S J B I T

Autonomous

PG Scheme & Syllabus

Programme: MCA

MBA/MCA BLOCK

SCHEME 2023

SJBIT ADMINISTRATIVE BLOCK

III & IV Semester

SERVICE TO MANKIND IS SERVICE TO GOD

His Divine Soul Padmabhushana

Sri Sri Sri Dr. Balagangadharanath MahaSwamiji

Founder President, Sri Adichunchanagiri Shikshana Trust®

Belief in God is not ignorance or illusion. It is a belief that there is an unseen, ineffable Power that transcends all our powers of muscles, mind and lives.

His Holiness Parama Pujya

Sri Sri Sri Dr.Nirmalanandanatha Maha Swamiji

President, Sri Adichunchanagiri Shikshana Trust®

True richness is the generosity of heart. Cultivate it and work to help the less fortunate ones in life.

Revered Sri SriDr.Prakashanatha Swamiji

Managing Director ,BGS & SJB Group of Institutions & Hospitals

People and prosperity follow the path which the leaders take. So the elders and leaders should make sure that they give the right lead and take the right path.

Syllabus for 3rd & 4thSemester		
The syllabus, scheme and guidelines are provided in detail. The syllabus, scheme and guidelines are subjected to changes if any needed. The updates will be done and intimated timely.		
The Syllabus book is available on	www.sjbit.edu.in	
For any queries, please write to	academicdean@sjbit.edu.in	
UPDATES		
Release/ Revision	**Date**	**Remarks**
Version 1	03/12/2024	First Release

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust (R)

SJB Institute of Technology

BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060
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Recognized by UGC, New Delhi with 2(f) & 12 (B)

AUTONOMOUS SCHEME (Tentative) PG - Second Year MCA

SCHEME: 2023 **Aca. Year.: 2024-25** **Date:** 21.06.2024

SEM: III

SL No	Course Type	Course type Count	Course Code	Course Title	Teaching Dept.	QP setting dept	Credits	Teaching Hrs/Week				Examinations				
								L	T	P	O			SEE		
								Lecture	Tutorial	Practical	PBL/ABL/ SL/othrs.	CIE Marks	Dur.	Th. Mrks	Lab. Mrks.	Tot. Marks
1	PCC	7	23MCAT301	Data Analytics	MCA	MCA	3	3	--	--		50	3	50	-	100
2	PCC	8	23MCAT302	Internet of Things			3	3	--	--		50	3	50		100
3	IPCC	4	23MCAI303	Web Technologies - 2			4	3	-	2		50	3	50	-	100
4	PEC	3	23MCAE33Y	Professional Elective 3			3	2	2	--		50	3	50	-	100
5	PEC	4	23MCAE34Y	Professional elective 4			3	2	2	--		50	3	50	-	100
6	PCCL	5	23MCAL306	Data Analytics Lab			2	--	2	2		50	3	--	50	100
7	PCCL	6	23MCAL307	IoT Laboratory			2	--	2	2		50	3	--	50	100
8	PRJ	1	23MCAPR31	Societal Project			2	--	--	--	@	100	--	--	--	100
9	PRJ	2	23MCAPR32	Mini Project			2	--	--	--	@	100	--	--	--	100
10	INT	1	23MCAIN31	Internship			2	--	--	--	@	50	3	--	50	100
11	AEC	3	23MCAAE31	Data Visualisation and Analysis With Power BI	IE		2		2	2		50	2	50	--	100
				Total			28	13	10	8		650	26	300	150	1100

Note: PCC: Professional core Courses, PEC: Professional Elective Courses. PROJ-Project Work, IPCC- Integrated Professional Core Courses, SP- Societal Project, AEC - Ability Enhancement course.

SLC : 10 Courses shall be defined at the beginning of the course. Gthe student should select any one course of their interest and mentors will be alloted to them to guide through the course. Weekly assignment reviews shall be done by mentors. The student should complete the course by end of 3rd semester. Rubrics and methodology will be defined separately. SLC will be creadited in 4th semester.

Professional Elective 3		Progessional Elective 4	
Course Code	Course title	Course Code	Course title
23MCAE331	Generative AI	23MCAE341	Enterprises resource Planning
23MCAE332	Cyber Security & Block chain Technology	23MCAE342	Software Metrics & Quality Assurance
23MCAE333	Devops	23MCAE343	Semantic Web and Social Networks
23MCAE334	NOSQL	23MCAE344	Optimization Techniques

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AUTONOMOUS SCHEME (Tentative) PG - Second Year MCA

SCHEME: 2023   **Aca. Year.: 2024-25**   **Date:** 07.11.2024

SEM: IV

SL No	Course Type	Course type Count	Course Code	Course Title	Teaching Dept.	QP setting dept	Credits	Teaching Hrs/Week				Examinations				Tot. Marks
								L	T	P	O		SEE			
								Lecture	Tutorial	Practical	PBL/ABL/ SL/othrs.	CIE Marks	Dur.	Th. Mrks	Lab. Mrks.	
1	PRJ3	1	23MCAPR41	Major Project work	MCA	MCA	18		--	--	@	200	3	--	200	400
2	SE	1	23MCASE42	Technical Paper writing with Seminar			2				@	50	2		50	100
3	SLC	1	23MCAS4YY	BOS recommended ONLINE NPTEL courses			2					50	--	50	--	100
Total							**22**	0	0	0	0	300	3	50	250	600

Note: PRJ-Project Work, SLC- Self Learning Course, SE - Seminar

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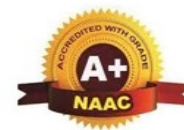# SJB Institute of Technology

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Master of Computer Applications (MCA)

Semester:	III	Course Type:	PCC		
Course Title: Data Analytics					
Course Code:	23MCAT301			**Credits:**	3
Teaching Hours/Week (L:T:P:O)			3:0:0:0	**Total Hours:**	40 Hrs
CIE Marks:	50	**SEE Marks:**	50	**Total Marks:**	100
SEE Type:		Theory		**Exam Hours:**	3 Hrs

I.   Course Objectives:

- Design real time application using Python collection Objects and classes
- Familiarize the concept of Data Visualization with NumPy, Seaborn
- Define the Web Scraping and Numerical Analysis.

II.   Teaching-Learning Process (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL),which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.

III. COURSE CONTENT

Module 1 : Foundation of Data Analytics: - Introduction ,Evolution , Concept and Scopes,Data , Big Data, Metrics and Data classification, Data Reliability & Validity,	8 Hrs

Problem Solving with Analytics, Different phases of Analytics in the business and Data science domain, Descriptive Analytics, Predictive Analytics and Prescriptive Analytics , Different Applications of Analytics in Business, Text Analytics and Web Analytics, Skills for Business Analytics , Concepts of Data Science, Basic skills required for understanding Data Science.Basics of data analytic framework, Statistics, probability, Probability Distribution, Bayes' Theorem, Central Limit theorem

RBT Levels: 2,3

Module 2: Data Exploration & preparation, Concepts of Correlation, Regression, Covariance, Outliers, Data visualization Inferential Statistics: Sampling & Confidence Interval, Inference & Significance. Estimation and Hypothesis Testing, Goodness of fit, Test of Independence, Permutations and Randomization Test, ttest/z-test (one sample, independent, paired), ANOVA, chi-square.	8 Hrs

RBT Levels: 1,3

Module 3 Data Pre-processing and Data Wrangling Acquiring Data with Python: Loading from CSV files, Accessing SQL databases. Cleansing Data with Python: Stripping out extraneous information, Normalizing data AND Formatting data. Combining and Merging Data Sets – Reshaping and Pivoting – Data Transformation – String Manipulation, Regular Expressions.	8Hrs

RBT Levels: 2,3

Module 4 : Web Scraping And Numerical Analysis Data Acquisition by Scraping web applications –Submitting a form - Fetching web pages – Downloading web pages through form submission – CSS Selectors. NumPy Essentials: TheNumPy	8 Hrs

RBT Levels: 2,3

Module 5: Data Visualization with NumPy Arrays, Matplotlib, and Seaborn Data Visualization: Matplotlib package – Plotting Graphs – Controlling Graph – Adding Text – More Graph Types – Getting and setting values – Patches. Advanced data visualization with Seaborn.- Time series analysis with Pandas.	8 Hrs

RBT Levels: 2,3,4

IV.Course Outcomes

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

CO1	Understand and comprehend the usage of Python programming in Data Analytics
CO2	Apply knowledge in real time applications.
CO3	Apply the Data Pre-processing & Data Wrapping.
CO4	Demonstrate the Web Scraping And Numerical Analysis.

IV.CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1		2											1			

CO2															
CO3			1										1		
CO4				1										1	

V. Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 1

Assessment Details (both CIE and SEE) : Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VI. Learning Resources

VI(a): Textbooks

Sl No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Business Analytics – The Science of Data – Driven Decision Making	Kumar, U.D		Wiley.
2	Python Data Science Handbook: Essential tools for working with data	Jake Vander plas	I Edition.	O,,Reilly Publishers

VI(b): Reference Books:

1	Think Python: How to Think Like a Computer Scientist.	Allen B. Downey	2nd edition,Updated for Python 3,2016	Shroff/O,,Reilly Publishers
2	Machine Learning in Python – Essential Techniques for Predictive Analysis	Bowles, M.		Wiley.
3	Data Mining and Predictive Analytics,	Larose, D.T. and Larose, C.T		Wiley.

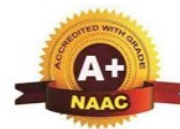|| Jai Sri Gurudev ||
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Master of Computer Applications (MCA)

Semester:	III	Course Type:	PCC		
Course Title: Internet of Things					
Course Code:	**23MCAT302**		**Credits:**		3
Teaching Hours/Week (L:T:P:O)		3:0:0:0	**Total Hours:**		40 Hrs
CIE Marks:	50	**SEE Marks:**	50	**Total Marks:**	100
SEE Type:		Theory		**Exam Hours:**	3 Hrs

I. Course Objectives:

- Define the IoT architecture and design along with functional/compute stack and data management.
- Explain IOT architecture for a given problem
- Analyse the application protocol, transport layer methods for the given business case.
- Analyse the application of data analytics for IOT for a given
- Analyse the architecture and develop program using modern tools for the given use case.

II. Teaching-Learning Process (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL),which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.

III.Course Content

Module-1 What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and	8 Hrs

IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.	
RBT Levels: 1,2	
Module-2 Smart Objects: The "Things" in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies.	8 Hrs
RBT Levels:2,3	
Module-3 IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods.	8 Hrs
RBT Levels: 2,3	
Module-4 Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment.	8 Hrs
RBT Levels: 2,3	
Module-5 IoT Physical Devices and Endpoints - Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints – RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples.	8 Hrs
RBT Levels: 2,3, 4	

	IV.Course Outcomes	
At the end of the course the student will be able to :	
CO1	To understand the IoT architecture and design along with functional/compute stack and data management.
CO2	Apply IOT architecture for a given problem.
CO3	To understand the application protocol, transport layer methods for the given business case.
CO4	Develop the application of data analytics for IOT for a given problem.
CO5	Develop the architecture and develop programming using modern tools for the given use case.

