|| सा विद्या या विमुक्तये ||

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड
"ज्ञानतीर्थ" परिसर, विष्णुपुरी, 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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प्रस्तुत विद्यापीठीय संकुलातील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदव्युत्तर स्तरावरील द्वितीय वर्षाचे **CBCS Pattern** नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०२०–२१ पासून लागू करण्याबाबत.

परिपत्रक

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 विद्यापीठीय संकुलातील 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.

01. M.Sc.-II Year-Botany
02. M.Sc.-II Year-Analytical Chemistry
03. M.Sc.-II Year-Industrial Chemistry
04. M.Sc.-II Year-Medicinal Chemistry
05. M.Sc.-II Year-Organic Chemistry
06. M.Sc.-II Year-Physical Chemistry
07. M.Sc.-II Year-Polymer Chemistry
08. M.Sc.-II Year-Computer Application
09. M.Sc.-II Year-Computer Network
10. M.Sc.-II Year-Computer Science
11. M.C.A.-II Year (Master of Computer Applications)
12. M.Sc.-II Year-Environmental Science
13. M.A./M.Sc.-II Year-Geography
14. M.Sc.-II Year-Geophysics
15. M.Sc.-II Year-Geology
16. M.A./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.A./M.Sc.-II Year-Statistics

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(संकुल)–सीबीसीएस
अभ्यासक्रम/२०२०–२१/५१३

दिनांक : ०८.०८.२०२०.

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) मा. संचालक, सर्व संबंधित संकुले, 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. (Computer Science) (Campus)* (Revised CBCS pattern)

Introduced from Academic Year 2020-2021

Program code: <u>SCS-S-MCS-PG (13-2-2-01)</u>

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

M.Sc. Computer Science (Campus)

M.Sc. Computer Science (2years) program / degree is a specialized program in latest advances in computer science issues. It builds the student on higher studies and research awareness in overall computational, IT and ICT fields 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. Computer Science 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. Computer Science** 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. Computer Science** 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.

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1. M.Sc. Computer Science 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
3. enhancement activity of 01 credits.
4. One Credit = 25 marks , Two Credits = 50 Marks, Four Credits = 100 Marks

PEO, PO and CO Mappings

1. **Program Name** : M.Sc.(CS) Campus { SCS-S-MCS-PG (13-2-2-01)}

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 computational science 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 computer sceince environment
   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

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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

The detailed syllabus is as below,

CBCS Revised Syllabus w.e.f AY: 2020-2021
Program: M.Sc.(Computer Science) (Campus) School of Computational Sciences

Sr. No	Course category	Course Code	Course Title	Internal credits	External credits	Total credits
"Third Semester"						
1.	**Core Subjects**	NCS-301	Windows Programming	2	2	4
2		NCS-302	Computer Networks	2	2	4
3		NCS-303	Compiler Designing	2	2	4
"Choose any one from below elective subjects"						
4	**Elective Subject**	NCS-304 A	Data Sciences	2	2	4
		NCS-304 B	Digital Image Processing			
"Practical /Lab"						
5	**Lab / Practical**	NCS-305	Lab-5: Windows Programming	1	1	2
		NCS-306	Lab-6: Based on Elective Subjects	1	1	2
6	**Open Elective**	NCS-307A	University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental OR Intra / Inter School OR	4	0	4
		NCS-307 B	Introduction to Web Technologies			
7	**Skill based Activity**	NCS-308	SK-03: Seminar Presentation Activity	1	0	1
	Total credits					**25**

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Sr. No	Course category	Course Code	Course Title	Internal credits	External credits	Total credits
			Fourth Semester			
1.	**Core Subjects**	NCS-401	Mobile Application Development	2	2	4
2		NCS-402	Advanced Databases and Administration	2	2	4
3		NCS-403	Major Project development Activity	0	4	4
			Choose any one from below elective subjects			
4	**Elective Subject**	NCS-404 A	Internet of Things (IoT)	2	2	4
		NCS-404 B	Big Data Analytics			
			Practical /Lab			
5	**Lab / Practical**	NCS-405	Lab-7: Mobile Application Development	1	1	2
		NCS-406	Lab-8: Advanced Databases	1	1	2
6	**Open Elective**	NCS-407A	University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental OR Intra / Inter School OR	4	0	4
		NCS-407 B	Programming in Python			
7	**Skill based Activity**	NCS-408	SK-04	1	0	1
	Total credits					**25**

NCS-301: Windows Programming

Course Objectives:
Windows Programming explores the fundamentals of structured design, development, testing, implementation, and documentation of application development in windows environment. It includes language syntax, data and file structures, input output tools, etc. the course will also emphasize Object Oriented Programming concepts like encapsulation (creating classes and instances), inheritance (defining classes the inherit data and/or methods from existing classes) and polymorphism (overriding base-class methods in derived classes).

