INDIAN STATISTICAL INSTITUTE

Students' Brochure
PART II

Master of Science in Library and Information Science

(Effective from 2021-22 Academic Year)

(See PART I for general information, rules and regulations)

The Headquarters is at
203 BARRACKPORE TRUNK ROAD
KOLKATA 700108

INDIAN STATISTICAL INSTITUTE

Master of Science in Library and Information Science

Contents

1 Curriculum

The two-year programme consists of a total of twenty credit-courses distributed over four semesters. These include colloquium, seminar and dissertation work. The courses other than colloquium, seminar and dissertation are allocated **four** hours per week, including lecture and practical/tutorial sessions.

The dissertation work on an approved topic will be spread over the 3rd and 4th semesters.

First Year

Semester I		Semester II	
Paper 01:	Foundations of Library and Information Science	Paper 06:	Library Management and Automation
Paper 02:	Information Organisation	Paper 07:	Digital Libraries
Paper 03:	Cataloguing and Metadata	Paper 08:	Knowledge Management
Paper 04:	Information Sources, Systems and Services	Paper 09:	Elements of Mathematics and Statistics
Paper 05:	Foundations of Information and Communications Technology (ICT)	Paper 10:	Colloquium and Study of Subject

Internship (4-6 weeks)

Second Year

Semester III		Semester IV	
Paper 11:	Information Retrieval	Paper 16:	Scientometrics and Informetrics
Paper 12:	Content Management Systems	Paper 17:	Web Based Information Systems and Services
Paper 13:	Data Management	Paper 18:	Semantic Web
Paper 14:	Research Methodology and Technical Writing	Paper 19:	Electives
Paper 15:	Seminar	Paper 20:	Dissertation (begins in 3rd semester with a guide assigned)

Elective Courses

E1: Geographic Information Science

E2: Health Informatics

E3: Data and Text Mining

E4: Big Data: Technology and Techniques

E5: Data Analytics

E6: Business/Corporate Information Systems.

2 Detailed Syllabi of the Courses

2.1 First Year, Semester I

Paper 01: Foundations of Library and Information Science

Module 1: Introduction to Library and Information Science

Unit 01: Meaning, Definition, Importance of data, information, knowledge

Unit 02: History and Evolution of libraries

Unit 03: Ancient period: writing media

Module 2: Evolution of Information Science

Unit 04: Evolution of Information Science as a discipline and its relation with cognitive sciences, library science, computer sciences and other disciplines, Spiral of scientific method

Unit 05: Library Education: National and International

Module 3: Library as a Social Institution

Unit 06: Library as a social institution; Role of Libraries in national and human development

Unit 07: Role of Libraries in Information, Recreation and Community Information

Unit 08: Changing role of Library and Information Centres in Society

Unit 09: Information Industry-Generators, Providers and Intermediaries

Module 4: Normative Principles of Library and Information Science

Unit 10: Normative principles

Unit 11: Five Laws of Library Science

Module 5: Types of Libraries and their functions

Unit 12: Academic Libraries

Unit 13: Public and National Libraries

Unit 14: Special Libraries

Module 6: Library Development and National Initiatives

Unit 15: National Information Policy, Development of Libraries in India

Unit 16: Digital Divide and Information Literacy

Module 7: Memory Institutions

Unit 17: Memory Institutions: Libraries, Archives, Museums and Art Galleries

Unit 18: Memory of the world– UNESCO, others such as Europeana

Module 8: Information and Communication

Unit 19: Information and communication; Models, channels and barriers; Trends in scientific communication

Module 9: Library Legislation and Library Related Acts

Unit 20: Library legislation: Concept, need and purpose

Unit 21: Public library legislations in India

Unit 22: Press and Registration Act

Unit 23: Delivery of Books and Newspapers Act

Unit 24: Intellectual Property Rights(IPR)

Unit 25: National Information Policy

Module 10: National and international library networks

Unit 26: Library resource sharing and Consortia

Unit 27: National networks: DELNET, INFLIBNET

Unit 28: International networks e.g., AGRIS, INIS

Module 11: LIS Professional Organisation and their Roles

Unit 29: Philosophy of librarianship and professional ethics

Unit 30: The Information Profession and professional bodies

Unit 31: Professional organisations such as: ALA, IFLA, ASLIB, ILA, IASLIC, IATLIS; Others: LoC, OCLC

Unit 32: Noteworthy Libraries and their roles: National Libraries, British Museum Libraries, Library of Congress, UNESCO and its activities in information sector

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2. Barua, B. P. (1992). *National Policy on Library and Information systems and services for India: Perspectives and Projections*. Popular Prakashan.

3. Bawden, D., & Robinson, L. (2015). *Introduction to information science*. Facet Publishing.

4. Choux, Deborah E. Bo. (2012). *Intellectual Property: The Law of Trademarks, Copyrights, Patents, and Trade Secrets* . Cengage.

5. Feather, J. (2013). *The information society: a study of continuity and change*. Facet Publishing.

6. Lester, J., & Wllace, C. (2007). *Fundamentals of information studies: Understanding information and its environment*. Neal-Schuman Publishers, Inc.

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8. Ranganathan, S. R. (1988). *The Five Laws of Library Science*. New Delhi: Sarada Ranganathan Endowment for Library Science.

9. Ruthven, I., & Kelly, D. (Eds.). (2011). *Interactive information seeking, behaviour and retrieval*. Facet Publishing.

10. Totterdell, A., Gill, J., & Hornsey, A. (2005). *An introduction to library and information work*. Facet Publishing.

Paper 02: Information Organisation

Module 1: Introduction and History

Unit 01: Classification – Meaning and Definition – Taxonomies, Library Classification Meaning and Purpose

Unit 02: Historical Perspectives; Developments in theory of Library Classification

Unit 03: Main contributions: E.C. Richardson, H.E. Bliss, W.C.Berwick Sayers, J.D. Brown, E.W. Hulme, CRG, and S.R. Ranganathan

Module 2: Classification Theory

Unit 04: General Theory of Classification

Unit 05: Salient Features of DDC, CC and UDC

Unit 06: DDC Theory: Main Classes, Divisions, Sections, Auxiliary and Phoenix Tables

Unit 07: Trends in classification: Ontologies and Folksonomies; Knowledge Organization in Digital Environment

Module 3: Ranganathan's Theory of Classification

Unit 08: Universe of Subjects; Modes of formation of subjects

Unit 09: Mapping of Universe of subjects in major schemes of Library classification

Unit 10: The Three planes of work

Unit 11: Basic Subject, Compound and Complex Subject, Fundamental Categories, Facet Analysis and facet sequence, Systems and specials, Phase Relations

Unit 12: Fundamental and Basic Laws

Unit 13: Canons, Principles and postulates

Unit 14: Rounds and Levels, Phase Relation, Mnemonics, Notation: Kinds and Hospitality

Unit 15: Common isolates, Language isolates, Space isolates and Time isolates Anteriorising and Posteriorising Common Isolates

Unit 16: Use of different Devices

Module 4: Classification Practice

Unit 17: Call Number and its components

Unit 18-23: DDC Practice

Unit 24-32: CC Practice

References

1. Bowman, J. H (2004). *Essential Dewey*. Facet Publishing.
2. Broughton, Vanda. (2004). *Essential Classification*. Facet Publishing.
3. Comaromi, J. P., Warren, M. J. & Dewey, Melvil. (1982). *Manual on the Use of the Dewey Decimal Classification*. Forest Press.
4. Ranganathan, S. R. (1928). *Colon Classification*. ESS ESS Publication.
5. *Dewey Decimal Classification and Relative Index*.OCLC.
6. Foskett, A. C. (2002). *The Subject Approach to Information*. Facet Publishing.
7. Kao, Mary L. (2003). *Cataloguing and Classification for Library Personnel*. Jaico.
8. Ranganathan, S. R. (2006). *Philosophy of Library Classification*. Ess Ess.
9. Ranganathan, S. R. (1967) *Prolegomena to Library Classification* . [Bombay, New York, Asia Pub. House]
10. Taylor, A. G. (2007). *Introduction to Cataloguing and Classification* .10th Ed. Atlantic.
11. *Universal Decimal Classification* . UDC Consortium.

Paper 03: Cataloguing and Metadata

Module 1: Fundamentals of Cataloguing

Unit 01: Introduction to Cataloguing: Library Catalogue - Meaning, Definition, Need, Purpose, Objectives Functions, types and forms of catalogues

Unit 02: Historical study of cataloguing - Inventory to Card Catalogue to OPAC

Unit 03: Accession list, Shelf list, bibliographies and trade catalogues

Module 2: Theory of Cataloguing

Unit 04: Normative principles of Cataloguing - Canons, Laws, Principles

Unit 05: Evolution of cataloguing codes (Cutter's Rules; AACR Code; Classified Catalogue Code; ALA Rules, LC Descriptive Rules, FRBR, FRAD, Resources escription and Access (RDA))

Unit 06: Types of catalogues: Dictionary Catalogue Vs Classified Catalogue

Unit 07: Filing of entries – Word-by-word Vs Character-by-character

Module 3: Cataloguing Codes

Unit 08-10: AACR2

Unit 11-12: RDA

Unit 13-14: CCC

Module 4: Machine Readable Catalogues

Unit 15: MARC21 and MARCXML

Unit 16: Authority Files – Name, Corporate, Serial etc

Module 5: Formats of Catalogues and Cataloguing

Unit 17: Centralized, Publisher's catalogue, CIP, Cooperative Cataloguing, Prenatal Cataloguing, Copy Cataloguing,

Unit 18: Union Catalogue such as WorldCat, IndCat

Module 6: Standards

Unit 19: ISBD

Unit 20: FRBR

Unit 21: Bibframe

Module 7: Metadata

Unit 22: Purpose; Types- Descriptive, Structural, Administrative, Preservation, Provenance etc

Unit 23: Dublin Core, QDC

Unit 24: Other Metadata Schema: EAD, TEI, METS, VRA Core etc

Module 8: Practicals

Unit 25-32: Practicals on Preparation of Bibliographic Records for different kinds of documents – Non Book Material; Manuscripts, Cartographic Materials, Microforms, Graphic Materials and Electronic Resources: Sound Recordings, Motion Pictures, Video Recordings, Computer Files, Web Resources

References

1. American Library Association. (1978). A*nglo-American cataloguing rules. 2nd Ed*. 2002 revision, 2005 update. American Library Association.
2. Andrew, P. G. (2003). *Cataloguing Sheet Maps*. Haworth Press.
3. Bowman, J. H. (2002). *Essential cataloguing the basics*. Facet Publishing
4. Broughton, Vanda. (2006). *Essential Thesaurus Construction*. Facet.
5. Broughton, Vanda. (2011).*Essential Library of Congress Subject Headings*. Facet
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15. Mitchell, Anne M. & Surratt, Brian E. (2005). *Cataloguing and Organizing Digital Sources*. Facet Publishing.

