।। सा विद्या या विमुक्तये ।।

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

"ज्ञानतीर्थ" परिसर, विष्णुपूरी, नांदेड - ४३१६०६ (महाराष्ट्र)

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED

"Dnyanteerth", Vishnupuri, Nanded - 431606 Maharashtra State (INDIA)

Established on 17th September 1994 – Recognized by the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'A' Grade

ACADEMIC (1-BOARD OF STUDIES) SECTION

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संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदव्युत्तर स्तरावरील द्वितीय वर्षाचे CBCS Pattern नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०२०–२१ पासून लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, **दिनांक २० जून २०२० रोजी संपन्न झालेल्या ४७व्या मा. विद्या परिषद बैठकीतील विषय क्र.११/४७–२०२०**च्या ठरावानुसार प्रस्तुत विद्यापीठाच्या **संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदव्युत्तर स्तरावरील द्वितीय वर्षाचे** खालील विषयांचे **C.B.C.S. (Choice Based Credit System) Pattern** नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०२०–२१ पासून लागू करण्यात येत आहेत.

1. M.Sc.-II Year-Botany
2. M.Sc.-II Year-Herbal Medicine
3. M.Sc.-II Year-Analytical Chemistry
4. M.Sc.-II Year-Biochemistry
5. M.Sc.-II Year-Organic Chemistry
6. M.Sc.-II Year-Physical Chemistry
7. M.Sc.-II Year-Computer Management
8. M.Sc.-II Year-Computer Science
9. M.Sc.-II Year-Information Technology
10. M.C.A. (Master of Computer Applications)-II Year
11. M.Sc.-II Year-Software Engineering
12. M.Sc.-II Year-System Administration & Networking
13. M.Sc.-II Year-Dairy Science
14. M.Sc.-II Year-Environmental Science
15. M.Sc.-II Year-Applied Mathematics
16. M.Sc.-II Year-Mathematics
17. M.Sc.-II Year-Microbiology
18. M.Sc.-II Year-Physics
19. M.Sc.-II Year-Zoology
20. M.Sc.-II Year-Biotechnology
21. M.Sc.-II Year-Bioinformatics

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या **www.srtmun.ac.in** या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी.

'ज्ञानतीर्थ' परिसर,
विष्णुपुरी, नांदेड – ४३१ ६०६.
जा.क्र.: शैक्षणिक–१/परिपत्रक/पदव्युत्तर–सीबीसीएस अभ्यासक्रम/२०२०–२१/**३३५**

दिनांक : १६.०७.२०२०.

स्वाक्षरित/–
उपकुलसचिव
शैक्षणिक (१–अभ्यासमंडळ) विभाग

प्रत माहिती व पुढील कार्यवाहीस्तव :
१) मा. कुलसचिव यांचे कार्यालय, प्रस्तुत विद्यापीठ.
२) मा. संचालक, परीक्षा व मूल्यमापन मंडळ यांचे कार्यालय, प्रस्तुत विद्यापीठ.
३) प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
४) साहाय्यक कुलसचिव, पदव्युत्तर विभाग, प्रस्तुत विद्यापीठ.
५) उपकुलसचिव, पात्रता विभाग, प्रस्तुत विद्यापीठ.
६) सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ.

Swami Ramanand Teerth Marathwada University, Nanded

(NAAC Re-accredited with 'A' Grade)

Syllabus of

Second Year M.Sc. (Information Technology)*
(Revised CBCS pattern)
Introduced from Academic Year 2020-2021

*(BoS deserves the rights for minor corrections, typographical errors in this syllabus with due approval of Administrations)

M.Sc. (Information Technology)

M.Sc. Information Technology (2years) program / degree is a specialized program in system administration and network related issues. It builds the student on higher studies and research awareness in system administration, maintenance and networking so as to become competent in the current race and development of new computational sciences. The duration of the study is of four semesters, which is normally completed in two years.

CBCS pattern

The M.Sc. Information Technology program as per CBCS (Choice based credit system) pattern, in which choices are given to the students under open electives and subject electives. The students can choose open electives from the wide range of options to them.

Eligibility and Fees

The eligibility of a candidate to take admission to **M.Sc. Information Technology** program is as per the eligibility criteria fixed by the University. More details on admission procedure and fee structure can be seen from the prospectus of the college / institution as well as on website of the University.

