Subject : PROGRAMMING

/ — / — 5.2

Topics	Sub-topics	Notes	L	Comments
1.Fundamental concept of flowchart	1.1[/] Characteristics and basic format of flowchart	· Purpose of the flowchart	△	Easy expression Clarifying the order for working Visualize Algorithm
		· Basic symbols	△	Terminal Process Decision Flow Line
		· Basic patterns of flowchart	○	Give some familiar example to each patterns Sequential pattern Branch pattern Loop pattern
	1.2 [2] Types of flow chart	· System flowchart	○	What is a system flow chart Characteristics and purpose of use Data symbol Basic format
		· Program flow chart	◎	What is a program flow chart Characteristics and purpose of use Arranging the idea Reconsider and debug Record as a program document
		· Outline flowchart and detail flow chart	△	Give some example and exercise
	1.3 [/] Rules	· General	△	Scope of application Flow direction Cross the flow line Join the flow line
		· Kinds and uses of symbols	○	ISO 5807 (Documentation symbols and conventions for data, program and system flow charts,...)
		· Other regulation	○	Description in the flow chart Side line Plural exit Repeat expression

Subject : PROGRAMMING

2 — 1 — 5.2

Topics	Sub-topics	Notes	L	Comments
		· Reconsider of the program logic	O	Condition for good program flow chart Improvement in the case of common process Improvement by sub-routine

Subject : PROGRAMMING

1 — 2 — 5.2

Topics	Sub-topics	Notes	L	Comments
2. Three basic patterns and their application	2.1 [1] Application of sequential pattern	· Sequential operation and change control flow	Δ	Stored program system Sequential control system Unconditional jump instruction Conditional jump instruction
		Application of sequential pattern	O	Give some examples and exercise
	2.2 [2] Application of branch pattern	· IF THEN ELSE type	O	Give some examples and exercises to each pattern
		· IF THEN type	Δ	Conditional expression
		· CASE type	Δ	
		· Compound condition type	O	logical expression AND condition OR condition NOT condition
	2.3 [2] Application of loop pattern	· DO WHILE type	O	Give some examples and exercises to each pattern
		· REPEAT UNTIL type	O	Counter Initial value Incremental value

Subject : PROGRAMMING 1 — 3 —5.2

Topics	Sub-topics	Notes	L	Comments
3.Single file processing	3.1[1] What is file processing	・Basic data processing in the business field	△	Fundamental element of data processing Generate Record Process Making report. Storage data Apply the computer to the field
		・Basic patterns of file processing	△	Input media conversion Sort the file Generate the file Merge the file Renewal the file Output media conversion
	3.2[12] Flow chart for single file processing	・Input media conversion and check input record	○	Program logic for input media conversion Check method Character check Code check Scope check Check digit Validity check Hash total check Sequence check Give some example and exercise
		・Detail print and page control	○	Program logic for detail print Give some example for detail print. Output record area Program logic for page control Report format Give some examples and exercises
		・Sequence check and group control	○	Program logic for sequence check Key field Program logic for group control Control item Control group Control break Give some example and exercise
		・Multi-group control and	◎	Program logic for multi-

Subject : PROGRAMMING

2 – 3 – 5.2

Topics	Sub-topics	Notes	L	Comments
		making the report		group control level Give some example and exercise

Subject : PROGRAMMING

1 — 4 — 5.2

Topics	Sub-topics	Notes	L	Comments
4.Structured program logic	4.1[1] Necessity	· Change of environment in software development	△	Progress of hardeare technology MIPS Cost per MIPS Memory device Increase the maintenance work Increase the size of the system Increase the software cost
		· Reconsider for conventional programming technique	△	Reliability Easy to maintenance simple logic Standardization
		· Condition for easy to understand	○	Dividing the module Structurizing the function Independency of the module Structured programming logic
	4.2[4] Regulation for structured programming	· How to make the structured programming logic	○	Non-proper flowchart plural entrance plural exit Structured unit Proper program
		· Structurize to proper program	◎	Give some example which have plural entrance or plural exit NSchart Structurize to file processing program

Subject : PROGRAMMING

1 − 5 − 5.2

Topics	Sub-topics	Notes	L	Comments
5.Multi file processing	5.1[1] Matching type processing	・What is matching type file processing	△	Matching processing for sorted file
		・Kinds of matching type file processing	△	File merge File matching File update File maintenance
	5.2[4] File merge	・Out line for file merge	△	Characteristics
		Program logic	◎	Out line structure Preparation Merge processing Termination The way using program switch The way using Hi-value
		・Example problem	○	Give a example problem and flow chart
	5.3[4] File matching	・Out line for file matching	△	Un-match record Master file Transaction file
		・Program logic	◎	Describe the program logic using flow chart Program switch Hi-value 1:n type matching process
		・Example problem	○	Give two practical example problem 1:1 type 1:n type
	5.4[2] File update	・Program logic	△	Describe the basic logic using flow chart
		・Example problem	○	Give a example problem for update the master file
	5.5[2] File maintenance	・Out line of file maintenance	△	Describe the following process using the goods master file as a example Record addition Record deletion Change the contents of

Subject : PROGRAMMING 2 – 5 – 5.2

Topics	Sub-topics	Notes	L	Comments
				record
		· Program logic	O	Describe the basic logic using flow chart
		· Example problem	O	Give a example of maintenance for master file of goods Give some exercise

Subject : PROGRAMMING

1 − 6 − 5.2

Topics	Sub-topics	Notes	L	Comments
6.Table operation	6.1[2] Structure of the table	· One-dimensional table	○	Table(array) Table(array) element Table(array) name subscript.(index) Limit value Reference the table Give a example for referencing table element
		· Two-dimensional table	△	Describe the structure of two-dimensional table Give a example for referencing table element
		· Three-dimensional table	△	Describe the structure of three-dimensional table Give a example for referencing table element
	6.2 [4] Table search	· Sequential search	○	Search argument Table argument Give some example for sequential search
		· Compound table search	△	Describe how to search compound table Give some example about compound table search
		· Interval search	○	Describe the interval search technique Give some example about interval search
		Direct search	○	Describe the direct search technique Give some example about direct search
		Binary search	○	Describe the binary search technique Compare search frequency sequential search and binary search Give some example about binary search
	6.3[2] Internal sort	· Basic concept of sort	○	External sort and internal sort Sort key

Subject : PROGRAMMING 2 - 6 - 52

Topics	Sub-topics	Notes	L	Comments
				Ascending Descending Describe the each stages of external sort Describe the type of internal sort Selective sort method Select-change method Insert sort method
		• Select-change method technique	○	Describe the basic logic and the process Give some example about select-change method

7. Flow chart technique for science and technology

7.1[ ] Basic patterns

- Average
- Standard deviation: $\sigma^2 = k\bar{i}^2 \cdot \frac{\pm k_n^2 - n\bar{k}^2}{n-1}$
- Factor
- Greatest common measure
- Error
  - Rounding error
  - Discontinue error
  - Accumulative error
  - Figure down error
  - Transform error

7.2[ ] Solve equations

- Binary dichotomy
- Newton's method: $x_{i+1} = x_i + \frac{f_i}{f'_i}\left(\frac{x_i}{x_i}\right)$

7.3[ ] Solve integral equations

- Simpson's rule: $S = \frac{h}{3}(f_0 + f_n + 4s_1 + 2s_2)$
- Trapezium rule: $S = \sum_1^n Si = \frac{h}{2}(f_0 + f_n + 2(f_1 + \cdots))$

7.4[ ] Solve processions

- Gauss-Jordon method: Pivot

7.5[ ] statistics calculation

- Bar chart of statistics data

5.2

8.Program test.	8.1[.] Quality control	·Necessity ·Type ·Method	
	8.2[ ] Type and features of program test.	·Module test. ·Integration test. ·System test. ·Test run ·Operational test.	
	8.3[ ] Test plan and test design	·Process ·Method ·Practice	
	8.4[ ] Program test method	·Integration test type ·Bottom up test ·Top down test ·Program debug method	Big-bang Driver module Stub module
	8.5[/] General	·Group meeting	

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Diploma in Computer Technology

Subject	Title	5. 3	PROGRAMMING LANGUAGES (FORTRAN77)		
	Responsible	Expert	N.SHINODA		
		C/P	Ranasinghe ,Jacintha		
Aim	Enabling to write a given problem in FORTRAN				
Teaching Strategy	Lecture	Tutorial	Practical		Total
	10	0	78		88
Preceding Subject	JCL and TSS				
Succeding Subject					
Objective	Upon the successful completion of this subject, students should be able to : 1. analyze the scientific problem 2. write the scientific flow charts 3. make FORTRAN programs				
Contents	1. Introduction of FORTRAN 2. FORTRAN programming Comprising analysis, input output designing,structure chatting,coding,input,debugging,with reference to FORTRAN syntax. 3. Summary of FORTRAN syntax				
Remarks	Topic 3 will be referred in Topic 2 as necessity arises				
Mode of Assesment	Written test	30 %			
	Practical test	30 %			
	Assignment	20 %			
	Report	20 %	Version: 2		
	Oral	0 %	Date : 15th Jul.1988		
		100 %	By : N.SHINODA		

Institute of computer technology

Subject : FORTRAN 77

1 — 1 — 5.3.

Topics	Sub-topics	Notes	L	Comments
1. Introduction of FORTRAN	1.1[2] Programming language	·Compiler	○	COBOL ALGOL PL/I
		·Interpreter	○	BASIC
		·FORTRAN	○	History FORTRAN coding form JCL and FORTRAN Stream of program creation

Subject : FORTRAN 77 1 — 2 — 5.3

Topics	Sub-topics	Notes	L	Comments
2.FORTRAN Programming	2.1[10] [10(p)] Q1-1 Basic calculation (30 lines) (without format statement)	·Input data n,n,a,b ·Output data sum difference product quotient square cube route	◎	Integer type calculation Real type calculation Arithmetic operator SQRT(intrinsic function) READ WRITE IF STOP END
	2.2[10] [10(p)] Q1-2 Basic calculation (40 lines) (with format statement)		◎	FORMAT statement
	2.3[10] [10(p)] Q2 Average and Standard deviation (30 lines)	·Input data $X_1, X_2, \cdots, X_{n-1}, X_n$ ·Output data input data number average standard deviation	◎	Comment line READ END statement GO TO statement BLOCK IF statement
	2.4[10] [10(p)] Q3 Electric charge in Sri Lanka (30 lines)	·Input data name electric present meter electric previous meter ·Output data input data units consumed electric charge	◎	CHARACTER Nest structure of IF THEN ELSE FORMAT statement
	2.5[10] [10(p)] Q4 Average and ascending sort (60 lines)	·Input data ID No. name height weight ·Output data sorting data (sort key height,weight) number of records	◎	Array Sort method OPEN CLOSE

Subject : FORTRAN 77

2 - 2 - 5.3(5)

Topics	Sub-topics	Notes	L	Comments
		average of height average of weight		
	2.6[10] [10(p)] Q5 Gauss-Jordan method (60 lines)	·Input data n $a_{11}, a_{12}, \cdots, a_{nn}, a_{n\,n+1}$ ·Output data input data $X_1, X_2, \cdots, X_{n-1}, X_n$	◎	SUBROUTINE CALL DO CONTINUE Actual argument Dummy argument
	2.7[10] [10(p)] Q6 Choice of prime numbers	·Input-data n ·Output data 2,3,5,7,···,n-i	○	Logical calculation TRUE FALSE
	2.8[10] [10(p)] Q7 Line printer plotting (Make a sin graph)		○	Character SIN Beautiful output design

Subject : FORTRAN 77 1 - 3 - 53.4

Topics	Sub-topics	Notes	L	Comments
3.FORTRAN syntax	3.1[1] Character, line,statement	·Character	○	Letter Digit Special character Alphanumeric character Collating sequence
		·Statement and Line	○	Initial line Continuation line Comment line
		·Statement label	○	
		·Kinds of statements	○	Executable statement Non-executable statement
		·Executable program	○	Program unit
		·Execution sequence	○	
	3.2[1] Symbolic name, Constant, Variable, Expression	·Symbolic name	○	
		·Data type	○	Numeric storage unit Character storage unit Integer constant Real constant Double precision constant Complex constant Logical constant Character constant
		·Variable	○	Array Array declarator Dimension declarator Subscript value
		·Expression	○	Arithmetic operator **,/,*,-,+ Character operator // Relational operator GT,GE,NE,EQ,LE,LT Logical operator NOT,AND,OR,EQV,NEQV
		·Priority of operator	○	
		·Evaluation of expression	○	x+y - y+x,x-y+z - x-(y-z)
	3.3[1] Declaration statements	·Dimension	○	
		·Type statements	○	Integer Real Double precision Complex Logical Character Implicit Parameter Equivalence Common Named common block

Subject : FORTRAN 77 2-3-53.

