Sheth NKTT College of Commerce and Sheth JTT College of Arts, Thane (Autonomous)

Credit Structure: Post Graduate Programme

As per NEP-2020

(w.e.f. 2024-25)

Semester-I M.Sc. (Information Technology)

Category	Course	Credit
Mandatory	Data Science MSD101	**4**
	Data Science Practical MSDP102	**2**
	Soft Computing Techniques MSS103	**4**
	Soft Computing Techniques Practical MSSP104	**2**
	Cloud Computing MSC105	**2**
OE (Any One)	Security Breaches and Countermeasures	**4**
	Data Center Technologies	
	Image Processing MSI106	
	Research MethodologyMSR107	**4**
	Total Credit	**22**

Semester-II M.Sc. (Information Technology)

Category	Course	Credit
Mandatory	Big Data Analytics MSB201	**4**
	Big Data Analytics PracticalMSBP202	**2**
	Modern NetworkingMSM203	**4**
	Modern Networking Practical MSMP204	**2**
	Microservices Architecture MSA205	**2**
OE (Any One)	Malware Analysis	**4**
	Cloud Management (PR)	
	Computer Vision (PR) MSCP206	
Field Project/OJT		**4**
	Total	**22**

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Programme Name: **M.Sc (Information Technology)** **Semester: I**
Course Category/Vertical:
Name of the Dept: **Information technology**
Course Title: **Data Science**
Course Code: MSD101 Course Level:6.0
Type: **Theory**
Course Credit: 4 credits
Hours Allotted: 60 Hours
Marks Allotted: 100 Marks
Course Objectives(CO): To enable the students to: CO1 : Develop in depth understanding of the key technologies in data science and business analytics: data mining, machine learning, visualization techniques, predictive modeling, and statistics. CO2 : Practice problem analysis and decision-making. CO3 : Gain practical, hands-on experience with statistics programming languages and big data tools through coursework and applied research experiences.
Course Outcomes (OC): Apply quantitative modeling and data analysis techniques to the solution of real world business problems, communicate findings, and effectively present results using data visualization techniques. Recognize and analyze ethical issues in business related to intellectual property, data security, integrity, and privacy. Apply ethical practices in everyday business activities and make well-reasoned ethical business and data management decisions. Demonstrate knowledge of statistical data analysis techniques utilized in business decision making. Apply principles of Data Science to the analysis of business problems. Use data mining software to solve real-world problems. Employ cutting edge tools and technologies to analyze Big Data. Apply algorithms to build machine intelligence. Demonstrate use of team work, leadership skills, decision making and organization theory.

Syllabus: NEP 2020 w.e.f 2024-25

Unit No.	Content	Hours
	Module I	
I	**Data Science Introduction & Basics** **a. Data Science Technology Stack:** Rapid Information Factory Ecosystem, Data Science Storage Tools, Data Lake, Data Vault, Data Warehouse Bus Matrix, Data Science Processing Tools ,Spark, Mesos, Akka , Cassandra, Kafka, Elastic Search, R ,Scala, Python, MQTT, The Future. **b. Layered Framework:** Definition of Data Science Framework, Cross Industry Standard Process for Data Mining (CRISP-DM), Homogeneous Ontology for Recursive Uniform Schema, The Top Layers of a Layered Framework, Layered Framework for High-Level Data Science and Engineering **c. Business Layer:** Business Layer, Engineering a Practical Business Layer **d. Utility Layer:** Basic Utility Design, Engineering a Practical Utility Layer	15
II	**Statistics for Data Science** **a. Three Management Layers:** Operational Management Layer, Processing-Stream Definition and Management, Audit, Balance, and Control Layer, Balance, Control, Yoke Solution, Cause-and-Effect, Analysis System, Functional Layer, Data Science Process **b. Retrieve Superstep:** Data Lakes, Data Swamps, Training the Trainer Model, Understanding the Business Dynamics of the Data Lake, Actionable Business Knowledge from Data Lakes, Engineering a Practical Retrieve Superstep, Connecting to Other Data Sources. **c. Assess Superstep:** Assess Superstep, Errors, Analysis of Data, Practical Actions, Engineering a Practical Assess Superstep	15
	Module II	
III	**Data Analysis with Python & Data Visualization** a. **Process Superstep :** Data Vault, Time-Person-Object-Location-Event Data Vault, Data Science Process, Data Science, b. **Transform Superstep :** Transform Superstep, Building a Data Warehouse, Transforming with Data Science, Hypothesis Testing, Overfitting and Underfitting, Precision-Recall, Cross-Validation Test.	15
IV	**Machine Learning for Data Science** a. **Transform Superstep:** Univariate Analysis, Bivariate Analysis, Multivariate Analysis, Linear Regression, Logistic Regression,	15