Credit Pattern

Every course has corresponding grades marked in the syllabus structure. There are 25 credits per semester. A total of 100 credits are essential to complete this program successfully. The Grading pattern to evaluate the performance of a student is as per the University rules.

Every semester has a combination of Theory (core or elective) courses and Lab courses. Each theory course has 04 credits which are split as 02 external credits and 02 internal credits. The university shall conduct the end semester examination for 02 external credits. For theory internal credit, student has to appear for 02 class test (15 marks) and 01 assignment (20 marks). Every lab course has 02 credits which are split as 01 external credit and 01 internal credit. For lab internal credit, the student has to submit Laboratory Book (05 marks) and remaining 20 marks are for the Lab activities carried out by the student throughout the semester. For lab external credit, 20 marks are reserved for the examinational experiment and 05 marks are for the oral / viva examinations. There is a special skill based activity of 01 internal credits per semester which shall inculcate awareness regarding the domain of computers, IT, and ICT.

The open elective has 04 credits which are purely internal. If students are opting for MOOCs as open elective, then, there must be a Faculty designed as MOOCs course coordinator who shall supervise learning through MOOCS. This is intentionally needed as the MOOCs course coordinator shall verify the MOOC details including its duration, staring date, ending date, syllabus contents, mode of conduction, infrastructure feasibility, and financial feasibility during start of each semester. This is precautionary as the offering of the MOOCs through online platforms are time specific and there must be proper synchronization of semester duration with the MOOCs duration. Students must opt for either institutional / college level open elective or a course from University recognized MOOCs platforms as open electives.

The number of hours needed for completion of theory and practical courses as well as the passing rules, grading patterns, question paper pattern, number of students in practical batches, etc shall be as per the recommendations, norms, guidelines and policies of the UGC, State Government and the SRTM University currently operational. The course structure is supplemented with split up in units and minimum numbers of hours needed for completion of the course, wherever possible.

Under the CBCS pattern, students would graduate **M.Sc. Information Technology** with a minimum number of required credits which includes compulsory credits from core courses, open electives and program specific elective course. All students have to undergo lab / practical activities leading to specific credits and project development activity as a part of professional UG program.

1. **M.Sc. Information Technology** Degree / program would be of 100 Credits. Total credits per semester= 25
2. Each semester shall consist of three core courses, one elective course, one open elective course and two practical courses. Four theory courses (core+elective) = 16 Credits. Two practical / Lab courses= 4 Credits in total (02 credits each) , One Open elective= 4 credit, One skill enhancement activity of 01 credits.
3. One Credit = 25 marks , Two Credits = 50 Marks, Four Credits = 100 Marks

PEO, PO and CO Mappings

1. **Program Name** : M.Sc.(IT)

2. **Program Educational Objectives**: After completion of this program, the graduates / students would

PEO I :Technical Expertise	Implement fundamental domain knowledge of core courses for developing effective computing solutions by incorporating creativity and logical reasoning.
PEO II : Successful Career	Deliver professional services with updated technologies in System Administration and NEtworking based career.
PEO III :Hands on Technology and Professional experience	Develop leadership skills and incorporate ethics, team work with effective communication & time management in the profession.
PEO IV :Interdisciplinary and Life Long Learning	Undergo higher studies, certifications and research programs as per market needs.

3. **Program Outcome(s):** Students / graduates will be able to

PO1: Apply knowledge of mathematics, science and algorithm in solving Computer problems.
PO2: Generate solutions by understanding underlying computational environment for administration and maintenance
PO3: Design component, or processes to meet the needs within realistic constraints.
PO4: Identify, formulate, and solve problems using computational temperaments.
PO5: Comprehend professional and ethical responsibility in computing profession.
PO6: Express effective communication skills.
PO7: Recognize the need for interdisciplinary, and an ability to engage in life-long learning.
PO8: Actual hands on technology to understand it's working.
PO9: Knowledge of contemporary issues and emerging developments in computing profession.
PO10: Utilize the techniques, skills and modern tools, for actual development process
PO11: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings in actual development work
PO12: Research insights and conduct research in computing environment.