Course Outcomes:
The student will use Visual Basic.Net to build Windows applications using structured and object-based programming techniques. Students will be exposed to analyze program requirements, Design/develop programs with GUI interfaces, Code programs and develop interface using Visual Basic.Net, Perform tests, resolve defects, and revise existing code.

Course Contents:

Unit-1 Introduction to Windows Programming
Need for Windows Programming, Advantages and Disadvantages of Windows Programming, Event Oriented Programming, Introduction to .NET concepts, .Net Framework, CTS, CLS, CLR, MSIL

Unit-2 Exploring IDE
Working with Development Environment, IDE Navigation, Interface Design, Understanding Tools, Controls, and Events, Understanding Programming concepts

Unit-3 Control Structures
Conditional Expressions, Decision Structures, Looping Constructs, working with Procedures

Unit-4 Functions
Introduction to Functions, Inbuilt Functions, String Functions, Math Functions, Formatting Function, Date and Time Function, User Defined Function

Unit-5 Advance Controls
Working with Menus, Advance interaction controls, Error Handling, Working with Files, Graphics, Working with Arrays, Dimensions of Arrays

Unit-6Database Access
ADO.NET, Dataset, Database Connections, Database tools, Data Grid view Control

Reference Books:

1. The Complete Reference Visual basic .NET, Jeffrey R. Shaprio
2. Mastering Visual Basic 2010, Evangelos Petroutsos, Sybex
3. Programming Windows, Charles Petzold, Microsoft
4. Visual Basic Programming, Black Book, Dream-Tech Press

NCS-302: Computer Networks

Course Overview

Students should be able to have an understanding of the fundamental concepts of computer networking and have a basic knowledge of the various networks models and their uses. They should be able to understand the organization of computer networks, factors influencing computer network development and the reasons for having variety of different types of networks.

Course Outcome

At the end of the course, students will be able to understand basic computer network technology. Understand and explain various components of computer networks. Identify the different types of network topologies and protocols. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer. Identify the different types of network devices and their functions within a network. Understand and build the skills of routing mechanisms.

Course Contents

Unit -1

What is the Internet; network edge, network core; Delay, Loss and throughput in Packet Switched Networks, Protocol Layers and their Service Models

Unit -2

Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, DNS-The Internet's Directory Service, Peer-to-Peer applications, Socket Programming, Creating network applications

Unit -3

Introduction and Transport-Layer Services; Multiplexing and De-multiplexing, Connectionless Transport UDP, Principles of Reliable of Data Transfer, Connection Oriented Transport: TCP, Principles of Congestion Control, TCP Congestion Control

Unit-4

Introduction, Virtual circuit and datagram networks, What is inside a router, Internet Protocol (IP), Forwarding and Addressing in the Internet, Routing Algorithms, Routing in the Internet, Broadcast and Multicast Routing

Unit-5

Introduction to the link layer, Error Detection and Correction Techniques, Multiple Access links and Protocols, Switched local area networks

Unit-6

Introduction, Wireless Links and Network Characteristics, CDMA, WiFi: 802.11 Wireless LANs, The 802.11 Architecture, Channels and Association, 802.11 Frame format, The 802.11 MAC Protocol

Text Book

1. Computer Networking A Top-Down Approach- James F Kurose, 6th edition Pearson Publication

Reference Book

1. Computer Networks: A Top-Down Approach- Behrouz A. Forouzan, Firouz Mosharraf McGraw Hill publications.

NCS-303: Compiler Designing

Course Objectives

This course explores the phases of Compiler, to aware the Finite Automata and Lexical Analysis, to understand Parsing Techniques.

