DAYANANDA SAGAR ACADEMY OF TECHNOLOGY & MANAGEMENT

CURRICULUM

Scheme and Syllabus I to II Semester

Outcome Based Education

(Academic Year 2023-2024)

Department of Master of Computer Applications

I & II Semester MCA

ABOUT THE INSTITUTE

Dayananda Sagar Academy of Technology and Management- DSATM was established in 2011 with 5 UG Programmes and 1 PG Program, the programmes are approved by All India Council for Technical Education (AICTE) New Delhi, Affiliated to Visvesvaraya Technological University (VTU), Belagavi and DSATM is an autonomous institute from 2023-2024.

The Dayananda Sagar Institutions is one of pioneer institutions in India and abroad with six decades of excellence in Academic and Research. The newer campuses were necessary to accommodate the growing need of the technology and innovation.

DSATM nurtures the students in academic, research, sports, cultural and extracurricular activities.

- Creating an academic environment to nurture and develop competent entrepreneurs, leaders and professionals who are socially sensitive and environmentally conscious.
- Integration of Outcome Based Education and cognitive teaching and learning strategies to enhance learning effectiveness.
- Developing necessary infrastructure to cater to the changing needs of Business and Society.
- Optimum utilization of the infrastructure and resources to achieve excellence in all areas of relevance.
- Adopting learning beyond curriculum through outbound activities and creative assignments.
- Imparting contemporary and emerging techno-managerial skills to keep pace with the changing global trends.
- Facilitating greater Industry-Institute Interaction for skill development and employability enhancement.
- Establishing systems and processes to facilitate research, innovation and entrepreneurship for holistic development of students.
- Implementation of Quality Assurance System in all Institutional processes.

VISION OF THE INSTITUTE

To strive at creating the institution a center of highest caliber of learning, so as to create an overall intellectual atmosphere with each deriving strength from the other to be the best of engineers, scientists with management & design skills.

MISSION OF THE INSTITUTE

- To serve its region, state, the nation and globally by preparing students to make meaningful contributions in an increasing complex global society challenges.
- To encourage, reflection on and evaluation of emerging needs and priorities with state-of-the-art infrastructure at institution.
- To support research and services establishing enhancements in technical, economic, human and cultural development.
- To establish interdisciplinary center of excellence, supporting/ promoting student's implementation.
- To increase the number of Doctorate holders to promote research culture on campus.
- To establish IIPC, IPR, EDC, innovation cells with functional MOU's supporting student's quality growth.

QUALITY POLICY

Dayananda Sagar Academy of Technology and Management aims at achieving academic excellence through continuous improvement in all spheres of Technical and Management education. In pursuit of excellence cutting – edge and contemporary skills are imparted to the utmost satisfaction of the students and the concerned stakeholders.

ABOUT THE DEPARTMENT

The MCA program at Dayananda Sagar Academy of Technology was started in the year 2021 with an intake of 60. Subsequently in the year 2023, the intake was increased to 120.The duration of the MCA program is 2 years. The department believes that Innovative Teaching-Learning methods coupled with problem-solving using modern tools help students to enhance their skills & enable them to handle the challenges faced in their professional lives. The department provides quality education with high standards to achieve academic excellence thereby achieving the career goals of the students. Various workshops/Technical Talks/Guest Lectures are organized through the department club "Xcurrate". Our students have completed MOOC's from various online platforms that has benefitted them in taking industrial internships. Our students are doing extremely well both in academics and extracurricular activities. The department offers various electives in cutting-edge technologies so that students are industry-ready.

The department encourages faculties and students to participate in National/International conferences to exhibit their ideas in the form of presentations and also publications in peer-reviewed Journals. The department has dedicated & committed faculty members supported by technical & administrative staff. The teaching faculties of the department are highly committed and give their best to the students by incorporating an innovative teaching learning process. The faculties are actively involved in research. Faculties publish their research work in various reputed International peer-reviewed journals. The students of MCA are placed in reputed companies such as Virusta, TCS, Capgemini, Cognizant, Tata Elxsi, Cognizant, Newton School and many more.

VISION OF THE DEPARTMENT

Nurture Continuous Learning through research and innovations in the field of Computer Science, Technology and Applications, to build competent professionals

MISSION OF THE DEPARTMENT

- Create a learning environment to motivate students to build strong technology skills.
- Promote value based ethical practices in all facets of learning.
- Instill Entrepreneurial collaborative thinking through structured interventions and industry participation.

PROGRAM EDUCATION OBJECTIVES (PEO'S):

PEO1: Analyse real life problems, design computing systems appropriate to its solutions that are technically sound, economically feasible and socially acceptable.

PEO2: Exhibit professionalism, ethical attitude, communication skills, team work in their profession and adapt to current trends by engaging in lifelong learning.

PEO3: Demonstrate Leadership and Entrepreneurship Skills by incorporating organizational goals.

PROGRAM OUTCOMES (PO's)

MCA Graduates will be able to:

1. Foundation Knowledge: Apply knowledge of mathematics, programming logic and coding fundamentals for solution architecture and problem solving.
2. Problem Analysis: Identify, review, formulate and analyse problems for primarily focussing on customer requirements using critical thinking frameworks.
3. Development of Solutions: Design, develop and investigate problems with as an innovative approach for solutions incorporating ESG/SDG goals.
4. Modern Tool Usage: Select, adapt and apply modern computational tools such as development of algorithms with an understanding of the limitations including human biases.
5. Individual and Teamwork: Function and communicate effectively as an individual or a team leader in diverse and multidisciplinary groups. Use methodologies such as agile.
6. Project Management and Finance: Use the principles of project management such as scheduling, work breakdown structure and be conversant with the principles of Finance for profitable project management.
7. Ethics: Commit to professional ethics in managing software projects with financial aspects. Learn to use new technologies for cyber security and insulate customers from malware
8. Life-long learning: Change management skills and the ability to learn, keep up with contemporary technologies and ways of working.

PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO 1: The graduates of the Program will have skills to develop, deploy and maintain applications for desktop, web, mobile, cloud and cross platforms using modern tools and technologies.

PSO 2: The graduates of the program analyze the societal needs to provide novel solutions through technological based research.

PROPOSED PG CREDIT STRUCTURE IN ALIGNMENT WITH VTU

Sl.No	Semester	No. of Credits
1	1st Semester	23
2	2nd Semester	24
3	3rd Semester	27
4	4th Semester	26
	Total	**100**

Scheme of Teaching and Examinations – 2023
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from 2023-24)

1st SEMESTER: MCA

Sl.No	Course Code	Course Title	Course Category	BOS/ TD	Teaching Hours/Week					Credits	Examination			
					Lecture	Tutorial	Practical	Project	Total		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
					L	T	P	S						
1	23MCA11	Mathematical Foundation for Computer Applications	BSC	MAT	3	2	0	0	5	4	3	50	50	100
2	23MCA12	Operating Systems	PCC	MCA	2	2	0	0	4	3	3	50	50	100
3	23MCA13	Data Structures	PCC	MCA	3	0	0	0	3	3	3	50	50	100
4	23MCA14	Object Oriented Programming UsingJava	PCC	MCA	3	0	0	0	3	3	3	50	50	100
5	23MCA15	Database Management System	IPCC	MCA	3	0	2	0	5	4	3	50	50	100
6	23RMDT16	Research Methodology and Design Thinking	MCC	MCA	2	0	0	0	2	2	3	50	50	100
7	23MCAL17	Data Structures Lab	PCCL	MCA	0	0	4	0	4	2	3	50	50	100
8	23MCAL18	Object Oriented Programming Using Java Programming Laboratory	PCCL	MCA	0	0	4	0	4	2	3	50	50	100
9	23MCA19*	Basics of Programming & CO	NCC	MCA	0	0	0	0	0	-	-	100	-	100
				Total	**18**	**06**	**10**	**0**	**34**	**23**	**24**	**500**	**400**	**900**

Scheme of Teaching and Examinations – 2023
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from 2023-24)

2nd SEMESTER: MCA

Sl.No	Course Code	Course Title	Course Category	BOS/ TD	Teaching Hours/Week					Credits	Examination			
					Lecture	Tutorial	Practical	Project	Total		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
					L	T	P	S						
1	23MCA21	Software Engineering	PCC	MCA	3	0	0	0	3	3	3	50	50	100
2	23MCA22	Python programming for Data Science	PCC	MCA	3	0	0	0	3	3	3	50	50	100
3	23MCA23	Design and Analysis of Algorithms	IPCC	MCA	3	0	2	0	5	4	3	50	50	100
4	23MCA24	Web Technologies	IPCC	MCA	3	0	2	0	5	4	3	50	50	100
5	23MCA25X	Professional Elective-1	PEC1	MCA	2	2	0	0	4	3	3	50	50	100
6	23MCA26X	Professional Elective-2	PEC2	MCA	2	2	0	0	4	3	3	50	50	100
7	23MCAL27	Data Analytics Using Python Lab	PCCL	MCA	0	0	4	0	4	2	3	50	50	100
8	23MCAL28	Cloud Computing Lab	PCCL	MCA	0	0	4	0	4	2	3	50	50	100
				Total	**16**	**04**	**12**	**0**	**32**	**24**	**24**	**400**	**400**	**800**

1st SEMESTER: MCA

Course Category	BOS	TD	Teaching Hours/Week					Credits
			Lecture	Tutorial	Practical	Project	Total	
			L	T	P	S	(Hrs/week)	
BSC	MAT	MAT	3	2	0	0	5	4
PCC	MCA	MCA	3	0	0	0	3	3
PCC	MCA	MCA	3	0	0	0	3	3
PCC	MCA	MCA	3	0	0	0	3	3
IPCC	MCA	MCA	3	0	2	0	5	4
MCC	MCA	MCA	2	0	0	0	2	2
PCCL	MCA	MCA	0	0	4	0	4	2
PCCL	MCA	MCA	0	0	4	0	4	2
NCC	MCA	MCA	2	0	0	0	2	PP
							Total	23

2nd SEMESTER: MCA

Course Category	BOS	TD	Teaching Hours/Week					Credits
			Lecture	Tutorial	Practical	Project	Total	
			L	T	P	S	(Hrs/week)	
PCC	MCA	MCA	3	0	0	0	3	3
PCC	MCA	MCA	3	0	0	0	3	3
IPCC	MCA	MCA	3	0	2	0	5	4
IPCC	MCA	MCA	3	0	2	0	5	4
PEC1	MCA	MCA	2	2	0	0	4	3
PEC2	MCA	MCA	2	2	0	0	4	3
PCCL	MCA	MCA	0	0	4	0	4	2
PCCL	MCA	MCA	0	0	4	0	4	2
							Total	24

Percentage of Mapping– Theory & Practical - Scheme & Syllabus- 1st semester

Sl. No	Course Category		
		Theory	**Practical**
1	BSC	100%	--
2	PCC	100%	--
3	PCC	100%	--
4	PCC	100%	--
5	IPCC	60%	40%
6	PCCL	--	100%
7	PCCL	--	100%
8	NCC	--	----
	Total Percentage	92%	80%

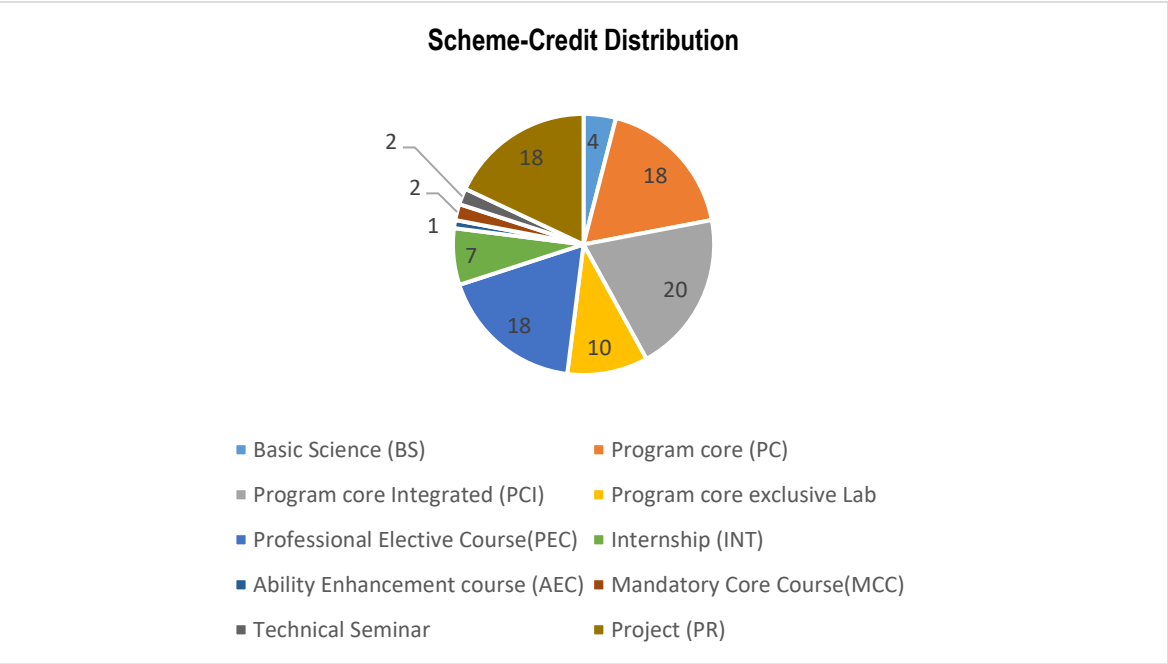
Percentage of Mapping– Theory & Practical - Scheme & Syllabus- 2nd semester

Sl. No	Course Category		
		Theory	**Practical**
1	PCC	100%	--
2	PCC	100%	-
3	IPCC	60%	40%
4	IPCC	60%	40%
5	PEC1	100%	--
6	PEC2	100%	
7	PCCL	--	100%
8	PCCL	--	100%
	Total Percentage	87%	70%

Scheme Distribution

Department of Master of Computer Applications

Course Component	Credits	% of Credits
Basic Science (BS)	4	4%
Program core (PC)	18	18%
Program core Integrated (PCI)	20	20%
Program core exclusive Lab	10	10%
Professional Elective Course(PEC)	18	18%
Internship (INT)	07	7%
Ability Enhancement Course (AEC)	01	1%
Mandatory Core Course(MCC)	02	2%
Technical Seminar	02	2%
Project (PR)	18	18%
Total	**100**	**100%**


Scheme-Credit Distribution
4
18
20
10
18
7
1
2
2
18
Basic Science (BS)
Program core (PC)
Program core Integrated (PCI)
Program core exclusive Lab
Professional Elective Course(PEC)
Internship (INT)
Ability Enhancement course (AEC)
Mandatory Core Course(MCC)
Technical Seminar
Project (PR)

SEMESTER-WISE CREDIT BREAKDOWN FOR MCA DEGREE CURRICULUM

BATCH 2023-2025

Course Category	Semester				Total Credits
	1st	2nd	3rd	4th	
Basic Sciences (BSC)	4	-	-	-	04
Professional Core Courses (PCC)	9	6	3	-	18
Integrated Professional Core Course (IPCC)	4	8	8	-	20
Professional Elective Course (PEC)	-	6	6	6	18
Ability Enhancement Course AEC)	-	-	1	-	01
Program Core exclusive labs	4	4	2	-	10
Internship (INT)	-	-	7	-	07
Technical Seminar	-	-	-	2	02
Mini Project / Project Work PW)	-	-	-	18	18
Mandatory Core Course(MCC)	2	-	-	-	02
Non-credit Course (NCC)	0	-	-	-	-
Total Credits	23	24	27	26	100

IPCC: Integrated Professional Core Course,

PCC: Professional Core Course

PBL: Project Based Learning

AEC: Ability Enhancement Course,

NCMC: Non-Credit Mandatory Course

MCC: Mandatory Core Course

L: Lecture,

T: Tutorial,

P: Practical

S= SDA: Skill Development Activity,

CIE: Continuous Internal Evaluation,

SEE: Semester End Evaluation.

Integrated Professional Core Course (IPCC): Refers to Integrated Professional Core Course Theory Integrated with practical's of the same course. Credit for IPCC can be 04 and its Teaching Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper.

1st SEMESTER

BASIC SCIENCE COURSE (BSC)

PCC Course - Professional Core Course

Teaching Hours/Week (L: T:P: S)	3:0:0:0
Total Hours of Pedagogy	40 hours
Credits:	03
Each Module	8 Hrs
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Theory

3 Credit Course – Professional Core Course (PCC)

Assessment Details (both CIE and SEE)

- 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 (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).
- A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Internal Assessment Test (IAT):

- For the Internal Assessment Test component of CIE, there are 25 marks and for Assignment component of the CIE, there are 25 marks. Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 25 marks
  - The first test will be administered after 40-50% of the syllabus has been covered, and
  - The second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.
- Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels

Semester-End Examination:

Theory SEE will be conducted as per the scheduled timetable (duration 03 hours).