4. **Course Outcome(s):** Every individual course under this program has course objectives and course outcomes (CO). The course objectives rationally match with program educational objectives. The mapping of PEO, PO and CO is as illustrated below

5. Mapping of PEO& PO and CO

Program Educational Objectives	Thrust Area	**Program Outcome**	Course Outcome
PEO I	Technical Expertise	PO1,PO2,PO3,PO6	All core courses
PEO II	Successful Career	PO4,PO5,PO11,	All discipline specific electives courses
PEO III	Hands on Technology and Professional experience	PO8,PO10	All Lab courses
PEO IV	Interdisciplinary and Life Long Learning	PO7,PO9,PO12	All open electives and discipline specific electives

Sr. No	Course category	Course Code	Course Title	Internal credits	External credits	Total credits
Third Semester						
1.	**Core Subjects**	IT-301	Information Security Management	1	3	4
2		IT-302	Programming in Java	1	3	4
3		IT-303	Software Testing	1	3	4
Choose any one from below elective subjects						
4	**Elective Subject**	IT-304 A	Computer Graphics	1	3	4
		IT-304 B	Digital Image Processing			
Practical /Lab						
5	**Lab / Practical**	IT-305	Lab-5: Java Programming	1	1	2
		IT-306	Lab-6: Based on Elective subjects	1	1	2
6	**Open Elective**	IT-307A	University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental OR Intra / Inter School OR	4	0	4
		IT-307 B	Logical Reasoning			
7	**Skill based Activity**	IT-308	SK-03: Seminar Presentation Activity	1	0	1
	Total credits					**25**

Sr. No	Course category	Course Code	Course Title	Internal credits	External credits	Total credits
FourthSemester						
1.	**Core Subjects**	IT-401	Mobile Communication	1	3	4
2		IT-402	Introduction to Scripting Language	1	3	4
3		IT-403	Major Project development Activity	0	4	4
Choose any one from below elective subjects						
4	**Elective Subject**	IT-404 A	Linux Administration	1	3	4
		IT-404 B	Mobile Application development			
Practical /Lab						
5	**Lab / Practical**	IT-405	Lab-7: Scripting Languages	1	1	2
		IT-406	Lab-8: Based on Elective subjects	1	1	2
6	**Open Elective**	IT-407A	University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental OR Intra / Inter School OR	4	0	4
		IT-407 B	Numerical Aptitude			
7	**Skill based Activity**	IT-408	SK-04 Soft Skills	1	0	1
	Total credits					**25**

Course Code: IT-301
Course Title: Information Security Management

Course Objectives:

- To Understand need of information Security in digital era.
- To understand types of security.
- To Understand different types of threats to security
- To understand security planning

Course Outcomes:

- At the end students will understand need of security, it types and various threat to security.
- Also, students will understand various security measures and how to secure the information from threats.

UNIT I: Introduction

Computer Security: Security Goals, Relation between Security-Confidentiality, Integrity, Availability and Authorization, Vulnerabilities- Principles of Adequate protection. Operating security, Database security, Program security,Attacks: Threats, Vulnerabilities and controls. The kind of problems-Interception, Interruption, Modification, Fabrication.

UNIT II: Program Security:

Program Security: Secure programs: Fixing Faults, Unexpected Behavior, Types of Flaws. **Nonmaliciousprogram errors:** Buffer overflows, Incomplete Mediation. Viruses and other **Maliciouscode:** Why worry about Malicious Code, Kinds of malicious code, how viruses attach,how viruses gaincontrol, Prevention.

UNIT III: Operating System Security

Protected objects and methods of protection, Memory address protection: Fence, Relocation, Base/BoundsRegisters, Tagged Architecture,Segmentation, Paging.**Control of access to general objects:** Directory,Access Control List.**File protection mechanism**: Basics forms of Protection, SinglePermissions.**Authentication:** Authentication basics, Password, Authentication Process Challengeresponse,Biometrics.**Models ofSecurity**: Requirement of security systems, Multilevel Security, AccessSecurity, Limitations of SecuritySystems.

UNIT IV: Database Security

Security requirements- Integrity of Database, Confidentiality and Availability,Reliability and integrity, Sensitive data, Interface, Multilevel database, Proposals for multilevelsecurity

UNIT V: Administrating Security&Nature of security Policies:

Security planning: Contents of a security, Planning Team members, commitment to a securityplan, Business continuity Plans.**Risk analysis**: The nature of risk, steps of risk analysis. Arguments forandagainst risk analysis,**Organizational security policies**: Purpose and goals of Organizational Security.Audience,Characteristics of a Good Security Policy.Data sensitivity policy, Government Agency IT securitypolicy.