	Clustering Techniques, ANOVA, Principal Component Analysis (PCA), Decision Trees, Support Vector Machines, Networks, Clusters, and Grids, Data Mining, Pattern Recognition, Machine Learning, Bagging Data,Random Forests, Computer Vision (CV) , Natural Language Processing (NLP), Neural Networks, TensorFlow. **b. Organize and Report Supersteps :** Organize Superstep, Report Superstep, Graphics, Pictures, Showing the Difference	
	Total Hours	60

References :-

1 Practical Data Science - Andreas François Vermeulen (APress 2018)
2 Principles of Data Science - Sinan Ozdemir (PACKT 2016)
3 Data Science from Scratch - Joel Grus (O'Reilly 2015)
4 Data Science from Scratch first Principle in python - Joel Grus (Shroff Publishers 2017)
5 Experimental Design in Data science with Least Resources - N C Das Shroff (Publishers 2018)

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Programme Name: **M.Sc (Information Technology)**	**Semester: I**
Course Category/Vertical:	
Name of the Dept: **Information technology**	
Course Title: **Data Science Practical**	
Course Code: MSDP102	Course Level:6.0
Type: **Theory**	
Course Credit: 2 credits (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a semester)	
Hours Allotted: 60 Hours	
Marks Allotted: 50 Marks	

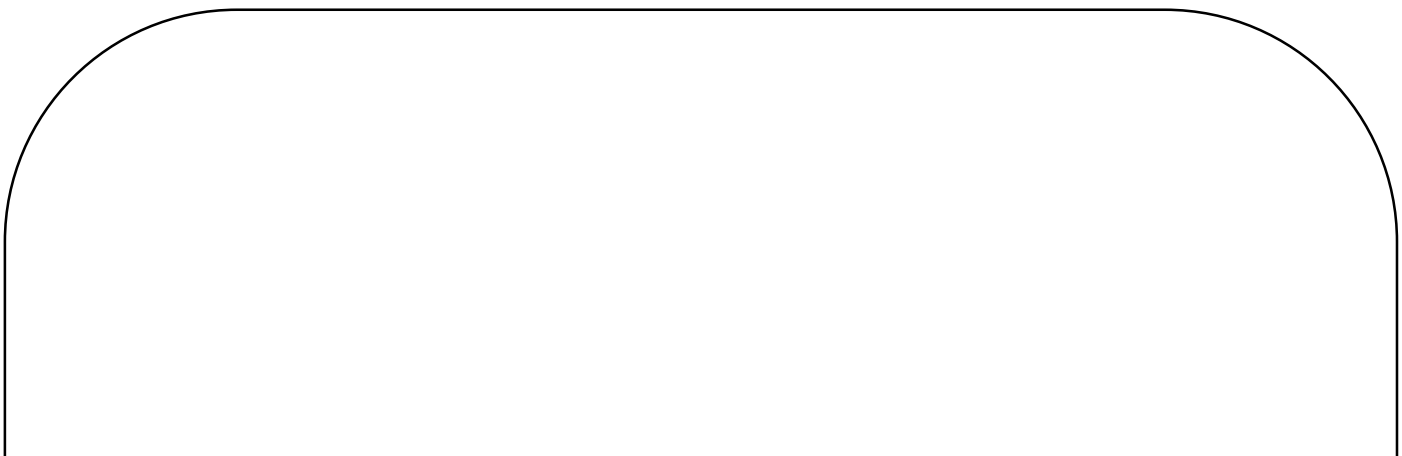
Course Objectives(CO):
To enable the students to:
CO1 To Develop statistical and analytical modelling using data science concepts
CO2 To develop data visualization
CO3 To Gain practical, hands-on experience with statistics programming languages and big data tools through coursework and applied research experiences

