INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES,

DEVI AHILYA UNIVERSITY, INDORE

M. Tech. (IT) 5 Years

Batch – IT-2K21

Semester – II

January – June 2022

Syllabus

Sub. Code	Subject Name	L	T	P	C
IT-201	Mathematics - II	3	1	0	4
IT-201A	Chemistry and Environment Sciences	3	1	0	4
IT-203A	Digital Computer Organization	3	1	0	4
IT-204A	Data & Computer Communications	3	1	0	4
IT-206B	C++ Programming	3	1	0	4
IT-207B	C++ Programming Lab	0	0	4	2
IT-208	Comprehensive Viva	0	0	4	4
				Total =	26

INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES, DEVI AHILYA UNIVERSITY, INDORE

M. Tech. (IT) (5 Years) II SEMESTER

Mathematics – II, IT – 201

Aim of Course: The aim of this course is to make student aware about the Probability and Statistical Methods for research and real life data analysis.

Objectives:

- Understand basic concepts of Probability and Statistical Methods for data analysis.
- Learn Hypothesis testing.
- Learn the application of different tests such as Chi-square, T & F statistic.

Course Contents:

UNIT 1

Theoretical Probability Distributions: Binomial Probability distribution, Poisson Probability distribution, Normal Probability distribution.

Estimation: Unbiased-ness, consistency, efficiency and sufficiency, minimum variance unbiased estimator, Cramer-Rao inequality and its application, Maximum Likelihood estimator.

Testing of Hypothesis, Simple and Composite hypothesis, Test of significance for Samples, Test for single proportion and for difference of proportion. Test of significance for single mean, Test of significance for difference of means.

UNIT II

Interval estimation: Confidence Interval and Confidence limits, Confidence limits for large samples.

Test of significance: Procedure for testing of Hypothesis, Test of significance for large samples, test for single proportion and for difference of proportions, Test of significance for single mean, Test of significance for difference of means.

UNIT III

Test of significance for small samples: Concept of Chi-square, t and F- statistics, Test for Chi-square distribution, to test goodness of fit, to test independence of Attributes, to test the homogeneity of correlation coefficients.

Test based on t- distribution: t-test for single mean, difference of means, paired t- test, t-test for testing significance of an observed sample correlation coefficient.

UNIT IV

Test based on F- distribution: Test for equality of population variance, Test for testing the significance of an observed multiple correlation coefficients.

Non parametric test: sign- test, median test, run test, Wilcox on signed rank test.

UNIT V

Analysis of variance and design of experiments: One - way and two - way classification with one observation per cell, Design of experiments, completely randomized design randomized block design and Latin square design.

Text Book:

1. S.C. Gupta & V.K. Kapoor : Fundamentals of Mathematical statistics, S. Chand sons.

Reference Books:

1. S.C. Gupta & V.K. Kapoor : Fundamentals of Applied statistics, S. Chand sons.
2. A.M.Gun, M.K.Gupta, B Dasgupta: An outline of statistical theory(Volume 1).
3. Kapoor and Saxena : Mathematical statistics , S. Chand and sons.

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M. Tech. (IT) (5 Years) II SEMESTER

Chemistry & Environment Science, IT-201A

Aim of Course: To make the students familiar with different issues related to Environment Science and Basics of Chemistry

Unit –I High Polymer:
Introduction, types and classification of polymerization, Natural & Synthetic Rubber; Vulcanization of Rubber, Preparation, Properties & uses of the following- Polythene, PVC, PMMA, Teflon, Poly acrylonitrile, Nylon 6, Nylon 6:6, Terylene, Phenol formaldehyde Resin.

Unit –II Energy
Sources of Energy: Renewable & Non Renewable, Fossil fuel, Biomass, Geothermal, Hydrogen, Solar, Wind, hydal, nuclear energy

Unit –III Ecosystem
Segments of Environment: Atmosphere, hydrosphere, Lithosphere, biosphere, Cycles in Ecosystem –
Water, Carbon, Nitrogen, Biodiversity: Threats and conservation.