Ref. Books:

1. Security in Computing, Second Edition, C. P.Pfleeger, and S. L. Pfleeger, Pearson Education.
2.Computer Security: Art and Science, Second Edition, Matt Bishop, Pearson Education
3. Cryptography and Network Security: Principles and practice First Edition, Stalling

Course Code: IT-302
Course Title: Programming in Java

Course Objectives:

- To learn why Java is useful for the design of desktop and web applications.
- To learn how to implement object-oriented designs with Java.
- To identify Java language components and how they work together in applications.
- To design and program stand-alone Java applications.

Course Outcomes:

At the end of course student will be able to: -

- Identify classes, objects, members of a class and relationships among. them needed for a specific problem.
- Write Java application programs using OOP principles and proper program structuring

Unit-I: Introduction to Java

History, Features, how java differ from C and C++? Java program structure, Java tokens, JavaStatements, Java virtual machine, Command line arguments, Constants, Variable, Data types, Typecasting.

Unit-II: Operators and Expression

Decision making and branching, Decision making and looping, Class, Methods, Objects,Constructors, Method overloading, Static members, nesting of methods.

Unit-III: Inheritance

Overriding methods, Final variables, Final methods, Final Classes, Finalizer method, Abstractmethods, Abstract Classes, Visibility Control, Interface, Arrays, Strings, Vectors, Wrapper Classes.

Unit-IV: System Packages

Naming conventions, Creating and accessing packages, Introduction to multithreaded programming,Creating and extending threads, Life cycle of thread, Thread exception, Thread priority,Synchronization, Implementing Runnable interface, Types of errors, Exceptions, Exception handlingcode, Multiple catch statements, finally statement, Throwing our own exceptions, Exception fordebugging.

Unit-V: Introduction to Applet

How applet differ from application, Applet code, Applet life cycle, creating an executable applet,designing a web page, Applet tag, Passing parameter to applet.

Reference Books

1. Programming with Java A Primer – E.Balaguruswamy, McGraw Hill.
2. Java 7 Programming Black Book -Kogent Learning Solutions Inc,DreamTech press.
3. Java Fundamentals A comprehensive introduction- Herbert Schildt, Dale Skrien,McGraw Hill Education.

Course Code: IT-303
Course Title: Software Testing

Course Objectives:

- To learn detection of bugs and performance issues in software.
- Understanding to develop and run test plans.
- Learn testing tools to detecting quickly bugs and error to smarter testing.
- To work with various software testing methods.

Course Outcomes:

At the end of course student will be able to:

- Determines the correctness, completeness and quality of software being developed.
- Technical documentation is well organized using testing.

Unit-I:Software Quality Assurance

Software Quality, Formal Technical Reviews, Elements of Software Quality Assurance, SQA Processes and Product Characteristics, SQA Tasks, Goals, and Metrics, Formal Approaches to SQA, Software Reliability, The ISO 9000 Quality Standards.

Unit-II:Software Testing Strategies

A Strategic Approach to Software Testing, Strategic Issues Test Strategies for Conventional Software, Test Strategies for WebApps & Mobile Apps, Validation Testing, System Testing, The Art of Debugging.

Unit-III:Testing Conventional Applications

Software Testing Fundamentals, Internal and External Views of Testing, White-Box Testing, Basis Path Testing, Control Structure Testing, Black-Box Testing, Testing for Real-Time System, Patterns for Software Testing

Unit-IV:Testing Web Applications

Testing Concepts for WebApps, The Testing Process—An Overview, Content Testing User Interface Testing, Navigation Testing, Configuration Testing, Security Testing of webapps, Performance Testing of web apps

Unit-V:Testing Mobileapps

Testing Guidelines, The Testing Strategies of mobile apps, Considering the Spectrum of User Interaction, Real-Time Testing Issues, Testing Tools and Environments.

Reference Books:

1. Software Engineering A Practitioner's Approach (eighth edition) By Roger S. Pressman (McGraw Hill Pub.)
2. The Art of Software Testing, 3rd Edition Author: Glenford J. Myers, Corey Sandler, Tom Baggett. The First Edition
3. The Just Enough Software Test Automation by Author: Dan Mosley and Bruce Posey

Course Code:IT-304 -A
Course Title: Computer Graphics

Course Objectives:

- To introduce the use of the components of a graphics system and become familiar with building approach of graphics system components and algorithms related with them.To learn the basic principles of 3- dimensional computer graphics.
- Provide an understanding of how to scan convert the basic geometrical primitives, how totransform the shapes to fit them as per the picture definition.
- Provide an understanding of mapping from a world coordinates to device coordinates, clipping, and projections. To be able to discuss the application of computer graphics concepts in the development of computer games, information visualization.