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18. Sears, M. E. (2010). *Sears List of Subject Headings*. 20th Ed. H. W. Wilson.

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20. Welsh, Anne & Batley, Sue. (2012). *Practical Cataloguing AACR, RDA and MARC21*. Facet Publishing

Paper 04: Information Sources, Systems and Services

Module 1: Information Sources

Unit 01: Documentary and Non-Documentary; Primary, Secondary and Tertiary Sources of Information and their Characteristics

Unit 02: Evaluation of Information Sources such as Dictionaries, Encyclopaedias, Journals, Abstracting Journals, Patents, Standards, Handbooks, Theses and Dissertations

Unit 03: Economics of Information

Unit 04: Other sources such as OCLC, WorldCat

Module 2: Information Needs and Studies

Unit 05: User Studies

Unit 06: Usage Studies

Module 3: Electronic Information Resources and Multimedia

Unit 07: Electronic Resources: Meaning, Concept, Definition, Emergence, features, advantages and disadvantages

Unit 08: Types of E-Resources: Databases, E-Books, E-Journals, Multimedia objects, E-references, Subject Guides, Bibliographic Databases, Open Content, Subject Gateways, Portals, Wikipedia, blogs, etc

Unit 09: E-Resource Management (ERM)

Unit 10: Reference Management Tools Such as Zotero, Mendeley etc

Module 4: Library and Information Services

Unit 11: Information Services: Concept, Need and Purpose, and Scope; Reference Services – Short and Long Range Information services

Unit 12: Current Awareness Service and Selective Dissemination of Information

Unit 13: Bibliographic Service

Unit 14: Other Information Services: Referral Service, Document Delivery Service

Unit 15: Community Information Services

Unit 16: Information Analysis and Consolidation: Trend reports and State of the Art Reports

Module 5: Information Systems

Unit 17: Information System: Basic Concept, Need, Components, Types and Characteristics and Evaluation criteria for Information Systems

Unit 18: National Information Systems: NISCAIR, DESIDOC, NASSDOC etc

Unit 19: Global Information Systems: INIS, AGRIS, MEDLARS, etc

Unit 20: Government Information and Publications

Unit 21: Decision support systems

Unit 22: Geographical Information Systems

Unit 23: Health Information Systems,

Module 6: Databases Information Sources and Systems

Unit 24: Databases as information systems: Definition, Concept, Need and Application

Unit 25: Other sources and services: Scopus, Web of Science, Science Direct, Google Scholar, ResearchGate etc

Module 7: Resource Sharing

Unit 26: Library Network: Meaning, Purpose, Function

Unit 27: Consortia – Advantages and Disadvantages

Unit 28: Library Networks: INFLIBNET, DELNET: Aims, objectives, role and functions, services, and activities

Unit 29: INB, ShodhGanga, Shodh Sindhu

Module 8: Major Operational Information Systems

Unit 30: Major Operational Information Systems and Programmes at the Global Level

Unit 31-32: Discipline/Mission-oriented systems as well as Information Systems specializing in different kinds of documents (Patents, Theses and Dissertations, Research Reports, etc)

References

1. Bopp, R. E., & Smith, L. C. (Eds.). (2011). *Reference and Information Services: An Introduction*. ABC-CLIO.
2. Cassell, K. A., & Hiremath, U. (2013). *Reference and information services: An introduction*. American Library Association.
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Paper 05: Foundations of Information and Communications Technology (ICT)

Module 1: Digital Computers

Unit 01: Evolution of Digital Computers

Unit 02: Social and Ethical Aspects of Information Technology; Privacy and Security

Unit 03: Number systems Binary, Octal, Decimal, Hexadecimal

Unit 04: Character Representation ASCII and UNICODE

Unit 05: Basic Components of computers: ALU, RAM, ROM, Cache memory; Cloud Infrastructure

Unit 06: I/O devices: keyboards, monitors, printers, scanners, PCs, Servers, secondary storage devices

Unit 07: Boolean Logic: AND, OR, NOT, NAND, NOR, EX-OR

Module 2: Operating Systems, UNIX/Linux

Unit 08: Operating System: Single User, multi-user, multi-tasking system

Unit 09: Introduction to UNIX/Linux; Flavours of Unix/Linux

Unit 10: Important shell commands

Unit 11: Directory Structure, File/Directory Permissions, Relative and Absolute Paths

Unit 12: Redirection; Environment Variables

Unit 13: Regex: Regular Expressions

Unit 14: Shell Scripting

Unit 15: Security and Firewalls

Module 3: Networking Technology

Unit 16: Network topologies: Star, Bus, Token Ring, Hybrid; Type of Networks LAN and VPN; Networking Hardware: Ethernet, Hubs, Switches, Cables and connectors

Unit 17: TCP/IP, IP4 and IP6; Public and LAN IPs, subnet masking; Networks classes: A, B, C, D; Transport layer protocols: TCP, UDP and AAL

Unit 18: SSH, SFTP, HTTP, passwordless SSH access, DNS, Proxy servers

Module 4: Introduction to Markup Languages

Unit 19: HyperText, Hyper Media and HTML

Unit 20: XML, DTD, XMLS

Unit 21: XSLT, CSS

Unit 22: HTML5

Unit 23: Apache Web Server

Module 5: Web Search Engines

Unit 24: Search Facilities Exact, Phrase, Truncation (Wild Cards), Boolean, Fuzzy, Proximity searches

Unit 25: Evaluation of Google, Yahoo etc

Unit 26: Ranking Algorithms

Module 6: Social Media

Unit 27: Web-2.0: Concept; Social, Privacy and Ethical Issues

Unit 28: FaceBook, Twitter, Instagram, ResearchGate, LinkedIn

Module 7: Database Management Systems

Unit 29: DBMS Models

Unit 30: Structured Query Language (SQL)

Unit 31-36: DBMS practice using Software like MySQL or PostgreSQL

References

1. Anderson, Paul. (2012). *Web 2.0 and beyond : principles and technologies*. CRC Press

2. Bach, Maurice J. (2015). *Design of the Unix Operating Systems*. Pearson

3. Date, C. J. (2003). *An Introduction to Database Systems*. Pearson Education.

4. Doyle, Stephen (2015) *Complete ICT for Cambridge IGCSE*. Oxford University Press.

5. Leon, Alexis & Leon, Mathews. (2006). *Fundamentals of Database Management Systems*. Vijan Nicole.

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9. Silberschatz. (2013). *Database System Concepts Paperback*. McGrawHill.

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13. Ward, Brian (2014) *How Linux Works – What Every Super user Should Know* . No Starch Press.

14. Wilson, Kevin (2016).*Essential Computing: Concepts of ICT*. Elluminate Press.

2.2 First Year, Semester II

Paper 06: Library Management and Automation

Module 1: Library Systems and their Components

Unit 01: Introduction to library administration

Unit 02: Library Housekeeping operations – Acquisition and Collection Development:policy, procedures, Document circulation-functions, procedures, and methods, Serials control-functions, procedures and methods, Stock verification

Unit 03: Organizational structure, Library Authority and Library Committee

Module 2: Different Theories and Principles of Management

Unit 04: Management theories and applications: Meaning, Definition, Need and Relevance

Unit 05: Schools of Management thought – Classical Management Theory, Neoclassical Theory, Modern Management Theory, Problems and Conflicts in Management Theories Principles of Management

Unit 06: Management functions – planning, organizing, staffing, leading, Budgeting and controlling

Unit 07: Human Resource Management: Delegation, communication and participation, Job description and analysis; Job evaluation, Interpersonal relations, Recruitment procedures, Motivation; Group dynamics, Training and development, Discipline and grievances, Performance appraisal

Module 3: Electronic Resources Management System (ERMS)

Unit 08: ERM: Concept, need, features, types, functional requirements, benefits

Unit 09: Application Modules of ERMS

Unit 10: ERM Technology Framework: ERM Software, DLF-ERM

Module 4: Financial Management and Budgeting

Unit 11: Financial Management: budgeting and different types of budgets-PPBS, ZBB, Line Budget; Costing, cost and benefit analysis, Resource mobilization, Outsourcing

Module 5: Project and Quality Management

Unit 12: Project Management: Project life cycle, PERT, CPM, Gantt Chart, Change Management

