Total No. of Questions—**12**] [Total No. of Printed Pages—**4+1**

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S.E. (I.T.) EXAMINATION, 2009

DIGITAL ELECTRONICS AND MICROPROCESSOR

(2003 COURSE)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer question No. **1** *or* **2**, **3** *or* **4**, and **5** *or* **6** from Section I and question No. **7** *or* **8**, **9** *or* **10**, and **11** *or* **12** from Section II.

(*ii*) Answers to the two sections should be written in separate answer-books.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Assume suitable data if necessary.

SECTION I

1. (*a*) Perform the following arithmetic's using 2's complement form (show step-by-step process) : [8]

(*i*) +7+1

(*ii*) –7+1

(*iii*) +7–1

(*iv*) –7–1

Also comment and justify your result.

(*b*) Convert the following decimal numbers into their equivalent binary, hexadecimal and octal numbers : [6]

(*i*) 85.7

(*ii*) 728

P.T.O.

(c) What do you mean by error correcting code ? Explain in brief Hamming Code. [4]

Or

2. (a) Convert the following (write the steps involved in the conversion) : [8]

(i) $(ABC.13)_{16} = (\ )_{10}$

(ii) $(673.625)_8 = (\ )_{10}$

(iii) $(11011010.110)_2 = (\ )_{10}$

(iv) $(23.05)_{10} = (\ )_2$

(b) Compare signed 2's complement, signed 1's complement and sign magnitude representation on the basis of range of numbers which can be represented. Represent "–5" in signed 2's complement, signed 1's complement and sign magnitude representation. [4]

(c) Explain properties and any *two* applications of Gray Code. [4]

(d) What are weighted code and non-weighted code ? Give examples. [2]

3. (a) Draw and explain 2 input NAND TTL logic gate with totem pole output driver. [8]

(b) A TTL gate is supposed to drive CMOS gates. What arrangement has to be made to work this interface satisfactorily ? Justify your answer with suitable circuit diagram. [8]

Or

4. (*a*) Compare TTL and CMOS families based on the following characteristics. Define the characteristics before comparison and state the typical values : [12]

(*i*) Figure of merit

(*ii*) Power dissipation

(*iii*) Fan-out

(*iv*) Noise Margin.

(*b*) What do you mean by open collector TTL gate ? What is its advantage over totem pole ? [4]

5. (*a*) Design and draw the basic circuit of single digit BCD adder circuit using IC 7483. [6]

(*b*) Simplify the following Boolean function using K map technique : [6]

$F\ (A, B, C, D) = \pi\ M\ (0, 2, 3, 10, 15).\ d\ (1, 6, 13)$

(*c*) Implement 32 : 1 multiplexer with 16 : 1 and 2 : 1 multiplexer. [4]

Or

6. (*a*) Implement the following Boolean function with 4 : 1 multiplexers : [8]

$F(A, B, C, D) = A + ABD + ABC + AB + D$

(*b*) Simplify the following Boolean function using K map technique : [4]

$F(A, B, C, D) = \sum m\ (0, 1, 2, 5, 10)\ .\ d\ (8, 9)$

(*c*) Compare PLA and PAL based on their logic configuration. [4]

SECTION II

7. (*a*) Design a sequence detector to detect the following sequence based on mealy mchine. [8]

sequence : 110

(*b*) Draw and explain 4-bit shift register having shift left and shift right facilities. [6]

(*c*) What is race around condition ? How to avoid it ? Explain with timing diagram. [4]

Or

8. (*a*) Explain internal architecture of IC 7490. Construct divide by 9 BCD counter with the help of IC 7490. [8]

(*b*) Design a circuit to generate the following sequence. How will you avoid lock-out condition ? Draw state diagram for the same $\overleftarrow{3\text{–}5\text{–}8\text{–}9\text{–}12}$. [10]

9. (*a*) With the help of suitable diagram explain the basic operation of dual slope ADC. [8]

(*b*) State and define any *four* specifications of DAC. Compare 4-bit R-2R ladder DAC and 4-bit weighted resistor DAC. [8]

Or

10. (*a*) State and define any *four* specifications of ADC. Compare in brief different ADC techniques based on these specifications. [8]

(*b*) Explain 4-bit R-2R ladder DAC with the help of suitable diagram. [8]

11. (*a*) Draw and explain the block diagram of 8255 PPI. State operating modes of 8255. [8]

(*b*) Draw the timing diagram of the basic memory. Write operation of microprocessor and show the necessary signals in your timing diagram. [4]

(*c*) State and explain the following signals of microprocessor 8085 : [4]

(*i*) INTR

(*ii*) SOD

(*iii*) Ready

(*iv*) TRAP.

