UNIVERSITY OF MUMBAI
No.UG/ 24 of 2005

CIRCULAR:-

A reference is invited to the scheme of papers at the Bachelor of Science (B.Sc.) degree course under the revised pattern vide this office Circular No.UG/237 of 2004, dated 8th June,2004 and the Principals of the affiliated colleges in Science are hereby informed that the recommendation made by the Board of Studies in Physics at its meeting held on 19th November,2004 has been accepted by the Academic Council at its meeting held on 14th December,2004 vide item No.4.8 and that in accordance therewith the syllabi in subject of (1) Electronic Instrumentation and (2) Computer Science Applied Component at the T.Y.B.Sc. examination has been revised as per **Appendix** and that the same will be brought into force with effect from the academic year 2005-2006.

MUMBAI-400 032
19th January, 2005

for REGISTRAR

To,

The Principals of the affiliated colleges in Science

AC/4.8/14.12.2004

****

No.UG/ 24-A of 2005. MUMBAI-400 032 19th January ,2005

Copy forwarded with compliments for information to :-

1)The Dean , Faculty of .Science
2) The Chairman, Board of Studies in Physics

for REGISTRAR

Copy to :-

The Director, Board of College and University Development, , the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Personal Assistants to the Vice-Chancellor, the Pro-Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ratnagiri for information .

The Officer on Special Duty-cum- Controller of Examinations (10 copies), the Finance and Accounts Officer (2 copies), Record Section (5 copies), Publications Section (5 copies), the Deputy Registrar, Enrolment, Eligibility and Migration Section (3 copies), the Deputy Registrar, Statistical Unit (2 copies), the Deputy Registrar (Accounts Section),Vidyanagari (2 copies), the Deputy Registrar, Affiliation Section (2 copies), the Director, Institute of Distance Education,(10 copies) the Director University Computer Center (IDE Building), Vidyanagari, (2 copies) the Deputy Registrar (Special Cell), the Deputy Registrar,(PRO) , **the Assistant Registrar, Academic Authorities Unit (2 copies)and the Assistant Registrar, Executive Authorities Unit (2 copies). They are requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to in the above Circular and that no separate Action Taken Report will be sent in this connection.** the Assistant Registrar Constituent Colleges Unit (2 copies), BUCT(1 copy), the Deputy Account, Unit V(1 copy), the In-charge Director, Centralize Computing Facility (1 copy), the Receptionist (1 copy), the Telephone Operator (1 copy), the Secretary MUASA (1 copy), the Superintendent, Post-Graduate ction (2 copies), the Superintendent, Thesis Section (2 copies)

[illegible] 5/19/05

A.C. Item No. 4.8 dt. 14/12/2004

UNIVERSITY OF MUMBAI

Revised Syllabus

for

T.Y.B.Sc.

1. Electronic Instrumentation

2. Computer Science

(Applied Component)

(with effect from the academic year 2005-2006)

T.Y.B.Sc.

REVISED SYLLABUS (with effect from 2005-06)

ELECTRONIC INSTRUMENTATION

The revised syllabus in the subject of Electronic Instrumentation (Applied Component) for Third Year B.Sc. Physics (Single/Twin major subject) will be implemented from the academic Year 2005-06, under the Revised Pattern of the Course of study for the Third year B.Sc. Degree which came into operation from 2004-05.

The scheme of examination in the subject of Electronic Instrumentation will be as follows:

SCHEME OF EXAMINATION
Electronic Instrumentation (Applied Component)

Paper	Section	Title	Marks
Paper E.I.– I	----	Analog Circuits and Instruments	60
Paper E.I.– II	----	Digital Electronics, Microprocessor and its applications, Programming in C++	60
Practicals	Expt. I	Practical Paper EIP– I	30
	Expt. II	Practical Paper EIP– II	30
		Certified Journal	10
		Viva-Voce	10

Total Marks: Theory: 120
Practical: 80

Total 200

N.B.

