Rashtriya Sanskrit Vidyapeetha :: Tirupati

M. Sc. Computer Science and Sanskrit Language Technologies

SYLLABUS STRUCTURE

Semester	Course No	Course Name	Course Type	Credits
First	MSC 111	Data Structures	Hard core	4
	MSC 112	DBMS	Hard core	4
	MSC 113	NLP – I: Natural Language Processing: Paninian Perspective	Hard core	4
	MSC 114	An introduction to Sanskrit	Hard core	4
	MSC 115	Basic of OS, Unix & Shell programming	**Soft core**	4
	Lab 111L	DBMS & Data Structures		4
	Lab 112L	NLP Lexical Resources Lab		4
Second	MSC 121	Operating Systems	Hard core	4
	MSC 122	Computer Organization	Hard core	4
	MSC 123	NLP II :Language and Speech Processing	Hard core	4
	MSC 124	Sanskrit Linguistics - 1	Hard core	4
	MSC 125	Programming with PERL	**Soft core**	4
	Lab 121L	Unix tools & Shell programming Lab		4
	Lab 122L	NLP Tools Lab		4
Third	MSC 211	Software Engineering	Hard core	4
	MSC 212	Artificial Intelligence	Hard core	4
	MSC 213	NLP III :Corpus Linguistics	Hard core	4
	MSC 214	Sanskrit Linguistics – II	Hard core	4
	MSC 215	Java Programming	**Soft core**	4
	Lab 211L	Corpus Linguistics & JAVA Lab		4
	Lab 212L	Mini Project work (Exclusively for M.Sc students)	Internship	4
Fourth	MSC221P	Major Project Work (Exclusively for M.Sc Course)	Hard core	10
	MSC222P	Project work for Sanskrit Applications (Exclusively for PG students of other Departments)	Internship	4

Soft skill course for PG students

Course code	Course Name	Course Type	Credits
CSSS	Fundamentals of Computers	Soft Skill	4

M. Sc. Computer Science and Sanskrit Language Technologies

Semester – 1

Data Structures

Course Code	Course Type	Credits	Theory	Practicals	Tutorial
MSC111	Hard core	4	4hrs/week	2hrs/week	1hr/week

Unit I

Introduction: Concepts of Data Structures – Overview of Data Structures – Implementation of Data Structures. Arrays: Definition – Terminology – One dimensional array – Multidimensional Arrays – Pointer arrays.

Unit II

Linked Lists: Single linked lists –Circular linked lists – Double linked lists – Applications of linked lists – Memory representation – Deal location strategy – Buddy system – Compaction.

Unit III

Stacks: Definition – Representation of stack – Operations of stack - Applications of stacks - Queues: Definition – Representation of Queues – Various queues structures – Application of queues.

Unit IV

Trees: Definition and concepts – Representation of Binary tree – Operations on Binary tree – Types of binary trees – Trees and Forests- B-Trees.

Unit V

Graphs: Terminology-Representation of Graphs-Operations on Graphs – Applications of graph structures. Sets: Representation of sets – Operations of sets –Applications of sets.

Prescribed Text Book

1. "CLASSIC DATA STRUCTURES" by D.Samanta – PHI, 2001.

REFERENCE BOOKS:

1. Aho, Hopcroft, Ulman, "Data Structures and Algorithms", Addison Wesley Publishing Company, 1985.
2. M.A.Weiss, "Data Structures and Algorithms Analysis in C++", Benjamin Cummiys, 1994.
3. A.S.Tanenbaum, Langram Y, Augestein MJ, Data Structures Using C", PHI, 1992.

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Semester – 1

Data Base Management Systems

Course Code	Course Type	Credits	Theory	Practicals	Tutorial
MSC112	Hard core	4	4hrs/week	2hrs/week	1hr/week

Unit I

Data Modeling Using the Entity – Relationship Model – Enhanced Entity – Relationship and Relational Database Design by ER – and EER-to- Relational Mapping – Practical Database design Methodology and Use of UML Diagrams.

Unit II

Introduction to Transaction Processing Concepts and Theory –Concurrency Control Techniques Database Recovery Techniques.

