. Explain about scheduling queues.
3. What is RAG? Explain.
4. Explain about memory management technique with respect to uniprocessing.
5. What is paging? Explain.
6. What is a file? Explain its types.
7. Explain ISAM.
8. Write the salient features of DOS.
9. Write short notes on pipelines, filters and shell scripts in UNIX.

PART B — ($4 \times 10 = 40$ marks)

Answer any FOUR questions.

10. Explain about DMA in detail.
11. What do you mean by Hierarchy of process?
12. How to avoid deadlock? Explain.
13. Explain about segmentation.
14. Explain about directory system.
15. Explain about nodes and mapping with file descriptor.

PART C — ($2 \times 15 = 30$ marks)

Answer any TWO questions.

16. Explain Scheduling Algorithm in detail.
17. Explain about Partition Allocation.
18. Write Short Notes on :
 - (a) Page Replacement Algorithm.
 - (b) File Allocation methods.

COMPUTER ORGANIZATION

Time : Three hours

Maximum : 100 marks

PART A — (6 × 5 = 30 marks)

Answer any SIX questions.

1. What is a hardwired control unit?
2. What is assembly language? Give examples of different types of instructions.
3. List and explain any two kinds of addressing modes.
4. What is address sequencing?
5. What is I/O interface?
6. Differentiate between synchronous and asynchronous data transfer.
7. Describe multi processor system organization.
8. What is virtual memory?
9. Explain any one device used commonly as auxiliary storage.
10. Differentiate between RAM and ROM chips.

PART B — (4 × 10 = 40 marks)

Answer any FOUR questions.

11. Explain the working of a Control unit.
12. Write an assembly program to add two numbers.
13. Discuss different types of address manipulation instructions.
14. With suitable diagram explain working of micro program sequencer.
15. What are priority interrupts?
16. List and explain different addressing modes.

PART C — (2 × 15 = 30 marks)

Answer any TWO questions.

17. Explain the concept of associative memory.
18. Discuss the concept of handshaking with suitable block diagrams.
19. Explain the working ALU with suitable block diagram.

9209/A26

OCTOBER 2010

COMPUTER ALGORITHMS AND DATA STRUCTURE

Time : Three hours

Maximum : 100 marks

PART A — ($6 \times 5 = 30$ marks)

Answer any SIX questions.

1. What is Divide and Conquer method? Give an example.
2. Write short notes on partition in Quick Sort.
3. Discuss about optimal storage on Tapes problem.
4. Define Greedy method and explain it.
5. Explain in detail the general concept behind 0/1 Knapsack problem.
6. Explain Optimal binary search trees in detail.
7. Define queue and how do you represent.
8. Write algorithm to delete an element from stack.
9. What is binary tree? How do you represent?
10. Define the following :
(a) Tree (b) Siblings (c) root.

PART B — ($4 \times 10 = 40$ marks)

Answer any FOUR questions.

11. Write an algorithm for selection sort.
12. Write Kruskal's algorithm to find minimal spanning tree.
13. Explain multi stage graphs in detail.
14. Explain the insertion and deletion operations on doubly linked list. Give algorithms.
15. Explain garbage collection and compaction in detail.
16. Explain threaded binary tree in detail.

PART C — ($2 \times 15 = 30$ marks)

Answer any TWO questions.

17. Write the quick sort algorithm and explain it with an example.
18. Write a procedure to add two polynomials using a linked list.
19. Describe the tree traversal techniques and explain their applications.

9210/A31

OCTOBER 2010

SOFTWARE ENGINEERING

Time : Three hours

Maximum : 100 marks

PART A — ($6 \times 5 = 30$ marks)

Answer any SIX questions.

1. How to understand a problem? Explain.
2. What is training? Explain.
3. What are the factors to be considered for setting project goal?
4. Give the outline for a software verification plan.
5. Explain work break down structure of a project.
6. Explain about Petri nets.
7. How to enhance maintainability?
8. Write short notes on walk through and inspections.
9. Write short notes on types of test.
10. What are source code metrics? Explain.

PART B — ($4 \times 10 = 40$ marks)

Answer any FOUR questions.

11. What are the software quality characteristics? Explain.
12. Explain about software development through iteration.
13. Write short notes on expert judgement.
14. Explain SADT.
15. Explain stepwise refinement.
16. Explain about system testing.

PART C — ($2 \times 15 = 30$ marks)

Answer any TWO questions.