V.CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2	2	1													
CO2	2	2	2													
CO3	2	1	1													
CO4	2	1	2													

VI. Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 1

Assessment Details (both CIE and SEE) : Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	IoT Fundamentals Networking Technologies, Protocols, and Use Cases for the"Internet of Things	David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry	1st Edition 2017 ISBN: 9789386873743	Pearso Education (Cisco Press Indian Reprint)
2	"Internet of Things"	Srinivasa K G	2017	CENGAGE Leaning India

VII(b): Reference Books: (Insert or delete rows as per requirement)

1	Internet of Things (A Hands-on-Approach)	Vijay Madisetti and Arshdeep Bahga	1 st Edition 2014 ISBN: 978-8173719547	VPT
2	Internet of Things: Architecture and Design Principles	Raj Kamal	1st Edition 2017 ISBN: 978-9352605224	McGraw Hill Education

VII(c): Web links and Video Lectures (e-Resources):

https://youtu.be/WUYAjxnwjU4

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Master of Computer Applications (MCA)

Semester:	3	Course Type:	IPCC			
Course Title: Web Technologies - 2						
Course Code:		**23MCAI303**		**Credits:**		4
Teaching Hours/Week (L:T:P:O)			3:0:2:0	**Total Hours:**		40
CIE Marks:	50	**SEE Marks:**	50	**Total Marks:**		100
SEE Type:		Theory		**Exam Hours:**		3 Hrs

I. Course Objectives

- Introduce intermediate-level web security concepts and authentication mechanisms.
- Develop proficiency in server-side development using Node.js and Express.js.
- Database integration techniques using MongoDB and Mongoose.
- Provide a foundation in modern front-end development using React.js.
- Familiarize students with deployment processes and web development best

II. Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.
1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL),which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.

III. COURSE CONTENT

III(a). Theory PART

Module-1: Introduction to Web Security and Authentication, Session Management and Cookies, Password Hashing and Salting, Basic Auth Implementation, Cross-	8Hrs

Site Scripting (XSS) Prevention, SQL Injection Prevention	
Textbook: Book 3, Chapters 3, 4, and 6	
RBT Levels: 2, 3	
Module-2: Server-Side Development with Node.js, Introduction to Node.js and npm, Creating a Basic Web Server with Express.js, Routing and Middleware in Express.js, Template Engines (EJS), Handling Form Data and File Uploads	8Hrs
Textbook: Book 1, Chapters 3, 4, and 5	
RBT Levels: 3,4	
Module-3: Database Integration and ORM, Introduction to MongoDB, CRUD Operations with MongoDB, Mongoose ODM Basics, Building RESTful APIs with Express and MongoDB, Database Security Practices	8Hrs
Textbook:Book 1, Chapters 13 and 14; Book 2, Chapter 9	
RBT Levels:3, 4	
Module-4: Front-End Framework Fundamentals, Introduction to React.js, Components and Props, State and Lifecycle, Handling Events in React, Forms and Controlled Components	8Hrs
Textbook 2: Book 2, Chapter 21	
RBT Levels: 3, 4	
Module-5: Web Application Deployment and Best Practices, Version Control with Git, Deploying Node.js Applications (Heroku or DigitalOcean), Environment Variables and Configuration, Basic SEO Practices, Web Performance Optimization Techniques.	8Hrs
Textbook: Book1, Chapters 18 and 19	
RBT Levels: 3, 4, 5	

III(b). PRACTICAL PART	
(Fill this portion III(b) if course type is integrated or else delete this portion, if course type is only practical, delete the theory part III(a) and retain this section)	

Sl. No.	Experiments / Programs / Problems
1	Implement secure session management and cookie handling in a Node.js application.
2	Create a password hashing and salting system using bcrypt in a Node.js environment.
3	Develop a basic Express.js server with routing for a simple multi-page website.
4	Build a dynamic web page using EJS templating engine with Express.js.
5	Implement CRUD operations on a MongoDB database using Mongoose ODM.

6	Create a RESTful API with Express.js and MongoDB for a resource of your choice (e.g., books, movies).
7	Develop a React component that manages its own state and responds to user events.
8	Implement form handling and validation in a React application.
9	Secure Blog Platform: Develop a basic blog platform using Node.js, Express, and MongoDB. Implement user authentication, secure session management, and protection against XSS and SQL injection. Allow users to create, read, update, and delete blog posts.
10	Task Management Application: Create a task management application with a React front-end and Express/MongoDB back-end. Include features like user registration, login, task creation, assignment, and status updates. Implement proper state management in React and RESTful API design.
11	E-commerce Product Catalog: Build a simple e-commerce product catalog with Node.js, Express, MongoDB, and React. Implement product listing, search functionality, and a basic shopping cart. Focus on creating reusable React components and efficient database queries.
12	Weather Dashboard: Develop a weather dashboard application that integrates with a third-party weather API. Use React for the front-end to display current weather and forecasts. Implement server-side caching with Node.js/Express to optimize API requests. Include user location detection or input for weather lookup.

IV. COURSE OUTCOMES

CO1	Implement basic security measures to protect web applications against common vulnerabilities.
CO2	Develop server-side applications using Node.js and Express.js framework
CO3	Design and implement database operations using MongoDB and Mongoose ODM.
CO4	Create interactive user interfaces using React.js components and state management.
CO5	Deploy web applications and apply best practices for performance optimization.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2	2	1													
CO2	2	2	2													
CO3	2	1	1													
CO4	2	1	2													

VI. Assessment Details (CIE & SEE)

General Rules: : Refer Annexure section 1

Assessment Details (both CIE and SEE) : : Refer Annexure section 1

Semester End Examination (SEE): : Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Web Development with Node and Express: Leveraging the JavaScript Stack	Ethan Brown	2e, 2019	O'Reilly Media
2	Learning PHP, MySQL & JavaScript: With jQuery, CSS & HTML5	Robin Nixon	5e, 2018	O'Reilly Media
3	Web Security for Developers: Real Threats, Practical Defense	Malcolm McDonald	1e, 2020	O'Reilly Media

VII(b): Reference Books:

VII(c): Web links and Video Lectures (e-Resources):

1. freeCodeCamp's Node.js and Express.js Full Course
   https://www.youtube.com/watch?v=Oe421EPjeBE

2. Net Ninja's MongoDB Tutorial Series
   https://www.youtube.com/playlist?list=PL4cUxeGkcC9jpvoYriLI0bY8DOgWZfi6u

3. Mosh Hamedani's React Tutorial for Beginners https://www.youtube.com/watch?v=Ke90Tje7VS0

4. Traversy Media's Web Security Crash Course https://www.youtube.com/watch?v=6MXUOXZrM8s

5. Traversy Media's Deploy Node.js Apps to Heroku
   https://www.youtube.com/watch?v=MxfxiR8TVNU

6. https://www.coursera.org/specializations/full-stack-react

7. Learning MEAN Stack by Building Real world Application
   Specializationhttps://www.coursera.org/specializations/mean-stack

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning
• Quizzes • Assignments• Seminar

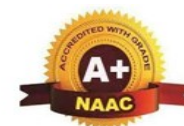|| Jai Sri Gurudev ||
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Master of Computer Applications (MCA)

Semester:	III		Course Type:		PEC		
Course Title: Generative AI							
Course Code:		**23MCAE331**			**Credits:**		3
Teaching Hours/Week (L:T:P:O)				2:2:0:0	**Total Hours:**		40 Hrs
CIE Marks:		50	**SEE Marks:**	50	**Total Marks:**		100
SEE Type:		Theory			**Exam Hours:**		3 Hrs

I. Course Objectives:

- Demystify generative AI models like GANs and VAEs to understand how they create new content.
- Unpack the training secrets of generative AI to see how they "learn" and generate.
- Explore the real-world use cases of generative AI - from creating realistic visuals to accelerating scientific breakthroughs.
- Navigate the ethical landscape of generative AI, identifying potential biases and misuse.
- Get hands-on with generative AI! Build basic models using Python and powerful libraries.

II. Teaching-Learning Process (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.
1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL),which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world and when that's possible, it helps

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to improve the student's understanding.	
III.Course Content	
Theory Part	
Module-1: Introduction to AI and Machine Learning, Demystifying Generative AI: Concepts and Applications, Types of Generative Models (GANs, VAEs, Autoregressive Models)	8 Hrs
Textbook1: Chapter 1,Textbook2: Chapter 2	
RBT Levels: 2, 3, 4	
Module-2: Foundations of Generative Models, Deep Learning Fundamentals (Neural Networks, Backpropagation), Generative Adversarial Networks (GANs): Architecture and Training, Variational Autoencoders (VAEs): Understanding the Latent Space	8 Hrs
Textbook1: Chapter 2,Textbook2: Chapter 3, 4	
RBT Levels: 2,3,4	
Module-3: Implementing Generative Models with Python, Python Programming refresher, TensorFlow and Keras for Deep Learning, Building and Training Simple GANs in Python, Exploring Pre-trained Generative Models and APIs.	8 Hrs
Textbook2: 5, 6,Reference book: 1	
RBT Levels:2,3,4	
Module-4: Applications of Generative AI, Generative AI Revolutionizing Image and Video Creation: Generative AI for Image and Video Creation, Text Generation and Natural Language Processing, Generative AI in Drug Discovery and Material Science, Creative Applications of Generative AI (Art, Music)	8 Hrs
Textbook1: Chapter 3, 4	
RBT Levels:2,3,4	
Module-5: Ethical Considerations and the Future of Generative AI, Bias and Fairness in Generative Models, Explainability and Interpretability, Potential Misuse and Malicious Applications, The Future of Generative AI and its Societal Impact.	8 Hrs
Textbook1: Chapter 5, 6, 7	
RBT Levels:2,3,4	
IV. COURSE OUTCOMES	
CO1	Gain a foundational understanding of Generative AI and its various model types like GANs and VAEs.
CO2	Explore the practical applications of generative AI in diverse fields like image/video creation, text generation, and scientific discovery.
CO3	Analyze the ethical considerations surrounding generative AI, including bias and potential misuse.
CO4	Develop hands-on skills by implementing basic generative models using Python and deep learning libraries.