Topics	Sub-topics	Notes	L	Comments
				Blank common block External Intrinsic Save Data Implied-DO list Block data
	3.4[1] Assignment statements	·Arithmetic assignment statements	○	
		·Logical assignment statements	○	
		·Character assignment statements	○	
		·Statement label assignment statements	○	
	3.5[1] Control statements	·Go to statements	○	Unconditional go to Computed go to Assigned go to

		·If statements	○	Block if
				Else if
				Else
				End if
				Logical if
				Arithmetic if

		·Do statements	○	Range of do-loop Initial parameter Terminal parameter Incrementation parameter Iteration count
		·Continue statement	△	
		·Stop statement	△	
		·Pause statement	△	
		·End statement	△	
	3.6[1] Input-Output statements and Format specification	·Data transfer Input-Output statements	○	Read Write Print
		·Auxiliary Input-Output statements	○	Open Close Inquire Backspace Endfile Rewind
		·Format specification	○	Edit descriptor I,F,E,D,G,L,A ',H,T,TL,TR,X,/,:,S,SP, SS,P,BN,BZ
	3.7[0.2]			

Subject : FORTRAN 77 3 - 3 -3.3.1

Topics	Sub-topics	Notes	L	Comments
	Main program	·Main program	△	Program
	3.8[0.8] Procedure	·Function	○	Intrinsic function Describe the Intrinsic table Statement function External function Function statement
		·Subroutine	○	Subroutine statement Call statement Entry statement Return statement Argument
	3.9[1] Appendix syntax	·EBCDIC code table	△	
		·ASCII code table	△	
		·Executable and non-executable statements	/	
		·Scope of symbolic name	△	

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SUB. 5.3-2

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Diploma in Computer Technology 5.3(2)

Subject	Title	Programming languages (COBOL)			
	Responsible	Expert	K.Osada,		
		C/P	Jayashinghe, Nilanthi		
Aim	Enabling to write a given problem in COBOL				
Teaching Strategy	Lecture	Tutorial	Practical		Total
	30		120		150
Preceding Subject	JCL and TSS Programming				
Succeding Subject					
Objective	Upon successful completion of this subject, student should be able to 1. Understand the basic function of each division 2. Write Data division based on file design. 3. Write procedure division based on flowchart 4. Understand COBOL syntax concerning file processing 5. understand COBOL syntax concerning table handling 6. Understand advanced functions of COBOL				
Contents	1.Outline of COBOL 2.Basic functions of each division 3.File maintenance 4.Table handling 5.Advanced COBOL options				
Remarks					
Mode of Assessment	Written test	50 %			
	Practical test	50 %			
	Assignment				
	Report				
	Oral			Date : 10 Dec. 1987	
				By : K.Osada	

Institute of Computer Technology

Subject : COBOL

1 — 1 — 532

Topics	Sub-topics	Notes	L	Comments
1.Out line of COBOL	1.1[1] History and nature	History	Δ	CODASYL ANS-COBOL ISO-COBOL
		Nature	Δ	Business-oriented language Standard language English-like language Self-documenting language
	1.2[2] Fundamental items for description	Kinds of characters	O	Letters Disits Special letters
		COBOL words	O	User-defined words Condition-name Data-name File-name Index-name Level-number Mnemonic-name Paragraph-name Section-name Record-name Program-name System names Reserved word Key word Optional word Connective word
		Constants	O	Literal Numeric literal Non numeric literal Figurative constants
	1.3[1] Configuration and format of COBOL program	Configuration of COBOL	Δ	DIVISION SECTION Paragraph Statement
		COBOL general format	Δ	
		Coding format	Δ	Sequence number area Indicator area Continuation of lines Comment line Area A and area B Program identification area

Subject : COBOL

1 — 2 — 5.3.2

Topics	Sub-topics	Notes	L	Comments
2. Basic functions of each division	2.1[0.5] Identification Division	General format and function	△	PROGRAM-ID AUTHER INSTALLATION DATE-WRITTEN DATE-COMPILED SECURITY
	2.2[0.5] Environment Division	General format and function	△	CONFIGURATION SECTION SOURCE-COMPUTER OBJECT-COMPUTER INPUT-OUTPUT SECTION FILE-CONTROL
	2.3[2] Data division	General format and function	△	FILE SECTION WORKING-STORAGE SECTION
		FILE SECTION	◎	FD sentence File name BLOCK CONTAINS clause LABEL RECORD clause Record description entry Level-number Elementary class Group-item FILLER clause PICTURE clause Numeric item Alphabetic item Alphanumeric item
		WORKING-STORAGE SECTION	○	VALUE clause Editing character Explain the function editing using many examples
	2.4[0.5] Procedure division	The format.	△	Sentence Paragraph Section Section name Module Documenting function
	2.5[10] Sequential program	Input/output statements	△	ACCEPT statement DISPLAY statement
		Data manipulation statement	◎	MOVE statement Describe the rules using many examples

Subject : COBOL

2 — 2 —532

Topics	Sub-topics	Notes	L	Comments
		· Arithmetic statement	○	ROUNDED clause SIZE ERROR clause ADD statement SUBTRACT statement MULTIPLY statement DIVIDE statement COMPUTE statement
		· other statements	○	INSPECT statement STRING statement UNSTRING statement STOP statement
		· Exercise	◎	
	2.6[10] Branch pattern program	· Conditional statement	○	IF statement Conditional statement Simple conditional Compound conditional OR AND NOT Sign test Class test
		· Exercise	◎	
	2.7[10] Loop pattern program	· PERFORM statement	○	UNTIL TIMES VARYING Nested PERFORM
		· GO TO statement	△	Case type
		· Exercise	◎	

Subject : COBOL　　1 — 3 — 5.3.2

Topics	Sub-topics	Notes	L	Comments
3.File Maintenance	3.1[15] Sequential file processing	· How to write in ENVIRONMENT DIVISION	○	FILE CONTROL paragraph SELECT clause ASSIGN clause
		· How to write in DATA DIVISION	○	BLOCK CONTAINS clause LABEL RECORD clause DATA RECORD clause
		· How to write in PROCEDURE DIVISION	○	OPEN statement Processing mode CLOSE statement READ Statement WRITE statement
		· Print file	○	LINAGE clause Logical page
		· Exercise	◎	Read a sales file (sequential) and print a sales report
	3.2[15] Relative file processing	· How to describe ENVIRONMENT DIVISION	△	ORGANIZATION clause ACCESS MODE clause RELATIVE KEY clause
		· How to describe PROCEDURE DIVISION	○	OPEN statement Mode CLOSE statement READ Statement INVALID KEY clause DELETE statement REWRITE statement WRITE statement
		· Exercise	◎	Print a customer list by using a customer master file(Relative)
	3.3[15] Indexed File Processing	· How to describe ENVIRONMENT DIVISION	△	ORGANIZATION clause ACCESS MODE clause RECORD KEY clause
		· How to describe PROCEDURE DIVISION	△	OPEN statement CLOSE statement READ Statement DELETE statement REWRITE statement WRITE statement
		· Exercise	◎	Inventory file(indexed) update

Subject : COBOL

2 — 3 — 5.3.2

Topics	Sub-topics	Notes	L	Comments
	3.4[5] SORT and MERGE	・Function of sort.	○	Sort file Collating sequence EBCDIC ASCII
		・Function of merge	△	
		・How to describe PROCEDURE DIVISION	○	SORT statement ASCENDING clause DESCENDING clause USING clause GIVING clause MERGE statement RELEASE statement RETURN statement
		・Exercise	◎	Sales data sort by the customer code and the goods code

Subject : COBOL　　1 − 4 − 5.3.2

Topics	Sub-topics	Notes	L	Comments
4. Table handling	4.1[1] Defining a table	· The use of OCCURS clause	O	Subscript Index Double level OCCURS clause Triple level OCCURS clause
		· Setting initial value	O	VALUE clause REDEFINS clause
		· Appointing Table element	O	The way by subscript The way by index
	4.2[15] How to describe procedure division	· SEARCH statement	O	General format, function and rules
		· SEARCH ALL statement	O	General format, function and rules Serial search Binary search
		· SET statement	O	General format, function and rules Modifying to the index
		· Excercise	◎	Table handling example (Read wage payment file and print health insurance fee notification)

Subject : COBOL

1 — 5 — 5.3.2

Topics	Sub-topics	Notes	L	Comments
5.Advanced COBOL Options	5.1[10] Inter program communication	Out line	○	Advantages Calling program Called program
		Calling program	○	LINKAGE SECTION CALL statement USING clause
		Called program	○	EXIT PROGRAM statement Referencing data between programs Procedure division header
		Exercise	◎	
	5.2[15] Report writer	Out line	○	Report format Report groups Report heading,... Control data item Page counter Line counter
		DATA DIVISION	○	File section Report section RD clause PAGE LIMIT clause CONTROL clause Report group description entry TYPE clause LINE NUMBER clause NEXT GROUP clause COLUMN NUMBER SOURCE clause SUM clause GROUP INDICATE clause
		PROCEDURE DIVISION	○	INTIATE Statement GENERATE statement TERMINATE statement
		Exercise	◎	Monthly sales report
	5.3[1] Library		△	COPY statement. REPLACING clause
	5.4[1] USAGE clause		△	Zoned decimal format Packed decimal Binary format

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Subject	Title :5.3.3 JCL/TSS				
	Responsible	Expert	Yoshio Niizeki		
		C/P	S.T.Nandasara, A.N.Ranasinghe		
Aim	To provide the basic knowledge in order to develop and debug the programs by using batch and interactive processing on ACOS - AVP.				
Teaching Strategy	Lecture	Tutorial	Practical		Total
	15	0	15		30
Preceding subjects	None				
Succeeding subjects	Programming language (FORTRAN,COBOL)				
Objective	Upon the successful completion of this subject, students should be able to: (1) Understand the basic JCL statements and PASS commands. (2) Execute simple programme by using batch processing and interactive processing.				
Contents	1.Introduction of programme development 2.Programme execution by using batch processing 3.Programme execution by using interactive processing 4.Programme debugging 5.Others				
Remarks	Assessment of this subject will be introduced in that of "COBOL" and "FORTRAN".				
Mode of Assessment	Written test				
	Practical test				
	Assignment				
	Report				
	Oral			Date :9.Dec. 87	
				By :Y.Niizeki	

Subject : JCL/TSS

1 - 1 -533

Topics	Sub-topics	Notes	L	Comments
1. Introduction to program development	1.1 [0.5] Use of ACOS-4/ADP	· Purpose of ACOS-4/ADP	○	A brief explanation of ACOS-4/ADP.
		· Using patterns of ACOS-4/ADP	○	There are 4 patterns of using ACOS-4/ADP. · Batch processing · Interactive processing · Online database system ~~· Integrated office system~~
	1.2 [1.5] Program development	· Procedure of program development	◎	Give a basic procedure by using the block flowchart.
		· Use of libraries	○	Explain the changes of the programs' forms during the program development. · Source Unit (SU) ↓ · Compile Unit (CU) ↓ · Load module (LM) Also explain the libraries corresponding to the forms of programs. Sourc library ↔ SU CU library ↔ CU LM library ↔ LM

Subject : JCL/TSS

2 - 1 - 5.3.3

Topics	Sub-topics	Notes	L	Comments
		• Program modularization	①	
		• Program execution and files	○	Explain the following two concepts. • Internal file name • External file name
		• List output and the SYSOUT file	○	Explain the following two items. • Effects of using a SYSOUT file • Using SYSOUT files

Subject : JCL/TSS

1 - 2 - 5.3.3

Topics	Sub-topics	Notes	L	Comments
2. Program development by using batch processing	2.1[1] Overview	· Concept of JCL statement	◎	Introduce the concept of JCL statement.
		· Job and Jobstep	◎	
		· JOB statement and ENDJOB statement	◎	Explain the basic rules and parameters for JOB/ENDJOB statements.
	2.2[5][3(P)] Basic JOB description	· From compile through execution	◎	Explain the basic pattern of JCB description for compile, link and go.
		· Use of files	○	Explain the file catalogue function and basic pattern of file description.
		· How to compile the program in library?	○	Give a basic example how to compile the program registerd in the library.
		· How to link the programs?	○	Explain the basic linkage parameters.
		· Execution of program	○	Explain the STEP statement.
		· Basic file assign	○	Give a basic example of the ASSIGN statement for file assign.