Course Outcomes

Completion of these course students will be able to perform Syntax as well as Semantic analysis. Students will be able to plot transition diagrams for DFA and NF

Course Contents

Unit 1: Introduction to Compilation

Compiler Basics, Issues in Compilation, Phases of Compilation: the Analysis – Synthesis Model, Compiler Construction Tools

Unit 2: Designing a Lexical Analyser

Role of Lexical Analysis, Input Buffering, Specification of Tokens, Recognition of Tokens,

Unit 3: Review to FA concepts

Finite automata, Conversion from regular expression to NFA, Deterministic finite automata, Conversion from NFA to DFA, Minimization of DFA, Creating Lexical Analyzer with LEX

Unit 4: Designing Syntax Analyzer

Role of Syntax Analyser, Classification of parsers, Top-Down Parsing: Introduction, Problems in top-down parsing, Recursive Parsing, Problems in Recursive Procedures, Predictive Parsing, Error Handling in Predictive Parsers, Bottom Up Parsing: Shift Reduce Parser, Actions of shift reduce parser, Construction of parse tree, Operator Precedence Parsing, Components of operator precedence parsers, Parsing action, Construction of operator precedence parsers, Advantages and disadvantages of operator precedence Parsing. LR Parsing: Simple LR parser, LALR parser.

Unit 5: Intermediate Code Generation

Need For Intermediate Code Generation, Intermediate Forms: Polish Notation, Quadruples, Triples, and Indirect Triples and Blocks

Unit 6: Code Optimization

Introduction, need for code optimization, Classification of code optimization techniques: Optimization techniques that work on machine code, Optimization techniques that work on intermediate forms of source code i.e. Optimization with in Basic Blocks: Folding, Redundant operation elimination, Optimization with in Loop: Strength Reduction, Dead code elimination, Moving operation within block out of block.

Text Books:

1. Compiler Principle, Techniques and Tools- Aho A.V., R. Sethi and J.D. Ullman, Addison Wesley.

2. Compiler Construction Theory and Practice, Barret, Couch, Asian Student Edition.

Reference Books

1. Compiler Construction Principle and Practice- Dhamdhere D.M, McMillan India.

2. Modern Compiler Design- David Galles, Pearson Education, 2009.

3. Compiler Construction for Digital Computer- Gres D., Wiley Press.

Course Code: **NCS-304 A**	Course Name: **Data Sciences**	Credits:4

Course Objectives:

Data Science is the study of the general extraction of knowledge from data. Being a data scientist requires an integrated skill set spanning mathematics, statistics, machine learning, databases and other branches of computer science. This course will introduce students to this rapidly growing field and equip them with some of its basic principles and tools as well as its general mindset.

Course Outcome: At the conclusion of the course, students should be able

CO1: To describe what Data Science is and the skill sets needed to be a data scientist.
CO2: Use R to carry out basic and advanced data analytics.
CO3: Explain the significance of exploratory data analysis (EDA) in data science and apply basic
     tools to carry out EDA.
CO4: Ability to recognize and implement various ways of selecting suitable model & model
     parameters for different machine learning techniques.
CO5: Ability to integrate machine learning libraries and mathematical and statistical tools
     with modern technologies.
CO6: Ability to extract relevant features from the large dataset.

Course Contents

Unit-1: Data Science Process

What is Data Science? Big Data and Data Science, Skill sets needed, The roles in a data science project, Stages of a data science project, Defining the goal, Data collection and management, Modeling, Model evaluation and critique, Presentation and documentation, Model deployment and maintenance, Setting expectations, Determining lower and upper bounds on model performance

Unit-2: Introduction to R

Basic of R programming, Loading data into R, Working with data from files, Working with well-structured data from files or URLs, Using R on less-structured data, Working with relational databases, Loading data from a database into R, Working with the PUMS data.

Unit-3 : Exploring Data

Exploratory Data Analysis (EDA), Using summary statistics to spot problems, Spotting problems using graphics and visualization, Visually checking distributions for a single variable, Visually checking relationships between two variables.

Chapter 4. Managing Data

Cleaning data, Treating missing values (NAs), Data transformations, Sampling for modeling and validation, Test and training splits, Creating a sample group column, Record grouping, Data provenance.