Course Outcomes (OC):
Upon completing this course, the student will be able to:
OC 1. Apply quantitative modeling and data analysis techniques to the solution of real world business problems, communicate findings, and effectively present results using data visualization techniques. OC 2. Recognize and analyze ethical issues in business related to intellectual property, data security, integrity, and privacy.
OC 3. Apply ethical practices in everyday business activities and make well-reasoned ethical business and data management decisions.
OC 4. Demonstrate knowledge of statistical data analysis techniques utilized in business decision making.
OC 5. Apply principles of Data Science to the analysis of business problems.
OC 6. Use data mining software to solve real-world problems.
OC 7. Employ cutting edge tools and technologies to analyze Big Data.
OC 8. Apply algorithms to build machine intelligence.
OC 9. Demonstrate use of team work, leadership skills, decision making and organization theory.

Syllabus: NEP 2020 w.e.f 2024-25

Unit No.	Name of Practical	Hours
I	1. Creating and using database in Cassandra 2. Write the programs for the following: 2a Text Delimited CSV to HORUS format 2b XML to HORUS format 2c JSON to HORUS format 2d MySql database to HORUS format 2e Picture(JPEG) to HORUS format 2f Video to HORUS format 2g Audio to HORUS format 3. 3a Fixers Utilities 3b Data Binning or Bucketing 3c Averaging of data 3d Outlier Detection 3e Logging	15
II	4. 4a Perform following data processing using R 4b Program retrieve different attributes of data 4c Data pattern 4d Loading IP_DATA_ALL 5. 5a Perform error management on the given data using pandas package 5b Write python/R program to create the network routing diagram from the given data on routers 5c Write a python/R program to build acyclic graph 5d Write python/R program to pick the content for BillBoards from the given data 5e Write a python/R program to generate GML file from given csv file 5f Write python/R program to plan location of warehouse from the given data 5g Write python/R program using data science via clustering to determine new warehouse using the given data 5h Using the given data Write python/R program to plan the shipping routers from best-fit international logistics 5i Write python/R program to delete the best packing option to ship in container from the given data 5j Write python program to create delivery route using the given data	20

	5k Write python program to crate simple forex trading planner from the given data 5l Write python program to process the balance sheet to ensure the only good data is processing 5m Write python program to generate payroll from the given data	
III	6. Build the time hub, links and satellites 7. Transforming data III 8. Organizing data 9. Generating data 10. Data visualisation using power Bi	15
	Total Hours	60



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Programme Name: **M.Sc (Information Technology)** **Semester: I**
Course Category/Vertical:
Name of the Dept: **Information technology**
Course Title: **Soft Computing Testing**
Course Code: MSS103 Course Level:6.0
Type: **Theory**
Course Credit: 4 credits (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a semester)
Hours Allotted: 60 Hours
Marks Allotted: 100 Marks
Course Objectives(CO): To enable the students to: CO1: Soft computing concepts like fuzzy logic, neural networks and genetic algorithm, where Artificial Intelligence is mother branch of all. CO2 : All these techniques will be more effective to solve the problem efficiently :
Course Outcomes (OC): Upon completing this course, the student will be able to: OC1 Gain a solid understanding of the fundamental concepts underlying soft computing, including the differences between soft computing and traditional hard computing methods. OC2 Familiarize with a variety of soft computing techniques such as fuzzy logic, neural networks, genetic algorithms, swarm intelligence, and probabilistic reasoning. OC3 Apply soft computing techniques to solve real-world problems from various domains such as engineering, finance, healthcare, and more. OC4 Formulate problems in a way that lends itself to the application of soft computing techniques, taking into account the uncertainties and imprecisions present in real-world data. OC5 Understnad of how fuzzy logic works and its applications in modeling and decision making under uncertainty. OC6 Gain knowledge of neural network architectures, training algorithms, and their applications in pattern recognition, regression, and classification tasks. OC7 Understand genetic algorithms, their components, and their use in optimization problems and search spaces. OC8 Familiarize with swarm intelligence algorithms such as ant colony optimization and particle swarm optimization, and their applications in optimization and search problems.