- 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 students have to answer 5 full questions, selecting one full question from each module.
- Marks scored shall be proportionally reduced to 50 marks.

Continuous and Comprehensive Assessment (CCA):

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **10 Marks**.

- CCA1 after 4th week and CCA2 after 9th week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
    - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
    - The evaluation of review 1 after 6th weeks of semester and review 2 after 12th week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **25 Marks**

Possible Continuous and Comprehensive Assessment (CCA):

- Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom,
- The assessment of these techniques shall be in rubrics.
- The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

Professional Core Course (PCC) – 3 Credit course – Theory

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
Total CIE Theory				**50**	----	----	**25**	
	Theory	Internal Assessment Test (IAT) - II	Module – 1 to 2.5	50	(50+50) / 2	**25**	15	Average of Two Internal test each of 50 Marks scale down the marks to 25
		Internal Assessment Test (IAT) - II	Module – 2.5 to 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives / Activity Based learning	Considering all the Modules	50	(50+50) / 2	**25**	15	Two CCA methods to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives / Activity Based learning		50				
	Total CIE Theory					**50**	30	Total Marks of IAT and CCA is 50

SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
			CIE + SEE	100	----	----	50	

Dayananda Sagar Academy of Technology & Management
(Autonomous Institute under VTU)

Semester	:	I				
Course Title	:	Mathematical Foundation for Computer Application				
Course Code	:	23MCA11				
Course Type (Theory/ Practical/ Integrated)	:	Theory				
Category	:	BSC				
Stream	:	MCA		CIE	:	50 Marks
Credits (L:T:P:PJ)	:	3::0:0		SEE	:	50 Marks
Total Hours	:	50 Hrs		SEE Duration	:	3 Hours

Course Learning Objectives: Students will be taught

Sl.No	Course Objectives
1	Acquire basic knowledge of Discrete Mathematical concepts used in computer science
2	Use concepts of matrices, mathematical logic, sets, relations, probability, statistics and graph theory in solving problems
3	Analyse problems using concepts of mathematical logic, statistics and graph theory
4	Analysis of various real time problems using the skills acquired

Teaching-Learning Process
Pedagogy (General Instructions):
These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) 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 students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple 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 improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.

DSATM

Scheme of Teaching and Examinations for MCA programme -2023-24
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2023-24)

COURSE SYLLABUS

Module No.	Contents of the Module	Hours
1	SETS AND RELATIONS: Sets, Operations on sets, Cardinality of sets, inclusion-exclusion principle, pigeonhole Principle, Relations and Their Properties, Representation of Relations, Composition of Relations, Equivalence Relations, Partial Orderings, Functions-One-One and Onto, Composition of functions, Inverse functions.	8
Pedagogy	Chalk and board, group discussion, ppt, videos	
2	MATRICES AND MATHEMATICAL LOGIC: Matrices, solution of system of equations, consistency, Gauss elimination method, Gauss Seidel iterative method, Propositional Logic, Applications of Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs.	8
Pedagogy	Chalk and board, group discussion, ppt, videos	
3	PROBABILITY THEORY: Probability of an event, probability associated with set theory, addition law, conditional probability, multiplication law, Bayes' theorem.	8
Pedagogy	Chalk and board, group discussion, ppt, videos	
4	BUSINESS STATISTICS: Classification of data, Measures of Central Tendency, Measures of Dispersion, Correlation and Regression Analysis, Index numbers, Time series.	8
Pedagogy	Chalk and board, group discussion, ppt, videos	
5	GRAPH THEORY: Definitions and examples, Subgraphs, Complements, Graph Isomorphism, Vertex Degree, Euler Trails and Circuits, Planar Graphs, Hamilton Paths and Cycles, Graph Colouring.	8
Pedagogy	Chalk and board, group discussion, ppt, videos	

Reference Books

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1	Kenneth H Rosen, "Discrete Mathematics and its Applications", McGraw Hill publications, 7th edition. (Chapters 2.1,2.2,2.5, 2.6,6.2,8.5,8.6,10.1 to 10.8)

2	Wolpole Myers Ye “Probability and Statistics for engineers and Scientist” Pearson Education, 8th edition.
3	Richard A Johnson and C.B Gupta “Probability and statistics for engineers” Pearson Education.
4	J.K Sharma “Discrete Mathematics”, Mac Millan Publishers India, 3rd edition,2011
5	S.C.Gupta and V.K.Kapoor “Fundamentals of Mathematical Statistics”, Chand Publishers,12th edition,2020.
6	David C Lay, Linear algebra and its applications, 4th Edition, Pearson Publications, 2018
7	Introduction to graph theory, Douglas B.West, Prentice Hall India Learning Private Limited, 2nd Edition, 2002.

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Understand the basic concepts of discrete mathematics	Understand	L2
CO2	Apply the concepts of discrete mathematics used in computer science	Apply	L3
CO3	Analyse data using various concepts of discrete mathematics	Analyse	L4
CO4	Investigate problems arising in real life using the overall knowledge acquired	Evaluate	L5

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	2	-	-	-	-	1	1	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Weblinks and Video Lectures (e-Resources)	
1	https://youtu.be/xlUFkMKSB3Y; https://youtu.be/dpj0dg8gvHQ; https://youtu.be/AtA3mmWyV0k
2	https://youtu.be/0uTE24o3q-o;https://youtu.be/FUIlqy5BITc;https://youtu.be/RBgSoft-HGs; https://youtu.be/MJkXMrQVglU
3	https://youtu.be/r1sLCDA-kNY; https://youtu.be/9wCnvr7Xw4E
4	https://youtu.be/2BK12ntx0og;

5	https://youtu.be/HkNdNpKUByM; https://youtu.be/y4RAYQjKb5Y

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			Practical
	Continuous Assessment Tests		Alternative Assessment Tool (AAT)	Test
	Test-1	Test-2		
	25 Marks	25 Marks	25 Marks	25 Marks
Remember	-	-	10	-
Understand	5	5	-	-
Apply	15	15	-	-
Analyse	5	5	-	-
Evaluate	-	-	15	-
Create	-	-	-	-

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1				Test-2			
	Module-1	Module-2	Module-3		Module-4	Module-5		
CO1	5	-	-	-	-	5	10	20%
CO2	5	5	5	5	5	5	30	60%
CO3	-	5	-	-	5		10	20%
CO4	-	-	-		-	-	-	-
CO5	-	-	-		-	-	-	-
CO6	-	-	-		-	-	-	-
Total	10	10	10		10	10	-	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
Remember	-
Understand	10
Apply	30
Analyse	10
Evaluate	-
Create	-

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	5	-	-	-	5	10	20%
CO2	5	5	10	5	5	30	60%
CO3	-	5	-	5	-	10	20%
CO4	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-
Total	10	10	10	10	10	-	100%

PROFESSIONAL CORE COURSE (PCC)

PCC Course - Professional Core Course

Teaching Hours/Week (L: T:P: S)	3:0:0:0
Total Hours of Pedagogy	40 hours
Credits:	03
Each Module	8 Hrs
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Theory

3 Credit Course – Professional Core Course (PCC)

Assessment Details (both CIE and SEE)

- 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 (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).
- A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Internal Assessment Test (IAT):

- For the Internal Assessment Test component of CIE, there are 25 marks and for Assignment component of the CIE, there are 25 marks. Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 25 marks
  - The first test will be administered after 40-50% of the syllabus has been covered, and
  - The second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.
- Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels

Semester-End Examination:

Theory SEE will be conducted as per the scheduled timetable (duration 03 hours).

- 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 students have to answer 5 full questions, selecting one full question from each module.
- Marks scored shall be proportionally reduced to 50 marks.

Continuous and Comprehensive Assessment (CCA):

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **10 Marks**.

- CCA1 after 4th week and CCA2 after 9th week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
    - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
    - The evaluation of review 1 after 6th weeks of semester and review 2 after 12th week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **25 Marks**

Possible Continuous and Comprehensive Assessment (CCA):

- Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom,
- The assessment of these techniques shall be in rubrics.
- The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

Professional Core Course (PCC) – 3 Credit course – Theory

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
Total CIE Theory				**50**	----	----	**25**	
	Theory	Internal Assessment Test (IAT) - II	Module – 1 to 2.5	50	(50+50) / 2	**25**	15	Average of Two Internal test each of 50 Marks scale down the marks to 25
		Internal Assessment Test (IAT) - II	Module – 2.5 to 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives / Activity Based learning	Considering all the Modules	50	(50+50) / 2	**25**	15	Two CCA methods to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives / Activity Based learning		50				
	Total CIE Theory					**50**	30	Total Marks of IAT and CCA is 50

SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
			CIE + SEE	100	----	----	50	

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**I**				
Course Title	:	**OPERATING SYSTEMS**				
Course Code	:	**23MCA12**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PCC**				
Stream	:	**MCA**		**CIE**	:	**50 Marks**
Credits (L: T:P:PJ)	:	**2:1:0:0**		**SEE**	:	**50 Marks**
Total Hours	:	**40**		**SEE Duration**	:	**3 Hours**

Course Learning Objectives: Students will be taught

Sl.No	Course Objectives
1	Know the Basic Components of Operating System.
2	Comprehend how an operating System Virtualizes CPU and Memory.
3	Discuss Various Scheduling and Paging Techniques.
4	Understand the basics of shell programming.
5	Implementing the programming aspects using Unix operating System.

Teaching-Learning Process

Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) 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 students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple 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 improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.

DSATM

Scheme of Teaching and Examinations for MCA Programme -2023-24
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2023-24)

COURSE SYLLABUS

Module No.	Contents of the Module	Hours
1	OPERATING SYSTEMS OVERVIEW: Introduction, operating system operations, Computer System architecture, Operating System structure, Operating System operations process management, memory management, storage management, protection and security, distributed systems. OPERATING SYSTEMS STRUCTURES: Operating system services and systems calls, system programs, operating system structure, operating systems generations.	8
Pedagogy	Assignment	
2	PROCESS MANAGEMENT: Process concepts, process state, process control block, scheduling queues, process scheduling, multithreaded programming. CONCURRENCY AND SYNCHRONIZATION: Process synchronization, critical section problem, Peterson's solution, synchronization hardware, semaphores, classic problems of synchronization, readers and writers problem, dining philosophers problem, monitors.	8
Pedagogy	Problem Solving	
3	DEADLOCKS: System model, deadlock characterization, deadlock prevention, detection and avoidance, recovery from deadlock banker's algorithm. MEMORY MANAGEMENT: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation, virtual memory, demand paging, page-replacement algorithms. FILE SYSTEM: Concept of a file, access methods, directory structure, file system mounting, file sharing, protection.	8
Pedagogy	Demonstration	
4	Basic File Attributes: Is options, File Ownership, File Permissions, chmod, Directory Permissions, Changing the File Ownership More File Attributes: File Systems and Inodes, Hard Links, Symbolic Links, The Directory, umask, Modification and Access Times, find. The Process: Process Basics, ps: Process Status, System Processes, Mechanism of Process Creation, Internal and External Commands, Running Jobs in Background, Killing Processes with Signals, Job Control, at and batch.	8
Pedagogy	Demonstration	

5	Essential Shell Programming: Shell Variables, Environment Variables, Shell Scripts, read, Using Command Line Arguments, exit and exit status of command, The Logical Operators, The if Conditional, using test and [] to Evaluate Expression, The case Conditional, expr, while: looping, for: looping with a list, set and shift, trap, Debugging Shell Scripts with set – x. WK and Advanced Shell Programming Simple AWK Filtering, Splitting a Line into Fields, printf, the Logical and Relational Operators, Number Processing, Variables, The –f option, BEGIN and END positional Parameters, getline, Built-invariables, Arrays, Functions, Interface with the Shell, Control Flow. The sh command, export Command, Conditional Parameter Substitution, Merging Streams, Shell Functions, eval, Exec Statement and Examples.	**8**
Pedagogy	Lab practice Programs	

Reference Books	
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)	
1	Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: Operating Systems Principles, 8th Edition, Wiley – India.
2	Sumitabha Das: UNIX Concepts and Applications, 4th Edition, Tata McGraw Hill, 2006.
3	D M Dhamdhere: Operating Systems – A Concept Based Approach, 2nd Edition, Tata McGraw – Hill, 2002.
4	P C P Bhatt: Operating Systems, 2nd edition, PHI, 2006.
5	UNIX: The Complete Reference: Kenneth Roson et al, Osborne/McGraw Hill, 2000.

Weblinks and Video Lectures (e-Resources)	
1	https://www.mbit.edu.in/wp- content/uploads/2020/05/Operating_System_Concepts_8th_EditionA4.pdf
2	https://www.coursera.org/courses?query=operating%20system
3	https://onlinecourses.nptel.ac.in/noc20_cs04/preview

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Understand the Basics of Operating Systems, its Operations and its components.	L2	Understand
CO2	Apply the Solutions to Deadlock and memory management Techniques ,Conclude with the Results	L3	Apply
CO3	Analyze the Design issues and optimizing resource allocation, and maximizing throughput.	L4	Analyse
CO4	Implement the working of basic commands of Unix environment including file processing.	L5	Evaluate
CO5	Create the usage of different shell commands, variable and AWK filtering to the given problem.	L5	Create

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	3	-	-	-	-	-	-	-	-	-
CO2	-	-	-	3	-	-	3	-	-	-	-	-	3	-
CO3	3	-	3	-	-	-	-	-	-	-	-	-	-	3
CO4	-	-	3	-	3	-	-	-	-	-	-	-	-	-
CO5	-	2	-	3	-	-	-	-	-	3	-	-	-	-

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			
	Continuous Assessment Tests			Alternative Assessment Tool (AAT)
	Test-1	Test-2	Test-3	
	50 Marks	50 Marks	50 Marks	40

Remember	10	10	20	-
Understand	10	-	-	-
Apply	20	20	20	-
Analyse	10	20	10	-
Evaluate	-	-	-	20
Create	-	-	-	20

CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage
	Test-1			Test-2			
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	1	1	1	1	1	10	20%
CO2	2	2	2	2	2	40	40%
CO3	2	2	2	2	2	40	40%
CO4	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-
Total	-	-	-	-	-	50	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	5
Understand	5
Apply	20

Analyse	**30**
Evaluate	**-**
Create	**-**

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	5	10	10	10	5	40	20%
CO2	20	20	20	20	20	80	40%
CO3	20	20	20	20	20	80	40%
CO4	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-
Total	25	40	50	50	45	200	100%

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**I**				
Course Title	:	**Data Structures**				
Course Code	:	**23MCA13**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PCC**				
Stream	:	**MCA**		**CIE**	:	**50 Marks**
Credits (L: T:P:PJ)	:	**3:0:0:0**		**SEE**	:	**50 Marks**
Total Hours	:	**40 Hrs**		**SEE Duration**	:	**3 Hours**

Course Learning Objectives: Students will be taught

Sl.No	Course Objectives
1	Understand the basic concepts of various Data Structures Techniques
2	Learn the various algorithms to solve real-world problems
3	Gain Knowledge of various Data structures like stacks, Queues, Linked Lists, Trees, and Graphs
4	To impart the various Sorting, Searching ,and evaluation Algorithms
5	To know the various applications of the Data Structures

Teaching-Learning Process

Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) 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 students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple 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 improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.

