St. Xavier's College (Autonomous), Mumbai

Syllabus of the courses offered by the Department of Information Technology (2017-18)

F.Y.B.Sc.I.T. COURSE: S.ITS.1.01

TITLE: PROFESSIONAL COMMUNICATION SKILLS

LEARNING OBJECTIVE:

To equip the students with communication skills required in the Information Technology Industry.

Number of lectures: 60

UNIT 1	**The Seven Cs of Effective Communication** Completeness, Conciseness, Consideration, Concreteness, Clarity, Courtesy, Correctness **Communication: Its interpretation** Basics, Nonverbal Communication, Barriers to Communication	**15**
UNIT 2	**Business Communication at Work Place** Letter Components and Layout, Planning a Letter, Process of Letter Writing, E-mail Communication, Memo and Memo Reports, Employment Communication, Notice Agenda and Minutes of Meeting, Brochures **Report Writing** Effective Writing, Types of Business Reports, Structure Of Reports, Gathering Information, Organization Of Material, Writing Abstracts and Summaries, Writing Definitions, Visual Aids, User Instruction Manual	**15**
UNIT 3	**Required Skills** Reading Skills, Listening Skills, Note Making, Precise Writing, Audiovisual Aids, Oral Communication	**15**
UNIT 4	**Mechanics of Writing** Transitions, Spelling Rules, Hyphenation, Transcribing Numbers, Abbreviating Technical and Non-Technical Terms, Proof Reading	**15**

Continuous Internal Assessment

Industrial Visits, Group Discussions, Presentations / Seminars Mid-Term Test

List of Text Books

1. ArunaKoneru, McGrawHill – Professional Communication.
   Koneru, Aruna: Professional communication. New Delhi. Tata McGraw Hill Education Private Limited , 2008. 0-07-066002-6--(651.7Kon)
2. Herta A Murphy, Herbet W Hildebrandt, Jane P Thomas, McGrawHill – Effective Business Communication.
   Murphy, Herta A.; Hildebrandt, Herbert W. & Thomas, Jane P.: Effective business communication. (7th ed.) New Delhi. McGraw Hill Education (India) Private Ltd., 1997(2015). 978-0-07-018775-7--(651.7Mur)
3. Lesikar and Petit, McGrawHill – Business Communication
   Lesikar, Raymond V.; Flatley, Marie E.; Rentz, Kathryn & Lentz, Paula: Business communication: connecting in a digital world. (13th ed.) New Delhi. McGraw Hill Education (India) Private Ltd., 2015. 978-93-513-4296-0--(651.74Les/Fla)
4. Summers Wiley, India – Communication Skills Handbook
   Summers, Jane & Smith, Brett: Communication skills handbook : How to succeed in written and oral communication. (Revised and updated ed.) New Delhi. Wiley India (P) Ltd, 2009. 81-265-2223-1--

(808.02Sum/Smi)

5. Rai and Rai, Himalaya Publishing House – Business Communication (Revised Edition)
   Rai, Urmila & Rai, S.M.: Personality development and communication skills - I. Mumbai. Himalaya Publishing House Pvt. Ltd., 2011. 978-93-5051-215-9--(651.7Rai/Rai)
6. R.C. Sharma and Krishna Mohan, TMH – Business Correspondence and Report Writing
   Sharma, R.C. & Mohan,Krishna : Business correspondence and report writing : a practical approch to business and technical communication. (4 th ed.) New Delhi. Tata McGraw Hill Education Private Limited, 2011. 0-07-068198-9--(651.7Sha/Moh)

F.Y.B.Sc.I.T. COURSE: S.ITS.1.02

TITLE: APPLIED MATHEMATICS - I

LEARNING OBJECTIVE: To study basic mathematics required for developing algorithms for systems and application software

Number of Lectures: 60

UNIT 1	**Matrices, Eigen Values and Eigen Vectors** Rank of a Matrix, System of Homogeneous and Non-Homogeneous Linear Equations, Linearly Independent and Linearly Dependent Vectors, Characteristic Equation of a Square Matrix, Derogatory and Non-Derogatory Matrices, Eigen Values and Eigen Vectors of a Square Matrix, Diagonalization of a Square Matrix, Cayley-Hamilton Theorem, Adjoint of a Matrix.	**15**
UNIT 2	**Real Valued Functions of One Variable** Intermediate Value Theorem, Successive Differentiation, Higher Order Derivatives and Leibnitz Rule, Mean Value Theorems, Increasing and Decreasing Functions, Finding Extreme Values by first and second Derivative Test, Concavity, Points of Inflection, Asymptotes, Tracing of Curves using first and second derivatives, Graphs of some standard function, Taylor's Series and Taylor's Polynomials.	**15**
UNIT 3	**Real Valued Functions of Two or Three Variables** Limit(Two path test) and Continuity of Functions in 2 or 3 variables, Level Curves to draw Quadric Surfaces, Partial Differentiation, Implicit Differentiation, Chain Rule, Euler's Theorem, Directional Derivatives and Gradients, Extreme Values of a Function of two variables by second derivative test and by the method of Lagrange's Multiplier.	**15**
UNIT 4	**Differential Equation** Exact Differential Equations of first order and first degree and Integrating Factors, Linear Differential Equations and Bernoulli's Differential Equation, Linear Differential Equations with Constant Coefficient	**15**

List of Recommended / Reference Books

1.B.S. Grewal, Khanna Publications – Higher Engineering Mathematics
Grewal, B.S.; Grewal, J.S. & Dhanoa, J.K.: Higher engineering mathematics. (43rd ed.) New Delhi . Khanna Publishers , 2015. 978-81-7409-195-5--(510Gre/Gre)
2.B.V. Ramana, McGrawHill – Higher Engineering Mathematics
Ramana, B.V.: Higher engineering mathematics. (reprint) New Delhi. Tata McGraw Hill Education Private Limited, 2010. 0-07-063419-X--(510Ram)
3.David C. Lay, Pearson – Linear Algebra and its Applications
Lay, David C.: Linear algebra and its applications. (3rd ed.) Noida. Pearson Education Inc., 2016. 978-81-775-8333-5-- (512.5Lay)
4.Shanti Narayan. S. Chand – Differential Calculus
Narayan, Shanti: Differential calculus. (15th ed.) New Delhi. Shyamlal Charitable Trust, 2008. 81-219-0471-4-- (515.3NAR)
5.Thomus and Finney, Pearson – Calculus
Thomas, George B.; Finney, Ross L. & Weir, Maurice D. : Calculus and analytic geometry. (9th ed. reprint) New Delhi. Dorling Kindersley (India) Pvt. Ltd, 1996(2007).

81-7758-325-5--(515.15THO/FIN)

**Use of software like Maple.

Deeba, Elias & Gunawardena, Ananda: Interactive linear algebra with Maple-V. New York. Springer-Verlag, 1977. 0-387-98240-X--(512.5078553042DEE)

F.Y.B.Sc (IT) **COURSE: S.ITS.1.03**

TITLE: DIGITAL ELECTRONICS

Number Of Lectures : 60

UNIT 1	**Number System** Analog System, Digital System, Numbering System, Binary Number System, Octal Number System, Hexadecimal Number System, Conversion form One Number System to Another, Floating Point Numbers, Weighted Codes Binary Code Decimal, Non-Weighted Codes Excess – 3 Code, Gray Hollerith Code, Morse Code, Teletypewriter (TTY), Error Detection And Correction, Universal Product Code, Code Conversion **Binary Arithmetic** Binary Addition, Binary Subtraction, Negative Number Representation, Subtraction Using 1's Complement and 2's Complement, Binary Multiplication and Division, Arithmetic in Octal Number System, Arithmetic in Hexadecimal Number System, BCD and Excess – 3 Arithmetic **Boolean Algebra** Introduction, Logic (AND,OR,NOT), Boolean Theorems, Boolean Laws, De Morgan's Theorem, Perfect Induction, Reduction of Logic Expression using Boolean Algebra, Deriving Boolean Expression from given Circuit	**15**
UNIT 2	**Logics Gates** Exclusive OR and Exclusive NOR gates, Universal Logic Gates, Implementation Of Other gates using Universal gates, Input Bubbled Logic, Assertion Level. **Minterm, Maxterm and Karnaugh Maps** Introduction, Minterms and sum of minterm form, maxterm and Product of Maxterm form, Reduction Technique using Karnaugh Maps – 2/3/4/5/6 variable K – Maps, K – Maps for Product of Sum Form, Minimize Boolean Expression using K – Map and obtain K – Map from Boolean Expression, Quine Mc Cluskey Method. **Combinational Logic Circuits** Introduction, Multi-input, multi-output Combinational Circuits, Code Converters Design and Implementations	**15**
UNIT 3	**Arithmetic Circuits** Introduction, Adder, BCD Adder, Excess – 3 Adder, Binary Subtractors, BCD Subtractor, Multiplier, Comparator **Multiplexer, Demultiplexer, ALU, Encoder and Decoder** Introduction, Multiplexer, Demultiplexer, Decoder, ALU, Encoders **Sequential Circuits:Flip-Flop** Introduction, Terminologies used, S–R Flip–Flop, D Flip-Flop, JK Flip-Flop, Race-Around Condition, Master-Slave JK Flip-Flop, T Flip-Flop Conversion from one type of Flip-Flop to another, Applications of Flip-Flops	**15**
UNIT 4	**Counters** Intorduction, Asynchronous Counter, Terms related to Counters, IC7493 (4-bit Binary Counter) , Synchronous Counter, Bushing, Type T Design, Type JK Design, Presettable Counter, IC7490, IC7492, Synchronous Counter ICs Analysis of Counter Circuits. **Shift Register** Introduction, Parallel and Shift Registers, Serial Shifting, Serial-In Serial-Out, Serial-In Parallel-Out, Parallel-In Parallel-Out, Ring Counter, Johnson Counter,	**15**

	Applications of Shift Registers, Pseudo-Random Binary Sequence Generator, IC 7495, Seven Segment Displays, Analysis of Shift Counters	

Reference Books

1. Anil K. Maini Wiley – Digital Electronics: Principles, Devices and Applications
2. Charles Platt, O'Reilly – Make Electronics
3. Malvino and Leach, TataMcGrawHill – Digital Principles and Applications
   Leach, Donald P.; Malvino, Albert Paul & Saha, Goutam: Digital principles and applications. (8th ed.) New Delhi. McGraw Hill Education (India) Private Ltd, 2015. 978-93-392-0340-5--(621.381Mal/Lea)
4. N.G. Palan, Technova – Digital Electronics and Logic Designs

R.P.Jain, TataMcGrawHill – Modern Digital Electronics

Jain, R.P.: Modern digital electronics. (4th ed.) New Delhi. Tata McGraw Hill Education Private Limited, 2010. 0-07-066911-2--(621.381Jai)

F.Y.B.Sc (IT) COURSE: S.ITS.1.03

TITLE: ART OF PROGRAMMING

OBJECTIVE: To ignite the logical ability in order to develop algorithms, for real world problems, independent of computer type, language or application.

Number Of Lectures : 60

UNIT-I	**Algorithm Design, Program Structure** Meaning of Algorithm, Control Structure, Pseudo Code, and Flowchart. Understanding need of: if and for statements. Understanding when and why multiple for statements required. Algorithm, Flowchart and Control Structure construction for area of triangle. Algorithm, Flowchart and Control Structure construction for finding gross pay for employee. Algorithm, Flowchart and Control Structure construction for date validation of a calendar date. Algorithm Construction for 5 more examples. Program Structure: Understanding Problem definition, input, processing, output. Case study of Program structure with Motor Vehicle Enquiries. Writing proper documentation for program/algorithm.	**15**
UNIT-II	**Module Design and Abstract Data Structure** Concept of module design, How to divide a given problem to modules, Inter module communication, module coupling, local and global data. Understanding Stack and its operation pop, push, peek and write corresponding Methods/pseudo code for it. Understanding Queue and its operation enqueue dequeue and write corresponding Pseudo code for it.	**15**
UNIT-III	**Programming fundamentals in C** Understanding while Loop, for loop in C through examples. The break Statement and continue Statement. Logical operators in C with single and multiple conditions. Understanding Arrays 1D, 2D, 3D in C through examples. Understanding if and Case statement in C. Writing program involving both arrays and loop.	**15**
UNIT-IV	**Functions and Pointers in C** What is a Function? Why Use Functions? Passing Values between Functions, Scope Rule of Functions, Calling Convention, Advanced Features of Functions, Return Type of Function Call by Value and Call by Reference, An Introduction to Pointers, Pointer Notation and corresponding memory diagram. Recursion and examples of it.	**15**

Continuous Internal Assessments

Assignments / Project / Presentation / Case Study / Mid Term Test

REFERENCE BOOKS:

Peter Juliff –Interface Publication- The Art of Structured Programming
Yashwant Kanetkar—BPB Publication.- Let us C
Kanetkar, Yashavant P.: Let us C. (8th ed.) New Delhi. BPB Publications, 2007. 81-8333-163-0--(005.133C/KAN)
Yashwant Kanetkar—BPB Publication- Exploring C

F.Y. B.Sc.IT **Course: ITS.1.05**

Title: Data Communication and network standards

Total Number of lectures: 60

UNIT 1	**Introduction to data communication and networking, Network models** Components of data communication, data flow, topology-bus, ring, star, hybrid, protocols and standards, The OSI reference model, Layers in OSI reference model, TCP/IP protocol suite	[15]
UNIT 2	**Media and Transmission modes** Data and signals, Periodic analog signals, Digital signals , Transmission impairment , Digital to digital, Analog to digital conversion, Transmission modes, Digital to analog conversion, Analog to analog conversion, Guided media and Unguided media	[15]
UNIT 3	**Switching and routing algorithms** Switching basics, circuit switching, packet switching and Message switching. datagram networks and virtual circuit networks, routing algorithms- distance vector routing and link state routing **Information Encoding, Error Detection and Correction** Introduction, representing different symbols, Minimizing errors, Error classification, types of errors, redundancy, detection versus correction, hamming distance, cyclic redundancy check, checksum	[15]
UNIT 4	**IP** IPV4 addressing**,** IPv6 addresses, IP v 6 header formats, IPv6 extension headers, IPv6 auto configuration, configuration via DHCP v6 , IPv6 transition strategies	[15]

List of Recommended Reference Books

1. Achyut Godbole - Data communications and Networks, TMH
   Godbole, Achyut S.: Data communications and networks. New Delhi. Tata McGraw Hill Education Private Limited, 2002. 0-07-047297-6--(004.65God)
2. Behrouz A Forouzan, Mc-Graw Hill – Data communications and Networking *(*Fourth Edition)
   Forouzan, Behrouz A.: Data communications and networking. (5th ed.) New Delhi. McGraw Hill Education (India) Private Ltd, 2013. 978-1-25-906475-3--(004.66For)
3. Dr.SidnieFeit - TCP/IP (Second Edition) TMH
   Feit, Sidnie: TCP/IP : Architecture, protocols, and implementation with IPv6 and IP security. (2nd ed.) New Delhi. Tata McGraw-Hill Publishing Company Limited, 1997. 0-07-0212389-5--(004.62Fei)
4. W.Stallings, Pearson Education - Data and Computer Communications (Eighth Edition)

Stallings, William: Data and computer communications. (9th ed.) New Delhi. Dorling Kindersley (India) Pvt. Ltd. , 2014. 978-93-325-1886-5--(004.65Sta)

ASSESSMENT:
THEORY:
CIA I: Written test **for 15 marks**

CIA II: Assignments / Project / Presentation / Case Study/ Written Test **for 25 marks**

F.Y. B.Sc.IT **Course: ITS.1.PR1**

Practical:

A) The Art of Programming

1) Write C program to find the Fibonacci series

2) Write C program for matrix addition.

3) Write C program for matrix multiplication.

4) Write C program to check for leap year. Accept the date from user.

5) Write C program to find sum of squares of natural numbers. Take the end number from user.

6) Write C program to generate the multiplication table.

7) Write C program to display simple calculator using switch case.

8) Write C program to convert decimal system to binary, octal and hexadecimal.

9) C program to count the number of vowels, consonants and so on.

10) C Program to Read a Line From a File and Display it.

11) Write a C program to create a pyramid pattern.

12) C Program to Store Information (name, roll and marks) of a Student Using Structure.

13) C Program to remove all Characters in a String except Alphabet.

14) C Program to Calculate Difference between Two Time Periods.

F.Y. B.Sc.IT **Course: ITS.1.PR2**

Practical:

B) Digital Electronics Practical

List of Practical

1. **Study of Logic gates and their ICs and universal gates:**
   a. Study of AND, OR, NOT, XOR, XNOR, NAND and NOR gates
   b. IC 7400, 7402, 7404, 7408, 7432, 7486, 74266
   c. Implement AND, OR, NOT, XOR, XNOR using NAND gates.
2. **Implement the given Boolean expressions using minimum number of gates.**

a. Verifying De Morgan's laws.
b. Implement other given expressions using minimum number of gates.

3. Implement combinational circuits.

a. Design and implement combinational circuit based on the problem given and minimizing using K-maps.

4. Implement code converters.

a. Design and implement Gray – to – Binary code converter.
b. Design and implement Binary – to – BCD code converter
c. Design and implement Binary – to – XS-3 code converter

5. Implement Adder and Subtractor Arithmetic circuits.

a. Design and implement Half adder and Full adder.
b. Design and implement BCD adder.
c. Design and implement XS – 3 adder.
d. Design and implement binary subtractor.