Syllabus: NEP 2020 w.e.f 2024-25

Unit No.	Content	Hours
	Module I	
I	**a) Introduction of soft computing -** soft computing vs. hard computing, various types of soft computing techniques, Fuzzy Computing, Neural Computing, Genetic Algorithms, Associative Memory, Adaptive Resonance Theory, Classification, Clustering, Bayesian Networks, Probabilistic reasoning, applications of soft computing. **b) Artificial Neural Network -** Fundamental concept, Evolution of Neural Networks, Basic Models, McCulloh-Pitts Neuron, Linear Separability, Hebb Network. **c) Supervised Learning Network -** Perceptron Networks, Adaptive Linear Neuron, Multiple Adaptive Linear Neurons, Backpropagation Network, Radial Basis Function, Time Delay Network, Functional Link Networks, Tree Neural Network	15
II	**a) Associative Memory Networks -** Training algorithm for pattern Association, Autoassociative memory network, hetroassociative memory network, bi-directional associative memory, Hopfield networks, iterative autoassociative memory networks, temporal associative memory networks. Kohonen self-organizing feature maps, learning vectors quantization, counter propogation networks, adaptive resonance theory networks. **b) Special Networks -** Simulated annealing, Boltzman machine, Gaussian Machine, Cauchy Machine, Probabilistic neural net, cascade correlation network, cognition network, neo-cognition network, cellular neural network, optical neural network **c) Third Generation Neural Networks -** Spiking Neural networks, convolutional neural networks, deep learning neural networks, extreme learning machine model. **d) UnSupervised Learning Networks -** Fixed weight competitive nets	15
	Module II	
III	**a. Introduction to Fuzzy Logic, Classical Sets and Fuzzy sets** Classical sets, Fuzzy sets. **b. Classical Relations and Fuzzy Relations -** Cartesian Product of relation, classical relation, fuzzy relations, tolerance and equivalence relations, non iterative fuzzy sets. **c. Membership Function -** features of the membership functions, fuzzification, methods of membership value assignments. ‘ **d. Defuzzification -** Lambda-cuts for fuzzy sets, Lambda-cuts for fuzzy relations, Defuzzification methods. E	15

	e. **Fuzzy Arithmetic and Fuzzy measures -** fuzzy arithmetic, fuzzy measures, measures of fuzziness, fuzzy integrals.	
IV	**a) Fuzzy Rule base and Approximate reasoning -** Fuzzy proportion, formation of rules, decomposition of rules, aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, Fuzzy logic control systems, control system design, architecture and operation of FLC system, FLC system models and applications of FLC System. **b) Genetic Algorithm -** Biological Background, Traditional optimization and search techniques, genetic algorithm and search space, genetic algorithm vs. traditional algorithms, basic terminologies, simple genetic algorithm, general genetic algorithm, operators in genetic algorithm, stopping condition for genetic algorithm flow, constraints in genetic algorithm, problem solving using genetic algorithm, the schema theorem, classification of genetic algorithm, Holland classifier systems, genetic programming, advantages and limitations and applications of genetic algorithm.Differential Evolution Algorithm, Hybrid soft computing techniques – neuro – fuzzy hybrid, genetic neuro-hybrid systems, genetic fuzzy hybrid and fuzzy genetic hybrid systems.	15
	Total Hours	60

References :-

1. Artificial Intelligence and Soft Computing by Anandita Das Battacharya, SPD publisher, 3rd edition, 2018
2. Principles of Soft computing by S.N.Sivanandam S.N.Deepa, Wiley publisher, 3rd Edition, 2019
3. Neuro-Fuzzy and Soft Computing by J.S.R.Jang, C.T.Sun and E.Mizutani, Prentice Hall of India publisher, 2004
4. Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications by S.Rajasekaran, G. A. Vijayalakshami, Prentice Hall of India publisher, 2004
5. Fuzzy Logic with Engineering Applications by Timothy J.Ross, McGraw Hill publisher, 1997
6. Genetic Algorithms: Search, Optimization and Machine Learning by Davis E.Goldberg, Addison Wesley publisher, 1989
7. Introduction to AI and Expert System by Dan W. Patterson, Prentice Hall of India publisher, 2009