DSATM

Scheme of Teaching and Examinations for MCA Programme -2023-24
Outcome Based Education and Choice Based Credit System (CBCS)
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COURSE SYLLABUS

Module No.	Contents of the Module	Hours
1	Primitive and Non-Primitive, Linear and Nonlinear; Dta structure Operations, Arrays: Linear Arrays, Representation of Linear Arrays, **Recursion**: Factorial, GCD, Fibonacci Sequence, Tower of Hanoi.	7
Pedagogy	**Assignment**	
2	**Stack:** Definition, Representation, Operations and Applications: Types of expressions, Infix to postfix conversion, evaluation of postfix expression, infix to prefix, postfix to infix conversion. **Queue:** Definition, Representation, Queue Variants: Circular Queue, Priority Queue, Double Ended Queue; Applications of Queues	10
Pedagogy	**Mini Project**	
3	Linked List : Limitations of array implementation, Memory Management: Static (Stack) and Dynamic (Heap) Memory Allocation, Memory management functions. Definition, Representation, Operations: getnode() and Freenode() operations, Types: Singly Linked List. Linked list as a data structure, Inserting and removing nodes from a list, Linked implementations of stacks, Header nodes, Array implementation of lists.	7
Pedagogy	**Hands-on Session**	
4	Trees: Terminology, Binary Trees, Properties of Binary trees, Arrays and Linked representation of Binary trees, Binary Tree traversal – Inorder, Postorder, Preorder Graphs: Definitions, Terminologies, Matrix and Adjacency List representation of Graphs, Elementary Graph Operations, Traversal Methods - BFS, DFS	8
Pedagogy	**Lab Assessment**	
5	**Sorting** : Bubble sort ,Insertion sort, Selection sort, Merge Sort , Radix sort, **Searching** : Linear Search ,Binary Search, Hashing: Hash table Organization, Hashing Functions, Static and Dynamic Hashing.	8
Pedagogy	**Hands-on Session**	

Reference Books
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1	Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures in C, 2nd Ed, Universities Press, 2014.
2	Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed, McGraw Hill, 2014.
3	Gilberg & Forouzan, Data Structures: A Pseudo-code approach with C, 2nd Ed, Cengage Learning,2014.
4	Reema Thareja, Data Structures using C, 3rd Ed, Oxford press, 2012.
5	Jean-Paul Tremblay & Paul G. Sorenson, An Introduction to Data Structures with Applications, 2nd Ed, McGraw Hill, 2013

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	Level Indicator
CO1	**Understand** different data structures and its operations using C programming.	Understand	L1,L2
CO2	**Apply** appropriate data structures for solving computing problems.	Apply	L3
CO3	**Analyze** the performance of Stack, Queue, Linked Lists, Trees, Hashing, Searching, and Sorting techniques	Analyze	L4
CO4	**Evaluate** the efficiency of algorithms for the given problem	Evaluate	L5
CO5	**Implement** the applications of data structures in a high-level language such as C/C++	Implement	L6

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	2	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	2	2
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	2	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	2	2	-	-	-	-	-	2	-	-	-

Weblinks and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=BBpAmxUNQo
2	https://www.youtube.com/watch?v=8hly31xKliO
3	https://archive.nptel.ac.in/courses/106/106/106106127/
4	https://archive.nptel.ac.in/courses/106/106/106106131/

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			
	Continuous Assessment Tests			Alternative Assessment Tool (AAT)
	Test-1	Test-2	Test - 3	
	50 Marks	50 Marks	50 Marks	40 Marks
Remember ¤	-	-	-	-
Understand	10	10	10	-
Apply	20	20	20	-
Analyse	20	20	20	-
Evaluate	-	-	-	20
Create	-	-	-	20

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1		Test-2		Test - 3			
	Module-1	Module-2		Module-3	Module-4	Module-5		
CO1	1	1	1	1	1	1	10	20%
CO2	2	2	2	2	2	2	20	40%
CO3	2	2	2	2	2	2	20	40%
CO4	-	-		-	-	-	-	-

CO5	-	-	-	-	-	-	-
Total	-	-	-	-	-	50	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (100 Marks)
Remember	-
Understand	20
Apply	40
Analyse	40
Evaluate	-
Create	-

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	10	5	10	5	10	40	20%
CO2	20	20	20	20	20	80	40%
CO3	20	20	20	20	20	80	40%
CO4	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-
Total	-	-	-	-	-	200	100%

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**I**				
Course Title	:	**Object Oriented Programming using Java**				
Course Code	:	**23MCA14**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PCC**				
Stream	:	**MCA**		**CIE**	:	**50 Marks**
Credits (L: T:P:PJ)	:	**3:0:0:0**		**SEE**	:	**50 Marks**
Total Hours	:	**40 Hrs**		**SEE Duration**	:	**3 Hours**

Course Learning Objectives: Students will be taught

Sl.No	Course Objectives
1	Understand the basic object-oriented programming concepts and apply them in problem-solving.
2	Learn object-oriented programming concepts to solve real-world problems.
3	Gain Familiarity with the concepts of class and objects and its access control to real-world entities.
4	Gain knowledge on behaviour of programs involving the basic programming constructs like control structures, constructors, string handling and garbage collection.
5	Learn the concepts of Method overloading and constructors to develop application programs.

Teaching-Learning Process

Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) 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 students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple 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 improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.

DSATM

Scheme of Teaching and Examinations for MCA Programme -2023-24
Outcome Based Education and Choice Based Credit System (CBCS)
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COURSE SYLLABUS

Module No.	Contents of the Module	Hours
1	**OOP concepts:** Classes and objects, data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, procedural and object oriented programming paradigm. Java programming: History of java, comments, data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow statements, jump statements, simple java stand alone programs, arrays, console input and output, formatting output, constructors ,methods, parameter passing, static fields and methods, access control, this reference, overloading methods and constructors, recursion, garbage collection, exploring string class.	10
Pedagogy	**Chalk and board, Active Learning, Quiz**	
2	**INHERITANCE:** Inheritance hierarchies, super and subclasses, member access rules, super keyword, preventing inheritance: final classes and methods, the object class and its methods; **Polymorphism:** Dynamic binding, method overriding, abstract classes and methods	7
Pedagogy	**Chalk and board, Power Point Presentation , Algorithmic challenges**	
3	**INTERFACES:** Interfaces VS Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface; **Packages:** Java API Packages, The import Statement, Using System Packages, Naming Conventions, CLASSPATH Settings, Creating and using Packages, Importing from other Packages, Access protection in Packages, Example for package.	8
Pedagogy	**Chalk and board, Power Point Presentation , Hunt the code**	
4	**EXCEPTION HANDLING:** Exception Handling: Benefits of exception handling, the classification of exceptions, exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, exception specification, built in exceptions, creating own exception sub classes **MULTI THREADING** : Understanding Threads , Needs of Multi-Threaded Programming ,Thread Life-Cycle, Thread Priorities ,Synchronizing Threads, Inter Communication of Threads	7
Pedagogy	**Chalk and board, Power Point presentation , Coding and Debugging**	

5	**Java I/O Streams File:** Directories, Using FileNameFilter, The listFiles, Creating Dirctrories, The Stream Classes: Byte Stream and Character Stream, Byte Streams: Input Stream Classes, Output Stream Classes Character Streams: Reader Classes, Writer Classes, Creating Byte Streams using FileInputStream / FileOutputStream Classes, Creating Character Streams using FileReader / FileWriter Classes. Accepting the input from the keyboard using InputStreamReader, BufferedReader and System.in, Creating DataInputStream / DataOutputStream, Serialization.	**8**
Pedagogy	**Chalk and board, Power Point Presentation , Mini Project**	

Reference Books	
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)	
1	Herbert Schildt and Dale Skrien, "Java Fundamentals – A comprehensive Introduction", McGraw Hill, 1st Edition, 2013.
2	Herbert Schildt, "Java the complete reference", McGraw Hill, Osborne, 7th Edition, 2011.
3	T.Budd, "Understanding Object- Oriented Programming with Java", Pearson Education, Updated Edition (New Java 2 Coverage), 1999.
4	P.J.Dietel and H.M.Dietel , "Java How to program", Prentice Hall, 6th Edition, 2005.

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Understand the Programming Concepts of java Programming.	L1,L2	**Understand**
CO2	Apply the proficiency in writing and executing Java programs using an integrated development environment (IDE).	L3	**Apply**
CO3	Analyze and apply object-oriented programming principles such as classes, objects, inheritance, and polymorphism to create reusable and modular code.	L4	**Analyse**
CO4	Develop an understanding of basic Java I/O Stream Files	L5	**Evaluate**
CO5	Create a programs using problem-solving skills by applying Java programming techniques to solve computational problems.	L6	**Create**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO3	-	3	3	-	-	-	-	-	-	-	-	-	-	3
CO4	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO5	-	-	-	-	2	-	-	-	-	-	2	-	-	-

Weblinks and Video Lectures (e-Resources)	
1	http://java.sun.com http://www.oracle.com/technetwork/java/index.html) http://java.sun.com/javase
2	http://www.oracle.com/technetwork/java/javase/overview/index.html
3	http://download.oracle.com/javase/7/docs/api/index.html

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory				Practical
	Continuous Assessment Tests			Alternative Assessment Tool (AAT)	Test
	Test-1	Test-2	Test-3		
	50 Marks	50 Marks	50 Marks	40 Marks	50 Marks
Remember	20	10	10	-	-
Understand	20	-	10	-	-
Apply	-	10	20	-	10

Analyse	10	30	10	-	20
Evaluate	-	-	-	20	20
Create	-	-	-	20	-

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1		Test-2		Test-3			
	Module-1	Module-2	Module-3	Module-4	Module-4	Module-5		
CO1	1	1	1	1	1	1	10	20%
CO2	2	2	2	2	2	2	20	40%
CO3	2	2	2	2	2	2	20	40%
CO4	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	50	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	5
Understand	5
Apply	20
Analyse	20
Evaluate	-
Create	-

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	10	5	10	5	10	40	20%
CO2	20	20	20	20	20	80	40%
CO3	20	20	20	20	20	80	40%
CO4	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-
Total	-	-	-	-	-	200	100%

INTEGRATED PROFESSIONAL CORE COURSE (IPCC)

IPCC Course – Integrated Professional Core Course

Teaching Hours/Week (L: T:P: S)	3:0:2:0
Total Hours of Pedagogy	40 hours Theory + 20 Hours of Practical Classes
Credits:	04
Theory - Each Module	8 Hrs
Practical's	8-10 Programs / Experiments
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Theory

- The theory part of the IPCC shall be evaluated both by CIE and SEE.
- The practical part shall be evaluated by only CIE (no SEE).
- However, questions from the practical part of IPCC shall be included in the SEE question paper.

Integrated Professional Core Course (IPCC) - 4 Credit Course

Assessment Details (both CIE and SEE)

- 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) and for the SEE minimum passing mark is 40% of the maximum marks (20 out of 50 marks).
- A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation (CIE) for the Theory component of the IPCC (Maximum marks 50)

Internal Assessment Test (IAT):

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are 25 marks and that for the practical component is 25 marks.
- 25 marks for the theory component are split into 15 marks for two Internal Assessment Tests

(Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 15 marks) and 10 marks for Two Continuous Comprehensive Assessment(CCA) methods.

- The first Internal test at the end of 40-50% coverage of the syllabus
- The second Internal test after covering 85-90% of the syllabus.
- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for 25 marks).
- The student has to secure 50% of 25 marks to qualify in the CIE of the theory component of IPCC.

The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Revised Blooms Taxonomy (RBT) Levels. Emphasis to be given for Higher order Thinking Skills(HOTS).

Continuous Internal Evaluation (CIE) for the practical component of the IPCC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and Marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report, **05 Marks** are for conducting the experiment, **05 Marks for** preparation of the laboratory record, **5 Marks** for conducting Open Ended Experiments Each experiment. Marks of all experiments' write-ups are added to 15 marks.
- The Practical laboratory test **(duration 03 hours)** at the end of the 15th week of the semester/after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **5 Marks.**
- The open-ended experiment after completion of all the experiments shall be conducted for 20 marks with a split-up for 5 Marks for writeup, 10 Marks for Execution, and 5 Marks for Viva-Voce.
  Marks for writeup, Execution and Viva-Voce is added and scaled down to 05 marks.
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for 25 marks.
- The student has to secure 50% of 25 marks to qualify in the CIE of the practical component of the IPCC.

Semester End Examination (SEE) for IPCC Theory

SEE will be conducted as per the scheduled timetable, with common question papers for the course (duration 03 hours)

- The question paper will have ten questions. Each question is set for 20 marks.
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English. **The duration of SEE is 03 hours.**
- 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 two questions shall be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels.
- The students have to answer 5 full questions, selecting one full question from each module.
- Marks scored by the student shall be proportionally scaled down to 50 Marks.
- The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only.
- Questions mentioned in the SEE paper may include questions from the practical component.

Continuous and Comprehensive Assessment (CCA):

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be (CCA1+CCA2)/2 and scaled down to **10 Marks**.

- CCA1 after 4th week and CCA2 after 9th week. The Assessment will be through rubrics.
- CCA as project-based learning,
    - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
    - The evaluation of review 1 after 6th weeks of semester and review 2 after 12th week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **25 Marks**

Possible Continuous and Comprehensive Assessment (CCA):

- Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom,

	• The assessment of these techniques shall be in rubrics. • The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

4 Credits Courses – Integrated Professional Core Course (IPCC)

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
Total CIE Theory + Practical				**50**	----	----	**25**	
CIE	**Theory**	Internal Assessment Test (IAT) - I	Module – 1 to 2.5	50	(50+50) / 2	**20**	15	Average of Two Internal test each of 50 Marks scale down the marks to 15 Marks
		Internal Assessment Test (IAT) - II	Module – 2.5 to 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives / Activity based learning	Considering all the Modules	50	(50+50) / 2	**20**	15	Two CCA methods to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives/ Activity based learning		50				
	Total CIE Theory					**40**	30	Scale down Marks of IAT and CCA to 25

CIE	**Practical**	Conduction of Experiments	Performance-Continuous Evaluation of each experiment	05	15	Average of all Experiments	15	4	Performance of the Experiment (On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. 20 marks are for conducting the experiment and calculations/observations/output)
			Record	05					
			Observation book	05					
		Practical Test	Write up	15	50	----	05	4	One Internal Practical Test after conduction of all Experiments for 50 Marks
			Execution	25					
			Viva-voce	10					
		Open Ended Experiment	Write up	05	20	----	05	2	One experiment for 20 marks. 20 marks reduced to 05 marks
			Execution	10					
			Viva-voce	05					
						Total CIE Practical	**25**	**10**	Scale down Marks of Experiments, Record, Observation, Practical Test and Open-Ended Experiment

SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
			CIE + SEE	100	----	----	50	

- The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component.
- The Laboratory Component for the IPCC shall be for CIE only.
- However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.

Note: If few of the 3 Credit Courses are Integrated course type, for such courses the method suggested for 4 Credit IPCC Course shall be followed

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**I**				
Course Title	:	**Database Management Systems**				
Course Code	:	**23MCA15**				
Course Type (Theory/ Practical/ Integrated)	:	**Integrated**				
Category	:	**IPCC**				
Stream	:	**MCA**		**CIE**	:	**50 Marks**
Credits (L: T:P:PJ)	:	**3:0:1:0**		**SEE**	:	**50 Marks**
Total Hours	:	**50 Hrs**		**SEE Duration**	:	**3 Hours**

Course Learning Objectives: Students will be taught

Sl.No	Course Objectives
1	Provide a strong foundation in database concepts, technology, and practice.
2	Practice SQL programming through a variety of database problems.
3	Understand the use of concurrency and transactions in database.
4	Understand how to build database applications for real world problems.

Teaching-Learning Process Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) 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 students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple 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 improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.

DSATM

Scheme of Teaching and Examinations for MCA Programme -2023-24
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COURSE SYLLABUS

Module No.	Contents of the Module	Hours
1	Introduction to Databases: Introduction data and databases, Characteristics of Database approach; Actors on the screen; Workers behind the scene; Advantages of using DBMS approach; A brief history of database applications; when not to use a DBMS. Data models, schemas and instances; Three-schema architecture and data independence; Database languages and interfaces; The database system environment; Centralized and client-server architectures; Classification of Database Management systems.	10
Pedagogy	**Role Play**	
2	Conceptual Data Modeling: Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design; ER Diagrams, Naming Conventions and Design Issues; Relationship types of degree higher than two. Relational Model: Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update Operations, Transactions and dealing with constraint violations; Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations : JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra; Relational Database Design Using ER- to-Relational Mapping	10
Pedagogy	**Demonstration**	
3	**SQL:** Data Definition and Data Types, Specifying Constraints in SQL, Basic Retrieval Queries in SQL, INSERT, DELETE, and UPDATE Statements in SQL, Views (Virtual Tables) in SQL, Schema Change Statements in SQL, Transaction Support in SQL (Commit, Rollback, Save point) **Introduction to PL/SQL:** Procedures, function , triggers in PL/SQL.	10
Pedagogy	**Demonstration**	
4	**Database Design and Transaction Concepts :** Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Cod Normal Form, De-normalization, Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability, Characterizing Schedules Based on Serializability, Two-Phase Locking Techniques for Concurrency Control	10

Pedagogy	Problem Solving	
5	Introduction to NoSQL & MongoDB : NoSQL, SQL versus NoSQL, Types of NoSQL Databases, CAP theorem, Getting Started with MongoDB – Documents, Collections, Databases, MongoDB Shell, Data Types, CRUD operations, Introduction to find Query.	10
Pedagogy	Demonstration	