Unit 13: TQM: Definition, concept, elements; Quality Management: audit, LIS related standards, Technology management, ISO 9000 series

Module 6: Performance Management and Analysis

Unit 14: Performance parameters; Measurement, Reengineering Time and Motion Study, SWOT (Strengths, Weaknesses, Opportunities, and Threats) Analysis

Unit 15: Reporting: Types of reports- Annual Report-compilation, contents and style, Library statistics

Module 7: Preservation of Library Materials

Unit 16: Preservation and Conservation: Concept, Need and History

Unit 17: Inherent characteristics of the Library Materials – Manuscripts, Books, Periodicals and Newspapers

Unit 18: Factors: Environmental Factors – Temperature, Humidity, Light and Dust, Biological Factors – Fungi, Insects and Other Pests, Chemical Factors – Chemicals used in Production and Preservation of Documents

Unit 19: Non-Book Materials and their Preservation

Module 8: Library Automation and Software Management

Unit 20: Introduction to Library Automation

Unit 21: Introduction to various ILMS such as: KOHA

Unit 22: Modules of ILMSs: Acquisition, Circulation, Cataloguing, Serial Control, Administration, OPAC and Web OPAC

Unit 23: Introduction to Library Discovery tool (such as VuFind and others)

Module 9: Practicals

Unit 24-28: ILMS such as Koha and others software

Unit 29-30: Discovery Tools such as VuFind, Blacklight, Google Scholar

Unit 31-32: ERM tools such as CORAL

References

1. Beard well, Ian & Holden, Len. (1996). *Human Resource Management: A contemporary perspectives*. Longman.

2. Bilal, Dania (2014). *Library Automation: Core Concepts and Practical Systems Analysis*, 3rd Edition. ABC-CLIO.

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4. Bryson Jo. (1996). *Effective Library and Information Management*. Jaico Pub. House

5. Drucker, Peter F. (2002). *Management Challenges for the 21st century*. Oxford; Butterworth Heinemann.

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10. Johnson, Peggy. (2009). *Fundamentals of Collection Development and Management*,. 2nd Ed. ALA.

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12. Judy, Brooks. (2014). *Practical Systems Analysis in Library Automation and Management*. Koros Press Limited

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Paper 07: Digital Libraries

Module 1: Open Access to Information

Unit 01: Scholarly Communication and Open Access to Information Movement; OAI Declarations

Unit 02: Study of Sherpa: Romeo and Juliet

Unit 03: Introduction to Digital Library; Historical Development

Unit 04: Digital/Institutional Repositories, International and National Initiatives

Unit 05: Registry of Digital Repositories: OpenDoar; GetaGrainger; openarchives.org

Unit 06: Ethical Issues in Digital Libraries

Module 2: Digitisation

Unit 07: Digitization: Hardware and Software; Best Practices for Digitisation

Unit 08: File Formats, Open Standards

Module 3: Digital Library Software

Unit 09: Features of Digital Library Software, Comparative study

Module 4: Standards and Protocols

Unit 10: Open Standards and Interoperability

Unit 11: Metadata, Dublin Core and Qualified Dublin Core

Unit 12: OAI-PMH, OAI-ORE, RSS/Atom feeds

Unit 13: Persistent Identifiers - DOI and CNRI, handles, ARCID

Module 5: Digital Repository Management

Unit 14: Digital Library Architectures

Unit 15: Planning and Implementation

Unit 16: Digital Rights Management (DRM)

Unit 17: Copyright and license issues; Creative Commons

Module 6: DSpace

Unit 18: DSpace Introduction

Unit 19: DSpace Administration: Content Organisation; E-people; Workflow

Unit 20: Harvesting : OAI-PMH and OAI-ORE

Module 7: DSpace Practicals

Unit 21: DSpace Administration

Unit 22: Installation; dspace/local.cfg

Unit 23: MultiLingual Interface; Customisation of Themes, Cron Jobs

Unit 24: Persistent Identifiers; Permissions in DSpace; Embargo configuration

Unit 25: Discovery in DSpace

Unit 26: Harvesting : OAI-PMH and OAI-ORE

Unit 27: Input forms customisation

Unit 28: Backup, Export, Import, AIP

Unit 29: DSpace Statistics

Unit 30: Curation in DSpace

Unit 31: Sword2; REST

Unit 32: DSpace Commands

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2. Chowdhury, G. G. & Chowdhury, Sudatta. (2003). *Introduction to Digital Libraries*. Facet Publishing.

3. Chowdhury, G. G., & Foo, S. (Eds.). (2012). *Digital libraries and information access: research perspectives*. Facet Publishing.

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6. Jones, Richard et al. (2006). *The Institutional Repository*. Oxford: Chandos Publishing.

7. Judith, Andrews & Derek, Law. (2004). *Digital Libraries*. Ashgate.

8. Lucy A. Tedd & Andrew Large. (2004). *Digital Libraries : Principles and Practice in a Global Environment*. G.G. Saur.

9. Purcell, Aaron .(2016). *Digital Library Programs for Libraries and Archives: Developing, Managing, and Sustaining Unique Digital Collections*. ALA

Paper 08: Knowledge Management

Module 1: Introduction to Knowledge Management

Unit 01: Meaning, Nature, Need and objective of KM study

Unit 02: Types of Knowledge, Concept Analysis Technique, History of Knowledge Management: From Physical Assets to Knowledge Assets

Unit 03: KM and business strategy

Unit 04: KM for Individuals, Communities, and Organizations

Unit 05: The KM Profession: KM Roles and Responsibilities within Organizations, The Ethics of KM

Unit 06: KM and Future

Unit 07: Case Studies and infographics

Module 2: KM Cycle

Unit 08: Major Approaches to the KM Cycle-1: The Zack KM Cycle, The Bukowitz and Williams KM Cycle The McElroy KM Cycle

Unit 09: Major Approaches to the KM Cycle-2: The Wiig KM Cycle, An Integrated KM Cycle, Strategic Implications of the KM Cycle

Module 3: KM Models

Unit 10: The von Krogh and Roos Model of Organizational Epistemology, The Boisot I-Space KM Model

Unit 11: The Nonaka and Takeuchi Knowledge Spiral Model: The Knowledge Creation Process, Knowledge Conversion, Knowledge Spiral

Unit 12: The Choo Sense-making KM Model, The Wiig Model for Building and Using Knowledge

Unit 13: Complex Adaptive System Models of KM, Practical Implications of KM Models

Module 4: Knowledge Economy

Unit 14: Nature and characteristics, national information infrastructure

Unit 15: KM Strategies in knowledge economy

Unit 16: Intellectual capital and Intellectual Infrastructure development

Module 5: Knowledge Capture, codification

Unit 17: Tacit Knowledge Capture: Tacit Knowledge Capture at Individual and Group Levels, Inter-viewing Experts, Structured Interviewing, Stories, Other Methods of Tacit Knowledge Capture

Unit 18: Explicit Knowledge Codification: Cognitive Maps, Decision Trees, Knowledge Taxonomies

Module 6: Knowledge Sharing

Unit 19: Knowledge transfer and knowledge sharing with respect to culture and national structure

Unit 20: The Social Nature of Knowledge, Sociograms and Social Network Analysis, Obstacles to Knowledge Sharing, Measuring the Value of Social Capital

Module 7: KM Tools and Portals

Unit 21: Knowledge Capture and Creation Tools: Content Creation Tools, Data Mining and Knowledge Discovery, Blogs, Content Management Tools; Knowledge Sharing and Dissemination Tools

Unit 22: Groupware and Collaboration Tools: Wikis, Networking Technologies

Unit 23: Knowledge Acquisition and Application Tools, Intelligent Filtering Tools, Adaptive Technologies

Unit 24: Knowledge Management Strategy: Knowledge Audit, Gap Analysis, The KM Strategy Road Map

Unit 25: KM Metrics: The Benchmarking Method, The Balanced Scorecard Method, The House of Quality Method

Unit 26: Knowledge Portals

Unit 27: Evaluation of KM effectiveness

Module 8: Role of Organisational Culture

Unit 28: Different Types of Cultures, Organizational Culture Analysis, Culture at the Foundation of KM, The Effects of Culture on Individuals, Cultural Transformation to a Knowledge-Sharing Culture

Unit 29: Organizational Maturity Models: KM Maturity Models, CoP Maturity Models

Module 9: Practice

Unit 30-32: KM Practice - Project Work

References

1. Cappelli, Peter. (2010). *The performance effects of it-enabled knowledge management practices*. Cambridge.
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3. Dalkir, Kimiz & Liebowitz, Jay (2011). *Knowledge Management Theory & Practice*. MIT Press
4. Easterby-Smith, Mark & Lyles, Marjorie A. (2011). *Handbook of organizational learning and knowledge management*. Wiley.
5. Frappaolo, Carl. (2006). *Knowledge Management*. Capstone.
6. Hislop, Donald. (2009). *Knowledge Management in organization*. Oxford.
7. Holsapple, Clyde. (2004).*Handbook on Knowledge Management 1: Knowledge Matters*. Springer
8. Jennex, Murray E. (2008). *Knowledge Management: Concepts, Methodologies, Tools and Applications*. Information Science Reference.
9. Liebowitz, Jay (2012). *Knowledge Management Handbook: Collaboration and Social Networking*. Taylor and Francis

Paper 09: Elements of Mathematics and Statistics

Module 1: Elements of Mathematics

Unit 01: Set theory: Sets and their representation; Universal Set; Empty Set; Subsets; Power Set' Venn Diagrams; Union and Intersection of Sets; Difference of Sets; Complements of Sets