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Programme Name: **M.Sc (Information Technology)** **Semester: I**
Course Category/Vertical:
Name of the Dept: **Information technology**
Course Title: **Soft Computing Practical**
Course Code: MSSP104 Course Level:6.0
Type: **Theory**
Course Credit: 2 credits (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a semester)
Hours Allotted: 60 Hours
Marks Allotted: 50 Marks
Course Objectives(CO): CO1. Hands-On Implementation CO2. Algorithm Understanding CO3. Real-World Applications CO4. Develop students' programming skills by experimenting with soft computing algorithms. CO5. Train students to visualize and interpret the results of soft computing techniques effectively.
Course Outcomes (OC): Upon completing this course, the student will be able to: OC 1: Identify and describe soft computing techniques and their roles in building intelligent machines OC 2: Recognize the feasibility of applying a soft computing methodology for a particular problem OC 3: Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems OC 4: Apply genetic algorithms to combinatorial optimization problems OC 5: Apply neural networks for classification and regression problems OC 6: Effectively use existing software tools to solve real problems using a soft computing approach OC 7: Evaluate and compare solutions by various soft computing approaches for a given problem.

Unit No.	Content	Hours
I	1.Implement the following: A. Design a simple linear neural network model. B. Calculate the output of neural net using both binary and bipolar sigmoidal function. 2. Implement the following: A.Generate AND/NOT function using McCulloch-Pitts neural net. B. Generate XOR function using McCulloch-Pitts neural net. 3.Implement the Following A.Write a program to implement Hebb's rule. B. Write a program to implement of delta rule.	20
II	4. Implement the Following A. Write a program for Back Propagation Algorithm B. Write a program for error Backpropagation algorithm. 5. Implement the Following A. Write a program for Hopfield Network. B.Write a program for Radial Basis function 6.Implement the Following A. Kohonen Self organizing map B. Adaptive resonance theory	20
III	7.Implement the Following A. Write a program for Linear separation. B. Write a program for Hopfield network model for associative memory 8.Implement the Following A.Membership and Identity Operators | in, not in, B. Membership and Identity Operators is, is not 9. Implement the Following A. Find ratios using fuzzy logic B. Solve Tipping problem using fuzzy logic	20

	10.Implement the Following A.Implementation of Simple genetic algorithm B. Create two classes: City and Fitness using Genetic algorithm	
	Total Hours	60

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Programme Name: **M.Sc (Information Technology)** **Semester: I**
Course Category/Vertical:
Name of the Dept: **Information technology**
Course Title: **Cloud Computing**
Course Code: MSC105 Course Level:6.0
Type: **Theory**
Course Credit: 2 credits (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a semester)
Hours Allotted: 30 Hours
Marks Allotted: 50 Marks
Course Objectives(CO): **To enable the students to:** CO1. To learn how to use Cloud Services. CO2. To implement Virtualization. CO3. To implement Task Scheduling algorithms. CO4. Apply Map-Reduce concept to applications. CO5. To build Private Cloud. CO6. Broadly educate to know the impact of engineering on legal and societal issues Involved
Course Outcomes (OC): Upon completing this course, the student will be able to: OC1 Analyze the Cloud computing setup with its vulnerabilities and applications using different architectures. OC2 Design different workflows according to requirements and apply map reduce programming model. OC3 Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms. OC4 Create combination auctions for cloud resources and design scheduling algorithms for computing cloud. OC5 Assess cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application OC6 Broadly educate to know the impact of engineering on legal and societal issues involved in addressing the security issues of cloud computing

Unit No.	Content	Hours
I	Introduction to Cloud Computing - Introduction, Historical developments, Building Cloud Computing Environments, Principles of Parallel and Distributed Computing - Eras of Computing, Parallel v/s distributed computing, Elements of Parallel Computing, Elements of distributed computing, Technologies for distributed computing. Virtualization - Introduction, Characteristics of virtualized environments, Taxonomy of virtualization techniques, Virtualization and cloud computing, Pros and cons of virtualization, Technology examples. Logical Network Perimeter, Virtual Server, Cloud Storage Device, Cloud usage monitor, Resource replication, Ready-made environment.	15
II	Cloud Computing Architecture: Introduction, Fundamental concepts and models, Roles and boundaries, Cloud Characteristics, Cloud Delivery models, Cloud Deployment models, Economics of the cloud, Open challenges. Fundamental Cloud Security: Basics, Threat agents, Cloud security threats, additional considerations. Industrial Platforms and New Developments: Amazon Web Services, Google App Engine, Microsoft Azure.	15
	Total Hours	30