Subject : JCL/TSS

2 - 2 - 5.3.3

Topics	Sub-topics	Notes	L	Comments
	2.3[3][2(d)] Variations of file assign	· Data file assign	○	Explain the following two types of files. · Permanent file · Temporary file
		· SYSOUT file assign	○	Explain the following two types of SYSOUT file · Standard SYSOUT file · Private SYSOUT file
		· SYSIN file assign	○	Explain how to use input data.

Subject : JCL/TSS

1 – 3 –5.3.3

Topics	Sub-topics	Notes	L	Comments
3. Program development by using interactive processing	3.1 [0.5] Overview	· What is an interactive processing?	◎	
		· Outline of procedures of program development by using interactive processing	◎	Explain the following two kinds of procedures. · By using only interactive processing · By using batch processing and interactive processing
		· How to start and end interactive processing	◎	Explain the operation for start/end interactive processing by using display images.
	3.2 [0.5] Program modification and execution	· Source program compilation and modification	○	Explain a series of program modification and execution by using display images.
		· Program linking	○	
		· Program execution	○	
		· List output	○	
		· Program execution by using the RUN subcommand	○	
		· Source program creation	○	

Subject : JCL/TSS

2 - 3 - 5.3.3

Topics	Sub-topics	Notes	L	Comments
	3.3 [2.0] [1(p)] Editing functions	· Edit processing using the editor	◎	Explain the kinds of file to be able to handle by editor · Sequential files · Libraries
		· Screens and operation	◎	· EDIT initial screen · EDIT subfile list screen · Regular EDIT screen
		· Basic editing operations	◎	· Movement of screen image · Modification of text · Writing of modified text
		· Practical editing operations	○	Explain how to edit for multiple text files.
	3.4 [1.5] [1(p)] Compilation	· Introduction	◎	
		· Screens	◎	· Initial screen · Execution screen
		· Compiling listing	◎	Explain about the compiler ouput lists.
	3.5 [1.5] [1(p)] Linking	· Introducting	◎	
		· Screens	○	Explain the following two types of screens. · LINK initial screen · LINK execution screen
		· Link map listing	◎	

Subject : JCL/TSS

3 - 3 - 533

Topics	Sub-topics	Notes	L	Comments
	3.6 [15] [1CD] Program execution and file assignment	· Introduction	◎	
		· Screens	○	· CALL initial screen · ASSIGN/FREE screen · CALL execution screen
		· Program execution using RUN	○	Explain initial screen and their parameters
		· Program execution using LOADGO	○	
		· Operation for interrupting program execution	○	Explain how to interrupt during the program execution
		· Operation when the screen display is filled	○	
		· Assigning libraries	○	
	3.7 [15] [1CD] List output (BROWSE)	· Introduction	◎	
		· Screens	◎	· Initial screen · Subfile list screen · Display screen · Error display screen

Subject : JCL/TSS

1 - 4 --5.3.3

Topics	Sub-topics	Notes	L	Comments
4. Program debugging	4.1 [0.5] Overview	· Debugging procedure	◎	
		· Creating the test environment	○	
		· Performing a test run	○	
		· Verifying program operation	○	
	4.2 [1.5] [1Q] Using files	· Basic information regarding files	◎	Explain about the following items. · Record and blocks · File organization · File media
		· Creating and scratching files	○	Explain about the following commands. · PREALLOC · DELETE
		· Creating data using the editor	○	Explain the following two ways. · How to create new data? · How to use an existing data file?
		· Using utilities	○	Explain the following utilities commands briefly. · SORT · PREALLOC · DELETE · CATLIST · FILLIST · COPY

Subject : JCL/TSS

2 - 4 - 5.3.3

Topics	Sub-topics	Notes	L	Comments
	4.3 [3.5] [2(4)] Using IDSP	· Introduction	◎	Explain the advantages of IDSP.
		· Procedure for using IDSP	◎	Explain the debugging procedure using IDSP.
		· Test execution using RUN or LOADGO	○	
		· Subcommands and debug processing	◎	Explain briefly the subcommands of IDSP.
		· Efficient debugging techniques	○	
	4.4 [3.5] [2(4)] Abnormal termination of program and debugging	· Program termination code	○	Explain the main termination codes.
		· Causes of abnormal termination	○	Explain how to look for the wrong statement.

Subject : JCL/TSS

1 - 5 - 5.3.3

Topics	Sub-topics	Notes	L	Comments
5. Others	5.1 [0.5] Libarary maintenance	~~· Creating a library~~	○	~~· Explain about the LIBALLOC command.~~
		~~· Deleting a library~~	○	~~· Explain about the DELETE command.~~
		· Example of operation	○	
		· Libarary maintenance facility	○	Explain about the LIBRARIAN facility.
	5.2 [0.5] Background processing	· What is a background processing ?	◎	· Job description · Job and jobstep · Background processing · Job processing flow
		· Using the editor to create and activate a job description.	◎	· Creating a job description · activating and monitoring a job description by using editor subcommands.
		· Activating and monitoring a job description using background	○	· Screen flow and operations. · Background initial screen. · RUNJOB screen · JOB STATUS screen · SYSTEM LOAD DISPLAY screen
		· Terminal output of job execution results.	○	· DELIVERY list screen · DELIVERY controls display screen

SUB.　　　　　　　　　　　　　　　　　　　　　　SUB. 6.1

NO.	DATE dd . mm . yy	PAGE sec. topic sub.	REVISED POINT	RMK

Subject	Title 16.1 Management of Data Processing Systems				
	Responsible	Expert	Ryo Takagi		
		C/P	S.T.Nandasara, A.N.Ranasinghe		
Aim	To acquire knowledge and techniques that are necessary for managing the information processing system from the point of view of efficient processing of machine and effective use of human and machine resources.				
Teaching Strategy	Lecture	Tutorial	Practical		Total
	15				15
Preceding subjects	Hardware, software information systems.				
Succeeding subjects					
Objectives	Upon the successful completion of this subject, students should be able to: (1) State the role of DB staff involved in daily operation consumables and facilities necessary for it. (2) Manage hardware resources effectively. (3) Audit information systems.				
Contents					
Remarks					
Mode of Assessment	Written test				
	Practical test				
	Assignment				
	Report				
	Oral			Date :	
				By :	

Topics	Sub-topics	Notes	Comments
1.Character Characteristics of data processing system	1.1 General		
	1.2 Concept of MIS		
	1.3 Type of data processing division	. Centralized and De-centralized . Organization of small and medium site.	
	1.4 Management of data processing department	. Segregation of functions	
	1.5 Personnel	. Personnel selection . Testing . Types of training	. On-the-job training . Training classes . Job rotation

Subject : MANAGEMENT OF INFORMATION PROCESSING SYSTEMS. 2 - 1 - 6.1

Topics	Sub-topics	Notes	Comments
2.Equipment management	2.1 Computer room design	. Location of the computer room	
		. Sufficient space	
		. Floor loading	
		. Walls and ceiling	
		. Lighting	
	2.2 Computer hardware management	. Environmental condition	
		. Hardware maintenance	. Contract with manufacturer
		. Daily check for maintenance	
		. Remote diagnosis	
		. Facilities maintenance	. Air conditioner
			. Power supply
			. Fire extinguisher
	2.3 Management of consumable goods	. Inventory control	
		. Purchase of goods	
	2.4 Trouble shooting	. Identification of trouble	
		. Recovery	
	2.5 Backup system	. Duplex system	
		. Dual system	

Topics	Sub-topics	Notes	Comments
3. Data and file management	3.1 Management of I/O data	. Input/output procedure	
		. Methods of data input	. Online data entry
			. Off-line data entry
		. Authencity of data	
		. Error correction	
		. Methods of input check	. Design code
		. Input form	
		. Management of output data	
		. Design of output form	
		. Output data statistics	
	3.2 Management of magnetic file	. Magnetic file as external storage	
		. File updating	
		. Maintenance of magnetic data	. Tape handling
			. Hard disk pack error
			. Floppy disk
			. Disk security
	3.3 Maintenance of software	. Program maintenance log	

Topics	Sub-topics	Notes	Comments
		. Standard and guidelines for software maintenance . Documentation for software maintenance	

Topics	Sub-topics	Notes	Comments
4. Computer security	4.1 Security measure	. Environmental security	. Fire
			. Water
		. Data management	
		. Management of teleprocessing	. Network management
			. Terminal management
	4.2 Security of important records	. Backup facility	
		. Recovery plan	
	4.3 Procedure of computer room	. In-out of computer room	
		. Staff	
		. Library management	

Topics	Sub-topics	Notes	Comments
5. Management of computer use	5.1 Operation management	. Operation plan	
		. Role and job of operator	
		. Documentation	
	5.2 Operation analysis and evaluation	. Methods	. Use of accounting log
			. Hardware monitors
			. Software monitors
		. Kiviat graph and Gantt chart	. Kiviat graph
			. Gantt chart
		. Identification of bottle neck	
		. Imporvement	

Topics	Sub-topics	Notes	Comments
6. EDP audit	6.1 General	. Purpose and concept of audit	
		. Role of auditor	
	6.2 Objective of auditing	. Auditing of the management of the division	
		. Auditing of the system development stage	
		. Auditing system operation	
	6.3 Audit techniques	. Data auditing	. Test data
			. Parallel simulation
			. Integrated testing
		. Program auditing	. Program code comparison
			. Trace routines and mapping
			. Logic path analysis program

SUB.

SUB. 6.2

NO.	DATE dd. mm. yy.	PAGE ser. top. sub.	REVISED POINT	RMK

Subject	Title 16.2 Management of projects				
	Responsible	Expert	Shizuo Shibata		
		C/P	S.T.Nandasara		
Aim	To understand how the management of a project can be implemented in accordance with the development of the information processing system and to acquire the knowledge on management technique and standardization.				
Teaching Strategy	Lecture	Tutorial	Practical		Total
	10				10
Preceding subjects	1. Outline of information processing system 2. Resource of information processing system 3. Information system design				
Succeeding subjects					
Objective	Upon the successful completion of this subject, students should be able to: (1) Understand the outline of the project management (2) Manage the project in the development stage.				
Contents	1. Overview of project planning and control 2. Organization of the project 3. Project planning 4. Planning techniques 5. Quality control 6. Configuration management 7. Progress control				
Remarks					
Mode of Assessment	Written test	100 %			
	Practical test				
	Assignment				
	Report				
	Oral			Date : 10.12.87	
				By : S. Shibata	

Subject: MANAGEMENT OF PROJECTS

1 - 1 - 6.2

Topics	Sub-topics	Notes	Comments
1.[1] Overview of project planning and control	1.1 [ ] Introduction of project management	.Effect of project	New system, young power, veteran knowledge.
		.Elements of a project	◎Target(goal), term, investment.
		.The success of a project.	Responsibility of project, Evaluation system.
	1.2 [ ] System development overview	.System development products	Solution to a problem, implementation method, Program
		.System development phases	Basic system design, Detail system design, Programming and testing, operation, Evaluation
		.System development reviews	Review Point:Timing, Contents, Aftercare
		.System development documentation	Standardization, Renew of documents
	1.3 [ ] Selection of life cycle	.Software life cycle	○Basic life cycle, Progress of EDP technique,Improvement of works
		.Hardware life cycle	○Basic life cycle, Progress of hardware technology, Improvement of works

Subject: MANAGEMENT OF PROJECTS 1 - 2 - 6.2

Topics	Sub-topics	Notes	Comments
2.[1] Organization of the project	2.1 [ ] Organization of the project	.Difference in small and large project	Small:Particular field technique, utilization of existing technique, Small improvement of works Large:Totally problem solution, using various new technique, various field person
		.Procedure in project management	Command system, reporting rule, standardization of term
		.Competence of project	Responsibility range of project,
	2.2 [ ] Project leader and members	.Selection of a project leader	Who select a project leader,
		.Qualities and traits of a project leader	Personality, Status, Judgement, Action
		.Members	
	2.3 [ ] Developing stage and the organization	.Project starting point	Who to establish the starting point, Decision making of a project goal
		.System design organization	Quality assurance, Man-machine interface, Project control, Software development
		.Programming and testing organization	(As above)
		.Implementation organization	Switchover point: Testing, training Implementation: Follow the operation