6. Implement Arithmetic circuits.

a. Design and implement a 2-bit by 2-bit multiplier.
b. Design and implement a 2-bit comparator.

7. Implement Encode and Decoder and Multiplexer and Demultiplexers.

a. Design and implement 8:3 encoder.
b. Design and implement 3:8 decoder.
c. Design and implement 4:1 multiplexer. Study of IC 74153/74157
d. Design and implement 1:4 demultiplexer. Study of IC 74139

8. Study of flip-flops and counters.

a. Study of IC 7473.
b. Study of IC 7474.
c. Study of IC 7476.
d. Conversion of Flip-flops.
e. Design of 3-bit ripple counter using IC 7473.

9. Study of counter ICs and designing Mod-N counters.

a. Study of IC 7490/ 7492/7493 and designing mod-n counters using these.

10. Design of shift registers and shift register counters.

a. Design serial – in serial – out, serial – in parallel – out, parallel – in serial – out, parallel – in parallel – out and bidirectional shift registers using IC 7474.
b. Implementation of digits using seven segment displays.

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Digital Electronics and Logic Design	N. G. Palan	Technova		
2.	Digital Principles and Applications	Malvino and Leach	Tata McGraw Hill		

Contents:

F.Y.B.Sc (IT) COURSE: S.ITS.2.01

TITLE: COMPUTER GRAPHICS

OBJECTIVES: TO understand the logic used in drawing graphs and to implement it through the use of a programming language.

Number Of Lectures : 60

UNIT1	**Introduction. Application and Algorithmic Implementation** **Introduction and Application** Areas of Computer graphics, Video Display Devices, Raster-Scan Systems, Random-Scan System, Input Devices, Hard-Copy Devices **Algorithms** Line Drawing Algorithms-DDA Algorithm, Bresenham's Line Algorithm, Circle-Generating Algorithms, Ellipse Generating Algorithms, Filled Area Permitives	**15**
UNIT2	**Modeling Attributes and 2D Transformation** **Modeling and Approaches to System Requirements** Line Attributes, Curve Attributes, Color and Grayscale levels, Area-Fill Attributes, Character Attributes, Aliasing **Two Dimensional Geometric Transformation and Viewing** Basic Transformation, Matrix Representation, Composite Transformation, Other Transformation- Reflection, Shear, Viewing Pipeline, Window-two-ViewPort, Co-ordinate Transformation, Clippling Operation, Point-Clipping, Line-Clipping, Polygon Clipping, Curve Clipping, Text Clipping	**15**

UNIT 3	**Three-Dimensional Concept** **Display Methods** Three-Dimensional Display Methods-Parallel Projection, Perspective Projection, Depth Cueing, Visible Line and Surface Identification, Surface Rendering **Curves** Three-Dimensional Object Representation-Bezier Curves and Surfaces, B-Spline Curves and Surfaces	**15**
UNIT 4	**Hidden Surface Removal Technique** **Visible-Surface Detection Method** Classification of visible-surface detection algorithms, back-face detection, painter's algorithm, scan-line algorithm, depth-sorting method, area-subdivision method, image and object precision, z-buffer algorithm, floating horizons	**15**

List of Reference Books and URL:

1. A.P. Godse, Technical Publications Pune – Computer Graphics

2. Donald Hearn and M.Pauline Baker, Pearson Education – Computer Graphics
Hearn, Donald & Baker, M. Pauline: Computer graphics : C version. (2nd ed.) Delhi. Dorling Kindersley (India) Pvt. Ltd., 2006.--(006.6633C/Hea/Bak)
3. Hill Jr – Computer Graphics
Hill, F.S. Jr.: Computer graphics Using openGL . (2nd ed.) Delhi. Dorling Kindersley (India) Pvt. Ltd., 2007. 81-317-1401-2--(006.6Hil)
4. J.D.Foleya, A.Van Dan, S.K.Feiner and R.L.Phillips, Addision Wesley – Computer Graphics Principles and Practise
5. J.D.Foleya, A.Van Dan, S.K.Feiner and R.L.Phillips, Addision Wesley – Introduction to Computer Graphics
6. Rogers – Computer Graphics
7. Steven Harrington, McGrawHill – Computer Graphics
Harrington, Steven: Computer graphics: a programming approach. (2nd ed.) New York. McGraw-Hill Book Company, 1987. 0-07-100472-6--(006.6Har)
8. William M.Newman, Robert F.Sproull, McGrawHill – Principles of Interactive Computer Graphics

Newman, William M. & Sproull, Robert F.: Principles of interactive computer graphics. (2nd ed.) New Delhi. Tata McGraw-Hill Publishing Company Limited, 1979. 0-07-463293-2--(006.6New/Spr)

F.Y B.Sc. (IT) COURSE: S.ITS.2.02

TITLE: Applied Mathematics - II

OBJECTIVES: To study basic mathematics required for developing algorithms for system and application software.

Number of Lectures: 60

UNIT 1	**Complex Variables** De Moivre's Theorem and its Applications, Circular and Hyperbolic Functions, Inverse Hyperbolic Functions, Limit and Continuity of f (z), Differentiable and analytic functions, Cauchy-Riemann Equations (In Cartesian And Polar Form), Harmonic Functions. Conformal Mapping, Cross Ratio, Bilinear Transformation, Fixed (Invariant) Points. Complex Integration, Cauchy's Theorem and its Consequences, Cauchy's Integral formula, Types of Singularities, Taylor and Laurent Series, Residues, Cauchy's Residue Theorem and its Applications.	**15**
UNIT 2	**Laplace Transform** Definition, Properties of Laplace Transform, Laplace Transform of Standard Functions. Inverse Laplace Transform, Inverse Laplace Transform of Standard Functions, Properties of Inverse Laplace Transform, Applications to Solve Differential Equations.	**15**
UNIT 3	**Special Integrals** Differentiation under Integral Sign, Error Function, Gamma Function, Beta Function.	**15**
UNIT 4	**Series** Series of Real Numbers, Sequence Of Partial Sums and Convergence of Series, Convergent and Divergent Series, Geometric Series, Cauchy Criterion of Convergence of Series, Comparison Test, Limit Form Of Comparison Test, Condensation Test, Alternating Series, Leibnitz Theorem (Alternating Series Test), Absolute Convergence, Conditional Convergence, Ratio Test, Root Test, Tests for Absolute Convergence.	**15**

List of recommended / Reference Books

1. A.R Vasishta, Dr. R.K. Gupta, Krishna Prakash Mandir – Integral Transforms
2. B.V. Ramana, McGrawHill – Higher Engineering Mathematics
   Ramana, B.V.: Higher engineering mathematics. (Eleventh reprint) New Delhi. Tata McGraw Hill Education Private Limited, 2010. 0-07-063419-X--(510Ram)
3. B.S. Grewal, Khanna Publications - Higher Engineering Mathematics
   Grewal, B.S.; Grewal, J.S. & Dhanoa, J.K.: Higher engineering mathematics. (43rd ed.) New Delhi . Khanna Publishers , 2015. 978-81-7409-195-5--(510Gre/Gre)
4. R.K. Jain, S.R.K. Iyengar, Narosa Publishing House – Advanced Engineering Mathematics
   Jain, R.K. & Iyengar, S.R.K.: Advanced engineering mathematics. New Delhi. Narosa Publishing House, 2002. 81-7319-420-3--(515JAI/IYE)
5. Thomus and Finney. Pearson - Calculus
   Thomas, George B.; Finney, Ross L. & Weir, Maurice D. : Calculus and analytic geometry. (9th ed. reprint) New Delhi. Dorling Kindersley (India) Pvt. Ltd, 1996(2007). 81-7758-325-5--(515.15THO/FIN)

F.Y B.Sc. (IT) **COURSE: S.ITS.2.03**

TITLE: MICROPROCESSROR AND MICROCONTROLLERS

OBJECTIVES: To understand the architecture and functioning of a microprocessor and microcontroller, which happen to be the prototypes of the modern large computers.

Number of Lectures: 60

UNIT 1	**Logic Devices** Tristate Devices, Buffers, Encoder, Decoder, Latches, Types of Memories, Concept of Control lines Such as Read/Write Chip Enable **Introduction to 8085 Microprocessor** Organization of Microprocessor based System, 8085 µp architecture, Concept of Address Line and Memory Interfacing, Address Decoding and Memory Interfacing	15
UNIT 2	**8085 Programming Model** Instruction Classification, Instruction Format, 8085 Instruction Set **Introduction to Modern Day Computer Systems** Organizations and Architecture, Structure and Function. **System Bus** Computer Components, Computer Functions **PCI** Features of PCI bus, Why PCI bus is needed?, Concept of PCI Arbitration **Internal Memory** Concept of Cache Memory, Methods of Cache Mapping, Concept and Need for Cache Coherency **External Memory** RAID	15
UNIT 3	**The 8051 Microcontroller** Introduction And Overview of 8051 family, 8051 Assembly Language Programming, Jumps	15
UNIT 4	**Interfacing the 8051 Microcontroller** 8051 I/O Port Programming, Addressing Modes, Arithmetic and Logical Instructions	15

Continuous Internal Assessment

Assignments / Projects / Mid Term Test

List of Recommended Books

1. Andrew C. Tanenbaum ,PHI – Structured Computer Organization (3rd Edition)
   Tanenbaum, Andrew S. & Austin, Todd: Structured computer organization. (6th ed.) Delhi. PHI Learning Private Limited, 2014. 978-81-203-4720-5--(004.22Tan)
2. John P Hayes,McGrawHill,1998 – Computer Architecture and Organization
   Hayes, John P.: Computer architecture and organization. (3rd ed.) Boston. Mcgraw-Hill Companies, Inc., 1998. 0-07-115997-5--(004.22HAY)
3. M. Morris Memo, PHI, 1998 – Computer System Architecture
   Mano, M. Morris: Computer system architecture. (3rd ed.) New Delhi. Prentice-Hall Of India Private Limited, 1993(2007). 81-203-0855-8--(004.16MAN)
4. M.A Mazidi, J.G. Mazidi & R.D – The 8051 Microcontroller and Embedded Systems
   Mazidi, Muhammad Ali; Mazidi, Janice Gillispie & McKinlay, Rolin D.: The 8051 microcontroller and embedded systems : using assembly and C. (2nd ed.) New Delhi. Dorling Kindersley (India) Pvt. Ltd. , 2013. 978-81-317-1026-5--(004.165Maz)
5. McKinlay, Pearson Education **DELETE this is part of title 4.**
6. Malvino – Digital Computer Fundamentals
   Leach, Donald P.; Malvino, Albert Paul & Saha, Goutam: Digital principles and applications. (8th ed.) New Delhi. McGraw Hill Education (India) Private Ltd, 2015. 978-93-392-0340-5--(621.381Mal/Lea)
7. R.S. Gaonkar, PRI (3rd Edition) – Microprocessor Architecture and Programming and Applications with the 8085.
   Gaonkar, Ramesh S.: Microprocessor architecture, programming and applications with the 8085. (6th ed.) Mumbai. Penram International Publishing (India) Pvt. Ltd., 2013(2015). 978-81-87972-88-4--(004.16Gao)
8. Thomas C Bartee, TMG – Digital Computer Fundamentals
   Bartee, Thomas C.: Digital computer fundamentals. (6th ed.) New Delhi. Tata Mc-Graw Hill Publishing Company Limited, 1991. 0-07-460400-7--(004.16BAR)
9. William Stallings , PHI,1998 – Computer Organization and Architecture (4th Edition)
   Stallings, William: Computer organization and architecture: designing for performance. (9th ed.) New Delhi. Dorling Kindersley (India) Pvt. Ltd., 2014. 978-93-325-1870-4--(004.22Sta)

F.Y.I.T **Course Code: ITS.2.04**

Title: Descriptive Statistics Learning

Objectives:

1. To introduce the technique of data collection and its presentation.
2. To emphasize the need for numerical summary measures for data analysis.

Total Number of lectures: 60

Unit I	Types of data from a population : Qualitative and Quantitative data; Geographical, Time series data; Discrete and Continuous data. Different types of scales: Nominal, Ordinal, Ratio and Interval. Collection of Data : Concepts of statistical population and sample. Primary data- designing a questionnaire , distinction between them, Problems when collecting data through the questionnaire. Secondary data– its major sources including s o m e government publications. Elementary Categorical Data Analysis Preparation of tables with two or three factors (variable /attributes) Of classification. Requisites of a good table.	15
Unit II	Univariate : Frequency distribution of discrete and continuous variables. Cumulative frequency distribution. Graphical representation of frequency distribution by Histogram, Frequency polygon, Frequency curve and Ogives. Diagrammatic representation using Bar diagrams and Pie chart. Exploratory data analysis: Stem and Leaf diagram, Dot plot. Bivariate : Frequency distribution, Marginal and Conditional frequency distributions.	15
Unit III	Measures of central tendency Arithmetic mean and its properties (simple and weighted), Combined mean. Geometric mean and Harmonic mean. Quartiles (Median, Quartiles, Deciles, Percentiles.) Mode. (Grouping Method not expected). Empirical relationship between mean, Median and Mode. Merits, Demerits and Uses of Mean, Median, Mode, G.M. and H.M. Requisites of a good average Choice of scale of measurement for each measure of central tendency.	15
Unit IV	Measures of Dispersion Definition of dispersion, objectives of measuring dispersion, absolute and relative measures, range, coefficient of range, inter quartile range ,mean deviation, standard deviation, coefficient of variation, graphic method of dispersion	15

	Skewness Skewness introduction, objectives of Skewness , Measures of Skewness, Karl Pearson's coefficient of Skewness. Moments and Kurtosis	

List of Recommended Reference Books

1. Statistics [Theory ,Methods & Application] - D.C Sancheti ,V.K.Kapoor , Sultan Chand & Sons

Sancheti, D.C. & Kapoor, V.K.: Statistics : theory, methods and application. (7th Ed.) New Delhi. Sultan Chand & Sons, 1991. 81-7014-276-8--(519SAN/KAP)

2. Fundamentals of Statistics, Volume I -Goon A.M., Gupta M.K., Dasgupta B. The World Press Private Limited, Calcutta. Fifth edition.

Goon, Atindra Mohan; Gupta, Milan Kumar & Dasgupta, Bhagabat: Fundamentals of statistics. [vol. 1] (6th ed.) Calcutta. World Press Private Ltd., 1983.--(519.5GOO)

2 Research Methodology, Methods and Techniques - Kothari, C.R.: Wiley Eastern Limited. First Edition. **Kothari, C.R.: Research methodology : methods and techniques. (2nd ed. reprint) New Delhi. Wishwa Prakashan, 2004(2011). 81-224-1522-9--(001.422KOT)**

3. Descriptive Statistics -Shah R.J, Seth Publications, Eighth edition.

ASSESSMENT:
THEORY:
CIA I: Written test **for 20 marks**

CIA II: Assignments / Project / Presentation / Case Study/ Written Test **for 20 marks**

F.Y.B.Sc (IT) COURSE: S.ITS.2.05

TITLE: INTRODUCTION TO C++ PROGRAMMING

OBJECTIVES: To learn a Programming Language and to learn structured and procedural programming concepts

Unit 1	C++ concepts Variables and Assignments Variables Identifiers Variable declarations Assignment Statements Reference variable Symbolic constant Input and Output cin, cout Escape sequences include directives and Namespaces Indenting and Comments Operator precedence Data types and expressions Arithmetic operators Type compatibilities	(15 Lectures)
Unit 2	**Flow of Control and Functions** Compound statements Loops while for do while Nested loops. Decision making if – else nested if else switch break and continue Manipulators endl setw sizeof Increment and decrement operators Type Cast Operators Scope resolution operators Function Prototypes Built in functions and user defined functions Function overloading Call by reference	(15 Lectures)

	Call by value const member functions Inline Functions and recursive functions Math Library Functions Virtual Functions	
Unit 3	**Arrays, Pointers, Strings, Vectors** String functions strcmp strcat strlen strcpy Vector Basics Arrays Introduction to arrays Arrays in functions 2-D arrays Multidimensional arrays Pointers and Functions Introduction to pointers void pointers Pointers in function Pointer to constant and constant pointer Generic pointer	(15 Lectures)
Unit 4	**Object Oriented Feature** Classes and Objects -Class Specification - Constructors and types -Accessing class members -Structures and classes - Passing Objects as Arguments - Returning Objects from functions -Data Hiding - Friend Function and Friend Class Inheritance -Inheritance and member accessibility -Multiple Inheritance - Constructors in derived class -Object Composition Polymorphism Generic programming with Templates -Function Templates - Class Templates - Overloading Function Templates	(15 Lectures)

Continuous Internal Assessment

Assignments / Project
Mid Term test.

List of Recommended Reference Books

1. Y.P.Kanetkar, "Let us C++" , seventh edition, BPB publication
Kanetkar, Yashavant P.: Let us C++. (2nd Rev. ed.) New Delhi. BPB Publications, 2016. 81-7656-106-1--(005.133C++/Kan)
2. Problem Solving with C++, Walter Savitch, Sixth Edition, Pearson Education.
Savitch, Walter: Problem solving with C++. (6th ed.) New Delhi. Dorling Kindersley (India) Pvt. Ltd, 2007(2009). 81-317-1585-7--(005.133C++/Sav)
3. J. R. Hubbard, Schaum's outlines "Programming with C++", Second Edition , Tata McGrawHill
Hubbard, John R.: Theory and problems of programming with C++. (2nd Ed.) New York. McGraw-Hill, 2000. 0-07-135346-1--(005.133C++/HUB)
4. Mastering C++ KR Venugopal
5. Object oriented programming with C++E. Balagurusamy, Third ed. And Tata-McGraw Hill
Balagurusamy, E.: Object-oriented programming with C++. (6th ed.) New Delhi. McGraw Hill Education (India) Private Ltd., 2015. 978-1-25-902993-6--(005.133C++/Bal)
6. Object oriented programming with C++ PoonamchandraSarang, PHI Second Edition.
7. Pure C++ programming, Amir Afzal, Pearson Education.