List of Programs

Sl.No	Experiments/Programs	COs
1	Create the following tables with properly specifying Primary keys, Foreign keys and solve the following queries. BRANCH (Branchid, Branchname, HOD) STUDENT (USN, Name, Address, Branchid, sem) BOOK (Bookid, Bookname, Authorid, Publisher, Branchid) AUTHOR (Authorid, Authorname, Country, age) BORROW (USN, Bookid, Borrowed_Date) Execute the following Queries: i.List the details of Students who are all studying in 2nd sem MCA. ii.List the students who are not borrowed any books. iii.Display the USN, Student name, Branch_name, Book_name, Author_name, Books_Borrowed_Date of 2nd sem MCA Students who borrowed books. iv.Display the number of books written by each Author. v.Display the student details who borrowed more than two books. vi.Display the student details who borrowed books of more than one Author. vii.Display the Book names in descending order of their names. viii.List the details of students who borrowed the books which are all published by the same publisher.	CO3
2	Consider the following schema: STUDENT (USN, name, date_of_birth, branch, mark1, mark2, mark3, total, GPA) Execute the following queries: i. Update the column total by adding the columns mark1, mark2, mark3. ii. Find the GPA score of all the students. iii. Find the students who born on a particular year of birth from the date_of_birth column. iv. List the students who are studying in a particular branch of study. v. Find the maximum GPA score of the student branch-wise. vi. Find the students whose name starts with the alphabet “S”. vii. Find the students whose name ends with the alphabets “AR”. viii. Delete the student details whose USN is given as 1001.	CO4
3	Design an ER-diagram for the following scenario, Convert the same into a relational model and then solve the following queries. Consider a Cricket Tournament “ABC CUP” organized by an organization. In the tournament there are many teams are contesting each having a Teamid,Team_Name, City, a coach. Each team is uniquely identified by using Teamid. A team can have many Players and a captain. Each player is uniquely identified by Playerid, having a Name, and multiple phone	CO3

	numbers,age. A player represents only one team. There are many Stadiums to conduct matches. Each stadium is identified using Stadiumid, having a stadium_name,Address (involves city,area_name,pincode). A team can play many matches. Each match played between the two teams in the scheduled date and time in the predefined Stadium. Each match is identified uniquely by using Matchid. Each match won by any of the one team that also wants to record in the database. For each match man_of_the match award given to a player. Execute the following Queries: i. Display the youngest player (in terms of age) Name, Team name, age in which he belongs of the tournament. ii. List the details of the stadium where the maximum number of matches were played. iii. List the details of the player who is not a captain but got the man_of _match award at least in two matches. iv. Display the Team details who won the maximum matches. v. Display the team name where all its won matches played in the same stadium. **Vi. Retrieve the matches played in a specific stadium.** **Vii. Retrieve all the teams participating in the "ABC CUP" tournament:**	
4	Design an ER-diagram for the following scenario, Convert the same into a relational model, normalize Relations into a suitable Normal form and then solve the following queries. A country can have many Tourist places . Each Tourist place is identified by using tourist_place_id, having a name, belongs to a state, Number of kilometers away from the capital city of that state,history. There are many Tourists visits tourist places every year. Each tourist is identified uniquely by using Tourist_id, having a Name, age, Country and multiple emailids. A tourist visits many Tourist places, it is also required to record the visted_date in the database. A tourist can visit a Tourist place many times at different dates. A Tourist place can be visited by many tourists either in the same date or at different dates. Queries: i. List the state name which is having maximum number of tourist places. ii. List details of Tourist place where maximum number of tourists visited. iii. List the details of tourists visited all tourist places of the state “KARNATAKA”. iv. Display the details of the tourists visited at least one tourist place of the state, but visited all states tourist places. v. Display the details of the tourist place visited by the tourists of all country.	**CO4**

5	A country wants to conduct an election for the parliament. A country having many constituencies. Each constituency is identified uniquely by Constituency_id, having the Name, belongs to a state,Number_of_voters. A constituency can have many voters. Each voter is uniquely identified by using Voter_id, having the Name, age, address (involves Houseno,city,state,pincode). Each voter belongs to only one constituency. There are many candidates contesting in the election. Each candidates are uniquely identified by using candidate_id, having Name, phone_no, age, state. A candidate belongs to only one party.Thereare many parties. Each party is uniquely identified by using Party_id, having Party_Name,Party_symbol. A candidate can contest from many constituencies under a same party. A party can have many candidates contesting from different constituencies. No constituency having the candidates from the same party. A constituency can have many contesting candidates belongs to different parties. Each voter votes only one candidate of his/her constituencty. Queries: i. List the details of the candidates who are contesting from more than one constituencies which are belongs to different states. ii. Display the state name having maximum number of constituencies. iii. Create a stored procedure to insert the tuple into the voter table by checking the voter age. If voter's age is at least 18 years old, then insert the tuple into the voter else display the "Not an eligible voter msg" . iv. Create a stored procedure to display the number_of_voters in the specified constituency. Where the constituency name is passed as an argument to the stored procedure. v. Create a TRIGGER to UPDATE the count of " Number_of_voters" of the respective constituency in "CONSTITUENCY" table , AFTER inserting a tuple into the "VOTERS" table.	
6.	**Execute the following schema using MongoDB.** Exercise–I: Student Database Agenda: Create database, create collection, insert data, find, find one, sort, limit, skip, distinct, projection. Create a student database with the fields: (SRN, Sname, Degree, Sem, CGPA) 1.Display all the documents 2.Display all the students in MCA 3.Display all the students in ascending order 4.Display first 6 students 5.Display students 5,6,7 6.list the degree of student "Ram" 7.Display student's details of 4,5,6,7 in descending order of percentage 8.Display the number of students in MCA 9.Display all the degrees without _id 10.Display all the distinct degrees	

Reference Books	
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)	
1	Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, 7th Edition, 2017, Pearson.
2	Database management systems, Ramakrishnan, and Gehrke, 3rd Edition, 2014, McGraw Hill.
3	Professional NOSQL, Shashank Tiwari, 2011, Inc.WROXPress, John Wiley & Sons, ISBN: 978-0-470-94224-6.
4	MongoDB: The Definitive, Guide Kristina Chodorow and Michael Dirolf, 1st Edition, 2010 O'Reilly Media, ISBN: 978-1-449-38156-1
5	Abraham Silberschatz, Henry F. Korth and S. Sudarshan"s Database System Concepts 6th EditionTata Mcgraw Hill Education Private Limited

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Understand the database objects, enforce integrity constraints on a database using RDBMS	**Remember Understand**	L1/L2
CO2	Apply SQL for various database operations	**Apply**	L3
CO3	Analyze database design with normalization, Concurrency control and transaction management	**Analyze**	L4
CO4	Design database applications and relate the concept of transaction, concurrency control and recovery in database	**Evaluate**	L5
CO5	Develop a non- relational data model for a given problem	**Create**	L6

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CO2	3	–	2	–	–	–	–	–	–	–	–	–	3	–
CO3	–	-	–	3	–	–	–	–	–	–	–	–	–	3

CO4	–	–	3	–	3	–	–	–	–	-	–	–	–	–
CO5	–	–	–	3	–	–	–	–	–	–	3	3	–	–

Weblinks and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=3EJlovevfcA
2	https://www.youtube.com/watch?v=9TwMRs3qTcU
3	https://www.youtube.com/watch?v=ZWl0Xow304I
4	https://www.youtube.com/watch?v=4YilEjkNPrQ
5	https://www.youtube.com/watch?v=CZTkgMoqVss
6	https://www.youtube.com/watch?v=Hl4NZB1XR9c

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	**Theory**			**Practical**
	Continuous Assessment Tests		**Alternative Assessment Tool (AAT)**	**Test**
	Test-1	**Test-2**		
	50 Marks	**50 Marks**	**20 Marks**	**50 Marks**
Remember	**20**	**10**	**-**	**-**
Understand	**20**	**-**	**-**	**-**
Apply	**-**	**10**	**-**	**10**
Analyse	**10**	**30**	**-**	**20**
Evaluate	**-**	**-**	**10**	**20**
Create	**-**	**-**	**10**	**-**

CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage
	Test-1			Test-2			
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	1	1	1	1	1	10	20%
CO2	2	2	2	2	2	40	40%
CO3	2	2	2	2	2	40	40%
CO4	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-
Total	-	-	-	-	-	50	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	10
Understand	10
Apply	20
Analyse	10
Evaluate	-
Create	-

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	15	5	10	10	20	60	35%
CO2	10	10	-	-	-	20	12%
CO3	20	10	20	20	20	90	53%
CO4	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-
Total	45	25	30	30	40	170	100%

MANDTORY CORE COURSE (MCC)

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**I**				
Course Title	:	**Research Methodology and Design Thinking**				
Course Code	:	**23RMDT16**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**MCC**				
Stream	:	**MCA**		**CIE**	:	**50 Marks**
Credits (L: T:P:PJ)	:	**2:0:0:0**		**SEE**	:	**50 Marks**
Total Hours	:	**30 Hrs**		**SEE Duration**	:	**3 Hours**

Course Learning Objectives: Students will be taught

Sl.No	Course Objectives
1	To give an overview of the research methodology, the techniques of defining a research problem and explain the functions of the literature review in research.
2	Understand various research designs and their characteristics.
3	Know the details of sampling designs, measurement and scaling techniques and also different methods of data collections.
4	Learn various forms of the intellectual property, its relevance and business impact in the changing global business environment.

Teaching-Learning Process Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) 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 students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple 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 improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.

DSATM

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COURSE SYLLABUS

Module No.	Contents of the Module	Hours
1	**Research Methodology:** Introduction, Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, and Problems Encountered by Researchers in India	6
Pedagogy	**Case Studies**	
2	**Defining the Research Problem**: Selecting the Problem, Necessity of Defining the Problem, An Illustration. Reviewing the literature: Place of the literature review in research, Bringing clarity and focus to your research problem, Improving research methodology, Enabling contextual findings, How to review the literature, searching the existing literature, reviewing the selected literature, Developing a theoretical framework, Developing a conceptual framework, Writing about the literature reviewed.	6
Pedagogy	**Demonstration of Reference Management tools**	
3	**Intellectual Property (IP) Acts**: Introduction to IP: Introduction to Intellectual Property (IP), different types of IPs and its importance in the present scenario, Patent Acts: Indian patent acts 1970.Design Act: Industrial Design act 2000. Copy right acts: Copyright Act 1957. Trade Mark Act, 1999	8
Pedagogy	**Patent searching and patent drafting**	
4	**PROCESS OF DESIGN** : Understanding Design thinking Shared model in team-based design – Theory and practice in Design thinking – Explore presentation signers across globe – MVP or Prototyping.	6
Pedagogy	**Prototyping through live examples and videos**	
5	**Tools for Design Thinking**: Real-Time design interaction capture and analysis – Enabling efficient collaboration in digital space – Empathy for design – Collaboration in distributed Design	4
Pedagogy	**Case studies on design thinking for real-time interaction and analysis**	

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Identify the suitable research methods, articulate the research steps in a proper sequence for the given problem	**Remember** **Understand**	L1/L2
CO2	Apply theoretical and conceptual frameworks, concepts of copyright Act /Patent Act /Cyber Law/ Trademark to the given case and develop conclusions	**Apply**	L3
CO3	Analyse the problem by selecting appropriate data collection methods and design appropriate solutions,	**Analyze**	L4
CO4	Evaluate the research problem by designing appropriate research designs.	**Evaluate**	L5
CO5	Develop feasible solutions for a research problem through scientific methods	**Create**	L6

Text Books	
1	Research Methodology: Methods and Techniques, C.R. Kothari, Gaurav Garg New Age International 4th Edition, 2018.
2	Research Methodology a step-by- step guide for beginners. (For the topic Reviewing the literature under module 2) Ranjit Kumar SAGE Publications Ltd 3rd Edition, 2011 Study Material.
3	Intellectual property, Debirag E. Bouchoux, Cengage learning, 2013
4	John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design", Cengage learning (International edition) Second Edition, 2013.
5	Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press , 2009.
6	Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	_	_	_	_	_	_	_	_	_	_	_	_	_	_
CO2	3	_	_	_	_	_	_	_	_	_	_	_	3	_
CO3	_	3	_	_	_	_	_	_	_	_	_	_	_	3
CO4	_	_	3	_	3	_	_	_	_	-	_	_	_	_
CO5	_	_	_	3	_	_	_	_	_	_	3	3	_	_

Weblinks and Video Lectures (e-Resources)	
1	https://onlinecourses.nptel.ac.in/noc23_ge36/
2	https://www.coursera.org/learn/research-methodologies
3	https://www.udemy.com/course/research-methods/

Assessment Pattern (both CIE and SEE)

2 Credit Course

Assessment Method	Component	Type of Assessment	Assessment Type used	Max. Marks	Evaluation Details	Reduced Marks	Min. Marks	Total
CIE	Theory	AAT	Pedagogical Initiatives	40	Case studies, Demonstration, writing skills	20	10	20
		Test-1	Theory	50	Average of three Internal Assessment Tests each of 50 Marks, scale down the Marks to 30 Marks	30	15	30
		Test-2	Theory	50				
		Test-3	Theory	50				
					Total CIE Theory		25	50

SEE		**100**	SEE Exam is Theory Exam, conducted for 100 Marks, scored marks are scaled down to 50 marks	**50**	**20**	**50**
				CIE+SEE	**40**	**100**
	The Minimum Marks to be secured in CIE to appear for SEE shall be 25 (50% of Maximum marks – 50) in the Theory Component.					

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	**Theory**			
	Continuous Assessment Tests			**Alternative Assessment Tool (AAT)**
	Test-1	**Test-2**	**Test-3**	
	50 Marks	**50 Marks**	**50 Marks**	**40**
Remember	**20**	**10**	**20**	**-**
Understand	**20**	**-**	**20**	**-**
Apply	**-**	**10**	**-**	**-**
Analyse	**10**	**30**	**10**	**-**
Evaluate	**-**	**-**	**-**	**20**
Create	**-**	**-**	**-**	**20**

CIE Course Assessment Plan

CO's	**Marks Distribution**					**Total Marks**	**Weightage**
	Test-1		**Test-2**		**Test-3**		
	Module-1	**Module-2**	**Module-3**	**Module-4**	**Module-5**		

CO1	1	1	1	1	1	1	10
CO2	2	2	2	2	2	2	20
CO3	2	2	2	2	2	2	20
CO4	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-
Total	-	-	-	-	-	50	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	10
Understand	10
Apply	20
Analyse	10
Evaluate	-
Create	-

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	30	10	10	10	10	70	53%
CO2	-	-	10	-	-	10	9%
CO3	10	-	20	10	10	50	38%
CO4	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-
Total	40	10	40	20	20	130	100%

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**I**				
Course Title	:	**Data Structures Laboratory**				
Course Code	:	**23MCAL17**				
Course Type (Theory/ Practical/ Integrated)	:	**Practical**				
Category	:	**PCCL**				
Stream	:	**MCA**		**CIE**	:	**50 Marks**
Credits (L: T:P:PJ)	:	**0:0:2:0**		**SEE**	:	**50 Marks**
Total Hours	:	**30 Hrs**		**SEE Duration**	:	**3 Hours**

Course Learning Objectives: Students will be taught

Sl.No	Course Objectives
1	Learn the basic concepts of Data Structures
2	Understand sorting and searching techniques for the given problem.
3	Understand the Data Structures concepts like Stacks, Queues, Linked list , Trees and Graphs, its operations
4	Learn about the Graph traversal algorithms

Teaching-Learning Process

Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) 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 students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple 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 improve the students' understanding.

9. Individual teachers can device innovative pedagogy to improve teaching-learning.

List of Experiments or Programs

Sl.No	Experiments/Programs	COs
1	Implement a Program in C for converting an Infix Expression to Postfix Expression.	CO1
2	Design, develop, and execute a program in C to evaluate a valid postfix expression using stack. Assume that the postfix expression is read as a single line consisting of non-negative single digit operands and binary arithmetic operators. The arithmetic operators are+ (add), - (subtract),* (multiply) and/ (divide).	CO1
3	Write a Menu driven Program to calculate nth Fibonacci series and Factorial of a number using Recursion.	CO1
4	Design, develop, and execute a program in C to simulate the working of a queue of integers using an array. Provide the following operations: a. Insert b. Delete c. Display	CO3
5	Design, develop, and execute a program in C to simulate the working of a Stack of integers using an array. Provide the following operations: a. Push b. Pop c. Display	CO3
6	Write a C program to simulate the working of a singly linked list providing the following operations: a. Display & Insert b. Delete from the beginning/end c. Delete a given element	CO3
7	Write a C program to Implement the following searching techniques a. Linear Search b. Binary Search.	CO2
8	Write a C program to implement the following sorting algorithms using user defined functions: a. Bubble sort (Ascending order) b. Selection sort (Descending order).	CO2
9	Write a C program to implement the Binary Tree Traversal.	CO2
10	Write a C Program to implement Depth First traversal	CO4

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Understand the techniques for evaluating the given expression	Understand	L1, L2
CO2	Apply sorting/searching techniques and validate input/output for the given problem.	Apply	L3

CO3	Evaluate data structures like Stacks, Queues, Linked list , Trees and Graphs, its operations, and algorithms	Analyze	L4
CO4	Implement the algorithm to find whether the given graph is connected or not and conclude on the performance of the technique implemented	Evaluate	L5

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	2	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	2	-
CO3	-	3	-	-	-	-	-	-	-	-	2	-	2	-
CO4	-	-	2		-	-	-	2	-	-	-	-	-	2

Weblinks and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=BBpAmxU NQo
2	https://www.youtube.com/watch?v=8hly31xKliO
3	https://archive.nptel.ac.in/courses/106/106/106106127/

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**I**				
Course Title	:	**Object Oriented Programming Using Java Laboratory**				
Course Code	:	**23MCAL18**				
Course Type **(Theory/ Practical/ Integrated)**	:	**Practical**				
Category	:	**PCCL**				
Stream	:	**MCA**		**CIE**	:	**50 Marks**
Credits (L: T:P:PJ)	:	**0:0:2:0**		**SEE**	:	**50 Marks**
Total Hours	:	**30 Hrs**		**SEE Duration**	:	**3 Hours**

Course Learning Objectives: Students will be taught

Sl.No	Course Objectives
1	Understand the basic object-oriented programming concepts and apply them in problem solving.
2	Learn object-oriented programming concepts to solve real world problems.
3	Learn the concept of class and objects with access control to represent real world entities.
4	Learn to solve the programs on basic programming constructs like control structures, constructors, string handling and garbage collection.
5	Gain Familiarity with the overloading methodology and constructors to develop application programs.