- Duration of Theory paper will be 3 Hours.
- Duration of Practical paper will be 3 Hours
- A certified Journal of Electronic Instrumentation must contain a minimum of 16 Experiments with at least 8 from each practical paper. At least two experiments from each sub group in the syllabus should be performed.
- Every candidate will be required to perform **two** experiments, one from each Practical paper.
- A candidate will be allowed to appear for the Practical Examination only if the candidate submits his/her certified Journal or a certificate from the Head of the Department of Physics stating that the candidate has completed the practical Course of Electronic Instrumentation as per requirements.
- Each theory paper shall consist of **six** questions, one per unit, with internal choice.
- A candidate will be required to attempt any **five** questions out of the **six** questions.
- Two periods per week per theory paper and four periods per week per practical batch are to be allocated in the work load.

PAPER – I: ANALOG CIRCUITS AND INSTRUMENTS

Unit 1: Transducers, Display devices & systems [10]

i) Temperature measurements: Resistance thermometer, thermocouple & thermistor.
Ref: H and C Ch. 11.5.1,11.5.2,11.5.4

ii) Pressure & Displacement Transducers: Strain Gauges, LVDT, Capacitive transducers, Load Cell.
Ref: K: Ch 13.6, 13.11, 13.13, 13.14

iii) Optical Transducers & display devices: Photo-multiplier tube, Photoconductive cell, LED, LCD, and Dot Matrix Display.
Ref: K : Ch.13.16, 2.10, 2.11, 2.12.4

iv) Seven segment Display System: Seven segment LED display, BCD to seven segment decoder / driver, Liquid crystal displays, COMS LCD decoder / driver.
Ref: T: Ch.6.6, 6.8, 6.9, 6.10

Unit 2 : Signal generation & conditioning , Timer application [10]

(i) Signal generators & 555 timer applications:
Square – triangular wave generator-using OpAmps, function generator using IC 8038.
Ref: H: Ch 23.2, 22.8
G: Ch 11.3
555 Timer applications: Astable with 50% duty cycle , Tone burst Oscillator, voltage controlled frequency shifter. Temperature to frequency Conversion
Ref: C and D : Ch.13-3.3, 13-3.4, 13-4.1, 13-4.2

(ii) Instrumentation Amplifier & its applications:
Basic Instrumentation Amplifier , Instrumentation system , Applications of Instrumentation Amplifier , Temperature indicator, light intensity meter , analog weight scale.
Ref: K: Ch.14.3,14.4

(iii) Active filters : Classification of filters ,
Butter worth filters : 2^{nd} order low pass & high pass filters , Band pass (wide band), narrow band rejection filter.
Ref: K : Ch.15.4,15.6.1, 15.5, 15.7.2 (Omit 15.5.1,15.5.3,15.5.4,15.5.6)

Unit 3 : Linear and switching regulators [10]

Adjustable positive voltage regulator (LM317), adjustable negative voltage regulator (LM337), Formation of adjustable bipolar voltage regulator using LM317 and LM337. Fixed output voltage regulator with current booster.
Ref: C and D : Ch 14.11, 14.12,14.13
M : Ch 24.4
Constant current source (ground load) using OP-Amp and transistor, Digitally controlled 4mA to 20 m current source.

Ref: C and D : Ch 5- 5.2, 5- 5.4
DC-to-DC converter, switching regulators (buck, boost and buck – boost), monolithic switchi regulators.
Ref : M: Ch 24.5, 24.6, 24.7

Unit 4. : Analog and Digital Multimeters [10]

(i) Analog multimeters:
(a) DC ammeter, multirange ammeter (with independent and Ayrton shunt).
(b) DC voltmeter multirange voltmeter loading effect of voltmeter, differential voltmeter
(c) Ohmmeter, series type and shunt type
(d) AC Voltmeter using rectifier, multirange ac voltmeter
Ref: K: Ch. 3.1, 3.2, 3.3, 4.2, 4.3, 4.4, 4.6, 4.10, 4.21, 4.22, 4.12, 4.13, 4.14, 4.15

(ii) Analog Electronic Multimeters;
Transistor voltmeter solid state (Op Amp based) voltmeter
Ref: K: Ch. 4.7, 4.9

(iii) DMM, 3 ½ Digit, resolution and sensitivity, general specification, automation (auto polarity, auto ranging and auto zeroing)
Ref: K : Ch 6.2, 5.8, 5.9, 5.10, 6.11

Unit 5: DIGITAL INSTRUMENTS [10]