Or

12. (*a*) Explain the addressing modes of 8085 microprocessor with suitable example. [8]

(*b*) Differentiate between memory mapped I/O and I/O mapped I/O techniques of interfacing peripherals. [4]

(*c*) State the internal operations carried out by 8085 microprocessor to execute the following instructions : [4]

(*i*) XCHG

(*ii*) CMP.

Total No. of Questions—**12**] [Total No. of Printed Pages—**4+1**

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S.E. (I.T.) EXAMINATION, 2009

FUNDAMENTALS OF DATA STRUCTURES

(2003 COURSE)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answers to the two Sections should be written in separate answer-books.
(*ii*) Neat diagrams must be drawn wherever necessary.
(*iii*) Figures to the right indicate full marks.
(*iv*) Assume suitable data, if necessary.

SECTION I

1. (*a*) What is the purpose of structure in 'C' ? Can we define structure into structure ? If yes, give suitable example. [6]

(*b*) What are bitwise operators ? Find out the output of the following statements : [8]

Assume a = 10, b = 15

(*i*) x = (a > b) ? a : b

(*ii*) x = ~ a

(*iii*) x = a & b

(*iv*) x = a & (a : b).

(*c*) What is macro ? Explain with suitable example. [4]

Or

2. (*a*) Justify the following statements : [6]

(*i*) When an array is passed as an argument to a function, a pointer is passed.

(*ii*) An integer cannot be added to a pointer.

P.T.O.

(*b*) Determine output of the following 'C' statements : [8]

(1)
```
int x = 5, y = 6
float z = 3.0
z + = x = y
printf ("%d", z);
```

(2)
```
int x = 10;
y = x >> 2;
printf ("%d", y);
```

(3)
```
int x = 4
printf ("% d% d% d", – – x, x, x – –);
```

(4)
```
int x;
for (x = 0; x < 10; x++)
    {
        printf ("%d", x);
    }
```

(*c*) What is an enumerated data type ? Give suitable example. [4]

3. (*a*) What is pointer variable ? Explain declaration, initialization and accessing a pointer variable with an example ? State any *four* advantages of pointers. [8]

(*b*) Explain with a suitable example function call by reference and call by value. [8]

Or

4. (*a*) Write a pseudo 'C' routine using pointers for checking whether a given string is palindrome or not ? [6]

(*b*) struct example

```
{
    int count;
    float *p;
} * ptr;
```

What will be effect of the following C expressions :

(*i*) ++ ptr → count

(*ii*) (++ ptr) → count

(*iii*) ptr ++ → count

(*iv*) * ptr → p++

(*v*) (ptr → p)++ [10]

5. (*a*) Write a 'C' function for iterative binary search to search a given number in an array ? [6]

(*b*) Consider the following numbers, sort them using quick sort. Show all passes to sort the values in ascending order. [6]

25 57 48 37 12 92 86 33.

(*c*) Discuss *one* example where Fibonacci search will be more efficient than binary search. [4]

Or

6. (*a*) Write a 'C' function to sort N input numbers using insertion sort. [5]

(*b*) Explain the following terms with respect to sorting : [6]

(1) Sort stability

(2) Efficiency

(3) Parses.

(*c*) Explain internal and external sort with suitable example. [5]

SECTION II

7. (*a*) Explain the following terms with suitable example : [10]

(1) Data

(2) Data objects

(3) Data type

(4) Abstract data type

(5) Data structure

(6) Classification of data structure.