Unit 02: Relations and Functions: Ordered pairs, Definition of a relation, domain and range of a relation; Functions as a special kind of relation from one set to another, domain and range of a function, real valued functions of the real variable, graphs of standard functions One to one and onto functions, inverse of a function, composite functions

Module 2: Introduction to Statistics

Unit 03: Introduction to Statistics

Unit 04: Statistical Applications, Challenges

Module 3: Data Collection and Presentation

Unit 05: Methods of data collection; Scales of measurement

Unit 06: Data Pre-processing: Coding, Classification, Tabulation etc

Unit 07: Data Visualisation – graphical and tabular; Frequency tables and curves, histogram, Frequency Polygon, Ogive etc

Module 4: Descriptive Statistics

Unit 08: Measures of central tendency

Unit 09: Measures of Dispersion

Unit 10: Measures of Asymmetry

Unit 11: Measures of Relationship

Unit 12: Simple Regression, Regression Vs Correlation

Unit 13: Index and Time Series

Module 5: Basics of Probability

Unit 14: Probability: Concepts: Classical and axiomatic,

Unit 15: properties of a probability measure; conditional probability, etc

Module 6: Independent events and Random variable

Unit 16: Independent events, random variable, discrete and continuous random variable

Unit 17: Distribution function, probability density functions

Unit 18: Probability Distributions such as Normal, Exponential, Binomial, Poisson, Geometric, Negative binomial distributions

Module 7: Statistical Test, Analysis of Variance and Regression analysis

Unit 19: Confidence intervals

Unit 20: Estimatiend Parameters

Unit 21: T-Test

Unit 22: Z-Test

Unit 23: Chi - Square tests, Goodness-of-fit test

Unit 24: Analysis of Variance (ANOVA) and

Unit 25: Analysis of Covariance (ANCOVA)

Unit 26: Regression analysis; Curve fitting

Module 8: Practicals

Unit 27-29: Statistical tests and regression analysis

Unit 30-32: Introduction to statistical analysis tool (such as R)

References

1. David M. Dietz, Christopher D. Barr, and Mine Cetinkaya-Rundel (2015). *OpenIntro Statistics*, American Institute for Mathematics.

2. *Mathematics Class 11th textbook*. NCERT.

3. Nicholas J. Horton, Daniel T. Kaplan, and Randall Pruim (2015). *A Student's Guide to R*.

4. Freedman, David, Robert Pisani, & Roger Pervis (2007). *Statistics*. New York: W. W. Norton.

5. James, Gareth, Daniela Witten, Trevor Hastie, & Robert Tibshirani (2013). *An Introduction to Statistical Learning: With Applications in R*. New York: Springer.

6. Kabacoff, Robert (2015). *R In Action: Data Analysis and Graphics with R*. Shelter Island, NY: Manning Publications Co.

Paper 10: Colloquium and Study of Subject

Colloquia
Colloquia are conducted periodically where the students give presentations on a given topic. The colloquium can be in the form of presentation of different aspects of a topic or debate mode. The idea behind such a debate is to discuss the advantages and disadvantages of an idea/concept/theory. Depending on the performance of each student, the faculty in-charge of the colloquia awards marks.
Total marks: 50

Study of Subject
Study of Subject (SoS) is a formal methodology to understand a domain in order to be able to provide information resources and services in that domain. SoS includes primary, secondary and tertiary sources of information on a given subject. In addition to the various sources of information, the study also covers all the aspects of Information sources and products. This would serve as a precursor to the third semester project which expects a student to build a subject gateway.
Total marks: 50

2.3 Second Year, Semester III

Paper 11: Information Retrieval

Module 1: Introduction to Information Retrieval

Unit 01: Introduction to Information Retrieval: Overview of IR Systems, Purpose, Historical Perspectives

Unit 02: Concept, Feature, Scope, Function

Module 2: Traditional Information Retrieval Strategy

Unit 03: Subject Indexing: Concept, characteristics, relationship and differences with cataloguing and classification

Unit 04: Subject Indexing Languages (SIL); Meaning of IL; Natural Language Vs IL

Unit 05: Controlled Vocabulary (CV): Purpose, methods

Unit 06: Subject Headings such as LCSH, Sears List of Subject Headings

Unit 07: Thesaurus: Concepts, Purpose, Structure; International Thesauri: Agrovoc, Inspec, MeSH

Unit 08: Pre-Coordinate Indexing - Cutter's Contribution; Systematic Indexing; keyword indexing; Chain Indexing

Unit 09: Post-Coordinate indexing – Uniterm indexing, search engine indexing

Module 3: Modern IR Models and Strategies

Unit 10: Classic IR: basic concepts, Boolean model

Unit 11: Vector model, probabilistic model

Unit 12: Alternative IR: set theoretic, algebraic models

Unit 13: Probabilistic models (Bayesian networks);

Unit 14: Mathematical morphological models

Unit 15: Structured Text Retrieval Models: model based on non-overlapping lists and proximal nodes

Unit 16: Text Operations: document pre-processing (word stemming, stop words, thesauri).

Unit 17: Document clustering; Google's Page Rank model

Unit 18: TF-IDF Matrix

Unit 19: IR Systems and the WWW

Unit 20: Intelligent Web Agents

Unit 21: Search methodology, algorithms

Unit 22: Cognitive IR modelling

Unit 23: Natural Language Processing

Unit 24: Multimedia Information Retrieval: (e.g., Image, Audio, Video)

Module 4: Search and Retrieval Query

Unit 25: Advanced search techniques: ex: Boolean, fuzzy, truncation, proximity, phrase search

Unit 26: Query: keyword based querying, Pattern matching, structural queries, query protocols

Unit 27: Hybrid statistical and knowledge approaches: query expansion and refinement based on a similarity, thesaurus and ontologies

Module 5: IR Evaluation

Unit 28: Evaluation of IR

References

1. Aitchison, Jean; Gilchrist, Alan; and Bawdown, David. (1990). *Thesaurus Construction and Use: Practical manual*. 4th Ed. ASLIB.

2. Becker, Joseph & Hayes, Robert M. (1967). *Information Storage and Retrieval tools Elements & Theories*. New York: John Wiley.

3. Chowdhury, G G .(2010). *Introduction to Modern Information Retrieval*. Facet Publishing

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8. Lancaster, F.W. (1977). *The Measurement and Evaluation of Library Science*. Information Sources Press.

9. Losee, Robert M. (1998). *Text retrieval and Filtering: Analytical Models of Performance*. Kluwer.

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11. Sharp, Harold S. (1964). *Readings in Information Retrieval*. The Scarecrow Press.

12. Soergel, Dagobert. (1974). *Indexing Languages & Thesaurus Construction & Maintenance*. Melville Pub. House.

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14. Van Rijsbergen, C.J. (1979). *Information Retrieval*. Butterworths

Paper 12: Content Management Systems

Module 1: Introduction to CMS

Unit 01: Introduction to CMS, benefits,

Unit 02: Challenges, real world application

Unit 03: Types of content: Document management, Records management

Module 2: Principles of CMS

Unit 04: General Principles,

Unit 05: Distributed Content Authoring, Digital Convergence

Unit 06: Content management architecture

Module 3: Content management strategies

Unit 07: Content Development: Content authoring, content review, content version management, crowdsourcing, Syndication

Unit 08: Content Publishing and repurposing, roll-out strategies , Content replication, Unit design management,

Unit 09: Content migration,

Unit 10: Retrieval in CMS: search development, metadata tagging

Module 4: Integration in CMS

Unit 11: System and data integration in CMS

Unit 12: CMS Applications

Module 5: CMS and Community Information Systems

Unit 13: CMS and CIS: Conceptual Framework, Purpose, Technologies, Case study

Module 6: Portals and Subject Gateways

Unit 14: Portals

Unit 15: Subject Gateways

Unit 16: Application (Building a portal/subject gateway)

Module 7: MashUp Technologies

Unit 17: An Introduction to MashUp technologies

Unit 18: Application (Building a MashUp page for information management and services)

Module 8: Agent technologies and Personalization

Unit 19: Agent technologies/Software Agent: Meaning, Properties, Related areas, Application

Unit 20: Personalization: Conceptual framework, Purpose, Technologies and Application

Module 9: Study and Evaluation of CMS Software

Unit 21: CMS software such as Drupal, Joomla, Wordpress

Unit 22: Learning Management Systems: MOOCs using Moodle or others

Unit 23: Evaluation of CMS

Module 10: Practicals

Unit 24-26: Drupal

Unit 27-28: Moodle

Unit 29-30: Joomla and Wordpress

References

1. Barker, D. (2016). *Web Content Management: Systems, Features, and Best Practices*, O'Reilly Media.
2. Boiko, Bob. (2004). *Content Management Bible*, 2nd Edition, Wiley, Indiana.
3. Blokdyk, G. (2021). *Enterprise Content Management System A Complete Guide*, 5StarCooks.
4. Blokdyk, G. (2020). *Records Management System A Complete Guide*, 5StartCooks.
5. Daniel, F. and Metera, M. (2014). *Mashups: Concepts, Models and Architectures (Data-Centric Systems and Applications)*, Springer, New York.
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7. Diamond, D. (2016). *Metadata for Content Management: Designing taxonomy, metadata, policy and workflow to make digital content systems better for users*, CreateSpace.

8. Endres-Niggemeyer, B. (2013). *Semantic Mashups: Intelligent Reuse of Web Resources*, Springer, Berlin.

9. Hackos, J. T. (2002). *Content Management Web Delivery*, John Wiley & Sons, New York.

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15. Nichols, K. (2015). *Enterprise Content Strategy: A Project Guide*. XML Press, California.