<table>
<tr><td colspan="18" align="center">V.CO-PO-PSO MAPPING (mark H=3; M=2; L=1)</td></tr>
<tr><td>PO/PSO</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>S1</td><td>S2</td><td>S3</td><td>S4</td></tr>
<tr><td>CO1</td><td>2</td><td>2</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO2</td><td>2</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO3</td><td>2</td><td>1</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO4</td><td>2</td><td>1</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

VI. Assessment Details (CIE & SEE)

General Rules: : Refer Annexure section 1

Assessment Details (both CIE and SEE) : : Refer Annexure section 1

Semester End Examination (SEE): : Refer Annexure section 1

VII. Learning Resources

VII(a). Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Introduction to Generative AI	Numa Dhamani	2024 ISBN: 9781638354345	Apress
2	Generative AI with Python and TensorFlow 2	Joseph Babcock and Raghav Bali	2023 ISBN: 9781119732920	John Wiley & Sons

VII(b). Reference Books:

1	Python Crash Course: A Hands-On, Project-Based Introduction to Programming	Eric Matthes	2e, 2019	No Starch Press

VII(c). Web links and Video Lectures (e-Resources):

1. https://www.coursera.org/learn/build-basic-generative-adversarial-networks-gans
2. https://www.deeplearning.ai/courses/generative-ai-for-everyone/
3. https://www.cloudskillsboost.google/course_templates/536

VIII.Activity Based Learning / Practical Based Learning/Experiential learning:

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning
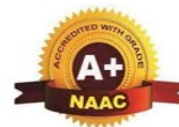• Quizzes ,• Assignments,• Seminar

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Accredited by NAAC with 'A+'grade, Certified by ISO 9001 – 2015
Recognized by UGC, New Delhi with 2(f) & 12 (B)

Master of Computer Applications (MCA)

Semester:	III	Course Type:	PEC		
Course Title: Cyber Security & Block Chain Technology					
Course Code:	**23MCAE332**			**Credits:**	3
Teaching Hours/Week (L:T:P:O)		2:2:0:0		**Total Hours:**	40 Hrs
CIE Marks:	50	**SEE Marks:**	50	**Total Marks:**	100
SEE Type:		Theory		**Exam Hours:**	3 Hrs

I. Course Objectives:

- Demonstrate the basics of Block chain concepts using modern tools/technologies.
- Illustrate the role of block chain applications in different domains including cyber security.
- Evaluate the usage of Block chain implementation/features for the given problem.
- Exemplify the usage of bitcoins and its impact on the economy
- Analyze the application of specific block chain architecture for a given problem

II. Teaching-Learning Process (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL),which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.

III.Course Content
Theory Part

Module-1: Introduction to Cybercrime and Laws: Definition and Origins of Cybercrime, information Security, Who are Cybercriminals? Classifications of Cybercrimes. How Criminals Plan Them – Introduction, How Criminals Plan the Attacks, Cybercafe and Cybercrimes, Botnets, Attack Vector, The Indian IT ACT 2000 and amendments. Tools and Methods used in Cybercrime Introduction, Proxy Server and Anonymizers, Password Cracking, Keyloggers and Spyware, Virus and Warms, Trojan and backdoors, Steganography, DOS and DDOS attack, SQLinjection, Buffer Overflow.	8 Hrs
Textbook1: Chapter1 ,Textbook2: Chapter 1	
RBT Levels: 2,3	
Module-2: Phishing and Identity Theft: Introduction, Phishing – Methods of Phishing, Phishing Techniques, Phishing Toolkits and Spy Phishing. Identity Theft – PII, Types of Identity Theft, Techniques of ID Theft. Digital Forensics Science, Need for Computer Cyber forensics and Digital Evidence, Digital Forensics Life Cycle.	8 Hrs
Textbook1: Chapter 2,Textbook2: Chapter 2	
RBT Levels: 3,4	
Module-3: Network Defense tools: Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs. Firewall, How a Firewall Protects a Network, Packet Characteristic to Filter, Stateless Vs Stateful Firewalls, Network Address Translation (NAT) and Port Forwarding, the basic of Virtual Private Networks, Linux Firewall, Windows Firewall, Snort: Introduction Detection System.	8 Hrs
Textbook1: : Chapter 3,4,Textbook2: Chapter 4	
RBT Levels:2,3	
Module-4: Block Chain Introduction: Overview of Block chain, Public Ledgers, Bitcoin, Smart Contracts, Block in a Block chain, Transactions, Distributed Consensus, Public vs. Private Block chain, Understanding Crypto currency to Block chain, Permissioned Model of Block chain, Overview of Security aspects of Block chain, Basic Crypto Primitives: Cryptographic Hash Function, Properties of a hash function, Hash pointer and Merkle tree, Digital Signature, Public Key Cryptography, A basic cryptocurrency.	8 Hrs
Textbook1: Chapter 2,3	
RBT Levels: 3,4	
Module-5: Bitcoin and Block chain: Creation of coins, Payments and double spending, Bitcoin Scripts, Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay. Working with Consensus in Bitcoin: Distributed consensus in open environments, Consensus in a Bitcoin network, Proof of Work (PoW) – basic introduction, Hashcash PoW, Bitcoin PoW, Attacks on PoW and the monopoly problem, Proof of Stake, Proof of Burn and Proof of Elapsed Time, The life of a Bitcoin Miner, Mining Difficulty, Mining Pool.	8 Hrs
Textbook1: Chapter 4,5	
RBT Levels: 3,4	

IV. COURSE OUTCOMES	
CO1	Understand the basics of Block chain concepts using modern tools/technologies.
CO2	Understand the role of block chain applications in different domains including cyber security.
CO3	Evaluate the usage of Block chain implementation/features for the given problem.
CO4	Exemplify the usage of bitcoins and its impact on the economy
CO5	To develop the application of specific block chain architecture for a given problem

V.CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2	2														
CO2	2	2														
CO3	2	1														
CO4	2	1														

VI.Assessment Details (CIE & SEE)

General Rules: : Refer Annexure section 1

Assessment Details (both CIE and SEE) : : Refer Annexure section 1

Semester End Examination (SEE): : Refer Annexure section 1

VII. Learning Resources

VII(a). Textbooks:

Sl No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Beginning Block chain: A Beginner's Guide to Building Blockchain Solutions	Arshdeep Bikramaditya Signal	2017	
2	Block chain Applications: A Hands-On Approach	Arshdeep Bahga, Vijay Madisetti	2018	A Press
3	Block chain	Melanie Swan	2015	OReilly

VII(b): Reference Books: (Insert or delete rows as per requirement)

1	Bitcoin and Cryptocurrency Technologies:	Aravind Narayan, Joseph Bonneau		Princeton
2	Bitcoin and Blockchain Basics A non-technical	Arthu.T		

introduction for beginners			

VII(c): Web links and Video Lectures (e-Resources):

https://youtu.be/mzPoUjQC4WU

Activity Based Learning / Practical Based Learning/Experiential learning:

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning
- Quizzes
- Assignments
- Seminar

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Master of Computer Applications (MCA)

Semester:	III	Course Type:		PEC			
Course Title: DevOps							
Course Code:	23MCAE333				Credits:		3
Teaching Hours/Week (L:T:P:O)			2:2:0:0		Total Hours:		40 Hrs
CIE Marks:	50	SEE Marks:	50		Total Marks:		100
SEE Type:		Theory			Exam Hours:		3 Hrs

I. Course Objectives:

- Understand the core principles and benefits of DevOps practices.
- Implement a CI/CD pipeline for automated software delivery.
- Automate infrastructure provisioning and configuration management.
- Integrate security practices throughout the DevOps lifecycle.

II. Teaching-Learning Process (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL),which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.

III.Course Content

Module-1: Introduction to DevOps, DevOps Fundamentals: Core concepts, principles, benefits & challenges, DevOps Lifecycle: Understanding the flow of activities in DevOps, Cultural Shift and Team Collaboration: Breaking down silos and fostering collaboration, DevOps Metrics and Measurement: Key Performance Indicators (KPIs) for measuring success	8 Hrs

Textbook1: Chapter1, 3, 4	
RBT Levels: 2, 3, 4	
Module-2: CI/CD Pipeline, Continuous Integration (CI): Benefits, practices, tools like Jenkins, Version Control Systems (VCS): Git fundamentals, branching strategies, Build Automation: Build servers, build pipelines using tools , Continuous Testing: Unit testing, integration testing frameworks, Deployment Strategies: Blue/green deployments, rollback procedures.	8 Hrs
Textbook2: Chapter 5, 6, 7, 8, Textbook3: 2,	
RBT Levels: 2,3,4	
Module-3: Infrastructure Automation and Configuration Management, Infrastructure as Code (IaC): Benefits, Infrastructure Definition Language (IDL) concepts, Configuration Management Tools: Chef, Puppet, Ansible - an overview, Infrastructure Provisioning with IaC: Creating infrastructure templates, (Cloud Infrastructure with IaC: Introduction to IaaS and provisioning using IaC	8 Hrs
Textbook3: Chapter 8, 9, 10	
RBT Levels:2,3,4	
Module-4: Monitoring vs Observability: Understanding system behavior through data, Metrics, Logs, and Traces (ELT): Data collection and analysis for system health, Monitoring Tools: Selecting tools for infrastructure and application monitoring, Alerting and Notification: Setting up alerts for anomalies	8 Hrs
Textbook1: Chapter 11, 12, 13	
RBT Levels:2,3,4	
Module-5: Security in DevOps, DevSecOps: Integrating security practices into the DevOps lifecycle, Shifting Left Security: Implementing security early in the development process, Security Automation and Testing: Static code analysis, vulnerability scanning, Compliance and Governance: Security policies and access control.	8 Hrs
Textbook1: Chapter 15, 16, 17, 18	
RBT Levels:2,3,4	

IV. COURSE OUTCOMES

CO1	Understand the impact of DevOps on software development and delivery.
CO2	Apply and implement automated build, test, and deployment pipelines.
CO3	Utilize Infrastructure as Code (IaC) tools for infrastructure management.
CO4	Apply security best practices within the DevOps workflow.

V.CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2	2														
CO2	2	2														
CO3	2	1														

CO4	2	1												

VI. Assessment Details (CIE & SEE)

General Rules: : Refer Annexure section 1

Assessment Details (both CIE and SEE) : : Refer Annexure section 1

Semester End Examination (SEE): : Refer Annexure section 1

VII. Learning Resources

VII(a) : Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations	Gene Kim, Jez Humble, Patrick Debois	3e, 2019	IT Revolution Press
2	Continuous Delivery: Reliable Software Releases Through Build, Test, and Deployment Automation	Jez Humble & Dave Farley	1e, 2010	Addison-Wesley Professional
3	DevOps for Dummies	Emily Freeman & Erik Morgan Dietrich2e	1e, 2019	John Wiley & Sons

VII(b): Web links and Video Lectures (e-Resources):

1. https://www.coursera.org/learn/intro-to-devops
2. https://youtu.be/Z79DcxjrRoU?feature=shared

Activity Based Learning / Practical Based Learning/Experiential learning:

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning
- Quizzes
- Assignments
- Seminar

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Master of Computer Application (MCA)

Semester:	III	Course Type:	PEC		
Course Title: NOSQL					
Course Code:	23MCAE334			Credits:	3
Teaching Hours/Week (L:T:P:O)		2:2:0:0		Total Hours:	40 Hrs
CIE Marks:	50	SEE Marks:	50	Total Marks:	100
SEE Type:		Theory		Exam Hours:	3 Hrs

I. Course Objectives:

- Demonstrate the concepts of unstructured data
- Analyse and Manage the Data using CRUD operations
- Develop the applications using NOSQL
- Realize the concept of Map Reduce its applicability in the real world application development
- Analyze the framework of NOSQL.

II. Teaching-Learning Process (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.
1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL),which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
9. Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.