(*b*) Write a pseudo C algorithm for addition of two single variable polynomials (Polynomial representation is by using sparse matrix). [6]

Or

8. (*a*) Write an algorithm for fast transpose of sparse matrix ? Compare simple and fast transpose. [10]

(*b*) What is linear data structure ? List the advantages and limitations of sequential organisation of data structures. [6]

9. (*a*) Explain a insertion of node in circular linked list : [8]

(1) the start of the list

(2) the end of the list

(3) after the position.

(*b*) What is dynamic data structure ? List the advantages of linked lists. [6]

(*c*) State applications of circular linked lists. [4]

Or

10. (*a*) Write a pseudo C routine to merge two sorted singly linked list without creating new node and without swapping data. [8]

(*b*) Give the structure definition to represent doubly linked lists to store numbers. Compare doubly linked lists with singly linked lists. [4]

(*c*) Write a 'C' function to delete Nth node in a circular linked list. [6]

11. (*a*) Write a 'C' program to convert infix to postfix. [8]

(*b*) List applications of queue. What are advantages of circular queue over linear queue ? [4]

(*c*) Write a short note on dequeue ? [4]

Or

12. (*a*) How stack and queue are represented as circular linked list ? Write applications of stack. [8]

(*b*) Write an ADT for queue ? [4]

(*c*) List the advantages of priority queue and multiqueue ? [4]

Total No. of Questions—**12**] [Total No. of Printed Pages—**4**

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S.E. (I.T.) EXAMINATION, 2009

MANAGEMENT AND FINANCE

(2003 COURSE)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer *three* questions from Section I and *three* questions from Section II.

(*ii*) Answers to the two Sections should be written in separate answer-books.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*vi*) Assume suitable data, if necessary.

SECTION I

1. (*a*) State and explain the contribution of Henry Fayol to Management science. What are the principles propounded by Henry Fayol ? [10]

(*b*) Explain the concept of Management by Objectives (MBO) and its importance. [6]

P.T.O.

Or

2. Define Management. Explain various functions of management. Critically analyse the role of manager in a changing global buisness environment. [16]

3. (*a*) State and explain internal and external economies of scale. How the firms attain maximum efficiency through internal and external economies of scale ? [10]

(*b*) What is human want ? Explain the characteristics of human wants. [6]

Or

4. Explain the following : [16]

(*a*) Enterprise resources planning

(*b*) Patent, copyright and trade marks.

5. (*a*) Define joint stock company. Explain its formation with merits and demerits. [10]

(*b*) Differentiate between project organisation and matrix organisation. [8]

Or

6. (*a*) State and explain how functional organisation is an improvement over line and staff organisation ? Give reasons. [10]

(*b*) Describe the role of public sector undertakings in India. How does it function ? [8]

SECTION II

7. (*a*) Define man-power planning. What are the factors affecting man power planning ? [8]

(*b*) Critically explain Maslow's need heirarchy Theory of Motivation. [8]

Or

8. (*a*) State and explain different methods of tranining imparted to industrial workers. [8]

(*b*) Critically evaluate the 'Down sizing' measure taken by Indian industries. Is it a feasible solution ? Justify your answer. [8]

9. (*a*) Explain the functions of money market and capital market with their importance. [10]

(*b*) Explain the following financial statements : [6]

(*i*) Profit and Loss Account

(*ii*) Balance Sheet.

Or

10. Define capital budgeting. Explain in detail various methods of capital budgeting. [16]

11. Define break-even analysis. Prepare break-even chart with its assumptions. Explain the importance of CVP graph and its role in financial planning. [18]

Or

12. (*a*) Explain any *four* methods of depreciation. [10]

(*b*) Explain the following ratios : [8]

(*i*) Liquidity ratio

(*ii*) Turn-over ratio

(*iii*) Debt-equity ratio.

Total No. of Questions—12] [Total No. of Printed Pages—4+1

[3562]-214

S.E. (IT) EXAMINATION, 2009

PROGRAMMING PARADIGM AND METHODOLOGY

(2003 COURSE)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer any *three* questions from each Section.

(*ii*) Answers to the two Sections should be written in separate answer-books.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Assume suitable data if necessary.