Course Outcomes:

At the end of course student will be able to: -

- To list the basic concepts used in computer graphics.
- To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.To describe the importance of viewing and projections, Understand a typical graphics pipeline
- To define the fundamentals of animation, virtual reality and its related technologies.

UNIT-I: Introduction to Computer Graphics

Introduction, Types of Graphics Devices, Input Devices, Video Basics: American Standard Video, High Definition Television ,Video Display Devices, Hard Copy Output Devices: Electrostatic output device, Ink-Jet Plotter, Thermal Plotter, Pen and ink, Plotter, Laser Printer,Graphics file format (.bmp, .tiff, .gif)

UNIT-II: Raster Scan Graphics

Line Drawing Algorithm, Digital Differential Algorithm,Bradenham's Algorithm: Integer, Algorithm, General Algorithm

UNIT-III: Transformation & Segmented Display files

Two-DimensionalTransformation, Matrix Representation, Translation, Rotation, Scaling, Reflection, Segments,Functions for segmenting display files, Posting and un posting segments, Segments naming schemes, Default error conditions, Appending to Segments

UNIT-IV: Clipping and Windowing

Viewing transformation, 2-D Clipping: Simple Visibility Algorithm, End points Code,Midpoint subdivision algorithm, Polygon Clipping algorithm (Sutherland-Hodgman algorithm)Windowing Transformation

UNIT-V: Display file Compilation Geometric Models

Refresh current with reconstruction, Free Storage Allocation, Display File Structure Simple Modeling Example, Geometric Modeling, Symbols& Instances, Implementation of instance transformation.

Reference Books:

1. Principle of Interactive Computer Graphics, William Newman & Robert Sproull (TMH)
2. Procedural Elements for Computer Graphics, David F. Rogers (TMH)
3. Mathematical Elements of Computer Graphics, David F Rogers (TMH)

Course Code:IT-304-B
Course Title:Digital Image Processing

Course Objectives:

- To learn fundamental concepts of Digital Image Processing,to study basic image processing operations.
- To understand image analysis algorithms
- To expose students to current applications in the field of digital image processing

Course Outcomes:

- Review the fundamental concepts of a digital image processing system, Analyze images in the frequency domain using various transforms.
- Evaluate the techniques for image enhancement and imagerestoration, Categorize various compression techniques.
- Interpret Image compression standards, Interpret image segmentation and representation techniques.

UNIT-I: Digital Image Processing Systems:

Visual Perception, Image sensing and acquisition, Image sampling and quantization Fundamental steps in DIP. Fundamental steps in DIP. Components of an Image Processing System, Elements of Visual Perception, Image sensing and acquisition, Image sampling and quantization Digital Image Representation, Data Classes & Image types and Converting between Data Classes and Image types.

Unit-II: Intensity transformation & Spatial filtering

Intensity Transformation function, Histogram processing & Function plotting, Spatial filtering

Unit-III: Frequency Domain Processing

2D –discrete Fourier transform, Filtering in frequency domain, Obtaining Frequency Domain Filters from spatial filters

Unit-IV: Image Restoration

A Model of the Image Degradation /Restoration Process, Noise Models, Restoration in presence of Noise only spatial filtering, Periodic Noise Reduction by Frequency domain filtering

Unit-V Color Image Processing &Introduction to Wavelets

Color Image Representation, Converting to other Color Space. Fast wavelet transforms, Working with Wavelet Decomposition structures Inverse Fast Wavelet transform Concept & terminologies, Graph Representation, TraversalsBFS &DFS Applications AOV networktopological sort AOE network critical path, Shortest path with implementation.

References:

1. R.C. Gonsales R. E. Woods, Digital Image Processing, Second Edition, Pearson Education.
2. Anil K. Jain, Fundamentals of Image Processing, PHI
3. R.C. Gonsales R. E. Woods, Digital Image Processing using MATLAB, Second Edition, Pearson Education.

Course Code:IT-305
Course Title:Lab-5: Java Programming

- Programming in Java: At least 15 Logical programs covering all concepts of Java programming.

Course Code:IT-306
Course Title:Lab-6: Based on Elective subjects

- At least 15 Logical programs covering all concepts of Elective adapted by the students.

Course Code:IT-307-A
Course Title:University recognized MOOC

- **Open Elective**: University recognized MOOC (NPTEL / SWAYAM / others) OR Intra /Inter Departmental courses.