Teaching-Learning Process

Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) 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 students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple 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 improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.

DSATM

Scheme of Teaching and Examinations for MCA Programme -2023-24
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2023-24)

List of Programs

Sl.No	Experiments/Programs	COs
1	Write a Java program to list the factorial of the numbers 1 to 10. To calculate the factorial value, use while loop. (Hint Fact of 4 = 4*3*2*1)	CO3
2	Write a Java program To find the area and circumference of the circle by accepting the radius from the user. To accept a number and find whether the number is Prime or not	CO4
3	Write a Java program to demonstrate a division by zero exception	CO3
4	Write a Java program to implement Inner class and demonstrate its Access protection	CO4
5	Write a Java program to demonstrate Constructor Overloading and Method Overloading.	CO3
6	Write a JAVA program to demonstrate Inheritance. Simple Program on Java for the implementation of Multiple inheritance using interfaces to calculate the area of a rectangle and triangle.	CO4
7	Write a JAVA program to create an enumeration Day of Week with seven values SUNDAY through SATURDAY. Add a method isWorkday() to the DayofWeek class that returns true if the value on which it is called is MONDAY through FRIDAY. For example, the call DayOfWeek. SUNDAY.isWorkDay () returns false.	CO4
8	Write a Java program that displays the number of characters, lines and words in a text file.	CO4
9	Create a package named shape and Create some classes in the package representing some common shapes like Square, Triangle, and Circle. Import and compile these classes in other program.	CO4
10	Write a java program to connect to database using JDBC &insert values into table	CO4

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Understand the Programming Concepts of java Programming.	L1,L2	Understand
CO2	Apply the proficiency in writing and executing Java programs using an integrated development environment (IDE).	L3	Apply

CO3	Analyze object-oriented programming principles such as classes, objects, inheritance, and polymorphism to create reusable and modular code.	L4	**Analyse**
CO4	Develop an understanding of basic concepts of File handling	L5	**Evaluate**
CO5	Create a programs using problem-solving skills by applying Java programming techniques to solve computational problems.	L6	**Create**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	2	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	2	-
CO3	-	3	-	-	-	-	-	-	-	-	2	-	2	-
CO4	-	-	2		-	-	-	2	-	-	-	-	-	2

Weblinks and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=BBpAmxU NQo
2	https://www.youtube.com/watch?v=8hly31xKliO
3	https://archive.nptel.ac.in/courses/106/106/106106127/

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**I**				
Course Title	:	**Basics of Programming and Computer Organisation**				
Course Code	:	**23MCA19-BC***				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**NCC**				
Stream	:	**MCA**		**CIE**	:	**50 Marks**
Credits (L: T:P:PJ)	:	**0:0:0:0**		**SEE**	:	**-**
Total Hours	:	**30 Hrs**		**SEE Duration**	:	**-**

Course Learning Objectives: Students will be taught

Sl.No	Course Objectives
1	Know the syntax and structure of a programming language.
2	Understand the basic programming constructs such as variables, loops, conditionals, and functions.
3	Learn how data is represented and stored in a computer system
4	Gain knowledge about the basics of computer networks and how they are organized and managed.
5	Know the basics of digital logic circuits and how they are used to implement computer components.

Teaching-Learning Process

Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) 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 students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple 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 improve the students' understanding.
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DSATM

Scheme of Teaching and Examinations for MCA Programme -2023-24
Outcome Based Education and Choice Based Credit System (CBCS)
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COURSE SYLLABUS

Module No.	Contents of the Module	Hours
1	C Programming: Decision making, control structures and arrays C Structure, Data Types, Input-Output Statements, Decision making with if statement, simple if statement, the if..else statement, nesting of if. Else statements, the else. If ladder, the switch statement, the ?: operator, the goto statement, the break statement, programming examples. The while statement, the do...while statement, the for statement, nested loops, jumps in loops, the continue statement, programming examples. One dimensional and two dimensional arrays, declaration and initialization of arrays, reading, writing and manipulation of above types of arrays.	6
Pedagogy	Assignment	
2	Structures and Functions: Structures: Defining a structure, declaring structure variables, accessing structure members, structure initialization, copying and comparing structure variables, operations on individual members, array of structures, structures within structures, structures and functions, Unions, size of structures. Functions: Need for user defined functions, elements of User defined functions, defining functions, return values and their types, function calls, function declaration, category of functions.	6
Pedagogy	.Paired Programming	
3	Pointers in C: Declaring and accessing pointers in C, Pointer arithmetic, Functions , Call by value, Call by reference, Pointer as function arguments, recursion, Passing arrays to functions, passing strings to functions, Functions returning pointers, Pointers to functions, Programming Examples.	6
Pedagogy	Active Learning	
4	Binary Systems and Combinational Logic ,Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, subtraction using r's and r-1 complements, Binary Code, Binary Storage and Registers, Binary Logic, Integrated Circuits, Digital Logic Gates.	6
Pedagogy	Demonstration	

5	Basic Structure of Computer Hardware and Software: Computer Types, Functional Units, Basic Operational Concepts, Bus structure, Software, Performance, Multiprocessing and Multi computers, Machine Instruction: Memory Locations and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Interrupts.	6
Pedagogy	Seminar	

Reference Books	
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)	
1	Programming in ANSI C, Balaguruswamy, 7th Edition, McGraw Hill Education.
2	C : The Complete Reference, Herbert Schild,4th Edition, McGraw Hill Education.
3	Let us C, Yashwant Kanetkar, BPB Publications.
4	M. Morris Mano, "Digital Logic and Computer Design", Pearson, 2012.
5	Carl Hamacher, ZvonkoVranesicSafwatZaky,"Computer Organization", 5th edition, Tata McGraw-Hill, 2011.

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Understand the key concepts of C programming by writing and executing the programs.	**L2**	**Understand**
CO2	Apply the key concepts in C programming for solving the programs.	**L2**	**Apply**
CO3	Analyze the various programming concepts like arrays,functions,structures and pointers in C programming to get the solution.	**L3**	**Analyze**
CO4	Design simple data paths and control units for basic processor architecture	**L3**	**Evaluate**
CO5	Implement the application using logic gates in solving the societal/industrial problems.	**L4**	**Create**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO3	-	3	3	-	-	-	-	-	-	-	-	-	-	3
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			
	Continuous Assessment Tests			Alternative Assessment Tool (AAT)
	Test-1	Test-2	Test - 3	
	50 Marks	50 Marks	50 Marks	40 Marks
Remember ¤	-	-	-	-
Understand	10	10	10	-
Apply	20	20	20	-
Analyse	20	20	20	-
Evaluate	-	-	-	20
Create	-	-	-	20

CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage
	Test-1		Test-2	Test - 3			
	Module-1	Module-2		Module-3	Module-4	Module-5		
CO1	1	1	1	1	1	1	10	20%
CO2	2	2	2	2	2	2	20	40%
CO3	2	2	2	2	2	2	20	40%
CO4	-	-		-	-	-	-	
CO5	-	-		-	-	-	-	-
Total	-	-		-	-	-	50	100 %

2nd SEMESTER

PROFESSIONAL CORE COURSE (PCC)

PCC Course - Professional Core Course

Teaching Hours/Week (L: T:P: S)	3:0:0:0
Total Hours of Pedagogy	40 hours
Credits:	03
Each Module	8 Hrs
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Theory

3 Credit Course – Professional Core Course (PCC)

Assessment Details (both CIE and SEE)

- 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 (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).
- A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Internal Assessment Test (IAT):

- For the Internal Assessment Test component of CIE, there are 25 marks and for Assignment component of the CIE, there are 25 marks. Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 25 marks
  - The first test will be administered after 40-50% of the syllabus has been covered, and
  - The second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.
- Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels

Semester-End Examination:

Theory SEE will be conducted as per the scheduled timetable (duration 03 hours).

- 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 students have to answer 5 full questions, selecting one full question from each module.
- Marks scored shall be proportionally reduced to 50 marks.

Continuous and Comprehensive Assessment (CCA):

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **10 Marks**.

- CCA1 after 4th week and CCA2 after 9th week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
    - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
    - The evaluation of review 1 after 6th weeks of semester and review 2 after 12th week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **25 Marks**

Possible Continuous and Comprehensive Assessment (CCA):

- Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom,
- The assessment of these techniques shall be in rubrics.
- The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

Professional Core Course (PCC) – 3 Credit course – Theory

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
Total CIE Theory				**50**	----	----	**25**	
	Theory	Internal Assessment Test (IAT) - II	Module – 1 to 2.5	50	(50+50) / 2	**25**	15	Average of Two Internal test each of 50 Marks scale down the marks to 25
		Internal Assessment Test (IAT) - II	Module – 2.5 to 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives / Activity Based learning	Considering all the Modules	50	(50+50) / 2	**25**	15	Two CCA methods to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives / Activity Based learning		50				
	Total CIE Theory					**50**	30	Total Marks of IAT and CCA is 50

SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
			CIE + SEE	100	----	----	50	

Dayananda Sagar Academy of Technology & Management
(Autonomous Institute under VTU)

Semester	:	**II**				
Course Title	:	**Software Engineering**				
Course Code	:	**23MCA21**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PCC**				
Stream	:	**MCA**		**CIE**	:	**50 Marks**
Credits (L: T:P:PJ)	:	**3:0:0:0**		**SEE**	:	**50 Marks**
Total Hours	:	**40 Hrs**		**SEE Duration**	:	**3 Hours**

Course Learning Objectives: Students will be taught

Sl.No	Course Objectives
1	Understand the basic concepts of software Engineering
2	Explore the different process models and requirement engineering process
3	Understand the different architectural designs and patterns
4	Understand the project management process and software Quality Management

Teaching-Learning Process

Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) 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 students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyse information rather than simply recall it.
6. Topics will be introduced in multiple 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 improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.

DSATM

Scheme of Teaching and Examinations for MCA Programme -2023-24

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2023-24)

COURSE SYLLABUS

Module No.	Contents of the Module	Hours
1	Introduction: Professional Software Development Attributes of good software, software engineering diversity, IEEE/ACM code of software engineering ethics, case studies. Software Process and Agile Software Development Software Process models: waterfall, incremental development, reuses oriented, Process activities; coping with change, The Rational Unified Process	8
Pedagogy	**Case Studies**	
2	Agile Software Development: Agile Methods, Plan-Driven and Agile Development, Extreme Programming, Agile Project Management, scaling agile methods. Requirement Engineering: Functional and non-functional requirements, The Software requirements document, Requirements specification, Requirements engineering processes, Requirement elicitation and analysis, Requirement validation, Requirement management	8
Pedagogy	**Role Play, Case Studies**	
3	What is object orientation? What is OO development? OO themes; Evidence for usefulness of OO development; OO modelling history, modelling as design Technique: Modelling; abstraction; the three models. Object and class concepts; Link and associations concepts; Generalization and inheritance; A sample class model; Navigation of class models; Practical tips. Advanced objects and class concepts; Associations ends; N-array association; Aggregation, Abstract class; Multiple inheritance; Metadata; Reification; Constraints; Derived data; packages; practical tips	8
Pedagogy	**UML Tool Demonstration**	
4	Software Testing, Project Management Development testing, Test-driven development, Release testing, User testing; Project management: Risk management, Managing people, Teamwork, Software pricing, Plan-driven development, Project scheduling, Agile planning, Estimation techniques	8
Pedagogy	**Case Studies, Problem solving**	

5	Software Quality Management Software quality, Software standards, Reviews and inspections, Software measurement and metrics, Change management, Version management, System building, Release management	**8**
Pedagogy	**Case Studies**	

Reference Books	
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)	
1	Ian Sommerville: Software Engineering, 9th Edition, Pearson Education, 2012
2	Michael Blaha, James Rumbaugh: Object Oriented Modelling and Design with UML, 2nd Edition, Pearson Education, 2005.
4	Pankaj Jalote: An Integrated Approach to Software Engineering, Wiley India.
5	Stephan R. Schach, "Object Oriented Software Engineering". Tata McGrawHill,2008
6	Craig Larman, Applying UML and Patterns, 3rd ed. Pearson Education, 2005.

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Understand the basic concepts of Software Engineering and architecture	**Remember Understand**	L1/L2
CO2	Apply the principles and practices of Software Engineering and architectural designs to build real world applications	**Apply**	L3
CO3	Analyse and manage software projects to ensure software quality and streamline testing process for delivering high-quality software products	**Analyse**	L4
CO4	Develop effective software projects using software models and tools	**Evaluate**	L5

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CO2		–	3	–	–	–	–	–	–	–	–	–	3	–
	–	-	–	2	–	–	–	–	–	–	–	–	–	3

CO3														
CO4	–	–	3	–	3	–	–	–	–	–	–	–	–	–

Weblinks and Video Lectures (e-Resources)	
1	https://onlinecourses.nptel.ac.in/noc20_cs68/preview
2	https://www.geeksforgeeks.org/software-engineering/
3	https://www.tutorialspoint.com/software_engineering/index.htm

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			
	Continuous Assessment Tests			Alternative Assessment Tool (AAT)
	Test-1	Test-2	Test-3	
	50 Marks	50 Marks	50 Marks	40
Remember	20	-	20	-
Understand	10	10	20	-
Apply	10	10	-	-
Analyse	10	30	10	-
Evaluate	-	-	-	20
Create	-	-	-	20

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2		Test- 3		
	Module-1	Module-2		Module-3	Module-4	Module-5		
CO1	1	1	1	1	1	1	10	20%
CO2	2	2	2	2	2	2	20	40%

CO3	2	2	2	2	2	2	20	40%
CO4	-	-		-	-	-	-	-
CO5	-	-		-	-	-	-	-
Total	-	-		-	-	-	50	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
Remember	10
Understand	10
Apply	20
Analyse	10
Evaluate	-
Create	-

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	20	-	10	10	10	50	42%
CO2	-	10	-	-	-	10	8%
CO3	10	-	20	10	10	50	42%
CO4	-	10	-	-	-	10	8%
Total	30	20	30	20	20	120	100%

Dayananda Sagar Academy of Technology & Management

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Semester	:	**II**				
Course Title	:	**Python Programming for Data Science**				
Course Code	:	**23MCA22**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PCC**				
Stream	:	**MCA**		**CIE**	:	**50 Marks**
Credits (L: T:P:PJ)	:	**3:0:0:0**		**SEE**	:	**50 Marks**
Total Hours	:	**40 Hrs**		**SEE Duration**	:	**3 Hours**

Course Learning Objectives: Students will be taught

Sl.No	Course Objectives
1	Understand the basic concepts of Python Programming.
2	Learn the concepts of Python collections and Object Oriented Programming
3	Gain knowledge on the essential operations of Numpy, Pandas and Data Visualization
4	Learn the various applications of Python Programming
5	Gain knowledge on Data analytics using Data visualization techniques

Teaching-Learning Process Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) 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 students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple 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 improve the students' understanding.

9. Individual teachers can device innovative pedagogy to improve teaching-learning.

DSATM

Scheme of Teaching and Examinations for MCA Programme -2023-24
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2023-24)

COURSE SYLLABUS

Module No.	Contents of the Module	Hours
1	**Introduction to Python Programming** : Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type( ) Function and Is Operator, Control Flow Statements, The if Decision Control Flow Statement, The if…else Decision Control Flow Statement, The if…elif…else Decision Control Statement, Nested if Statement, The while Loop, The for Loop, The continue and break Statements, Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.	10
Pedagogy	**Chalk and Board , Powerpoint Presentation,Assignment**	
2	**Python Collection Objects** : Strings- Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings, Lists-Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods. Sets, Tuples and Dictionaries.	7
Pedagogy	**Chalk and Board , Powerpoint Presentation , Pair Programming**	
3	**Object Oriented Programming** : Overview of Object Oriented Programming – Class Definition , Creating Objects, Objects as arguments, Objects as return values, Constructors, Inheritance , Encapsulation , Method Overloading Information hiding.	7
Pedagogy	**Chalk and Board , Powerpoint Presentation , Hunt the code**	
4	**Introduction to Numpy and Pandas :** **Numpy**:- Understanding datatypes in python, basics of NumPy arrays, computation on NumPy arrays: universal functions.	8

	Pandas:-Introducing to pandas data structures, essential functionality, summarizing and computing descriptive statistics, handling missing data, Combining and merging data sets, Reshaping and Pivoting, Data Transformation	
Pedagogy	**Chalk and Board , Powerpoint Presentation, Code Challenge**	
5	**Visualization with Matplotlib and Seaborn** : General Matplotlib tips, simple line plots, simple scatter plots, visualizing errors, density and contour plots, histograms, binning, and density, customizing plot legends and colorbars, customizing matplotlib, visualization with seaborn.	**8**
Pedagogy	**Chalk and Board , Powerpoint Presentation , Design the Code**	

Reference Books

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)	
1	Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition,Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/thinkpython/)
2	Mark Lutz, "Programming Python", O'Reilly Media, 4th edition, 2010.
3	Jake Vander plas, "Python Data Science Handbook: Essential tools for working with data", O'Reilly Publishers, I Edition.
4	Wes Mc Kinney, "Python for Data Analysis", O'Reilly Media, 2012Mark Lutz, "Programming Python", O'Reilly Media, 4th edition, 2010.
5	Tim Hall and J-P Stacey, "Python 3 for Absolute Beginners", Apress, 1st edition, 2009.