III. Course Content

Module-1: Introduction to NoSQL ,Definition of NoSQL, History of NoSQL and Different NoSQL products. Exploring NoSQL Exploring Mongo DB Java/Ruby/Python, Interfacing and Interacting with NoSQL.	8 Hrs

Textbook1: Chapter 1,2	
RBT Levels: 1,2	
Module-2: NoSQL Basics: NoSQL Storage Architecture, CRUD operations with Mongo DB, Querying, Modifying and Managing. Data Storage in NoSQL: NoSQL Data Stores, Indexing and ordering datasets (Mongo DB/Couch DB/Cassandra)	8 Hrs
Textbook2: Chapter 2,3 **Textbook3:**	
RBT Levels: 1,2	
Module-3: Advanced NoSQL, NoSQL in Cloud, Parallel Processing with Map Reduce, Big Data with Hive.	8 Hrs
Textbook3: Chapter 3,4	
RBT Levels: 2,3	
Module-4: Working with NoSQL, Surveying Database Internals, Migrating from RDBMS to NoSQL, Web Frameworks and NoSQL, using MySQL as a NoSQL.	8 Hrs
Textbook1: Chapter 4,5	
RBT Levels: 2,3	
Module-5: Developing Web Application with NOSQL and NOSQL Administration Php and MongoDB, Python and MongoDB, Creating Blog Application with PHP.	8 Hrs
Textbook1: Chapter 5,6,7	
RBT Levels: 2,3	

IV. COURSE OUTCOMES

CO1	Understand and Manage the Data using CRUD operations
CO2	Apply and Develop the applications using NoSQL.
CO3	Realize the concept of Map Reduce its applicability in the real World application development.
CO4	Apply the framework of NOSQL to find the Solutions.

V.CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2	2														
CO2	2	2														
CO3	2	1														
CO4	2	1														

VI.Assessment Details (CIE & SEE)

General Rules: : Refer Annexure section 1

Assessment Details (both CIE and SEE) : : Refer Annexure section 1

Semester End Examination (SEE): : Refer Annexure section 1

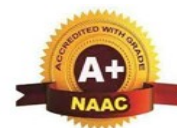| VII.Learning Resources				
VII(a). Textbooks:				
Sl. No.	**Title of the Book**	**Name of the author**	**Edition and Year**	**Name of the publisher**
1	Professional NOSQL	Shashank Tiwari		WROX Press
VII(b). Reference Books:				
1	The Definitive Guide to Mongo DB, The NOSQL Database for cloud and Desktop Computing Eelco Plugge	Peter Membrey and Tim Hawkins		A Press
VIII. Activity Based Learning / Practical Based Learning/Experiential learning:				
Activity Based Learning (Suggested Activities in Class)/ Practical Based learning • Quizzes • Assignments • Seminar				

|| Jai Sri Gurudev ||
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Master of Computer Applications (MCA)

Semester:	III	Course Type:	PEC			
Course Title: Enterprise Resource Planning						
Course Code:		**23MCAE341**		**Credits:**		03
Teaching Hours/Week (L:T:P:O)			2:2:0:0	**Total Hours:**		40 hrs
CIE Marks:	50	**SEE Marks:**	50	**Total Marks:**		100
SEE Type:		**Theory**		**Exam Hours:**		3 Hrs

I. Course Objectives:

CO1.To provide a contemporary and forward-looking on the theory and practice of Enterprise Resource Planning Technology
CO2.To focus on a strong emphasis upon practice of theory in Applications and Practicaloriented approach.
CO3 To train the students to develop the basic understanding of how ERP enriches the business organizations in achieving a multidimensional growth.
CO4.To aim at preparing the students technological competitive and make them ready to self-upgrade with the higher technical skills.

II. Teaching-Learning Process (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.
1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL),which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
10. Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.

III.Course Content

Module-1 Introduction to ERP, Basic ERP Concepts, Justifying ERP Investments, Business Processes, Risks of ERP, Benefits of ERP	8Hrs

Text Book: Chapter 1

RBT Levels: 1,2

Module-2 ERP Implementation: Implementation of Life Cycle, Implementation Methodology, Hidden Costs, Organizing Implementation, Vendors, Consultants and Users, Contracts, Project Management and Monitoring	8Hrs

Text Book: Chapter 1,2

RBT Levels: 1,2

Module-3 Business Modules: Business Modules in an ERP Package, Finance, Manufacturing, Human Resource, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution.	8 Hrs

Text Book: Chapter 2,3

RBT Levels: 1,2

Module-4 ERP Market: ERP Market Place, SAP AG, People Soft, Baan Company, JD Edwards World Solutions Company, Oracle Corporation, QAD, System Software Associates	8 Hrs

Text Book: Chapter 3,4,5

RBT Levels: 1,2

Module-5 ERP–Present And Future: Turbo Charge the ERP System, EIA, ERP and E–Commerce, ERP and Internet, Future Directions in ERP.	8 Hrs

Text Book: Chapter 6,7

RBT Levels: 1,2

IV. COURSE OUTCOMES

CO1	Understand the essentials of supply chain management in ERP
CO2	Understand the implementation of ERP in the context of business of the different organization L2
CO3	Apply ERP for different business modules for the given problem
CO4	Develop the given case study of ERP marketing.
CO5	Analyse the design of ERP with future E-commerce and internet.

V.CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

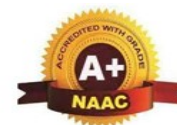| PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2	2														
CO2	2	2														
CO3	2	1														
CO4	2	1														

VI.Assessment Details (CIE & SEE)

General Rules: : Refer Annexure section 1

Assessment Details (both CIE and SEE) : : Refer Annexure section 1

Semester End Examination (SEE): : Refer Annexure section 1

VII.Learning Resources

VII(a). Textbooks:

Sl No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
[1]	ERP Demystified	Alexis Leon	1999	Tata McGraw Hill

VII(b).Reference Books:

[1]	Concepts in Enterprise Resource Planning	Joseph A. Brady, Ellen F. Monk, Bret J. Wangner	**2001**	Thomson Learning
[2]	Enterprise Resource Planning concepts and Planning	Vinod Kumar Garg and N.K .Venkata Krishnan	**1998**	Prentice Hall

VII(c).Web links and Video Lectures (e-Resources):

[1]. https://www.digimat.in/nptel/courses/video/106105183/L01.html
[2]http://www.digimat.in/nptel/courses/video/106105081/L25.html
[3]https://nptel.ac.in/courses/106105081
[4]. VTU e-Shikshana Program

SJB Institute of Technology

Master of Computer Applications (MCA)

Semester:	III	Course Type:	PEC		
Course Title: Software Metrics & Quality Assurance					
Course Code:	23MCAE342			Credits:	03
Teaching Hours/Week (L: T:P:O)		2:2:0:0		Total Hours:	40 hrs
CIE Marks:	50	SEE Marks:	50	Total Marks:	100
SEE Type:		Theory		Exam Hours:	03 Hrs

I. Course Objectives:

- Learn about Software quality assurance and benchmarking measurements.
- Describe software development best practices for minimizing vulnerabilities in programming code.
- Conduct a security verification and assessment (static and dynamic) of a software application.
- To discover an availability of metrics and measures.

II. Teaching-Learning Process (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.
1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
11. Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.

III. Course Content

Module-1: What Is Software Quality: Quality: Popular Views, Quality Professional Views, Software Quality, Total Quality Management and Summary. Fundamentals Of Measurement Theory: Definition, Operational Definition, And Measurement,	8Hrs

Level Of Measurement, Some Basic Measures, Reliability And Validity, Measurement Errors, Be Careful With Correlation, Criteria For Causality, Summary. Software Quality Metrics Overview: Product Quality Metrics, In Process Quality Metrics, Metrics for Software Maintenance.	
Text Book : Chapter 1	
RBT Levels: 1	
Module-2: Applying The Seven Basic Quality Tools In Software Development: Ishikawa's Seven Basic Tools, Checklist, Pareo Diagram, Histogram, Run Charts, Scatter Diagram, Control Chart, Cause And Effect Diagram. The Rayleigh Model: Reliability Models, The Rayleigh Model Basic Assumptions, Implementation, Reliability And Predictive Validity.	8Hrs
Text Book : Chapter 2,3	
RBT Levels: 2,3	
Module-3: Complexity Metrics and Models: Lines Of Code, Halstead's Software Science, Cyclomatic Complexity Syntactic Metrics, Metric And Lessons Learned For Object Oriented Projects: Object Oriented Concepts And Constructs, Design And Complexity Metrics, Productivity Metrics, Quality And Quality Management Metrics, Lessons Learned For object oriented Projects.	8Hrs
Text Book : Chapter 3,4	
RBT Levels:2,3	
Module-4: Availability Metrics: Definition And Measurement Of System Availability, Reliability Availability And Defect Rate, Collecting Customer Outage Data For Quality Improvement, Conducting Software Project Assessment: Audit Ad Assessment, Software Process Maturity Assessment And Software Project Assessment, Software Process Assessment A Proponed Software Project Assessment Method	8Hrs
Text Book : Chapter 4,5	
RBT Levels :2,3	
Module-5: Dos and Don'ts of Software Process Improvement: Measuring Process Maturity, Measuring Process Capability, Measuring Levels Is Not Enough, Establishing The Alignment Principle, Take Time Getting Faster, Keep it Simple Or Face Decomplexification, Measuring The Value Of Process Improvement, Measuring Process Compliance, Using Function Point Metrics to Measure Software Process Improvement: Software Process Improvement Sequences, Process Improvement Economies.	8Hrs
Text Book : Chapter 6,7	
RBT Levels: 3,4	

IV. Course Outcomes	
CO1	Identify and apply various software metrics, which determines the quality level of software.
CO2	Compare and Pick out the right reliability model for evaluating the software.
CO3	Discover new metrics and reliability models for evaluating the quality level of the software based on the requirement.

CO4	Identify and evaluate the quality level of internal and external attributes of the software product.

<table>
<tr><td colspan="17" align="center">V.CO-PO-PSO MAPPING (mark H=3; M=2; L=1)</td></tr>
<tr><td>PO/PSO</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>S1</td><td>S2</td><td>S3</td><td>S4</td></tr>
<tr><td>CO1</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO2</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO3</td><td>2</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO4</td><td>2</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

VI.Assessment Details (CIE & SEE)
General Rules: Refer Annexure section 1
Assessment Details (both CIE and SEE) : Refer Annexure section 1
Semester End Examination (SEE): Refer Annexure section 1

VII.Learning Resources

VII(a). Textbooks:

Sl No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Metrics and Models in Software Quality Engineering,	Stephen H Khan	2nd edition 2013	Pearson

VII(b). Reference Books:

| 1 | Software quality and Testing Market | S.A.Kelkar | 2012 | PHI Learing, Pvt, Ltd 2012 |
| 2 | Managing the Software Inc | Watts S Humphrey | 2008 | Process Pearson Education 2008 |

VII(c). Web links and Video Lectures (e-Resources):

● https://www.bmc.com/blogs/software-quality-metrics/
● https://www.youtube.com/watch?v=KqDlDubS-OU
● https://www.youtube.com/watch?v=Jj7dLM8cLuE

VIII.Activity Based Learning / Practical Based Learning/Experiential learning:

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning.
● Quizzes,● Assignments, ● Seminar

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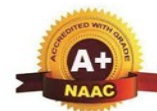
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Master of Computer Applications (MCA)

Semester:	III	Course Type:			PEC	
Course Title: Semantic Web and Social Networks						
Course Code:	**23MCAE343**			**Credits:**		3
Teaching Hours/Week (L:T:P:O)			2:2:0:0	**Total Hours:**		40 Hrs
CIE Marks:	50	**SEE Marks:**	50	**Total Marks:**		100
SEE Type:		**Theory**		**Exam Hours:**		3 Hrs

I. Course Objectives:

- Learn Web Intelligence
- Describe how the Semantic Web provides the key in aggregating information across heterogeneous sources.
- Learn Knowledge Representation for the Semantic Web.
- Explain the analysis of the social Web and the design of a new class of applications.