Unit III

Concepts for Objects Databases – Object Database Standards, Languages and Design – Object Relational and Extended Relational Systems.

Unit IV

Database Security and Authorization –Enhanced Data Models for Advanced Applications

Unit V

Distributed Databases and Client / Server Architectures.

Prescribed Text Book:

1. "FUNDAMENTALS OF DATABASE SYSTEMS" by Ramez Elmasri and Shamkant B.Navathe, Pearson Education, Fourth Edition 2004 Chapters 3,4,7,12,17,18,19,20,21,22,23,24,25,26.

REFERENCE BOOKS :

1. Stefano Ceri and Giuesppe Pelagalti, "Distributed Databases – Principles and Systems", Mc.Graw Hill Book Company, 1987.
2. C.J.Date, "An Introduction to Database Systems", Third Edition, Vol.I, Narosi Publishing House, 1995.
3. Setrag Khoshafian, "Object Oriented Databases", John Wiley and Sons, Inc. 1993.
4. James Martin, "Computer Data-Base Organization" Prentice Hall of India, 1994.

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Semester – 1

Natural language Processing : Paninian Perspective

Course Code	Course Type	Credits	Theory	Practicals	Tutorial
MSC113	Hard core	4	4hrs/week	2hrs/week	1hr/week

Unit I

Introduction to NLP: Goal, History of NLP - Applications of NLP – Open Problems – Knowledge sources

Unit II

Language Structure and Language analyzer: Introduction to Language Structure, Overview of Language analyzer: Morphological Analyzer, Local word grouping (LWG), Core Parser.

Unit III

Words and their Analyzer: Introduction to Morphological Analysis (MA), MA using Paradigms - Speeding up of MA by compilation - Local Word Grouping: Verb groups, Noun groups, Strategy for grammar Development.

Unit IV

Paninian Grammar: Introduction to Paninian grammar – Semantic model - Paninian theory: Karaka Relations – Active Passive: Karaka to Vibhakti Mapping, Karaka shares.

Unit V

Paninian Parser: Introduction, Core Parser: Constraints – Preferences over Parses – Lakshan charts for Sense Disambiguation – Machine Translation: Introduction, Anusaraka or Language Accessor

Prescribed Text Books:

1. Natural Language Processing: Paninian Perspective. Prof. V.Chaitanya, Rajiv Sangal, published by Prentice Hall of India 1997

2. Natural Language Modeling: Prof G.U. Rao book- 413 published by HCU 2006

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Semester – 1

An Introduction to Sanskrit

Course Code	Course Type	Credits	Theory	Practicals	Tutorial
MSC114	Hard core	4	4hrs/week	2hrs/week	1hr/week

Unit I

1 The Alphabet
2 Verbs - Parasmai pada - singular/ plural/ dual
3. Preposition

Unit II

1 Noun - Msc N Nuter gender
2 Adverbs
3 Verbs - Atmanepada

Unit III

1 Noun - Femi
2 Verbs - Imperfect
3 Nouns ending with other vowels

Unit IV

1.Verbs - Imperative Mood
2. Nouns ending with consonant
3. Verbs - potential mood

Unit V

1. Pronoun
2. Selected poetics and prose
3. Glossary

Prescribed text book:

1. First Book of Sanskrit by R.G. Bhandarkar, published by Karnatak Publishing House, Mumbai

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Semester – 1

Basic of Operating Systems, Unix and shell Programming

Course Code	Course Type	Credits	Theory	Practicals	Tutorial
MSC115	Soft core	4	4hrs/week	2hrs/week	1hr/week

Unit I

The File system: Types of files in Unix, Structure of the System, File System type : Parent – Child relationship, Directory handling and navigation (mkdir, rmdir, pwd and cd). The PATH variable, absolute and relative pathnames, the and Directories, creating, viewing (cat), Copying (cp), renaming (mv) and deleting (rm) files, Listing files (ls), viewing through pg, tail and head command.

Unit II

File Attributes : Structure of the inode, brief discussion on partitions and file systems File Type and permissions (chmod), Significance of directory permissions, concept of ownership the elcpasswd and etcgroup files, changing (Chown and chgrp), Modification and access times, Default file and directory permissions (umask) – The Vi Editor.