SECTION I

1. (*a*) Specify characteristics of functional and logical programming paradigms. [6]

(*b*) Explain exception handling with the help of the following points : [8]

(*i*) Exception handler

(*ii*) Raising an exception

(*iii*) Propagating an exception.

P.T.O.

(c) What major features would perfect programming language include ? Explain. [4]

Or

2. (a) What are good attributes of good programming language ? What are major application area of corresponding programming language ? [8]

(b) How pointer assignment can result in memory leaks ? Explain. [6]

(c) Compilation can be more efficient than interpretation ? Justify your answer. [4]

3. (a) Explain properties of structured and non-structured data types. [6]

(b) Demonstrate early binding and late binding with example. [6]

(c) What is Enumeration ? Explain it with example. [4]

Or

4. (a) Compare scalar data type and composite data type. [6]

(b) Explain in detail static binding and dynamic binding. [6]

(c) What are the advantages and disadvantages of implicit declaration. [4]

5. (*a*) Define the following : [8]

(*i*) Life time

(*ii*) Scope

(*iii*) Static scope

(*iv*) Dynamic scope.

(*b*) What are general characteristics of subprogram ? [4]

(*c*) What are advantages and disadvantages of dynamic local variable ? [4]

Or

6. (*a*) What are general problem with static scoping ? [6]

(*b*) What are advantages and disadvantages of dynamic scoping ? [6]

(*c*) What are different benefits of procedure ? [4]

SECTION II

7. (*a*) What is friend function and friend class in C++ ? What are merits and demerits of friend function ? [10]

(*b*) Describe the various design issues for object-oriented language. [8]

Or

8. (*a*) What is meant by public, private and protected members in C++ ? Explain with example. [6]

(*b*) What is meant by polymorphism ? What are different types of polymorphism in C++ ? Explain each in detail. [6]

(*c*) How dynamic memory allocation is achieved in C++ using constructor ? [6]

9. (*a*) What is meant by relation in PROLOG ? Explain the following terms in PROLOG : [8]

(*i*) Facts

(*ii*) Rules

(*iii*) Queries.

(*b*) Which are the different applications of functional programming language ? [8]

Or

10. (*a*) Which are the different applications of Logic Programming Language ? [8]

(*b*) Write lisp code for appending string and to find length of string. [8]

11. (*a*) Explain the difference between procedural and non-procedural languages. [6]

(*b*) How the file handling is different in C++ than C ? [6]

(*c*) What are special features of PROLOG ? [4]

Or

12. (*a*) Compare functional and logic programming with respect to the following issue : [8]

(*i*) Syntactic structure

(*ii*) Semantics

(*iii*) Data type.

(*b*) Explain the following terms in C, C++, LISP and PROLOG : [8]

(*i*) Variable declaration

(*ii*) Modularity

(*iii*) Control structure.

Total No. of Questions—12] [Total No. of Printed Pages—4

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S.E. (Information Technology) EXAMINATION, 2009

MICROPROCESSOR SYSTEMS

(2003 COURSE)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer any *three* questions from each Section.

(*ii*) Answers to the two Sections should be written in separate answer-books.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*vi*) Assume suitable data, if necessary.

SECTION I

1. (*a*) With the help of block diagram explain the basic architecture of 8086 processor. What is the role BUS Interface unit and queue ? Explain. [12]

(*b*) Give difference between 8086 and 8088 processor. [4]

(*c*) What is the significance of $\overline{BHE}$. [2]

Or

2. (*a*) Draw functional diagram of 8086 in maximum mode. Describe signals/pins used in maximum mode. [12]

(*b*) Draw Non-pipelined read cycle for 80386. Explain. [6]

P.T.O.

3. (*a*) How to generate .obj, .lst, .exe and .map file ? Give significance of these files. [8]

(*b*) Identify the addressing modes of the following instructions and calculate physical address of the operand : [8]

(1) MOV AL, [BP]

(2) MOV CX, [BX]

(3) MOV AL, [BP + SI]

(4) MOV CS : [BX], AL

Given : CS = 2000H, DS = 3000H, SS = 4000H, ES = 5000H, BP = 0020h, BX = 0030h, SP = 0040h, S1 = 0050h, D1 = 0060h.