II. Teaching-Learning Process (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.
1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL),which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
12. Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.

III. Course Content

Module-1: Web Intelligence Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the	8 Hrs

semantic Web.		
Textbook1: Chapter 2,3		
RBT Levels: 1,2		
Module-2: Knowledge Representation for the Semantic Web Ontology's and their role in the semantic web, Ontology Languages for the Semantic Web – Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.	8 Hrs	
Textbook2: Chapter 3,4		
RBT Levels: 1,2		
Module-3: Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.	8 Hrs	
Textbook3: Chapter 4,5		
RBT Levels: 2,3		
Module-4: Semantic Web Applications, Services and Technology Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods.	8 Hrs	
Textbook1: Chapter 6,7		
RBT Levels: 2,3		
Module-5: Social Network Analysis and semantic web What is social Networks analysis, Development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features.	8 Hrs	
Textbook1: Chapter 7,8		
RBT Levels: 2,3		

IV. COURSE OUTCOMES

CO1	Summarize to create ontology and knowledge representation for the semantic web.
CO2	Solve to build a blogs and social networks.
CO3	Describe the Modeling and aggregating social network data.
CO4	Illustrate the Web-based social network and Ontology.

V.CO-PO-PSO MAPPING (mark H=3; M=2; L=1)																	
PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4	
CO1	2	2															
CO2	2	2															
CO3	2	1															
CO4	2	1															

	VI.Assessment Details (CIE & SEE)			
General Rules: Refer Annexure section 1				
Assessment Details (both CIE and SEE) : Refer Annexure section 1				
Semester End Examination (SEE): Refer Annexure section 1				
	VII.Learning Resources			

VII(a). Textbooks:

Sl No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Thinking on the Web - Berners Lee	Godel and Turing,	2008	Wiley inter science
2	Social Networks and the Semantic Web	Peter Mika	2007	Springer

VII(b). Reference Books:

1	1. Semantic Web Technologies, Trends and Research in Ontology Based Systems	J.Davies, R.Studer		P.Warren, John Wiley & Sons
2	Semantic Web and Semantic Web Services	Liyang Lu Chapman and Hall/CRC		Publishers,(Taylor & Francis Group).

VII(c).Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=yCXu10eDtcA
2. https://www.youtube.com/watch?v=Q7tyi1kp33w
3. https://www.youtube.com/watch?v=QQCWHgclGB8
4. ttps://www.youtube.com/watch?v=QQCWHgclGB8&t=1474s
5. https://www.youtube.com/playlist?list=PL3JRjVnXiTBYHhu15olX6ugN5B4oizwAb

VIII.Activity Based Learning / Practical Based Learning/Experiential learning:

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning
● Quizzes,● Assignments,● Seminar

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Master of Computer Applications (MCA)

Semester:	III		Course Type:		PEC
Course Title : Optimization Techniques					
Course Code:	**23MCAE344**		**Credits:**		3
Teaching Hours/Week (L:T:P:O)	2:2:0:0		**Total Hours:**		40 Hrs
CIE Marks:	50	**SEE Marks:**	50	**Total Marks:**	100
SEE Type:	**Theory**		**Exam Hours:**		3 Hrs

I. Course Objectives :

- Understand the importance and applications of operations research in different domains
- Formulate mathematical models for quantitative analysis of managerial problems in industry.
- Formulate the real world problems using mathematical models
- Analyze the optimal solution for the given problem by applying Transportation Problems
- Analyse & Solve Simple Game Theory Problems.

II. Teaching-Learning Process (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.

2. Use of Video/Animation to explain functioning of various concepts.

3. Encourage collaborative (Group Learning) Learning in the class.

4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.

5. Adopt Problem Based Learning (PBL),which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.

6. Introduce Topics in manifold representations.

7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.

III.Course Content

Module 1: Introduction to Operations Research & LPP:	Teaching Hours
Introduction, Operations Research models, Solving the OR models, Phases of an OR study Introduction, structure of linear programming model, advantages, general model of Linear programming problem(LPP), examples of LP formulation, graphical solutions of LP problem, Simplex method.	8
Text Book : Chapter 1	
Blooms Taxonomy:L1 – Remembering, L2 – Understanding	
Module-2: Linear programming problem (LPP)	
Simplex method ,two-phase method, Big M method, Design of experiments and ANNOVA.	8
Blooms Taxonomy:L1 – Remembering, L2 – Understanding	
Module – 3: Transportation Problem	
Transportation problem, Mathematical model of Transportation problem, Methods of finding initial solution (North-West corner rule, Least cost method,Vogel's Approximation method), Test for Optimality in TP using MODI method (uv-method).	8
Blooms Taxonomy: L2 – Understanding,L3 – Applying,L4 - Analyze	
Module-4: Duality in Linear Programming	
Duality in Linear Programming, Formulation of Dual Linear Programming Problem and Examples. Assignment Problem: Mathematical model of Assignment Problem, Hungarian method for solving Assignment problem.	8
Blooms Taxonomy: L2 – Understanding,L3 – Applying, L4- Analyze	
Module 5: PERT and CPM and Game Theory	
PERT and CPM Network representation, Critical path (CPM) computations and PERT networks Game Theory The formulation of two persons, zero sum games, solving simple games- a prototype example, games with mixed strategies, graphical solution procedure, solving by linear programming, extension.	8
Blooms Taxonomy: L2 – Understanding,L3 – Applying, L4 - Analyze	

IV.	COURSE OUTCOMES	
CO1	Explore the importance of Operations Research.
CO2	Formulate the problem using linear programming technique
CO3	Analyze the optimal solution for the given problem by applying Transportation problems.
CO4	Understand the essence and foundations of the simplex algorithm and write the dual of the given primal problems.
CO5	Analyze the strategies with different players through game theory approach.

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2	2														
CO2	2	2														
CO3	2	1														
CO4	2	1														

<p align="center">V.CO-PO-PSO MAPPING (mark H=3; M=2; L=1)</p>

VI.Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 1

Assessment Details (both CIE and SEE) : Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII.Learning Resources

VII(a). Textbooks & Reference Books:

Sl No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Operations Research - An Introduction Pearson,	Hamdy A Taha	9th Edition, 2014, ISBN: 978-93-325-1822-3, First Impression	Pearson
2	Introduction to Operations Research	Frederick S. Hillier & Gerald J. Lieberman	8th Edition, 2007, ISBN-10: 0070600929, ISBN-13: 978-0070600928	Tata McGraw Hill

VIII.Activity Based Learning / Practical Based Learning/Experiential learning:

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning
- Quizzes
- Assignments
- Seminar

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Recognized by UGC, New Delhi with 2(f) & 12 (B)

Master of Computer Applications (MCA)

Semester:	III	Course Type:		PCCL	
Course Title: Data Analytics Laboratory					
Course Code:	**23MCAL306**			**Credits:**	2
Teaching Hours/Week (L:T:P:O)		0:2:2:0		**Total Hours:**	**Lab sessions**
CIE Marks:	50	**SEE Marks:**	50	**Total Marks:**	100
SEE Type:		**Laboratory**		**Exam Hours:**	3 Hrs

I. Course Objectives:

- Develop python program to perform search/sort on a given data set
- Demonstrate data visualization using Numpy for a given problem
- Demonstrate regression model for a given problem
- Design and develop an application for the given problem

II. Teaching-Learning Process (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Use of Video/Animation to explain functioning of various concepts.

2. Encourage collaborative (Group Learning) Learning in the class.

3. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.

4. Adopt Problem Based Learning (PBL),which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.

5. Introduce Topics in manifold representations.

6. Show the different ways to solve the same problem and encourage the students to come up with

	their own creative ways to solve them.

7.Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.

	III. Practical Programs
	(PART A)
1	Implement a python program to demonstrate a) Importing Datasets b) Cleaning the Data c) Data frame manipulation using Numpy.
2	Implement a python program to demonstrate the following using NumPy a) Array manipulation, Searching, Sorting and splitting. b) broadcasting and Plotting NumPy arrays.
3	Implement a python program to demonstrate Data visualization with various Types of Graphs using Numpy.
4	Write a Python program that creates a mxn integer array and Prints its attributes using Matplotlib.
5	Write a Python program to demonstrate the generation of linear regression models.
6	Write a Python program to demonstrate the generation of logistic regression models.
7	Write a Python program to demonstrate Time series analysis with Pandas
8	Write a Python program to demonstrate Data Visualization using Seaborn
	(PART B)

Two Students as a team shall carry out a mini project using python/pandas to demonstrate the data analysis. However during the examination, each student must demonstrate the project individually
The team must submit a brief project report (20-25 pages) that must include the following
  a.   Introduction
  b.   Requirement Analysis.
  c.   Software Requirement Specification.
  d.   Analysis and Design.
  e.   Implementation.
  f.   Testing
Brief synopsis not more than two pages to be submitted by the team as per the format given. It is recommended that students to do prior art search as part of literature survey before submitting the synopsis for the Mini/Major projects.

	IV. Course outcomes (Course Skill Set):
	At the end of the course the student will be able to:
CO1	Design and develop an application for the given problem for the societal/industrial problems.
CO2	Develop python program by applying suitable feature for the given problem and verify the

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
output.																

V.CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2	2														
CO2	2	2											2			
CO3	2	1												1		
CO4	2	1													1	

VI.Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 1

Assessment Details (both CIE and SEE) : Refer Annexure section 1

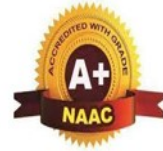**Semester End Examination (SEE):** Refer Annexure section 1

Master of Computer Applications (MCA)

Semester:	III	Course Type:		PCCL	
Course Title: IoT Laboratory					
Course Code:	**23MCAL307**			**Credits:**	2
Teaching Hours/Week (L:T:P:O)		0:2:2:0	**Total Hours:**		**Lab sessions**
CIE Marks:	50	**SEE Marks:**	50	**Total Marks:**	100
SEE Type:		**Laboratory**		**Exam Hours:**	3　Hrs
I.　Course Objectives:					

- Demonstrate the IoT architecture design for a given problem.
- Apply IOT techniques for a given problem.
- Analyse the application protocol, transport layer methods for the given business case.

II.　Teaching-Learning Process (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.

2. Use of Video/Animation to explain functioning of various concepts.

3. Encourage collaborative (Group Learning) Learning in the class.

4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.

5. Adopt Problem Based Learning (PBL),which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.

6. Introduce Topics in manifold representations.

7. Show the different ways to solve the same problem and encourage the students to come up with

	their own creative ways to solve them.
	8.Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.

III. Experiments Programs

(PART A)

1	Run some python programs on Pi like: Read your name and print Hello message with name Read two numbers and print their sum, difference, product and division. Word and character count of a given string Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from standard input Print a name „n" times, where name and n are read from standard input, using for and while loops. Handle Divided by Zero Exception. Print current time for 10 times with an interval of 10 seconds. Read a file line by line and print the word count of each line.
2	Get input from two switches and switch on corresponding LEDs.
3	Flash an LED at a given on time and off time cycle, where the two times are taken from a file.
4	Switch on a relay at a given time using cron, where the relay's contact terminals are connected to a load.
5	Access an image through a Pi web cam.
6	Control a light source using web page.
7	Implement an intruder system that sends an alert to the given email.
8	Get the status of a bulb at a remote place (on the LAN) through web.
9	Get an alarm from a remote area (through LAN) if smoke is detected.