Course Code:IT-307-B
Course Title:Logical Reasoning

UNIT I: General Mental Ability-I
Series Completion, Coding and Decoding, Blood relations, Seating Arrangement,Comparison type questions.

UNIT II: General Mental Ability-II
Directions sense test, logical Venn diagrams, Inserting the missing character, data sufficiency.

UNIT III: Logical Deduction
Logic, statement arguments, statement assumptions, statement conclusion.

UNIT IV: Arithmetical Ability-I
Numbers, Simplification, Average, Problems on ages, Percentage, Probability.

UNIT V: Arithmetical Ability-II
Profit and loss, ratio and proportion, time and work, simple interest compound interest, calendar.

Reference books:
1. Quantitative Aptitude by Dr. R S Aggarwal, Revised edition, ISBN 81-219-2498-7
2. A Modern Approach to Verbal Reasoning by Dr. R S Aggarwal, S. Chand andCompany Pvt. Ltd., ISBN 81-219-0552-4

Course Code:IT-308
Course Title:Seminar Presentation Activity
(SK-03 Skill Based Activity)

Purpose:

1. To enable a student to be familiar with Communication skills
2. Student is expected to Learn – how to deliver a seminar
3. Every student must deliver a seminar on recent topic and one seminar report has to be submitted

Course Code:IT-401
Course Title:Mobile Communication

Course Objectives:

- To understand the basics of wireless voice and data communication technologies.
- To study about the wireless communication Techniques, to understand measurement and performance of mobile and wireless system.
- To understand security and privacy issues in wireless environments.

Course Outcomes:

- Evaluate the usability of mobile devices such as smart phones.
- Select appropriate wireless technologies in commercial and enterpriseapplications.
- Assess the capabilities of next generation networks and role of mobiletechnologies.

Unit-I:Introduction

Applications, Vehicles, Emergencies, Business, Replacement of wired networks, Infotainment and more, Location dependent services, Mobile and wireless devices A short History of wireless communication, A market for mobile communication Some open research topics, A simplified reference model,

Unit-II:Cellular System

Basic Cellular System Performance Criteria, Operation of Cellular System,Planning a Cellular System.

Unit-III:Wireless transmission

Frequencies for radio transmission,Regulations, Signals, Antennas, Multiplexing Modulation, Cellular Systems.

Unit-IV:Medium Access Control & Telecommunication Systems

Motivation for specialized MAC, SDMA,TDMA,Fixed TDM, Classical Aloha Slotted Aloha. Introduction to GSM, Mobile services, System architecture, Applications of satellite systems.

Unit-V:Wireless LAN
InfraredVs Wireless LAN, Infrastructure and Ad-hoc network, IEEE 802.11 System Architecture, Protocol Architecture, HIPERLAN, HIPERLAN Bluetooth, Architecture of Bluetooth.

Reference books:
1. Mobile Communications Second Edition – By Jochen Schiller (Pearson Education)
2. Mobile Cellular Telecommunications Second Edition-By William C.Y.Lee (Mc-GrawHill)

Course Code:IT-402
Course Title:Introduction to Scripting Language

Course Objectives:
- The principles of scripting languages,Motivation for and applications of scripting.
- Difference between scripting languages and non- scripting languages.
- Types of scripting languages.

Course Outcome:
Upon learning the course, the students will have the:
- Ability to create and run scripts in design flow.
- Ability to use and write programs for automation of scripts

Unit I: Basic Network and Web Concepts
Internet Basics, Internet standards - TCP and UDP protocols - URLs - MIME - CGI - Introduction to SGML.

Unit II:Introduction to HTML
List, Creating table.Linking documents.Frames.Graphics to HTML doc.Style sheet.Style sheet basics.Add style to document.Creating style sheet roof,Style sheet properties,Font - Text List, Color and Background color,Box Display properties.

Unit III: Dynamic Html& Java Script
Dynamic HTML - introduction - cascading style sheets - object model and collections - event model - filters and transition - data binding - data control - ActiveX control - handling ofmultimedia data,Introduction to JavaScript, HTML, Structure of JavaScript,Advantage of java script, Java script syntax,Data type- Variable, Array,Operator and Expression looping constructor,Function, Dialog Box.

UnitIV: Java Script

Java script document object model, Introduction object in HTML,Event handling, Window object,Document object,Browser object,Form object,Navigator object,Screen objectBuilt in object,User defined object,Cookies.