1. D/A conversion, variable (weighted) resistor and binary ladder (4 bit) type, DAC 0808, D/A accuracy and resolution.
   A/D conversion, counter method, Dual slope and successive approximation converters, ADC 0804,A/D accuracy and resolution.
   Ref: M & L : Ch. 11 (omit 11.5 & 11.7)
2. Digital frequency meter and measurement of time.
   Ref: K: Ch. 6.3, 6.4

Unit 6: CATHODE RAY OSCILLOSCOPE [10]

CRO block diagram, CRT connection, Vertical amplifier, Horizontal deflection system, Basic function of sweep generator, passive voltage(high)probe, Attenuators, Dual trace CRO
Ref: K: Ch 7.4, 7.12, 7.6, 7.7, 7.3.1, 7.28.2, 7.29, 7.15, 7.32

References:

1. **H & C** : Modern Electronic Instrumentation & Measurement Techniques By Albert D. Helfrick & William D.Cooper (PHI) EEEdition
2. **K** : Electronic Instrumentation by K.S.Kalsi (TMH)
3. **T** : Digital electronics by G.L.Tokheim (4th Ed) (Mc Graw Hill)
4. **C & D** : "OPAMPs and linear integrated circuits" by Coughlin & F.F.Driscoll (4th edition PHI)
5. **G** : OPAMPs and linear integrated circuits by R.A. Gayakwad (3rd edition, PHI)
6. **M** : "Electronic Principles" by A.P.Malvino (6th edition, PHI)
7. **M & L** : Digital Principle and Applications" by Malvino and Leach (5th edition, TMH)
8. **H** : The Art of Electronics ,by Paul Horowitz & Winfield Hill (2nd Ed.)

T.Y.B.SC.

ELECTRONIC INSTRUMENTATION PAPER-II

Digital Electronics, Microprocessor and its applications, Programming in C++.

Unit - I **DIGITAL ELECTRONICS**

A) Digital Electronics : (6)
Introduction to Concept of registers, Tri-state devices and buffers, Decoder, Encoder, BCD to seven segment Decoder Driver, D.Flip – Flop [Latch & clocked Function; explanation with example of 74LS 373].
Concept of counters (Synchronous, Asynchronous); Shift register.

Ref: M & L : 10.1, 11.1, 11.3
R.G : 2.51, 2.52, 2.53, 2.54, 2.55
M & B : 8.2, 8.3

B) Types of memories. Basic concept of memory Organization (4)
[Number of address lines required, arrangement of memory cells, control lines, memory extension] concept of control lines such as Read/Write chip enable.

Ref: R.G. : 2.25, RPJ 11.2 & 11.4

UNIT - II **MICROPROCESSOR ARCHITECTURE:** **[10]**

A) 8085 Functional block diagram. Address bus, Data bus & Control Bus. Need to multiplex address & data bus in 8085. Memory Interfacing

Ref: R.G. : 2.11, 3.3, 3.15

B) **INSTRUCTION SET**

Classification of instruction set in Five functional categories And different instructions in each type.
Addressing modes - Immediate, Direct, Indirect & Register Addressing:

Ref: G. : 6.1 to 6.9, **M& B** : 17.3

UNIT - III **ASSEMBLY LANGUAGE PROGRAMMING** **(10)**
Concept of writing simple program in assembly language with help of flowchart. [Details of, machine cycle & T state required for a particular instruction is not expected, however the result of the instruction execution should be explained completely] [Programming with looping counting and indexing ...]
Program using data transfer instruction, arithmetic instruction for 8 bits and 16 bits number operation.

Ref: R.G. : 6.1 to 6.5 and 7.1, 7.2

UNIT - IV INTERFACING [10]

A) Interfacing with peripherals
Study of 8255 – programmable peripheral interfacing device in simple I/O mode.

B) Interfacing A/D & D/A converters
Ref: R.G. :13.1, 13.2, 15.1 AND G : 13.8

UNIT - V **Introduction to C++**

Introduction to computer programming: why program?, Computer systems, Program and programming languages, what is program made of?, input, processing and output, the programming process, procedural and object oriented programming. (TG: 1.1 to 1.7)

Introduction to C++: parts of C++ program, cout, #include directive variables and constants, data types, arithmetic operators, comments, cin, typecast operators, power of constants, multiple and combined assignment, formatting Input and output, more mathematical and library functions. (TG: 2.1 to 2.4, 2.6 to 2.9, 2.13, 2.14, 3.1, 3.4 to 3.9, 3.11)