F.Y. B.Sc.IT Course: ITS.2.PR

Practical:

A) Introduction to C++ Programming

Learning Objective:

To help students learn to write an algorithm, convert it to program logic and execute the same on a Computer, thus instilling the foundations of basic programming principles in them.

I. Write a C++ program for Formatting the following statement using setw and endl:
" Nothing is difficult than beginning"
"So Let's start the voyage of technology"
II. Write a C++ program to Calculate simple and compound interest.
III. Write C++ programs to perform the following:
   a. Calculate sum of the digits of a number.
   b. Find the reverse of a number, entered by the user.
IV. Write a C++ program for:
   a. solving the quadratic equation
   b. printing all the prime numbers in a given range (ask user input for lower bound and upper bound of the range)
   c. Write a C++ program for displaying the Fibonacci series.

VI) Write a C++ program for converting number to words. (switch, break, continue)

V. Write a C++ function for:
   a. Swapping two numbers with the use of a third variable
   b. Swapping two numbers without using third variable.

VI. Write a recursive C++ function for calculating the factorial of a given number

VII. Write a C++ program for (1D arrays):
   a. sorting an array of numbers in ascending and descending order

b. Finding the max in the array

VIII. Write a C++ program for the following(2D arrays):
   a. Matrix Transpose
   b. Matrix Addition.
   c. Matrix Multiplication.
   d. Inverse of a matrix.

IX. Write your own function for string reverse, string palindrome, string comparison

X. Write a program for implementing the concept of structures

XI. Write a C++ program for finding the greatest and smallest number using vector

XII. Write a C++ program for:
   a. Implementing the concept of call by value and call by reference.
   b. Programs on use of pointers

COMPUTER GRAPHICS

Learning Objective: To develop a program to implement following algorithms

I) Write a program to implement the DDA Algorithm.
II) Write a program to implement the Bresenham's Algorithm.
III) Write a program to implement the Mid-point Circle Algorithm.
IV) Write a program to implement the Ellipse Algorithm.
V) Write a program to implement the Pie-Algorithm.
VI) Write a program to design any given pattern.
VII) Write a program to implement the 2D Translation Concept.
VIII) Write a program to implement Translation Concept.
IX) Write a program to implement Scaling Concept.
X) Write a program to implement Reflection Concept.
XI) Write a program to implement the Cohen-Sutherland Line Clipping Concept.
XII) Write a program to implement the Bezier Curve

F.Y. B.Sc.IT Course: ITS.2.PR

Practical:

B) **MICROPROCESSOR AND MICROCONTROLLERS**

Learning Objective:
To be able to develop and execute assembly language programs for microprocessors and microcontrollers.

8085 programs:
I) Simple 8-bit and 16-bit addition and subtraction
II) Transfer a block of data from one location to another.
III) Find the largest/smallest of the numbers stored at one location. IV) Addition of 10 numbers.
V) Multiplication of 8-bit and 16-bit numbers. VI) BCD addition

8051 programs:

I) To search a number from a given set of numbers. The end of the data is indicated by 00. II)

Finding the average of signed numbers.

III) Multiplication of signed numbers.

IV) Convert the BCD 0111 0101 number to two binary numbers and transfer this number to registers.

Contents:

CLASS: S.Y. B.Sc.IT **COURSE CODE: S.ITS.3.01**

TITLE: **Logic and Discrete Mathematical Structures (LDMS)**

LEARNING OBJECTIVES:

To develop logical reasoning and analytic mind

Total Number of lectures: 60

UNIT I	**Basics of set theory and logic**	**15**
	Sets and subsets Operations on sets Sequences mathematical structures The inclusion exclusion principle Mathematical induction Logic – propositions and logical operations Methods of proof	
	Counting principles:	
	Permutations Combinations The pigeon hole principles Recurrence relation Basics of probability	
UNIT II	**Relations and Digraphs**	**15**

	Relations and digraphs Paths in relation and digraphs Properties of relation Equivalence relations Computer representation of relation and digraphs Transitive closure and Warshalls algorithm	
	Graph	
	Eulers paths and circuits Hamiltonion paths and circuits **Trees** Labeled trees Tree searching Minimal spanning trees	
UNIT III	**Order relations and Structures**	**15**
	Partially ordered sets Lattices Finite Boolean Algebra	

	Functions on Boolean Algebra	
	Semi Groups	
	Groups Coding of Binary Information and error detection Decoding and error correction	
UNIT IV	**Languages and finite state machines**	**15**
	Languages Representation of special languages and grammars Finite state machines Machines and regular languages	

Continuous Internal Assessment

Problem Solving / MCQ
Midterm test

List of Recommended Reference books

1. B Kolman, RC Busby, S Ross Pvt. Ltd- Discrete Structures
   Kolman, Bernard; Busby, Robert C. & Ross, Sharon Cutler: Discrete mathematical structures. (6th ed.) Noida. Pearson India Education Services Pvt. Ltd, 2015. 978-93-325-4959-3--(510Kol)
2. Liu - Discrete Structures
   Levy, Leon S.: Discrete structures of computer science. New Delhi. New Age International (P) Limited, Publishers, 1980(2003). 81-224-0090-6--(004.0151LEV)
3. Joe L Mott – Discrete Mathematics For computer scientists and mathematicians
   Mott, Joe L., Kandel, Abraham & Baker, Theodore: Discrete mathematics for computer scientists and mathematicians. (2nd ed.) New Delhi. Prentice-Hall Of India Private Limited, 2006. 81-203-1502-2--(511MOT)
4. Seymour Lipschutz, Marc Lipson – Discrete Mathematics, Schaum's outline series
   Lipschutz, Seymour & Lipson, Marc Lars: Theory and problems of discrete mathematics. (2nd ed. Indian reprint) New Delhi. Tata Mcgraw-Hill Publishing Co. Ltd., 1997(1999). 0-07-463710-X--(512LIP/LIP)

CLASS: S.Y. B.Sc.IT **COURSE CODE: S.ITS.3.02**

TITLE: **Web Designing and Programming**

LEARNING OBJECTIVES:

1. To learn web page designing using HTML, CSS for the WWW.
2. To learn web page designing using JavaScript, jQuery, XML, PHP, mysql technologies.

Total Number of lectures: 60

UNIT I	Components of the internet and web page designing	15
	Internet and WWW	
	What is Internet? Introduction to internet and its application, E-mail, telnet, FTP, ecommerce, e-business, internet service providers, Domain name Server, Internet address, World Wide Web(WWW) World Wide Web and its evolution, Exploring the Uniform resource locator(URL) and its components Browsers: Google Chrome, Mozilla Firefox, Opera, Apple Safari, Internet Explorer, Search engine, Web server: Apache , IIS, proxy server, xampp, HTTP protocol method	
	HTML & CSS HTML Tags: Formatting Tags,Understanding the difference between a tag, Element and attributes in HTML,DIV Element,SPAN Element,Creating Lists, Imagemaps, hyperlink tags, Tables, Frames, iframes. Tables, Forms, Canvas for 2D drawing, video, audio, content specific element: Article , footer, header, nav, section, wbr, datalist, output Form controls, Calendar, date, time, email, url, search. Style Sheets using CSS: Evolution of CSS, Understanding the CSS syntax, Exploring CSS Selectors (universal, type, class, id , child, descendent, adjacent Sibling), Inserting CSS in an HTML document: The Internal Style Sheet, The External Style Sheet , The Inline Style Sheet, Defining Inheritance in CSS, Background and Color Gradients, Fonts and Text Styles, Creating Boxes and Columns, Displaying, Positioning, Floating an Element, List Styles, Table Layouts Pseudo-classes and Pseudo -elements	

UNIT II	Javascript	15
	Fundamentals of JavaScript Client-Side JavaScript,Server-Side JavaScript	
	Operator: Assignment operators, Comparison Operators, Arithmetic Operators, % (Modulus),++ (Increment), --(Decrement), -(Unary negation), Logical Operators, Short-Circuit Evaluation, String Operators, Special Operators, (Conditional operator), (Comma operator), delete, new, this, void. **Statements:** Break, comment, continue, delete, function, return, switch, var **Core JavaScript**(Properties and Methods of Each): Array, Boolean , Date, Function, Math, Number, Object, String, regExp **Events and Event Handlers** General Information about events, defining event handlers, Event, onAbort, onBlur, onChange, onClick, onDblClick, onDragDrop, onError, onFocus, onKeyDown, onKeyPress, onKeyUp, onLoad, onMouseDown, onMouseMove, onMouseOut, onMouseOver, onMouseUp, onMove, onReset, onResize, onSelect, onSubmit, onUnload	
UNIT III	jQuery and XML	15
	jQuery Fundamentals of jQuery, Loading and using jQuery, jQuery Syntax , jQuery Selectors ,Element Properties and attributes, Methods to access HTML Attributes , Methods For Traversing, jQuery Events, CSS using jQuery **XML** Introduction to XML, Anatomy of an XML Document, creating XML Documents, creating XML DTDs, XML schemas, XSL	
UNIT IV	PHP & Mysql	15
	PHP Why PHP and Mysql ? Server-side web scripting , installing PHP, Adding PHP to HTML, Syntax and Variables , Passing information between pages , Strings , Arrays and Array Functions , Numbers , Basic PHP errors/problems	

	Advanced PHP and Mysql PHP/Mysql Functions, displaying Queries in tables , building forms from queries , PHP /Mysql Efficiency, PHP/Mysql Problems Advanced array Functions , String and Regular Expressions , file system and system Functions , sessions , cookies and HTTP, type and type conversion , PHP mathematics , E-mail, Steps to deploy a website	

LIST OF RECOMMENDED REFERENCE BOOKS and URL:

1. HTML5 covers CSS3, JavaScript, XML, PHP, jQuery Black book, dreamtech press
   Kogent Learning Solutions Inc.: HTML 5 : covers CSS3, Javascript,XML, XHTML, AJAX, PHP and Jquery. New Delhi. Dreamtech Press, 2011(2013). 978-93-5004-095-9--(006.74K.L.S.)
2. John Pullock, Tata McGraw Hill – JavaScript: A beginners guide
   Pollock, John: JavaScript : A beginner's guide. (3rd edition) New Delhi. Tata McGraw Hill Education Private Limited, 2010. 0-07-068348-4--(005.2762Java/Pol)
3. Bear Bibeault and Yehuda Katz , dreamtech press- jQuery in Action Second Edition
4. Williamson , Tata McGraw hill – XML the complete reference
5. http://www.w3schools.com

CLASS: S.Y. B.Sc.IT **COURSE CODE: S.ITS.3.03**

TITLE: **Advanced Structure Query Language(ASQL)**

LEARNING OBJECTIVES:

To develop the skill of database programming using PL/SQL

Total Number of lectures: 60

UNIT I	Basic SQL	15
	Writing Basic SQL Select Statements, Restricting and Sorting Data, Single –Row Functions, Joins (Displaying Data from Multiple Tables). Aggregating Data using Group Functions, Manipulating Data, Creating and Managing Tables , Including Constraints, Creating Views, inline views, Controlling user Access, grant, revoke, and rollback. Creating Other Database Objects(Sequences, Indexes and Synonyms) Group by clause advanced concepts Using SET operators, Enhancements to Group by Clause , cube, Rollup and Grouping, Advanced Sub queries: Multiple column sub queries, Sub queries in FROM clause, IN,ALL.ANY, EXISTS operators, Scalar and correlated sub queries Basics of Procedure Language: Types of Pl/SQL blocks, Identifiers , types of Identifiers, Declarative section , variables, Scalar Darta Types, The % TYPE Attribute , Bind Variables, Sequences in PL/SQL Expressions , Executable Statements, PL/SQL Functions in Pl/SQL Block Syntax , Deployment of SQL Functions in Pl/SQL, Nested Blocks, Operators.	
UNIT II	Control Structures	15
	Conditional processing using IF Statements, Loop Statement, While Loop Statement, For Loop Statement, the Continue Statement, Composite Data Types Exception Handling, Exceptions with PL/SQL, Trap Predefined and non predefined Oracle Server errors , user define Exceptions , Propagate Exceptions, RAISE _APPLICATION_ERROR Procedure, Stored procedure: What is Procedure? Syntax of crating procedure, Creating procedure with parameters,IN parameter, OUT paramenter, methods of passing Parameter, invoking procedure from other	

	procedure , the PL/SQL Execution environment, Differences between Anonymous Blocks and Subprograms, Declaring Subprograms , Handled Exceptions, removing procedures	
UNIT III	Functions:	15
	Basic concept of functions , different types of functions , advantages of using stored functions The steps to create a stored function , Invoke user-defined functions in SQL Statements , restrictions when calling Functions , control side effects when calling functions , view functions information, Functions and procedures , Packages: Overview of packages, components of packages, referencing package objects, developing a package, creating package specification, declaring public constructs, creating package body, public and private constructs, removing packages, advantages of packages. overloading using forward declaration , user-defined package , invoking user defined Package from a SQL statement Large objects : Objectives , LOB , Anatomy of LOB, contrasting Long and LOB data types, adding LOB columns to a table , populating LOB columns removing LOB, BFILE, loading BFILE	
UNIT IV	Cursor: Objectives , explicit cursor functions , declaring the cursor , opening the cursor , fetching data from the cursor , closing the cursor , explicit cursor attribute , the %ISOPEN attribute , cursor FOR loops Triggers: Definition .the trigger event types and body , business application scenarios for implementing triggers ,create DML triggers using the CREATE TRIGGER statement and SQL Developer , Body and firing (Timing), Statement level triggers and Row level Triggers, creating Compound, DDL and Event Database Triggers, Compound Trigger structure for tables and views, instead of trigger, DDL Trigger. Comparison of database Triggers and Stored Procedures,	15

LIST OF RECOMMENDED REFERENCE BOOKS and URL:

1. Steven Feuerstein , Bill Pribyl -Oracle PL/SQL Programming 5th edition
2. Oracle 11g:SQL Reference Oracle press
3. Joel Murach , Murach and associates- Murach's Oracle SQL and PLSQL
4. Michael Mc- Oracle Database 11g PL/SQL Programming workbook

Term work:

Assignments /test

CLASS: S.Y. B.Sc.IT **COURSE CODE: S.ITS.3.04**

TITLE: **Object Oriented Programming with Java**

LEARNING OBJECTIVES:

To learn a core Java fundamentals, to understand how Java is used in object oriented programming. To develop strong foundation for building project in Java. To understand how Java differs from other programming languages.
Design patterns skill is useful in designing projects.

Total Number of lectures: 60

UNIT I	Overview of Java, OOPS fundamentals, Interface and Package Overview of Java Difference between C++ and Java. History of Java. Installation of JDK, Features JDK. Difference between JDK and JRE. Architecture of Java—portablity Features of Java, datatypes in Java Variables in Java, scope and l ifetime of variables Arrays in Java- 1 D,2 D,different ways to declare an array Arithmetic operators, Boolean operators, assignment operators, operator Control statements- while,do- while,for, if- else, switch, string, string buffer, string Tokenizer in details OOPS fundamentals What is class and objects, Meaning of Object oriented and i ts Features? Assigning Object Reference Variables,Methods, Passing different parameter to method with different return type, Constructors, this and super keyword, garbage collection, Inheritance, Polymorphism, Wrapper Classes, Access Control, Modifiers, Anonymous Classes Interface and Packages Packages, Access Protection, Importing Packages, Interfaces, Defining an Interface Implementing Interfaces, Nested Interfaces, Applying Interfaces,Variables in Interfaces, Interfaces can be extended	15

UNIT II	Exceptional Handling, JDBC and Thread Exception Handling Exception Hierarchy Exceptional Handling fundamentals, Exception Types Uncaught Exceptions, Try and catch, multiple catch clauses, Nested try statements, throw, throws Finally, java built in exception, Creating your own exception subclasses JDBC Understanding type I driver of JDBC, examples using JDBC, Understanding ResultSetMetaData, Prepared statement, callable statement Thread Java thread model, main thread, creating a thread, creating multiple threads, Using isAlive(), join(), Thread priorities, Synchronization, interthread communication	15
UNIT III	Collection framework and design pattern *Collection framework* Collection overview , collection hierarchy, the collection interface-list interface, set interface Collection classes-ArrayList class , linked list class, Vectors and Hashtable Map *Design pattern* What is design pattern ?singleton pattern , adapter pattern , façade pattern , Factory pattern , Proxy Pattern	15
UNIT IV	i/o, Applets and Swing I/O basics, Reading console inputs, writing console o/p, print writer class, reading and writing files. Applet fundamentals, Life Cycle of Applet, Programs using applets, introduction to swing. Difference between swing and applet. JLabel and ImageIcon, JTextField, JButton, JToggleButton Check boxes, radio buttons, jTabbedPane, JScrollPane , JList JcomboBox , trees , JTable and event handling	15

Continuous Internal Assessment
Assignments /Projects
Mid term test.