Unit III

The Shell as Interpreter : The major shells : bourne Shell, C Shell, Korn and Bash, the Shell's Interpretive cycle, Wild-cards, Escaping and quoting, difference between single and double quotes, the three standard files and redirection (>> and >>), Connecting commands with pipes (|), Command substitution, Shell variables.

Unit IV

Shell scripts, and execution methods, User's initialization file (. Profile and rc, etc.), the dot command, Interactive excution and command line arguments ($1,$2) etc), Meta characters – Syntactic (&&, (), & ||, ;;, <,> etc), pattern matching, substitute shell variables, Quoting, Test command. Control flow : for if, while, case, the here document, string handling and computation using expr, setting positional parameters (set command), and shift, shell functions. Unix Internals : Kernel basic, processes and files, system calls, User mode and kernel mode, the file system, disk architecture, block I/O, How inode stores all blocks of a file, File system layout, the super block, Process Management.

Unit V

Administering File systems : Device files, Block and character devices, Partitions and file systems (in detail), types of file systems, Mounting local and networked file systems (mount, unmount and etcfstab), File system checking (fsck), Compressing files (copress, gzip and zip), Checking free space and disk usage (df aabd du), Finding files (find), Backing up files (tar, dump, cpio, dd), creation of user, deletion of user.

Prescribe Books

1. Maurice J.Bach, Design of the Unix Operating system, Third Edition, 2000, PHI
2. Sumitabha Das, Unix : Concepts and Applications, Third Edition 1998, Tata McGraw Hill.

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Semester – 2

Operating Systems

Course Code	Course Type	Credits	Theory	Practicals	Tutorial
MSC121	Hard core	4	4hrs/week	2hrs/week	1hr/week

Unit I

Processor registers – Instruction execution – Interrupts – Memory Hierarchy Cache Memory – I/O communication Techniques operating System objectives and functions – evolution of operating systems – Major achievements – characteristics of operating systems

Unit II

Process states, description and control – UNIX Processes management system – Processes and Threads-symmetric Multiprocessing –Micro kernels.

Unit III

Principles of Concurrency – Mutual exclusion: Software approach and Hardware support – Semaphores – Monitors – message passing – Principles of Deadlock – Deadlock prevention – Deadlock avoidance-deadlock detection – integrated Deadlock strategy – Dining philosophers problem

Unit IV

Memory Management: Memory Management requirements – memory partitioning, paging, segmentation, Virtual Memory : Hardware and control structures – operating system software **Scheduling** : Types of scheduling – Scheduling algorithms – Multiprocessor scheduling Real time scheduling.

Unit V

Input/Output and Files : I/O Devices – organization of the I/O function – Operating Systems design issues – I/O buffering – Disk scheduling – RAID – disk cache. File Management: File organization – file Directories – File sharing – record Blocking – Secondary storage management – UNIX and Windows file management.

Prescribed Text Book:

1. Operating Systems Fourth Edition by William Stalling, Pearson Education.

REFERENCE BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin “Operating System Concepts “ Fifth Edition Addison – wisely, 1997.
2. Deitel, “An Introduction to Operating Systems” Addison Wesley, 1985.
3. A.S.Tenanbaum, “Modern Operating System”, PHI.
4. Madnick SE and Donovan JJ, “Operating System”, Mc Graw Hill, 1974.

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Semester – 2

Computer Organization

Course Code	Course Type	Credits	Theory	Practicals	Tutorial
MSC122	Hard core	4	4hrs/week	2hrs/week	1hr/week

Unit I

Digital Logic circuits: Digital computers – gates – Boolean algebra – map simplification – combinational circuits – flip flaps sequential circuits**. Digital components:** Integrated circuits – Decodes multiplexes – registers – shift registers – binary counting memory unit.

Unit II

Register transfer and microoperations : register transfer language – register transfer – Bus and memory transfer – Arithmetic microoperations – logic microoperations – shift microoperations – arithmetic logic shift unit. **Basic computer organizations and Design:** Intersection codes – computer registers – computer intersections – intersections cycle – memory reference intersections – input – output and intercepts.