Making decisions: relational operators, if statement , if-else statement, flags, logical operators, more about variable declaration an scope,, comparing strings, conditional operator, switch statement. (TG: 4.1 to 4.7, 4.10, 4.11, 4.14 to 4.16)

UNIT-V More about C++ programming

Looping: increment and decrement operators, while, do-while, for, counters, breaking out of the loop, continue, using loops for input validation. (TG: 5.1 to 5.7, 5.10 to 5.12)

Functions: defining and calling functions, functions prototypes, sending information into a function, changing a value of a parameter, return statement, returning value from a function, local and global variables, default arguments, using reference variables as parameters, exit function, (TG: 6.1 to 6.13, 6.15)

References

1) **M & L** : Digital principles & applications by Malvino & Leach (5th Ed.TMH)
2) **R.G.** : Microprocessor Architecture Programming and Application with 8085 [4th Edition] By Ramesh S Gaonkar, Penram Int. Publishing Pvt.
3) **M & B** ; Digital computer Electronics By Albert Paul Malvino and Brown (TMH)
4) **G** : Microprocessors – Principles & applications by Gilm0re (2nd Ed.TMH)
5) **RPJ** : Modern Digital Electronics 3rd edition (TMH) – R .P. Jain
6) **B.G** Programming with C++ by Byron Gttfried (Schaum outlines 2nd Ed.Sixth reprint 1999)
7) **T.G.** Starting out with C++, 3e, Tony Gaddis, dreamtech.

Additional References

1)T : Microprocessor fundamentals - by Roger L Tokheim.
2)H : Microprocessor and Digital systems By Douglas V. Hall (2nd Edition)
3)V & B : Introduction to 8085 – Vibhute & Borole
4) H. Schildt : C++ Programming

T.Y.B.Sc.
PROPOSED SYLLABUS
Electronic Instrumentataion (PRACTICALS)
PAPER I

GROUP-A

1) Thermistor Characteristics –Thermal and electrical **(H&C Ch.11)**
2) Thermistor as sensor in temperature to voltage converter using OPAMP **(C&D Ch.8)**
3) Basic Instrumentation Amplifier using 3 OpAmps coupled to the resistance bridge / strain gauge bridge **(C&D Ch.8)**
4) Study of counter using common mode seven segment display, decoder / driver (7447) and decade counter (7490). Its use as a light beam interruption counter using LDR as sensor. **(RPJ Ch.6)**
5) Temperature Measurement using thermocouple (J or K type) with cold junction compensation **(H & H Ch.15)**

GROUP-B

1) Pulse Position Modulation (PPM)using 555 timer **(M Ch23)**
2) Pulse Width Modulation (PWM)using 555 timer**(M Ch23)**
3) Second Order active low pass / high pass filter (frequency response & phase relation) **(K.Ch15)**
4) Active Notch Filter (frequency response & phase relation) **(K.Ch15)**
5) 4 bit D/A converter using OPAMP (weighted resistor / binary adder network) **(K Ch17)**
6) Square and Triangular wave generator using OPAMPs. **(M.Ch 23)**

Note: All the B-group experiments should be performed on breadboard

GROUP-C

1) Adjustable Voltage Regulator using LM 317 /LM337 **(C & D Ch 14)**
2) Constant Current source using OPAMP and PNP transistor (o/p current less than 50 mA) **(C & D Ch 5)**
3) Adjustable Current Source using LM317 **(C & D Ch 5)**
4) Conversion of PMMC micro ammeter into dual range DC voltmeter (series string of resistor DC ammeter (Ayrton shunt) and series type ohmmeter **(H & C Ch 4.)**
5) OPAMP based DC voltmeter and AC voltmeter **(G Ch.7)**

References:

1. **H & C** : Modern Electronic Instrumentation & Measurement Techniques By Albert D. Helfrick & William D.Cooper (PHI) EEEdition
2. **C & D** : "OPAMPs and linear integrated circuits" by Coughlin & F.F.Driscoll (4^{th} edition PHI)
3. **G** : OPAMPs and linear integrated circuits by R.A. Gayakwad (3^{rd} edition, PHI)
4. **M** : "Electronic Principles" by A.P.Malvino (6^{th} edition, PHI)
5. **K** : Electronic Instrumentation by K.S.Kalsi (TMH)
6. **M & L** : Digital Principle and Applications" by Malvino and Leach (5^{th} edition, TMH)
7. **H & H** : The Art of electronics by Paul Horowitz & Winfield Hill (2^{nd} Ed.)
8. **RPJ** : Modern Digital Electronics 3^{rd} edition (TMH) – R .P. Jain