Unit-5:Basic Machine Learning Algorithms
Linear Regression, k-Nearest Neighbours (k-NN), k-means, Association Rules, Motivating application: Filtering Spam, Why Linear Regression and k-NN are poor choices for Filtering Spam, Naive Bayes and why it works for Filtering Spam.
Unit-6:Feature Generation and Feature Selection
Extracting Meaning From Data, Motivating application: user (customer) retention, Feature Generation, Feature Selection algorithms, Filters; Wrappers; Decision Trees; Random Forests Recommendation Systems: Building a User-Facing Data Product, Algorithmic ingredients of a Recommendation Engine, Dimensionality Reduction, Singular Value Decomposition, Principal Component Analysis.
Text Books:
1. Practical Data Science With R - Nina Zumel and John Mount, Manning Publications,2014.
2.Doing Data Science - Rachel Schutt and Cathy O'neil, O'reilly Media, Inc.,2014
Reference Books:
1. Data Science Concepts and Practice, Second Edition, - Vijay Kotu & Bala Deshpande, Morgan Kaufmann, Elsevier Inc., 2019.
2.Data Science:Theories,Models,Algorithms,and Analytics -S.R.Das,Published by S.R.Das,2016.
3.The Art of Data Science: A Guide for Anyone Who Works with Data - Roger D. Peng and Elizabeth Matsui, 2016. 4.Machine Learning For Dummies - John Mueller & Luca Massaron, John Wiley & Sons, 2016.
5.R Programming for Data Science - Roger D. Peng

NCS-304 B : **Digital Image Processing**

Course Objectives

This course is to study the image fundamentals and mathematical transforms necessary for image processing. This course elaborates the concepts of the image enhancement techniques and image restoration procedures. It is to study the image compression procedures with the study of image segmentation and representation techniques.

Course Outcomes

This course made students to learn digital image fundamentals, exposed to simple image processing techniques, be familiar with image compression and segmentation techniques, to learn to represent image in form of features

Course Contents

Unit-1 Digital Image Processing Systems:

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 and Image types and Converting between Data Classes and Image types

Unit-2 Intensity transformation and spatial filtering:

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

Unit-3 Frequency Domain Processing:

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

Unit-4 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-5 Color Image Processing and Wavelets:

Color Image Representation, Converting to other Color Space

Unit-6 Introduction to Wavelets:

Fast wavelet transform, working with Wavelet Decomposition structures Inverse Fast Wavelet transform

Text Books:

1. Digital Image Processing- R.C. Gonsales R. E. Woods, Second Edition, Pearson Education

2. Fundamentals of Image Processing- Anil K. Jain, PHI Publishing.

Reference Books:

1. Digital Image Processing using MATLAB- R.C. Gonsales R. E. Woods, Second Edition, Pearson Education.

NCS-305 Lab-5: Windows Programming

Lab Course Objectives

The student will use Visual Basic.Net to build Windows applications using structured and object-based programming techniques. Students will be exposed to analyze program requirements, Design/develop programs with GUI interfaces, Code programs and develop interface using Visual Basic.Net, Perform tests, resolve defects, and revise existing code.

1. Study Window''s API and Their Relationship with MFC classes

2. Study essential classes in Document View Architecture and Their Relationship with each other

3. Create Window and Interact with it

4. Draw a free hand drawing as Mouse is Drag

5. Create Window of My Own Class (MFC)

6. Line Drawing Using MFC Classes

7. Creating a Notepad in VC++

8. Creating a Blinking Cursor

9. Creating a Menu, Dialog Box and Adding Shortcut andAccelerator Keys, Status Bar, Tools to the Menu items

10. Serializing your own Objects and Class

11. Create, Open , Read, Write, Modify and Close a file

12. Creating a Multiple Document Interface

13. Creating a Dynamic Link Library

14. Creating a Web Browser

15. Creating Internet Applications using HTTP

16. Creating Internet Applications using FTP

17. Creating an ActiveX Control

18. Creating a Dialog based Application

19. Database Connectivity in VC++

20. Keyboard Handling

Course Code:	NCS-306	Lab-6 : Based on Elective Subject	Credits: 02
Course Objectives: As per the Lab Manual circulated to students by the concerned Teacher			
Course Outcome: As per the Lab Manual circulated to students by the concerned Teacher			
Experiments As per the Lab Manual circulated to students by the concerned Teacher			

Code: NCS-307 A	Third Semester	Open Elective	Credits:04
Open Elective : University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses or Intra School or Inter School			

OR

Code: NCS-307 B : Introduction to Web Technologies

Course Objective

1. Students implement personal and interpersonal skills to prepare for a rapidly evolving Workplace .
2. Students enhance reading, writing, computing, communication, and critical thinking and apply them to the information technology environment.