16. Noessel, C. (2017). *Designing Agentive Technology: AI That Works for People*, Rosenfeld Media.

17. Regli, T. (2016). *Digital and Marketing Asset Management: The Real Story about DAM Technology and Practices*, Digital Reality Checks.

18. Rockley, A. (2012). *Managing Enterprise Content: A Unified Content Strategy (Voices That Matter)*, 2nd Edition, New Riders.

19. Yapa, S. (2019). *Getting Started with Dynamics 365 Portals: Best Practices and Solutions for Enterprises*, Apress, Australia.

Paper 13: Data Management

Module 1: Introduction

Unit 01: Data acquisition preservation and curation: Definition, Terminologies and Fundamental Concepts; Philosophy of Data Curation

Unit 02: Open Science and Open Data

Unit 03: Data Librarianship: Role and Functions of the Library

Module 2: Research and Government Data

Unit 04: RDM: Definition and Need, Life cycle, Issues and Challenges to RDM

Unit 05: Government data: e-Governance and Smart Cities

Module 3: Data Curation Standards and Models

Unit 06: Introduction to data curation models and data life cycle

Unit 07: Open Archival Information System(OAIS) model, Archival Information Package(AIP), Submission Information Package(SIP), Dissemination Information, Package(DIP); ISO 16363; Digital Curation (DCC) Lifecycle Model

Unit 08: Data Curation workflow, Domain specific Data Curation

Module 4: Data Handling and Big Data

Unit 09: Concepts and Components of ETL

Unit 10: Big Data: Nature, Characteristics, Challenges and opportunities

Unit 11: Data Types and Data Models

Unit 12: Data Net, open data, open government initiatives

Unit 13: Data Cleaning and Integration; Managing, Processing, and Policy Heterogeneity; Schema Integration

Module 5: Data Curation and Related Concepts

Unit 14: Data Curation and Libraries and Repositories

Unit 15: Data Curation Planning(e.g., DMPTool)

Unit 16: Organizations for Data Preservation and curation such as : Digital Curation Centre (DCC), Digital Preservation Coalition, Library of Congress (NDIIPP)

Module 6: Data Repositories

Unit 17: Evolution and Components of Data Repositories

Unit 18: Evaluation of Data Repositories

Module 7: Linked Open Data (LOD)

Unit 19: Introduction to LOD

Unit 20: Metadata and Interoperability, Ontology

Unit 21: Case studies

Module 8: Practice

Unit 22-29: Software tools for ETL such as Spreadsheet, OpenRefine, R, Apache Spark

Unit 30-32: Data Repository Software such as CKAN, Dataverse

References

1. Borgman, C. L. (2015a). *Big Data, Little Data, No Data: Scholarship in the Networked World*. Cambridge MA: MIT Press.

2. Fearon, D. J., Gunia, B., Lake, S., Pralle, B. E., & Sallans, A. L. (2013). *Research Data Management Services*, SPEC Kit 334 (July 2013).

3. Gajbe, S. B., Tiwari, A., Gopalji & Singh, R. K. (2021). *Evaluation and analysis of Data Management Plan tools: A parametric approach*. Information Processing & Management, 58(3), 102480.

4. Inter-university Consortium for Political and Social Research. (2012). *Guide to Social Science Data Preparation and Archiving: Best Practice Throughout the Data Life Cycle* (No. 5th edition). Ann Arbor, MI: ICPSR. R

5. Kimpton, M., & Morris, C. M. (2013). *Managing and Archiving Research Data: Local Repository and Cloud-Based Practices*. In J. M. Ray (Ed.), Purdue University Press.

6. National Science Foundation. (2011). *NSF Data Management Plans*. Washington, DC: NSF.

7. Ray, J. M. (2014). *Research data management: practical strategies for information professionals*. West Lafayette, Ind.: Purdue University Press.

Paper 14: Research Methodology and Technical Writing

Module 1: Introduction to Research

Unit 01: Fundamentals of Research: Concept, meaning, need and process of research

Unit 02: Types of Research: basic research, applied research, action research, fundamental, survey, historical, including interdisciplinary and multidisciplinary approach

Unit 03: Research Methods: scientific, historical, descriptive, survey methods, case studies, , delphi and experimental methods, exploratory, constructive, empirical, primary and secondary research; qualitative and quantitative research

Unit 04: Approaches to research: descriptive research, comparative research, exploratory research, diagnostic research, social research

Unit 05: Research Design: conceptualization and operationalization

Unit 06: Research process: process of conducting research- identification of research topic and for mulation of research problem, literature search, formulation of hypotheses

Unit 07: Systematic collection of evidence or data, literature review or rigorous evaluation of resources, data interpretation and synthesis, nominal and operational definition, validity checking; limitations

Unit 08: Research Ethics and Plagiarism

Unit 09: Current trends in library and information science research: (assignment on the topic) - Trend report

Module 2: Research Techniques and Tools

Unit 10: Variables and sampling: types of variables- random variable, discrete and continuous ran dom variable; distribution function, probability density functions

Unit 11: Measurement of data: census versus sample survey

Unit 12: Sampling Procedure and Types of sampling: simple random sampling (srs), systematic ran dom sampling, stratified random sampling, multistage sampling, quota sampling, snowball sampling

Unit 13: Data collection methods: interviews, observation, questionnaire, telephonic surveys

Module 3: Hypothesis formulation and Testing

Unit 14: Procedure for Hypothesis Testing; Measuring the Power of a Hypothesis Test; Important Parametric Tests; Limitations of the Tests of Hypotheses

Unit 15: Hypothesis Testing of Means;Hypothesis Testing for Differences between Means; Hypothesis Testing for Comparing Two Related Samples

Unit 16: Hypothesis Testing of Proportions;Hypothesis Testing for Difference between Proportions

Unit 17: Hypothesis Testing for Comparing a Variance to Some Hypothesized Population Variance; Testing the Equality of Variances of Two Normal Populations; Hypothesis Testing of Cor-relation Coefficients

Module 4: Citation and Referencing

Unit 18: Citation style manual MLA

Unit 19: Citation style manual APA

Unit 20: Citation style manual CHICAGO

Unit 21: Reference management tools such as Mendeley, Zotero

Module 5: Technical Communication

Unit 22: Introduction to Technical Communication -oral communication, audio-visual communication- quality of contents, structural organisation, physical production; written communication- individual writing, corporate writing, office communication, oral presentation; creative writing

Unit 23: Technical Writing

Unit 24: Writing Research plans/proposals

Unit 25: Research reports: structure, style, concepts, guidelines for research reporting

Unit 26-32: Practicals on Reference tools and technical communication

References

1. Booth, W. C., Williams, J. M. & Colomb, G. G. (2003). *The Craft of Research*. University of Chicago Press.

2. Brady, John. (1997). *The Craft of Interviewing*. Vintage.

3. Gilliam, Bill. (2000). *The Research Interview*. Continuum Press.

4. Goddard, W. and Melville, S. (2004). *ResearchMethodology : An Introduction*, Juta Academic.

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7. Kumar Ranjit (2021) *Research Methodology: A step-by-step guide for beginners*, SAGE.

8. Marshall, Catherine & Rossman, Gretchen B .(2006). *Designing Qualitative Research*. Sage.

9. Patterns Rea, Louis M & Parker, Richard A. (2005). *Designing and Conducting Survey Research*. Jossey-Bass.

10. Rubin, Herbert and Irene (2004). *Qualitative Interviewing: The Art of Hearing Data*. Sage, USA.

11. Sudman, Seymour (1976). *Applied Sampling*. Academic Press.

Paper 15: Seminar

Students are required to prepare a seminar paper on a topic approved by faculty. Students must submit the paper for evaluation to the faculty in charge and after approval of the paper, the seminar will be held.

As for evaluation, there will be 50% weight on the paper and 50% on the presentation.

2.4 Second Year, Semester IV

Paper 16: Scientometrics and Informetrics

Module 1: Introduction and Evolution

Unit 01: Introduction and need of metric studies in scholarly communication

Unit 02-03: Evolution of metric studies (From Librametrics to Altmetrics)

Unit 04: Open Content Metrics

Module 2: Scientific Collaboration

Unit 05: Concept, need and types of scientific collaboration

Unit 06: Measurement of scientific collaboration

Module 3: Bibliometric Laws

Unit 07: Law of scattering (Bradford's law)

Unit 08: Zipf's law, Lotka's law

Unit 09: Generalised bibliometrics distributions and Fitting of Informetrics models: Bradford's curve, Leimkuhler's distribution,

Unit 10: 80-20 rules, Price's law relating to scientific productivity

Unit 11: Aspects of concentration measures; Circulation Statistics

Module 4: Citation Analysis

Unit 12: Data Citation

Unit 13: Citation indexing, Impact Factor, H and G Indexes

Unit 14: Standard Citation Indicators(MOCR, FECR and MECR)

Unit 15: Relative citation Indicators(NMCR and RCR); bibliographic coupling and co-citation analysis

Module 5: Growth and obsolescence of literature

Unit 16: Various growth models; the half-life analogy

Unit 17: Determinations of aging factor and half-life: real vs apparent; synchronous vs diachronous

Unit 18-19: Measurement of growth and obsolescence (Practice)

Module 6: Mapping and Science Indicators

Unit 20: Mapping of science

Unit 21: Science indicators

Unit 22: Measurements of science indicator, mapping and visualization (Practice)

Unit 23: Metric Based Evaluations

Module 7: Altmetric studies

Unit 24: Introduction need and real world scenario

Unit 25: Altmetrics tools and indicators

Unit 26: Altmetrics (Practice)

Module 8: Ranking

Unit 27: Need, Objective and frameworks e.g., NIRF

Module 9: Citation Databases and Infographics

Unit 28-29: Scopus, Web of Knowledge, PubMed, Medline, Google Scholar

Unit 30: Infographics

Module 10: Tools for metric studies

Unit 31-33: Tools for bibliometric and scientometric studies (e.g. R)

References

1. Almind, T C & Ingwersen, P. (1997) *Informetric analysis of World Wide Web: Methodological approaches to webometrics*. Journal of Documentation, 53(4).412-420.