PAPER II

GROUP A

1) Study of 4 bit / 5 bit shift register [7495 / 7496] (H &C Ch.11)
2) Study of 3: 8 decoder [74LS138] study of 8 : 3 encoder [74LS 148] (C& D Ch.8)
3) Study of 74LS 245/245
4) Diode ROM array
5) Addition / Subtraction of two 8-bit numbers using 7483 & 7486
6) 7segment display (using 7447 decoder.)

Ref: 1.Modern Digital Electronics 3rd edition (TMH) – R .P. Jain
2.Digital electronics Practice using ICs --- Jain and Anand

GROUP B :

1) Study of 8085 kit. Identifying the kit in a functional form, getting familiar with display and keyboard routines. Simple programme using these routines.
2) Programming Addition of two 8-bit/16-bit numbers. Numbers are at different locations. Display of the result and carry.
3) Program on subtraction of two 8-bit numbers. Display of the result and borrow. Identification of the sign.
4) Program on the addition of series of numbers, arranging these numbers in ascending/descending orders/finding maximum/minimum from the series.
5) Program from the series of numbers finding odd/even numbers positive and negative numbers.
6) Multiplication of two 8-bit numbers by repeated addition.
7) Transferring series of data from source to destination.

Ref : Refer the same books as in Theory Paper II

GROUP C: Programming with C++

1) Program based on If – else statement.
2) Program using Nested – If statement.
3) Program using switch statement.
4) Program using array
5) Program using for – loop / while – loop.
6) Program using constant.

Ref : **Refer the same books as in Theory Paper II**

Practical Guideline

Check weather the entered number is prime or not using If – else.

1) Calculate the grade of student using nested If.
2) Check weather the enter alphabet is vowel or not using switch statement.
3) Using array arrange the number in ascending order.
4) Create a structure student having
   (a) Roll No
   (b) NAME
   (c) MARKS OF THREE SUBJECT.
5) Using for loop print the even numbers from 1 to 100
6) Calculate the following formulas
   Area of Circle = πr^2
   Perimeter of Circle = $2\pi r$
   Area of square = $(side)^2$
   Perimeter of square = 4 X side
7) Create a program for fibonacci series using If (1,1,2,3,5,8,..... .)

T.Y.B.Sc. Computer Science
Revised Syllabus- Effective from 2005-06

Computer Science (Applied Component)
Third Year B.Sc. Physics (Single/Twin Major Subject).

The revised syllabus in the subject of Computer Science (Applied Component) For Third Year B.Sc. Physics (Single/Twin major subject) will be implemented from Academic Year 2005-06, under the Revised Pattern of the Course of study for the Third year B.Sc. Degree which came into operation from 2004-05.

The scheme of examination in the subject of Computer Science will be as follows:

SCHEME OF EXAMINATION
Computer Science (Applied Component)

Paper	Section	Title	Marks
Paper CS – I	----	Computer Hardware, Assembly language programming and Operating System	60
Paper CS – II	----	Programming in C++	60
Practicals	Expt. I	Practical Paper CSP – I	30
	Expt. II	Practical Paper CSP – II	30
		Certified Journal	10
		Viva Voce	10

Total Marks: Theory: 120
Practical: 80
Total 200

N.B.

- A certified Journal of Computer Science must contain a minimum of 16 Experiments with at least 8 from each practical paper and as per the sub-sections in the syllabus.
- Duration of Theory paper will be 3 Hours.
- Duration of Practical paper will be 3 Hours.
- Every candidate will be required to perform **two** experiments, one from each Practical paper. Further each practical will be of two parts Part A and Part B.
- A candidate will be allowed to appear for the Practical Examination only if the candidate submits his/her certified Journal or a certificate from the Head of the Department of Physics stating that the candidate has completed the practical Course of Computer Science as per requirements.
- Each theory paper shall consist of **six** questions, one per unit, with internal choice.
- A candidate will be required to attempt any **five** questions out of the Six questions set.

