

St. Xavier's College, Autonomous
DEPARTMENT OF PHYSICS
SYLLABUS UNDER AUTONOMY FOR SEMESTER VI
COMPUTER SCIENCE (APPIED COMPONENT)

COURSE: S.PHY.6.07

PROGRAMMING IN C++

[30 LECTURES]

Learning objectives: To study object oriented programming language C++

UNIT I

(15 LECTURES)

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

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

UNIT –II

(15 LECTURES)

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

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

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

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).

Reference: Tony Gaddis – “ Programming in C++” 3rd Edition

Additional Ref: 1) Schaum series-“ Programming in C++”

2) Cohoon & Davidson- “ C++ program Design”

CIA:PROBLEM SOLVING/MULTIPLE CHOICE QUESTION

St. Xavier's College, Autonomous
DEPARTMENT OF PHYSICS
SYLLABUS UNDER AUTONOMY FOR SEMESTER VI
COMPUTER SCIENCE (APPLIED COMPONENT)
COURSE: S.PHY.6.08

MICROCONTROLLER [30 LECTURES]

Learning objectives: To study microcontroller 8051 and its applications.

UNIT – I [15 LECTURES]

- 1) **Introduction to microprocessor:** comparing microprocessor and microcontroller, The 8085 and the 8051, A microcontroller survey, Development systems for microcontroller.
- 2) **The 8051 Architecture :** 8051 microcontroller hardware, Input/ Output pins, ports and circuits, External memory, counter and timers, Serial data Input / Output, interrupts.
- 3) **Basic Assembly language programming concepts:** A generic computer, Mechanics of programming, The Assembly language programming process, The PAL practice CPU, Programming, Programming tools and techniques, Programming the 8051.

SELF STUDY

Numbering Systems and Binary Arithmetic:

Symbolic numerical systems, positional numerical systems, Integer binary number, Fractional binary number, Binary Addition, Subtraction, Division and Multiplication, Binary codes.

UNIT – II [15 LECTURES]

- 1) **Moving Data:** Addressing modes, External data moves, codes memory read only data moves, push and pop Opcodes, data exchange.
- 2) **Logical Operations:** Byte – level logical operations, Bit – level logical operations, Rotate and Swap operations.
- 3) **Arithmetic Operations:** Flags, Incrementing and Decrementing, Addition, Subtraction, Multiplication and Division, Decimal arithmetic.
- 4) **Jump and Call Instructions:** The jump and call program range, Jumps, calls and subroutines, Interrupts and returns, more details on interrupts.

References

K.J.Ayala : The 8051 microcontroller architecture, programming and applications , 2nd edition, Thomas Delmar learning.

CIA: Programing /MULTIPLE CHOICE QUESTIONS

St. Xavier's College, Autonomous
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SYLLABUS UNDER AUTONOMY FOR SEMESTER VI
COMPUTER SCIENCE (APPIED COMPONENT)

COURSE: S.PHY.6.07&6.08.PR

PAPER I:

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 Dimension)
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)

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

PAPER II:

With the help of 8051 Microcontroller: (minimum four)

1. Interface with 8 bit Digital to Analog convertor for waveform generation.
2. Primary Counter (Display with LED).
3. Switch Interfacing.
4. Detection of external interrupt.
5. Computer Interfacing.

References :-

K.J.Ayala : The 8051 microcontroller architecture, programming and applications , 2nd edition, Thomas Delmar learning.

CIA: PRACTICAL SKILLS WILL BE TESTED

St. Xavier's College, Autonomous
DEPARTMENT OF PHYSICS
SYLLABUS UNDER AUTONOMY FOR SEMESTER VI
ELECTRONIC INSTRUMENTATION (APPLIED COMPONENT)

COURSE: S.PHY.6.05

Learning Objectives: To learn about various electronic measuring instruments

MEASURING INSTRUMENTS

[30 Lectures]

UNIT I: (15 Lectures)

I) Analog & Digital Multimeters

1. Analog Multimeter : DC Ammeter, Multimeter Ammeter (with Independent & Ayrton Shunt), DC Voltmeter multirange voltmeter loading effect of voltmeter, Differential Voltmeter, AC Voltmeter using Rectifier, Multirange AC Voltmeter.
2. Analog Electronic Multimeters: Transistor Voltmeter Solid State (OP-AMP Based) Voltmeter, DMM, 3½ Digit, Resolution and Sensitivity, General Specification.