LIST OF RECOMMENDED REFERENCE BOOKS:

1 .Herbert Schildt.—TMH Publications – Java 2 complete reference books
Schildt, Herbert: Java 2 : the complete reference. (5th ed.) New Delhi. Tata Mcgraw-Hill Publishing Company Limited, 2002. 0-07-049543-2--(005.133JAVA/SCH)

2. Steven John Metsker—Pearson publication- design pattern in java

5. Kathy Sierra-OCJP
6. Ivan Bayross –bpb publication-Java2
7. Balaguruswamy—TMH-Java2

S.Y. B.Sc.IT **Course: S.ITS.3.05**

Title: Embedded System

LEARNING OBJECTIVE:

To learn the importance of Embedded Systems. Write programs for embedded system

[Total Lectures 60]

Unit 1	**Introduction** Review of 8051 microcontroller. Introduction to embedded system? Variations on the theme, C : The least common denominator , Introduction about hardware **Real Time Operating System** OS Services Interrupt Routines Handling Task Scheduling Models Handling of Task Scheduling and Latency and Deadlines as Performance Metrics	**15 lectures**
Unit 2	**Inter Process Communication and Synchronization.** Shared Data Problem Use of Semaphore(s) Priority Inversion Problem and Deadlock Situations Inter Process Communications using Signals Semaphore Flag or Mutex as Resource key Message Queues **Embedded Programming** Compiling, linking and locating, the Build Process. Writing Embedded C Programs Difference between programs and embedded programs	**15 lectures**
Unit 3	**Memory** Types of memory, Memory testing, Validating memory contents, Working with Flash Memory **Peripherals**	**15 lectures**

	Control and status Registers, The device driver philosophy, Timers and Timer Drivers in Embedded Systems.	
Unit 4	**Design and Development** Embedded system development environment-IDE, types of file generated on cross compilation ,disassemble / decompiler , simulator, emulator and debugging, embedded product development life cycle, trends in embedded industry	**15 lectures**

Continuous Internal Assessment

Assignments / Project
Mid Term test.

List of Recommended Reference Book

1. Rajkamal, ―Embedded Systems Architecture, Programming and Design‖, Tata McGraw Hill.
   Kamal, Raj: Embedded systems : architecture, programming and design. (3rd ed.) New Delhi. McGraw Hill Education (India) Private Ltd., 2015.
   978-93-32901-49-0--(004.16Kam)
2. Shibu K., Introduction to Embedded Systems
3. Programming Embedded systems in C and C++, O.reilly
   Barr, Michael: Programming embedded systems in C and C++. Navi Mumbai. Shroff Publishers & Distributors Pvt.Ltd, 2008. 81-7366-076-X--(005.133C/BAR)
4. http://www.ece.cmu.edu/~koopman/iccd96/iccd96.html

S.Y. B.Sc.IT **S.ITS.3.PR1**

ASQL

EMBEDDED SYSTEM

Number of lectures: 45

ADVANCED SQL

Learning Objective: To develop database using advanced SQL concepts.

For a 1.5 credit course a minimum of 8 programs should be executed. A journal of the printouts of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.

Advanced SQL practicals

I. Select queries and joins
   a. Select queries on single table using alias, where and order by clause.
   b. Select queries on single table using aggregate functions and group by clause.
   c. Querying data from multiple Tables using ROLLUP, CUBE operators.

II. ISub queries, DML and DDL

a. Querying single and multiple tables using sub queries.

b. Manipulating data (Insert, update and delete)

c. Creating simple tables and tables with constraints.

III. Creating database objects,

Controlling user access and using set operators

   a. Creating Views, Sequences, Indexes and synonyms.
   b. Granting and revoking privileges on user objects.

IV) Working with advanced sub queries
   a. Multiple column sub queries, sub queries in from clause,
   b. Scalar sub queries and correlated sub queries,
   c. correlated sub query

V. Basic PL/SQL,
   a. Creating anonymous PL/SQL blocks.
   b. manipulating data using PL SQL

   c. Process a number of rows from a table and populate another table with the results using a cursor FOR loop.

VI) Cursors, Exceptions and procedures issuing DML and query commands.

a. Cursors with parameters to process a number of rows from multiple tables.
b. Create exception handlers for specific situations.
c. Create procedures that issue DML and query commands.

VII) Functions and Stored Procedures
   a. Creating and invoking functions from SQL statements.
   b. Creating and invoking stored procedures.
   c. Create inbuilt functions using Cursor.

VIII) Working with packages

a. Create package specifications and package bodies. Invoke the constructs in the packages.

   b. Create a package containing an overloaded function.
   c. Implementation of LOB data type.

IX) Working with triggers

a. Create a trigger to update a table only during office timing.
b. Create row triggers for updating values.
c. Create procedures that will be invoked from the triggers.

X) Working with INSTEAD OF triggers, business rules and recompiling procedures, functions, packages and views.

a. Create instead of triggers for views.
b. Implement business rules.

C create trigger for automatic updating tables.

EMBEDDED SYSTEM

Learning Objective:

To learn to program using assembly language / embedded C, Arduino and Microcontroller Kits.

Any three from the each of the following categories should be implemented Using

Simulator

1. Write a program to flash single LED at P1 from right-to-left and left-to-right.
2. Write a program to search a number from given set of numbers
3. Add two numbers stored in R0 and R1. If the sum is greater than FF, Port p1.0 will be ―ON‖.

4. Add four numbers stored in RAM location 40 to 43 display the result in binary at port0(MSB) and port1 (LSB).

5. Write a program to toggle all the bits of P1 continuously after every 1s. Use Timer0, mode 1 (16 bit timer/counter) to create the delay.

- Using polling method
- Using interrupt driven method

Using Arduino Kit

1. Programming using LED.
2. Programming using LDR
3. Programming using LCD
4. Programming using REMOTE CONTROL
5. Programming using the serial command prompt as display and the remote control.

Using Microcontroller Kit do the following:

1. Configure timer control registers of 8051 and develop a program to generate given time delay.

2. Port I/O: Use one of the four ports of 8051 for O/P interface to eight LED's.

Simulate binary counter (8-bit) on LED's.

3. 8051 with D/A converter and generate square wave of given frequency using an oscilloscope.

4. Interface stepper motor with 8051 and write a program to move the motor through a given angle in clockwise or counter clock wise direction.

5. Generate traffic signal

A journal of the printouts of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.

Continuous Internal Assessment

MCQ / Viva test during practicals Mid

Term practical test.

S.Y. B.Sc.IT **Course: S.ITS.3.PR2**

Practical – II:

OOP with JAVA

WEB DESIGNING AND PROGRAMMING

OOP with JAVA

Learning Objective: To apply the concepts learnt in object oriented programming using java.

I) Design a program to implement concept of class, constructor and inheritance Design a class to represent a bank account to display name and balance using

Members:

b. Account name
c. Depositor name
d. Type of account

e. Balance amount in account

Methods:

a. to assign initial value
b. to deposit an amount
c. to withdraw an amount after checking balance

II. Write a program to Calculate sum of the digits of a number

III. Create a login screen and authenticate the user by matching username and password through database

IV) Write java code to design four radio buttons and whenever user clicks on a particular button the selected button should be known by text message. Implement the Listener

V. Design the screen using swing to accept the roll number and marks in three subjects and on click of the button it shows the average of marks on the text

VI) Write a program for exception handling. Implement user-defined exception. Create, throw and catch user – defined exception and handle runtime exception

VII) Write java program to find whether the string is a palindrome or not
VIII) Write java program for arranging the strings in alphabetical order

IX) Write java program to arrange the numbers in decreasing order but the numbers should be stored using Vector

X) Write a java program to read data from a file and copy it to another file.

A journal of the printouts of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.

WEB DESIGNING AND PROGRAMMING

Learning Objective:

To be able to design and develop a dynamic website.

Number of lectures: 45

For a 1.5 credit course a minimum of 8 programs should be executed. A journal of the printouts of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.

I. Design a web page using a text editor with different text formatting tags and save it as ***aboutme .html*** extension in a folder called ***Prac_1*** in the D - drive.

II. Lists, Links & Images:

Design a HOME page called ***index.html*** with links to different pages and allow navigation between pages. **Elements:** your page must use some lists (numbered and/or un-numbered and/or description), as well as a table, and a variety of headings. The page must also include some images and some links to other websites like ww.xaviers.edu. The web page title must reflect what the page is: example ―John White's Home Page‖

Make the top level heading of the web page the same as the title. **Content:** the page should comprise of your personal information like

Academic/Employment status: I am a student Courses that you are studying (make use of table tag)

Write about your interests (nice place for some lists or perhaps an image as well?) Write about where you come from (perhaps you could find some images, and use them as links?

III. Design a web page **with image maps**.

Journal entry: The World Wide Web Consortium (W3C) has an HTML validation service. Give the steps on How does one validate an HTML page and the purpose behind this validation?

IV) **Tables:** Design a web page with different tables. Design a web page using tables so that the content appears well placed.

V. **Form & CSS:** Create the Registration form using all types of controls. Create the CSS file and Implement the CSS with HTML.

VI) **Frames & CSS:** Design a web site using a frameset and open different pages in the frames. Make use of an external/linked style sheet so that the pages have uniform style.

VII) Javascript:

- Create an HTML form that accepts an integer value from the user and then using JavaScript, prints its factorial.

- Design an HTML form for the canteen coffee counter that accepts the item, quantity and using JavaScript calculates the total along with taxes and displays back to the user. (make use of list box/check box/radio button/text box etc)

- Design a form with a text box and a command button. Using JavaScript, write a program to check whether the number entered in the text box is a prime number or not.

.

VIII) Design a form and validate all the controls placed on the Registration form using JavaScript and regular expressions.

IX) jQuery introduction:

a. hello world example

b. calling a function in jQuery and JavaScript

c. Loading jQuery form Google **Journal entry:** why is it better to load the library using Google code?

d. Applying styles to a table using jQuery CSS

e. Design a web page to create the sliding effect using the slideup(), slidedown() and slidetoggle() methods

f. Make use of the **toggleClass(class)** method that adds the specified class styling when clicked upon and removes the specified class styling when clicked for the second time.

X. **XML:**

a. Design a DTD, corresponding XML document and display it in browser using CSS.

b. Design an XML document and display it in browser using XSL.

c. Design XML schema and corresponding XML document.

XI) PHP:

a. Design a php page to process a form.

b. Design a php page for authenticating a user.

XII) Design a complete dynamic website with all validations.

#**Note:** Keeping the SYBsc.IT students in mind, although care has been taken to cover the significant areas of Web designing and Programming, but being a vast subject, one semester is not sufficient to cover all the sub-topics during lectures and practical sessions. Hence students are encouraged to do research and practicals on their own in their leisure time, through various books, online sites as advised by the course instructor at the end of every session, in order to gain an in-depth knowledge of this paper.

Continuous Internal Assessment

MCQ / Viva test during practicals Mid

Term practical test.

Contents:

CLASS: S.Y. B.Sc.IT **COURSE CODE: ITS.4.01**

TITLE: **Software Engineering**

LEARNING OBJECTIVES:

To develop an understanding of the systematic approach required for software development.

Total Number of lectures: 60

UNIT I	**Introduction and Principles** **(**15 lectures)
	Process Models
	What is software engineering? Phases in the development of software, Prescriptive Models, Waterfall Model, Incremental Process Model, Evolutionary Process Models, Specialized Process Models.
	Software Engineering Practice
	Software Engineering Practice, Communication Practices, Planning Practices, Modeling Principles, Construction Practice, Deployment.
UNIT II	**Modeling and the UI aspects** **(**15 lectures)

	Modeling and Approaches to System Requirements
	Events and system requirements, Things and system requirements, Data entities and Objects, Entity-Relationship diagram, Traditional Approach, Object oriented approach
	Performing User Interface Design
	The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation.
UNIT III	**Software Testing Concepts** **(**15 lectures)
	Testing Strategies and Tactics
	A Strategic Approach to Software Testing, Test Strategies for Conventional Software, Object Oriented Software, Validation Testing, System Testing,

	Software Testing Fundamentals, Black Box Testing, White Box Testing
UNIT IV	**Project Management** **(**15 lectures)
	Software Project Management
	Cost Estimation, Project Scheduling, Staffing, Software Configuration Management, Quality Assurance, Project Monitoring, Risk Management.

……..

LIST OF RECOMMENDED REFERENCE BOOKS and URL:

1. Software Engineering, Principles and Practice ‖, Hans van Vliet, Wiley.
   van Vliet, Hans: Software engineering : principles and practice. (3rd ed.reprint) New Delhi. Wiley India Pvt Ltd, 2010. 81-265-2737-3--(005.1van)
2. Software Engineering, A Practitioner's Approach‖, Roger S. Pressman, TMH
   Pressman, Roger S.: Software engineering : a practitioner's approach. (7th ed.) Boston. McGraw Hill Higher Education, 2010. 0-07-126782-3--(005.1Pre)
3. System Analysis and Design, by Satzinger
   Satzinger, John W.; Jackson, Robert B. & Burd, Stephen D.: Introduction to system analysis and design : an agile, iterative approach. (6th ed.) Delhi. Cengage Learning India Private Limited, 2015. 978-81-315-2918-8--(004.21Sat)
4. An Integrated Approach to Software Engineering, PankajJalote, Narosa.
   Jalote, Pankaj: An integrated approach to software engineering. (3rd ed.) New Delhi. Narosa Publishing House, 2005(2008). 81-7319-702-4--(005Jal)
5. Software Engineering, S. L. Pfleeger, Macman.
   Pfleeger, Shari Lawrence & Atlee, Joanne M.: Software engineering : Theory and practice. (3rd ed.) New Delhi. Dorling Kindersley (India) Pvt. Ltd, 2008. 81-317-2098-1--(005.1Pfl/Atl)

ASSESSMENT:

Presentation / Developing Documentation for Project
Undertaken. Mid Term test.

MODERN OPERATING SYSTEM COURSE: S.ITS.4.02

LEARNING OBJECTIVE:
Operating System forms the heart of all computer system which is required for running any kind of application program. This subject focuses on the mechanism involved in building an Operating System and understanding the fundamentals of modern operating system. Distributed Operating System is also focussed.

[Total Lectures 60]

Unit 1	**Introduction To Operating System, Process and DeadLock** Introduction to Operating System History of Operating System, General Architecture of Computer, Parts of Computer System, Functions of Operating System. Types of Operating System Batch, Multiprogramming, Multitasking, Real-Time Operating System Structure	15 lectures

	Layered, Monolithic, Microkernel Process and Thread Process Management Creation, Termination, States Thread Model and Implementation, Interprocess Communication & Synchronization Race Condition Critical Region, Dekker Algorithm, Mutual Exclusion, Semaphores, Monitiors Classical IPC Problems Dining Philosophers Problem, Readers and Writers Problem Process Scheduling(Preemptive and Nonpremptive) Deadlock Condition of deadlock,Resource Allocation Graph, Deadlock Detection And Recovery, Banker's Algorithm.	
Unit 2	**Linux Commands and Shell Scripts** Basic Commands(ls,pwd,bc,cat cp, mv, rm, echo, date, cal,chmod etc.), vi Editor(Basic Concepts, Commands, Programming in vi), Shell Programming Concepts (Types of Shell, Environment Variables, Programming Construct: loops, conditions, logical operators). At least 10 shell scripts. Simple filters—head, tail, cut, paste, sort. Searching through awk, grep, sed command in details. Inode structure in Linux.	15 lectures
Unit 3	**Memory Management:** Static Allocation, Dynamic Allocation, Segmentation, Paging, paged segmentation and segmented paging. Virtual Memory, Page Replacement Algorithm (Optimal Page Replacement Algorithm, First-In First-Out)	15 lectures
Unit 4	**File System and Distributed Operating System** File System Files(Naming, Structure, Types, Access, Attribute), Directories(Single Level, Hierarchical Level, Path Name, Operations), File System Implementation(Layout, Implementation, Shared Files) Distributed Operating System Introduction to Distributed Operating System (Goals, Hardware Concepts, Software	15 lectures

	Concepts, Design Issues), Multiprocessor System (Motivation And Classification, Multiprocessor Interconnection, Types of Multiprocessor). Transparency in Distributed system, Challenges in distributed system. Types of Distributed System.	

Continuous Internal Assessment

Assignments / Project / Presentation / Case
Study Mid Term test.

Text Books:

Reference Books:

1. Linux and Unix – Sumitbha Das -Tata McGraw Hill
   Das, Sumitabha: Unix : concepts and applications. (4th ed. 28th Reprint) New Delhi. McGraw Hill Education (India) Private Ltd., 2006(2016). 978-0-07-063543-3--(005.43UNIX/Das)
2. Operating System Concepts by Silbershatz, Peterson, Galvin – Addison Wesley.
   Silberschatz, Abraham; Galvin, Peter Baer & Gagne, Greg: Operating system concepts. (9th ed.) New Delhi. Wiley India Pvt. Ltd., 2014(2016). 978-81-265-5427-0--(005.43Sil)
3. Mordern Operating Systems by Andrew S. Tnenbaum - Pearson Education.
   Tanenbaum, Andrew S.: Modern operating systems. (3rd ed.) New Delhi. Dorling Kindersley (India) Pvt. Ltd, 2009. 81-317-2003-5--(005.43Tan)
4. Distributed Operating Systems by Andrew S. Tnenbaum, Pearson Education.
   Tanenbaum, Andrew S.: Distributed operating systems. New Delhi. Dorling Kindersley (India) Pvt. Ltd, 1995(2007). 81-7758-179-1--(005.43TAN)
5. The Design of UNIX Operating System by Maurice J. Bach – Prentice Hall.
   Bach, Maurice J.: The design of the UNIX operating system. Noida. Pearson India Education Services Pvt. Ltd, 2015. 978-93-325-4957-9--(005.43UNIX/Bac)
6. Working with Unix by Kaushal Thakker, Kiran Dattani – BPB Publication
   Mukhi, Vijay, Thakkar, Kaushal, Dattani, Kiran & Mirchandani, Ramesh: Working with Unix. New Delhi. BPB Publications, 1993(2007). 81-7029-336-7--(005.43UNIX/MUK)
7. Operating System Design and Implementation by Andrew S. Tanenbaum.
   Tanenbaum, Andrew S. & Woodhull, Albert S.: Operating systems design and implementation. (3rd ed.) New Delhi. Prentice-Hall of India Private Limited, 2006. 81-203-2955-4--(005.43TAN/WOO)

CLASS: S.Y. B.Sc.IT **COURSE CODE: ITS.4.03**

TITLE: **Mobile Application Development**

LEARNING OBJECTIVES:

To help students gain a strong foundation in developing mobile apps for the android operating system.