Unit –IV Air Pollution & Sound Pollution -
Air Pollution: Air pollutants, classification, (Primary & secondary Pollutants) Adverse effects of pollutants. Causes of Air pollution chemical, Green house effect, ozone layer depletion, acid Rain. Sound Pollution: Causes, controlling measures, effects of sound pollution

Unit –V Water Pollution & Sound Pollution -
Water Pollution– Water Pollution: Pollutants in water, adverse effects. Treatment of Domestic & Industrial water effluent. **Society, Ethics & Human values–** Impact of waste on society. Solid waste management (Thermal, Plastic, Agriculture, domestic and e-waste). Ethics and moral values, ethical situations, objectives of ethics and its study. Preliminary studies regarding Environmental Protection Acts,

Text Book:

1. “Energy Environment Ecology and Society” By Dr. Surinder Deshwal Dhanpat Rai Publication

References:
1. Harris, CE, Prichard MS, Rabin’s MJ, “Engineering Ethics”; Cengage Pub.

2. Rana SVS ; “Essentials of Ecology and Environment”; PHI Pub.

3. Raynold, GW “Ethics in information Technology”; Cengage.

4. Svakumar; Energy Environment & Ethics in society; TMH

5. AK De “Environmental Chemistry”; New Age Int. Publ.

6. BK Sharma, “Environmental Chemistry” ; Goel Publ. House.

INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES, DEVI AHILYA UNIVERSITY, INDORE
M. Tech. (IT) (5 Years) II SEMESTER
Digital Computer Organization, IT-203A

Aim of Course: To make students understand the organization of the computer, and the way the hardware components are connected together to form a computer system, and the development of the hardware for the computer taking into consideration a given set of specifications.

Objectives:

The course is designed to make students:

- Understand the various functional units of CPU.
- Study various units of ALU.
- Understand instruction formats and addressing modes.
- Understand interconnection and interfacing of various units of computer system.

Course Contents:

UNIT I

Introduction to computer organization, Von Neumann Architecture, Computer components, interconnection structures, Bus interconnection.

UNIT II

Input output organization: I/O interface, modes of transfer, Interrupt driven I/O, Priority interrupt, DMA, I/O processor, and serial communication, Synchronous, Asynchronous data transfer, strobe control, handshaking, PCI, Working mechanisms of Peripherals: Keyboard, Mouse, Scanners, Video Displays, Touch Screen panel etc.(features and principles)

UNIT III

Control Unit: Instruction word format, fetch and execution cycle, sequence of operation of control registers, control of arithmetic operations, microprogramming concepts.

UNIT IV

Memory Organization: Memory hierarchy, internal and external memory. Types of memories: ROM: PROM, EPROM, EEPROM, RAM: SRAM, DRAM, High speed memories: Cache memory, Organization and mapping techniques, Virtual memory, secondary storage: Magnetic disk, tape, optical memory, DROM, DVD.

UNIT V

CPU Organization: General register organization, stack organization and accumulator type organization. Instruction formats – three address instruction, two addresses, one address and zero address instructions, Instruction set selection. Addressing modes: - Immediate, direct, indirect, register, indexed etc.

Text Books:

1. Computer Organization and architecture by William Stalling, 8th edition, Prentice Hall of India
2. Computer System Architecture by M. Morris Mano, 3rd edition, Prentice Hall of India

Reference Books:

1. Computer Organization by D A Godse and A P Godse
2. Computer Architecture and Organization by J. P. Hayes, 2nd edition, Tata McGraw-Hill
3. Structured Computer Organization by A. S. Tanenbaum, 3rd edition, Prentice Hall of India

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M. Tech. (IT) (5 Years) II SEMESTER

Data and Computer Communication, IT – 204A

Aim of Course: To gain an understanding of the fundamentals of data communications networks.

Objectives: The course is designed to make students:

- Understand basic data communication components.
- Understand the fundamentals of signaling and data transmission.
- Study data link layer and data link protocols.
- Study Network layer, MAC sub layer, LAN and its standards.

Course Contents:

UNIT- I

Introduction & Overview of Communication Systems:

Basis for Data Communication, Guided Transmission Media: Twisted Pair; Coaxial Pair; Fiber Optics, Multiplexing Techniques: FDM; WDM; TDM; STDM, Unguided Transmission Media: Wireless Communication; Cellular Radio; Satellite Communication.

UNIT- II

Network Model: The OSI model: Layered Network Architecture, Peer-to-Peer Processes, Layers in the OSI Reference model, The TCP/IP Model, Addressing: Physical, Logical, Port and Specific addressing, Comparing and Contrasting - OSI & TCP/IP Model.