Unit III

Microprogrammed control : Control memory – address sequencing – Design of control unit. **Control processing unit**: general register organization – stack organization – interruption formats – addressing modes - Data transfer and manipulation – program control.

Unit IV

Input-output organization: peripheral Devices – I/O interface – asynchronous data transfer – modes of transfer – priority interrupt – DMA

Unit V

Memory organization: memory hierarchy – main memory – auxiliary memory – associative memory cache memory – virtual memory.

Prescribed Text Books:

1. Computer System Architecture, M.Morris mano, Third edition, PHI (Chapters 1,2,4,5,7,8,11,12)

Reference Books :

1. Computer Architecture & Organization, John Hazu, third Edition, McGraw Hill International Edition

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Semester – 2

Language and Speech Processing

Course Code	Course Type	Credits	Theory	Practicals	Tutorial
MSC123	Hard core	4	4hrs/week	2hrs/week	1hr/week

Unit I

Introduction to NLP: Knowledge in Speech and Language Processing – Ambiguity – Models and Algorithms – Language, Thought and Understanding – Brief History – Words : Basic Regular Expression patterns – Disjunction, Grouping and precedence, advanced operators – Regular Expression substitution.

Unit II

Finite state automata, Using FSA to recognize sheeptalk, Non-deterministic FSAs, Using an NFSA to accept strings, Relating Deterministic and Non-Deterministic Automata.

Unit III

Morphology and Finite State Transducers: English Inflectional and Derivational Morphology, Finite state Morphological parsing, Combining FST Lexicon and Rules, Lexicon-Fee FST – Porter Stemmer, Human Morphological Processing

Unit III

Features and Unification : Feature Structures – Unification of Feature Structurs – Features structures in the Grammar – Implementing Unification – Parsing with Unification Constrains – Types and Inheritance

Unit V

Discourse: Reference resolution – Text Coherence- Discourse Structure – Psycholinguistic studies of Reference and coherence - Dialogue and Conversational Agents: What makes dialogue different – Dialogue Acts – Automatic Interpretation of Dialogue Acts – Dialogue Structure and Coherence – Dialogue managers in conversational Agents.

Prescribed Text Books:

1. Speech and Language Processing – Danial Juafsky, Jamaes H. Martin.

M. Sc. Computer Science and Sanskrit Language Technologies
Semester – 2

Sanskrit Linguistics -I

Course Code	Course Type	Credits	Theory	Practicals	Tutorial
MSC124	Hard core	4	4hrs/week	2hrs/week	1hr/week

Unit I

Language-Its Nature, Importance, Origin and Development- Definition and nature of language- Utility of language- Theories about origin of language- Methods of investigation of the origin of language- Nature of the primitive language- Dialects and cognate languages- General Survey of Linguistics- Nature and scope of linguistics- Phases of development of linguistics- Branches of linguistics- Diachronic and synchronic study of language.

Unit II

Linguistic families- Number of languages- Living and dead languages- Concept of the family of languages- Methods of classification of languages- Indo-European family- Name of the family- Evolution of IE family- Branches of the Indo-European family- The chief common characteristics of the Indo-European family.

Unit III

Outlines of the history of Indo-Aryan- Old Indo-Aryan- Evolution of Classical Sanskrit- Differences between the Vedic and the Classical Sanskrit- Middle Indo-Aryan- Modern Indo-Aryan- Dravidian languages.

Unit IV

Physiology of Language- Organs of speech- Process of articulation of speech- Analysis of Sanskrit Alphabet- Indian tradition of phonetics- Processes- Distinction between vowel and consonant- Stops- Fricatives- Semivowels- Vowels- Nasalization of vowels and semivowels- Anusvara- Glide- Acoustic Phonetics- Accent- Sources of Sanskrit Vowels- Simple Vowels- Diphthongs- PIE Neutral Vowel(Shwa)- PIE Sonant Nasals- PIE Sonant Liquids.

Unit V

Phonetic Law- PIE Consonants in Different Branches- Grimm's law- Exceptions to Grimm's law- Gutturals in PIE- Satam and Centum Groups of Languages- Basis for Classification- Sources of Sanskrit Consonants- Palatals- Gutturals- Retroflex- Dentals- Labials- Nasals- Semivowels- Liquids- Spirants- Indo-European Sources of Sanskrit h- Laryngeal Theory- Ablaut- Phonetic Change- Analogy.