Total Number of lectures: 60

UNIT I	**User Interface**	**15**
	Android Foundation and basic user interface	
	Introduction: Android history, Android architecture, Android versions, Building blocks **User Interface:** Layouts, Button, TextView and EditText, Dialog, Lists, Notifications, Radiogroup, CheckBox	
	Advanced User Interface:	
	SeekBar, ProgressBar, ToggleButton, ListView, Spinner, CustomControls	

	Date and Time Pickers, Sliding drawer Tabs, Tabs with swipe, Custom title bar	
UNIT II	**Android Programming and Data Persistence**	**15**
	Activities, Lifecycle, Preferences, Menu – Context and Options menu Activities and intents	
	Data Persistence –(internal memory and SD Card)	
	Data Storage & Permissions: Process & application context, Permission systems, Internal storage, External storage, Cache management, Preferences	
UNIT III	**Databases, Content Providers & Contacts**	**15**
	Databases	
	SQL review, DB helper, Database operations, Cursors, Databases, SQL review, DB helper, Database operations, Cursors	
	Content Providers & Contacts	
	Content providers & URIs, Accessing contacts, Insertion, deletion, updating, Managed cursors	
UNIT IV	**Services and Web Services**	**15**
	Services:	
	Lifecycle, Bound services, Notifications, Running in foreground	
	Web Services:	
	Bluetooth, Wifi, Maps, Telephone manager, CSV reader and writer, Call and SMS	

LIST OF RECOMMENDED REFERENCE BOOKS and URL:

1. Android programming for beginners, John Horton, Open Source
2. Head First Android Development, Griffiths & Griffiths, Oreilly
   Griffiths, Dawn & Griffiths, David: Head first Android development. (2nd Indian Reprint) Navi Mumbai. Shroff Publishers & Distributors Pvt. Ltd., 2015. 978-93-5213-134-1--(005.268Android/Gri)
3. Beginning Android Application development, Wei-Meng lee, Wrox, Wiley India
   Wei-Meng Lee: Beginning Android 4 application development. New Delhi. Wiley India Pvt. Ltd., 2012(2015). 978-81-265-3557-6--(005.268Android 4/Wei)

ASSESSMENT:

THEORY:

CIA I: Written test **for 20 marks**

CIA II: Assignments / Project / Presentation / Case Study/ Written Test **for 20 marks**

SEMESTER IV COURSE: ITS.4.02

MODERN OPERATING SYSTEM

LEARNING OBJECTIVE: Operating System forms the heart of all computer system which is required for running any kind of application program. This subject focuses on the mechanism involved in building an Operating System and understanding the fundamentals of modern operating system.

Distributed Operating System is also focused

[Total Lectures 60]

Unit 1	**Introduction To Operating System, Process and DeadLock** Introduction to Operating System History of Operating System, General Architecture of Computer, Parts of Computer System, Functions of Operating System. Types of Operating System Batch, Multiprogramming, Multitasking, Real-Time Operating System Structure Layered, Monolithic, Microkernel Process and Thread Process Management Creation, Termination, States Thread Model and Implementation, Interprocess Communication & Synchronization Race Condition Critical Region, Dekker Algorithm, Mutual Exclusion, Semaphores, Monitiors Classical IPC Problems Dining Philosophers Problem, Readers and Writers Problem Process Scheduling(Preemptive and Nonpremptive) Deadlock Condition of deadlock,Resource Allocation Graph, Deadlock Detection And Recovery,Banker's Algorithm.	15 lectures
Unit 2	**Linux Commands and Shell Scripts** Basic Commands (ls, pwd, bc, cat cp, mv, rm, echo, date, cal, chmod etc.), vi Editor (Basic Concepts, Commands, Programming in vi), Shell Programming Concepts (Types of Shell, Environment Variables, and Programming Construct: loops, conditions, logical operators). At least 10 shell scripts. Simple filters—head, tail, cut, paste, sort. Searching through awk, grep, sed command in details. inode structure in Linux	15 lectures
Unit 3	**Memory Management:** Static Allocation, Dynamic Allocation, Segmentation, Paging, paged segmentation and segmented paging. Virtual Memory, Page Replacement Algorithm (Optimal Page Replacement Algorithm, First-In First-Out)	15 lectures

Unit 4	**File System and Distributed Operating System** File System Files(Naming, Structure, Types, Access, Attribute), Directories(Single Level, Hierarchical Level, Path Name, Operations), File System Implementation(Layout, Implementation, Shared Files) Distributed Operating System Introduction to Distributed Operating System (Goals, Hardware	15 lectures

	Concepts, Software Concepts, Design Issues), Multiprocessor System (Motivation And Classification, Multiprocessor Interconnection, Types of Multiprocessor). Transparency in Distributed system, Challenges in distributed system. Types of Distributed System.	

Continuous Internal Assessment

Assignments / Project / Presentation / Case
Study Mid Term test.

Reference Books:

1) Distributed Operating Systems by Andrew S. Tanenbaum, Pearson Education.
Tanenbaum, Andrew S.: Distributed operating systems. New Delhi. Dorling Kindersley (India) Pvt. Ltd, 1995(2007). 81-7758-179-1--(005.43TAN)
2) Linux and Unix – Sumitbha Das -Tata McGraw Hill
3) Operating System Concepts by Silbershatz, Peterson, Galvin – Addison Wesley.
Silberschatz, Abraham; Galvin, Peter Baer & Gagne, Greg: Operating system concepts. (9th ed.) New Delhi. Wiley India Pvt. Ltd., 2014(2016). 978-81-265-5427-0--(005.43Sil)
4) Modern Operating Systems by Andrew S. Tanenbaum - Pearson Education
Tanenbaum, Andrew S.: Modern operating systems. (3rd ed.) New Delhi. Dorling Kindersley (India) Pvt. Ltd, 2009. 81-317-2003-5--(005.43Tan)
5) The Design of UNIX Operating System by Maurice J. Bach – Prentice Hall.
Bach, Maurice J.: The design of the UNIX operating system. Noida. Pearson India Education Services Pvt. Ltd, 2015. 978-93-325-4957-9--(005.43UNIX/Bac)
6) Working with Unix by Kaushal Thakker, Kiran Dattani – BPB Publication
7) Operating System Design and Implementation by Andrew S. Tanenbaum.
Tanenbaum, Andrew S. & Woodhull, Albert S.: Operating systems design and implementation. (3rd ed.) New Delhi. Prentice-Hall of India Private Limited, 2006. 81-203-2955-4--(005.43TAN/WOO)

DATA STRUCTURES USING JAVA **COURSE: ITS.4.04**

LEARNING OBJECTIVE:

Data Structure is required in almost all programming design. Performance of a

Program mainly depends on the data structure and algorithms used. This subject forms the basis for selecting the appropriate data structure as needed by the program to improve the efficiency of a program. Knowledge of Data Structure and complexity helps in improving analytical skill.

[Total Lectures 60]

Unit 1	**Introduction to Data Structure, Stacks, Queues and Recursion** Introduction and Complexity Data Types, Data Structure, Abstract Data Types, What is an algorithm, Rate of growth and its graph with analysis. Time Complexity(Big Oh and Big Omega, Theta Notation,), Master Theorem for divide and conquer, Problems on complexity for divide and conquer, Master Theorem for subtract and conquer and problems on it. Stacks Introduction to Stack, Array Representation of Stack, Notations (infix, prefix and post fix notation),understanding stack operations push, pop, peek , algorithm for converting infix to postfix and infix to prefix, algorithm to separate operator and operand from given string , Queue concept of queue, inserting deleting data in queue, concept of circular queue, inserting deleting data in circular queue	15 lectures

	recursion What is recursion? Format of recursive function, recursion and memory visualization, Examples on recursion, Tower of Hanoi and its complexity.	
Unit 2	**Linked List** What is a Linked List, Comparing Linked List with Arrays, advantage and disadvantage of Linked List? Singly Linked List, traversing, insertion node at beginning, ending and at middle, deleting node from beginning, ending and at middle for singly linked list, Doubly Linked List, Insertion node at beginning, ending and at middle for doubly linked list, deleting node from beginning, ending and at middle for doubly linked list, circular linked list, printing content of circular linked list, inserting node at front, end and middle of circular linked list, deleting node from front, end and middle of circular linked list, searching elements from singly, doubly, circular linked list.	15 lectres
Unit 3	**Trees** What is a Tree, Binary Tree and Binary search Tree, properties of Binary Tree, Structure of Binary Tree, Types of Binary Trees(Strict Binary Tree, Full Binary Tree, complete Binary Tree, Almost complete Binary Tree), inorder, preorder and post order traversal with recursion and without recursion, searching element in Binary Search Tree, Finding maximum and minimum element from Binary Search Tree, deleting an element from Binary Search Tree, Threaded Trees, traversal using right thread, AVL Tree, single and double rotation,Expression Trees , concept of N-ary Tree(Generic Tree), Huffman's coding	15 lectures
Unit 4	**Sorting and Graph** Sorting Bubble Sort, Selection Sort, Insertion Sort, Radix sort and its complexity Heap property, Heapify, Building Heap, Heapsort algorithm and complexity Merge sort and its complexity. Quick sort and its complexity. Graphs Definition of Graph, difference between Graph and Tree, various terminology in Graph(multi graph , complete graph, bipartite, isomorphism, planar and non-planar graph,	15 lectures

	complete graph, regular graph),Representation of Graph (Adjacency matrix, Path Matrix, Linked Representation), Euler path, Hamilton path, Traversing(Breadth-First Search, Depth First Search), Spanning Tree, Algorithm for finding minimum spanning Tree- Prim's algorithm, Krushkal's algorithm, shortest path using Dijkastra's algorithm and Warshall's Algorithm,	

Continuous Internal Assessment
Assignments / Project /
Presentation

Reference Book:

1. Data Structure and Algorithms made easy in Java by Narashimha Karumanchi
   Karumanchi, Narasimha: Data structures and algorithms made easy. (5th ed.) Mumbai. CareerMonk Publications, 2017. 978-81-932452-7-9--(005.7Kar)
2. Data Structured by Seymour Lipschutz- Schaum publication
   Lipschutz, Seymour & Pai, G.A. Vijayalakshmi: Data structures. New Delhi. Tata McGraw Hill Education Private Limited, 2006. 0-07-060168-2--(005.73Lip/Pai)
3. Fundamentals of Data Structure by Ellis Horowitz, Sartaj Sahni – Galgatia Booksource
   Horowitz, Ellis & Sahni, Sartaj: Fundamentals of data structures. (Indian reprint) Gurgaon. Galgotia Booksource P. Ltd., 1976.--(005.73Hor/Sah)

S.Y. B.Sc.IT **Course: S.ITS.4.05**

Title: Statistical Techniques and Operation Research

Learning Objective:

To develop the skill of decision making using statistical techniques and Operation Research

Number of lectures: 60

Unit 1	**Basics of statistics** Basic of statistics Meaures of central tendency mean, median, mode, measures of variation,\ mean deviation, standard deviation, variance, Measures of Skewness, regression and correlation. **Discrete and continuous distribution** Binomial distribution: Properties of binomial distribution Constants of binomial distribution Importance of binomial distribution Fitting of binomial distribution Poisson distribution Constants of Poisson distribution Role of the Poisson distribution Fitting a Poisson distribution	15 lectures

	Normal distribution: Graph of normal distribution Importance of normal distribution Area under the normal curve Fitting a Normal distribution	
Unit 2	**Sampling theory and testing of hypothesis** Hypothesis testing: Procedure of testing hypothesis , Two tailed and one tailed tests of hypothesis, Test of significance of large samples. Tests of significance **of small samples** Students t-distribution: Properties of t-distribution, Application of the t_distribution. The Chi Square Distribution: Constants of Chi square distribution, Use of Chi square test, Conditions for applying chi square test, Applications of chi square test **L.P.P** Introduction to O.R in business and industry, scope of O.R in modern management and decision making Linear Programming: various definition, statements of basic theorems And properties, advantages, limitations and application areas of Linear Programming. Linear programming formulation, Identification of decision variables, constructing objective functions and constraints, graphical methods, simplex method	15 lectures
Unit 3	**Transportation problem and Assignment problems** The transportation algorithm, Formulation of TP, Determination of initial solution, North west corner rule method Least cost method Vogels approximation method Test for Optimality The modified distribution method Variations in transportation problem Maximization transportation problem	15 lectures

	The assignment model: Introduction Mathematical model of assignment problem The Hungarian method Special variations in the assignment problem	
Unit 4	**PERT and CPM** Network representation of simple projects , critical path computation, construction of time schedule, basic difference between PERT and CPM, arrow networks , time estimates, earliest expected time , occurrence time, forward pass computation , backward pass computation probability of meeting scheduled date of completion, various floats for activities	15 lectures

Continuous Internal Assessment

Problem solving
Mid Term test.

List of Recommended Reference Books

1. Quantitative techniques in management ND VOHRA

Vohra, N.D.: Quantitative techniques in management. (4th ed. reprint) New Delhi. Tata Mcgraw Hill Education Private Limited, (2010)2011. 0-07-014673-x--(658.403028Voh)

2. Operation research an introduction---Hamdy A Taha

Taha, Hamdy A.: Operations research : an introduction. (9th ed.)
New Delhi. Dorling Kindersley (India) Pvt Ltd., 2017.
978-93-325-1822-3--(003Tah)

3. Introduction to statistics---Ronald EWalpole

Walpole, Ronald E.: Introduction to statistics. (3rd ed.) New York.
Macmillan Publishing Company, Inc., 1982. 0-02-424150-4--
(519.5WAL)

4. Operations research principles and practice—Ravindran, Philips

Ravindran, A., Phillips, Don T. & Solberg, James J: Operations research : principles and practice. (2nd ed.) New York. John Wiley & Sons, Inc., 1987. 0-471-85980-X--(003RAV)

5. Operation research by Kanti Swaroop

Swarup, Kanti; Gupta, P.K.; Mohan, Man & Gupta, Priynshu: Operations research. (18th Revised Ed.) New Delhi. Sultan Chand & Sons, 2015(2017). 978-93-5161-049-6--(003Swa)

6. Introduction to statics by Gupta and Kapoor

Approx 10 titles by this duo, which one do they mean??

Gupta, S.C. & Kapoor, V.K.: Fundamentals of mathematical statistics. (11th rev. ed.) New Delhi. Sultan Chand & Sons, 2002(2011). 81-8054-004-9--(519.5GUP/KAP)

S.Y. B.Sc.IT **Course: ITS.4.PR1**

Practical:

Mobile Application Development

1) a. Create "Hello World" application. That will display "Hello World" inthe middle of the screen in the blue color with white background.

b. Create an app with two buttons. Have the first one pop up a Toast or insert text into a TextView that says "Hello". Have the second one say "Goodbye". Use the named inner class approach. (**Hint**: String text = "..."; Toast tempMessage = Toast.makeText (referenceToMainActivity, text, Toast.LENGTH_SHORT); tempMessage.show () ;)

2) Create a project with a Spinner

   a. That displays the choices Red, Yellow, Blue, and Green. Have a TextView whose color matches the Spinner. Set the choices in XML.
   b. Modify the above project by adding a second Spinner with the same choices and behavior as above. But, this time, set the choices from Java.
   c. If you want to have a prompt (i.e., title at the top when the spinner pops up, use yourSpinner.setPrompt and supply either an id or a String).

3) a. Create a sample application with login module. (Check username and password) On successful login, go to next Activity. And on a failed login, alert user using Toast. Also pass username to next Activity with a Welcome Message.

b. Create a project whose initial screen has a TextView that says "Activity 1" and has a Button that says "Go to Activity 2". Have Activity 2 show a TextView that says "Activity 2" and have a Button that says "Go to Activity 1". Have the buttons switch back and forth.

c. Understanding of UI:
Create an UI such that, one screen have list of all the types of cars. On selecting of any car name, next screen should show Car details like: name, launched date, company name, images (using gallery) if available, show different colors in which it is available.

4) Create an application to read:
   a. File from the sdcard and display that file content to the screen.
   b. Read messages from the mobile and display it on the screen.

5) Create an application to send message between two emulators.

6) Create an application to perform Insert, update, Delete and retrieve operation on the sqlite database.

7) Create an application that uses the google maps API to help you locate your current geographical location.

8) Create a project to send a common mail to all the intended recipients via gmail from your application.