UNIT- III

Physical Layer and Media:

Digital Data, Digital Signal: NRZL; NRZI; Bipolar AMI; Pseudo Ternary; Manchester; Differential Manchester; B8ZS; HDB3, Digital Data, Analog Signal: ASK; FSK; PSK, Analog Data, Digital Signal: PCM; PAM; DM; ADM, Analog Data, Analog Signal: AM; FM; PM, Switching: Circuit switch networks, Datagram Networks, Virtual Circuit networks, Multiplexing techniques: FDM, WDM, TDM, STDM.

UNIT- IV

The Data Link Layer:

Data Link Layer Design Issue: Framing; Character Count; Character Stuffing; Bit Stuffing; Physical Layer Coding Violation: Error Control; Flow Control; Error Correcting Codes; Error Detecting Codes; Hamming Codes; CRC Code. Protocols: Stop & Wait Protocol, Unrestricted Stop & Wait Protocol, Simplex Stop & Wait Protocol, Protocol for Noisy Channel, Sliding Window Protocol, Go Back N, Selective Repeat, Verification using File State, HDLC Data Link Protocol, ISDN, ATM.

UNIT-V

The Medium Access Protocols:

The Medium Access Sub Layer: Channel Allocation; Static; Dynamic, Multiple Access Protocols: ALOHA; CSMA, Collision Free Protocols, Limited Connection Free Protocols, WDMA, Wireless LAN Protocols, Digital Cellular Radio. Overview of IEEE Standards.

Text Books:

1.Data Communications and Networking (IV Edition). B.A. Forouzan (Tata McGraw Hill Publications)

Reference Books:

1. Computer Networks (IV Edition), A.S. Tanenbaum (PHI Publications)
2. Data and Computer Communications, William Stallings (PHI Publications)
3. Data Communications and Networks, Achyut S. Godbole (Tata McGraw Hill Publications)

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M. Tech. (IT) (5 Years) II SEMESTER

C++ Programming, IT-206B

Aim of Course: The aim of course is to help students to gain a better understanding of OO design and program implementation by using OO language features.

Objectives:

- Understand object-oriented programming features in C++,
- Apply these features to program design and implementation,
- Understand object-oriented concepts and how they are supported by C++,
- Gain some practical experience of C++,
- Understand implementation issues related to object-oriented techniques,
- Build good quality software using object-oriented techniques

Course Contents:

UNIT I

Principle of Object-Oriented Programming, Object-Oriented Terminology, OOP Paradigm, Basic concept of OOP, Benefits of OOP, Application of OOP.

Introduction of C++: Tokens, Keywords, Identifier and constants, Operator, Data Type, Variable Manipulator, Expression and Control structure.

UNIT II

Classes and Function in C++ :

Class: Defining Classes in C++, Classes and Encapsulation, Member functions, Instantiating and Using Classes, Access specifiers, Static Class Members.

Constructor and Destructor: Use of Constructors, Multiple Constructors, Types of constructor, Using Destructors to Destroy Instances.

Function: Function Introduction, Main function, Function Prototyping, inline function, friend function.

UNIT III

Inheritance & Polymorphism: Overview of Inheritance, Defining Base and Derived Classes, Constructor and Destructor Calls, Virtual base classes, Abstract classes. Overview of Polymorphism

Operator & Function Overloading: Operator Overloading, Working with Overloaded Operator Methods, Introduction to Function overloading.

UNIT IV

Pointer and Virtual Function: Introduction of Pointer, Dynamic memory allocation, Pointers to object, this pointer, Pointers to derived classes, Virtual Functions, Pure virtual function.

UNIT V

Working with files in C++, Exceptions Handling and Templates: Files: Standard Streams, Manipulators, Unformatted Input and Output, File Input and Output. Exceptions: Basics of Exception handling, Exception handling mechanism. Templates: Template Overview, Customizing a Template Method, Standard Template Library Containers.