(PART B)

A team of two students must develop the mini project. However during the examination, each student must demonstrate the project individually
The team must submit a brief project report (20-25 pages) that must include the following
   g. Introduction
   h. Requirement Analysis.
   i. Software Requirement Specification.
   j. Analysis and Design.
   k. Implementation.
   l. Testing
Brief synopsis not more than two pages to be submitted by the team as per the format given. It is recommended that students to do prior art search as part of literature survey before submitting the synopsis for the Mini/Major projects.

IV. Course outcomes (Course Skill Set):

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

CO1	Design and develop an application for the given problem for the societal/industrial problems.
CO2	Develop python program by applying suitable feature for the given problem and verify the output.

CO3	Build intruder system that sends an alert to the given email.																

V.CO-PO-PSO MAPPING (mark H=3; M=2; L=1)																	
PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2	2														
CO2	2	2											2			
CO3	2	1													1	
CO4	2	1														1

VI.Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 1

Assessment Details (both CIE and SEE) : Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

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Recognized by UGC, New Delhi with 2(f) & 12 (B)

Master of Computer Applications (MCA)

Semester:	III	Course Type:		PRJ		
Course Title: Societal Project						
Course Code:	**23MCAPR31**			**Credits:**		2
Teaching Hours/Week (L:T:P:O)		0:0:0:@		**Total Hours:**		-
CIE Marks:	100	**SEE Marks:**	----	**Total Marks:**		100
SEE Type:				**Exam Hours:**		

I.   Course Objectives:

- Build creative solutions for development problems of current scenario in the Society.
- Utilize the skills developed in the curriculum to solve real life problems.
- Improve understanding and develop methodology for solving complex issues

II. Teaching-Learning Process (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Adopt Problem Based Learning (PBL),which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.

2. Introduce Topics in manifold representations.

3. Show the different ways to solve the same problem and encourage the students to come up with

their own creative ways to solve them.

4.Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.

III.Some of the domains to choose for societal projects:

• Infrastructure• Health Care• Social security• Security for women• Transportation • Business Continuity• Remote working and Education• Digital Finance• Food Security • Rural employment• Water and land management• Pollution• Financial Independence • Agricultural Finance• Primary Health care• Nutrition• Child Care• E-learning • Distance parenting• Mentorship etc .	

IV. Course outcomes
At the end of the course the student will be able to:

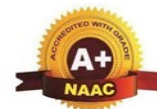|	
Co1	Building solution for real life societal problems
Co2	Improvement of their technical/curriculum skills

V.CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2	2												2		
CO2	2	2											2			
CO3																
CO4																

V. Assessment Details (CIE & SEE)
General Rules: Refer Annexure section 1
Assessment Details (both CIE and SEE) : Refer Annexure section 1
Semester End Examination (SEE): Refer Annexure section 1

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SJB Institute of Technology

BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060
Approved by AICTE, New Delhi.
Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi
Accredited by NAAC with 'A+'grade, Certified by ISO 9001 – 2015
Recognized by UGC, New Delhi with 2(f) & 12 (B)

Master of Computer Applications(MCA)

Semester:	III	Course Type:		PRJ	
Course Title: Mini Project					
Course Code:	**23MCAPR32**		**Credits:**		2
Teaching Hours/Week (L:T:P:O)		0:0:0:@	**Total Hours:**		**Lab sessions**
CIE Marks:	100	**SEE Marks:**	-	**Total Marks:**	100
SEE Type:		----		**Exam Hours:**	--

I. Course Objectives:

- Support independent learning.
- Guide to select and utilize adequate information from varied resources for maintaining ethics.
- Guide to organize the work in the appropriate manner and present
- information (acknowledging the sources) clearly.
Develop interactive, communication, organization, time management, and presentation skills. Impart flexibility and adaptability.
- Inspire independent and team working
.• Expand intellectual capacity, credibility, judgment, intuition.
- Adhere to punctuality, setting and meeting deadlines.
- Instil responsibilities to oneself and others.
- Train students to present the topic of project work in a seminar without any fear, face audience confidently, enhance communication skill, involve in group discussion to present and exchange ideas

II. Teaching-Learning Process (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Adopt Problem Based Learning (PBL), which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.

2. Introduce Topics in manifold representations.

3. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.

4.Discuss how every concept can be applied to the real world and when that's possible, it helps to

improve the student's understanding.

III. Project Work

Students in consultation with the guide/s shall carry out literature survey/ visit industries to finalize the topic of the Project. Subsequently, the students shall collect the material required for the selected project, prepare synopsis and narrate the methodology to carry out the project work.

Seminar:

Each student, under the guidance of a Faculty, is required to Present the seminar on the selected project orally and/or through power point slides.

- Answer the queries and involve in debate/discussion.
- Submit two copies of the typed report with a list of references.
- The participants shall take part in discussion to foster friendly and stimulating environment in which the students are motivated to reach high standards and become self-confident.

IV. Course outcomes:

At the end of the course the student will be able to: Demonstrate a sound technical knowledge of their selected project topic.
- Undertake problem identification, formulation, and solution.
- Design engineering solutions to complex problems utilising a systems approach.
- Communicate with engineers and the community at large in written an oral forms.
  - Demonstrate the knowledge, skills and attitudes of a professional engineer.

V.CO-PO-PSO MAPPING (mark H=3; M=2; L=1)																
PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2	2												2		
CO2	2	2											2			
CO3		2												2		
CO4			2												1	

VI. Assessment Details (CIE & SEE)
General Rules: Refer Annexure section 1
Assessment Details (both CIE and SEE) : Refer Annexure section 1
Semester End Examination (SEE): Refer Annexure section 1

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Master of Computer Applications (MCA)

Semester:	III	Course Type:	INT			
Course Title: INTERNSHIP						
Course Code:	**23MCAIN31**			**Credits:**		2
Teaching Hours/Week (L:T:P:O)			0:0:0:@	**Total Hours:**		
CIE Marks:	50	**SEE Marks:**	50	**Total Marks:**		100
SEE Type:		**Laboratory**		**Exam Hours:**		3 Hrs

I. Course Objectives:

Internship/Professional practice provide students the opportunity of hands-on experience that include personal training, time and stress management, interactive skills, presentations, budgeting, marketing, liability and risk management, paperwork, equipment ordering, maintenance, responding to emergencies etc.
The objective are further,
To put theory into practice.
To expand thinking and broaden the knowledge and skills acquired through course work in the field. To relate to, interact with, and learn from current professionals in the field.
To gain a greater understanding of the duties and responsibilities of a professional.
To understand and adhere to professional standards in the field. To gain insight to professional communication including meetings, memos, reading, writing, public speaking, research, client interaction, input of ideas, and confidentiality.
To identify personal strengths and weaknesses.
To develop the initiative and motivation to be a self-starter and work independently.

II. Internship/Professional practice

Students under the guidance of internal guide/s and external guide shall take part in all the activities regularly to acquire as much knowledge as possible without causing any inconvenience at the place of internship.

III. Seminar

Each student, is required to Present the seminar on the internship orally and/or through power point slides.
- Answer the queries and involve in debate/discussion.
- Submit the report duly certified by the external guide.
- The participants shall take part in discussion to foster friendly and stimulating environment in which the students are motivated to reach high standards and become self-confident.

IV. Course outcomes

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

CO1	Gain practical experience within industry in which the internship is done.
CO2	Acquire knowledge of the industry in which the internship is done.
CO3	Apply knowledge and skills learned to classroom work.
CO4	Develop a greater understanding about career options while more clearly defining personal career goals.
CO5	Experience the activities and functions of professionals.
CO6	Develop and refine oral and written communication skills.
CO7	Identify areas for future knowledge and skill development.
CO8	Expand intellectual capacity, credibility, judgment, intuition.
CO9	Acquire the knowledge of administration, marketing, finance and economics.

V.CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2	2												2		
CO2	2	2											2			
CO3		2												2		
CO4			2												1	

VI.Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 1

Assessment Details (both CIE and SEE) : Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

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Master of Computer Applications (MCA)

Semester:	III	Course Type:	AEC		
Course Title: Data Visualization and Analysis With Power BI					
Course Code:	**23MCAAE31**			**Credits:**	02
Teaching Hours/Week (L: T: P: O) {O – Other pedagogies, mention @}		0:2:2:0		**Total Hours:**	40
CIE Marks:	50	**SEE Marks:**	50	**Total Marks:**	100
SEE Type:		**Theory**		**Exam Hours:**	2 Hrs

Pre prerequisite: Basic understanding of data analysis concepts and familiarity with spreadsheet software like Excel. Additionally, knowledge of SQL for data querying and manipulation would be beneficial for advanced data analysis tasks in POWER BI.

I.   Course Objectives:

- To gain a foundational understanding of Power BI, including Power BI Desktop and the Power BI website.
- To create various data visualizations, including stacked and clustered bar charts, waterfall charts, scatter plots, filled maps, and 3D maps.
- To prepare and transform data using Power Query for acquisition, grouping, binning, merging, joining, and transformation.
- To design and build interactive reports and dashboards, utilizing bookmarks, buttons, and KPIs for enhanced user interactivity.
- To perform advanced data analysis with DAX, creating measures, calculated columns, and using functions like SUMX, IF, FILTER, DatesInPeriod, DatesBetween, and WeekToDate.

II.   Teaching-Learning Process (General Instructions):

The following are some of the strategies that teachers can employ to facilitate the achievement of various course outcomes:

1. **Diverse Teaching Methods**: Instead of relying solely on traditional lecture methods, can explore alternative and effective teaching approaches. These might include interactive discussions, hands-on activities, or multimedia presentations.
2. **Visual Aids**: Utilize videos and animations to elucidate complex concepts. Visual representations enhance understanding and engagement among students.

3. **Collaborative Learning**: Encourage group learning within the classroom. Collaborative activities foster teamwork, communication, and a deeper grasp of subject matter.

4. **Higher Order Thinking (HOT) Questions**: Pose at least three thought-provoking questions during class. These questions stimulate critical thinking and encourage students to analyze and evaluate information.

5. **Problem-Based Learning (PBL):** Implement PBL, which nurtures analytical skills. PBL goes beyond rote memorization by challenging students to design solutions, evaluate evidence, and think critically.

6. **Multiple Representations**: Introduce topics using various representations. Visuals, diagrams, and real-world examples cater to diverse learning styles.

7. **Creative Problem Solving**: Present different approaches to solving the same problem. Encourage students to think outside the box and devise their own innovative solutions.

8. **Real-World Application**: Discuss how each concept relates to practical scenarios. Connecting theoretical knowledge to real-world contexts enhances students' comprehension and retention.