A journal of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.

MOS Practical (Linux) **ITS.4.PR2**

Shell scripts

1) Write a shell script which prints file name followed by first line of each file in the current directory

2) Write a shell script to print the information as to how many files and how many directories are present in current directory.

3) Write a shell script which accepts a filename, displays menu with following options, accepts user choice as number and takes appropriate actions

Number	Menu option	Expected Action
1	Contents	Display the file contents
2	Size of block	Display the file Size in blocks
3	Number of words	Display the number of words in file
4	Last four Lines	Display last five lines of the file
5	First seven Lines	Display first ten lines of the file

4) Write a shell script which accepts a filename, displays menu with following options, accepts user choice as number and takes appropriate actions

Number	Menu option	Expected Action
1	No of users	Displays the No of users looged in
2	Current user	Display the login id of user logged in
3	Current Directory	Display the present working directory
4	Home Directory	Display the home directory of logged in user

5	Concatenate	Display concatenated output from two files which are listed by user.

5) Write Linux shell script which will greet user as per the login time that is

5-12 → Good Morning 12-
15→ Good Afternoon 15-
19→Good Evening 19-24→
Good Night

0-5→ Good Night

6) Accept a number from user. Now calculate the sum of digits.
7) A year is entered through keyboard, write a program to determine the year is leap or not.
8) Write program to print all prime numbers from 1 to 300.

9) Create a group of 2 and give them password so they can work on common project.

AWK Command

1) Create file called emp.txt using VI editor with 10 records some of it are

 # eno | ename | desg | salary | doj | dob | dept
100 | rajesh| ceo | 30000 | 12/3/90 | 10/1/78| IT 101 | mahesh | gm | 20000 | 11/3/95 | 10/1/81| sales

Solve the query using AWK/ grep command
a) Find the names of emp who work for sales dept
b) Name the employee whose salary is maximum
c) Name the employee whose salary is maximum in IT dept
d) Count the number of employee in each dept.
e) Find the desg and name of employees who are more than 30 years old
f) Find the name of employee who is senior most as per doj.
g) Sort the file as per the DOB.

Tar, put and get command

1) Create tree structure in 2 different machines copy subtree of Mahesh in John directory.

/ **/**

bin sbin etc home mnt

bin sbin etc home mnt

Mahesh **John**

Networking in Linux

Setting up LAN
Configuration TCP/IP
Adding windows computer to LAN IP
address classes
Subnetting
Configuring telnet

C an Java Compilers in Linux

1) Use gcc/ cc/ other compiler to compile C and C++ program related to finding area of rectangle by accepting length and breadth from user.
2) Use java compiler to compile and run java program related to applet.
3) Use java compiler to compile and run socket related program in java.

DATA STRUCTURE USING JAVA

For a 1.5 credit course a minimum of 8 programs should be executed. A journal of the printouts of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.

Learning Objective:

To study different data structures and algorithms used in programs.

Data Structure Using Java practicals

I) Implement a Queue in Java and perform the following operations:
   a. Create,
   b. Insert,

c. Delete,

d. Search a data item

II) Implement a Stack in Java and perform the following operations:
   a. Create,
   b. Push,
   c. Pop,
   d. Search

III) Write a program in Java for implementing Tower of Hanoi.

IV) Implement a Linked List in Java and perform the following operations:
   a. Create,
   b. InsertFirst,
   c. InsertLoc,
   d. DeleteFirst,
   e. DeleteLoc,
   f. Search a data item

V) Implement a Binary Search Tree in Java and perform the following operations:
   a. Create,
   b. Insert,
   c. Search a data item

VI) Implement Traversing (Preorder, Inorder, Postorder) of Binary Tree in

Java VII) Implement Deletion of a node in Binary Search Tree

VIII) Implement Heap in Java and perform the following
operation: a. Create,
   b. Insert, and
   c. Delete

IX) Implement Traversing (Breadth-First Search, Depth-First Search) in Java

X) Implement following Sorting Algorithms in Java:
   a. Bubble Sort,
   b. Insertion Sort,
   c. Selection Sort,
   d. Heap Sort

STATISTICAL TECHNIQUES AND OPERATION RESEARCH

Learning Objective:

To develop analytical skill and programming logic.

Statistical Techniques and Operation Research practicals

I) write a program to implement simplex method

II) write a program to implement L .P using north west corner method

III) Write a program to implement T.P using least cost method

IV) Write a program to implement Assign problem

V) write a program to calculate mean ,median, mode

VI) Write a program to calculate S.D, variance

VII) Write a program to implement correlation

VIII) Write a program to implement discrete distribution

IX) Write a program to implement continuous distribution

X) Write a program to implement testing of hypothesis

Contents:

T.Y.B.Sc (I.T) **S.ITS5.01**

Subject: Network Security and Internet Technology

Objective:

Security is an important aspect for the internet. This course teaches various security cryptography techniques and digital signature along with network security. It also introduces to the technique of accessing remote objects through RMI.

[Total lectures 60]

UNIT I	**Computer Security and Cryptography** Computer Security : Introduction, Need for security, Principles of Security, Types of Attacks Cryptography : Plain text and Cipher Text, Substitution techniques, Caesar Cipher, Mono-alphabetic Cipher, Polygram, Poly alphabetic Substitution, Playfair, Hill Cipher, Transposition techniques, Encryption and Decryption, Symmetric and Asymmetric Key Cryptography, Steganography, Key Range and Key Size, Possible Types of Attacks, Diffie-Hellman Key Exchange.	15
UNIT II	**Symmetric Key, Asymmetric Key Algorithms, Digital Signature** DES, AES, Brief history of Asymmetric Key Cryptography, Overview of Asymmetric Key Cryptography, RSA algorithm, Symmetric and Asymmetric key cryptography together, Digital Signatures, Digital Certificates, Private Key Management, PKI and Security.	15
UNIT III	**Designing Trusted Operating System and Network Security** ***Designing Trusted OS*** What is Trusted System, Military Security policy, Commercial security policy, Clark-Wilson security policy. Models of security: Multilevel security, Bell-La Padula model, Biba integrity model, Trusted Operating system design. Understanding MAC, DAC. Trusted Computing Base and its functions. ***Network Security*** What makes Network Vulnerable? Who attacks Networks? Threat Precursors, Threats in Transit: Eavesdropping and wiretapping, Spoofing, DoS and DDoS, Link Encryption, End-to-End encryption, VPN, IPSec, Kerberos, Firewall, different types of firewall, IDS, Different types of IDS, Security of E-Mail.	15
UNIT IV	**TCP/IP Protocol Suite and RMI** OSI Model, TCP/IP Protocol Suite, IPV 4 Addresses and Protocol and IPV6 Addresses and Protocol, Address Resolution Protocol (ARP), Streams, Sockets for Clients, Sockets for Servers, Secure Sockets, UDP Datagram and Sockets, Remote Method Invocation, RMI Programming.	15

Continuous Internal Assessment
MCQ/Presentation/Case studies
Midterm test

BOOKS:

1) Atul Kahate: Cryptography and Network Security by Atul Kahate, 2nd Edition, Tata McGrawHill.
   Kahate, Atul: Cryptography and network security. (3rd ed.) New Delhi. McGraw Hill Education (India) Private Ltd., 2016. 978-1-25-902988-2--(005.8Kah)
2) Behrouz A. Forouzan: TCP/IP Protocol Suite, 4th Edition, Tata McGrawHill.
   Forouzan, Behrouz A.: TCP/IP protocol suite. (4th ed.) New Delhi. Tata Mcgraw Hill Education Private Limited, 2010(2012). 978-0-07-070652-1--(004.62For)
3) Charles P Pfleeger: Security in Computing.
   Pfleeger, Charles P., Pfleeger, Shari Lawrence & Shah, Deven: Security in computing. (4th ed.) New Delhi. Pearson Education, Inc., 2007. 978-81-317-2725-6--(005.8Pfl)

T.Y. B.Sc.IT **S.ITS5.02**

TITLE: C# with ASP.NET

Learning objective:

Student will learn the latest development of C# and ASP.NET in framework 4.0. This will equip them with required in software industry for developing website projects.

[Total lectures 60]

UNIT I	**Introduction to DOTNET framework 4.0** Over view of .NET Framework, Components of .NET framework, Versions of .net framework, understanding Visual studio 2010 IDE environment: Design view, Source view, Output window, Error list window, Intelligence, Property window, Object browser window, Start page, Toolbar and Toolbox. **C# language** Introduction to C#: understanding C# in .NET, Overview of C# literals, Variables, Data types, Operators, Expressions, Branching and looping operations methods, Arrays, Strings. Classes and objects: class, objects, constructors, static members, static constructors, private constructor, copy constructors, destructors, member initialization, this reference, nesting of classes. Inheritance and Polymorphism: Classical inheritance, containment inheritance, defining of subclasses, visibility control, defining subclasses constructors, multilevel inheritance, Overriding methods, hiding methods, Abstract classes, abstract methods. Interface: Defining an interface, Extending an interface, Implementing interface, Difference between interface and abstract class.	15

UNIT II	**Delegate, Events and Exception handling in C#** Delegate: Delegate declaration, delegate methods, Delegate's instantiation, delegates, multicast delegates, Types of error, exceptions, Syntax of exception handling code, Multiple catch statement, the exception hierarchy, general catch handler, using final statement, nested tri blocks, throwing our own exceptions, checked and un checked operators, Using exceptions for debugging . Controls in ASP.NET : introduction to control class: Text box control, button control, Label control, Image control, Image button control, Image map control, Drop down list control, Check box control, Radio button control, Table control, calendar control, site map control, Tree view control, Menu control, validation controls, login controls, Database controls.	15
UNIT III	**ADO.NET** ADO.NET object model, data binding, Using connection, Command, data reader classes, Queries returning results sets, passing parameters in queries, using repeater control, data adapter, Using data set (typed), Data table, Data row& data column, introducing the ADO.NET entity framework, mapping your data model to an object model	15

UNIT IV	**LINQ and Crystal Report** LINQ: Introducing LINQ, LINQ to objects, LINQ to XML, LINO to ADO.NET. Crystal report: Adding a crystal report to an ASP.NET application, Inserting fills, Text and special fields, sorting, grouping and subtotaling, select expert, dynamic Formatting, using the Crystal report viewer Continuous internal assessment: Assignment on unit 1, unit 2, unit 3, unit 4, midterm test	15

LIST OF RECOMMENDED REFERENCE BOOKS

1) ASP.NET 4.0 in simple steps dreamtech press
Kogent Learning Solutions Inc.: ASP.Net 4.0 in simple steps. New Delhi. Dreamtech Press, 2011. 978-93-5004-029-4--(005.276ASP/K.L.S.)
2) Integrating Crystal report into an ASP.NET Application by Vincent Varallo Wrox Publication

3)ASP.NET-The Complete reference Tata McGraw Hill.
MacDonald, Matthew: ASP.Net : the complete reference. New Delhi. Tata Mcgraw Hill Education Private Limited, 2002(2011). 978-0-07-049536-4--(005.276ASP/Mac)
4) Beginning ASP.NET 4: in C# and VB by Imar Spaanjaars Wrox Publication.
Spaanjaars, Imar: Beginning ASP.Net 4 in C# and VB. New Delhi. Wiley India Pvt Ltd, 2012. 978-81-265-2605-5--(005.276ASP/Spa)
5) C# and .NET 4 by Christian wrox publication.
6) C# 2010 and .NET 4 plat form by Andrew Troelsen Apress publication.

T.Y. B.Sc.IT **S.ITS5.03**

TITLE: Data Warehousing and data mining.

Learning objective:

Learn basic concept of Data Warehousing and data mining.

[Total lectures 60]

UNIT I	**Introduction to data Warehousing** What is the data warehousing, Need for data warehousing, Basic elements of data warehousing, Data warehouse architecture, Data warehouse development life cycle, data warehousing developing methodologies. Overview of the components, meta data in the data warehouse, data warehouse design consideration and dimension modeling defining the business requirement, information package requirement gathering methods, principles of dimensional modeling , dimensional table, fact table, star schema model snow flake schema, slowly changing dimension	15
UNIT II	**Extraction, transformation and loading** ETL overview, data extraction, source identification, data extraction techniques , data transformation, basic task, major transformation types, how to implement transformation, data loading, data refresh verses update, procedure for dimension table incremental loads, OLAP in the data warehouse, OLAP models.	15

UNIT III	**Introduction to data miming and classification** Basic data mining tasks, Data mining verses knowledge discovery in databases, A statistical perspective on data mining, Baye's theorem, regression and correlation, Neural networks classification introduction, Classification Introduction, issues in classification, Statistical based algorithms, Bayesian classification, distance based algorithms, simple approach, K nearest neighbors, Decision tree based algorithms, ID3.C 4.5	15

UNIT IV	**Clustering and association rule** Introduction to clustering, Hierarchical algorithms Agglomerative algorithms, Divisive clustering, Partition algorithms, Minimum spanning tree algorithm, squared error clustering large data base, BIRCH Introduction to association rule Large item set, AR general algorithm, Apriori-gen algorithm, Apriori algorithm	15

Continuous Internet Assessment
Assignments, Written Test,
Presentation

List Of Recommended Reference Books

1) Data warehousing fundamentals by Paulraj Ponniah
Ponniah, Paulraj: Data warehousing fundamentals for IT professionals. (2nd ed.) New Delhi. Wiley India Pvt Ltd, 2010(2013). 978-81-265-3729-7--(005.745Pon)
2) Data Mining Introductory and Advanced Topics, M.H. Dunham, Pearson Education.
Dunham, Margaret H.: Data mining : introductory and advanced topics. New Delhi. Dorling Kindersley (India) Pvt. Ltd, 2006(2011). 978-81-7758-785-2--(006.312Dun)
3) Ian H. Witten, Data Mining, MK publishers.
Witten, Ian H., Frank, Eibe & Hall, Mark A.: Data mining : practical machine learning tools and techniques. (3rd ed.) New Delhi. Reed Elsevier India Private Limited, 2011(2012). 978-0-12-374856-0--(006.312Wit)
4)W.H. Inmon, Building the Data Warehouses, Wiley Dreamtech.
Inmon, W.H.: Building the data warehouse. (4th ed.) New Delhi. Wiley India Pvt Ltd, 2005(2012). 978-81-265-0645-3--(005.74Inm)
5)R. Kimpall, The data warehouse toolkit, John Wiley.
Kimball, Ralph & Ross, Margy: The data warehouse toolkit : the complete guide to dimensional modeling. (2nd ed.) New Delhi. Wiley India Pvt Ltd, 2012. 978-81-265-0889-1--(005.74Kim/Ros)
6)Data warehousing, Soumendra Mohanty, Tata McGraw Hill
Mohanty, Soumendra: Data warehousing : design, development and best practices. New Delhi. Tata Mcgraw Hill Education Private Limited, 2006(2012). 978-0-07-063544-9--(005.74Moh)

T.Y. B.Sc.IT **S.ITS5.04**
TITLE: E-COMMERCE AND M-COMMERCE TECHNOLOGY

OBJECTIVE:

To create an awareness about role of it in business and to introduce concepts and techniques of e-commerce Students will learn the ecommerce transaction done via paypal, how verisingn works, how payment gateway works.

Student can apply the skill learnt in developing website project on e-commerce, m-commerce.

[Total lectures 60]

UNIT I	**Overview of electronic commerce and case study** Ecommerce Overview: understanding trade/ Business cycle, Business process and business activity, History of e-commerce, generic model of e-commerce, Evolution of e-commerce. Global and Indian scenario, difference between conventional commerce and electronic commerce, classification of ecommerce-B2B,B2C,C2C,C2B,G2G,G2C,B2G sites, introduction to IT act and its role to encourage e-business, growing e-learning and e-governance, understanding horizontal and vertical market, growth of online retailing and e-marketing concepts, Features & benefits of e-commerce –Impacts, challenges and limitations of e-commerce. Case study Amazon – success story, core values, business model, history, growth, future plan, comparison with other e-commerce sites, e-bay-business model, history, future plan, Verisign, Shopping process with Payseal and Paypal, Flipkart-history, business model, growth, comparison with other E-commerce sites, future plan, dotcom-its rise, fall and analysis, payTM-business model, growth and history, Infrastructure for shopping cart .	15

UNIT II	E-Commerce Models, Portals E-Commerce Models: store-front model, brick and mortar model, build to order merchant model, service provider model, subscription based model, broke model, advertiser model, virtual mall model, infomediary model. Portals: Difference between website and portal function of portals, portals technologies, feature of portal.	15
UNIT III	Advance technology of Ecommerce and security Rich internet application, web 2.0, Web Services, Web Mashup, Working of Search Engines, SEO, LDAP, EDI, VPN, click stream analysis. E-CRM-Concept& definition, features Goals of E-Cm business framework, Types of E-CRM. Working of Payment Gateway. Security concerns in e-commerce. Public and Private key, encryption. Cryptography and types of cryptography, Digital signature. Role of Certificate Authority. Firewall and types of firewall Intrusion Detection System and Honey posts, SSL and IP sec protocol. Net banking, DoS and DDoS attack.	15
UNIT IV	M-Commerce Technologies 1) INTRODUCTION TO m-COMMERCE - What is m-Commerce - Why wireless? - Compare 2G, 3G, 4G - WAP --WAP architecture --How WAP works –WAP benefit –WAP limitations 2) THE TECHNOLOGIES OF m-COMMERCE. - Computer of cell, MS, BSC, MSC, NSS, OSS. - Multiplexing scheme [TDMA, FDMA, CDMA]. - Concept of uplink and downlink traffic. - Understanding handover - Understanding frequency reuse. - GSM in detail. 3) M-COMMERCE Services Today - introduction -mobile portals -mobile information services -mobile directory services -mobile banking and trading -mobile E-tailing and E-Ticketing -mobile entertainment -mobile business application and services	15

Continuous Internal Assessment

CIA I: Written test **for 20 marks**

CIA II: Assignments / Project / Presentation / Case Study/ Written Test **for 20 marks**

REFERENCE Books:

1) E-Commerce: The cutting edge of business, Kamlesh K. Bajaj and Debjani Nag, Tata McGraw Hill
Bajaj, Kamlesh K. & Nag, Debjani: E-Commerce : The cutting edge of business. (2nd ed.) New Delhi. Tata McGraw-Hill Publishing Company Limited, 2005(2008). 0-07-058556-3--(658.84Baj/Nag)
2) E-Commerce and M-Commerce technologies by P.Candace Deans and IRM press publication

3) m-Commerce by Norman sadeh john and wiley & Sons Publication.
Sadesh, Norman: M-Commerce : technologies, services and business models. New York. John Wiley & Sons, 2002. 978-0-471-13585-2--(658.84Sad)
4) E-Commerce strategies, technology and applications (David) Tata McGrawHill
Whiteley, David: e-Commerce : Strategy, technologies and applications. New Delhi. Tata McGraw-Hill Publishing Company Limited, 2008. 0-07-044532-X--(658.84Whi)
5) Introduction of E-Commerce (jeffrey) Tata-McGrawHill

CLASS: T.Y. B.Sc.IT **COURSE CODE: S.ITS5.05**

TITLE : Introduction to Artificial Intelligence

LEARNING OBJECTIVES:

To provide students with a basic exposure to the field of Artificial Intelligence.