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	Level Indicator
CO1	**Understand** the basic concepts of Python Programming.	**Understand**	**L1,L2**
CO2	**Apply** the concepts of Python collections and Object Oriented Programming for solving the given problem	**Apply**	**L3**
CO3	**Analyse** the essential operations using Numpy, Pandas and Data Visualization	**Analyze**	**L4**
CO4	**Design** the applications using Python Programming concepts	**Design**	**L5**

CO5	**Implement** the data analysis using Data visualization techniques	**Implement**	**L6**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	2	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	2	2	-	-	-	-	-	2	-	-	-

Weblinks and Video Lectures (e-Resources)	
1	www.geeksforgeeks.org/python programming
2	https://www.youtube.com/watch?v=eWRfhZUzrAc
3	https://www.youtube.com/watch?v=kWEbNBXc2-Y
4	https://archive.nptel.ac.in/courses/106/106/106106182/

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			
	Continuous Assessment Tests			Alternative Assessment Tool (AAT)
	Test-1	Test-2	Test - 3	
	50 Marks	50 Marks	50 Marks	40 Marks
Remember	-	-	-	-

Understand	10	10	10	-
Apply	20	20	20	-
Analyse	20	20	20	-
Evaluate	-	-	-	20
Create	-	-	-	20

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2	Test - 3			
	Module-1	Module-2		Module-3	Module-4	Module-5		
CO1	1	1	1	1	1	1	10	20%
CO2	2	2	2	2	2	2	20	40%
CO3	2	2	2	2	2	2	20	40%
CO4	-	-		-	-	-	-	-
CO5	-	-		-	-	-	-	-
Total	-	-		-	-	-	50	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (100 Marks)
Remember	-
Understand	20
Apply	40
Analyse	40

Evaluate	**-**
Create	**-**

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	5	4	5	6		20	20%
CO2	6	10	8	10	6	40	40%
CO3	8	6	10	6	10	40	40%
CO4	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	100

INTEGRATED PROFESSIONAL CORE COURSE (IPCC)

IPCC Course – Integrated Professional Core Course

Teaching Hours/Week (L: T:P: S)	3:0:2:0
Total Hours of Pedagogy	40 hours Theory + 20 Hours of Practical Classes
Credits:	04
Theory - Each Module	8 Hrs
Practical's	8-10 Programs / Experiments
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Theory

- The theory part of the IPCC shall be evaluated both by CIE and SEE.
- The practical part shall be evaluated by only CIE (no SEE).
- However, questions from the practical part of IPCC shall be included in the SEE question paper.

Integrated Professional Core Course (IPCC) - 4 Credit Course

Assessment Details (both CIE and SEE)

- 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) and for the SEE minimum passing mark is 40% of the maximum marks (20 out of 50 marks).
- A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation (CIE) for the Theory component of the IPCC (Maximum marks 50)

Internal Assessment Test (IAT):

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are 25 marks and that for the practical component is 25 marks.
- 25 marks for the theory component are split into 15 marks for two Internal Assessment Tests (Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 15 marks) and 10 marks for Two Continuous Comprehensive Assessment(CCA) methods.

- The first Internal test at the end of 40-50% coverage of the syllabus
- The second Internal test after covering 85-90% of the syllabus.
- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for 25 marks).
- The student has to secure 50% of 25 marks to qualify in the CIE of the theory component of IPCC.

The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Revised Blooms Taxonomy (RBT) Levels. Emphasis to be given for Higher order Thinking Skills(HOTS).

Continuous Internal Evaluation (CIE) for the practical component of the IPCC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and Marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report, **05 Marks** are for conducting the experiment, **05 Marks for** preparation of the laboratory record, **5 Marks** for conducting Open Ended Experiments Each experiment. Marks of all experiments' write-ups are added to 15 marks.
- The Practical laboratory test **(duration 03 hours)** at the end of the 15th week of the semester/after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **5 Marks.**
- The open-ended experiment after completion of all the experiments shall be conducted for 20 marks with a split-up for 5 Marks for writeup, 10 Marks for Execution, and 5 Marks for Viva-Voce.
  Marks for writeup, Execution and Viva-Voce is added and scaled down to 05 marks.
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for 25 marks.
- The student has to secure 50% of 25 marks to qualify in the CIE of the practical component of the IPCC.

Semester End Examination (SEE) for IPCC Theory

SEE will be conducted as per the scheduled timetable, with common question papers for the course (duration 03 hours)

- The question paper will have ten questions. Each question is set for 20 marks.

- The question paper shall be set for 100 Marks. The medium of the question paper shall be English. **The duration of SEE is 03 hours.**
- 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 two questions shall be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels.
- The students have to answer 5 full questions, selecting one full question from each module.
- Marks scored by the student shall be proportionally scaled down to 50 Marks.
- The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only.
- Questions mentioned in the SEE paper may include questions from the practical component.

Continuous and Comprehensive Assessment (CCA):

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be (CCA1+CCA2)/2 and scaled down to **10 Marks**.

- CCA1 after 4th week and CCA2 after 9th week. The Assessment will be through rubrics.
- CCA as project-based learning,
    - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
    - The evaluation of review 1 after 6th weeks of semester and review 2 after 12th week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **25 Marks**

Possible Continuous and Comprehensive Assessment (CCA):

- Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom,
- The assessment of these techniques shall be in rubrics.
- The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

4 Credits Courses – Integrated Professional Core Course (IPCC)

<table>
<tr><th>Assessment Method</th><th>Component</th><th>Type of Assessments</th><th>Syllabus Coverage</th><th>Maximum Marks</th><th>Average</th><th>Reduced Marks</th><th>Minimum Passing Marks</th><th>Evaluation Details</th></tr>
<tr><td colspan="4">Total CIE Theory + Practical</td><td>50</td><td>----</td><td>----</td><td>25</td><td></td></tr>
<tr><td rowspan="4">CIE</td><td rowspan="2">Theory</td><td>Internal Assessment Test (IAT) - I</td><td>Module – 1 to 2.5</td><td>50</td><td rowspan="2">(50+50) / 2</td><td rowspan="2">20</td><td rowspan="2">15</td><td rowspan="2">Average of Two Internal test each of 50 Marks scale down the marks to 15 Marks</td></tr>
<tr><td>Internal Assessment Test (IAT) - II</td><td>Module – 2.5 to 5</td><td>50</td></tr>
<tr><td rowspan="2">Continuous Comprehensive Assessment (CCA)</td><td>CCA-1- Pedagogical Initiatives / Activity based learning</td><td rowspan="2">Considering all the Modules</td><td>50</td><td rowspan="2">(50+50) / 2</td><td rowspan="2">20</td><td rowspan="2">15</td><td rowspan="2">Two CCA methods to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted</td></tr>
<tr><td>CCA-2- Pedagogical Initiatives/ Activity based learning</td><td>50</td></tr>
<tr><td colspan="5">Total CIE Theory</td><td>40</td><td>30</td><td>Scale down Marks of IAT and CCA to 25</td></tr>
</table>

CIE	**Practical**	Conduction of Experiments	Performance-Continuous Evaluation of each experiment	05	15	Average of all Experiments	15	4	Performance of the Experiment (On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. 20 marks are for conducting the experiment and calculations/observations/output)
			Record	05					
			Observation book	05					
		Practical Test	Write up	15	50	----	05	4	One Internal Practical Test after conduction of all Experiments for 50 Marks
			Execution	25					
			Viva-voce	10					
		Open Ended Experiment	Write up	05	20	----	05	2	One experiment for 20 marks. 20 marks reduced to 05 marks
			Execution	10					
			Viva-voce	05					
						Total CIE Practical	**25**	**10**	Scale down Marks of Experiments, Record, Observation, Practical Test and Open-Ended Experiment

SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
			CIE + SEE	100	----	----	50	

- The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component.
- The Laboratory Component for the IPCC shall be for CIE only.
- However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.

Note: If few of the 3 Credit Courses are Integrated course type, for such courses the method suggested for 4 Credit IPCC Course shall be followed

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Semester	**:**	**II**				
Course Title	**:**	**Design and Analysis of Algorithms**				
Course Code	**:**	**23MCA23**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Integrated**				
Category	**:**	**IPCC**				
Stream	**:**	**MCA**		**CIE**	**:**	**50 Marks**
Credits (L: T:P:PJ)	**:**	**3:0:2:0**		**SEE**	**:**	**50 Marks**
Total Hours	**:**	**60 Hrs**		**SEE Duration**	**:**	**3 Hours**

Course Learning Objectives: Students will be taught

Sl.No	Course Objectives
1	Describe the basic algorithm design strategies and use them for devising new problem.
2	Differentiate between deterministic and probabilistic algorithms and use the probabilistic algorithms in appropriate scenarios
3	Understand various computational problem solving techniques.
4	Gain Knowledge on various methods of algorithm analysis

Teaching-Learning Process

Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) 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 students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple 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 improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.

DSATM

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COURSE SYLLABUS

Module	Contents of the Module	Hours
1	**Introduction**: Introduction to Algorithm, Algorithm Specification, Analysis Framework, Performance Analysis: Space complexity, Time complexity. and notation, Mathematical analysis of Non- Recursive and recursive Algorithms, Asymptotic Notations: Big-Oh notation, Omega notation, Theta notation. Important Problem Types: Sorting, Searching, String processing, Graph Problems, Combinatorial Problems.	08
Pedagogy	**Assignment**	
2	**Divide and Conquer:** General method, Binary search, Recurrence equation for divide and conquer, Finding the maximum and minimum, Merge sort, Quick sort, Advantages and Disadvantages of divide and conquer. Decrease and Conquer Approach: Topological Sort, Transform and Conquer Approach: Heaps and Heap Sort	12
Pedagogy	**Mini Project**	
3	**Greedy Method:** General method, Coin Change Problem, Knapsack Problem, Job sequencing with deadlines, Minimum cost spanning trees: Prim's Algorithm, Kruskal's Algorithm Single source shortest paths: Dijkstra's Algorithm, Optimal Tree problem: Huffman Trees and Codes	10
Pedagogy	**Chalk and Board , PowerPoint Presentation , Mini Project**	
4	**Dynamic Programming:** General method with Examples, Multistage Graphs, Transitive Closure: Warshalls Algorithm, All Pairs Shortest Paths: Floyd's Algorithm,	

	Optimal Binary Search Trees, Knapsack problem, Travelling Sales Person problem, Reliability design	**10**
	Assignment	
5	**Backtracking**: General method, N-Queens problem, Sum of subsets problem, Graph colouring, Hamiltonian cycles, Programme and Bound: Assignment Problem, Travelling Sales Person problem, 0/1 Knapsack problem LC Programme and Bound solution, FIFO Programme and Bound solution, P,NP, NP-Complete, and Approximation algorithms for NP-Hard classes.	**10**
Pedagogy	**Chalk and Board, PowerPoint Presentation, Assignment**	

List of Programs

Sl.No	Experiments/Programs	COs
1	Compute the transitive closure of a given directed graph using Warshall's algorithm.	**CO3**
2	Obtain the Topological ordering of vertices in a given digraph.	**CO3**
3	Implement 0/1 Knapsack problem using Dynamic Programming.	**CO3**
4	From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.	**CO3**
5	Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm.	**CO3**
6	Print all the nodes reachable from a given starting node in a digraph using BFS method.	**CO3**
7	Check whether a given graph is connected or not using DFS method.	**CO3**
8	Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.	**CO4**
9	Implement All-Pairs Shortest Paths Problem using Floyd's algorithm. Parallelize this algorithm, implement it using OpenMP and determine the speed-up achieved.	**CO5**
10	Design an algorithm to solve the N-Queens problem using backtracking.	**CO5**

Reference Books
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1	Introduction to the Design and Analysis of Algorithms, Anany Levitin: 2nd Edition, 2009. Pearson.
2	Computer Algorithms/C++, Ellis Horowitz, SatrajSahni and Rajasekaran, 2nd Edition, 2014, Universities Press.
3	Algorithms, Kenneth A Berman and Jerome L Paul, Cengage Leaming India Pvt Ltd, 2002 edition.
4	Introduction to Algorithms, Thomas H. Carmen, Charles E. Leiserson, Rona! L. Rivest, Clifford Stein, 3rd Edition, PHI.
5	Design and Analysis of Algorithms, S. Sridhar, Oxford (Higher Education)

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	Level Indicator
CO1	**Understand** the relevance of algorithms for computational problem solving and real time applications.	Understand	L1,L2
CO2	**Apply** design and analysis techniques for a given algorithm	Apply	L3
CO3	**Analyze** a given algorithm for its efficiency based on time and space it occupies.	Analyze	L4
CO4	**Evaluate** any given problem with mathematical rigor to provide an algorithmic based solution.	Evaluate	L5
CO5	**Implement** the applications of algorithms in a high-level language such as C/C++	Implement	L6

Weblinks and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=BBpAmxU_NQo
2	https://www.youtube.com/watch?v=8hly31xKliO
3	https://archive.nptel.ac.in/courses/106/106/106106127/

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	2	2	-	-	-	-	-	2	-	-	-

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			Practical
	Continuous Assessment Tests		Alternative Assessment Tool (AAT)	Test
	Test-1	Test-2		
	50 Marks	50 Marks	20 Marks	50 Marks
Remember	20	10	-	-
Understand	20	-	-	-
Apply	-	10	-	10
Analyse	10	30	-	20
Evaluate	-	-	10	20
Create	-	-	10	-

CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage
	Test-1			Test-2			
	Module-1	Module-2	Module-3	Module-4	Module-5		

CO1	1	1	1	1	1	10	20%
CO2	2	2	2	2	2	40	40%
CO3	2	2	2	2	2	40	40%
CO4	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-
Total	-	-	-	-	-	50	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (100 Marks)
Remember	-
Understand	20
Apply	40
Analyse	40
Evaluate	-
Create	-

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	5	4	5	6	-	20	20%
CO2	6	10	8	10	6	40	40%
CO3	8	6	10	6	10	40	40%
CO4	-	-	-	-	-	-	

CO5	-	-	-	-	-	-	
Total	19	20	23	22	16	100	100

Dayananda Sagar Academy of Technology & Management
(Autonomous Institute under VTU)

Semester	:	**II**				
Course Title	:	**Web Technologies**				
Course Code	:	**23MCA24**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**IPCC**				
Stream	:	**MCA**		**CIE**	:	**50 Marks**
Credits (L: T:P:PJ)	:	**3:0:1:0**		**SEE**	:	**50 Marks**
Total Hours	:	**60 Hrs**		**SEE Duration**	:	**3 Hours**

Course Learning Objectives: Students will be taught

Sl.No	Course Objectives
1	Understand the basics of internet and web technologies
2	Understand scripting language concepts for developing client -side applications
3	Know the usefulness of web services
4	Gain Familiarities with database applications
5	Learn interactive web applications using client & server-side scripting

Teaching-Learning Process Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) 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 students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple 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 improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.