III. COURSE CONTENT

Module-1:Power BI Essentials	8 Hrs
Utilize POWER BI Desktop and its web counterpart, acquiring data from various sources including CSV files and folders. Master data transformation with Power Query, create visualizations, and distinguish between dashboards and reports for effective data presentation. **Textbook1**: Chapter 1,2	
RBT Levels: L1, L2, L3, L4	

Module-2:Visualization in POWERBI	8 Hrs
Advanced visualization techniques in POWER BI, including various chart types, map visualizations, and interactive features like slicers, bookmarks, and buttons. Additionally, explore data grouping, binning, and Key Performance Indicators (KPIs) for effective data analysis and presentation. **Textbook1: :** Chapter 3,4	
RBT Levels: L1,L2,L3, L4	

Module-3:Basic Data Transformation in Power BI	8 Hrs
Power Query basics, data preparation, and importing data from Excel and Azure SQL Database. Understand the difference between reference vs duplicate and append vs merge in POWER BI for effective data transformation. **Textbook1: :** Chapter 4,5	
RBT Levels: L1,L2,L3,L4	

Module-4:Advanced Data Transformation in Power BI	8 Hrs
Advanced data manipulation techniques in POWER BI, including merge join types, pivot operations, grouping, exception reporting, flawless date conversion, and numeric division. These skills enhance ability	

to handle diverse data scenarios efficiently.	
Textbook1: : Chapter 5,6	
RBT Levels: L1, L2, L3,L4	
Module-5: Power BI Modeling And DAX	8 Hrs
Advanced data modelling and calculation techniques in POWER BI, including sorting, data preparation, relationship management, and using measures versus calculated columns. Explore functions like SUM vs SUMX, IF and FILTER, and address DAX time zone issues, enhancing data analysis skills.	
Textbook 1: : Chapter 6,7,8	
RBT Levels:L1, L2, L3,L4	

<table>
<tr><td colspan="2" align="center">IV. COURSE OUTCOMES:</td></tr>
<tr><td colspan="2">At the end of this course, students will be able to</td></tr>
<tr><td>CO1</td><td>Apply Power BI Desktop and its web counterpart to acquire, prepare, and transform data from various sources, including CSV files and Azure SQL Database, using Power Query.</td></tr>
<tr><td>CO2</td><td>Apply advanced visualization techniques, including various chart types, map visualizations, and interactive features like slicers, bookmarks, and buttons, for effective data presentation.</td></tr>
<tr><td>CO3</td><td>Implement data modeling techniques, including designing star schemas, managing relationships, and differentiating between measures and calculated columns.</td></tr>
<tr><td>CO4</td><td>Perform advanced data analysis and calculations with DAX, using functions like SUM vs SUMX, IF, FILTER, and handling DAX time zone issues.</td></tr>
<tr><td>CO5</td><td>Develop an interactive reports and dashboards, publish reports, and pin them to dashboards in the PowerBI.com service, utilizing KPIs for performance tracking.</td></tr>
</table>

V. CO-PO-PSO MAPPING(mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3	3											1			
CO2			3	3										2		
CO3		2	2												1	1
CO4	3				3											
CO5			2		2				2					1		

VI. Assessment Details (CIE & SEE)
General Rules: Refer Annexure section 1
Continuous Internal Evaluation (CIE): Refer Annexure section 1
Semester End Examination (SEE): Refer Annexure section 1

	VII. Learning Resources			

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Power BI Cookbook: Creating Business Intelligence Solutions of Analytical Data Models, Reports, and Dashboards	Brett Powell	Second edition 2018	Packt Publishing
2	Mastering Microsoft Power BI: Expert techniques for effective data analytics and business intelligence	Brett Powell	Third Edition 2020	Packt Publishing
3	Power BI 10-Day Pass: A Practical Guide to Building Enterprise Data Models	Paul Turley	First Edition 2019	Independently published

VII(b): Reference Books:

1	M is for (Data) Monkey: A Guide to the M Language in Excel Power Query	Ken Puls and Miguel Escobar	First Edition 2015	Holy Macro! Books
2	Analyzing Data with Power BI and Power Pivot for Excel	Alberto Ferrari and Marco Russo	Second Edition 2017	Microsoft Press

VII(c): Web links and Video Lectures (e-Resources):

- [Microsoft Power BI Official Website](https://powerbi.microsoft.com/)
- [Power BI Tips](https://powerbi.tips/)
- [Guy in a Cube](https://guyinacube.com/)
- [Power BI Blog](https://powerbi.microsoft.com/en-us/blog/)
- [Enterprise DNA](https://www.youtube.com/channel/UCiNm8KMJWggC4iRrxtnkovA)

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

Assignments, Quizzes and Seminar, Mini projects

Master of Computer Applications (MCA)

Semester:	IV	Course Type:		PRJ	
Course Title: Major Project work					
Course Code:	23MCAPR41		Credits:		18
Teaching Hours/Week (L:T:P:O)		0:0:0:@	Total Hours:		Lab sessions
CIE Marks:	200	SEE Marks:	200	Total Marks:	400
SEE Type:		Laboratory		Exam Hours:	3 Hrs

I. Course Objectives:

- Support independent learning.
- Guide to select and utilize adequate information from varied resources for maintaining ethics.
- Guide to organize the work in the appropriate manner and present
- information (acknowledging the sources) clearly.

Develop interactive, communication, organisation, time management, and presentation skills. Impart flexibility and adaptability.

- Inspire independent and team working
.• Expand intellectual capacity, credibility, judgement, intuition.
- Adhere to punctuality, setting and meeting deadlines.
- Instil responsibilities to oneself and others.
- Train students to present the topic of project work in a seminar without any fear, face audience confidently, enhance communication skill, involve in group discussion to present and exchange ideas

II. Project Work

Each student of the project batch shall involve in carrying out the project work jointly in constant consultation with internal guide, co-guide, and external guide and prepare the project report as per the norms avoiding plagiarism.

Follow the Software Development life cycle
Data Collection ,Planning
Design the Test cases
Validation and verification of attained results

Significance of parameters w.r.t scientific quantified data.		
Publish the project work in reputed Journal.		

III. Course outcomes:

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

CO1	Present the project and be able to defend it.
CO2	Make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.
CO3	Habituated to critical thinking and use problem solving skills.
CO4	Communicate effectively and to present ideas clearly and coherently in both the written and oral forms.
CO5	Work in a team to achieve common goal.
CO6	n their own, reflect on their learning and take appropriate actions to improve it.

IV.CO-PO-PSO MAPPING (mark H=3; M=2; L=1)																
PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2	2												2		
CO2	2	2											2			
CO3		2												2		
CO4			2												1	

V.Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 1
Assessment Details (both CIE and SEE) : Refer Annexure section 1
Semester End Examination (SEE): Refer Annexure section 1

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Master of Computer Applications (MCA)

Semester:	IV	Course Type:	SE		
Course Title: Technical Paper Writing with Seminar					
Course Code:	**23MCASE42**			**Credits:**	02
Teaching Hours/Week (L:T:P:O)		0:0:0:@	**Total Hours:**		Lab sessions
CIE Marks:	50	**SEE Marks:**	50	**Total Marks:**	100
SEE Type:		**Laboratory**		**Exam Hours:**	2Hrs

I. Course Objectives:

- Support independent learning.
- To understand the technical paper writing.
- Guide to select and utilize adequate information from varied Literatures & resources.
- To formulate the problem to be solved in effective way.
- To understand the different research methodologies and its usage in solving the problem at hand.
- Train students to present the technical paper topic in a seminar without any fear, face audience confidently, enhance communication skill, involve in group discussion to present and exchange ideas

II. Technical Paper writing & Seminar

Each student of the project batch shall write the research paper in the selected domain jointly in constant consultation with guide and prepare the technical paper as per the norms avoiding plagiarism.

Each Student should periodically present their findings and progress of the work in seminar.

III. Course outcomes:

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

CO1	Present the seminar on the technical paper domain/topic.
CO2	Make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the technical paper writing.

| CO3 | To formulate and write the technical paper in IEEE,APA format. | | | | | | | | | | | | | | | | |

IV.CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2	2												2		
CO2	2	2											2			
CO3		2												2		
CO4			2												1	

V.Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 1

Assessment Details (both CIE and SEE) : Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

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Master of Computer Applications (MCA)

Semester:	IV	Course Type:		SLC		
Course Title: BOS recommended Online NPTEL Courses						
Course Code:	**23MCAS4YY**			**Credits:**		02
Teaching Hours/Week (L:T:P:O)		0:0:0:0		**Total Hours:**		**Lab sessions**
CIE Marks:	50	**SEE Marks:**	50	**Total Marks:**		100
SEE Type:		**Theory**		**Exam Hours:**		3Hrs

I. Course Objectives:

- To provide high quality education to students.
- The courses offered through this platform reduce the gap among students by including everyone in the digitalization of education.

II. Teaching learning process

NPTEL Online BOS recommended Certification Courses, through an online portal, 8weeks online **courses**, typically on topics relevant to students in their domains or in interdisciplinary domains. Students can select from any of the 10 courses approved in the BOS meeting.

III. Course Content

As defined by Swayam NPTEL for the respective courses.

IV. Course outcomes:

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

CO1	Will understand and acquire knowledge in new domain of IT or in similar interdisciplinary domain.
CO2	Will be able to apply the knowledge in problem solving.
CO3	Will be able to do self learning of new domain specific topic.

IV.CO-PO-PSO MAPPING (mark H=3; M=2; L=1)																
PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2	2												2		
CO2	2	2											2			
CO3		2												2		
CO4			2												1	

V.Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 1

Assessment Details (both CIE and SEE) : Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

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Self Learning course list for PG MCA - 2024

SCHEME: 2023   **Release date: JUL-24**

Self-Learning course - 1 (NPTEL)		
Course Code	**Course Title**	**NPTEL Code**
23MCAS401	Introduction to Graph Algorithms	noc24-cs70
23MCAS402	Basics of Health Promotion and Education Intervention	noc24-ge44
23MCAS403	Ethics in Engineering Practice	noc24-mg131
23MCAS404	Distributed Systems	noc24-cs77
23MCAS405	Design and Analysis of Algorithms	noc24-cs79
23MCAS406	Big Data Computing	noc24-cs130
23MCAS407	Google Cloud Computing Foundations	noc24-cs131
23MCAS408	Data Base Management System	noc24-cs75
23MCAS409	Introduction To Machine Learning - IITKGP	noc24-cs81
23MCAS410	Computer Graphics	noc24-cs82

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05.9.8.2024.
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Academic Dean

Dr. BABU. N.V
Prof & Academic Dean
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CIE & SEE Evaluation strategy for PG- MCA Autonomous Scheme 2023 (Tentative)

Date: 28/03/2024

Note: Calcuation of components of CIE for final marks is modified as per regulations

S. #	Course Type /Credits	Total CIE marks	Min. Eligty.	Marks	Min. Eligty.	A. Unit test Nos.	A. Unit test Marks/Each	B. Formative Nos.	B. Formative Marks/Each	Tot. Theory marks (I)	Marks	Min. Eligty.	C. Weekly Each week	C. Weekly Tot. marks	D. Internal Test Nos.	D. Internal Test Marks/Each	D. Internal Test Total marks	Tot. marks (II)	Total CIE marks	Dur. In hrs.	Theory Max. cond. marks	Theory Max. considered marks	Theory min. pass %	Practical Max. cond. marks	Practical Max. considered marks	Practical min. pass %	Total SEE marks	Total Marks (CIE+SEE)	Passing Standard
1	BSC/PCC/PEC (3 or 4 Credit courses)	50	50%	50	50%	2	50	1	50	50 (avg. of A + B) reduced to 50	--	--	--	--	--	--	--	--	50 (I)	03	100	50	40%	--	--	--	50	100	50%
2	IPCC (4 Credit courses)	50	50%	50	50%	2	50	--	--	50 (avg. of 2)	50	50%	50	50 (Avg. of all)	1	50	50	50 (Avg. of C & D)	50 (Avg. of I & II)	03	100	50	40%	--	--	--	50	100	50%
3	PCCL (2 Credit courses)	50	50%	--	--	--	--	--	--	--	50	50%	50	50 (Avg. of all)	1	50	50	50 (Avg. of C & D)	50 (II)	03	--	--	--	100	50	40%	50	100	50%
4	AEC (2 credit course)	50	50%	50	50%	2	50	1	50	50 (avg. of A + B) reduced to 50	--	--	--	--	--	--	--	--	50 (I)	--	--	--	--	--	--	--	--	50	50%
5	MAC- (No credit course)	50	50%	50	50%	2	50	1	50	50 (avg. of A + B) reduced to 50	--	--	--	--	--	--	--	--	50	--	--	--	--	--	--	--	--	50	50%

Formative (Successive) Assessments: Assignments/quiz/ seminars/field survey and report presentation/course project/etc. based on the faculty & dept. planning

Practical Conduction: The conduction of each experiment/program per week should evaluate for 50 Marks and average of all shall be taken.