Total Number of lectures: 60

UNIT I	**Introduction to AI and Searching Techniques**	**(**15 lectures)
	Introduction to AI	
	What is AI? The Foundations of Artificial Intelligence The History of Artificial Intelligence, The State of the Art Agents and Environments, Good Behavior: The Concept of Rationality, the Nature of Environments, the Structure of Agents	
	Searching Techniques	
	Problem-Solving Agents, Example Problems, Searching for Solutions, **Uninformed Search** Strategies, **Informed (Heuristic) Search** Strategies, Heuristic Functions, Local Search Algorithms and Optimization Problems	
UNIT II	**Learning from Observation**	**(**15 lectures)
	Fundamentals of Javascript	
	Forms of Learning, Inductive Learning, Learning Decision Trees, Ensemble Learning, Why Learning Works: Computational Learning Theory	
	Introduction to ANN	

	Units in neural networks, Network structures, Single layer feed-forward neural networks (perceptrons), Multilayer feed-forward neural networks, Learning neural network structures

UNIT III	**Introduction to Genetic Algorithms**	**(**15 lectures)
	Genetic Algorithms	
	A Brief History of Evolutionary Computation, The Appeal for Evolution, Biological Terminology, Search Spaces and Fitness Landscapes, Elements of Genetic Algorithms, A Simple Genetic Algorithm, Genetic Algorithms and Traditional Search Methods, Some Applications of Genetic Algorithms	
UNIT IV	**Introduction to Fuzzy System**	**(**15 lectures)
	Fuzzy Systems	
	The Case for Imprecision, A historical Perspective, The Utility of Fuzzy Systems, Limitations of Fuzzy Systems, The Illusion: Ignoring Uncertainty and Accuracy, Uncertainty and Information, The Unknown, Fuzzy Sets and Membership, Chance verses Fuzziness	

……

LIST OF RECOMMENDED REFERENCE BOOKS and URL:

1. Stuart Russel, Peter Norvig, "Artificial Intelligence- A Modern Approach", Pearson Education
   Russell, Stuart J. & Norvig, Peter: Artificial intellegence : a modern approach. (2nd ed.) Noida. Dorling Kindersley (India) Pvt. Ltd, 2013. 978-81-7758-367-0--(006.3Rus/Nar)
2. An Introduction to genetic algorithms- By Melanie Mitchell
3. Fuzzy Logic with Engineering Applications – by Timothy J. Ross

   Ross, Timothy J.: Fuzzy logic with engineering applications. (3rd ed.) New Delhi. Wiley India Pvt Ltd, 2010. 978-81-265-3126-4--(511.3Ros)
4. Elaine Rich, Kevin Knight, "Artificial Intelligence"

   Rich, Elaine, Knight, Kevin & Nair, Shivashankar B.: Artificial intelligence. (3rd ed.) New Delhi. Tata Mcgraw Hill Education Private Limited, 2009. 978-0-07-008770-5--(006.3Ric)
5. Patterson, "Introduction to Artificial Intelligence and Expert Systems"

   Patterson, Dan W.: Introduction to artificial intelligence and expert systems. New Delhi. PHI Learning Private Limited, 2012. 978-81-203-0777-3--(006.3Pat)
6. Jacek M Zurada, "Introduction to Artificial Neural Systems"

   Zurada, Jacek M.: Introduction to artificial neural systems. Mumbai. Jaico Publishing House, 1994(2006). 81-7224-650-1--(006.32Zur)
7. Ahmad Ibrahim, "Introduction to Applied Fuzzy Electronics", PHI

T.Y. B.Sc.IT **Course: S.ITS6.PR1**

Practical:

A) Network Security and Internet Technology

LEARNING OBJECTIVE:
To equip the students with skills required in software industry
Students will learn RMI and Network Security practicals.
(Minimum 8 expts.)

Based on Socket and RMI

Q1) Write a socket program using TCP to find the factorial of a number.

Q2) Write a socket program using UDP to whether the number provided is even or odd.

Q3) Write a program using RMI concept to implement a menu driven task.

Q4) Write RMI program to implement sum of digits of number.

Based on Substitution and Transposition Cipher

Q5) Write a java code to implement Caeser Cipher with encryption and decryption.

Q6) Write a java code to implement polygram substitution Cipher with encryption and decryption.

Q7) Write java program to implement Rail-Fence Transposition Technique taking no of rows from the user as input.

Q8) Write java program to implement Vernam cipher with encryption and decryption.

Q9) Implement RSA algorithm accepting the inputs from user.

Based on AES /DES/Blowfish

Q10) Accept 16 Hex bits(64 bits) number from user and generate 16 subkeys of 12Hex bits(48bits) each using DES Algorithm and PC-1 Table .

Q11) Implement the Blow Fish algoritm.

Q12) Implement the subbyte transformation using S-Box of AES.

Q13) Implement digital signature in the program.

B) Subject : Data warehousing and Data mining

Course code: S.ITS5.PR1

Objective : to develop the skill of data analytics and to understand the concept of data warehouse.
Software: Oracle 11g and Weka

Practical topics:

1. Oracle Database creation
2. Importing tables from data sources.
3. Designing staging area.
4. Design star schema model
5. Implementation of data extraction , transformation and loading
6. Setting up a data mart

7. Implementation of classification algorithm
    a. Naïve Bayes algorithm
    b. Decision tree based algorithms(J48)
8. Implementation of different types of clustering algorithm
    a. K means algorithm
    b. Hierarchical algorithm
9. Implementation of Apriori algorithm.

10. Implementation of classification, clustering and association rule using Knowledge flow.

T.Y. B.Sc.IT **Course : S.ITS.5.PR1**

Practical – II:

C) C# with ASP.NET

Learning Objective:

To equip the students with skills required in software industry Students will learn the latest of C# and ASP.NET in framework 4.0 Students can apply the skill learnt in developing website projects

I) Write a C# code to generate fibonacci numbers in between the sequence along with an option to continue or quit. Accept the start and end numbers from user.
II) Write a C# code to separate the numbers in an array num[20] having odd and even numbers into two arrays even[10] containing only even numbers and odd[10] containing only odd numbers. Accept the numbers from the user.
III) Write a C# code to find a number which appears maximum number of times in an array of n numbers. Repetition is allowed.
IV) Write a C# code to print pascals triangle. Accept the number of rows from the user
V) Write C# code to arrange the name of cities in sorted order. Accept name of 10 cities from the user
VI) Write C# code to use the LINQ (Language-Integrated Query) feature of C# by creating a collection of CarNames stored in string array. Now display all the names using LINQ.
VII) Create methods add(). multiply(), substract() ,divide() with suitable parameters and call these methods using concept of C# delegate.
VIII) Using DataList control in ASP.NET display the following fields ENO ENAME ADDRESS PHOTO from the database. Accept the eno range from the user
IX) Which control should be used to validate:
    a) A password which is entered twice for confirmation
    b) The age of the user to be over 21
    c) The date to be after the 10/10/2000

Justify your answer by writing correct Validators and conditions.

Design a Login screen in ASP.NET which accepts user name and password. On submit it should check from the server whether the user exists or not. If the user exists in web server then he/she should be directed to proper html page with welcome message.

X) Design a Login screen in ASP.NET which accepts user name and password. On submit it should check from the server whether the user exists or not. If the user exists in web server then he/she should be directed to proper html page with welcome message.
XI) Write the following application.
The initial page is called Validator.aspx and it has 7 text boxes representing (Name, Family Name, Address,City, Zip Code, Phone and e-mail address), and a Check button. Display the page that user gets after clicking on Check button.

The required validation actions are:

- name different from family name,
- address at least 2 letters,
- city at least 2 letters,

- zip-code 5 digits,
- phone according to the format XX-XXXXXXX or XXX-XXXXXXX,

- e-mail is a valid email.

Display the page with the message that user gets after entering only some of the details correctly.
Finally display the page that the user gets after a correct submission of all the details.

XII) Create a screen which accepts student roll no. On click of submit it should display student result in the grid view with fields

Name Course Marks Total Marks Percentage

The database table contains table called student (roll no, name, course , address, year)
Result (roll no, subject, marks, total marks)

XIII) Design a purchase order report using crystal report. PO must have the basic fields

VENDOR SHIP TO ITEM NO DESCRIPTION QTY UNIT PRICE TOTAL

XIV) Using crystal report design simple mark-sheet for SSC result. The data should appear dynamically form database.

XV) Using crystal report design attendance report for SYIT in various subjects.
Data should be taken dynamically from database

XVI) Design the front page of the website using various controls of DOTNET framework Some of the controls are SiteMap control, TreeView control, Menu control, Validation controls, Login controls etc.

Continuous Internal Assessment

Conducting practical test

T.Y. B.Sc.IT **Course: S.ITS5.PR2**

Practical:

The practical for this subject can be performed in any of the following programming languages: Java, C#.NET, Python, C++ and Android.

D) Artificial Intelligence

1. Implementation of any 2 uninformed search methods with some meaningful application.
2. Implementation of any 2 informed search methods with some application.
3. Implementation of a simple NN for any suitable application (with tool/library).
4. Implementation of a simple NN for any suitable application (without tool).
5. Implementation of a simple GA for any suitable application (with tool/library).
6. Implementation of a simple NN for any suitable application (without tool).
7. Implementation of MiniMax approach for TIC-TAC-TOE using Java/ Android/Python.
8. Demonstrate the use of fuzzy systems to help the management decide whether the player should get selected for a team or not.
9. Develop a book recommend-er (a book that the reader should read and is new to the reader) Expert system or (any other).

ASSESSMENT:
PRACTICALS *
ESE: **45 marks** for exam + **05 marks** for journal

A journal of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.

Contents:

CLASS: T.Y. B.Sc.IT **COURSE CODE: S.ITS6.01**

TITLE: **Cloud Computing and Big Data**

LEARNING OBJECTIVES:

To study the fundamentals of cloud computing, various architectures and applications that implement cloud computing and understand the scope of its security features.
To understand the basic concept of Big data.

Total Number of lectures: 60

Unit I	**Evolution of Cloud and its fundamentals:** Hardware evolution, Internet Software evolution, Protocols for communication, Common interface to the internet, the appearance of Cloud Formations. **Cloud Computing Service Models:** IaaS, PaaS, SaaS **Different Cloud Models:** Public, Private, Hybrid Cloud	10

Unit II	**Virtualization:** Introduction & benefits of Virtualization, Characteristics of Virtualized environments, Taxonomy of Virtualization techniques, Pros and Cons of Virtualization, Technology examples: VMware, Microsoft Hyper-V, Virtual Box (Freeware App to try out on Local Computer) Hyper V- Generation 1 & 2 **Storage:** What is a Cloud Storage 1. Different storage type over Cloud: Blobs, Tables (Non-Relational), File Storage. 2. Blob: Block Blob, Page Blob, Append Blobs. 3.Table Storage 4. File Storages. File Systems: NTFS, HDFS. Where to use Cloud Storages, Different Cloud Storage Providers: Google Drive, Microsoft One Drive, Azure Storage, Amazon S3(Simple Storage Service), Drop Box **Virtual Machines** What are Virtual Machines, Which scenario where we can use Virtual Machines, VM's on Cloud (Azure – VM /Amazon EC2), Components of Virtual Machines, How physical Machines can be moved to Virtual Machines(Workloads), Traffic Management – Load Balancers & Traffic Managers, Comparing VMware/HyperVisor VM's to Azure Cloud VM **Security Related to Cloud Computing:** Risk Management, Authentications Modes [Multi Factor, Single SignOn]	20
Unit III	**Fundamentals of Big Data**	10

	understanding Big data , concepts and terminology Big data characteristics, different types of data business motivations and drivers for big data adoption Business architecture, big data adoption and planning considerations Organizational prerequisites, Data procurement Big data analytics life cycle, enterprise technologies and big data business intelligence, Online transaction processing(OLTP), Online analytical processing(OLAP) Extract ,transform ,Load(ETL), Traditional BI, Big data BI	
Unit IV	**Big data storage concepts** Clusters, File systems and distributed systems NoSQL, Sharding, Replication, CAP theorem ACID, Big data processing concepts, Parallel data processing Distributed data processing, Processing workloads, batch Transactional Cluster, Processing in batch mode Batch processing with Map Reduce, Map and Reduce tasks Map, Combine, Partition, Shuffle and sort Reduce, Understanding map reduce algorithms **Hadoop** Hadoop Fundamentals, What is hadoop?, Hadoop Framework A hadoop cluster, Hadoop directory layouts The Hadoop distributed File System YARN and HDFS	20

LIST OF REFERENCE BOOKS:

1)Big data fundamentals concepts, Drivers and Techniques -Thomas Earl, Wajid Khattak, Paul Bulher
Erl, Thomas; Khattak, Wajid & Buhler, Paul: Big data fundamentals : concepts, drivers and techniques. Noida. Pearson India Education Services Pvt. Ltd, 2016. 978-93-325-7507-3--(006.312Erl)
2)Virtualizing Hadoop -George Trujillo, Charles Kim, Steven Jones , Romme Garcia, Justin Murray
Trujillo, George J. Jr.; Kim, Charles; Jones, Steven & Garcia, Rommel: Virtualizing Hadoop : how to install, deploy and optimize hadoop in a virtualized architecture. Noida. Pearson India Education Services Pvt. Ltd, 2016. 978-93-325-7043-6--(005.74Hadoop/Tru)

3)Cloud computing patterns, Fehling, Leymann, Ralph Retter, et. al., Springer
Fehling, Christoph; Leymann, Frank; Retter, Ralph & Schupeck, Walter: Cloud computing patterns : fundamentals to design, build and manage cloud applications. New York. Springer, 2014. 978-3-7091-1567-1--(004.6782Feh)
4)Cloud Computing, Rittinghouse, Ransome, CRC press
Rittinghouse, John W. & Ransome, James F.: Cloud computing : implementation, management and security. Boca Raton. CRC Press, 2010(2017). 978-1-1386-2703-1--(004.6782Rit/Ran)

ASSESSMEN
T: THEORY:
CIA I: Written test **for 20 marks**

CIA II: Assignments / Project / Presentation / Case Study/ Written Test **for 20 marks**

ESE PATTERN:
For 60 marks: 4 Units- 4 Questions of 15 marks each [per unit]

For 100 marks: 4 Units- 5 Questions of 20 marks each [Q1 of ALL units and Q2 to Q5 per unit]

CLASS: T.Y. B.Sc.IT **COURSE CODE: S.ITS6.02**

TITLE : Enterprise Resource Planning

LEARNING OBJECTIVES:

To introduce the concept of ERP systems and SCM's structures with special focus on Material Management module along with open source ERP software demos as a learning tool.