Or

4. (*a*) How MS-DOS is loaded ? Explain with diagram. [8]

(*b*) What is the difference between Near and Far procedure ? What are the directives that are used in programming modules while using FAR procedures ? [8]

5. (*a*) Explain response of 8086 to an external hardware interrupt through interrupt controller. Draw diagram for the same. [12]

(*b*) Is it possible to use 8253 as 8-bit counter ? If yes, how ? [4]

Or

6. (*a*) Explain mode 0 and mode 1 of 8253 with timing diagram. [12]

(*b*) Write a short note on IVT. [4]

SECTION II

7. (*a*) Explain in detail various types of communication. [8]

(*b*) What are the logical levels of RS-232 C ? [2]

(*c*) Explain significance of HOLD and HLDA with diagram. [6]

Or

8. (*a*) Draw interfacing diagram of 8086 with 8255. Explain CWR format in detail. [10]

(*b*) It is required to interface keyboard matrix (4 × 4) and 2 digit seven segment display to 8255. Draw interfacing diagram. Write ALP to initialize 8255. [6]

9. (*a*) What is call gate ? Explain its role in changing P.L. [10]

(*b*) What is physical address of 80386 on "POWER-ON". Explain. [6]

Or

10. (*a*) Explain control registers used in 80386. [6]

(*b*) How to convert logical address to linear address when 80386 is operating in PM mode. Explain necessary registers used for the same. [10]

11. (*a*) What is IDT ? Which are different descriptors present in IDT ? Give significance of descriptors in IDT. [10]

(*b*) What is 'Nested Task' ? How are they handled in 80386 ? [6]

(*c*) How 80386 switches from RM to VM mode ? [2]

Or

12. Write short notes on : [18]

(1) VM 86 mode of 80386

(2) Pentium architecture

(3) Task switching in 80386.

Total No. of Questions—12] [Total No. of Printed Pages—7

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S.E. (I.T.) EXAMINATION, 2009

DATA STRUCTURES AND FILES

(2003 COURSE)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answers to the two Sections should be written in separate answer-books.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Assume suitable data, if necessary.

SECTION I

1. (*a*) Define sparse matrix. Explain its representation with an example. Write the pseudo-code for fast transpose of sparse matrix. [8]

(*b*) Perform merge-sort for the given list of numbers. Show the output at each pass.

12 56 1 34 89 78 43 10.

Write the pseudo-code for merge-sort using linked list and find the time and space complexity of the code. [10]

Or

2. (*a*) Write the pseudo-code for linear and binary search and compare with respect to time and space complexity. [8]

(*b*) What are the different asymptotic notations. Explain each with an example. [6]

P.T.O.

(*c*) Define data structures. Explain the entire classification of data structures. [4]

3. (*a*) Define a binary tree. List down some applications of binary trees. Define the following terms with respect to trees : [4]

(*i*) Degree of node

(*ii*) Complete binary tree

(*iii*) Forest

(*iv*) Skewed binary tree.

(*b*) Explain array representation of binary trees using the following trees.

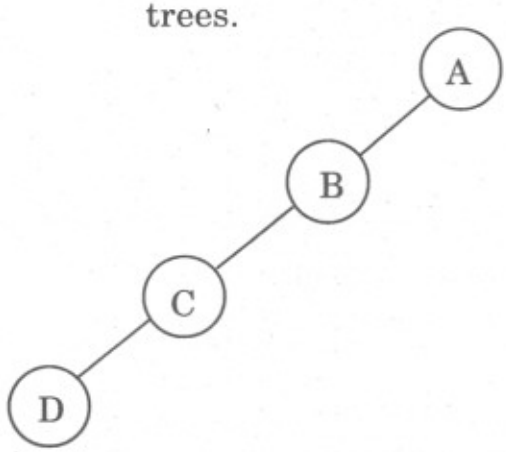

Fig. (i)