Subject: MANAGEMENT OF PROJECTS

1 - 3 - 6.2

Topics	Sub-topics	Notes	Comments
3. [ ] Project planning	3.1 [ ] Project plan	.An assumption of the project goal	Goal of the projects, An essential matters and wishful matters
		.An assumption of developing size and resources	Choice of existing or new technology, improvement of existing system on new system development
		.Phase plan	Why phases are needed, set up of a goal in each phases
	3.2 [ ] Project estimate	.Software cost	Unit cost, amount of system development, outside suplier or not use of utility system
		.Hardware cost	Installation method (purchase,rental, lease), period of time of use, Assumption of devices
		.Data entry cost	Backdate data entry cost,Update data entry cost,unit cost, amount of data entry
		.Other cost	Operating cost (expendable supplies, equipments, electricity and heating expenses, personnel expenses),Occasional cost (construction expenses,installation expenses)
3.3 [ ] Decision making of project plan	.Decision making →		Decision maker, Contents of decision making, set up the priority

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Subject: MANAGEMENT OF PROJECTS 2 - 3 - 6.2

Topics	Sub-topics	Notes	Comments
		.To secure resources	Man power (Quality and Quantity), Expenses, Materials

10

Topics	Sub-topics	Notes	Comments
4.[3] Planning techniques	4.1 [ ] Work breakdown structure (WBS)	.Definition and objectives	Breakdown, Stratum structure, special knowledge, manpower
		.Make of WBS table	Final material (document, program), characteristic of project, difficulty, label of specialist
		.Developing process and kind of WBS	Initial WBS, Preliminary WBS, Project WBS, Phase WBS
	4.2 [ ] Schecule planning	.MILESTONE chart	MILESTONE (event, term review item), GANT (Bar) chart
		.PERT (Program Evaluation and Review Technique)	Critical Pass Method, Network
	4.3 [ ] Trial calculation of performance	.Simulation	Response time, model pattern, processing time
		.Pilot model	Use of new technique Big system, Response time

Topics	Sub-topics	Notes	Comments
5.[1] Quality control	5.1 [ ] Software Quality	.Usability	Reliability, Efficiency, Human Engineering
		.Maintainability	Testability, Understandability Modifiability
		.Others	Portability
	5.2 [ ] Technique of Quality control	.Review	Effect of review, Method of review, Notice point in review
		.Walk through	Early finding of error Method of walk through
		.Others	Capture.recapture, Continuous Integration (iterative enhancement), Bug management graph Test support tool

Topics	Sub-topics	Notes	Comments
6. [2] Configuration management	6.1 [ ] Overview of configuration	.Configuration definition	Baseline management standardization change control documentation
		.Organization for configuration management	EDP manager, project manager, Librarian, Configuration manager.
	6.2 [ ] Standardization	.Kind of standardization ◎	Project control, working standard, document
		.Method of standardization	Configuration manager Project manager, Documentation
		.Effect of standardization	Development expenses, term, Homogenization of work
	6.3 [ ] Change control	.Change factor ◎	Improvement of work, amendment of law, correction of bug.
		.Document change control	Change rule.
		.Program change control	Change rule, Data database according.
		.Code and listing change control	
		.Database change control	
	6.4 [ ] Configuration according	.Document management	Change log, Librarian
		.Software problem report.	Database according

13

Topics	Sub-topics	Notes	L	Comments
7.[1] Progress control	7.1 [ ] Objectives and Limitations	.Definition of control	O	Target, Term, Investment
		.Need for control system	O	Completion of project by original schedule is very difficult.
	7.2 [ ] Pre-requisites of progress control	.Accurate estimate		Term manpower, understanding of User needs, WBS
		.Setting of review process		Clear and accurate working process, event, reporting rule
	7.3 [ ] Progress control method	.Control objectives and tools	◎	Term, actual result, Status report, review checklist, master project manual, deal to delay.
	7.4 [ ] Progress control techniques	.MILESTONE		
		.PERT		

Diploma in Computer Technology

Subject	Title	APPLICATION PACKAGES 7.1			
	Responsible	Expert	S.TAKAHASHI		
		C/P			
Aim	Understanding the outline of application packages				
Teaching Strategy	Lecture	Tutorial	Exercise	Practical	Total
	23			7	30
Preceding Subjecect	Hardware , Software , FORTRAN				
Succeding Subject					
Objective	Upon the successful completion of this subject , students should be able to : (1) Explain the usage and effects of application packages. (2) Understand the basic function of application packages.				
Contents	1. Outline of application packages 2. Management science package with demonstration of MATHLIB package 3. Engineering package 4. Information retrieval package 5. CAD/CAM package with demonstration of MS4100 6. Production management package				
Remarks					

Mode of Assesment		
	Written test	40%
	Practical test	30%
	Assignment	30%
	Report	
	Oral	
		100%

Date : 30/3/1988 (REV 03)

By : S. Takahashi

Institute of computer technology

Topics	Sub-topics	Notes	Comments
1. Outline of application packages	1.1[1] Introduction of application package	.What is a application package	Explain the definition of application package
			Describe the application package:
			Management science Engineering Information retrieval CAD/CAM system Production management
		.Usage of application package	Explain the advantage and disadvantage of application package by using following keywords
			Cost Term Manpower Knowledge
	1.2[1.5] Outline of application package	.Management science package	Describe the management science package:
			Statistical package Forecasting Simulation Mathematical programming package
		.Engineering package	Describe the engineering package:
			Mathematical calculation package
			Construction analysis package
			Numerical control package (NC)

Subject: APPLICATION PACKAGE

2 - 1 - 7.1

Topics	Sub-topics	Notes	Comments
		.Information retrieval package	Describe the outline of information retrieval package
		.CAD/CAM package	Describe the CAD/CAM package CAD package (Computer Aided Design) CAM package (Computer Aided Manufacturing)
		.Production management package	Describe the production management package Material planning package

Topics	Sub-topics	Notes	Comments
2. Management science package	2.1[2] Statistical package	Outline of statistical package	Explain the famous statistical packages SAS (Statistical Analysis System) BMD (Biomedical computer program) SPSS (Statistical package for social science)
		.Usage of statistical package	Explain the usage and effects of statistical package (from applicable field point of view) Applicable field: Administration Economy Agriculture Medicine Investigation
		.Functions of statistical package	Explain the basic functions of statistical package by using NEC STATPAC package STATPAC (Statistical package) Explain the basic functions of STATPAC by using simple example

Topics	Sub-topics	Notes		Comments
	2.2[2] Forecasting package	.Outline of forecasting package	◎	Explain the basic function of forecasting package
		.Usage of forecasting package	◎	Explain the usage and effects of forecasting package (from applicable field point of view) Applicable field: National economy analysis Regional economic analysis Industry analysis Management analysis
	2.3[2] Simulation package	.Outline of simulation package	◎	Explain the famous simulation package DYNAMO (Dynamic model) GPSS (General purpose system simulator)
		.Usage of simulation package	◎	Explain the usage of and effects of simulation package (from applicable field point of view) Motor traffic network Airport capabilities Supermarket configuration Online system design Crane operation etc.
		.Functions of simulation package	◎	Explain the basic functions of simulation package by using NEC GPSS package

Topics	Sub-topics	Notes	Comments
			Explain the simulation results by using following example Terminal utilization
	2.4[2] Mathematical programming	.Outline of mathematical programming package	Explain the basic functions of mathematical programming package by using following keywords Linear programming Non-linear programming Integer programming
		.Usage of mathematical programming package	Explain the usage and effects of mathematical programming package (from applicable point of view) Investment planning Capital planning Personnel planning Production planning etc.

Topics	Sub-topics	Notes		Comments
3. Engineering package	3.1[11] [6 (P)] Mathematical calculation package	.Outline of mathematical calculation package	@	Explain the famous mathematical calculation packages: MACSYMA (project MAC's symbolic manipulation system) REDUCE u-MATH
		.Usage of mathematical calculation package	@	Explain the usage and effects of mathematical calculation package (from applicable field point of view) Universities Colleges Research instruction etc.
		.Functions of mathematical calculation package	@	Explain the basic functions of mathematical calculation package by using NEC MATHLIB package MATHLIB (Mathematical library)
		.Basic functions of MATHLIB package	@	Explain the basic functions of MATHLIB package by using following keywords Matrix calculation Simultaneous linear equations

Topics	Sub-topics	Notes		Comments
				Eigenvalue and eigenvector
				Algebrabic equation
				Nonlinear equation
				Polynominal
				Interpolation
				etc.
		Example programs of MATHLIB package	◎	EX. Gauss-Jordan method
				Explain the JCL of MATHLIB package
				How to call the MATHLIB package from FORTRAN program
				Execute the MATHLIB package
				Check the results with FORTRAN programs
	3.2[2] Construction analysis package	.Outline of construction analysis package	○	Explain the famous construction analysis package:
				DEMOS-E
				NASTRAN
				MARC
		.Usage of construction analysis package	○	Explain the usage and effects of construction analysis package
				(from applicable field point of view)
				Housing site preparation
				Road building

Topics	Sub-topics	Notes	Comments
			Railroad facilities etc.
	3.3[1] Numerical control package (NC)	.Outline of numerical control package	Explain the outline of numerical control package
		.Usage of numerical control package	Explain the usage and effects of numerical control packages

Topics	Sub-topics	Notes	Comments
4. Information retrieval package	4.1[2] Information retrieval package	.Outline of information retrieval package	Explain the outline of information retrieval package
		.Usage of information retrieval package	Explain the usage and effects of information retrieval package (from applicable field point of view) Research and development Business field Personnel field Service field
		.Functions of information retrieval package	Explain the basic functions of information retrieval package by using NEC DATA-710 information retrieval package

Topics	Sub-topics	Notes		Comments
5. CAD/CAM package	5.1[1] CAD package (Computer Aided Design)	.Outline of CAD package	ⓐ	Explain the outline of CAD package
		.Usage of CAD package	ⓑ	Explain the usage and effects of CAD package Applicable field: Industry Engineering etc.
	5.2[0.5] CAM package (Computer Aided Manufacturing)	.Outline of CAM package	ⓒ	Explain the outline of CAM package
		.Usage of CAM package	ⓓ	Explain the usage and effects of CAM package
	5.3[1 (P)] Demonstration of graphic package	.Demonstration of graphic package	ⓟ	Demonstration of graphic package based on MS4100 GRANSY package

Topics	Sub-topics	Notes	Comments
6. Production management package	6.1[1] Material planning package	.Outline of material planning package	Explain the outline of material planning package
		.Usage of material planning package	Explain the usage and effects of material planning package

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NO.	DATE dd. mm. yy	PAGE ser. topi sub.	REVISED POINT	RMK
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Subject	Title 7.3 Assemblerlike language and system macros				
	Responsible	Expert	Yoshio Niizeki		
		C/P	A.P.Madurapperuma, A.N.Ranasinghe		
Aim	To provide the basic knowledge on how to use the assemblerlike language which uses the many functions provided hardware and operating system.				
Teaching Strategy	Lecture	Tutorial	Practical		Total
	10	0	0		10
Preceding subjects	1. Software 2. Hardware		3. COBOL 4. FORTRAN		
Succeeding subjects	None				
Objective	Upon the successful completion of this subject, students should be able to: (1) Explain the basic knowledge on how to use the assemblerlike language. (2) Explain the several basic system macros.				
Contents	1. Introduction 2. Basic file processing system 3. Advanced processing system 4. String processing programs 5. Processing with BASED variables 6. Other functions including system macros				
Remarks	In this subject try to describe the basic knowledge by using many sample programs rather than the synthatical details.				
Mode of Assessment	Written test	60 %			
	Practical test	10 %			
	Assignment	20 %			
	Report	10 %			
	Oral	0		Date : 21.DEC.,'87	
		100 %		By : Yoshio Niizeki	

Subject : Assemblerlike language and system macros

1 — 1 — 7.3

Topics	Sub-topics	Notes	L	Comments
1. Introduction	1.1 [0.25] Purpose		◎	Explain the necessity and purpose of this assemblerlike language.
	1.2 [0.25] Sample program		○	Give a sample program to explain the basic knowledge
	1.3 [0.5] Program description		◎	Give a brief description of each lines of above sample programs.
	1.4 [1.0] Summary	· Coding	○	
		· Identifiers	○	
		· Use of blanks and comments	○	
		· Statement formats	○	Explain the following two formats. · Simple statement · Compound statement
		· Labels	○	
		· Data declaration	○	Explain how to declare the following five types of data · Binary arithmetic data · Logical data · Character string data · Bit string data · Decimal arithmetic data