17. How to plan an organisation structure? Explain.
18. Explain about format specification techniques.
19. Explain about the various design notations in software design.

CLIENT/SERVER COMPUTING WITH ORACLE

Time : Three hours

Maximum : 100 marks

PART A — ($6 \times 5 = 30$ marks)

Answer any SIX questions.

1. Discuss briefly on database security.
2. Discuss the types of data users.
3. Differentiate centralized and distributed computing.
4. Explain about minicomputer computing model.
5. How is a table structure modified? Give example.
6. Compare variable declaration and constant declaration.
7. What are explicit cursors?
8. What is a SQL? What are its advantages?
9. What is a database trigger? How are they fired?
10. What is a database server? Explain.

PART B — ($4 \times 10 = 40$ marks)

Answer any FOUR questions.

11. Explain any two OS the supports GUI.
12. Explain PL/SQL block structure.
13. How are errors trapped in PL/SQL?
14. What are the set operations in SQL?
15. Explain the process of Turing in Oracle database server.
16. Elaborate on stored procedures and functions in Oracle.

PART C — ($2 \times 15 = 30$ marks)

Answer any TWO questions.

17. (a) Explain the concept of database recovery.
(b) Explain Client/Server computing model.
18. Explain the configuration of Oracle for user connections.
19. (a) Explain in detail about Relational model.
(b) Discuss about database backup and recovery.

9212/A33

OCTOBER 2010

COMPUTER NETWORKS

Time : Three hours

Maximum : 100 marks

PART A — ($6 \times 5 = 30$ marks)

Answer any SIX questions.

1. What are the four classes of service primitives in network software?
2. Explain the Wide Area Network (WAN).
3. Explain the Broadband coaxial cable.
4. Explain the Microwave Transmission.
5. Explain the Low-orbit satellite.
6. What are the functions of MODEM?
7. Explain the Traditional cryptography.
8. Discuss Network Security.
9. Explain the digital signature.
10. Explain the Uniform Resource Locator (URL).

PART B — ($4 \times 10 = 40$ marks)

Answer any FOUR questions.

11. Describe the Novell Netware.
12. Discuss the microwave Transmission.
13. Explain the Baseband coaxial cable.
14. Explain the quality of service.
15. Discuss the Elements of Transport protocols.
16. Explain the facility of E-mail in details.

PART C — ($2 \times 15 = 30$ marks)

Answer any TWO questions.

17. Explain in detail the structure and functions of OSI model.
 18. Explain the Time division switching.
 19. Comparison of virtual circuit and Datagram subnets.
-

9213/A34

OCTOBER 2010

**MULTIMEDIA – TECHNOLOGY AND
APPLICATIONS**

Time : Three hours

Maximum : 100 marks

PART A — (6 × 5 = 30 marks)

Answer any SIX questions.

1. Briefly explain the communication devices used in multimedia.
2. Write short notes on Software Drivers for multimedia.
3. Explain about “Choosing text fonts”.
4. Discuss about Color Dithering.
5. Write short notes on:
 - (a) Digital Audio Systems.
 - (b) Digital Audio Software Support.
6. Explain about various recording formats.

7. Explain about simple authoring and delivery tools.
8. Discuss about Labor Model.
9. Write short notes on communication protocol.
10. Write short notes on animation for the web.

PART B — ($4 \times 10 = 40$ marks)

Answer any FOUR questions.

11. Write down any five applications of multimedia.
12. What are the basic ideas to be followed when using graphics in multimedia products?
13. Explain the process of editing digital audio.
14. Explain about the various multimedia tool features.
15. Explain in detail about web page development and web page browsers.
16. Explain in detail about the process of video compression.

PART C — ($2 \times 15 = 30$ marks)

Answer any TWO questions.

17. How will you group the multimedia products?
 18. Discuss in detail about Animation Techniques.
 19. Give a brief account on "Multimedia on the web".
-

JAVA PROGRAMMING

Time : Three hours

Maximum : 100 marks

PART A — ($6 \times 5 = 30$ marks)

Answer any SIX questions.

1. How objects are passed and returned in java?
2. Explain multilevel inheritance in detail.
3. What is the different format of static?
4. Discuss all the integer data types in java.
5. Explain Thread priorities.
6. How will you define and derive a subclass?
7. Explain the idea of UDP based network communication.
8. Explain how AWT helps GUI development.
9. What are Buffered Streams?
10. Explain the use of new operator.