Text Books:

1. The Complete Reference - C++, Tata Mcgraw Hill

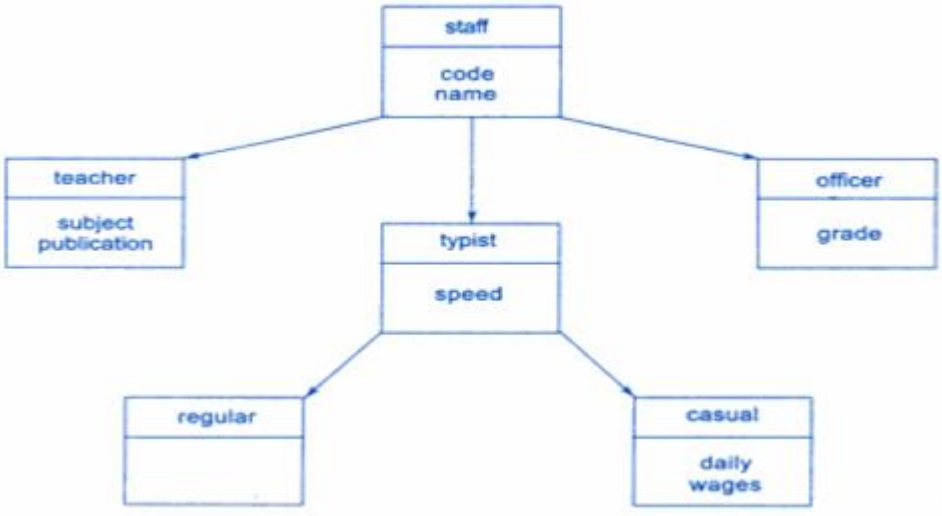
Reference Books:

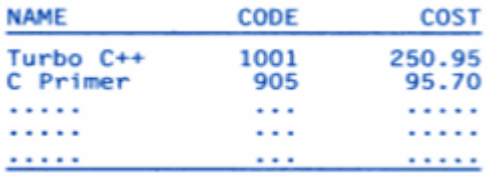
1. E. Balagurusamy, Object-Oriented Programming with C++
2. Yashwant Kanitkar, Let us C++.
3. Robert Lafore, Object Oriented Programming in Turbo C++

INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES,
DEVI AHILYA UNIVERSITY, INDORE
M. Tech. (IT) (5 Years) II SEMESTER
C++ Programming Lab, IT-207B
Lab Assignment

S.No.	Description
1.	Write a program to display the minimum, maximum, sum, search and average of elements of an array.
2.	Define a class student with the following specification **Private members** of class student admno integer sname 20 character eng. math, science float total float **Public member** function of class student ctotal() a function to calculate eng + math + science with float return type. Takedata() Function to accept values for admno, sname, eng, science Showdata() Function to display all the data members on the screen
3.	Define a class in C++ with following description: **Private Members** A data member Flight number of type integer A data member Destination of type string A data member Distance of type float A data member Fuel of type float A member function CALFUEL() to calculate the value of Fuel as per the following criteria Distance — Fuel <=1000 — 500 more than 1000 and <=2000 — 1100 more than 2000 — 2200 **Public Members** A function FEEDINFO() to allow user to enter values for Flight Number, Destination, Distance & call function CALFUEL() to calculate the quantity of Fuel. A function SHOWINFO() to allow user to view the content of all the data members.
4.	Write a menu driven program to perform following: a) Input a matrix b) Display matrix c) Add two matrix d) Multiply two matrixes e) Transpose a matrix
5.	Write a C++ program for calculating volume of sphere, cuboid and cylinder using function overloading.
6.	Write the definition for a class called **complex** that has floating point data members for storing real and imaginary parts. The class has the following member functions: **void set(float, float)** to set the specified value in object **void disp()** to display complex number object **complex sum(complex)** to sum two complex numbers & return complex number 1. Write the definitions for each of the above member functions. 2. Write main function to create three complex number objects. Set the value in two objects and call sum() to calculate sum and assign it in third object. Display all complex