Prescribed Text book:

An Introduction to Sanskrit Linguistics, M.Sriman Narayana Murti by D.K. Publications, Delhi.

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Semester – 2

Programming with PERL

Course Code	Course Type	Credits	Theory	Practicals	Tutorial
MSC125	Soft core	4	4hrs/week	2hrs/week	1hr/week

Unit I

Introduction to Perl: The structure of a Perl – a sample Perl Program – Editing and Execution of Perl - Variables and constants - types – operators and types - Input from STDIN - Output to STDOUT

Unit II

Scalar Variables: Defining Scalar Variables - Literal Representation - Scalar Operators – Reading and Printing scalar variables - Arrays: Defining a List or Array - Literal Representation - Array Operators- Reading and Printing scalar variables - Hashes: Defining Hash Array- Hash Key and its value -Literal Representation - Accessing Hash Array values - Hash Array Operators- Reading and Printing scalar variables

Unit III

Perl Loops and control statements: Relational Operators- if, if..else, while, do..while, do..until statements- Loop control statements: Next,Last, Redo statements

Unit IV

What is a Filehandle - Opening & Closing a Filehandle - Using Filehandles to read and Write data. - Perl Functions - Defining a User Function - Invoking A User Function - Creating a User Function that takes arguments - Private Variables in Functions - Return Values

Unit V

Regular Expressions: Concepts, Patterns, Matching Operators - Substitutions, The Split & Join Functions

Prescribed Text Books

1. Learning Perl (Second edition) by Randal L. Schwartz and Tom Christiansen, Shroff Publishers and Distributers Pvt. Ltd
2. Progrmming Perl, Second edition bt Larry Wall, Tom Christiansen and L. Schwartz, Shroff Publishers and Distributers Pvt. Ltd
3. Mastering Perl 5 by Herrmann – BPB Publications, New Delhi
4. Perl Primer by R J Rama Sree published by RSVP

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Semester – 3

Software Engineering

Course Code	Course Type	Credits	Theory	Practicals	Tutorial
MSC211	Hard core	4	4hrs/week	2hrs/week	1hr/week

Unit I

THE PRODUCT AND THE PROCESS: Evolving role of software – Process , methods and tools – software process – software process models- The linear sequential model – prototyping model – RAD model – Evolutionary software process models – fourth generation techniques. **PROJECT MANAGEMENT CONCEPTS:** The Management spectrum – People – Problem – Process - Metrics in the process and project domains – software measurement – Metrics for software quality.

Unit II

SOFTWARE PROJECT PLANNING AND SCHEDULING : Project planning objectives - software scope – resources – software project estimation – Decomposition techniques - Empirical Estimation Models – Software risks – risk identification – risk projection - Basic concepts of project scheduling - project plan.

SOFTWARE QUALITY ASSURENCE : Software quality concepts - Software quality assurance - formal technical reviews – formal approaches to SQA – The SQA plan – ISO 9000 quality standards.

Unit III

CONVENTIONAL METHODS FOR SOFTWARE ENGINEERING: Computer based systems- System engineering hierarchy- information engineering- information strategy planning – product engineering - requirement analysis – communication techniques – Analysis principles – software prototyping – data modeling – Functional modeling and information flow – Behavioral modeling – the mechanics of structured analysis – Data dictionary – Design process – Design principles – Design concepts- Effective modular design.

Unit IV

DESIGN METHODS AND DESIGN FOR REAL TIME SYSTEM: Data Design - Architectural design – Transform mapping – transaction mapping – Interface design guidelines – Procedural design – Real Time Systems - Analysis and simulation of real time systems – Real time design.

Unit V

SOFTWARE TESTING METHODS : Software Testing fundamentals –Test case deign - White Box testing - basis path testing - control structure testing - black box testing – strategic approach to software testing – Unit Testing – Integration Testing Validation Testing – System Testing.