Unit V: Server-Side Programming
Servlets - deployment of simple servlets - web server (Java web server / Tomcat), - HTTP GET and POST requests - session tracking - cookies - JDBC - simple webapplications - multi-tier applications.

Reference books:
1. HTML, DHTML, JavaScript, Perl CGI by IVAN Bayroos, BPB Publication.
2. JavaScript 2.0 - The Complete Reference by Thomas Powell and Fritz Schneider, McGraw-Hill, 2nd Edition.
3. Java Network Programming byElliotte Rusty Harold, O'Reilly Publishers, 2002
4. Internet and Java Programming, By R. Krishnamoorthy & S. Prabhu, New Age International Publishers.

Course Code: IT-403
Course Title: Major Project development Activity

Course Objectives:

To provide a postgraduate level knowledge in computer science, including understanding, analysis, management, and handling of real-life information technology problems in workplace. Students are encouraged to problems from real life / NGO/ / state-central govt projects/ hackathon/ etc

Course Outcome:

Project based learning will increase their capacity and learning through shared cognition. Students will have an ability to identify, formulate and implement computing solutions. Students will be able to design a system, component or process as per needs and specification.

Guidelines for Project Development:

1. A group of maximum three students should be formed at the beginning of the semester
2. Each project will be allotted one project guide.
3. Students must submit the project topic and synopsis to the project guide.
4. Students will be given a project approval letter signed by the head of department and the project guide.
5. After receiving a project approval letter, students must submit at least three progress reports of their development in project to the guide, one per month.

6. After completion of project students have to give pre-exam demo to his guide.
7. After finalization of the project, students must prepare minimum 03 copies of the project reports, out of which one copy is for the college and one copy is for the university records. University/College copy must be bind with black covering with golden embossment and it should contain
   i. First Page
   ii. Certificate
   iii. Declaration
   iv. Acknowledgement
   v. Project Approval letter
   vi. Three Progress reports
   vii. System Flow Diagram/DFD
   viii. Chapter wise briefing, results, conclusions, snapshots, code, etc
   ix. Bibliography

Course Code:IT-404-A
Course Title: Linux Administration

UNIT I: Introduction to LINUX
Hardware Requirements, Red Hat LINUX Installation, Advantages of LINUX, Other LINUX distributions, Concept of Linux loader

UNIT II: Working with Linux & X window System
LINUX file system, Shells, Text editors, Changing User Information, File Permissions, Virtual Consoles Basic X window system, Configuring X window systems, Starting X, Selecting & using X window.

UNIT III: Managing Services, Software & System Resources
LINUX Boot Process, System services and run levels, controlling services at boot with administrative tools, Starting and stopping services manually, Using RPM for software management, Using RPM on the command line, Extracting a single file from & RPM file, Graphical Package Management, System monitoring tools

UNIT IV: Printing with Linux
Configuring & managing print services, Local printer installation, Network printer installation, LINUX printing commands, Using the Common UNIX Printing System (CUPS), Console print control

UNIT V: Network Connectivity
Networking with TCP/IP, Hardware devices for networking, Using RED HAT Linux network, configuration tools, Using DHCP [Dynamic Host Configuration Protocol], Using the network file system, Wireless networking, Introduction to DNS,

Reference Books:

1. Red Hat Linux Unleashed, Edition illustrated reprint, "Bill Ball, David Pitts", Sams, 2001, ISBN 0672319853, 9780672319853.
2. 2. Red Hat Fedora 2 Unleashed, Edition illustrated, "Bill Ball, David Pitts", Sams, 2005, ISBN 067232721X, 9780672327216.

Course Code:IT-404-B
Course Title:Mobile Application Development

Objectives:

- This course shall build a platform for students to start their own enterprise
- For Making Student Job Ready, to gain an understanding of the processes that are involved in an Android developed, application, to become familiar with Android development tools and user interface.
- To understand Activity and Intends,& SQLite Database. Web view control, Ability to build Many simple apps that can be shared with mobile users.

Outcome of the course:

- Understand the Android OS architecture.
- Install and use appropriate tools for Android development, including IDE, deviceemulator, and profiling tools.
- Understand the Android application architecture, including the roles of the task stack, activities, & services. Build user interfaces with fragments, views, form widgets, text input, lists, tables, andmore.