Syllabus for Computer Science

Paper I : Computer Hardware , Assembly language programming and operating system

Unit I: **(10 Lectures)**

- Review "PC to palm top"
- Basic idea of number systems: integers, real numbers, floating point representation and binary arithmetic.
- Networking, topologies and benefits
- Familiarity with Internet, WWW and Web Search engines
- Viruses: types and protection

Ref: TB plus handout.

Unit –II **(10 Lectures)**

8085 Microprocessor

1. Features of Intel 8085 and Pin diagram of 8085
2. 8085 CPU Architecture -
   - Arithmetic and Logical Group
   - ALU, Accumulator, Temporary Register, Flag Register (PSW)
     Register Group
   - Temporary Registers (Wand Z), General purpose Registers, Special purpose
   - Registers
   - Interrupt Control
   - Serial I/O Control Group
   - Instruction Register, Decoder and Control Group
   - Instruction Register, Instruction Decoder, Timing and Control
3. Logic devices for interfacing: Tri state devices, Buffers, Encoder, Decoder, Latch
   Ref: VB 2.4 TO 2.6

Unit –III **(12 Lectures)**

8085 Instruction Set

1. Addressing Modes
   Immediate Addressing, Register Addressing, Direct Addressing, Indirect Addressing, Implied Addressing or Inherent Addressing

2. Classification of Instruction Set
   Data Transfer Group, Arithmetic Group, Logical Group, Branching Group, Stack and Machine Control Group Notations used in Instructions and Opcode

   - Data Transfer Group:
     MOV R_d, Rs; MOV R, M or MOV M,R; MVI R, Data; MVI M, Data; LXI Rp, Data 16 bit; LDA Address; STA Address, IN, OUT

   - Arithmetic Operation Group:
     ADD R; ADD M; ADC M; ADI Data; ACI Data; SUB R; SUB M; SBB R; SUI Data; INR R; INR M; DCR M; INX Rp; DCX Rp

- Logical Group:
  CMP R, CMP M, RLC, RRC, RAL, RAR
- Branch Group:
  JMP Address, Conditional Jump instructions, RST N, Concept of Looping, Operating on Block of Data

3. Instruction set summary.

Ref: VB Chapter 4 (exclude 4.6.5)

Unit –IV Storage devices **(8 Lectures)**

- Study of storage devices: Memory Hierarchy, Cache Memory principles,
- Ref: 4.1, 4.2 (WS)
- Semiconductor main memory organization, Advanced DRAM organization.
- Ref: 5.1, 5.3 (WS)
- Magnetic Disk, Optical Memory. Magnetic Tape
- Ref: 6.1,6.3,6.4 (WS)
- PC Memory DIPS, SIMMS, DIMMS, ECC Memory, Flash RAM.
  Ref: pages 129 to 136, 149 (MM)

Unit -V : Study of peripheral devices and interfacing **(10 Lectures)**

1. Multimedia Devices: Color Monitor, Sound card, Digital cameras, MP3 player.
   Ref: JA 488 TO 499, JNO 527 to 530 and 540 to 542
2. Interfacing peripheral devices with PC: Comparison of serial, parallel, USB and firewire ports for interfacing.
   JA 454 to 470 plus handouts.

Unit VI : Operating Systems: **(10 Lectures)**

1. Windows 2000
   FM: Chapter 13
2. Memory Management
   FM: 45 to 46 and 69 to 71.
3. Scheduling
   FM 77 to 86.
4. Network OS
   FM 208-210 AND 252-255.
5. Case study: Windows and Linux
   Ref: Handouts.

Reference:

VB V. J. Vibhute, P. B. Borole, Tech-Max (formerly Technova) "Microprocessor- 1"

RG Ramesh Gaonkar "Microprocessor Architecture Programming and Applications with the 8085" (RG) 5th edition Penram

WS William Stallings "Computer Organization and Architecture" 6th Edition Pearson Publication

MM Mark Minassi "PC upgrade and maintenance" 10th edition BPB

TB Thomas Bartee "Digital Computer Fundamentals" TMH

JA Jean Andrews "Enhanced Guide to managing and maintaining your PC"
Thomson Learning (Chapter 9 and 10)

FM Understanding Operating Systems(3rd Ed) by Flynn and McHoes (Brooks/Cole , Thomson)

Additional References:

1. Andrew Tanembaum OS
2. Achyut Godbole OS

(In addition to these books internet web-sites can be used wherever necessary.)