Prescribed Text Book:

1. Software engineering, a practitioner's approach by Rober s. pressman, Mcgraw Hill International Edition ,4th Edition. (Chapter 1 to 17)

Reference Books:

1. Martin L.Shooman, software Engineering McGraw Hill Inter- national, 1983.
2. Richard fairly, "Software Engineering concepts", Mc.Graw Hill, 1985.
3. Carlo Ghezzi mehdi Jagayari, Dino Mandriot "fundamentals of software Engineering", PHI. 1991.

M. Sc. Computer Science and Sanskrit Language Technologies
Semester – 3

Artificial Intelligence

Course Code	Course Type	Credits	Theory	Practicals	Tutorial
MSC212	Hard core	4	4hrs/week	2hrs/week	1hr/week

Unit I

Overview of AI: What is AI? Importance, Related fields - What is AI – The Early work in AI – AI and Related Fields. **Knowledge: General concepts**: Introduction – Definition and Importance of Knowledge – Knowledge- Based systems-Representation of Knowledge- Knowledge Manipulation- Acquisition of Knowledge

Unit II

Formalized symbolic logic: Introduction – Syntax and Semantics for Prepositional Logic – Syntax and Semantics for FOPL – Properties of Wffs – Conversion to Clausal Form – Inference Rules – The Resolution Principle – No deductive Inference Methods – Representations Using Rules. **Structured Knowledge**:Introduction – Associative Networks – Frame Structures – Conceptual Dependencies and Scripts.

Unit III

Object-oriented representations : Introduction – overview of object-oriented systems – Objects, Classes, Messages, and Methods – Simulation Example Using an OOS Program – Object Oriented Languages and Systems

Unit IV

Knowledge Acquisition: Introduction – Types of Learning – Knowledge Acquisition Is Difficult – General Learning Model – Performance Measures

Unit V

Early Work in Machine Learning: Introduction – Perceptions – Checker Playing Example – Learning Automata – Genetic Algorithms – Intelligent Editors. **Learning by Induction**: Introduction – Basic Concepts – some Definitions – Generalization and specializations - Inductive Bias – Example of an inductive Learner.

Prescribed Text Book:

Introduction to Artificial Intelligence and expert systems, Prntice –Hall of India Private Limited, New Delhi.

M. Sc. Computer Science and Sanskrit Language Technologies
Semester – 3

Corpus Linguistics

Course Code	Course Type	Credits	Theory	Practicals	Tutorial
MSC213	Hard core	4	4hrs/week	2hrs/week	1hr/week

Unit I

Introduction: Basic Concepts - What can we do with corpora- Need for Corpus Linguistics - Types of Corpus - Historical development: two competing approaches - How to build corpus - Applications of Corpus Linguistics **Tools for finding and displaying texts using Unix tools**: sorting- counting text tokens –Generating frequency lists for a given text file, making n-grams, solving small problems using Unix tools and Perl.

Unit II

Concordances: What is concordance? Key word in context (KWIC) index – How to prepare KWIC-studying existing concordance programs for concordance. **Corpus Design:** How to design our own corpus – enrichment of corpus for our own applications.

Unit III

Annotation – Tools for annotation –Methods to annotate the given text -Issues in annotation – Annotating the texts of Indian Language Texts.

Unit IV

Probability and Language Modeling: Probability – Joint probability- Conditional Probability– chain Rule- Bayes Rule- How probability is useful in NLP.

Unit V

Hidden Morkov Models and POS tagging – Statistical parsing.

Prescribed Text book:

1. Data intensive Linguistics by Chris Brew and Marc Moens – 2004.

M. Sc. Computer Science and Sanskrit Language Technologies
Semester – 3

Sanskrit Linguistics –II

Course Code	Course Type	Credits	Theory	Practicals	Tutorial
MSC214	Hard core	4	4hrs/week	2hrs/week	1hr/week

Unit I

Morpheme- Allomorph- Morph- Morphology(Morphemic)- Suffixes- Nature of the root- Origin of suffixes- Composition Theory- Secretion theory- Noun Formative Suffixes- Comparison of the division of the formative suffixes into primary and secondary with paninian classification of krt and taddhita- Simple and compound suffixes- Comparative and superlative suffixes- Vedic infinitive- Gerund or Indeclinable participle- Root-noun.