UNIT I: Introduction

About Mobile Programming &Android, Smart phones future, preparing the Environment-Installing the SDK, Creating Android Emulator, Installing Eclipse, Installing Android Development Tools, choosing which Android version to use, Android Stack, Android applications structure.

UNIT II: Android Architecture

Android Stack, Android applications structure, creating a project, working with the, Android Manifest.xml, Using the log system, Activities

UNIT III: UI Architecture &User Interface Widgets
Application context, Intents, Activity life cycle, Supporting multiple screen sizes
Text controls, Button controls, Toggle buttons, Images, Notification and Toast- Parameters on Intents**,** Pending intents**,** Status bar notifications**,** Toast notifications

UNIT IV: Menus, Dialogs &Animation
Localization, Options menu, Context menu, Dialogs- Alert dialog, Custom dialog, Dialog as Activity, Animation-View animation, Draw able animation

UNIT V: Working with data storage
Shared preferences, Preferences activity, Files access, SQLite database

Reference Books:
1. Professional Android 4 Application Development,Edition3,Reto Meier,Wrox John Wiley & Sons, 2012,ISBN 1118237226, 9781118237229.
2. Beginning Android 4 Application Development, Edition illustrated, Wei-Meng Lee, John Wiley & Sons, 2012, ISBN 1118240677, 9781118240670.
3. Sams Teach Yourself Android Application Development in 24 Hours, Edition illustrated, Lauren Darcey& Shane Conder, Sams Publishing, 2012, ISBN 0672335697, 978067233569

Course Code:IT-405
Course Title: Lab-7: **Scripting Languages**

- Scripting Languages: At least 15 Logical programs covering all Scripting Languagesincluding HTML, DHTML, Java script

Course Code:IT-406
Course Title: Lab-8: **Based on Elective subjects**

- At least 15 Logical programs covering all concepts of Elective adapted by the students.

Course Code:IT-407-A
Course Title:University recognized MOOC

- Open Elective: University recognized MOOC (NPTEL / SWAYAM / others) OR Intra /Inter Departmental courses.

Course Code:IT-407-B
Course Title:Numerical Aptitude

Unit I: Introduction of Number system

Numbers: Types of numbers, Divisibility tests of numbers, arithmetic progression, Geometric progression, Relationship between Arithmetic progression and Geometric progression.HCF and LCM: Methods of calculating highest common factor and greatest common divisor,factorization method, Division method, Finding HCF and LCM more than two numbers, LCMand HCF of fractions and decimal numbers, Applications of LCM and HCF.

Unit II: Average & Problem on ages

Average: Definition of average, Formulae and theoretical problem on average.Problem on ages: simultaneous equations and their applications, Theoretical problems on ages,Theoretical problems on numbers.

Unit III: Percentage & Profit and Loss

Percentage: Concept of percentage, Application of percentage, Results on populations, Result on depreciations, Theoretical problem on percentage.Profit and Loss: Definition of cost price, selling price and profit, Formulae of profit and loss,Theoretical problems on profit and loss.

Unit IV: Time, Work & Distance

Time and Work: Concept of time and work, Relationship between time and work, Theoretical problems on time and work.Time and Distance: Concept of time and distance, Formulae of time and distance, Theoreticalproblems on time and distance.Problems on Train: Formulae of problems on train, Theoretical problems on train.

Unit V: Interest, Probability, Permutations and combinations

Simple and Compound Interest: Definition of simple and Compound interest, Formulae ofsimple and compound interest, Relationship between simple and compound interest, Theoreticalproblems on simple and compound interest.Probability: Definition of probability, Examples of performing a random experiment, Probability of occurrence of an event, Results on probability.

Reference Books:

1) Quantitative Aptitude by Dr.R.SAggrawal , S. Chand and Company Publications
2)Quantitative Aptitude by AbijitGuha, Tata McGraw Hill Publications
3) Objective Arithmetic by S.L Gulati, Cosmos book hive Pvt,5th edition2015

Course Code:IT-408
Course Title:Skill Based Activity
(SK-04 Soft Skills)

- Soft skill Necessary for IT recruitment and further studies
- Strong technical skills are essential for any IT (information technology) position. However, IT employees also need soft skills, sometimes known as interpersonal skills. IT professionals need to be able to interact successfully with others, as well as manage projects and teams.
- Employers have found that many IT professionals possess as many interpersonal skills as anyone else. Technology experts suffering from more severe social handicaps (such as functional forms of autism) are able to practice and learn interpersonal and other soft skills to help them integrate well within a team.