Sample web-sites for Paper – I

http://www.howstuffworks.com
http://www.intel.com
http://www.linux.org
http://www.hardwarecentral.com
http://www.mdronline.com

Computer Science: Paper –II: Programming in C++

Unit 1 **(12 Lectures)**

Introduction to Computers and Programming: Programs and programming languages, the programming process, Procedural and object oriented programming

Object oriented terms: object, class, data hiding, encapsulation, inheritance and polymorphism

Chapter 1.3 to 1.7

Website for Object oriented terms
http://java.sun.com/docs/books/tutorial/java/concepts/

Introduction to C++: The parts of a C++ program, The cout object, preprocessor directive (#include), variables and constants, Identifiers and rules for naming identifiers, Data types(integer, char, floating point, bool), variable assignment and initialization, scope of a variable, Arithmetic operators, comments.

Chapter 2.1 to 2.14 [exclude 2.10]

Expressions and Interactivity: The cin object, entering multiple values, reading strings, mathematical expressions, operator precedence and associativity, type coercion, overflow and underflow, typecast operator, #define directive, multiple and combined assignment, formatting input and output, precision, mathematical library functions.

Chapter 3.1 to 3.11

Unit 2 **(8 Lectures)**

Making Decisions: Relational operators, if statement, flags, concept of compound statement, if/else statement, if/else if statement, trailing else, nested if statements, logical operators, validating user input, scope of a variable, comparing strings, conditional operator, switch statement.

Chapter 4.1 to 1.16

Looping: Increment and decrement operators, while loop, sentinels, do-while loop, for loop, nested loops, break and continue statement.

Chapter 5.1 to 5.11

Unit 3 **(12 Lectures)**

Functions: need for functions, defining and calling functions, function prototypes, sending information into a function (parameter passing), changing the value of the parameter, the return statement, returning a value from a function, local and global variables, static local variables, default arguments to a function, reference arguments, overloaded functions.

Chapter 6.1 to 6.5 and 6.7 to 6.14

Arrays: Concept of arrays, accessing array elements, array initialization, processing array contents, copying and printing contents of an array, arrays as function arguments, two-dimensional arrays, arrays of strings.

Chapter 7.1 to 7.5 and 7.8 to 7.11

Unit 4 (10 Lectures)

Pointers: concept of a pointer, pointer variables, relationship between arrays and pointers, pointer arithmetic, Initializing pointers, comparing pointers, pointers as function parameters, dynamic memory allocation.

Chapter 9.1 to 9.8

Introduction to classes: Introduction to class, access specifiers(private and public) defining member functions, instance of a class(object), need for private members, inline member functions.

Chapter 13.1 to 13.8

Unit 5 (10 Lectures)

Object initialization and cleanup: constructors, destructors, constructors that accept arguments, overloaded constructors, default constructor and destructor, arrays of objects

Chapter 13.9 to 13.14

More about classes: static members, friends of classes, member wise assignment, copy constructors.

Chapter 14.1 to 14.4

Operator Loading: Overloading assignment operator, this pointer, Overloading Math operators, overloading relational operators.

Chapter 14.5 [exclude >> and << operators]

Unit 6: (8 Lectures)

Inheritance: Basics of inheritance, types of inheritance, protected members and class access, constructors and destructors, Overriding base class functions.

Polymorphism and virtual member functions: Concept of polymorphism, abstract base class and pure virtual functions, base class pointers, classes derived from derived classes, Multiple inheritance (concept only).

Chapter 15.1 to 15.9

All topics are from the book Tony Gaddis "Programming in C++" 3rd Edition

Additional References:

1. Garry Bronson
2. Schaum series "Programming in C++"
3. Robert Lafore
4. H. Schildt
5. Cohoon & Davidson "C++ Program Design"
6. Tanembaum et. al. "Data Structures in C++" (Prentice Hall)

PRACTICALS :

Important :

- **Internet facility with easy access should be provided in the Computer Science labratory**

- **A fee of Rs. 1000/- be charged per student for the hands on experience on the in house computer facility.**
- **Not more than 2 students per computer should be allowed.**

<u>Practicals Paper I</u>

A1 : MS Office Word and Excel – Computer generated report of a Physics experiment actually performed by the student in the T.Y.B.Sc. lab. (This should include formulae, diagram, data table, graph, results etc)

A2: Powerpoint: Presentation of any one Physics topic from T.Y.B.Sc. syllabus to be brought on floppy disk / CD

A3: **MS Access :** Creating a database file. Adding, deleting, updating and querying the database.