Unit II

Compounds - Natural of the compound - Paninian classification of compounds - Origin of compounds - Tatpurusa (Determinative compound) - Bahuvrihi (Epithetized compound) – Dvandva (Copulative compound) - Obscure compounds.

Unit III

Pakts of Speech and Grammatical Categories- Graeco-Roman classification of parts of speech- Paninian classification of parts of speech- Noun, Adjective and Pronoun- Declension- Number- Gender- Case-forms or Syncretism- Declensional contamination- Pronoun- Numerals.

Unit IV

Verb Morphology- Verbal root- Thematic and a thematic roots- Panini's classification of roots- PIE verb system- Person- Number- Voice- Aspect or type of verbal action- Reduplication- Augment- Personal endings-

Unit IV

Tenses- Present system- Future system- Aorist system- Perfect system - Moods- Secondary Conjugation- Primary Meaning and Secondary Meaning- Etymological Meaning- Popular Etymology- Synonyms- Polysemy- Homonym and Homophone- Antonyms- Role of Context in Deciding Meaning.

Prescribed Textbook:

1. An Introduction to Sanskrit Linguistics, M.Sriman Narayana Murti by D.K. Publications, Delhi.

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Semester – 3

JAVA Programming

Course Code	Course Type	Credits	Theory	Practicals	Tutorial
MSC215	Soft Core	4	4hrs/week	2hrs/week	1hr/week

Unit I

Fundamentals of Object Oriented Programming: Object Oriented Programming Concepts - Objects and Classes - Data abstraction and encapsulation

Unit II

Introduction to Java Programming Language: Java program structure - Java tokens- Java statements- Java virtual machine – constants – Variables - Data types - Arrays and Strings

Unit III

Classes, Objects and Methods – Implementation using interfaces – packages - multithread programming – Exception handling Catch and finally statements.

Unit IV

Managing I/O files in Java, Concept of streams, Reading / Writing characters and bytes, Interactive I/O.

Unit V

Intro to applet Programming: Applets Vs applications - Local and Remote Applets, Designing web pages.

Prescribed Text books

1. Programming with JAVA by E. Balaguruswami, Tata McGraw Hill Pub.

M. Sc. Computer Science and Sanskrit Language Technologies

Semester – 4

Major Project Work

Course Code	Course Type	Credits
MSC221P	Hard core	10

This course gives an opportunity to the students to implement applications of sastras as Project Work. The student must submit a dissertation at the end of the semester as a partial fulfillment of the course work for awarding degree.

M. Sc. Computer Science and Sanskrit Language Technologies

Semester – 4

Project Work for Sanskrit Applications

Course Code	Course Type	Credits
MSC222P	Internship	4

The internship exclusively for PG students of other Departments

Soft skill course for PG students

Fundamentals of Computers

Course Code	Course Type	Credits	Theory	Practicals	Tutorial
CSSS	Soft Skill	4	4hrs/week	2hrs/week	1hr/week

Unit – I

Introduction to computers: History – Types of computers – Block diagram – Applications of computers – Types of Computers - I/O devices – Memory – Primary and Secondary Storage devices.

Unit – II

Introduction to operating systems : Functions – Types of operating systems – MS-DOS – MS-Windows – Linux.

Unit – III

Document processing : MS-Word – ILeap – Shreelipi – Page Maker – MS-Power Point.

Unit – IV

Internet – History – Uses of Internet – Internet Service Provider (ISP) – World Wide Web (WWW) – Web Browsers – E-Mail.

Unit – V

HTML: Structure of HTML – Basic Tags of HTML – Tables and layout.

Prescribed Text Book

1. Introduction to computers by Rajaraman, PHP Publications
2. R.K.Taxali, PC Software for Windows 98 made simple, Tata McGraw-Hill Publishing Company Limited, New Delhi.
3. Complete reference Linux by Richard Peterson.
4. Fundamentals of Internet and WWW by Raymond Greenlaw and Ellen Hepp, Tata McGraw Hill edition
5. The complete reference HTML and XHTML by Thomas A.Powell, Tata McGraw Hill edition.
6. Comdex Desktop Publishing Course Kit by Vikas Gupta, Dreamtech Press, New Delhi.