2. Andres, Ana. (2009). *Measuring academic research: How to undertake Bibliometric Study*. Oxford.

3. De Bellis, N. (2009). *Bibliometrics and citation analysis: From the Science Citation Index to Cybermetrics*. Scarecrow press.

4. Egghe, L & Rousseau, R.. (1990). *Introduction to Informetrics: Quantitative methods in library, documentation and information science*. Elsevier Science.

5. Egghe, L. (2006). *Theory and practice of the g-index*. Scientometrics . 69(1): 131-152

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8. Lancaster, F W. (1991). *Biblometric methods in assessing productivity and impact of research*. SRELS

9. Moed, H F. (2000). *Citation Analysis in research evaluation*. Springer.

10. Vinkler, P. (2010). *The evaluation of research by scientometric indicators*. Oxford: Chandos Publishing.

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12. Wilson, C S. (1999) *Informetrics*. In Williams, M E. Ed., ARIST, Vol.34. Medford: Information Today.

Paper 17: Web Based Information Systems and Services

Module 1: HTML and CSS

Unit 01: HTML Basics: tags, attributes, text/paragraph formatting, hyperlinks

Unit 02: HTML Tables and Layouts, physical vs logical tags

Unit 03: HTML5: Semantic tags, meta tags, SEO, Open Graph Protocol (OGP) tags

Unit 04: CSS Basics: Inline vs global CSS, CSS selectors, Box-model

Unit 05: CSS pseudo classes, pseudo elements, combinator, Rule of specificity

Unit 06: CSS layout, responsive design with @media queries

Unit 07: CSS Frameworks: Twitter Bootstrap (layout, utility classes, theming, etc.)

Module 2: XML

Unit 08: XML Concepts: Markup vs semantics, rules for well-formed XML

Unit 09: XML DTD: valid vs well-formed, element and attributes definitions, validation tools (xmllint)

Unit 10: XML Schema: data types, data facets and patterns, XML namespaces, Simple vs Complex types

Unit 11: XML Styling: CSS vs XSL, XSLT/XPATH/SQuery, xsltproc tool

Unit 12: XSLT advanced: XPATH Primer, advanced XSLT templates, lists, if-else, loops

Unit 13: Crosswalk using XSLT: MARCXML to DC/MODS and DC to MODS

Unit 14: YAML/JSON Primer: Basics of JSON, YAML standard and JSON, XML vs JSON

Module 3: Introduction to Databases

Unit 15: Database basics: RDBMS/SQL introduction, MySQL basic commands: connect, cre ate/alter tables, insert/update/delete data

Unit 16: Database constraints: Primary key, Foreign key, SQL Joins, Table alias in joins

Unit 17: Advanced SQL: Nested SQL in Where clause, Database export (mysqldump, pg_dump), SQL import

Module 4: Python Programming and web servers

Unit 18: Python Basics: print, concatenate, variables, string operations, math operations, functions

Unit 19: Python Data structures: Arrays, dict, Lists/Dict operations, Conditionals and loops, global vs local scope

Unit 20: Python modules: Datetime, Regular expression, JSON module, pymarc

Unit 21: Apache Web-server: Web server concept, VirtualHost, DocumentRoot and Alias, permissions, Listen to port

Unit 22: Python CGI: Form handling, GET param from URL, GET vs POST methods, Python MySQL connection

Module 5: Advanced topics for web based services and networking

Unit 23: Modern web patterns: Templating, MVC pattern, CGI vs WSGI, Security, Flask framework (Python)

Unit 24: Database abstraction: OS-level abstraction (ODBC), Language-level (JDBC/PDO/DBI), Object Relational Mapping (ORM)

Unit 25: Javascript: Client-side script concept, Browser/DOM events, jQuery, asynchronous pro-gramming (AJAX)

Unit 26: Web skills practical: use custom jQuery and CSS in Koha/DSpace with examples

Unit 27: Search engine components: Spider/crawler, Indexer, Searcher, Tokenizer, Filters, Ranking algorithms (TF-IDF scores)

Module 6: Web based services protocols

Unit 28: Z39.50 Protocol Operations (Init, Search, Present, Scan) using Yaz-Client, Record Syntax, Element set, Resultset management

Unit 29: Type-1 Query (RPN) examples with Bib-1 Attributes (Use, Relation, Position, Structure, Truncation, Completeness)

Unit 30: Z39.50 server setup using IndexData Zebra software, Index MARC records, Record Id de-duplication

Unit 31: Z39.50 Application Profiles: US National Profile (Z39.89), Bath Profile Conformance Levels for Functional Area A

Unit 32: SRU Operations (searchRetrieve, scan, explain), CQL basics (ContextSets, Relation Modifiers), Conformance/Base Profile

Unit 33: OAI-PMH: OAI Verbs, Selective Harvesting, Flow Control (resumptionToken), Tools and implementation

Unit 34: WWW/Search Engines: Scholarly/Vertical search engines, Federated Search Engines (Masterkey/Pazpar2), Discovery Platforms

Unit 35: Open Discovery Initiative (NISO RP-19-2020), COUNTER Usage statistics, SUSHI Protocol (Z39.93-2014), OpenURL (Z39.88-2004)

Module 7: Advanced web based services

Unit 36: Network authentication: IP-based authentication, EZProxy, Shibboleth, OpenAthens, etc.

Unit 37: Web Services: REST vs SOAP, SOAP usages, REST design principles, API

References

1. Anderson, Paul. (2012). *Web 2.0 and beyond : principles and technologies*. CRC Press

2. Bates, Chris. (2006). *Web Programming: Building Internet Applications*. 3rd Ed. Wiley-India.

3. Duckett, Jon .(2011). *HTML and CSS: Design and Build Websites Paperback* .Wiley

4. Kalbach, James. (2007). *Designing Web Navigation: Optimizing the User Experience*. O'Reilly Media.

5. Macdonald, Matthew (2015). *Creating a Website: The Missing Manual*. O'Reilly Media.

6. Morville, Peter & Rosenfeld, Louis. (2006). *Information Architecture for the World Wide Web: Designing Large-Scale Web Sites*. 3rd Ed. O'Reilly Media.

7. Robbins, Jennifer Niederst. (2012). *Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics*. 4th Ed. O'Reilly Media.

8. Stallings, William. (2007). *Computer Networking with Internet Protocols and Technology*. Pearson Education.

Paper 18: Semantic Web

Module 1: Introduction to Semantic Web

Unit 01: Transition from Syntactic Web to Semantic Web: Syntactic Web, Problems with Syntactic Web, Requirement and motivation of Semantic Web

Unit 02: Introduction to Glossary, Dictionary, Metadata, Taxonomy, Thesauri, Ontology, Their interrelationships

Module 2: Knowledge Organisation and Representation

Unit 03: Semantic Web: Introduction, Knowledge Organization (KO), Knowledge Organization Systems (KOS).

Unit 04: Knowledge Representation (KR) Goal, Properties, Semantic Network, Knowledge Representation issues

Module 3: Semantic Web Architecture and Components

Unit 05: Hypertext web technologies: URI/IRI, UNICODE, XML, XML Namespace

Unit 06: Standardised semantic web technologies: RDF, RDFS, Ontology, SPARQL, Rule, Logic

Unit 07: Unrealised semantic web technologies: Proof, Trust, Cryptography

Module 4: Resource Description Framework

Unit 08: Resource Description Framework, Fundamentals, Resource, Property, Value, Statements

Unit 09: Serialization Formats, Blank Node, Container

Unit 10: Resource Description Framework Schema, Core Classes in RDFS,

Module 5: Ontology and Ontology Language

Unit 11: Ontology (What, Why, Evolution), Ontology Classification

Unit 12: Ontology Building Blocks, TBox and ABox,

Unit 13: Ontology Development Methodologies

Unit 14: Ontology Editors, Introduction to protégé

Unit 15: Introduction to OWL, Syntax (Exchange Syntax, Abstract Syntax).

Unit 16: Flavours of OWL language: OWL 2 vs OWL 1 OWL 2 Profiles, OWL2, OWL 2 DL vs OWL 2 Full

Unit 17: OWL Semantics

Module 6: Logics

Unit 18: Description Logics, Basic Building Blocks of DL Ontologies,

Unit 19: DL System Architecture

Unit 20: Description Logic Family

Module 7: Advanced semantic web techniques

Unit 21: Reasoning and Inference: Concept, Tools

Unit 22: SPARQL, Linked Data

Unit 23: Ontology Querying

Module 8: Practice

Unit 24-27: Ontology development, data integration, knowledge graph

Unit 28-30: Reasoners such as Pellet, Hermit, Fact++, graph data access and visualization

Unit 31-32: Ontology Querying using such as SPARQL, DL Query

References

1. Tim Berners-Lee, James Hendler and Ora Lassila (2001). *The Semantic Web*, Scientific American.

2. Tim Berners-Lee and James Hendler (2001). *Publishing on the Semantic Web*, Nature.

3. Allemang, D. and Hendler, J. (2008). *Sementic Web for the working Ontologist: Effective modeling in RDFS and OWL*, Morgan Kaufmann Publishers.