Unit I Introduction to HTML : HTML Common tags- Block Level and Inline Elements, Lists, Tables, Images, Forms, Frames; Cascading Style sheets, CSS Properties; Java Script: Introduction to Java Script, Objects in Java Script, Dynamic HTML with Java Script

Unit II JDBC: Data Base, Database Schema, A Brief Overview Of The JDBC Process, JDBC Driver Types, JDBC Packages, Database Connection, Associating The JDBC-ODBC Bridge With Database, Creating, Inserting, Updating And Deleting Data In Database Tables, Result Set, Metadata.

Unit III Web Servers and Servlets: Tomcat web server, Introduction to Servlets: Servlets, the Advantage of Servlets over "Traditional" CGI, Basic Servlet Structure, Simple Servlet Generating Plain Text, Compiling and Installing the Servlet, Invoking the Servlet, Lifecycle of a Servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Context Parameters, Handling Http Request & Responses, Using Cookies-Session Tracking, Servlet with JDBC.

Unit IV Introduction to JSP: The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing, JSP Application Development: Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Declaring Variables and Methods , Sharing Data Between JSP pages, Users Passing Control and Data between Pages, JSP application design with JDBC, JSP Application Design with MVC.

TEXT BOOKS:

1. Jon Duckett "Beginning Web Programming" WROX.

2. Marty Hall and Larry Brown "Core Servlets and Java Server pages Vol. 1: Core Technologies", Pearson.

REFERENCE BOOKS:

1. DanWoods and Gautam Guliani,"Open Source for the Enterprise: Managing Risks, Reaping Rewards", O'Reilly, Shroff Publishers and Distributors, 2005.

2. Sebesta,"Programming world wide web" Pearson.

3. Dietel and Nieto,"Internet and World Wide Web – How to program",PHI/Pearson Education Asia.

Course Code:NCS-308

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

Objectives :
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

NCS-401: Mobile Application Development

Course Objectives

Today's applications are increasingly mobile. This course teaches students how to build mobile apps for Android that is today's mobile operating platforms. Students learn to write both web apps and native apps for Android using Eclipse and the Android SDK platforms.

Course Outcomes

At the conclusion of the course, students should be able to understand the basic concepts of mobile computing, Learn the basics of mobile telecommunication system, Be exposed to Ad-Hoc networks and Gain knowledge about different mobile platforms and application development

Course Contents

Unit 1 Introduction

Introduction to Mobile Computing, Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development, Android User Understanding B4A for Android: Installing Basic4Android and Android SDK, Install and configure Basic4Android, Installing Android Emulator, My first program (MyFirstProgram.b4a), Second program (SecondProgram.b4a)

Unit 2 Understanding Android Mobiles and the IDE of B4A

Screen sizes and resolutions (Special functions like 50%x, 50dip, PerXToCurrent, PerYToCurrent - 50%x, DipToCurrent - 50dip), Understanding various Android Emulators for B4A, Understanding B4A bridge (The Designer, Tools, General Setting)

Menu and Toolbar, Toolbar, File menu, Edit menu, Project menu, Tools menu, Code area, tabs

Unit 3 Process and Activity life cycle

Variables and objects, Variable Types, Names of variables, declaring variables, Simple variables, Array variables, Array of views (objects), Type variables, Casting, Scope(Process variables, Activity variables, Local variables), Tips and Modules(Activity modules, Code modules, Service modules)

Unit 4 Understanding Basic Language

Program flow, Process Globals routine, Globals routine, Activity Create (First Time As Boolean) routine, Activity Resume routine, Activity Pause (User Closed As Boolean) routine, Expressions (Mathematical expressions, Relational expressions, Boolean expressions), Conditional statements (If – Then – End If, Select – Case) Loop structures (For – Next, Do – Loop), Subs (Declaring, Calling a Sub, Naming, Parameters, Returned value),Events, Libraries (Standard libraries, Additional libraries folder)

Unit 5 Creating User Interface,

Menu example, TabHost example, Button toolbox example, Scroll View examples, SQLite Database (SQLite Database basics, SQLite Database example program), GPS (GPS Library, GPS Objects)

Unit 6:

String manipulations, Files (File object, Text Writer, Text Reader, Text encoding), Graphics and Drawing

Text Books

1. Fundamentals of Mobile Computing- Prasant Kumar Pattnaik, Rajib Mall, PHI Learning Pvt.Ltd, New Delhi.

Reference Books

1. Java: A Beginner"s Guide- Herbert Schildt, Oracle Press.

2. Learning Java by Building Android Games- John Horton, Packt Publishing.

3. Android Programming for Beginners- John Horton, Packt Publishing.

NCS-402 : Advanced Databases and Administration

Course Objectives

This course is intended to provide comprehensive understanding of the advances and administrations practices in database management systems. The course provides a solid technical overview of roles and responsibilities of DBA in an organisation. These include concurrency, recovery, performance, warehouses.