In case of Integrated course, minimum eligibility shall be attained as prescribed in both the theory and practical components.

Self Learning Courses (SLC) Courses, Internship, Mini project & Major Project: Rubrics & Methodology shall be defined seperately

S.Nagamani
HOD

Academic Dean
Dr. BABU. N.V
Prof & Academic Dean
SJB Institute of Technology
BGS Health & Educati...

05.3.4.224
Principal
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CIE and SEE guidelines based on course Type for MCA Autonomous Scheme 2023

- ➢ The CIE conduction coordination will be done by the office of Controller of Examination (COE).
- ➢ The SEE will be conducted by the office of Controller of Examination (COE).

Continuous Internal Evaluation (CIE)	Semester End Examination (SEE)	Final Passing requirement
1. BSC/PCC/ PEC– Theory Course (03 & 04 Credit courses)		
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.		
The minimum passing mark for the CIE is 50% of the maximum marks (25 marks out of 50). **Continuous Internal Evaluation:** CIE will be conducted by the department and it will have only 01 component: **I. Theory component.** Theory Component will consist of A. Internal Assessment Test B. Formative assessments	The minimum passing mark for SEE is 40% of the maximum marks (20 out of 50 marks). **Semester-End Examination:** Durationof 03 hours and total marks of 100. • The question paper will have ten questions. Each question is set for 20 marks.	The student is declared as a pass in the course if he/she secures a minimum of 50% (50 marks out of 100) in the sum total of the CIE and SEE taken together.

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A. Internal Assessment Test:

- There are 02 tests each of 50 marks conducted during 7th week & 14th week, respectively.
- The question paper will have four questions (max of 3 sub questions) from the notified syllabus. Each question is set for 25 marks.
- The student has to answer 2 full questions (one from 1st & 2nd questions and another from 3rd & 4th question).
- Internal Assessment Test question paper shall be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

B. Formative assessments:

- 01 formative assessment of 50 marks shall be conducted by the course coordinator before 10th week.
- The syllabus content for the formative assessment shall be defined by the course coordinator.
- The formative assessments include Assignments/ Quiz/ seminars/case study/field survey/ report presentation/ course project/etc.
- The assignment QP or Quiz QP shall indicate marks of each question and the relevant COs & RBT levels.
- The rubrics required for the other formal assessments shall be defined by the departments along with mapping of relevant COs & POs.

The final CIE marks will be 50:

- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
- The students have to answer 5 full questions, selecting one full question from each module.
- Marks scored shall be proportionally reduced to 50 marks.

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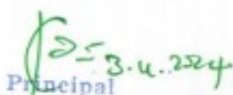—2|9— BGS Health & Education City
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Total Average of 2 tests and 1 formative assessment scaled down to 50 marks. **The documents of all the assessments shall be maintained meticulously.**		

2. IPCC – Integrated with Theory & Practical (04 credit courses)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.

The minimum passing mark for the CIE is 50% of the maximum marks (25 marks out of 50).
Minimum eligibility of 50% marks shall be attained separately in both the theory component and practical component.
 	
Continuous Internal Evaluation:
CIE will be conducted by the department and it will have 02 component:
 	
I. Theory Component.
II. Practical Component.
 	
I. Theory Component will consist of
  A. Internal Assessment Test
  B. Formative assessments - No formative assessment for IPCC.
	The minimum passing mark for SEE is 40% of the maximum marks (20 out of 50 marks).
	
	Semester-End Examination:
	Only theory SEE for duration of 03 hours and total marks of 100.
	
	• The question paper will have ten questions. Each question is set for 20 marks.
	• There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
		The student is declared as a pass in the course if he/she secures a minimum of 50% (50 marks out of 100) in the sum total of the CIE and SEE taken together.

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A. Internal Assessment Test: • There are 02 tests each of 50 marks conducted during 7th week & 14th week, respectively. • The question paper will have four questions (max of 3 sub questions) from the notified syllabus. Each question is set for 25 marks. • It is suggested to include questions on laboratory content in the Internal Assessment test Question papers. • The student have to answer 2 full questions (one from 1st & 2nd questions and another from 3rd & 4th question). • Internal Assessment Test question paper shall be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course. **B. Formative assessments:** No formative assessment in theory. **II. Practical Component:** **C.** Conduction of each experiment/program should be evaluated for 50 marks and average of all the experiments/programs shall be taken. (rubrics will be published by the lab conduction committee) **D.** One laboratory Internal Assessment test will be conducted during the 14th week for 50 marks. (rubrics will be published by the lab conduction committee) **The final CIE marks will be 50 =** Avg. {**I** [Avg. of (02 Internal assessment tests)] + **II** [Avg. of (C	• The laboratory content must be included in framing the theory question papers. • The students have to answer 5 full questions, selecting one full question from each module. • Marks scored shall be proportionally reduced to 50 marks. **No Practical SEE for Integrated Course.**

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& D)]} . The documents of all the assessments shall be maintained meticulously.		

3. PCCL: Laboratory course (02 credit course)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.

The minimum passing mark for the CIE is 50% of the maximum marks (25 marks out of 50).
Continuous Internal Evaluation:
CIE will be conducted by the department and it will have only 01 component:
 	
I. Theory Component. (Not required for Laboratory course)
II. Practical Component.
 	
II. Practical Component:
   C. Conduction of each experiment/program should be evaluated for 50 marks and average of all the experiments/program shall be taken (rubrics will be published by the lab conduction committee).
   D. One laboratory Internal Assessment test will be conducted for 50 marks (rubrics will be published by the lab conduction committee) during 14th week.
 	
The final CIE marks will be 50 = Avg. of (C & D)
	The minimum passing mark for SEE is 40% of the maximum marks (20 out of 50 marks).
	Semester-End Examination:
	Only laboratory SEE will be conducted jointly by the internal examiner and external examiner appointed by COE as per the scheduled timetable for duration of 03 hours.
	
	• The examination shall be conducted for 100 marks and shall be reduced to 50 marks proportionately.
	• All laboratory experiments/programs are to be included for practical examination.
	• Breakup of marks (Rubrics) and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners (OR) based on the course requirement evaluation rubrics
		The student is declared as a pass in the course if he/she secures a minimum of 50% (50 marks out of 100) in the sum total of the CIE and SEE taken together.

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	shall be decided jointly by examiners.	
The documents of all the assessments shall be maintained meticulously.	• Students can pick one question (experiment/program) from the questions lot prepared by the internal /external examiners jointly. • Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners. • General rubrics suggested for SEE: writeup-20%, Conduction procedure and results -60%, Viva-voce 20% of maximum marks. • Change of experiment is allowed only once and shall be assessed only for 85% of the maximum marks.	

4. AEC: Ability Enhancement Courses (2 credit courses)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.

| The minimum passing mark for the CIE is 50% of the maximum marks 50 marks out of 100).

Continuous Internal Evaluation:
CIE will be conducted by the department and it will have only 01 component:

I. Theory component.
Theory Component will consist of | The minimum passing mark for SEE is 40% of the maximum marks (20 out of 50 marks).

Semester-End Examination:
Theory SEE will be conducted by COE as per the scheduled timetable for duration of 2 hours and total marks of | The student is declared as a pass in the course if he/she secures a minimum of 50% (50 marks out of 100) in the sum total of the CIE and SEE taken |

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A. Internal Assessment Test	50.	together.
B. Formative assessments		

- **Internal Assessment Test:**	- Multiple Choice Question Paper
- There are 02 tests each of 50 marks conducted during 7th week & 14th week, respectively.	- Student should answer all the questions.
- The question paper will have Multiple Choice Questions (MCQ's)	
- The student have to answer all the questions.	
- Internal Assessment Test question paper shall be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.	

A. Formative assessments:

- 01 formative assessment of 50 marks shall be conducted by the Course Coordinator based on the dept. planning before 10th week.
- The formative assessments include Assignments/seminars/case study/field survey/ report presentation/course project/etc.
- The assignment QP shall indicate marks of each question and the relevant COs & RBT levels.
- The rubrics required for the other formal assessments shall be defined by the departments along with mapping of relevant COs & POs.

The final CIE marks will be 50 - Total Average of 2 tests and 1 formative assessment scaled down to 50 marks. **The documents of all the assessments shall be maintained meticulously.**

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5. MAC: (0 credit courses)

The weightage is only for Continuous Internal Evaluation (CIE) for 50 marks.

The minimum passing mark for the CIE is 50% of the maximum marks 50 marks out of 100).
 	
Continuous Internal Evaluation:
CIE will be conducted by the department and it will have only 01 component:
 	
II. Theory component.
  Theory Component will consist of
  A. Internal Assessment Test
  B. Formative assessments
 	
Internal Assessment Test:
• There are 02 tests each of 50 marks conducted during 7th week & 14th week, respectively.
• The question paper will have four questions (max of 3 sub questions) from the notified syllabus. Each question is set for 25 marks.
• The student have to answer 2 full questions (one from 1st & 2nd questions and another from 3rd & 4th question).
• The student have to answer all questions.
• Internal Assessment Test question paper shall be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course
	• No Semester End Examination.	The student is declared as a pass in the course if he/she secures a minimum of 50% (50 marks out of 100 scaled down to 50) in the CIE.

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B. Formative assessments: • 01 formative assessments of 50 marks shall be conducted by the faculty based on the dept. planning during random times. • The formative assessments include Assignments/seminars/case study/field survey/ report presentation/course project/etc. • The assignment QP shall indicate marks of each question and the relevant COs & RBT levels. • The rubrics required for the other formal assessments shall be defined by the departments along with mapping of relevant COs & POs. **The final CIE marks will be 50** - Total Average of 2 tests and 1 formative assessment scaled down to 50 marks. **The documents of all the assessments shall be maintained meticulously.**		

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ATAL Ranking:
Band Performer

Band of 151 to 300 in
Innovation Category