Subject : Assemblelike language and system macros

2 — 1 — 23

Topics	Sub-topics	Notes	L	Comments
		· Constants	○	Explain the following six types of constants. · Decimal integer constant · Binary integer constant · Hexadecimal integer constant · Binary string constant · Hexadecimal string constant · Character string constant
		· Expressions	○	Explain the following four types of expressions. · Binary arithmetical expressions. · Logical expressions. · Decimal arithmetic expressions. · Character string expressions, pointer expressions and entry expressions.
		· Statements	○	Explain the following three types of statements. · Assignment statement · IF statement · RETURN statement
		· Program structure and blocks	○	Explain the following three statements. · PROC statement · BEGIN statement · END statement

Subject : Assemblerlike language and system macros

1 – 2 –7.3

Topics	Sub-topics	Notes	L	Comments
2. Basic file processing program	2.1[0.25] Sample program		○	Give a sample program to explain the basic file processing method.
	2.2[0.75] Program description		◎	Give a brief description of each line of above sample program.
	2.3[1.0] Summary	· System macros.	△	Briefly describe the system macros. Detailed description will be made latter
		· Use of registers	◎	Explain the following three registers and how to use those registers · General registers · Index registers · Based registers
		· Structure declarations.	○	
		· Array declarations and references	○	
		· Qualifiers	○	
		· Displacements	○	
		· Allocation and STATIC block	○	Explain the following two types of allocation · Static allocation · Dynamic allocation
		· Initial values and CONSTANT block	○	Explain about the INIT attribute
		· END statement	○	

Subject : Assemblerlike language and system macros

1 — 3 — D.3

Topics	Sub-topics	Notes	L	Comments
3. Advanced file processing program	3.1 [0.25] Sample program		C	Give a sample program to explain the advanced file processing method.
	3.2 [0.25] Program description		◎	Give a brief description of each line of above sample program.
	3.3 [0.5] Summary	· DO groups	◎	Explain the following three types of DO groups. · DO; ~ END; · DO WHILE(X>Y); ~ END; · DO I=X TO Y BY Z WHILE(X>Y); ~ END;
		· CALL statement and procedures.	◎	
		· Program structures containing internal procedures.	◎	Explain the difference between the internal procedures and external procedures.

Subject : Assemblerlike language and system macros

1 – 4 – 7.3

Topics	Sub-topics	Notes	L	Comments
4. String Processing Program	4.1 [0.25] Sample program		○	Give a sample program to explain the string processing program.
	4.2 [0.75] Program description		◎	Give a brief description of each line of above sample program.
	4.3 [1.0] Summary	· Factoring-out of attributes	○	
		· Label arrays	○	Explain the dynamic control of the flow of program execution by using label arrays.
		· External procedures and scope of names	◎	Explain the following items. · Arguments and parameters · External name definitions · STATIC block link · Transfer of register values · Interlanguage data transfer
		· Unlabeled items	○	

Subject : Assemblerlike language and system macros

1 – 5 – 73

Topics	Sub-topics	Notes	L	Comments
5. Processing with BASED variables	5.1 [0.25] Sample program		C	Give a sample program to explain the BASED variables.
	5.2 [0.25] Program description		◎	Give a brief description of each line of above sample program.
	5.3 [0.5] Summary	· Pointers and BASED variables	◎	Introduce the concept of BASED variable.
		· Generation Access	C	Explain how to access to a given generation.
		· Pointer declaration	C	
		· Equating Pointers and BASED variables	◎	Explain the following three techniques how to equate the BASED variables with a pointer. · Explicit qualification · Implicit qualification via a DCL statement · Qualification via a BEGIN statement
		· Priority levels of pointer qualifications	C	

Subject : Assemblerlike language and System macros

1 – 6 – 7.3

Topics	Sub-topics	Notes	L	Comments
6. Other functions	6.1 [0.25] External Procedure calling	· Secondary entry point	○	
		· Entry data	○	Explain the entry variable.
		· STOP statement	○	Explain the difference between the STOP statement and RETURN statement.
	6.2 [0.5] Semaphore definition	· SEMAPHORE block	◎	
		· Use of semaphore	○	
	6.3 [0.25] System macros	· Concept of system macros	◎	Introduce system macros as routines which give smooth-skined services to programs.
		· System control macros	○	· Task control service · Operator message service · Timer service · Event control service · Control variable service · Job control service
		· Data control macros	△	· File access service · File control service · Label processing service
		· Message control macros	△	· Mail box access service · Network control service · Message control service
		· System service macros	○	· Return code check

Subject : Assembler/libs language and System macros

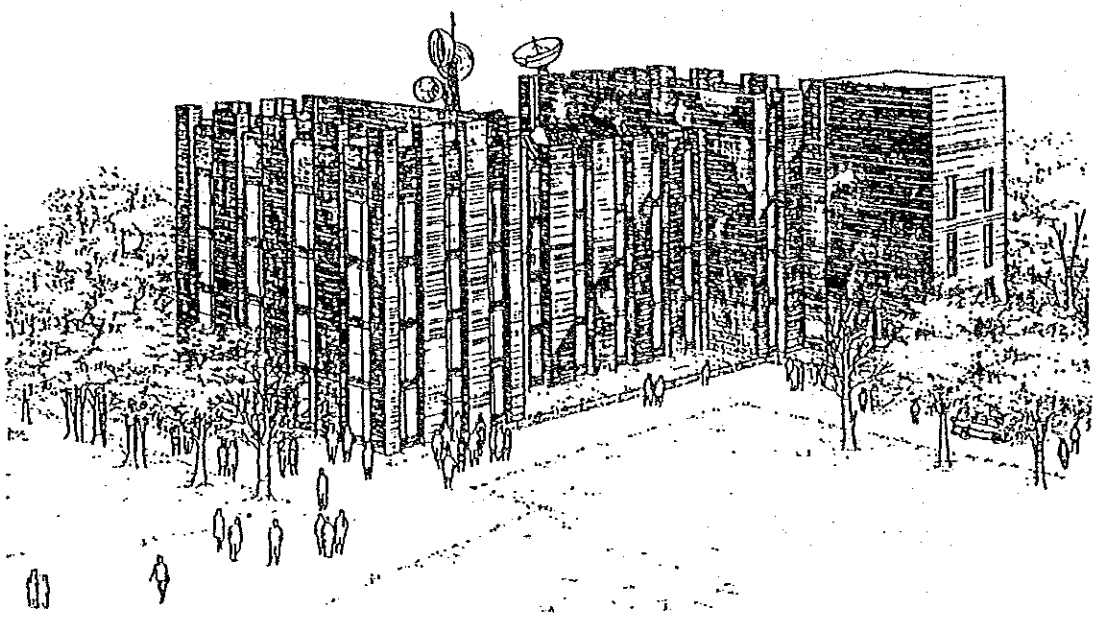
1 – 6 –7.3

Topics	Sub-topics	Notes	L	Comments
	6.4 [0.25] Built-in functions and Pseudo-variables	• Arithmetic Built-in functions	○	
		• Pointer Processing Built-in functions	○	
		• String Processing Built-in functions	○	
		• Gds Special Built-in functions	○	
		• Pseudo-variables	○	
	6.5 [0.25] Interfacing with high level languages	• Interfacing with FORTRAN77	◎	
		• Interfacing with COBOL	◎	

7—2　DCT コースパンフレット

UNIVERSITY OF COLOMBO

INSTITUTE OF COMPUTER TECHNOLOGY



DIPLOMA IN COMPUTER TECHNOLOGY

A Colombo Plan Project with Japanese Government Technical Cooperation

P R O S P E C T U S

March 1988

CONTENTS

THE INSTITUTE

The Institute of Computer Technology (ICT) was established by Order made by the Hon. Minister of Higher Education on September 1987 under Section 24A(1) of the Universities Act No. 16 of 1978 as amended by Act No. 07 of 1985. The Institute is governed by "The Institute of Computer Technology Ordinance No. 2 of 1987" published in the Gazette No. 472/2 of 21st September 1987 of the Democratic Socialist Republic of Sri Lanka. The Ordinance came into force on 15th September 1987. The institute is expected among other things, to provide instruction and training in Computer Technology, thereby contributing towards the development of human resources required by Sri Lanka in this important area of modern technology.

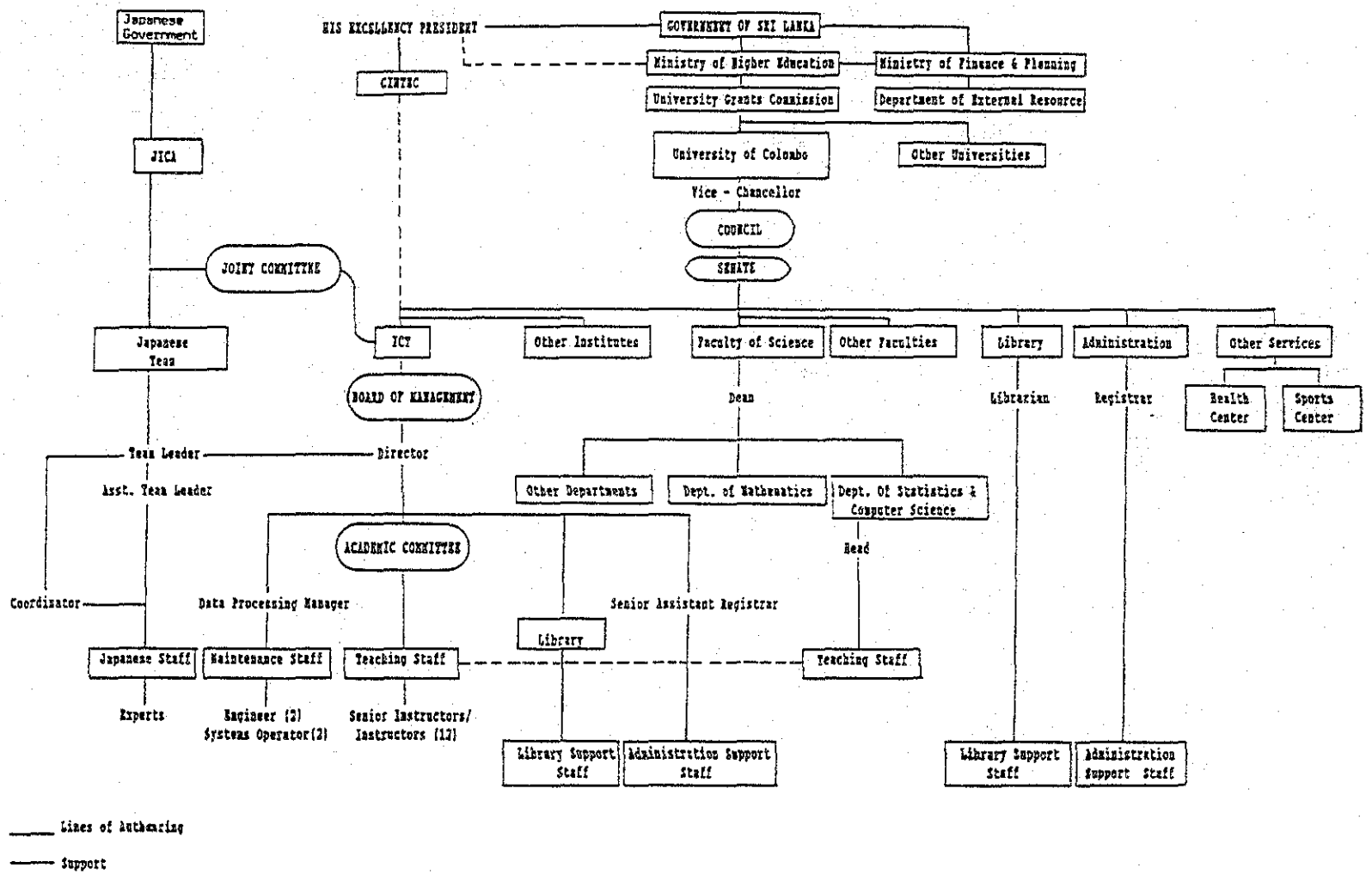
As a first step in the fulfillment of its objectives, the Institute will provide a one year full time course leading to a Diploma in Computer Technology. This course is supported by the Japanese Government as a Colombo Plan Technical Cooperation Project as provided for in the Record of Discussion signed between the two Governments on 3rd March 1987.