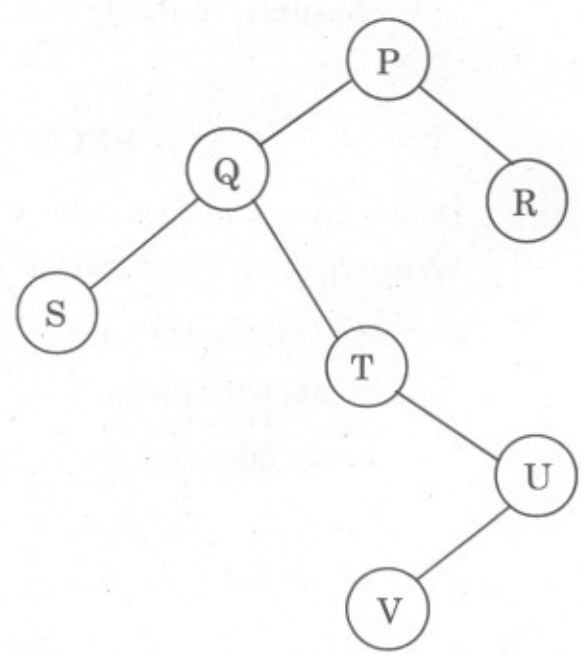

Fig. (ii)

State and explain limitations of this representation. [4]

(*c*) Write the pseudo-code for insert and delete (all cases) operations. [8]

Or

4. (*a*) From the given traversals construct the binary tree. [4]

In-order : D B F E A G C L J H K

Post-order : D F E B G L J K H C A

(*b*) Write pseudo-code for non-recursive post-order and in-order traversals for binary tree. [6]

(*c*) Write pseudo-code for finding in order successor and in-order predecessor of threaded binary tree. [6]

5. (*a*) Define graph. Explain the following terms with example in Fig. (iii) : [6]

(*i*) In-degree and out-degree of vertex

(*ii*) Adjacent vertices

(*iii*) Linear path and cycle.

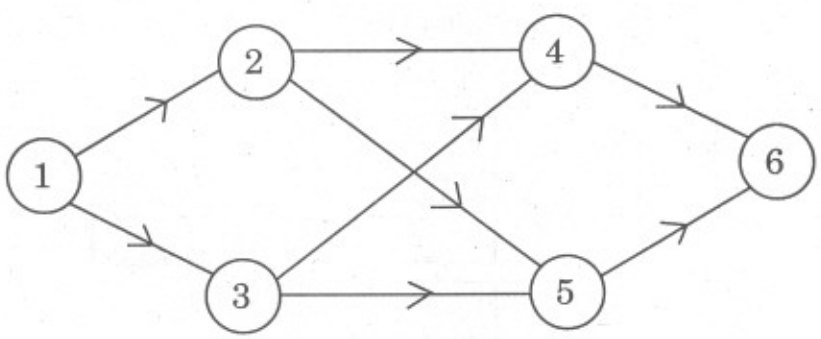

Fig. (iii)

(*b*) Write an algorithm for non-recursive DFS for graphs. Find DFS, BFS for the graph given in Fig. (iv). Show each pass separately. [10]