Total Number of lectures: 60

UNIT I	**ERP-An Introduction and Implementation** (15 lectures)
	ERP-An Introduction
	What is ERP? The Need for ERP, Benefits of ERP, Business Models, Growth of ERP in India
	ERP Implementation Lifecycle introduction
	In-house Implementation Pros and Cons, Vendors, Consultants, End-Users
UNIT II	**Supply Chain Management – I** (15 lectures)
	Introduction -
	What is Supply Chain? Its objective, Supply Chain Decision making, Process View of a Supply Chain, Examples of Supply Chains
	The Network -
	The Role of Distribution in the Supply Chain, Factors that influence the Distribution Network Design, Design Options for a Distribution Network, E-Business and the Distribution Network, Channels of Distribution, Distribution Networks in Practice.
UNIT III	**Supply Chain Management - II** (15 lectures)
	The Customer service dimension –
	Customer Service and Customer Retention, Service driven logistics systems, Setting customer service priorities and service standards
	Benchmarking the Supply Chain –
	Benchmarking the logistics process, Mapping supply chain processes, Supplier and distributor benchmarking, Setting benchmarking priorities, performance indicators
UNIT IV	**ERP Modules** (15 lectures)
	Key ERP Modules

	Finance, Sales and Distribution, Human Resource Management, Marketing, Material Management
	Understanding the functionality of the modules with the demonstration of open source ERP software

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LIST OF RECOMMENDED REFERENCE BOOKS and URL:

1. "ERP", Alexis Leon, Tata McGraw Hill.
   Leon, Alexis: Enterprise resource planning. (2nd ed.) New Delhi. Tata McGraw-Hill Publishing Company Ltd, 2008. 0-07-065680-0--(658.4038Leo)
2. "Supply Chain Management Strategy, Planning and Operation", **Chopra, Sunil; Meindl, Peter & Kalra, Dharm Vir: Supply chain management : strategy, planning and operation. (5th ed. Reprint) New Delhi . Dorling Kindersley (India) Pvt. Ltd. , 2013(2016). 978-81-317-8920-9--(658.5Cho)** S Chopra, P. Meindl and D.
3. "Logistics and Supply Chain Management", Martin Christopher, Pearson

   Christopher, Martin: Logistics and supply chain management. (4th ed.) Harlow. Pearson Education Limited, 2011. 978-0-273-73112-2--(658.5Chr)
4. Alexis Leon, "ERP Demystified", Tata McGraw Hill
   Leon, Alexis: ERP demystified. (3rd ed.) New Delhi. Mcgraw-Hill Education (India) Private Limited, 2015. 978-93-5134-160-4--(658.4038Leo)

"Enterprise Resource Planning", E. Monk, B. Wagner, Cengage Learning

Monk, Ellen F. & Wagner, Bret J.: Concepts in enterprise resource planning. (4th ed.) Delhi . Cengage Learning India Private Limited , 2013. 978-81-315-2592-0--(658.4038Mon/Wag)

Materials Management with SAP ERP, 3rd Edition, Martin Murray, SAP PRESS.

T.Y. B.Sc.IT **Course: S.ITS6.03**

Title: Advanced Java

Learning Objective:

To equip the students with skills required in software industry
Students will learn the latest of Java through Struts2, Hibernate and Spring.
Students can apply the skill learnt for projects.

Total Number of lectures: 60

Unit 1	**J2EE Concepts and Java Database Connectivity [JDBC] (15 lectures)** ***JDBC*** - Introduction to JDBC Architecture - Type I Driver (JDBC-ODBC Bridge) - Types of Driver - Understanding Statement, PreparedStatement, CallableStatement Interface through examples - Understanding ResultSet , ResultSetMetadata interface through examples - Difference between execute() , executeUpdate(), executeQuery() method - Transactions , Commits, Rollbacks, and Savepoints Batch Processing ***J2EE*** -meaning of J2EE, J2EE Architecture. -Component Technology (EJB) and Service Technology (JNDI, JAAS).
Unit 2	**Servlet and JSP (15 lectures)** ***Servlet*** - What is a Servlet ? - Servlet Lifecycle

	- Servlet API -Object model of Servlet framework. -understanding web.xml, servlet tags and directory structure of web application. - GenericServlet and HttpServlet, ServletConfig & ServletContext - Handling Form data with get and post request - Initializing a servlet - Request Dispatcher, Redirecting Request. - Session Management. -Filters in servlet -programs in servlet to read all parameters from form, database handling program, reading cookies values. ***JSP*** - What is JSP page? Compare it with servlet - Lifecycle of JSP page - JSP syntax using Directive, Declaration , Expression , Scriplet, Comment - Using javabean and Action Tag in JSP - JSP implicit objects - Using JSP standard tag library (JSTL) - Session management - Exception handling - Custom tag - Transferring Control to Another Web Component - Using JDBC in JSP -Programs in JSP. -Integrating JSP with JQuery, Bootstrap, Angular JS, JSON.
Unit 3	**Struts (15 lectures)** ***Basic of Struts2*** - Understanding MVC architecture - Struts2 framework. -understanding default-stack. -comparing struts with other framework. ***Working with Struts2 Actions*** 1) Introducing Struts 2 actions 2) Packaging your actions 3) Implementing actions ***Adding workflow with interceptors*** 1) Why intercept requests? 2) Interceptors in action 3) Surveying the built-in Struts 2 interceptors 4) Declaring interceptors 5) Building your own interceptor ***Data transfer: OGNL and type conversion*** 1) Data transfer and type conversion: common tasks of the web application

	domain 2) OGNL and Struts 2 3) Built-in type converters 4) Customizing type conversion ***Validation framework*** 1) RequiredFieldValidator Class 2) RequiredStringValidator Class 3) ExpressionValidator Class 4) Email Validator Class 5) RegexFieldValidator Class 6) DateRangeFieldValidator Class ***Struts UI and Tiles***
Unit 4	**Hibernate and Spring (15 lectures)** ***Hibernate*** - Introduction to Hibernate - Understanding ORM (Object Relational Mapping) - Understanding Transient, Persistent and Detached Object states - Issues while writing manual JDBC code. - Hibernate and JPA (Java Persistence API). - Writing persistence classes. -Steps to work with Hibernate. - Handling CRUD operations in Hibernate. - Mapping Inheritance between classes with tables in database. -HQL -One to One and One to One mapping in Hibernate. ***Core Spring*** -Springing into action. -Wiring beans. -Advanced wiring. -Aspect oriented Spring. ***Spring in Web and Backend*** -Building spring web application -JDBC with spring / Hibernate with spring **Continuous Internal Assessment** Assignment on unit 1, unit 2, unit 3, unit 4 Mid Term Test.

BOOKS:

1) Struts 2 in Action --Manning publication
Author: Donald Brown, Chad Michael Davis, and Scott Stanlick
Brown, Donald; Davis, Chad Michael & Stanlick, Scott: Struts 2 in action. New Delhi. Dreamtech Press, 2012. 978-81-7722-875-5--(006.78Bro)

2) Spring in Action—Craig Walls—Manning Dreamtech press
Walls, Craig: Spring in action. (4th ed.) New Delhi. Dreamtech Press, 2015(2017). 978-93-5119-799-7--(005.133Spring/Wal)

2) Pure JSP by James Goodwill Techmedia SAMS publication
Goodwill, James: Pure Java server pages. (Reprint) New Delhi. Techmedia, 2004(2010).

Collect

81-7635-441-4--(005.2762Goo)

3) Hibernate in Action Manning publication Author: Christian Bauer and Gavin King
Bauer, Christian & King, Gavin: Java persistence with Hibernate. New Delhi. Dreamtech Press, 2012. 978-81-7722-719-2--(005.133JAVA/Bau)

REFERENCE:

1) Java Servlet Programming O'Reilly Publication-Author: Jason Hunter.
Hunter, Jason: Java servlet programming. (2nd ed.) Mumbai. Shroff Publishers & Distributors Pvt. Ltd., 2011. 978-81-7366-285-0--(005.133JAVA/Hun)

2) Struts 2 Black Book.
Kogent Solutions Inc.: Struts 2 : Black book. (2nd ed.) New Delhi. Dreamtech Press, 2012. 978-81-7722-870-0--(006.78K.S.I.)

3) Database Programming with JDBC and Java – O'Relly Publication.
Reese, George: Database programming with JDBC and Java. (2nd ed.) Mumbai. Shroff Publishers & Distributors Pvt. Ltd., 2010. 978-81-7366-289-8--(005.756Ree)

T.Y. B.Sc.IT **Course: S.ITS6.04**

Title: Software Testing

Learning Objective:

To develop the skill of software testing

Number of lectures: 60

Unit 1	**The basics of software testing (15 lectures)** Terms and Motivations: Error and Bug Terminology, Testing Terms, Software Quality The Fundamental Test Process Test Planning and Control, Test Analysis and Design, Test Implementation and Execution, Evaluation of the Test Exit Criteria and Reporting, Test Closure Activities **Testing in software lifecycle** The General V Model Component Test: Explanation of Terms**,** Test Objects**,** Test Environment**,** Test Objectives**,** Test Strategy, Integration Test: Integration Strategy, System Test, Acceptance test: Testing for user acceptance**,** Operational testing**,** Field testing, alpha testing and beta testing.
Unit 2	**Functional testing (15 lectures)** Boundary value analysis testing, Robustness testing, Worst case testing, Equivalence class testing, Decision table based testing, Cause effect graphing technique and State transition testing. **Structural testing** Control flow testing, Statement coverage, Branch coverage, Conditional coverage and path coverage, Data flow testing, Basis path testing, cyclomatic complexity, Mutation testing, mutation and

	mutants, Mutation operators and mutation score and slice based testing
Unit 3	**Static testing and Test management (15 lectures)** Static testing, Foundations, Review, Walkthroughs, inspections, The General Process, Roles and Responsibility and Types of Review **Test Management** Test Planning: Quality Assurance Plan, Test Plan, Prioritizing Tests Cost and Economy Analysis: Cost of Testing, Test Effort Estimation Definition of Test Strategy: Preventives Reactive Approach, Analytical vs. Heuristic Approach
Unit 4	**Advanced concepts of software testing (15 lectures)** Metrics and models in software testing, Software metrics, categories of metrics, What should be measured during testing? Testing web applications, Functional testing, user interface testing, navigation testing and form based testing, automated test data generation using genetic algorithm, initial population, Crossover and mutation, fitness function and algorithm for generating test data.

List of Recommended Reference Books

1. SoftwareTestingbyYogesh Singh
Singh, Yogesh: Software testing. Delhi. Cambridge University Press, 2012(2015). 978-1-107-65278-1--(005.14Sin)

2. Softwaretestingfoundations–AndreasSpillner, TiloLinz, HansSchaefer (SPD publication)
Spillner, Andreas, Linz, Tilo & Schaefer, Hans: Software testing foundations : a study guide for the certified tester exam : foundation level, ISTQB compliant. (2nd ed.) Mumbai. Shroff Publishers & Distributors Pvt. Ltd., 2011. 978-81-8404-314-3--(005.14Spi)

3. Software Testing–Ron Patton second edition
Patton, Ron: Software testing. New Delhi. Dorling Kindersley (India) Pvt. Ltd, 2012. 978-81-7758-031-0--(005.14Pat)

4. Software engineering–A Practitioners Approach Roger s Pressman
Pressman, Roger S.: Software engineering : a practitioner's approach. (7th ed.) Boston. McGraw Hill Higher Education, 2010. 0-07-126782-3--(005.1Pre)

5. Software testing–Principles, Techniques and Tools- TataMc-GrawHill education Pvt .Ltd, New Delhi **Limaye, M.G.: Software testing : principles, techniques and tools. New Delhi. Tata Mcgraw Hill Education Private Limited, 2012. 978-0-07-013990-9--(005.14Lim)**

Title: Project

Learning Objective:

To build an innovative software solution for a well defined problem by applying the knowledge of all the application oriented software learnt in the BSc.IT course and beyond.

Students are expected to continue the project which they had started in semester V. Project will carry 8 credits with 200 Marks.

Students can do live project in industry or in-house project.

Students are expected to give time equivalent to 12 lecture periods/week, out of which 3 periods will be contact time for guidance from internal guide. There will be continuous internal assessment (CIA) for 40% of the credit (80Marks).

This will consist of:

Remaining 60% of the credit (120Marks) will be end semester examination consisting of documentation, presentation and viva. This will be jointly examined by the project guide and external examiner under the subheading of marks as follows:

Documentation	Presentation	Execution of	System design
	(validation, database Handling,)	various modules with report and testing, UI, Project Quality	Understanding And viva
30	30	30	30

List of project categories

1. Hardware projects based on microcontroller / PIC
2. Networking projects
3. Mobile App projects
4. Website projects
5. Desktop application
6. Real-time application in Linux/Unix
7. Or any other suitable project which is approved by the project guide

Suggested format for project report S.ITS6.PROJ

1. Cover page
2. Certificate from college(for in-house / external project)
3. Synopsis of project
4. Project report
    a. Table of content
    b. Definition of problem
    c. Objective and scope of project
    d. System analysis and design
    e. User requirement
    f. Functional requirement
    g. Non-functional requirement
    h. Normalization
    i. DFD, context level diagrams
    j. Flowchart, ER diagram
    k. Use case diagrams
    l. Feasibility study
        1. Technical feasibility

2. Economical feasibility
3. Operational feasibility

m. Software engineering paradigm applied
n, Software and hardware requirement specification
o. PERT chart, Gantt chart
p. Coding
q. Code efficiency
r. Validation checks
s. Testing

- Test techniques(white box and black box testing)
- Writing Test cases
- Using test data
- Generating defect reports

- Use of testing tools(manual/automated)

t. System security measures
u. Cost estimation of project
v. Screen shots
w. Future enhancement
x. Bibliography
y. Glossary

5. Students have to submit black book to college(1 per group) in A4 size with one side written (approx 100-200 pages) along with CD having full documentation and codes

6. Students doing project in industry will have to get certificate from the company.

T.Y. B.Sc.IT **Course: S.ITS6.PR1**

Practical:

A) ADVANCED JAVA

Learning Objective:

To equip the students with skills required in software industry. Students will learn the latest of Java through Struts2 and Hibernate Practicals. Students can apply the skill learnt for projects.

For a 2 credit course a minimum of 8 programs should be executed. A journal of the printouts of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.

I) Write a servlet code with the initialization parameter.

II) Implement a Stack in Java and perform the following operations: (Create, Push, Pop, Search a data item)

III) Write Filter program in servlet to block the user from particular IP address.

IV) Write a servlet which displays the cookie name and the value.

V. Create Bulletin Board Servlet

This is a bulletin board that is maintained by the server. Entries are parsed as HTML, so you can post anything from plain text to applets. The entries are saved to a file, so the board will survive server shutdowns.

Enter message:

Submit Message | Clear Message | View Postings

-

VI) Create a "**DataServlet.java**" which is the servlet which is making the connection to the database and retrieves the data from database. After getting the values from database, data is added to the Data List. Then data list is added to the request object and sent to the JSP page. In JSP page the values are displayed using **Iterator** class object.

VII) Create an html page with fields, eno, name, age, desg, salary. Now on submit this data to a jsp page which will update the employee table with matching eno.

VIII) Write jsp code to demonstrate the use of session object in shopping cart.

IX) Write JSP code to do login authentication from database and redirect to new JSP page as per the role assigned in the database.

X) Using struts validation framework do validation for

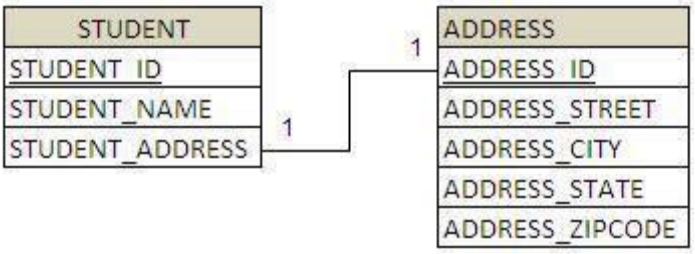
1)email

2)phone 3)emp no
4)emp name 5)age

XI) Create a login interceptor in struts which always intercepts and displays a login screen when the user has not logged in and tries to visit some page on the website.

XII) To persist the java objects using the Hibernate Object/Relational Mapping (ORM) framework

XIII) Consider one to one relation as shown. Now map this relationship using hibernate



Continuous Internal Assessment
MCQ / Viva test during practicals

Mid Term practical test.

T.Y. B.Sc.IT **Course: S.ITS6.PR1**

Practical:

B) Mobile Application Development

1) a. Create "Hello World" application. That will display "Hello World" in the middle of the screen in the blue color with white background.

b. Create an app with two buttons. Have the first one pop up a Toast or insert text into a TextView that says "Hello". Have the second one say "Goodbye". Use the named inner class approach. (**Hint**: String text = "..."; Toast tempMessage = Toast.makeText(referenceToMainActivity, text, Toast.LENGTH_SHORT); tempMessage.show();)

2) Create a project with a Spinner

a. That displays the choices Red, Yellow, Blue, and Green. Have a TextView whose color matches the Spinner. Set the choices in XML.
b. Modify the above project by adding a second Spinner with the same choices and behavior as above. But, this time, set the choices from Java.
c. If you want to have a prompt (i.e., title at the top when the spinner pops up, use your Spinner. Set Prompt and supply either an id or a String).

3) a. Create a sample application with login module. (Check username and password) On successful login, go to next Activity. And on a failed login, alert user using Toast. Also pass username to next Activity with a Welcome Message.

b. Create a project whose initial screen has a Text View that says "Activity 1" and has a Button that says "Go to Activity 2". Have Activity 2 show a Text View that says "Activity 2" and have a Button

that says "Go to Activity 1". Have the buttons switch back and forth.

c. Understanding of UI:
Create an UI such that, one screen have list of all the types of cars. On selecting of any car name, next screen should show Car details like: name, launched date, company name, images (using gallery) if available, show different colors in which it is available.

4) Create an application to read:
a. File from the scared and display that file content to the screen.
b. Read messages from the mobile and display it on the screen.

5) Create an application to send message between two emulators.

6) Create an application to perform Insert, update, Delete and retrieve operation on the slate database.

7) Create an application that uses the Google maps API to help you locate your current geographical location.

8) Create a project to send a common mail to all the intended recipients via Gmail from your application.

AS
SE
SS
ME
NT:
PR
AC
TI
CA
LS
***

ESE: **45 marks** for exam + **05 marks** for journal

A journal of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.

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