The Institute will occupy a part of the new Statistics and Computer Science Building complex at the University of Colombo premises at Ried Avenue.

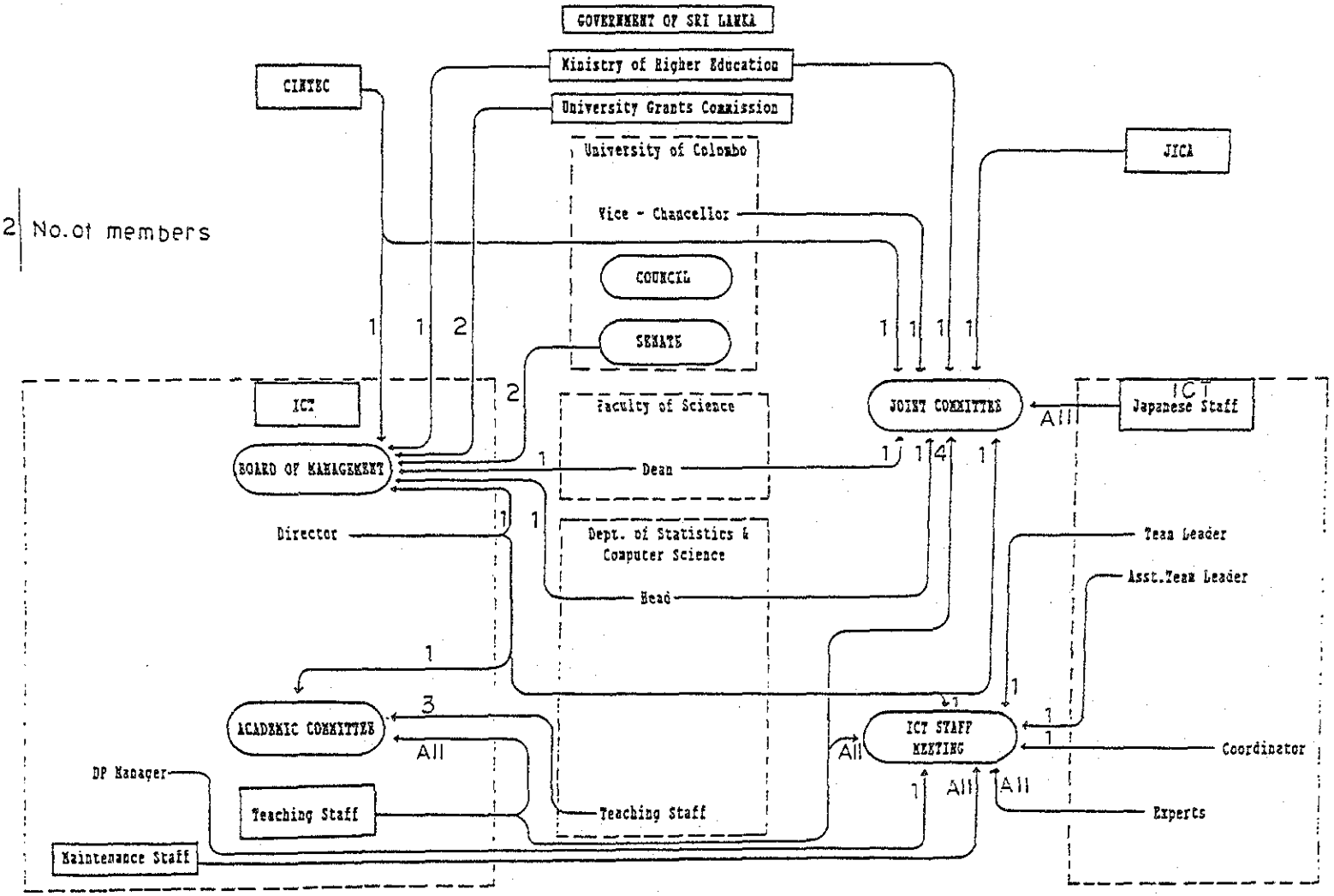
1.1

2

ORGANIZATIONAL CHART SHOWING THE POSITION OF
THE INSTITUTE OF COMPUTER TECHNOLOGY IN RELATION TO THE
RELEVANT NATIONAL AND INTERNATIONAL AUTHORITIES AND BODIES



1.2 Composition of bodies related to ICT



1.3 THE BOARD OF MANAGEMENT OF THE INSTITUTE AS ON 01.03.1988

As per Section 7 of the Ordinance The Board of Management shall be the academic and executive body of the Institute and shall consist of the following persons :

(1) the following ex-officio members, namely -

The Dean Faculty of Science of the University of Colombo who shall be the Chairman
Prof.L.M.V. Tillekeratne
B.Sc., D.Phil.(Oxon), Ph.D. (Oxon)

The Director
Prof. V.K. Samaranayake
B.Sc., D.I.C., Dip. Stat., Ph.D., M.C.S. (S.L)

The Secretary to the Ministry of the Minister in charge of the subject of Higher Education or his nominee
Mr. M.C.T. Fonseka
(Addl. Secretary, Ministry of Higher Education)

The Chairman of the Computer and Information Technology Council of Sri Lanka (CINTEC) or his nominee
Mr. R.B. Ekanayake
B.Sc., M.Sc., M.C.S. (S.L)
(CINTEC Board Member; President Computer Society of Sri Lanka; and Assistant General Manager (Information Technology, Sampath Bank)

The Head of the Department of Statistics and Computer Science of the University
Mrs. A. Karunaratne
M.Sc., Dip.OR. Rome

(Contd...

(2) the following other members, namely -

Two representatives nominated from among its members, by the Senate

Prof. P.W. Epasinghe (Dept. of Mathematics)
B.Sc., Ph.D. D.I.C. (Lond.)

Prof.(Ms) Kusuma Gunawardena (Dept. of Geography)
BA, Ph.D Camb,

Two members appointed by the Commission

Dr. Anton Balasuriya
B.A., Ph.D
Executive Director,
Sri Lanka Business Development Centre

Dr. Ranjith Cabraal
B.Sc., Ph.D
Personnel Manager, Lever Brothers Ltd.

1.4 ACADEMIC COMMITTEE OF THE INSTITUTE AS ON 01.01.1988

As per Section 10 of the Institute of Computer Technology Ordinance, the Acadmic Committee shall consist of the following persons -

The Director who shall be the Chairman;

Prof. V.K. Samaranayake
B.Sc., D.I.C., Dip. Stat., Ph.D.

Such teachers and other staff of the Institute imparting instruction in the Institute as have been confirmed in their appointment as such;

Mr. S.T. Nandasara, B.Dev.
Mr. A.P.S.R. Somasiri, B.Sc
Mr. L. Patric Jayasinghe, B.Sc.
Mr. S.A.U. Gunasekera, B.Sc.
Mr. A.N. Ranasinghe, B.Sc.
Mr. M.J.N. Peiris, B.Sc.
Mr. K.W. Weerawarna, B.Sc.
Mr. S.J. Paheerathan, B.Sc.
Miss H.N.A. Jayatilake, B.Sc.
Miss K.P.D.J.S. Karunanayake, B.Sc.
Mr. A. Weerasinghe, B.Sc.
Mr. A.P. Madurapperuma, B.Sc.
Mr. M.J.P.U. Samantilake, B.Sc. (Eng.)
Mr. Keerthi S. Goonetilake, B.Sc.

three members elected from among its own academic staff by the Department of Statistics and Computer Science of the University;

Dr. E.K. Seneviratne, B.Sc., M.Sc., Ph.D, M.C.S. (SL)
Mr. D.P. Liyanage, B.Sc., M.Sc.
Mr. R.L. Pears, B.Sc., M.Sc.

1.5

JOINT COMMITTEE
AS ON 01.03.1988

As per Annex V - 6 of the Record of Discussions between the Governments of Sri Lanka and Japan dated 03.03.1987, the Vice-Chancellor, University of Colombo will appoint a Joint Committee to act on his behalf.

The Committee will comprise of

The Vice-Chancellor, University of Colombo as Chairman
Prof. S. Wijesundera, B.Sc., B.Sc., B.Sc., D.Phil

Chairman, Board of Managment of the Institute
Prof. L.M.V. Tillekeratne (Dean/Science)

Director of the Institute
Prof. V.K. Samaranayake

Secretary of the Ministry of Higher Education or his nominee
Mr. M.C.T. Fonseka

Chairman, Computer and Information Technology Council of Sri Lanka or his nominee
Mr. R.B. Ekanayake

Head, Department of Statistics and Computer Science,
Mrs. A. Karunaratne

Four Instructors of the Insitute
Mr. S.T. Nandasara
Mr. L.P. Jayasinghe
Mr. K.W. Weerawarna
Mr. M.J.N. Peiris

Japanese Team

Team Leader	-	Mr. Ryo Takagi
Asstistant Team Leader	-	Mr. Shizuo Shibata
Co-ordinator	-	Mr. Kazuhiko Tanaka
Experts	-	Mr. Katsuharu Iwahara
	-	Mr. Yoshio Niizeki
	-	Mr. Kenji Osada
	-	Mr. Sinichi Takahashi
	-	Mr. Nobuyuki Shinoda
Resident Representative of the JICA Sri Lanka office in Colombo	-	Mr. Jiro Hashiguchi

2. DIPLOMA IN COMPUTER TECHNOLOGY

2.1 AIM :

The aim of the course is to provide professionally trained Analyst/Programmers who can play a leading part in the use and development of application programs and in the operation and management of computer installations.

2.2 MODE OF STUDY :

The course will be conducted on a full time basis, for a period of one year, 7 hours of the day (from 8.00 a.m. to 4.00 p.m.) 5 days of the week and 40 weeks in a year in two semesters of 20 weeks each. Lectures, practicals, assignments and project work would all be part of the course.

2.3 CERTIFICATE :

Students who have successfully completed the course and the prescribed examinations incuding continuous assessment and project work would be awarded the DIPLOMA IN COMPUTER TECHNOLOGY by the Institute of Computer Technology of the University of Colombo.

2.4 ENTRY REQUIREMENTS :

Applicants must have a degree from a recognised University in any subject other than computer science. Applicants would be required to sit an aptitude test in order to assess the applicant's suitability for the course.

The course would be conducted in the English medium and as such applicants should have a working knowledge of English. Prior experience in computing is not a necessity but would be an advantage.

An interview would also be held to facilitate selection of candidates.

2.5 COURSE FEES :

The all inclusive fee for the course is Rs. 10,000/-. However, 10 scholarships would be available to those who are not in a position to pay the above fee.

2.6 INTAKE :

The course is very much practical oriented and involves close supervision by the instructors. As such, the intake is strictly limited to 30 students per batch. The first batch will begin their course on 15th July 1988 and the second batch will commence work in January 1989.

2.7 MODE OF APPLICATION :

Those interested in applying for the course should write to the Senior Assistant Registrar/ICT at the following address for an application form enclosing a stamped self addressed envelop (4"x9"). The closing date of applications would be notified later.

Institute of Computer Technology
University of Colombo
P.O. Box 1490
Colombo
Sri Lanka

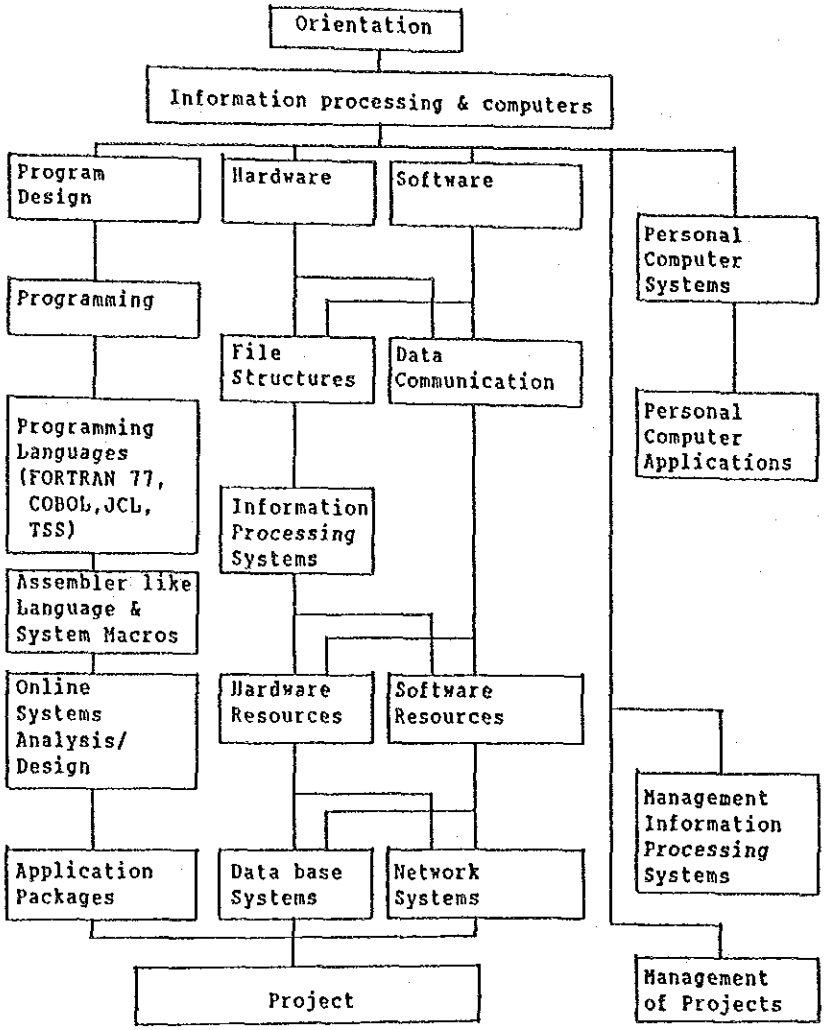
Information given in Sections 2.2 to 2.6 are subject to approval by the Senate and Council of the University of Colombo and the adoption of appropriate By-Laws.