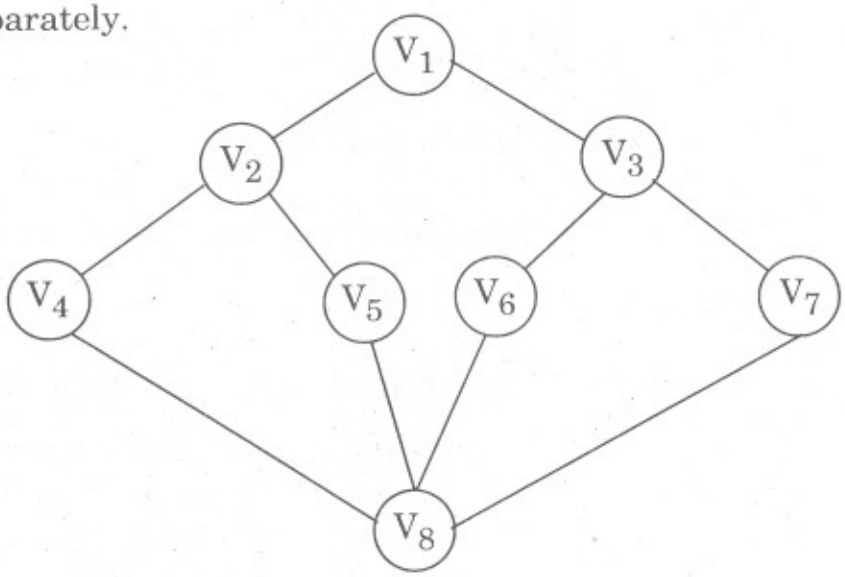

Fig. (iv)

Or

6. (*a*) Explain the different representations of graphs. For the adjacency matrix given below, draw the corresponding graph. [6]

	A	B	C	D
A	0	1	1	1
B	0	0	0	1
C	0	0	0	0
D	0	0	0	0

For the adjacency list given below, draw the corresponding graph,

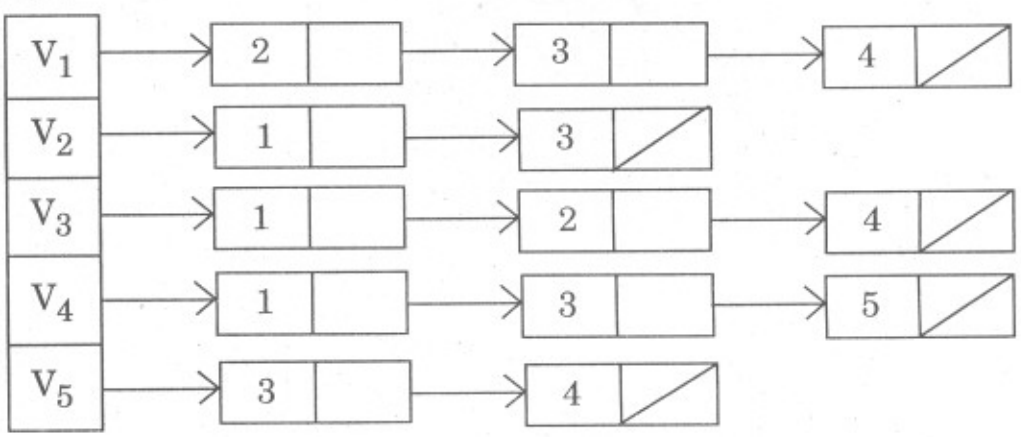

Fig. (v)

(*b*) Write pseudo-code for Kruskal's method for finding MST of graphs.

Find the MST for the graph given in Fig. (v) using both Prim's and Kruskal's algorithms. Show each pass for both algorithms. [10]

SECTION II

7. (*a*) Obtain the AVL tree for the following data : [8]

MAR, MAY, NOV, AUG, APR, JAN, DEC, JUN, FEB, JUL, OCT, SEP

Show the balance factor of each node and show rotations for the entire process.

(*b*) Compare BST, OBST and AVL trees and state applications of each. [6]

(*c*) Explain all the rotations possible in an AVL tree. [4]

Or

8. (*a*) Write pseudo-code for heap sort.

Perform heap sort for the following set of data using the pseudo-code. [10]

D B G E A H C F

(*b*) Write short notes on : [8]

(*i*) Symbol Table

(*ii*) Huffman's Code.

9. (*a*) State and explain in brief the algorithmic strategies applied for the following problems : [6]

(*i*) Chained matrix multiplication

(*ii*) Mazing problem.

(*b*) State differences between greedy and dynamic programming. [4]

(*c*) State job sequencing with deadlines problem and explain how it is solved using greedy strategy with suitable example. [6]

Or

10. (*a*) State and explain in brief the algorithmic strategies applied for the following problems : [6]

(*i*) Towers of Hanoi

(*ii*) Graph colouring problem.