II) Active Filters and ADC & DAC Digital Instruments

1. Active Filters: Introduction, Active Filters, 1st order low/high pass filter, 2nd order low/high pass Butterworth filter, Band pass filter, Wide band pass filter, Wide band rejection filter and Narrow band rejection filter.

UNIT II: Digital Instruments and CRO (15 lectures)

1. Digital Instruments : D/A Conversion, Variable (Weighted) Resistor and Binary Ladder (4 Bit) type, D/A Accuracy & Resolution, A/D Conversion, Counter method, Successive Approximation Converters, A/D Accuracy and Resolution, Digital Frequency Meter and Measurement of Time.
2. CRO: Introduction, CRO Block Diagram, CRT Connection, Vertical Amplifier Basic Function of Sweep Generator, Horizontal Deflection System, Triggered Sweep, Trigger Pulse, Delay Line, Dual Trace CRO.
3. Probes: 1:1 Probe, 10:1 Probe, Attenuation (Uncompensated and Compensated).

References:

1. Basic Electronics and Linear Circuits - N. N. Bhargava, D. C. Kulshreshtha and S. C. Gupta. Technical Teachers training Institute, Tata McGraw Hill Publishing Company Limited.
2. Modern Electronic Instrumentation & Measurement Techniques - Albert D. Helfrick & William D. Cooper (PHI) Edition.
3. Electronic Instrumentation - H. S. Kalsi, 2nd Edition, Tata McGraw Hill.
4. Digital Principle & Applications - Malvino & Leach (6th edition, TMH)

CIA: PROBLEM SOLVING/MULTIPLE CHOICE QUESTIONS

St. Xavier's College, Autonomous
DEPARTMENT OF PHYSICS
SYLLABUS UNDER AUTONOMY FOR SEMESTER VI
ELECTRONIC INSTRUMENTATION (APPLIED COMPONENT)

COURSE: S.PHY.6.06

MICROCONTROLLER [30 LECTURES]

Learning objectives: To study microcontroller 8051 and its applications.

UNIT – I [15 LECTURES]

- 4) **Introduction to microprocessor:** comparing microprocessor and microcontroller, The 8085 and the 8051, A microcontroller survey, Development systems for microcontroller.
- 5) **The 8051 Architecture :** 8051 microcontroller hardware, Input/ Output pins, ports and circuits, External memory, counter and timers, Serial data Input / Output, interrupts.
- 6) **Basic Assembly language programming concepts:** A generic computer, Mechanics of programming, The Assembly language programming process, The PAL practice CPU, Programming, Programming tools and techniques, Programming the 8051.

SELF STUDY

Numbering Systems and Binary Arithmetic:

Symbolic numerical systems, positional numerical systems, Integer binary number, Fractional binary number, Binary Addition, Subtraction, Division and Multiplication, Binary codes.

UNIT – II [15 LECTURES]

- 5) **Moving Data:** Addressing modes, External data moves, codes memory read only data moves, push and pop Opcodes, data exchange.
- 6) **Logical Operations:** Byte – level logical operations, Bit – level logical operations, Rotate and Swap operations.
- 7) **Arithmetic Operations:** Flags, Incrementing and Decrementing, Addition, Subtraction, Multiplication and Division, Decimal arithmetic.
- 8) **Jump and Call Instructions:** The jump and call program range, Jumps, calls and subroutines, Interrupts and returns, more details on interrupts.

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ELECTRONIC INSTRUMENTATION (APPIED COMPONENT)

COURSE: S.PHY.6.05 &6.06.PR

PAPER I:

EXPERIMENTS:

1. 2nd order active Low pass / High pass filters.
2. Digital to Analog Convertor using Opamp.
3. Digital frequency meter / Voltmeter.
4. 2nd order active notch filter.

DEMO:

1. Analog to Digital Convertor.
2. Study of 8:1 multiplexer (74LS151) and its applications and study of 1:4 De-multiplexer (74LS155) and its applications.

PAPER II:

With the help of 8051 Microcontroller:

6. Interface with 8 bit Digital to Analog convertor for waveform generation.
7. Primary Counter (Display with LED).
8. Switch Interfacing.
9. Detection of external interrupt.
10. Computer Interfacing.

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CIA: PRACTICAL SKILLS WILL BE TESTED