4. Domingue, J. and Hendler, J. (2011). *Handbook of Semantic Web Technologies*, Springer.

5. Rudi Studer, Stephan Grimm, and Andreas Abecker (2007). *Semantic web services: concepts, technologies, and applications*, Springer Verlag, Heidelberg.

6. Michael Hausenblas, Luke Ruth, David Wood, and Marsha Zaidman (2013). *Linked Data*, Manning Publications.

7. Bob DuCharme (2013). *Learning SPARQL: Querying and Updating with SPARQL 1.1*, O'Reilly Media.

Electives

Paper 19, Elective E1: Geographic Information System

Module 1: Historical view of maps

Unit 01: Various maps (e.g. geographical and mathematical); Deterministic and non deterministic models and/or maps; certain coordinate systems;

Unit 02-03: What spatial maps contain (points; lines; objects); spatial and temporal scales; Basics of spatial data acquisition, Information retrieval and analysis, reasoning and modeling; Google maps

Unit 04-05: Transformation involved in space -time modeling; Digital geographics, frameworks, theories to formalize use and development of geographical information systems and services.

Module 2: Spatial data and spatial map

Unit 06: Continuous data, discrete data episodic data; popular data formats; Collection and acquisition of spatial data; collection standards, Conflation and digitization; geocoding positional accuracy, consistency, and data quality; Data Sources, Data Models and Data Structures, Algorithms, DBMS, Creation of Databases (spatial and non-spatial), Spatial analysis- Interpolation, Buffer, Overlay, Terrain Modeling and Network analysis.

Unit 07: Spatial data structures and databases; Raster vs vector; storage, access methods, and indexing;

Unit 08: Sources of geographical images: Aerial imaging and photogrammetry-Types of photo-graphs, Flying height and scale, Relief (height) displacement,

Stereoscopy, 3-D Model, Height determination using Parallax Bar, Digital Elevation Model (DEM), Slope; remote sensing- Basic concept, Electromagnetic spectrum, Spectral signature, Resolutions-Spectral. Spatial, Temporal and Radiometric, Platforms and Sensors, Remote Sensing Data Products- Pan, Multispectral, Microwave, Thermal, Hyperspectral, Visual interpretation method; GNSS– Principle used, Components of GNSS, Data collection methods, DGPS, Errors in observations and corrections.

Unit 09: Representation of other data (e.g., census data, business data, digital elevation models, health geographic data) in to spatial formats;

Unit 10: Spatial data representation and visualization; Information zonation, zone prioritization, spatial spread

Unit 11: basics of digital image processing and analysis: Sampling and quantization, Principle of Linear System, Convolution, Continuous and Discrete Fourier Transform, Principle of Maxima and Minima, Principle of Electromagnetic Waves, Maxwell's Equations, Antennas, Digital image characteristics, Image histogram, Image enhancement, Smoothing and Gradient Operators, and Basic digital image classification techniques.

Module 3: Analytics and retrieval techniques:

Unit 12: Geocoding; Representation of the data into maps; spatial data mining; geoprocessing environment

Unit 13: Classifying satellite images; classifying ancient maps for better preservation; map registration; map integration; classification schemes;

Unit 14: Data mining and pattern discovery; image processing and recognition/computer vision techniques; computational geometry,

Unit 15-16: Computer based segmentation, feature decomposition into zones; information retrieval, location allocation, network analysis, similarity search and approximity matching; statistical and geostatistical analysis

Module 4: Modeling:

Unit 17: Commonly sharing physical mechanism- basic measures, universal scaling laws, self organized critically exhibited by universal power laws; map algebra via mathematical morphology;

Unit 18: Relationship, topology, basic mathematical morphology operations, mathematical morphology to deal with global structural information, expressing spatial relationship in terms of morphological operations;

Unit 19: Algebraic structure of mathematical morphology; equivalence in set theoretical terms; directional mathematical morphology and reformalized hough transformation for the analysis of topographic maps; map matching method; euclidean and non euclidean metrics;

Unit 20: Minkowski distance, Hausdorff Distances;

Unit 21: similarity search; spatiotemporal data and information visualization and modeling;

Unit 22-24: Spatial interpolations via recursive generation of median element; Spatial extrapolations,

Unit 25-26: Spatial autocorrelation vs spatial dependency; Coupled spatial models; spatial and/or temporal information complexity;

Unit 27: How to construct an attractor explaining the spatial and/or temporal behavior of a phenomenon? New insights from spatial information science explaining the spatio-temporal behavior

Module 5: GIS Tools and Platforms

Unit 28: Information sources; GIS Software (e.g., ArcInfo, IDRISI, Geoda, SQL for spatial data min ing); Cartograms, Cartogram-based Spatio-Temporal Modelling

Unit 29: Mathematical Morphology in Geographical Information Science

Unit 30-31: Case studies- Cartography, Earth Sciences, Astronomy, Emergency and Crisis management, Environmental Monitoring, Impact Assessment, Medical Imagery and Atlases, Public Safety and homeland Security, Traffic and Transportation, Urban Planning and Management

Unit 32-34: Project Work

References

1. Bolstad, Paul (2000). *GIS Fundamentals: A First Text on Geographic Information Systems*, Fifth Edition. Michigan: XanEdu Publishing Inc.

2. Zhu, Xuan (2016). *GIS for Environmental Applications: A Practical Approach*. New York : Routledge

3. Price, Maribeth (2013). *Mastering ArcGIS.*, Seventh Edition. McGraw Hill.

4. Shellito, Bradley A. (2016) *Discovering GIS and ArcGis.* W. H. Freeman

5. Sutton, Tim and Sutton, Marcel. (2013) *The Quantum GIS training manual: A Comprehensive Introduction to Quantum GIS*. Locate Press

6. Harvey, Francis. (2008) *A Primer of GIS Second Edition*. New York : Guilford Press

7. Brewer, Cynthia. (2005) *Designing better maps: a guide for GIS users*. ESRI Press

8. Daly, C. ,Neilson, Ronald P. and Phillips, Donald L. (1993). *A Statistical-Topological Model for Mapping Climatological Precipitation over Mountainous Terrain*. Journal Applied Meteorology. Volume 33.

9. McBratney, A.B., Mendonca-Santor, M.L., Minasny, B. (2003) *On Digital Soil Mapping*. Geoderma.

10. *ESRI GIS Bibliography*. https://gis.library.esri.com/

11. *ESRI GIS Dictionary of all the GIS related terms*. https://support.esri.com/en/other-resources/gis-dictionary

Paper 19, Elective E2: Health Informatics

Module 1: Introduction to Health Informatics

Unit 01: Introduction to health informatics and its significance

Unit 02: Definitions and key concepts in health informatics

Unit 03: Background disciplines, historical overview, and future challenges

Unit 04: Introduction to knowledge hierarchy: Data, information, and knowledge

Unit 05: The definitions of healthcare data and information

Unit 06: Types of healthcare information (internal versus external data and information)

Unit 07: Introduction to Project Management and Evaluation of Public Health Informatics Systems; Patients Monitoring Systems (PMS); Clinical Decision Support Systems (CDSS); Elec tronic Health Records (EHR) tools

Unit 08: Personal Health records and Decision aids

Unit 09: Health Literacy and Digital Divide Issues, Ethics in Health Informatics

Unit 10: The major purposes of maintain patient records

Unit 11: The content and uses of patient records and claim content

Unit 12: The common issues related to healthcare data quality

Unit 13: The challenges associated with measuring and ensuring healthcare data quality

Unit 14: Quality assessment including total quality management and data quality

Unit 15: Introduction to biomedical research and publicly available resources

Module 2: National Landscape of History of Healthcare Information System

Unit 16: The major influences shaping the health IT landscape in India

Unit 17: The major events that have influences the adoption of health IT and systems

Unit 18: History and evolution of healthcare information systems (HCIS)

Unit 19: The major advances in information technology

Module 3: Standards in Health Informatics

Unit 20: Introduction to standards

Unit 21: The Need for Health Informatics Standards

Unit 22: Major types of healthcare information standards such as HL7

Unit 23: The importance of healthcare IT standards to the future of the health care delivery system

Module 4: Knowledge management system and Organizing Health IT services

Unit 24: Introduction to knowledge management in health care department

Unit 25: Knowledge discovery, Data Mining and Data Forecasting in Public Health

Unit 26: Knowledge management and decision making support in biomedicine

Unit 27: The roles, responsibilities, and major functions of the IT department in healthcare organizations

Unit 28: Clinical data analytics, Big Data in Healthcare and visualization

References

1. Wager, K. A., Lee, F. W., &; Glaser, J. P. (2017). *Health care information systems: A practical approach for healthcare management-4 th Edition*. Jossey-Bass.

2. Trotter, F. and Uhlman, D. (2011). *Hacking healthcare: A guide to standards, workflows, and meaningful use*. O'Reilly Media.

3. Heimar Marin, Eduardo Massad, Marco Antonio, Gutierrez Roberto, Jaime Rodrigues & Daniel Sigulem. *Global Health Informatics, How Information Technology Can Change Our Lives in a Globalized World*, Imprint: Academic Press

4. Kathleen Mastrian & Dee McGonigle, *Informatics For Health Professionals (Navigate 2 Advantage Access)*, - 1 st Edition, Jones and Bartlett Publishers.