PART B — ($4 \times 10 = 40$ marks)

Answer any FOUR questions.

11. Explain abstract class and its importance.
12. Explain the advantage of Java.
13. Explain nested try statements with example program.
14. Explain the Socket programming in Java.
15. Discuss the method overloading with example.
16. Write note on inter-thread communication.

PART C — ($2 \times 15 = 30$ marks)

Answer any TWO questions.

17. Explain in detail the control statements in java with example.
18. Explain the importance of thread synchronization in multithreaded programming.
19. Write short note on :
(a) FlowLayout (b) BorderLayout
(c) GridLayout (d) CardLayout.

PART C — ($2 \times 15 = 30$ marks)

Answer any TWO questions.

17. Solve the following using simplex method :

$$\text{Max } z = 5x_1 + 3x_2$$

$$\text{Subject to : } x_1 + x_2 \leq 2$$

$$5x_1 + 2x_2 \leq 10$$

$$3x_1 + 8x_2 \leq 12 \text{ and}$$

$$x_1, x_2 \geq 0.$$

18. Consider the transportation problem and determine the IBFS by Vogel's method :

						Supply
	2	11	10	3	7	4
	1	4	7	2	1	8
	3	9	4	8	12	9
Demand	3	3	4	5	6	

19. A car hiring company has one car at each of five depots a, b, c, d and e . A customer requires a car in each town A, B, C, D, E . Distance between depots and towns are given the following matrix. How should the cars be assigned to customers so as to minimize the distance travelled.

	a	b	c	d	e
A	160	130	175	190	200
B	135	120	130	160	175
C	140	110	155	170	185
D	50	50	80	80	110
E	55	35	70	80	105

9215/A36

OCTOBER 2010

OPERATIONS RESEARCH

Time : Three hours

Maximum : 100 marks

PART A — ($6 \times 5 = 30$ marks)

Answer any SIX questions.

1. What is operations research? State any three applications of O.R.
2. Explain the different types of models used in OR.
3. Explain the graphical method of solving given LPP.
4. What is LPP? Explain the various steps involved in the mathematical formulation of LPP.
5. An animal feed company must produce 200 lbs of a mixture containing ingredients x_1 and x_2 . x_1 costs Rs. 3 per lb and x_2 costs Rs. 8 per lb. Not more than 80 lbs of x_1 can be used minimum quantity to be used for x_2 is 60 lbs. Formulate the mathematical form to find how much of each x_1, x_2 should be used if the company wants to minimize the cost.
6. Explain the two-phases simplex method.

7. State the general rules for converting any primal LPP into its dual.
8. What is assignment problem? Give the mathematical formulation of assignment problem.
9. Define a transportation problem. Explain unbalanced transportation problem with example.
10. Explain column minima method to solve a TP.

PART B — ($4 \times 10 = 40$ marks)

Answer any FOUR questions.

11. Discuss the main phases of OR.

12. Solve graphically :

$$\text{Min } z = x_1 + x_2$$

$$\begin{aligned} \text{Subject to } & x_1 + x_2 \leq 1 \\ & -3x_1 + x_2 \geq 3 \\ & \text{and } x_1, x_2 \geq 0. \end{aligned}$$

13. Solve using Big-M method :

$$\text{Minimize } z = 2x_1 + 9x_2 + x_3$$

$$\begin{aligned} \text{Subject to constraints : } & x_1 + 4x_2 + 2x_3 \geq 5 \\ & 3x_1 + x_2 + 2x_3 \geq 4 \\ & \text{and } x_1, x_2, x_3 \geq 0. \end{aligned}$$

14. Obtain an initial basic feasible solution for the following transportation problem using :

- (a) North west corner rule method and
- (b) Least cost entry method.

					Availability
	11	13	17	14	250
	16	18	14	10	300
	21	24	13	10	400
Requirement	200	225	275	250	

15. Four computer programming jobs have to be assigned to four programmers. Time taken by each programmer on each job is shown in the table below. Find an optimum assignment.

		Programmers			
		A	B	C	D
Jobs	I	12	30	21	15
	II	18	33	9	31
	III	44	25	24	21
	IV	23	30	28	14

16. Solve the following travelling salesman problem.

	A	B	C	D	E
A	∞	4	7	3	4
B	4	∞	6	3	4
C	7	6	∞	7	5
D	3	3	7	∞	7
E	4	4	5	7	∞