References:

Sr.No	Title	Author	Publisher	Edition	Year
1.	Mastering Cloud Computing Foundations and Applications Programming	Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi	Elsevier		2013
2.	Cloud Computing Concepts, Technology & Architecture	Thomas Erl, Zaigham Mahmood, and Ricardo Puttini	Prentice Hall		2013
3.	Distributed and Cloud Computing, From Parallel Processing to the Internet of Things	Kai Hwang, Jack Dongarra, Geoffrey Fox	MK Publishers		2012

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Programme Name: **M.Sc (Information Technology)**	**Semester: I**
Course Category/Vertical:	
Name of the Dept: **Information technology**	
Course Title: **Image Processing**	
Course Code: MSI106	Course Level:6.0
Type: **Theory**	
Course Credit: 4 credits (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a semester)	
Hours Allotted: 60 Hours	
Marks Allotted: 100 Marks	

Course Objectives(CO):

CO1. Review the fundamental concepts of a digital image processing system.
CO2. Analyze images in the frequency domain using various transforms.
CO3. Evaluate the techniques for image enhancement and image restoration.
CO4. Categorize various compression techniques.
CO5. Interpret Image compression standards.
CO6. Interpret image segmentation and representation techniques.

Course Outcomes (OC):

OC 1: Understand the relevant aspects of digital image representation and their practical implications.
OC 2: Have the ability to design point wise intensity transformations to meet stated specifications.
OC 3: Understand 2-D convolution, the 2-D DFT, and have the abitilty to design systems using these concepts.
OC 4: Have a command of basic image restoration techniques.
OC 5: Understand the role of alternative color spaces, and the design requirements leading to choices of color space.
OC 6: Appreciate the utility of wavelet decomposition and their role in image processing systems.

Syllabus: NEP 2020 w.e.f 2024-25

Unit No.	Content	Hours
	Module I	
I	**Introduction:** Digital Image Processing, Origins of Digital Image Processing, Applications and Examples of Digital Image Processing, Fundamental Steps in Digital Image Processing, Components of an Image Processing System, **Digital Image Fundamentals:** Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization, Basic Relationships Between Pixels, Basic Mathematical Tools Used in Digital Image Processing, **Intensity Transformations and Spatial Filtering:** Basics, Basic Intensity Transformation Functions, Basic Intensity Transformation Functions, Histogram Processing, Fundamentals of Spatial Filtering, Smoothing (Lowpass) Spatial Filters, Sharpening (Highpass) Spatial Filters, Highpass, Bandreject, and Bandpass Filters from Lowpass Filters, Combining Spatial Enhancement Methods, Using Fuzzy Techniques for Intensity Transformations and Spatial Filtering	15
II	**Filtering in the Frequency Domain:** Background, Preliminary Concepts, Sampling and the Fourier Transform of Sampled Functions, The Discrete Fourier Transform of One Variable, Extensions to Functions of Two Variables, Properties of the 2-D DFT and IDFT, Basics of Filtering in the Frequency Domain, Image Smoothing Using Lowpass Frequency Domain Filters, Image Sharpening Using Highpass Filters, Selective Filtering, Fast Fourier Transform **Image Restoration and Reconstruction:** A Model of the Image	15

	Degradation/Restoration Process, Noise Models, Restoration in the Presence of Noise Only-----Spatial Filtering, Periodic Noise Reduction Using Frequency Domain Filtering, Linear, Position Invariant Degradations, Estimating the Degradation Function, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Constrained Least Squares Filtering, Geometric Mean Filter, Image Reconstruction from Projections **Wavelet and Other Image Transforms:** Preliminaries, Matrix based Transforms, Correlation, Basis Functions in the Time Frequency Plane, Basis Images, Fourier-Related Transforms, Walsh-Hadamard Transforms, Slant Transform, Haar Transform, Wavelet Transforms	
	Module II	
III	Color Image Processing: Color Fundamentals, Color Models, Pseudocolor Image Processing, Full-Color Image Processing, Color Transformations, Color Image Smoothing and Sharpening, Using Color in Image Segmentation, Noise in Color Images, Color Image Compression. Image Compression and Watermarking: Fundamentals, Huffman Coding, Golomb Coding, Arithmetic Coding, LZW Coding, Run-length Coding, Symbol-based Coding, 8 Bit-plane Coding, Block Transform Coding, Predictive Coding, Wavelet Coding, Digital Image Watermarking, Morphological Image Processing: Preliminaries, Erosion and Dilation, Opening and Closing, The Hit-or-Miss Transform, Morphological Algorithms, Morphological Reconstruction, Morphological Operations on Binary Images, Grayscale Morphology	15
IV	**Image Segmentation I: Edge Detection, Thresholding, and Region Detection:** Fundamentals, Thresholding, Segmentation by Region Growing and by Region Splitting and Merging, Region Segmentation Using Clustering and Superpixels, Region Segmentation Using Graph Cuts, Segmentation Using Morphological Watersheds, Use of Motion in Segmentation **Image Segmentation II: Active Contours: Snakes and Level**	15