DSATM

Scheme of Teaching and Examinations for MCA Programme -2023-24
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2023-24)

COURSE SYLLABUS

Module No.	Contents of the Module	Hours
1	**Introduction to HTML**-fundamentals of HTML elements, Document body, text, hyperlink, Web browsers, web servers, MIME, URL, HTTP Introduction to XHTML5 tags, Basic syntax and structure, text markups, images, lists, tables, progress, Media tags-audio and video, forms, frames, JavaScript: JavaScript basics, variables, string manipulation, mathematical functions, statements, operators, arrays and functions.	8
Pedagogy	**Collaborative Learning**	
2	**Introduction to CSS -** Levels of CSS, Selectors, Font, color and Text Properties, BOX Model, Span and Div tags. Introduction to JavaScript, controls statements, Arrays and functions, pattern matching, Element Access, Event Handling, **XML -** Basics XML, document type definition, xml schemas, Document Object Model, presenting XML.	8
Pedagogy	**Blended Learning**	
3	**Introduction to Bootstrap**- First example, containers, Bootstrap elements: colors, tables, images, buttons, button groups, progress bars, Forms, utilities, Classes, alerts, custom forms, Grid System	8

Pedagogy	**Hands on Session**	
4	**INTRODUCTION TO PHP and J query-** Basics of PHP, downloading, installing, configuring PHP, programming in a web environment and the anatomy of a PHP page, Introduction to JQuery, Syntax, selectors, events, JQuery HTML, JQuery Effects, JQuery CSS.	**8**
Pedagogy	**Mini Project**	
5	**Introduction to AngularJS -** Directives, Expressions, Controllers, Filters, Services, Events, Forms, Validations, Examples, MVC architecture: PHP,XML ,AJAX and other web technologies.	**8**
Pedagogy	**Hands on Session**	

List of Experiments or Programs

Sl.No	Experiments/Programs	COs
1	Create your Resume using HTML & CSS	**CO3**
2	Create a Registration form using HTML and CSS with Database connectivity	**CO4**
3	Write a Bootstrap program to demonstrate Cards with Data Insertion	**CO3**
4	Write a PHP program to connect to a MySQL database which retrieves the data from the tables and displays them to the user.	**CO4**
5	Write a Java script to design a simple calculator to perform the following operations: sum, product, difference and quotient.	**CO3**
6	Write an Angular JS application to calculate Factorial and compute Square based on given user input	**CO3**
7	Write a JS code to validate the user login page	**CO3**
8	Write an Angular JS program to create simple CRUD applications for managing users.	**CO3**
9	a. Write a PHP program to hit counter using cookies b. Write a PHP program to calculate Date and Time function.	**CO4**
10	Create a web page for software company website	**CO4**

Reference Books	
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)	
1	Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, 7th Edition, 2017, Pearson.
2	Database management systems, Ramakrishnan, and Gehrke, 3rd Edition, 2014, McGraw Hill.
3	Professional NOSQL, Shashank Tiwari, 2011, Inc.WROXPress, John Wiley & Sons, ISBN: 978-0-470-94224-6.
4	MongoDB: The Definitive, Guide Kristina Chodorow and Michael Dirolf, 1st Edition, 2010 O'Reilly Media, ISBN: 978-1-449-38156-1
5	Abraham Silberschatz, Henry F. Korth and S. Sudarshan‟s Database System Concepts 6th EditionTata Mcgraw Hill Education Private Limited

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Understand the database objects, enforce integrity constraints on a database using RDBMS	**Remember** **Understand**	L1/L2
CO2	Apply SQL for various database operations	**Apply**	L3
CO3	Analyze database design with normalization, Concurrency control and transaction management	**Analyze**	L4
CO4	Design database applications and relate the concepts of transaction, concurrency control and recovery in database	**Evaluate**	L5
CO5	Develop a Relational data model for a given problem	**Create**	L6

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	_	_	_	_	_	_	_	_	_	_
CO2	3	_	2	_	_	_	_	_	3	_
CO3	_	-	_	3	_	_	_	_	_	3

CO4	_	_	3	_	3	_	_	_	_	_
CO5	_	_	_	3	_	_	_	_	_	_

Weblinks and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=3EJlovevfcA
2	https://www.youtube.com/watch?v=9TwMRs3qTcU
3	https://www.youtube.com/watch?v=ZWl0Xow304I
4	https://www.youtube.com/watch?v=4YilEjkNPrQ
5	https://www.youtube.com/watch?v=CZTkgMoqVss
6	https://www.youtube.com/watch?v=Hl4NZB1XR9c

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	**Theory**			**Practical**
	Continuous Assessment Tests		**Alternative Assessment Tool (AAT)**	**Test**
	Test-1	**Test-2**		
	50 Marks	**50 Marks**	**20 Marks**	**50 Marks**
Remember	**20**	**10**	**-**	**-**
Understand	**20**	**-**	**-**	**-**
Apply	**-**	**10**	**-**	**10**
Analyse	**10**	**30**	**-**	**20**
Evaluate	**-**	**-**	**10**	**20**

Create	-	-	10	-

CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage
	Test-1			Test-2			
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	3	2	5	5	5	20	20%
CO2	10	10	5	5	10	40	40%
CO3	10	10	5	5	10	40	40%
CO4	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-
Total	33	22	15	15	25	100	100

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	10
Understand	10
Apply	20
Analyse	10
Evaluate	-
Create	-

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	15	5	10	10	20	60	35%
CO2	10	10	-	-	-	20	12%
CO3	20	10	20	20	20	90	53%
CO4	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-
Total	45	25	30	30	40	170	100%

PROFESSIONAL ELECTIVE COURSE (PEC)

PEC Course - Professional Elective Course

Teaching Hours/Week (L: T:P: S)	3:0:0:0
Total Hours of Pedagogy	40 hours
Credits:	03
Each Module	8 Hrs
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Theory

3 Credit Course – Professional Elective Course (PEC)

Assessment Details (both CIE and SEE)

- 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 20% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 40% of the maximum marks (25 out of 50 marks).
- A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Internal Assessment Test (IAT):

- For the Internal Assessment Test component of CIE, there are 25 marks and for Assignment component of the CIE, there are 25 marks. Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 25 marks
  - The first test will be administered after 40-50% of the syllabus has been covered, and
  - The second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.
- Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels

Semester-End Examination:

Theory SEE will be conducted as per the scheduled timetable (duration 03 hours).

- 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 students have to answer 5 full questions, selecting one full question from each module.
- Marks scored shall be proportionally reduced to 50 marks.

Continuous and Comprehensive Assessment (CCA):

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **10 Marks**.

- CCA1 after 4th week and CCA2 after 9th week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
    - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
    - The evaluation of review 1 after 6th weeks of semester and review 2 after 12th week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **25 Marks**

Possible Continuous and Comprehensive Assessment (CCA):

- Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom,
- The assessment of these techniques shall be in rubrics.
- The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

Professional Core Course (PCC) – 3 Credit course – Theory

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
Total CIE Theory + Practical				**50**	----	----	**20**	
	Theory	Internal Assessment Test (IAT) - II	Module – 1 to 2.5	50	(50+50) / 2	**25**	10	Average of Two Internal test each of 50 Marks scale down the marks to 25
		Internal Assessment Test (IAT) - II	Module – 2.5 to 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives / Activity Based learning	Considering all the Modules	50	(50+50) / 2	**25**	10	Two CCA methods to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives / Activity Based learning		50				
	Total CIE Theory					**50**	20	Total Marks of IAT and CCA is 50

SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
			CIE + SEE	100	----	----	40	

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**II**				
Course Title	:	**Data Mining & Business Intelligence**				
Course Code	:	**23MCA251**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PEC**				
Stream	:	**MCA**		**CIE**	:	**50 Marks**
Credits (L: T:P:PJ)	:	**2:1:0:0**		**SEE**	:	**50 Marks**
Total Hours	:	**40 Hrs**		**SEE Duration**	:	**3 Hours**

Course Learning Objectives: Students will be taught

Sl.No	Course Objectives
1	Understand the concepts of data warehouse, Business Intelligence, and OLAP
2	Learn data pre-processing techniques and applications of association rule mining algorithms
3	Understand data mining for various business intelligence applications for the given problem
4	Learn the various data structures in R Programming
5	To know the classification and regression techniques for the given problem

Teaching-Learning Process

Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) 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 students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyse information rather than simply recall it.
6. Topics will be introduced in multiple 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 improve the students' understanding.

9. Individual teachers can device innovative pedagogy to improve teaching-learning.

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Scheme of Teaching and Examinations for MCA Programme -2023-24
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2023-24)

COURSE SYLLABUS

Module No.	Contents of the Module	Hours
1	**Overview and concepts Data Warehousing and Business Intelligence** Why reporting and Analysing data, Raw data to valuable information-Lifecycle of Data - What is Business Intelligence - BI and DW in today's perspective - What is data warehousing - The building Blocks: Defining Features - Data warehouses and data 1marts - Overview of the components - Metadata in the data warehouse - Need for data warehousing - Basic elements of data warehousing - trends in data warehousing. The Architecture of BI and DW BI and DW architectures and its types - Relation between BI and DW - OLAP (Online analytical processing) definitions - Difference between OLAP and OLTP - Dimensional analysis - What are cubes? Drill-down and roll-up - slice and dice or rotation - OLAP models - ROLAP versus MOLAP - defining schemas: Stars, snowflakes and fact constellations	8
Pedagogy	**Open Source Tool Demonstration**	
2	**Introduction to data mining and Association Rule Mining:** Motivation for Data Mining - Data Mining-Definition and Functionalities – Classification of DM Systems - DM task primitives - Integration of a Data Mining system with a Database or a Data Warehouse - Issues in DM – KDD Process .Data Pre-processing: Why to pre-process data? - Data cleaning: Missing Values, Noisy Data - Data Integration and transformation - Data Reduction: Data cube aggregation, Dimensionality reduction **Association Rule Mining**: Market basket analysis - basic concepts - Finding frequent item sets: Apriori algorithm - generating rules – Improved Apriori algorithm – Incremental ARM – Associative Classification – Rule Mining.	8
Pedagogy	**Problem Solving, Demonstration**	
3	**Classification and prediction**: What is classification and prediction? – Issues regarding Classification and prediction: Classification methods: Decision tree, Bayesian Classification, Rule based, CART, Neural Network Prediction methods: Linear and nonlinear regression, Logistic Regression. Introduction of tools such as DB Miner /WEKA/DTREG DM Tools	8

Pedagogy	**Problem Solving, Demonstration**	
4	Introduction to R Programming Introduction to R, R Data Structures, Vectors, Scalars, Matrices, Arrays and List, Control Statements, Creation of Data frames, Factors and Tables	**8**
Pedagogy	**Demonstration**	
5	Data Mining for Business Intelligence Applications: Data mining for business Applications like Balanced Scorecard, Fraud Detection, Clickstream Mining, Market Segmentation, retail industry, telecommunications industry, banking & finance and CRM etc., Data Analytics Life Cycle: Introduction to Big data Business Analytics - State of the practice in analytics role of data scientists Key roles for successful analytic project - Main phases of life cycle - Developing core deliverables for stakeholders.	**8**
Pedagogy	**Case Study**	

Reference Books	
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)	
1	J. Han, M. Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann
2	M. Kantardzic, "Data mining: Concepts, models, methods and algorithms, John Wiley &Sons Inc.
3	PaulrajPonnian, "Data Warehousing Fundamentals", John Wille
4	M. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education.
5	Norman Mat off, "The Art of R Programming: A Tour of Statistical Software Design", No Starch Press, 2011.

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	Level Indicator
CO1	**Understand** data pre-processing techniques and application of association rule mining algorithms	**Remember** **Understand**	L1/L2
CO2	**Apply** various classification algorithms ,regression techniques and evaluation of classifiers for the given problem	**Apply**	L3
CO3	**Analyse** the concept of data warehouse, Business Intelligence and OLAP	**Analyse**	L4
CO4	**Design** the various Business Intelligence Applications using R Programming	**Evaluate**	L5

CO5	**Implement** the various Business Intelligence Applications using R Programming	**Create**	L6

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CO2		2	-	–	–	–	–	–	–	–	–	–	3	–
CO3	–	-	–	3	–	–	–	–	–	–	–	–	–	3
CO4	–	–	3	–	3	–	–	–	–	-	–	–	–	–
CO5	–	–	–	–	3	–	–	–	–	–	–	–	3	3

Weblinks and Video Lectures (e-Resources)	
1	**https://onlinecourses.nptel.ac.in/noc21_cs06/preview**
2	**https://www.geeksforgeeks.org/data-mining/**
3	**https://www.ibm.com/topics/data-mining**

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	**Theory**			
	Continuous Assessment Tests			**Alternative Assessment Tool (AAT)**
	Test-1	**Test-2**	**Test-3**	
	50 Marks	**50 Marks**	**50 Marks**	**40**
Remember	**10**	**10**	**20**	**-**
Understand	**10**	**10**	**10**	**-**
Apply	**20**	**20**	**10**	**-**

Analyse	10	10	10	-
Evaluate	-	-	-	20
Create	-	-	-	20

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2		Test- 3		
	Module-1	Module-2		Module-3	Module-4	Module-5		
CO1	1	1	1	1	1	1	10	20%
CO2	2	2	2	2	2	2	20	40%
CO3	2	2	2	2	2	2	20	40%
CO4	-	-		-	-	-	-	-
CO5	-	-		-	-	-	-	-
Total	-	-		-	-	-	50	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	10
Understand	10
Apply	10
Analyse	20
Evaluate	-
Create	-

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	10	10	10	10	10	50	33%
CO2	20	-	10	-	10	40	27%
CO3	10	10	10	-	10	40	27%
CO4	-	10	-	10	-	20	13%
Total	50	20	30	20	30	150	100%

Dayananda Sagar Academy of Technology & Management
(Autonomous Institute under VTU)

Semester	:	**II**				
Course Title	:	**User Interface Design**				
Course Code	:	**23MCA252**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PEC**				
Stream	:	**MCA**		**CIE**	:	**50 Marks**
Credits (L: T:P:PJ)	:	**2:1:0:0**		**SEE**	:	**50 Marks**
Total Hours	:	**40 Hrs**		**SEE Duration**	:	**3 Hours**

Course Learning Objectives: Students will be taught

Sl.No	Course Objectives
1	Know the key terms related to user interfaces and user interface design and implementation.
2	Identify various types of computer users and design contexts.
3	Gain knowledge about interface design process
4	Learn about Direct Manipulation and Virtual Environment.
5	Understand command, natural languages and issues in design for maintaining QoS.

Teaching-Learning Process

Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) 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 students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple 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 improve the students' understanding.

9. Individual teachers can device innovative pedagogy to improve teaching-learning.

DSATM

Scheme of Teaching and Examinations for MCA Programme -2023-24
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2023-24)

COURSE SYLLABUS

Module No.	Contents of the Module	Hours
1	Introduction: Usability of Interactive Systems: Introduction, Usability Goals and Measures, Usability Motivation, Universal Usability, Goals for our profession. Guideline, principles, and theories: Introduction, Guidelines, principles, Theories.	8
Pedagogy	**Hands on session**	
2	Development Processes: Managing Design Processes: Introduction, Organizational Design to support Usability, The Four Pillars of Design, Development methodologies: Ethnographic Observation, Participatory Design, Scenario Development, Social Impact statement for Early Design Review, Legal Issues	8
Pedagogy	**Hands on session**	
3	Evaluating Interface: Design Introduction, Expert Reviews, Usability Testing and Laboratories, Survey Instruments, Acceptance tests, Evaluation during Active Use, Controlled Psychologically Oriented Experiments	8
Pedagogy	**Hands on session**	
4	Direct Manipulation and Virtual Environments: Introduction, Examples of Direct Manipulation, Discussion of direct manipulation, 3D Interfaces, Tele-operation, Virtual and Augmented Reality Menu Selection, Form Filling and Dialog Boxes: Introduction, Task-Related Menu Organization, Single Menus, Combination of Multiple Menus, Content Organization, Fast Movement Through Menus, Data Entry With Menus, Form Filling, Dialog Boxes and Alternatives, Audio Menus and Menus for Small Displays	8
Pedagogy	**Hands on session**	
5	UI/ UX Design Tools User Study- Interviews, writing personas: user and device personas, User Context, Building	8

	Low Fidelity Wireframe and High-Fidelity Polished Wireframe Using wire framing Tools, Creating the working Prototype using Prototyping tools, Sharing and Exporting Design.	
Pedagogy	**Tools Explore**	

Reference Books	
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)	
1	**Ben shneiderman-Designing the uer interface 4 th Edition.**
2	**Lean UX:Applying lean principles to improve user experience**

Youtube links	
1	**https://www.youtube.com/watch?v=pIUC337qMfs**
2	**https://www.youtube.com/watch?v=0aGZ0Fft63g**

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Understand the new technologies that provide interactive devices and interfaces Direct Manipulation and Virtual Environment	**L1**	**Remember**
CO2	Apply the guidelines to develop the UID and evaluate for the given problem.	**L2**	**Apply**
CO3	Analyse methodologies with an analysis of the social impact and legal issues.	**L3**	**Analyse**
CO4	Implements the command, natural languages and issues in design for maintaining QoS.	**L4**	**Demonstrate**
CO5	Demonstrate techniques for information search and visualization for the given problem.	**L5**	**Evaluate**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	2	-	1	-	-	-	-	-	-	-	3	3
CO5	-	-	-	-	-	-	3	-	-	2	1	-	3	3

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			
	Continuous Assessment Tests			Alternative Assessment Tool (AAT)
	Test-1	Test-2	Test-3	
	50 Marks	50 Marks	50 Marks	40 Marks
Remember	10	5	-	-
Understand	-	5	-	-
Apply	20	10	30	-
Analyse	20	30	20	-
Evaluate	-	-	-	20
Create	-	-	-	20

CIE Course Assessment Plan

	Marks Distribution		

CO's	Test-1		Test-2		Test-3	Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	1	1	1	1	1	10	20%
CO2	2	2	2	2	2	40	40%
CO3	2	2	2	2	2	40	40%
CO4	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-
Total	-	-	-	-	-	50	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	5
Understand	5
Apply	20
Analyse	20
Evaluate	-
Create	-

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		

CO1	5	10	10	10	5	40	20%
CO2	20	20	20	20	20	80	40%
CO3	20	20	20	20	20	80	40%
CO4	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-
Total	-	-	-	-	-	200	100%

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	II				
Course Title	:	Advanced Java Programming				
Course Code	:	23MCA261				
Course Type (Theory/ Practical/ Integrated)	:	Theory				
Category	:	PEC				
Stream	:	MCA		CIE	:	50 Marks
Credits (L: T:P:PJ)	:	2:1:0:0		SEE	:	50 Marks
Total Hours	:	40 Hrs		SEE Duration	:	3 Hours

Course Learning Objectives: Students will be taught

Sl.No	Course Objectives
1	Understand basic concepts of .NET Framework
2	Know the knowledge of Object Oriented Programming
3	To impart knowledge of Database Connection
4	Apply the knowledge of Graphical User Interface with Windows forms

Teaching-Learning Process

Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) 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 students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple 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 improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.