2.8 THE CURRICULUM

The Diploma course in Computer Technology is made up of 9 modules, 8 modules are on course work and the last module is a project.

	MODULE	HOURS
1.	Outline of information processing systems	
	1.1 Orientation	
	1.2 Information Processing & Computers	10
2.	Resource of IPS	
	2.1 Hardware	40
	2.2 Hardware resources	40
	2.3 Software	40
	2.4 Software resources	40
3.	Data structure	
	3.1 File Structures	30
	3.2 Data Base Systems	60
4.	Information system design	
	4.1 Information Processing systems	40
	4.2 Data Communication	40
	4.3 Network systems	40
	4.4 Online systems analysis & Design	180
5.	Program Development	
	5.1 Program design	60
	5.2 Programming	90
	5.3 Programming Languages	
	5.3.1 FORTRAN	120
	5.3.2 COBOL	150
	5.3.3 JCL/TSS	30
6.	Management of Computer Systems	
	6.1 Management of IPS	10
	6.2 Management of Projects	10
7.	Application	
	7.1 Application Packages	30
	7.2 Special Lectures by Specialists	
	7.3 Assembler like Languages & System Macros	10
	7.4 Special Topics	
8.	Personal Computer	
	8.1 Personal Computer Systems	15
	8.2 Personal Computer Applications including PASCAL	45
9.	Project	

2.9 COURSE STRUCTURE



STAFF

(As on 01.03.1988)

Sri Lankan Staff

Prof. V.K. Samaranayake - Director
B.Sc., D.I.C., Dip. Stat., Ph.D., M.C.S. (Sc)

Teaching Staff :

Mr. S.T. Nandasara, B.Dev.	-	Instructor
Mr. A.P.S.R. Somasiri, B.Sc	-	Instructor
Mr. L. Patric Jayasinghe, B.Sc.	-	Instructor
Mr. S.A.U. Gunasekera, B.Sc.	-	Instructor
Mr. A.N. Ranasinghe, B.Sc.	-	Instructor
Mr. M.J.N. Peiris, B.Sc.	-	Instructor
Mr. K.W. Weerawarna, B.Sc.	-	Instructor
Mr. S.J. Paheerathan, B.Sc.	-	Instructor
Miss H.N.A. Jayatilake, B.Sc.	-	Instructor
Miss K.P.D.J.S. Karunanayake, B.Sc.	-	Instructor
Mr. A. Weerasinghe, B.Sc.	-	Instructor
Mr. A.P. Madurapperuma, B.Sc.	-	Instructor

Maintenance Staff

Mr. M.J.P.U. Samantilake, B.Sc. (Eng.)	-	Engineer
Mr. Keerthi S. Goonetilake, B.Sc.	-	Engineer

Systems Operators

(02 vacancies to be filled soon)

Administrative Staff

Mr. P.D.W. de Silva, B.A. Hon	-	Senior Asst. Registrar
Miss P. Vidyakanthi	-	Stenographer

Vacancies exists for 03 clerks, 02 Lab Attendants, Library Assistant and 02 Library attendants.

Japanese Team

Mr. Ryo Takagi	-	Team Leader
Mr. Shizuo Shibata	-	Asst. Team Leader
Mr. Kazuhiko Tanaka	-	Coordinator
Mr. Katsuharu Iwahara	-	Expert
Mr. Yoshio Niizeki	-	Expert
Mr. Kenji Osada	-	Expert
Mr. Sinichi Takahashi	-	Expert
Mr. Nobuyuki Shinoda	-	Expert

and other short term Consultants from time to time.

COMPUTER FACILITIES

HARDWARE

1. Mainframe Computer

NEC System 430 Model 30 with

32 bit word length in Execution Processing Unit
64 bit in High Speed Scientific Processing Unit
- 16 MB Main Memory
- 4 Unit of Dual Disk Drives (Total 3888 Megabytes)
- 2 Magnetic Tape Units
- 2 Line Printers (Each 900 Lines per Minutes)
- 60 Intelligent Terminals (APC III) each with
  - 640 KB Main memory
  - 5 1/4" Dual Floppy Disk Drive (each 1.2 MegaBytes)
  - 10 MegaBytes Hard Disk Unit
  - Color Graphics Display (640 X 400)

- 1 Serial Printer (200 CPS)
- 1 8" Dual Floppy Disk Unit
- 1 Operator Station

2. Super Mini Computer

NEC MS4100 (Multi Service, Graphics Processing Unit) with

- 4 MegaBytes Main Memory
- 1 Unit of Disk Drive (168 Megabytes)
- 1 Magnetic Tape Unit
- 1 Line Printer (900 Line per minutes)
- 1 XY Plotter (A4, A3 size, 8 colors)
- 1 Graphics Display Unit
- 1 Tablet
- 1 Control Dial
- 1 Intelligent Terminal (APC III) with
  - 640 KB Main Memory
  - 5 1/4" Dual Floppy Disk Drives (1.2 MegaBytes)
  - Color graphics Display Unit (640 x 400)

- 1 Operator Station

3. Personal Computers

14 NEC APC IV Computers

- 640 KB Main Memory
- 20 MB Disk Storage Unit
- 5 1/4" Floppy Disk Unit (1.2 MegaBytes)
- Advanced Color Graphics Display
- Advanced Graphics Board (IBM CGA, EGA)

6 NEC APC III Computers

- 640 KB Main Memory
- 5 1/4" Dual Floppy Disk Unit (each 1.2 MegaBytes)
- Color Graphics Display (640 x 400)

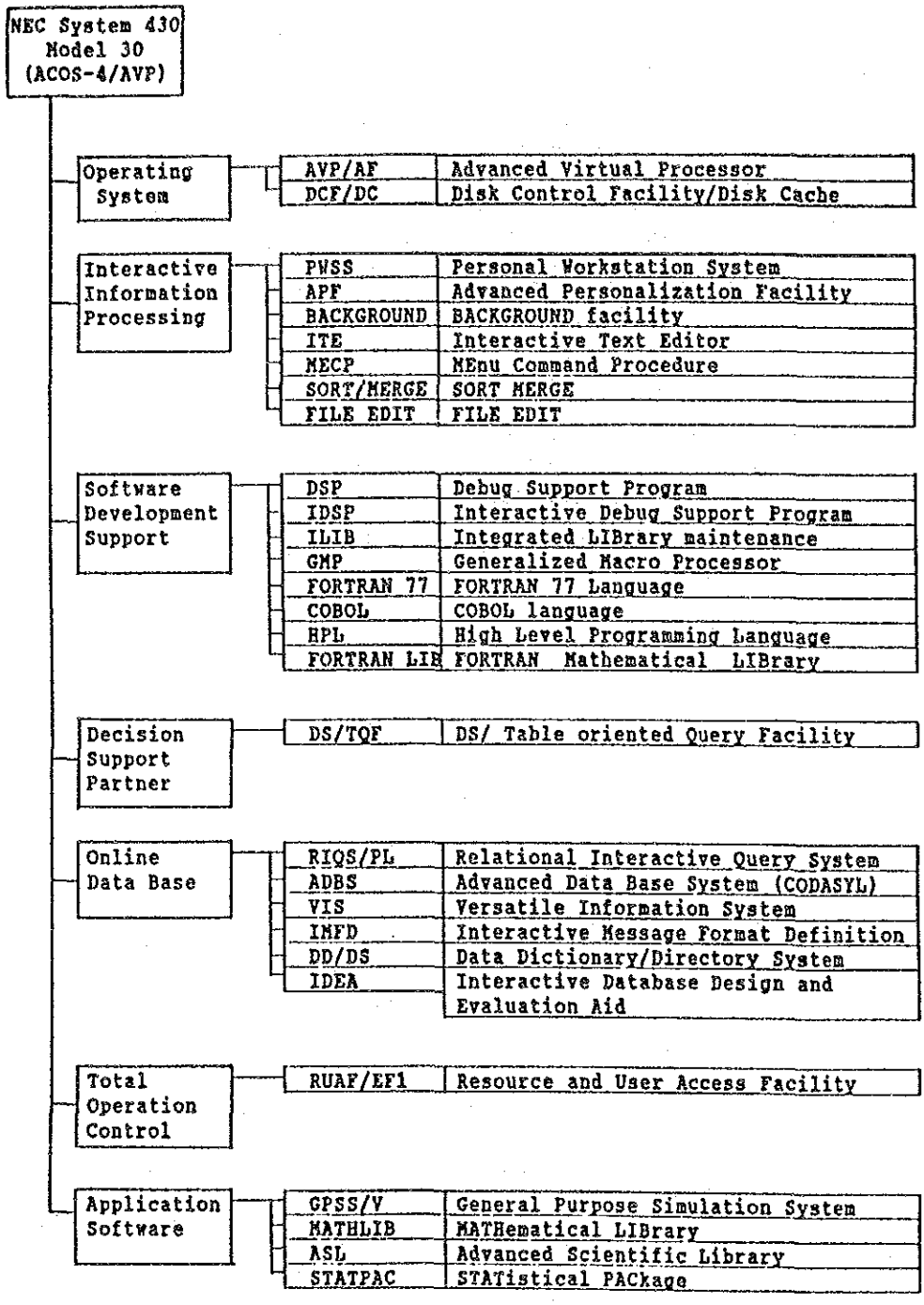
20 NEC Pinwriter P560 Printers (264/240 CPS, 24 Dots)