	Sets: Background, Image Segmentation Using Snakes, Segmentation Using Level Sets. **Feature Extraction:** Background, Boundary Preprocessing, Boundary Feature Descriptors, Region Feature Descriptors, Principal Components as Feature Descriptors, Whole-Image Features, Scale-Invariant Feature Transform (SIFT)	
	Total Hours	60

References:

Sr.No	Title	Author	Publisher	Edition	Year
1.	Digital Image Processing	Gonzalez and Woods	Pearson/Prentice Hall	Fourth	2018
2.	Fundamentals of Digital Image Processing	A K. Jain	PHI		
3.	The Image Processing Handbook	J. C. Russ	CRC	Fifth	2010

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Programme Name: **M.Sc (Information Technology)**	**Semester: I**
Course Category/Vertical:	
Name of the Dept: **Information technology**	
Course Title: **Research Methodology**	
Course Code: MSR107	Course Level:6.0
Type: **Theory**	
Course Credit: 2 credits (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a semester)	
Hours Allotted: 60 Hours	
Marks Allotted: 100 Marks	
Course Objectives(CO): CO1. To be able to conduct business research with an understanding of all the latest theories. CO2. To develop the ability to explore research techniques used for solving any real world or innovate problem.	
Course Outcomes (OC): A learner will be able to: OC 1: solve real world problems with scientific approach. OC 2: develop analytical skills by applying scientific methods. OC 3: recognize, understand and apply the language, theory and models of the field of business analytics OC 4: foster an ability to critically analyze, synthesize and solve complex unstructured business problems OC 5: understand and critically apply the concepts and methods of business analytics OC 6: identify, model and solve decision problems in different settings OC 7: interpret results/solutions and identify appropriate courses of action for a given managerial situation whether a problem or an opportunity OC 8: create viable solutions to decision making problems	

Sheth J.T.T College of Arts

Unit No.	Content	Hours
I	a) Introduction: Role of Business Research, Information Systems and Knowledge Management, Theory Building, Organization ethics and Issues b) Beginning Stages of Research Process: Problem definition, Qualitative research tools, Secondary data research	15
II	a) Research Methods and Data Collection: Survey research, communicating with respondents, Observation methods, Experimental research	15
III	a) **Measurement Concepts, Sampling and Field work:** Levels of Scale measurement, attitude measurement, questionnaire design, sampling designs and procedures, determination of sample size	15
IV	a) Data Analysis and Presentation: Editing and Coding, Basic Data Analysis, Univariate Statistical Analysis and Bivariate Statistical analysis and differences between two variables. Multivariate Statistical Analysis.	15
	Total Hours	60

References:

Sr.No	Title	Author	Publisher	Edition	Year
1.	Business Research Methods	William G.Zikmund, B.J Babin, J.C. Carr, Atanu Adhikari, M.Griffin	Cengage	8e	2016
2.	Business Analytics	Albright Winsto	Cengage	5e	2015
3.	Research Methods for Business Students Fifth Edition	Mark Saunders			2011

Scheme of Examination

Internal : 50 External: 50

Internal	**Marks: 20**
Assignment	
Active class Participation/Attendance	
Class test	

Paper Pattern for Internal and External Examination

Q. No.	Internal	Marks: 30
Q .1	Attempt Any two questions from the following. A B C D	16 Marks
Q. 2	Attempt Any Two questions from the following. A B C D	14 Marks

Signatures of Team Members

Sr. No.	Name	Signature
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		