Paper 19, Elective E3: Data and Text Mining

Module 1: Basic Introduction to Data mining

Unit 01: Data Mining: Introduction, Definitions, Issues and Challenges, Real World Applications

Unit 02: KDD vs DM, DBMS vs DM, DM techniques

Unit 03: Data warehousing and OLAP: Data warehousing: Introduction, Definitions, Multidimen sional data model, OLAP and OLAP Engine

Unit 04: Location, Spread, Shape and Dependency

Unit 05: Graphic display of basic statistical description: Boxplot, Histogram, Quantile plot, Quan tile-quantile (q-q) plot, Scatter plot

Unit 06: Probability Density Function and Variance-Covariance Matrix: Probability Density Function, Variance-Covariance Matrix

Unit 07: Various Distances, Standardization and Normalization: Matric Space, Similarity and Dis-similarity measures, Minkowski Distance, Euclidean Distance, Mahalanobis Distance, Standardization and Normalization

Unit 08: Association rules: Introduction, Methods to discover association rules, Related Algorithms

Unit 09: Decision trees: Tree construction principle, Decision tree construction algorithm, Presorting

Unit 10: Principal Component analysis, Cumulative distribution function and Confusion Matrix

Module 2: Classification and Clustering Methods for Data Mining and Fuzzy logic

Unit 11: Classification and Classification Algorithms: Introduction to classification, Bayes Decision Rules, KNN, Other Classification Algorithms

Unit 12: Clustering and Clustering Algorithms: Introduction to Clustering, K-means, DBSCAN, Other Clustering Algorithms

Unit 13: Fuzzy Logic

Module 3: Data Mining Application

Unit 14: Web mining: Content, structure and usage mining, Text mining, Image and multimedia mining

References

1. James, G., D. Witten, T. Hastie, and R. Tibshirani, *An Introduction to Statistical Learning with Application to R*, Springer, New York.

2. Witten, I. H., E. Frank, and M. A. Hall, *Data Mining: Practical Machine Learning Tools and Techniques*, Morgan Kaufmann.

3. Montgomery, D. C., and G. C. Runger, *Applied Statistics and Probability for Engineers*. John Wiley & Sons

4. Samueli G., N. R. Patel, and P. C. Bruce, *Data Mining for Business Intelligence*, John Wiley & Sons, New York.

5. Hastie, T., R. T. Jerome, and H. Friedman, *The Elements of Statistical Learning: Data Mining, Inference and Prediction*, Springer.

6. Colleen Mccue, *Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis*, Elsevier

7. Jiawei Han, Micheline Kamber *Data Mining Concepts and Techniques*, Second Edition, Elsevier

Paper 19, Elective E4: Big Data - Technology and Techniques

Module 1: Introduction to Big data

Unit 01: 5V's to define Big Data

Unit 02: History of Hadoop

Module 2: Hadoop Core

Unit 03: Introduction to HDFS, Working of HDFS

Unit 04: Introduction to MapReduce, Working on MapReduce

Unit 05: Introduction to Ambari

Unit 06: Overview of Hive, Working of Hive, Integration MySQL with Hadoop

Unit 07: Introduction to Pig: Overview of Pig, Pig Latin

Unit 08: Introduction to Spark (ML): Need of Spark, Overview of Resilient Distributed Data set (RDD)

Unit 09: Using non relational data stores with Hadoop – Hbase: Need of NoSQL, Overview of HBase

Unit 10: Overview of NoSQL: Introduction to Cassandra, Introduction to MongoDB

Module 3: Managing Hadoop cluster

Unit 11: Introduction to YARN, Introduction to Tez

Unit 12: Introduction to ZooKeeper, Introduction to Oozie

Unit 13: Overview of Zeppelin

Unit 14: Feeding data to cluster: Introduction to Kafka

Unit 15: Introduction to analysing stream of data (ML): Introduction to Spark Streaming, Apache Storm

Module 4: Practice

Unit 16-22: Practice

References

1. Bill Franks, *Taming the Big Data Tidal wave: Finding Opportunities in Huge Data Streams with Advanced Analytics*, John Wiley & Sons.

2. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, *Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses*, Wiley

3. David Dietrich, Barry Heller, Beibei Yang, *Data Science and Big Data Analytics*, EMC Education Series, John Wiley

4. Frank J Ohlhorst, *Big Data Analytics: Turning Big Data into Big Money*, Wiley and SAS Business Series

5. Michael Berthold, David J. Hand, *Intelligent Data Analysis*, Springer

6. Paul Zikopoulos, Chris Eaton, Paul Zikopoulos, *Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data*,

7. Glenn J. Myatt, *Making Sense of Data*, John Wiley & Sons

8. Pete Warden, *Big Data Glossary*, O'Reilly.

9. Peter Bühlmann, Petros Drineas, Michael Kane, Mark van der Laan, *Handbook of Big Data*, CRC Press

Paper 19, Elective E5: Data Analytics

Module 1: Statistical Foundation

Unit 01: Descriptive Statistics

Unit 02: Probability Distributions

Unit 03: Inferential Statistics

Unit 04: Inferential Statistics through hypothesis tests Permutation and Randomization Test

Module 2: Regression and ANOVA

Unit 05: Regression

Unit 06: ANOVA (Analysis of Variance)

Module 3: Machine Learning: Introduction and Concepts

Unit 07: Differentiating algorithmic and model based frameworks

Unit 08: Regression : Ordinary Least Squares, Ridge Regression,

Unit 09: Lasso Regression, K Nearest Neighbours Regression

Module 4: Supervised Learning with Regression and Classification techniques -1

Unit 10: Classification

Unit 11: Bias-Variance Dichotomy Model Validation Approaches

Unit 12: Logistic Regression

Unit 13: Linear DiscriminantAnalysis

Unit 14: Quadratic DiscriminantAnalysis

Unit 15: Regression and Classification Trees

Unit 16: Support Vector Machines

Module 5: Supervised Learning with Regression and Classification techniques -2

Unit 17: Ensemble Methods: Random Forest

Unit 18: Neural Networks

Unit 19: Deep learning

Module 6: Unsupervised Learning and Challenges for Big Data Analytics

Unit 20: Clustering

Unit 21: Associative Rule Mining

Unit 22: Challenges for big data analytics

Module 7: Prescriptive analytics

Unit 23: Creating data for analytics through designed experiments

Unit 24: Creating data for analytics through Active learning

Unit 25: Creating data for analytics through Reinforcement learning

Module 8: Practice

Unit 26-32: Practice

References

1. Michael Berthold, David J. Hand, *Intelligent Data Analysis*, Springer
2. Anand Rajaraman and Jeffrey David Ullman, *Mining of Massive Datasets*, Cambridge University Press.
3. Bill Franks, *Taming the Big Data Tidal wave: Finding Opportunities in Huge Data Streams with Advanced Analytics*, John Wiley & Sons.
4. David Dietrich, Barry Heller, Beibei Yang, *Data Science and Big Data Analytics*, EMC Education Series, John Wiley
5. Colleen Mccue, *Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis*, Elsevier
6. Michael Berthold, David J. Hand, *Intelligent Data Analysis*, Springer

7. Trevor Hastie, Robert Tibshirani, Jerome Friedman, *The Elements of Statistical Learning*, Springer

8. Mark Gardner, *Beginning R: The Statistical Programming Language*, Wrox Publication

9. Glenn J. Myatt, *Making Sense of Data*, John Wiley & Sons

10. Jiawei Han, Micheline Kamber *Data Mining Concepts and Techniques*, Second Edition, Elsevier

Paper 19, Elective E6: Business/Corporate Information Systems

Unit 01: Introduction to Business Information Systems and E-Business

Unit 02: Enterprise Systems overview

Unit 03: Process Control Systems overview

Unit 04: Enterprise Collaboration Systems

Unit 05: Transaction processing systems (TPS)

Unit 06: Management Information Systems

Unit 07: Decision Support Systems

Unit 08: Executive information systems

Unit 09: Expert Systems supporting Business/corporate processes

Unit 10: Professional information support systems

Unit 11: Corporate Knowledge Management System

Unit 12: Decision support systems and business intelligence: model-driven and data-driven

Unit 13: Strategic Information Systems

Unit 14: Functional Business Systems (Information Systems From Functional Perspective)

Unit 15: Sales and Marketing Information Systems

Unit 16: Manufacturing and Production Information Systems

Unit 17: Finance and Accounting Information Systems

Unit 18: Human Resource Information System

Unit 19: Operational support and enterprise systems

Unit 20: Internal information systems development

Unit 21: Enterprise resource planning (ERP) system

Unit 22: Managing Information Security

Unit 23: Acquiring Information Systems And Services, Acquisition from external sources

Unit 24: Evaluation process of initiatives/investments of information systems

Unit 25: Framework for Evaluation of Integrated Logistics and Services

Unit 26: Information support for Data Analytics for Business/corporates

Unit 27: Customer relationship management (CRM), Consumer Behavior Data

Unit 28: Supply chain management (SCM) system; Web-Enabled to SCM- Information flows

Unit 29: Management reporting systems

References

1. Chakrabarty (2010).*Management Information System for Industrial Safety, Health and Environment Hardcover*.

2. Los Alamitos, CA, 1992. *Information Systems and Decision Processes*, E. A. Stohr and B. R. Konsynski, IEEE Computer Society Press.

3. Thomas Boucher (2006). *Design of Industrial Information Systems*, MA, 432 pages, Ali Yalcin Academic Press, Burlington.

Paper 20: Dissertation

Students are required to submit a guided dissertation. The work begins in third semester with a guide assigned. It is completed and evaluated in the fourth semester. The evaluation committee consists of the dissertation guide and an external expert in LIS. The student has to present his/her work to the committee.

3 Internship

The internship is for a 4 to 6 weeks period, after second semester examinations. Students are permitted to intern in any library, LIS academic departments and other relevant places such as in information centres, data and knowledge management group.