(*b*) State differences between divide and conquer and dynamic programming. [4]

(*c*) State the principle of optimality and explain in brief how O/I Knapsack problem can be solved using dynamic programming. [6]

11. (*a*) What are the key ideas behind hashing ? Explain the characteristics of a good hash function. [4]

(*b*) For the given integers, create a hash table using linear probing with and without replacement. Assume hash function X % 10 and hash table size = 10 and one slot per bucket. [6]

19, 34, 23, 29, 100, 53, 191

(*c*) What is index sequential file ? Write pseudo-code for performing primitive operations on index sequential file. [6]

Or

12. (*a*) List advantages and disadvantages of chaining. [4]

(*b*) For the given data, create a hash table using chaining with and without replacement. Assume hash function X % 10 and hash table size = 10 and one slot/bucket : [6]

10, 100, 32, 45, 58, 126, 3, 29, 200, 400

(*c*) What is direct access file ? Write pseudo-code for performing primitive operations on direct access file. [6]

Total No. of Questions—12] [Total No. of Printed Pages—4

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S.E. (I.T.) EXAMINATION, 2009

PRINCIPLES OF COMMUNICATION ENGINEERING

(2003 COURSE)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer any *three* questions from each Section.

(*ii*) Answers to the two Sections should be written in separate answer-books.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*vi*) Assume suitable data if necessary.

SECTION I

1. (*a*) Define modulation and explain why it is necessary and important. Also draw the basic communication system and explain the functions of all blocks. [8]

(*b*) Plot the three trigonometric terms in the time domain and frequency domain.

$$v(t) = \sin(2\pi .100t) + 0.3 \sin(2\pi .200\, t) + 0.2 \sin(2\pi .300\, t).$$ [8]

P.T.O.

Or

2. (*a*) Explain simplex and duplex communication systems. State any *eight* examples of each system. [8]

(*b*) Explain Fourier transform with an appropriate example. Also state its properties. [8]

3. (*a*) What is modulation index ? Draw the waveforms for signals having undermodulation, critical modulation and overmodulation. Also state the formula for calculating modulation of an AM signal displayed on an oscilloscope. [8]

(*b*) Define and explain the processes of frequency modulation and phase modulation and state their differences. [8]

Or

4. (*a*) Compare the advantages and disadvantages of FM compared to AM. [8]

(*b*) Define the terms DSB and SSB. Draw them in time domain and frequency domain. State the advantages of SSB over an AM signal proving the power advantage of SSB over AM is 3 : 1. [8]

5. (*a*) Explain the basic concept and benefits of a superheterodyne receiver with a neat block diagram. [10]

(*b*) Draw a block diagram of a typical FM transmitter using indirect FM with a phase modulator. Explain all the blocks. [8]

Or

6. (*a*) Draw and explain the block diagram of a dual conversion superheterodyne receiver. [10]

(*b*) Draw and explain the block diagram of a SSB transmitter. [8]

SECTION II

7. (*a*) Explain the process of FDM and frequency demultiplexing and state *three* modern applications. [8]

(*b*) What is a Facsimile System ? Draw its block diagram and explain the functions of all blocks. [8]

Or

8. (*a*) Explain the operation of a pulse code modulation system and state at least *two* applications. [8]

(*b*) What is paging system ? Draw a block diagram of a basic paging receiver and explain its operation. [8]

9. (*a*) Explain the following terms : [10]

(*i*) Balance line

(*ii*) Unbalanced line

(*iii*) Wavelength

(*iv*) Velocity factor

(*v*) Characteristic impedance.

(*b*) Draw and explain the block diagram of cable TV System. [8]

Or

10. (*a*) State the characteristics of a radio wave and explain how antenna polarisation is determined. Draw and explain the half-wave dipole antenna. [10]

(*b*) Draw and explain the block diagram of a colour TV receiver. [8]

11. (*a*) Explain the concepts of communications by serial binary data and define the terms ASCII, baud rate, synchronous and asynchronous communication. [8]

(*b*) Draw and explain block diagram of a fibre optic communication system and list at least *eight* benefits of its over conventional electrical cables for communication. [8]

Or

12. (*a*) Name the *three* basic types of fibre optic cable and state the *two* materials from which they are made. Also state at least *eight* applications of fibre optic cables. [8]

(*b*) Explain the need for and types of communication protocols and error detection and error correction schemes. [8]