DSATM

Scheme of Teaching and Examinations for MCA Programme -2023-24
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2023-24)

COURSE SYLLABUS

Module No.	Contents of the Module	Hours
1	Enumerations, Autoboxing and Annotations(metadata): Enumerations, Enumeration fundamentals, the values() and valueOf() Methods, java enumerations are class types, enumerations Inherits Enum, example, type wrappers, Autoboxing, Autoboxing and Methods, Autoboxing/Unboxing occurs in Expressions, Autoboxing/Unboxing, Boolean and character values, Autoboxing/Unboxing helps prevent errors, A word of Warning. Annotations, Annotation basics, specifying retention policy, Obtaining Annotations at run time by use of reflection, Annotated element Interface, Using Default values, Marker Annotations, Single Member annotations, Built-In annotations	8
Pedagogy	**Project based Learning -** Quiz	

2	The collections and Framework: Collections Overview, Recent Changes to Collections, The Collection Interfaces, The Collection Classes, Accessing a collection Via an Iterator, Storing User Defined Classes in Collections, The Random Access Interface, Working With Maps, Comparators, The Collection Algorithms, Why Generic Collections?, The legacy Classes and Interfaces, Parting Thoughts on Collections.	8
Pedagogy	**Coding and Debugging**	
3	String Handling : The String Constructors, String Length, Special String Operations, String Literals, String Concatenation, String Concatenation with Other Data Types, String Conversion and toString( ) Character Extraction, charAt( ), getChars( ), getBytes( ) toCharArray(), String Comparison, equals( ) and equalsIgnoreCase( ), regionMatches( ) startsWith( ) and endsWith( ), equals( ) Versus == , compareTo( ) Searching Strings, Modifying a String, substring( ), concat( ), replace( ), trim( ), Data Conversion Using valueOf( ), Changing the Case of Characters Within a String, Additional String Methods, StringBuffer , StringBuffer Constructors, length( ) and capacity( ), ensureCapacity( ), setLength( ), charAt( ) and setCharAt( ), getChars( ),append( ), insert( ), reverse( ), delete( ) and deleteCharAt( ), replace( ), substring( ), Additional StringBuffer Methods, StringBuilder	8
Pedagogy	**Hunt the code**	
4	Background: The Life Cycle of a Servlet; Using Tomcat for Servlet Development; A simple Servlet; The Servlet API; The Javax.servlet Package; Reading Servlet Parameter; The,. Javax.servlet.http package; Handling HTTP Requests and Responses; Using Cookies; Session Tracking. Java Server Pages (JSP): JSP, JSP Tags, Tomcat, Request String, User Sessions, Cookies, Session Objects Text Book 1: Ch 31	8
Pedagogy	**Hands-on Session**	
5	The Concept of JDBC; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Associating the JDBC/ODBC Bridge with the Database; Statement Objects; ResultSet; Transaction Processing; Metadata, Data types; Exceptions.	8
Pedagogy	**Hackathon**	

Reference Books	
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)	
1	Herbert Schildt: JAVA the Complete Reference, 7th/9th Edition, Tata McGraw Hill, 2007.
2	Jim Keogh: J2EE-TheCompleteReference, McGraw Hill, 2007.

3	Y. Daniel Liang: Introduction to JAVA Programming, 7thEdition, Pearson Education, 2007.
4	Stephanie Bodoff et al: The J2EE Tutorial, 2nd Edition, Pearson Education,2004.

Weblinks and Video Lectures (e-Resources)	
1	**httpps://www.geeksforgeeks.org/what-is-advanced-java/**
2	**https://www.tutorialspoint.com/what-is-advanced-java**
3	**https://www.codecademy.com/learn/learn-advanced-java**

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	Level Indicator
CO1	**Understand** the concepts related to Java Technology	L1/L2	U/R
CO2	**Apply** and xplore use of Java Server Programming	L3	A
CO3	**Analyze** dynamic web pages, using Servlets and JSP	L4	AN
CO4	**Design and Develop** real time applications	L5	D
CO5	**Implement** advanced skills for programming in Java	L6	E

Mapping of Course Outcomes to Program Outcomes:

-	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	3	-
CO4	-	-	-	3	-	3	-	-	-	-	-	-	-	3
CO5	-	-	-	-	3	-	-	-	-	-	3	-	-	-

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			
	Continuous Assessment Tests			Alternative Assessment Tool (AAT)
	Test-1	Test-2	Test-3	
	50 Marks	50 Marks	50 Marks	40 Marks
Remember	5	-	10	-
Understand	5	10	-	-
Apply	20	20	20	-
Analyse	20	20	20	-
Evaluate	-	-	-	20
Create	-	-	-	20

CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage
	Test-1		Test-2		Test-3		
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	1	1	1	1	1	10	20%
CO2	2	2	2	2	2	20	40%
CO3	2	2	2	2	2	20	40%
CO4	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-
Total	-	-	-	-	-	50	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	5

Understand	5
Apply	20
Analyse	20
Evaluate	-
Create	-

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	5	10	10	10	5	40	20%
CO2	20	20	20	20	20	80	40%
CO3	20	20	20	20	20	80	40%
CO4	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-
Total	-	-	-	-	-	200	100%

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**II**				
Course Title	:	**Mobile Application Development**				
Course Code	:	**23MCA262**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PEC**				
Stream	:	**MCA**		**CIE**	:	**50 Marks**
Credits (L: T:P:PJ)	:	**2:1:0:0**		**SEE**	:	**50 Marks**
Total Hours	:	**40 Hrs**		**SEE Duration**	:	**3 Hours**

Course Learning Objectives: Students will be taught

Sl.No	Course Objectives
1	To Comprehend the basics of internet and Android technologies
2	To introduce GUI concepts for developing User interface applications
3	To know the usefulness of Geographical conditions
4	Familiar with Android studio
5	Learn how to Build interactive Mobile applications using Android studio

Teaching-Learning Process

Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) 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 students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple 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 improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.

DSATM

Scheme of Teaching and Examinations for MCA Programme -2023-24
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2023-24)

COURSE SYLLABUS

Module No.	Contents of the Module	Hours
1	Introduction to mobile communication and computing: Introduction to mobile computing, Novel applications, limitations and GSM architecture, Mobile services, System architecture, Radio interface, protocols, Handover and security. Smart phone operating systems and smart phones applications. Basic graphical primitives.	8
Pedagogy	**Project based Learning -** Basic graphical primitives.	
2	Fundamentals of Android Development: Introduction to Android., The Android Jelly Bean SDK, Understanding the Android Software Stack, Installing the Android SDK, Creating	8

	Android Virtual Devices, Creating the First Android Project, Using the Text View Control, Using the Android Emulator. Develop a Simple Android Application that uses GUI components, Font and Colors.	
Pedagogy	**Project based Learning**	
3	The Intent of Android Development, Four kinds of Android Components: Activity, Service, Broadcast Receiver and Content Provider. Building Blocks for Android Application Design, Laying Out Controls in Containers. Graphics and Animation: Drawing graphics in Android, Creating Animation with Android"s Graphics API. Develop an application that makes use of Notification Manager Develop an application that uses Layout Managers and event listeners.	8
Pedagogy	**Project based Learning**	
4	Creating the Activity, working with views: Exploring common views, using a list view, creating custom views, understanding layout. Using Selection Widgets and Debugging Displaying and Fetching Information Using Dialogs and Fragments. Multimedia: Playing Audio, Playing Video and Capturing Media. Advanced Android Programming: Internet, Entertainment, and Services. Develop a native application that uses GPS location information	8
Pedagogy	**Project based Learning**	
5	Displaying web pages and maps, communicating with SMS and emails. Creating and using content providers: Creating and consuming services, publishing android applications Implement an application that creates an alert upon receiving a message	8
Pedagogy	**Project based Learning**	

Reference Books	
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)	
1	Mobile Computing: (technologies and Applications N. N. Jani S chand
2	Android programming B.M.Hirwani Pearson publications 2013
3	Android in Action W. Frank Ableson, RobiSen and C. E. Ortiz DreamTech Publisher Third Edition-2012
4	Android Application development James C. Sheusi Cengage learning 2017

Weblinks and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=fis26HvvDII
2	2. https://www.youtube.com/user/androiddevelopers
3	3. https://www.youtube.com/watch?v=jtK3RYjEH2I

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Understand the requirements fundamentals and challenges for mobile applications development using GSM	L1/L2	U/R
CO2	Apply the Android Fundamentals in Android studio for Animations,Drawings,widges,Graphics	L3	A
CO3	Analyze the Android widgets & Implement the design using Android SDK, Objective C and iOS	L4	AN
CO4	Develop design for mobile applications for specific requirements	L5	D
CO5	Deploy mobile applications in Android and iPhone marketplace for distribution	L6	E

Mapping of Course Outcomes to Program Outcomes:

-	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-		-
CO3	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	3	-	-	-	-	-	-	-	3	2
CO5	-	-	-	-	-	-	3	-	-	3	3	-	2	3

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category		Theory	
	Continuous Assessment Tests		
	Test-1	Test-2	Test-3

				Alternative Assessment Tool (AAT)
	50 Marks	50 Marks	50 Marks	40 Marks
Remember	5	-	10	-
Understand	5	10	-	-
Apply	20	20	20	-
Analyse	20	20	20	-
Evaluate	-	-	-	20
Create	-	-	-	20

CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage
	Test-1		Test-2		Test-3		
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	1	1	1	1	1	10	20%
CO2	2	2	2	2	2	20	40%
CO3	2	2	2	2	2	20	40%
CO4	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-
Total	-	-	-	-	-	50	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	5
Understand	5

Apply	20
Analyse	20
Evaluate	-
Create	-

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	5	10	10	10	5	40	20%
CO2	20	20	20	20	20	80	40%
CO3	20	20	20	20	20	80	40%
CO4	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-
Total	-	-	-	-	-	200	100%

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	II				
Course Title	:	Data Analytics using Python Lab				
Course Code	:	23MCAL27				
Course Type (Theory/ Practical/ Integrated)	:	Practical				
Category	:	PCCL				
Stream	:	MCA		CIE	:	50 Marks

Credits (L: T:P:PJ)	**:**	**0:0:2:0**		**SEE**	**:**	**50 Marks**
Total Hours	**:**	**30 Hrs**		**SEE Duration**	**:**	**3 Hours**

Course Learning Objectives: Students will be taught

Sl.No	Course Objectives
1	Learn the basic concepts of Python Programming
2	Understand the Python Collection objects and Object Oriented Programming
3	To know the concepts of Numpy and Pandas
4	Learn about the data visualization using various plots

Teaching-Learning Process Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) 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 students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple 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 improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.

DSATM

Scheme of Teaching and Examinations for BE Programme -2023-24
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2023-24)

List of Programs

Sl.No	Experiments/Programs	COs
1	Write a Python Program to perform Arithmetic operations on List.	CO2
2	Write a Python Program to sort words in a sentence in alphabetical Order.	CO1
3	Write a Python Program to perform the MaxMin operation (using function) on a list of numbers.	CO1
4	Write a Python Program to generate a random number within a given range and store in a list	CO1
5	Write a Python program to perform Linear search	CO1
6	Write a python program using object-oriented programming to demonstrate encapsulation, overloading and inheritance	CO1
7	Implement a python program to demonstrate the following using NumPy a) Array manipulation, Searching, Sorting and splitting. b) broadcasting and Plotting NumPy arrays	CO2

8	Implement a python program to demonstrate Data visualization with various Types of Graphs using Numpy and Seaborn	**CO3**
9	Develop a Python Program for basic plots using Matplotlib	**CO3**
10	Write a Python Program to demonstrate the concepts of Pandas	**CO3**

Reference Books	
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)	
1	Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition,Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/thinkpython/)
2	Mark Lutz, "Programming Python", O'Reilly Media, 4th edition, 2010.
3	Jake Vander plas, "Python Data Science Handbook: Essential tools for working with data", O'Reilly Publishers, I Edition.
4	Wes Mc Kinney, "Python for Data Analysis", O'Reilly Media, 2012Mark Lutz, "Programming Python", O'Reilly Media, 4th edition, 2010.
5	Tim Hall and J-P Stacey, "Python 3 for Absolute Beginners", Apress, 1st edition, 2009.

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Understand the basic concepts of Python Programming.	**Understand**	**L1,L2**
CO2	Apply the concepts of Python collections and Object Oriented Programming for solving the given problem	**Apply**	**L3**
CO3	Analyse the essential operations using Numpy, Pandas and Data Visualization	**Analyze**	**L4**
CO4	Design the applications using Python Programming concepts	**Design**	**L5**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	2	-

CO2	3	-	-	-	-	-	-	-	-	-	-	-	2	-
CO3	-	3	-	-	-	-	-	-	-	-	2	-	2	-
CO4	-	-	2		-	-	-	2	-	-	-	-	-	2

Weblinks and Video Lectures (e-Resources)	
1	www.geeksforgeeks.org/python programming
2	https://www.youtube.com/watch?v=eWRfhZUzrAc
3	https://www.youtube.com/watch?v=kWEbNBXc2-Y
4	https://archive.nptel.ac.in/courses/106/106/106106182/

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	**:**	**II**				
Course Title	**:**	**Cloud Computing Lab**				
Course Code	**:**	**23MCAL28**				
Course Type **(Theory/ Practical/ Integrated)**	**:**	**Practical**				
Category	**:**	**PCCL**				
Stream	**:**	**MCA**		**CIE**	**:**	**50 Marks**
Credits (L: T:P:PJ)	**:**	**0:0:2:0**		**SEE**	**:**	**50 Marks**
Total Hours	**:**	**30 Hrs**		**SEE Duration**	**:**	**3 Hours**

Course Learning Objectives: Students will be taught

Sl.No	Course Objectives
1	Understand the basic concepts of Cloud computing
2	Describe the differences between public, private, hybrid, and community cloud models
3	Learn the basics of virtualization and its role in cloud computing.
4	Learn to monitor, optimize, and troubleshoot cloud infrastructure and services using AWS

Teaching-Learning Process

Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) 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 students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple 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 improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.

DSATM

Scheme of Teaching and Examinations for MCA Programme -2023-24
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2023-24)

List of Experiments and Programs using AWS.

Sl.No	Experiments/Programs	COs
1	Set up an AWS EC2 Instance with Linux and Windows operating systems.	CO1
2	Establish and link an EBS Volume to a Linux installation.	CO4
3	Generate a snapshot of an existing EBS instance.	CO4
4	Conduct an experiment to configure and implement Route 53	CO4
5	Conduct an experiment to establish an environment with automatic scaling	CO1
6	Create a Virtual Private Cloud (VPC) using AWS	CO5
7	Explore the functionalities of Cloud Watch	CO4
8	Host a basic website using an EC2 Instance.	CO5

9	Create S3 Bucket and assign a custom policy	**CO5**
10	Demonstrate data replication across regions using S3 Services in an experiment.	**CO4**

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Understand the basic concepts and principles of automatic scaling in AWS cloud environments	L1,L2	**Understand**
CO2	Apply the knowledge of EBS volumes to configure and link them effectively in a Linux environment	L3	**Apply**
CO3	Analyse and optimize a VPC design to meet security and connectivity requirements in AWS	L4	**Analyse**
CO4	Develop a disaster recovery plan using snapshots and EBS volumes.	L5	**Evaluate**
CO5	Create a VPC from scratch, considering security, subnets, and network connectivity in AWS.	L6	**Create**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	2	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	2	-
CO3	-	3	-	-	-	-	-	-	-	-	2	-	2	-
CO4	-	-	2		-	-	-	2	-	-	-	-	-	2

Weblinks and Video Lectures (e-Resources)	
1	**https://www.geeksforgeeks.org/cloud-computing/**
2	**https://www.w3schools.in/cloud-computing**

3	https://onlinecourses.nptel.ac.in/noc21_cs14/preview