A4: Linux shell commands

- Logging in and out of Linux
- **File system commands :** ls command with options, pwd, passwd, cd, ln, cat, mkdir, rmdir, chmod, cp, mv, rm
- **General purpose utilities:** more , wc, cmp, diff, comm., date , who

B. Microprocessor experiments :

- ISR program(use VI key) (compulsory)

And

Any three of the following

- Addition and subtraction of 2 bit 8 bit numbers with carry and borrow
- Sum of n numbers (n <= 10). Find smallest /greatest number
- Transfer of memory block
- Multiplication of two positive numbers with product greater than 255.

Note: Observation of registers by single stepping is expected.

Practicals Paper II:

C++ Programming Excercises:

Part – A : Structured programming using C++.
(Perform minimum 1 experiment from each A1 to A4)

A-1 Control structures:

1. Temperature Conversion (Page 151 GB)
2. Triangle classification problem
3. A function calculator (Rational expression evaluator) (Page 125 RL)
4. Binary, Hex, Octal equivalents of decimal numbers in range 1 through 256 (page 154 DD)

A-2 Functions:

5. Use functions: a) To find if an integer is a perfect number &
   b) Print all perfect numbers in the range 1 to 1000
   (page 232 DD)

6. Use functions: a) To find if a given integer is a prime or not
   b) Print all prime numbers between 1 and 500
   (page 232 DD)

7. Use functions: To find GCD of two integers (page 232 DD)

A-3 Arrays:

8. Mean, Variation and Deviance of a set of numbers (page 299 GB)
9. Linear Search / Binary Search
10. Selection Sort / Bubble Sort / Insertion Sort

A-4 Sring Manipulation:

11. a) To find if a given string is a palindrome or not
    b) Reversing a string (Print a string backwards)
    (page 303 DD)
12. Use of string-compare & string-copy
13. To arrange names alphabetically

Part-B: Object Oriented Programming using C++

(Perform minimum 4 experiments from the list given below)

1. Rectangle Class (page 494 GB)

2. Complex class for performing arithmetic with complex numbers (page 449 DD)

3. Class called Rational for addition, subtraction & multiplication (page 449 DD)

4. Time Class (page 502 GB) / Date class

5. Function overloading: Absolute value of integer, float, double

6. Operator overloading – Unary operators prefix/postfix

7. Operator overloading – Binary operators – Addition of distances (Robert lafore)

8. Rectangle to Polar Co-ordinate conversion & vice versa. (Robert lafore – 2 Dimensio

9. Functionality of INT (refer Robert Lafore)

10. Inheritance problems (Garry Bronson – Base class circle, Derived class – cylinder)

11. Quadratic equation using Object Oriented techniques

12. Traffic lights (ref. Garry Bronson)

13. Polymorphism and Virtual function problems. (Garry Bronson)

Demonstration Experiments: (Any four)

- Microprocessor 8085 timing diagram
- Interfacing through 8255
- Interfacing PC with real world using parallel port. Linkage with temperature , light, EM relays, stepper motor, D.C. motor, solenoid, seven segment display ,etc.
- Installation of device drivers (e.g. Web Cam., joystick, mouse…)
- Microprocessor simulation on PC using 8085 simulator floppy disk from Gaonkar textbook
- Internet usage (Physics search/Technical literature)
- VB program demo
- Graphics with C++

GB: Garry Bronson
DD: Deital & Deital
RL: Robert Lafore

Practical Examination:

1. Practical I Part A (15 marks) – Access/ Linux .
   Part B (15 Marks) - Microprocessor

Total 30 Marks (3 hours)

2. Practical II Part A (15 Marks) Structured programming using C++
   Part B (15 Marks) OOP using C++

Total 30 Marks (3 hours)

Note: Algorithms ,Flowchart optional. Printout of source code and output compulsory.

Note : For both practical papers there is no time differentiation between A and B