	numbers.
7.	Write the definition for a class called **Rectangle** that has floating point data members length and width. The class has the following member functions: **void setlength(float)** to set the length data member **void setwidth(float)** to set the width data member **float perimeter()** to calculate and return the perimeter of the rectangle **float area()** to calculate and return the area of the rectangle **void show()** to display the length and width of the rectangle **int sameArea(Rectangle)** that has one parameter of type Rectangle. sameArea returns 1 if the two Rectangles have the same area, and returns 0 if they don't. 1. Write the definitions for each of the above member functions. 2. Write main function to create two rectangle objects. Set the length and width of the first rectangle to 5 and 2.5. Set the length and width of the second rectangle to 5 and 18.9. Display each rectangle and its area and perimeter. 3. Check whether the two Rectangles have the same area and print a message indicating the result. Set the length and width of the first rectangle to 15 and 6.3. Display each Rectangle and its area and perimeter again. Again, check whether the two Rectangles have the same area and print a message indicating the result.
8.	Write a date class with data members dd, mm, yy. Write a constructor and overload ++ operator, << operator and >> operator.
9.	Develop a mark sheet in C++ for university examination with following data:) Students' name) Enrolment no) roll no) Theory marks in 5 subjects) Practical marks in five subjects) grade Overload << and >> operator .Grade should be calculated for each subject. Use Constructor overloading. Roll no should be auto generated.
10.	Write a menu driven program for addition, subtraction, display result of two distances (given in meter and centimetre) . i. Overload '+' operator with member function ii. Overload '–' operator using friend function iii. Overload << and >> operator
11.	Create a class time with hours and minutes as its data members. Write a C++ program which has a member function to overload binary operator + to add two times. Also overload relational operator > to compare 2 times. It should also overload << (output) and >>(input) operator.
12.	Create an array class. In it dynamically allocate memory for integer array of size according to value passed to constructor, and write following methods i. copy constructor ii. destructor iii. Overload [ ] operator. iv. Overload << , >>operator.
13.	Define a class to represent a Bank Account. Include the following members:

	Data Members: i. Name of the depositor ii. Account number iii. Type of account iv. Balance amount in the account Member Functions: 1. To Input initial values 2. To deposit an amount 3. To withdraw an amount after checking the balance 4. To display name and balance Also write constructor for this class that takes four arguments. It should also handle type of account as savings by default.
14.	Assume that a bank maintains two kinds of accounts, are called as saving account and current account. The saving account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below the level, a service charge is imposed. Create a class account that stores customer name, account number and type of account. From this derive the classes cur_acct and sav_acct to make them more specific to their requirements. Include necessary member functions in order to achieve the following tasks: a. Include constructor for all the three classes. b. Accept deposit amount from the customer and update the balance. c. Display the balance. d. Compute and deposit interest. e. Permit withdrawal and update the balance. f. Check for minimum balance, impose penalty, necessary and update the balance.
15.	An educational institution wishes to maintain a database of its employees. The database is divided into number of classes whose hierarchical relationships are shown in below figure. The figure also shows minimum information required for each class. Specify all the classes and define functions to create the database and retrieve individual information as and when required. 

16.	Create a base class called shape .Use this class to store two double type values that could be used to compute the area of figures, Derive two specific classes called triangle and rectangle from the base shape .Add to the base class, a member function get_data() to initialise base class data members and another member function display_area() to compute and display the area of figures. Make display_area () as a virtual function and redefine this function in the derived class to suit their requirements. Using these three classes, design a program that will accept dimensions of a triangle or a rectangle interactively and display the area. Area of rectangle = x*y Area of triangle = ½*x*y
17.	Write a program to read a list containing item name, item code and cost interactively and produce a three column output as shown below:  NAME CODE COST Turbo C++ 1001 250.95 C Primer 905 95.70 .... Note that the name and code are left justified and the cost is right-justified with a precision of two digits. Training zeros are shown. Also fill the unused spaces with hyphens.
18.	Write a program to create a class EMP which have data member Name, Employee ID, contact number, address, year of joining and department in which he/she is working with data member get and put. Create a database of minimum 300 employees. Store and retrieve information on the basis of above configuration.
19.	Create a class Inventory which performs the following operations on the file STOCK.DAT a. Adds a new item to the file b. Modifies the details of an item c. Displays the contents of the file
20.	Write a program to create a class EMP which have data member Name, Employee ID, contact number, address, year of joining and department in which he/she is working with data member get and put. Create a database of minimum 300 employees. Store and retrieve information on the basis of above configuration.
21.	Write a function template for finding the minimum value contained in an array.
22.	Write a class template to represent a generic vector. Include member function to perform the following tasks: a. To create the vector b. To modify the value of a given element c. To multiply by a scalar value d. To display the vector in the form (10, 20, 30……)
23.	Write a program with following: a. A program to read two double type numbers from keyboard b. A function to calculate the division of these two numbers c. A try block to throw an exception when a wrong type of data is keyed in d. try block to detect and throw an exception if the condition “divide by zero” occurs e. Appropriate catch block to handle the exception thrown

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