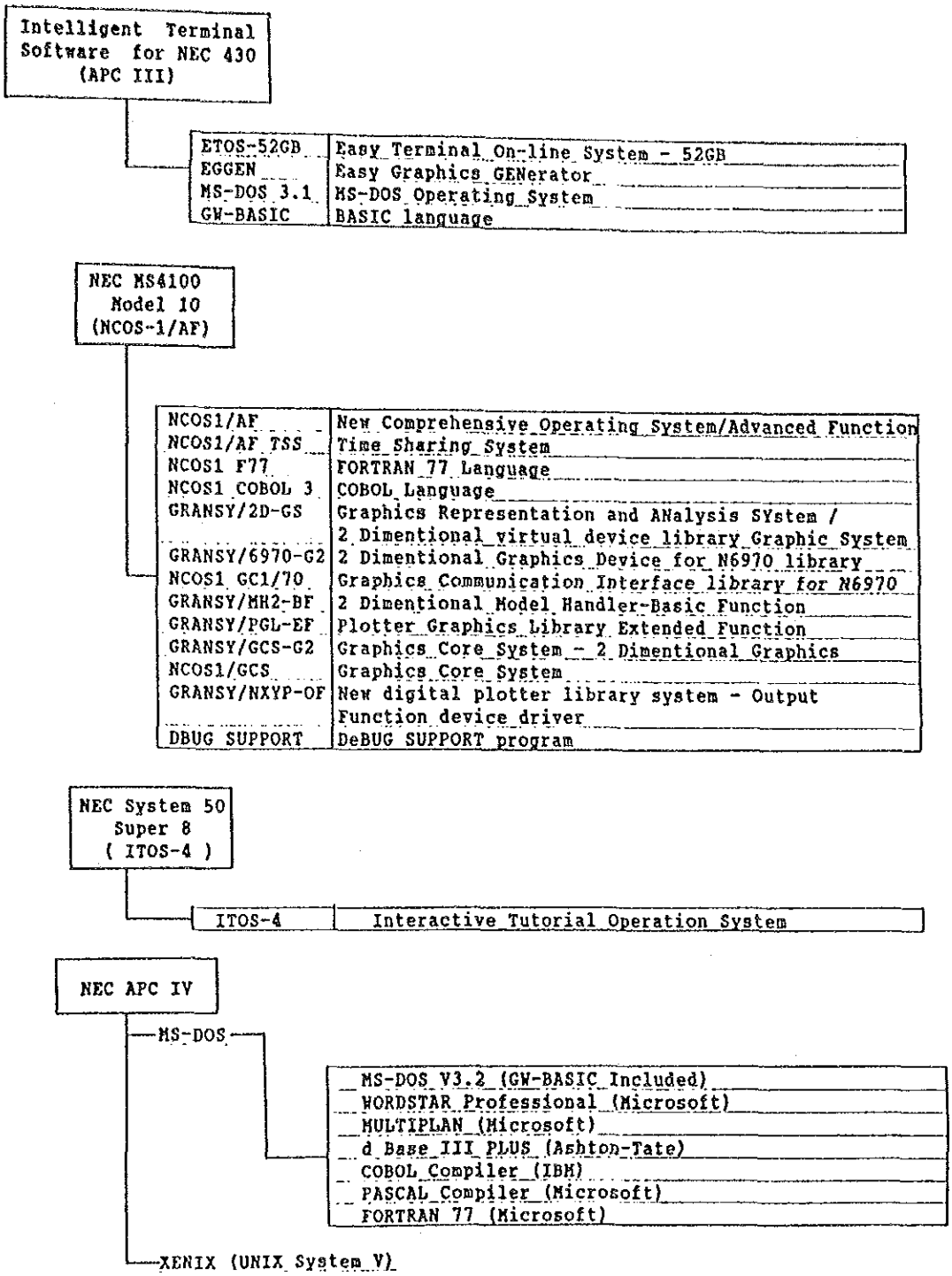
2 Laser Printers (8 PPM)

2 NEC System 50 / Super 8 Data Entry units with

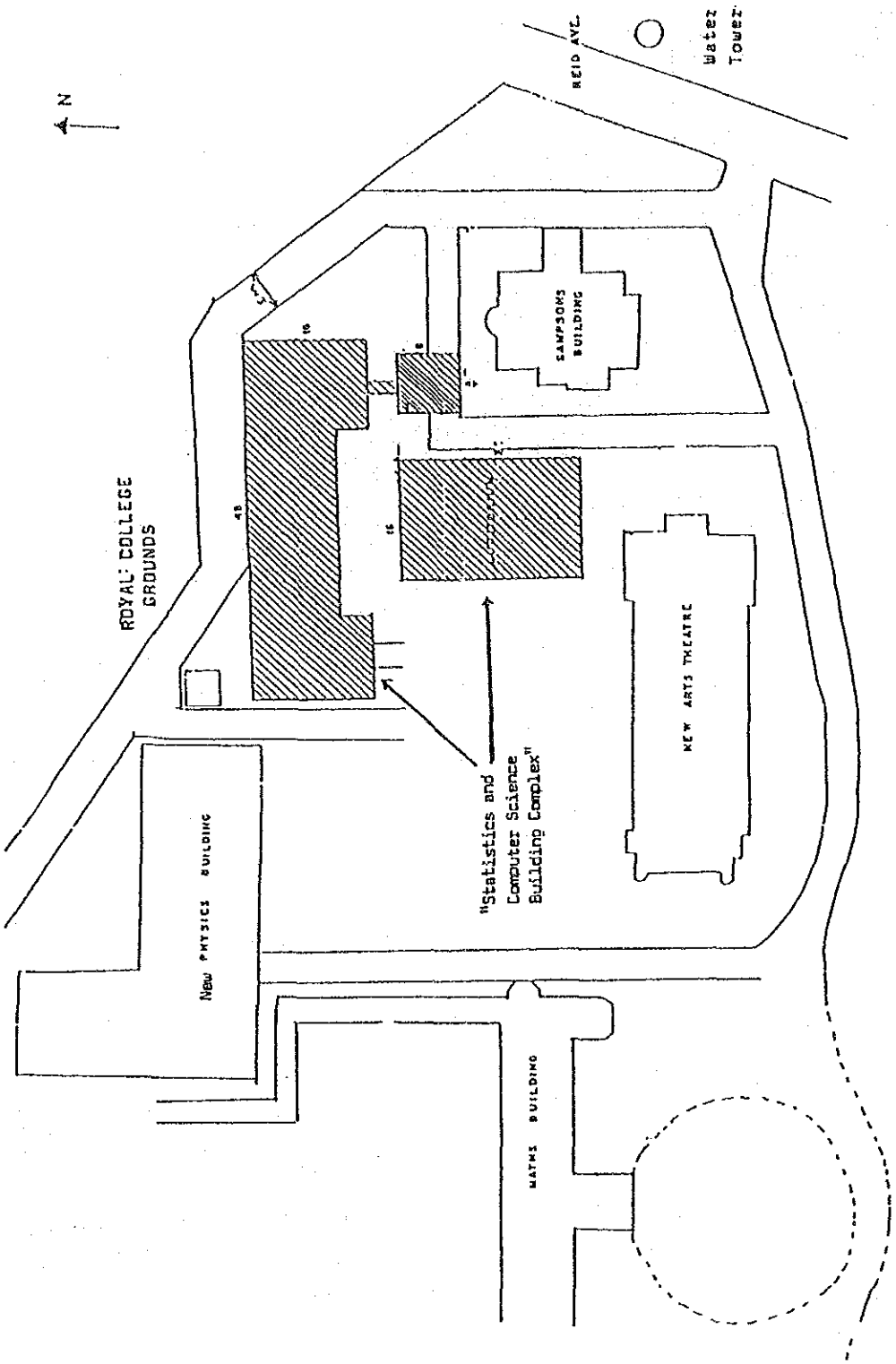
- 256 KB Main Memory
- 8" Dual Floffy Disk Unit
- 20 MB Disk Storage Unit
- Display Unit

SOFTWARE


NEC System 430
Model 30
(ACOS-4/AVP)
Operating System
AVP/AF
Advanced Virtual Processor
DCF/DC
Disk Control Facility/Disk Cache
Interactive Information Processing
PWSS
Personal Workstation System
APF
Advanced Personalization Facility
BACKGROUND
BACKGROUND facility
ITE
Interactive Text Editor
MECP
MEnu Command Procedure
SORT/MERGE
SORT MERGE
FILE EDIT
FILE EDIT
Software Development Support
DSP
Debug Support Program
IDSP
Interactive Debug Support Program
ILIB
Integrated LIBrary maintenance
GMP
Generalized Macro Processor
FORTRAN 77
FORTRAN 77 Language
COBOL
COBOL language
HPL
High Level Programming Language
FORTRAN LIB
FORTRAN Mathematical LIBrary
Decision Support Partner
DS/TQF
DS/ Table oriented Query Facility
Online Data Base
RIQS/PL
Relational Interactive Query System
ADBS
Advanced Data Base System (CODASYL)
VIS
Versatile Information System
IMFD
Interactive Message Format Definition
DD/DS
Data Dictionary/Directory System
IDEA
Interactive Database Design and Evaluation Aid
Total Operation Control
RUAF/EF1
Resource and User Access Facility
Application Software
GPSS/V
General Purpose Simulation System
MATHLIB
MATHematical LIBrary
ASL
Advanced Scientific Library
STATPAC
STATistical PACkage


Intelligent Terminal Software for NEC 430 (APC III)
ETOS-52GB
Easy Terminal On-line System - 52GB
EGGEN
Easy Graphics GENerator
MS-DOS 3.1
MS-DOS Operating System
GW-BASIC
BASIC language
NEC MS4100 Model 10 (NCOS-1/AF)
NCOS1/AF
New Comprehensive Operating System/Advanced Function
NCOS1/AF TSS
Time Sharing System
NCOS1 F77
FORTRAN 77 Language
NCOS1 COBOL 3
COBOL Language
GRANSY/2D-GS
Graphics Representation and ANalysis SYstem / 2 Dimentional virtual device library Graphic System
GRANSY/6970-G2
2 Dimentional Graphics Device for N6970 library
NCOS1 GC1/70
Graphics Communication Interface library for N6970
GRANSY/MH2-BF
2 Dimentional Model Handler-Basic Function
GRANSY/PGL-EF
Plotter Graphics Library Extended Function
GRANSY/GCS-G2
Graphics Core System - 2 Dimentional Graphics
NCOS1/GCS
Graphics Core System
GRANSY/NXYP-OF
New digital plotter library system - Output Function device driver
DBUG SUPPORT
DeBUG SUPPORT program
NEC System 50 Super 8 (ITOS-4)
ITOS-4
Interactive Tutorial Operation System
NEC APC IV
MS-DOS
MS-DOS V3.2 (GW-BASIC Included)
WORDSTAR Professional (Microsoft)
MULTIPLAN (Microsoft)
d Base III PLUS (Ashton-Tate)
COBOL Compiler (IBM)
PASCAL Compiler (Microsoft)
FORTRAN 77 (Microsoft)
XENIX (UNIX System V)

17


N
REID AVE.
Water Tower
SAMPSONS BUILDING
ROYAL COLLEGE GROUNDS
"Statistics and Computer Science Building Complex"
NEW ARTS THEATRE
NEW PHYSICS BUILDING
MATHS BUILDING

18

7. RELATIONSHIP OF ICT WITH THE DEPARTMENT OF STATISTICS AND COMPUTER SCIENCE (DSCS) OF THE UNIVERSITY OF COLOMBO

As indicated in the organisational chart given in Section 1.1 the ICT and the DSCS are two independent organizations of the University of Colombo housed in the same "Statistics and Computer Science Building Complex". The staff of the two organizations would work closely and share their resources and expertise. The DSCS is statutorily represented in the Academic Bodies of the ICT. The Auditorium, Lecture Rooms and other resources in the building would be shared by both with priority where necessary given to the owning organization. Functions of ICT and DSCS will differ according to their respective aims and objectives.

While the ICT will concentrate on providing facilities for the Diploma Course in Computer Technology, the DSCS will provide undergraduate, postgraduate and service courses in Statistics and Computer Science and undertake research and consultancy. The ICT will also provide some extension courses and consultancy later on.

The DSCS will have computer facilities of their own, including the existing equipment (Data General MV 2000 and S/140 together with 70 BBC Microcomputers, several IBM PC XT/AT and compatibles and two Amigas). They are expected to install the Super-Mini Computer and a Microcomputer Laboratory consisting of 20 PC XT/AT compatibles in 1988.

A Central Reference Library for Computer Science would function in the building under the ICT. This would be open ICT students and staff as well as postgraduate and special degree students and staff of the DSCS.

DSCS presently conduct undergraduate courses in Computer Science for the general degree in Science as well as the special degree in Computer Science. Course Units are also provided for the undergraduate courses in Geography, Economics, Commerce, Sociology and the Masters' Degree Courses in Business Administration, Nuclear Science etc.

Further information about the DSCS is available in a separate publication.

7—3　スカラシップ要請書

UNIVERSITY OF COLOMBO, SRI LANKA

INSTITUTE OF COMPUTER TECHNOLOGY

ICT

A COLOMBO PLAN PROJECT WITH JAPANESE GOVERNMENT TECHNICAL COOPERATION

29th March 1988

Dear Sir,

I have pleasure in enclosing a copy of the prospectus of the newly established Institute of Computer Technology of the University of Colombo. The Diploma Course on Computer Technology is assisted by Project Type Technical Cooperation of the Japanese Government.

As indicated in the prospectus this course would produce competent Analyst/Programmers out of graduates (of any subject), after an intensive study course of one years duration, using a mainframe computer system that is at present the largest in the country.

We would like to solicit your assistance in supporting suitable applicants to joint the course by the offer of a scholarship to cover the course fee of Rs. 10,000.

Your organization would also be able to recruit some of the end products of the course, the total out put being 30 per batch and 2 batches per year.

The support we expect is a commitment of Rs. 10,000 per batch (every 06 months) for one or more batches.

Please do not hesitate to contact me for further information.

This would be exempt from Income Tax as are donations to the University of Colombo.

Yours sincerely,

Prof. V.K. Samaranayake
Director