Course Outcome

At the completion of this course, students should be able to understand the role of a database management system in an organization. Design and implement a small database project using latest platform. Understand the concept of a database transaction and related database facilities, including concurrency control, journaling, backup and recovery, and data object locking and protocols.

Course Contents

Unit 1

Review of the fundamental principles of database management systems, relational databases and SQL, Query processing and query optimisation.

Unit 2

Transaction management: ACID properties, Concurrency control, Recovery.

Unit 3

Distributed databases data fragmentation and replication, distributed query processing, distributed transaction management, Parallel databases, components, performance issues, standard architectures, Data Warehouse technology

Unit 4

Introduction, Installation, contemporary database Server and its Management Studio , Database Administration, Managing Server Security , Manipulating Schemas, Tables, Indexes, and Views

Unit 5

Dealing with Indices, constraints and partitions, Replication, Implementing Replication, Back Up and Recovery, Database Automation and Maintenance

Text Books

1. Database Management Systems- R. Ramakrishnan and J.Gehrke, 3rd Edition, McGraw Hill

2. Database System Concepts- A.Silberschatz, H.F.Korth and S.Sudarshan, 6th Edition, McGraw-Hill

Reference Books

1. Principles of Distributed Database Systems - M.T.Oszu and P.Valduriez, Springer,

2. Management of Heterogeneous and Autonomous Database Systems- A.Elmagarmid, M.Rusinkiewicz and A.Sheth (eds), Morgan Kaufmann, Oracle Press Books.

Course Code: NCS-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

NCS-404 A : Internet of Things (IoT)

Course Objectives

The objective of the course is to Vision and Introduction to IoT Data and Knowledge Management and use of Devices in IoT Technology. Understand State of the Art IoT Architecture. Industrial Automation and Commercial Building Automation in IoT.

Course Outcomes

At the end of the course the student will be able to understand the vision of IoT from a global context. Use of Devices, Gateways and Data Management in IoT. Building state of the art architecture in IoT. Application of IoT in Industrial and Commercial Building Automation.

Course Contents

Unit -1 M2M to IoT

The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics.

Unit-2 M2M to IoT

A Market Perspective, Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

Unit -3 M2M and IoT Technology Fundamentals

Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management

Unit -4 IoT Architecture-State of the Art

Introduction, State of the art, Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model

Unit-5 IoT Reference Architecture

Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints- Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control

Unit -6 Industrial Automation

Service-oriented architecture-based device integration, SOCRADES: realizing the enterprise integrated Web of Things, IMC-AESOP: from the Web of Things to the Cloud of Things, Commercial Building Automation- Introduction, Case study: phase one-commercial building automation today, Case study: phase two- commercial building automation in the future.

Text Books

1. From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence- Jan Holler, Vlasios Tsiatsis, 1st Edition, Academic Press.

Reference Books

1. Internet of Things A Hands-on-Approach- Vijay Madisetti and Arshdeep Bahga, VPT.

Course Code: **NCS-404 B**	Course Name: **Big Data Analytics**	Credits:4

Course Objectives:

Understand the Big Data Platform and its Use cases
Provide an overview of Apache Hadoop and its ecosystem components
Learn Injecting data into Hadoop
Provide HDFS Concepts and Interfacing with HDFS
Understand Map Reduce algorithm phases and MR Jobs
Provide hands on some Hodoop Eco System data analytics
Apply analytics on Structured & Unstructured Data.

Course Outcome: At the conclusion of the course, students should be able

CO1: Identify Big Data and its Business Implications.
CO2: List the components of Hadoop and Hadoop Eco-System
CO3: They will able to learn distributed systems with Apache Hadoop.
CO4: Access and Process Data on Distributed File System
CO5: Manage Job Execution in Hadoop Environment
CO6: Develop Big Data Solutions using Hadoop Eco System

Course Contents

Unit-1: Introduction to Big Data & Hadoop

Data, Data Storage and Analysis, Comparison with Other Systems, RDBMS, Grid Computing, Brief History of Hadoop, Apache Hadoop and the Hadoop Ecosystem.

Unit-2:Hadoop Distributed File System

The Design of HDFS, HDFS Concepts, Blocks, Namenodes and Datanodes , HDFS Federation, HDFS High-Availability, The Command-Line Interface, Basic Filesystem Operations, Hadoop Filesystems. Moving Data In and Out of Hadoop(some techniques)

Unit-3: MapReduce Types and Formats

Introduction to MapReduce , MapReduce Types, The Default MapReduce Job, Input Formats, Input Splits and Records, Text Input, Binary Input ,Multiple Inputs, Database Input (and Output),Output Formats, Text Output , Binary Output, Multiple Outputs, Database Output

Unit-4: Pig

Installing and Running Pig, Execution Types, Running Pig Programs, Grunt, Pig Latin Editors, Example, Comparison with Databases, Pig Latin, Structure, Statements, Expressions, Types, Schemas, Data Processing Operators, Loading and Storing Data, Filtering Data, Grouping and Joining Data, Sorting Data, Combining and Splitting Data

5. Hive & Hbase

The Hive Shell, Running Hive, Configuring Hive, Hive Services, The Meta store, Comparison with Traditional Databases, Schema on Read Versus Schema on Write, Updates, Transactions, and Indexes, HiveQL, Data Types, Operators , Tables, Partitions and Buckets, Storage Formats, Importing Data,

Altering Tables, Dropping Tables, Querying Data, Sorting and Aggregating, MapReduce Scripts, HBase: HBasics ,Test Drive, Schemas, Loading Data, Web Queries, HBase Versus RDBMS.

Unit 6: SPARK

Introduction to Data Analysis with Spark, Downloading Spark, and Getting Started, Programming with RDDs, Machin Learning with MLlib

Text Books:

1. Hadoop: The Definitive Guide, 3rd edition – Tom White,O'reily Media, 2012.

2.Big Data Analytics - Seema Acharya, Subhasini Chellappan, Wiley 2015.

3.Big Data and Hadoop - VK Jain, Kindle Edition, 2018.

Reference Books:

1. The Human Face of Big Data – Rick Smolan and Jennifer Erwitt, Odds Productions.
2. Learning Spark: Lightning-Fast Big Data Analysis –Holden Karau, O¨Reilly Media,2016.
3.Understan ding Big data, Chris Eaton, Dirk Deroos et. al , McGraw Hill, 2012.

NCS-405 : Lab-7 : Mobile Application Development

1. Develop an application that uses GUI components, Font and Colours

2. Develop an application that uses Layout Managers and event listeners.

3. Develop a native calculator application.

4. Write an application that draws basic graphical primitives on the screen.

5. Develop an application that makes use of database.

6. Develop an application that makes use of RSS Feed.

7. Implement an application that implements Multi threading

8. Develop a native application that uses GPS location information.

9. Implement an application that writes data to the SD card.

10. Implement an application that creates an alert upon receiving a message.

11. Write a mobile application that creates alarm clock

Course Code:	NCS- 406	Lab-8 : Advanced Databases	Credits: 02
Course Objectives: As per the Lab Manual circulated to students by the concerned Teacher			
Course Outcome: As per the Lab Manual circulated to students by the concerned Teacher			
Experiments As per the Lab Manual circulated to students by the concerned Teacher			

Code: NCS-407 A	Forth Semester	Open Elective	Credits:04
Open Elective : University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses or Intra School or Inter School			

OR

NCS-407 B Programming in Python

Course Objectives

Upon successfully completing this course, students will be able to "do something useful with Python".

1. Identify/characterize/define a problem
2. Design a program to solve the problem
3. Create executable code
4. Read most Python code
5. Write basic unit tests

This course include the following topics.

1. Lesson 1: Introduction
2. Lesson 2: gitHub, Functions, Booleans and Modules
3. Lesson 3: Sequences, Iteration and String Formatting
4. Lesson 4: Dictionaries, Sets, and Files
5. Lesson 5: Exceptions, Testing, Comprehensions

6. Lesson 6: Advanced Argument Passing, Lambda -- functions as objects
7. Lesson 7: Object Oriented Programming
8. Lesson 8: More OO -- Properties, Special methods
9. Lesson 9: Iterators, Iterables, and Generators
10. Lesson 10: Decorators, Context Managers, Regular Expressions, and Wrap Up

Course Code:NCS-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.